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Volume 9 Number 4 November 2006

Australasian Society for Ultrasound in Medicine

ULTRASOUND BULLETIN

ASUM Multidisciplinary Workshop 2007
Gold Coast 28 February–4 March 2007

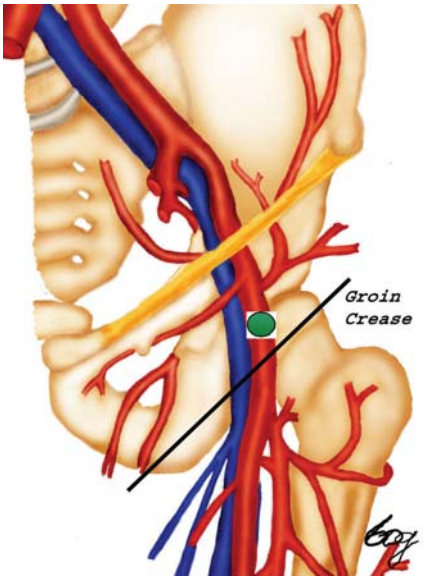
Nuchal Translucency Course
Gold Coast 2 March 2007

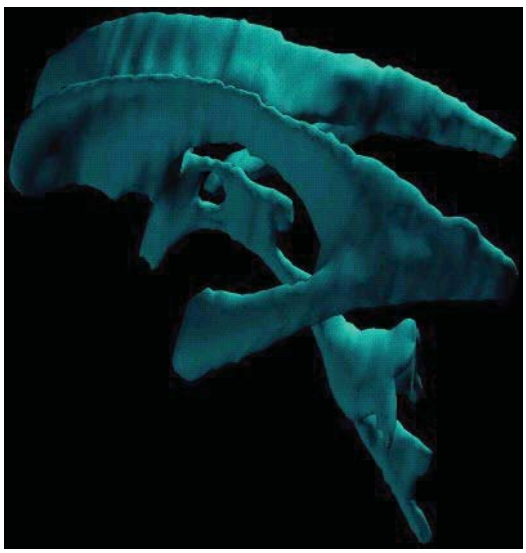
Fetal Echocardiography Symposium
Gold Coast 3–4 March 2007

DDU / DMU Preparation Courses
Gold Coast 28 February–4 March 2007

ASUM (NZ) and RANZCR (NZ) Scientific Meeting
Wellington New Zealand 19–22 July 2007

ASUM Annual Scientific Meeting 2007
Cairns 13–16 September 2007





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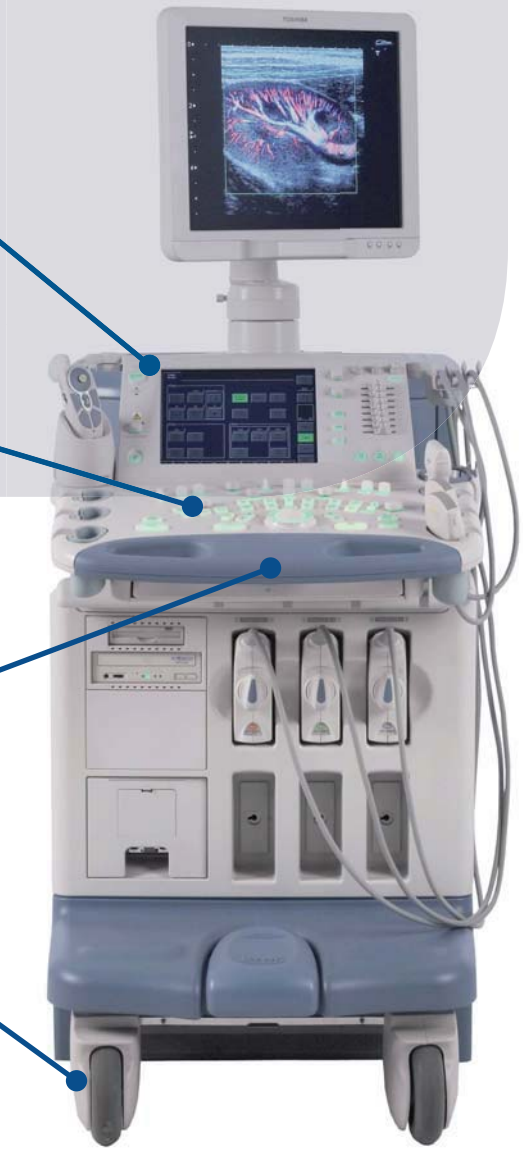

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ULTRASOUND BULLETIN

ASUM Ultrasound Bulletin November 9: 4

Notes from the Editor

Another year is almost past. The *Ultrasound Bulletin* has continued to broaden its educational, scientific and related articles from across Australia New Zealand and Asia over recent years. This issue also contains a number of articles of excellent scientific value, maintaining the educational standard of the journal.

Evidence-based medicine principles are used very effectively in the article by McLennan *et al.* on *Reassessment of lateral cerebral ventricle measurement*. Readers are urged to read this article and apply the use of evidence-based principles in other similar areas of ultrasound practice.

Baxter and Dodd have described with great lucidity the role of ultrasound in brachytherapy of the prostate, an area where many readers will share with the Editor a 'black hole' of knowledge.

A comprehensive description of Hepatitis B and the role of ultrasound has been submitted by Alan Williams, while a clear and detailed description of evaluation of the arterial system of the lower extremities has been provided by Deb Coghlan.

This issue also includes the first part of the abstracts from ASUM Annual Scientific Meeting (ASM) 2006 held in Melbourne, for the assistance of members who were unable to attend. The pre-eminent position of ASUM in providing educational meetings in Australasia is very clear from these scientific submissions. A key scientific and educational activity of ASUM is the ASM. All ASUM members are urged to set time aside in their continuing educational activity program to attend ASM 2007 and start planning for WFUMB 2009 to be held in Sydney. WFUMB will never be more accessible for Australian and New Zealand members.

Finally, I wish all ASUM members best wishes for the festive season, and farewell as Editor. As Scientific Convenor for WFUMB 2009, I will with some regret pass on the role of Editor to another ASUM member. Please contact the ASUM office if you wish to be considered for this position.

Roger Davies
Ultrasound Bulletin Editor

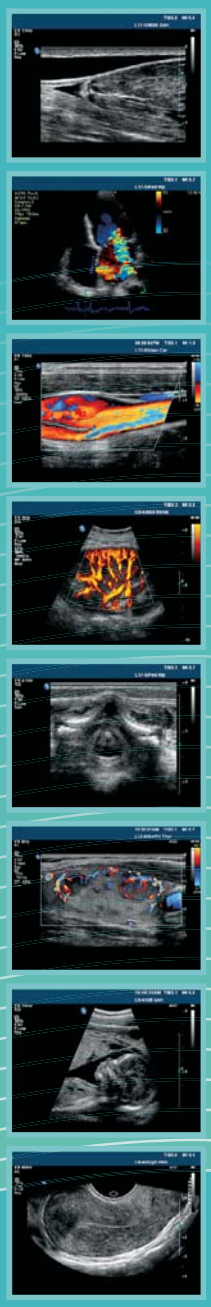
2007

Promoting Excellence in Ultrasound

Multidisciplinary Ultrasound Workshop

Australasian Society for Ultrasound in Medicine (ASUM)

28 February – 4 March 2007



Convenors

Glenn McNally
Deb Coghlan
Margaret Condon
Jane Fonda
Andrew Ngu

- Fetal Echocardiography Symposium
- Musculoskeletal
- Cardiac
- Vascular
- Abdominal
- Paediatric
- Small Parts
- Obstetrics & Gynaecology

Pre & Post Workshop Meetings

DDU Technical Seminars	28 February – 1 March
DMU Preparation Courses	28 February – 4 March
Nuchal Translucency Course	2 March

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Multidisciplinary Workshop Program

The program is subject to change at any time without notice. Please visit the website for information.

**Please indicate on your registration form which concurrent session you will be attending.*

Wednesday 28 February

	DMU / DDU 9.00am – 5.00pm
Session 1	DMU Preparation Course – *Physics and DDU Technical Seminar*
Session 2	
Session 3	
Session 4	

Thursday 1 March

	DMU / DDU 9.00am – 5.00pm
Session 1	DMU Preparation Course – *Physics and DDU Technical Seminar*
Session 2	
Session 3	
Session 4	

Friday 2 March

	Obstetrics: Nuchal Translucency 8.30am – 5.00pm	General 9.00am – 5.00pm				Vascular 9.00am – 5.00pm				DMU 9.00am – 5.00pm		
Session 1	Introduction / MCQ Principles of Screening Practicalities of NT Measurement	Workshop 1 **Breast**	Workshop 2 **Abdomen**	Workshop 3 **Thyroid**	Workshop 4 **Musculo-skeletal**	**Clinical Aspects of Carotid Disease** – *Philip Walker* **Evolution of and Recommendations for Duplex Criteria to Access ICA** – *Murray Org* **Pre & Post Stent Duplex Evaluation in Management of Carotid Stenosis** – *Rhyan Priestley* **Panel Discussion**				**DMU Preparation Course** – *Vascular Stream*	**DMU Preparation Course** – *Cardiac Stream*	**DMU Preparation Course** – *General & Obstetric Stream*
Session 2	NT & Chromosone Abnormality Biochemical Screening 12 week Anomaly Scan	**Getting a Good Look at Breasts** *Dr Wes Cormick*				Workshop 1 **ICA Stenosis**	Workshop 2 **Carotid Stent**	Workshop 3 **Upper Limb Arteries**	Workshop 4 **Normal Carotid**			
Session 3	Screening and Multiple Pregnancy Invasive Prenantal Testing Counselling Issues	Workshop 5 **Breast**	Workshop 6 **Abdomen**	Workshop 7 **Thyroid**	Workshop 8 **Musculo-skeletal**	**Clinical Aspects of Arterial Disease & Defining Appropriate Intervention** – *Philip Walker* **Surgical Aspects of Arterial Bypass Grafting** – *John Bringley* **Lower Extremity Stent & Graft Surveillance** – *Dennis Nelson* **Panel Discussion**						
Session 4	Increased NT and Normal Chromosomes MCQ Finish / Discussion	**A Close Up Look at Tendons, Entheses and Joints** *Dr Wes Cormick*				Workshop 5 **Lower leg Arteries**	Workshop 6 **Dypass Graft**	Workshop 7 **ABI's**	Workshop 8 **TOS**			

Saturday 3 March

	Obstetrics: Fetal Echocardiography Symposium 9.00am – 5.00pm	General 9.00am – 5.00pm				Vascular 9.00am – 5.00pm				DMU 9.00am – 5.00pm		
Session 1	**Set-up for Fetal Echo** – *Boris Tutschek* **Indications to Fetal Echo** – *Boris Tutschek* **Normal 4-chamber View: How to Assess it** – *Boris Tutschek*	Workshop 9	Workshop 10	Workshop 11	Workshop 12 **Musculoskeletal**	**Repair AAA by Surgical & Endovascular Methods** – *Tim McGahan* **Duplex assessment Aortic Endografts & Complications** – *Deb Coghlan* **Use of Renal Duplex Scanning in Selection of Patient's for Interention** – *Harry Gibbs* **Panel Discussion**				**DMU Preparation Course** – *Vascular Stream*	**DMU Preparation Course** – *Cardiac Stream*	**DMU Preparation Course** – *General & Obstetric Stream*
Session 2	**AVSD and Septation Defects** – *Dario aladini* **Normal Outflow Tract Views: What to Check** – *Dario Paladini* **Discussions**	**Cutting Up the Liver** *Dr Wes Cormick* **Segmental Sectioning of the Liver for Surgery** *Prof David Morris*				Workshop 9 **Renal Arteries**	Workshop 10 **Mesenteric Imaging**	Workshop 11 **Aortic Stent Graft**	Workshop 12 **Aortolliac Imaging**			
Session 3	**Abnormal Outflow Tract 1 - General Framing** – *Dario Paladini* **Videoclips and Live Demostrations with Discussions** – *Dario Paladini & Boris Tutschek*	Workshop 13	Workshop 14	Workshop 15	Workshop 16 **Abdominal Scanning Workshop**	**Review of Venous Haemodynamics & Clinical Consequences** – *Tim McGahan* **Significance of Calf Vein Thrombosis** – *Dennis Nelson* **The Natural History of Upper Extremity DVT** – *Jonothan Stewart* **Panel Discussion** **Vascular Case Presentations**						
Session 4	**Videoclips and Live Demostrations with Discussions** – *Dario Paladini & Boris Tutschek*	**The Role of Ultrasound in Thyroid Disease** *Dr Wes Cormick* **Assessment of Pediatric Urogenital Abnormalities** *Dr Wes Cormick*				Workshop 13 **CVI**	Workshop 14 **DVT**	Workshop 15 **Upper Venous**	Workshop 16 **Upper Fistula**			

Sunday 4 March

	Obstetrics: Fetal Echocardiography Symposium 9.00am – 3.30pm	DMU 9.00am – 3.30pm		
Session 1	**Conotruncal Anomalies 1: DORV, CAT, TOF** – *Dario Paladini* **Conotruncal Anomalies 2: TAG and cTGA** – *Boris Tutschek* **The 3 Vessel View and the Detection of Ductus-dependency** – *Dario Paladini* **Discussion**	**DMU Preparation Course** – *Vascular Stream*	**DMU Preparation Course** – *Cardiac Stream*	**DMU Preparation Course** – *General & Obstetric Stream*
Session 2	**The Arch Anomalies: Coarctation, IAA, RAA and Abnormal Branching** – *Dario Paladini* **CHD & Extra-cardiac Anomalies** – *Boris Tutschek* **Discussion**			
Session 3	**Cardiac Failure** – *Boris Tutschek* **Management of the Fetus with CHD** – *Dario Paladini* **Videoclips and Live Demostrations** – *Dario Paladini & Boris Tutschek*			

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President's message

Dr Matthew Andrews

It is a great personal honour to be elected as the ASUM President for the next two years. I trust my term will be one of continued advancement for the Society and for the practice of medical ultrasound throughout Australia and New Zealand.

I am a general radiologist working in private practice. I have a special interest in ultrasound, having undertaken an Abdominal Imaging Fellowship, which was predominantly ultrasound, at University of California, Davis in the early 1990s. I became a member of ASUM shortly after my return to Melbourne and have been a member of the ASUM Council for the past six years.

Thanks David Rogers

I would like to pay tribute to my predecessor, David Rogers, who for the past two years has presided over a society that has gone from strength to strength. ASUM is providing an ever-widening range of local educational resources, including the Annual Scientific Meetings and Multidisciplinary Workshops and this *Ultrasound Bulletin,* which provide cutting edge, world-class ultrasound science and practical skills. In addition, the Diploma of Medical Ultrasound (DMU) and Diploma of Diagnostic Ultrasound (DDU) continue as highly regarded ultrasound practice qualifications. The Certificate of Clinician Performed Ultrasound (CCPU) has been launched and is set to expand as it is embraced by more clinician groups. The ASIA-Link Program, with its many facets, is raising the profile of ASUM, resulting in mutual benefits to ASUM's members and the many Asian societies with which we have formalised affiliations. The CADUCEUS liaison with Denmark and the BMUS (British Medical Ultrasound Society) Presidential Exchange programs have established ASUM's interaction with European Societies.

A strong future for the Society

Several years ago, I thought that ASUM's future was limited as the constituent member groups that utilise ultrasound seemed to be heading down a path of managing ultrasound issues, including education and training within their own disciplines. I am pleased to have been proved wrong, as ASUM's role in delivering all facets of medical ultrasound services has, in fact, expanded greatly. ASUM is unusual in that it is an imaging modality-based society, in contrast to most others, which are organ-system based. This provides one of ASUM's great strengths in that it draws its membership from a wide and ever-expanding range of backgrounds as ultrasound applications grow. The technological and scientific developments in ultrasound are inspiring new uses of ultrasound both on a referred and a clinician-performed basis. New scanning techniques are continually applied by sonologists and sonographers. In addition to its traditional constituency of sonologists, sonographers, scientists and trade, ASUM is now providing clinical ultrasound instruction to clinicians, such as accident and emergency physicians, surgeons of many subspecialties, obstetricians, gynaecologists and anaesthetists. These services are culminating in the ASUM College of Ultrasound Project, examining the feasibility of ASUM providing a dedicated ultrasound education institution.

The collaboration of so many different medical craft groups under the one society in conjunction with sonographers, scientists and trade representatives is unique. The team approach within the ASUM reflects the best standard of ultrasound service provided to patients and clinicians. Each constituent group provides its expertise to the combined end-product and ASUM is proud to be the umbrella bringing these groups together. On a personal level, ASUM membership provides a diverse forum in which to exchange ultrasound knowledge and enables individual member's insight and contact with a broad range of ultrasound practice. In my own case, the personal and professional friendships I have developed through ASUM have been of enormous benefit.

Challenges

ASUM's challenges over the next two years will include progression of the many activities mentioned above. In addition, major specific challenges will include:

The opening ceremony at the 36th ASM (l–r) Matthew Andrews, David Rogers and Andrew Ngu

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sense and simplicity

i) The World Federation of Ultrasound in Medicine and Biology (WFUMB) Meeting in Sydney in 2009 will be a major planning priority for the ASUM. I urge all members to take advantage of holding such a prestigious meeting in our sphere, whether it is through playing a role in organisation, making presentations or simply by attending;

ii) ASUM's move into its new premises will provide an exciting morale boost to the Society as its home base will reflect its expansion and many new facets;

iii) ASUM intends the College of Ultrasound Project will incorporate and expand many of the educational activities current provided by the Society; and

iv) The CCPU will expand to provide relevant certification to more clinician groups requesting ultrasound education and training.

Finally, I look forward to collaborating with the ASUM Council, the CEO and Secretariat and the membership in advancing the practice of medical ultrasound in Australia and New Zealand over the next two years. I would also like to increase dialogue and cooperation with other groups such as medical colleges, sonographer and scientific bodies, overseas societies and Government health departments. We are fortunate to have a huge wealth of ultrasound educational resources and I would like ASUM to be a facilitator in utilising these in an efficient and effective manner.

The ASUM BMUS Presidential Exchange: Dr Grant Baxter (left) and Dr David Rogers

Matthew Andrews
ASUM President

Donations to ASUM Research and Grants Fund

The ASUM Council wishes to acknowledge the following who have made donations towards the ASUM Research and Grants Fund.

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Nepean Medical Research Foundation, University of Sydney

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Dr Beverley Barraclough
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Dr Greg Briggs
Dr Neville Brown
Dr Barry L Chapman
Dr Anthony Coates
Dr Jean Engela
Dr Peter English
Miss Tanja Gatnik
Prof John Harris
Dr Caroline Hong and ASUM Staff
Ms Katherine Karakalpakis
Dr Nama Karunanithy
Dr Peter Kell
Dr George Kukawski
Dr George Larcos
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CEO's message

Dr Caroline Hong

ASUM 2006 Melbourne ASM attracted more than 600

We are pleased to report that more than 600 people attended the 36th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine (ASUM) from 14th to 17th September, at the Melbourne Convention Centre. Including exhibitors, trade and accompanying persons, over 800 in total were present at the meeting.

We gratefully acknowledge the support of ASUM members who attended as delegates, speakers and organisers. We also appreciate the continuing support of our sponsors and exhibitors. Gold sponsors at this meeting were Toshiba, GE Healthcare, Philips and Siemens.

The meeting received very positive feedback about the quality of the speakers, content of the presentations, quality of the workshops and the excellent social programs.

ASUM congratulates the recipients of the following awards and honours, which were announced at the meeting:

Awards

UI UL – Prof David Elwood
Caduceus 2006 – Mary Langdale
BMUS Presidential Exchange 2006 – Dr Grant Baxter
Chris Kohlenberg Teaching Fellowship 2006, sponsored by GE – David Fauchon and Dr Meiri Robertson
Giulia Franco Teaching Fellowship 2006, sponsored by Toshiba – Stephen Bird
Beresford Buttery Overseas Fellowship 2006, sponsored by GE – Assoc Prof Albert Lam
2006 Best Sonographer's Research Presentation Award, $2000 sponsored by Philips – Stephen Bird
2006 Best Research Presentation Award, $1500 sponsored by Siemens – Rebecca Charmess
2006 Anthony Tynan Award for Best Clinical Presentation, $1000 sponsored by Siemens – Peter Coombs and Dr Boon Kian Yeu
2006 ASUM Poster Award, Free registration to the next ASUM meeting and $500 expenses (valued at approximately $1500) – Benjamin Micallef

Honours

Life Members – Dr Bev Barraclough and Dr Susie Woodward
Honorary Fellow – Sue Davies
Honorary Members – Dr Christian Nolsoe and Dr YuXin Jiang
More is reported about our special Life Members, Honorary Fellow and Honorary Members in this issue (pages 14–16).

Dr Matthew Andrews is new ASUM President

During the meeting, Dr David Rogers completed his two year-term and Dr Matthew Andrews commenced his presidential duties for 2006 to 2008.

On behalf of ASUM Council and the members, Dr Andrews thanked Dr Rogers for his outstanding contribution to ASUM during his term as president. In particular, and on behalf of the ASUM Secretariat staff, we also thank Dr Rogers for his support and for the enormous work he has undertaken for ASUM. We have enjoyed working with a great leader.

ASUM in the news

In the box on page 11 is a news release issued on 14th September 2006, which attracted media coverage in *The Herald Sun*, *The Advertiser*, *Channel Seven News* and several other media outlets.

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ASUM Gala Dinner

Chinese delegate Dr Yu Xia and ASUM member, Dr Ming Hao

CCPU

At the time of writing this report, ASUM has conducted four Certificate in Clinician Performed Ultrasound (CCPU) Basic Courses in Melbourne and Sydney and an Advanced Emergency and O&G Course is planned at the Royal North Shore Hospital in November. There is increasing interest in the ASUM CCPU and communications have advanced with the following organisations: Australasian College for Emergency Medicine (ACEM); Australasian College of Rural and Remote Medicine (ACRRM); Australasian College of Sports Physicians (ACSP); Australasian College of Phlebology (ACP);

Thursday 14th September 2006 News Release
World spotlight on ultrasound in Melbourne

Melbourne will come under the international spotlight from the medical profession when it becomes the venue for the 36th Annual Scientific Meeting of the Australasian Society of Ultrasound in Medicine (ASUM) from today until 17th September, at the Melbourne Convention Centre.

It will involve more than 500 doctors, sonographers and other medical experts from Australia and overseas who are looking at the latest in scientific developments in the use of ultrasound in medicine, the president of the Australasian Society of Ultrasound in Medicine (ASUM), Dr David Rogers, said.

'Technologies including real-time 3D ultrasound, medical disorders in pregnancy, sonographic detection, uses of ultrasound in breast cancer and female infertility will be among more than 90 issues being discussed at the meeting.

'Diagnostic ultrasound is one of the most rapidly expanding branches of medicine. Technological developments permit higher resolution images to be obtained and it can now be used to examine virtually every part of the body.'

Dr Rogers warned that the new trend of using powerful ultrasound technologies for entertainment – to produce ultrasound 'snapshots' and DVD movies of fetuses – was not medically appropriate and should be discouraged.

'In-utero portraits are being taken for family entertainment by fetal photo shops that may not have technicians with the necessary qualifications,' he said. 'In their hands ultrasound, which is generally a safe procedure, may have unanticipated risks.

'Recent advances in ultrasound technology, including the increasingly widespread availability of powerful 3D imaging equipment, has seen the proliferation of businesses offering ultrasound examinations during pregnancy for the purpose of producing 'snapshot' images of fetuses and DVD movies as souvenirs.

'The first businesses in this field in Australia are already operating. They have become most prevalent in the United States, where much effort is currently being directed toward regulating this phenomenon and restoring the use of diagnostic medical ultrasound equipment to the area of medical diagnosis, as opposed to entertainment.

'Fetal ultrasonography is considered safe when properly used – as a diagnostic tool.

'But, while there is no evidence to suggest that exposing a fetus to unnecessary ultrasound is harmful, it would be sensible to use the technology only in qualified hands to avoid misinterpretation and the unnecessary anxiety that it might cause the patient.' Dr Rogers said.

'The pretty fetal photos for non-medical purposes taken at these entertainment non-diagnostic centres, could falsely assure the mother that everything is alright. It is a concern that abnormalities or problems might be missed.'

ASUM disseminates medical and scientific information. It rotates its annual meetings between the major cities of Australia and New Zealand and includes lectures from some of the world's foremost experts in ultrasound technology.

Following the media release, several press interviews were held with Dr Matthew Andrews. Many of you would have seen him interviewed on Melbourne's *Channel Seven News*, when he represented ASUM' s views on the use of ultrasound for non-medical purposes.

Clockwise from top left – CADUCEUS Assoc Prof Christian Nolsøe; Ms Ann Robertson, Dr Andrew Ngu, Dr Amanda Sampson and Prof David Elwood at the 2006 ASM, happy campers at the 2006 ASM; Faculty Dinner ASM 2006

Australian and New Zealand College of Nephrology (ANZCN); Australian and New Zealand College of Intensivists (ANZICS); Department of Health and Ageing (DoHA); Royal Australian College of General Practitioners (RACGP); Royal Australian College of Physicians (RACP); Royal Australian College of Surgeons (RACS); Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) and the Royal New Zealand College of General Practitioners (RNZCGP)

There are many more colleges with which ASUM will be working closely in the development of the CCPU relevant to their disciplines.

At present, 47 candidates are enrolled in the CCPU program and the number of applications from Fellows and Registrars is continuing to grow.

ASUM is also compiling a database of suitably qualified sonographers who may be interested to contributing to the ongoing ultrasound skills development of CCPU candidates. People who are interested in becoming involved in this exciting and developing program should contact the ASUM office by email to ccpu@asum.com.au .

Dr Glenn McNally, Chair of the ASUM CCPU Certification Board, and the ASUM CEO have met with various groups, including the DoHA to discuss attaining education and standards for non imaging specialists who wish to practise medical ultrasound at their point of care.

ASUM BMUS Presidential Exchange 2007

As you are all aware, for some years now, ASUM and BMUS have had a Presidential Exchange Program. By agreement, on alternate years, the respective presidents present at the annual scientific meeting of their opposite number's society.

In 2007, Dr Matthew Andrews will be a presenter at the BMUS Annual Scientific meeting at Harrogate, UK. Dr Grant Baxter, President of BMUS was our guest speaker at the ASUM 2006 Melbourne meeting and it was delightful to return the hospitality shown to us at the previous BMUS 2005 meeting last December.

International scholarship placements with ASUM

Earlier this year, Borsha Sarker spent some time in Sydney, gaining an insight into emergency medicine. She has written about her interesting experience under the ASUM BMUS Scholarship Program in this issue (page 74).

Dr Maria Gonzales is the first WFUMB scholarship recipient placement in Sydney. She was helped by the ASUM Secretariat and Dr John Crozier in finding opportunities for her placement in Sydney. Her article is also published in this issue (page 78).

Mary Langdale was chosen as the first CADUCEUS scholar to go to Denmark in November 2006. Look out for her article in a future issue of the Ultrasound Bulletin.

DMU (Asia)

This venture is progressing at Vision College in Kuala Lumpur, Malaysia. ASUM will be sending experienced

general sonographer lecturers to Vision College at regular intervals, to assist in the teaching of students. To date, ASUM volunteers involved in this program have included Roger Gent, Jane Fonda, Andrew Ngu, Martin Necas, Glenn McNally, Ros Savage, David Rogers and Christopher Skyes.

The ASUM CEO continues to liaise with the executive director of Vision College on administrative and college matters relating to the DMU (Asia).

Expressions of interest on committees

It is always healthy to see so many people interested in the activities of ASUM. Unfortunately, we are unable to provide positions for all the people who have expressed interest. ASUM thanks all the people who have submitted their expressions of interest for committees, and continues to encourage input from members in forums other than on committees.

Bookshop at www.mitec.com.au

Recently, Prof Ron Benzie, a tireless worker for ASUM, referred a new book, *Early Pregnancy Care* by George Condous, an ASUM member, to me. I recommend this title to members. It will be reviewed in a future issue of the *Ultrasound Bulletin*.

It is now available through the ASUM bookshop (www.mitec.com.au/catalogue/category797/c845/p12302). Email asumbookshop@mitec.com.au if you wish to order this book.

You can view all of the 2006 titles and previous years' titles on the ASUM bookshop website at www.mitec.com.au.

ASUM meetings coming up soon

Members often come up to me at ASUM meetings to say how much they have enjoyed attending our meetings. Many also comment on the quality of the speakers and programs, on how proud they are to see how ASUM has increased its international profile over the past few years and on how well ASUM is being represented at international events.

One of the most valuable commodities that most people lack is time. At ASUM meetings we try to ensure that members, trade and speakers have ample opportunities to network professionally, as well as update their skills and knowledge.To help you plan your next meeting schedule, please mark these dates in your and visit the ASUM website for updates.

- 28th February – 4th March 2007 Multidisciplinary Workshop 2007 Gold Coast Queensland
- 19th – 22nd July 2007 ASUM NZ branch and RANZCR NZ Branch Joint Annual Scientific Meeting 2007 Wellington New Zealand
- 13th – 16th September 2007 ASUM Annual Scientific Meeting 2007 Cairns Australia
- 30th August – 3rd September 2009 WFUMB 2009 Sydney World Congress to be hosted by ASUM Sydney Australia.

For a full listing of all ASUM meetings, see the ASUM calendar at www.asum.com.au .

ASUM office is moving: date to be announced on the ASUM website

Plans are underway for the design and fit-out for the new and more efficient ASUM premises, which were purchased on 1st September 2006. We hope to have completed our relocation to the new office by the end of 2006. The new address will be:

Level 2, 511 Pacific Highway
St Leonards NSW 2065
SYDNEY
AUSTRALIA

Mail sent to the Willoughby address will be redirected when we move, so there is no need to worry about correspondence going astray. Our telephone and facsimile numbers will also change and will be announced on our website.

We seek your patience during the move; we will do our best to minimise any disruptions to services and will keep members fully informed of this exciting achievement.

Seasons greetings

By the time you receive this issue, it would be close to the Christmas and New Year holidays.

I take this opportunity to thank all our volunteers, sponsors, supporters, loyal members, staff, councillors and their families. I wish you all a happy festive season.

The ASUM office will be closed from Friday 22nd December and will reopen on Wednesday 3rd January 2006.

We look forward to another successful and exciting year ahead in 2007.

Dr Caroline Hong
ASUM CEO
carolinehong@asum.com.au

Sonographer Registration Working Party
Sonographer registration will happen – help us to make it happen on our terms

What the current accreditation system means:

Since 2001 the Australasian Sonographer Accreditation Registry (ASAR) has been the body for accreditation of sonographers in Australia. This involves:

- Assessing and evaluating education and training courses and institutions to uphold standards and consistency of sonographer education and training; and
- Ensuring sonographers meet the required level of expertise and maintain that level via mandatory continuing professional development (CPD).

The Sonographer Registration Working Party, comprising representatives of all professional associations and stakeholders – ASAR, ASUM, ASA, AIR, and CSANZ – has been formed to work towards developing a national sonographer registration board.

What future national Sonographer Registration would mean for you and the ultrasound profession:

- Offers protection to patients and the community by assuring the quality and safety of ultrasound service provision by registered sonographers
- Enhanced accountability of practitioners in ultrasound
- Avoids the multiplicity of state-based registration boards and their associated fees, thus facilitating interstate work opportunities
- Uniform national standards – assessment of character and fitness to practice
- Recognition of sonography as an allied health profession
- Protection of the title 'sonographer'.

All enquiries can be addressed to the ASUM representative, Ros Savage, via ASUM at srwp@asum.com.au

Awards presented at the 2006 ASUM Annual Scientific Meeting

Life Member – Charnisay Susan Woodward MBBS, DMRD (Lon), FRANZCR, DDU, GDEB

ASUM Council elected Susan Woodward as a Life Member of ASUM at its meeting on September 15, 2006. Susan Woodward's election was unanimously confirmed at the 36th Annual General Meeting of ASUM held on 16th September 2006, Melbourne.

Susan Woodward has been an exceptional member for almost 30 years. Her energy and dedication to ASUM is evident, firstly through membership of the Victorian Clinical Ultrasound Group from 1983, continuing as the Victorian Branch Secretary from 1987 to 1990, at which time, she became Chairman.

Her involvement in ASUM Council, which commenced in 1989, culminated in Susan's election to ASUM President in 1996. She continues to be involved in education and examining. During all this time, Susan has actively worked in ultrasound and supported ASUM's goal of promoting excellence in ultrasound.

Much of Susan's postgraduate training was attained in the United Kingdom between 1973 and 1976 at Kings College, London, using bistable ultrasound.

On her return to Australia, Susan worked, from 1976 to 1977, at the Royal Prince Alfred Hospital and Royal Alexandria Hospital for Children, Sydney.

She attended the Ultrasonic Institute/ Royal Hospital for Women Medical Ultrasound Course in 1977 and was also awarded the DDU in 1977. She has a wide range of experience as a Radiology Consultant, having worked at The Alfred Hospital, Melbourne (1977–1980); the Queen Victoria Hospital, Melbourne (1980–1986); the Mercy Hospital for Women, Melbourne (1980–1994) as a specialist in O&G and Neonatal Paediatric ultrasound; sessional Radiology at the Royal Children's Hospital, Melbourne (1994–1995); Preston and Northcote Community Hospital, Preston (1995–1998).

Susan was a radiologist at City and North Breast Screen (1993–2005); and is currently a radiologist for Symbion Imaging [previously Mayne Health Diagnostic Imaging] (1998 – present).

Susan Woodward was elected to ASUM Council in 1989, a position she actively filled until 1999, serving in a variety of roles.

She was a member of the Standards of Practice Committee 1991–1992; Convenor, Annual Scientific Meeting, Melbourne 1993; Chairman, Education Committee 1994–1996; President-Elect 1995; and President from 1996 to 1998.

During her presidency, the ASUM *Ultrasound Bulletin* was established.

She has also been actively engaged in assisting ASUM in the role of examiner. Susan has examined for the Diploma of Medical Ultrasonography (DMU) and was a member of the ASUM DMU Board of Examiners.

Susan continues as an examiner for the Diploma of Diagnostic Ultrasound (DDU) and is, currently, a member of ASUM DDU Board of Examiners.

The Society and its members are richer for Susan Woodward's involvement and leadership and she, deservedly, has been elected to Life Membership.

Beverley Barraclough MBBS DDU

ASUM Council elected Beverley Barraclough as a Life Member of the Society at its meeting on September 15th 2006.

Her election was unanimously confirmed at the 36th Annual General Meeting of the Society, on 16th September 2006, in Melbourne.

Beverley Barraclough truly deserves her election to Life Membership of the Society. She has been a dedicated member for 30 years, during which she has been energetically active, initially through the New South Wales Branch and as a Councilor.

She was elected as ASUM's first female president.

Beverley has practiced diagnostic ultrasound since 1976, attending the Ultrasonic Institute – Royal Hospital Ultrasound Course.

In 1977, with clinical and engineering colleagues, including Drs Richard Picker, Peter Duffy and Jack Jelllins, one of the first private practices in diagnostic ultrasound was established at Hornsby – the Hornsby Diagnostic Ultrasound Centre.

The practice was formed with the intention of furthering ultrasound research and was active in teaching physicians and sonographers. It made substantial donations to research funds and developed a prototype third world capable diagnostic ultrasound machine.

She has been a partner in private specialist ultrasound practices situated in Hornsby, St Leonards, at the Sydney Adventist Hospital and the North Shore Private Hospital since 1976.

Also, she has been a Visiting Medical Officer in Diagnostic Ultrasound at Hornsby and Ku-rin-gai Hospital 1982–2004, (director of the department 1992–2004), the Sydney Adventist Hospital 1981–2000 (department director), North Shore Private

Hospital 1998 – and Dubbo Base Hospital 1986–2004.

In 1979, Council awarded her the Diploma of Diagnostic Ultrasound after examination. She is one of only eight doctors awarded the DDU, recognised by the Medical Board of NSW but without additional specialist qualification.

She has contributed to the literature, particularly in breast, obstetrics, the thyroid and parathyroid glands and reviewed books on diagnostic ultrasound.

Beverley's active contributions to ASUM have been substantial, serving at branch and federal levels. She was President of the Sydney Clinical Group of ASUM in 1982, elected to ASUM Council in 1984, Hon Secretary, 1986–1991, Hon Treasurer, 1988–1990 and was President of ASUM in 1991, 1992. She has chaired the Education Committee of ASUM and served as an examiner for the DMU from 1984–1995 and as archivist from 1993–1995.

During these periods, recognition of vascular and urological ultrasound training programs and qualifications occurred and specialist diplomas in these areas were established.

She was actively involved in the purchase and establishment of ASUM's permanent headquarters in Sydney and the introduction of the 'in-house' conference organising function.

She has had a significant role in ASUM since the early days of its inception and in the development of its diplomas, standards, guidelines and education and watched it grow into a well-respected and active society.

Honorary Fellow – Susan Davies DMU, AMS

The ASUM Council appointed an Honorary Fellowship to Susan Davies at its meeting on September 15th, 2006 at the 36th Annual Scientific Meeting (ASM) in Melbourne for her work in ultrasound and for her outstanding contributions to ASUM over a number of years.

Susan's sonographic life started in 1973, shortly after she arrived from England, at the Royal Hospital for Women, under the directorship of William Garrett.

Susan became part of the scene at the Ultrasonics Institute (UI), when she joined the weekly 'brainstorming sessions' that included sonologists and sonographers from 'the Royal' and Royal North Shore Hospital with the Institute's scientists and sonographers.

Her career has encompassed public and private sector clinical practice; ultrasound applications and product management and training consultancy, culminating in directorship of the Australian Institute for Ultrasound (AIU).

Susan's early days in Australia involved several interstate moves, until she realised that Queensland owned her heart. From 1975–77 she was sonographer at the Mercy Hospital Melbourne; followed by: Chief sonographer Queen Victoria Hospital Adelaide (1977–1980); private practice in Sydney (1980–1984); Chief sonographer and tutor, South Coast Radiology (1984–1992); and GEC Medical (1992–1994).

In 1994, Susan established a training consultancy which expanded into the AIU in 1995, of which she is today, Program Director.

Susan has conducted courses in Emergency Medicine, Obstetrics and Vascular ultrasound in Hong Kong, New Zealand, Singapore, Brunei, Malaysia, India and Indonesia.

In 2006 she was Visiting Professor at Kwong Wah Hospital Accident and Emergency Department, Hong Kong.

Since joining ASUM in 1973, Susan has served the membership in many roles. She was an active member of the Ultrasonographers' Group, serving on the Committee from 1979–1989 and was elected President of the Ultrasonographers' Group from 1986 to 1989.

ASUM Council awarded Susan the Diploma of Medical Ultrasonography (DMU) in 1979.

From 1980 to 1983, she represented South Australia on the ASUM DMU Board of Examiners and was Chairman from 1980 to 1982. Susan served on ASUM Council from November 1983 to 1989.

After establishing her private consultancy, Susan again turned her attention to representing sonographer issues. She was elected to the Sonographers' Affairs Committee in 1996 and remained active within this committee and on ASUM Council until 1999, during which time she advocated the sonography profession and promoted standards of excellence. In these roles as President of the Ultrasonographers Group and ASUM Councillor (1986–1988) and as an ASUM Councillor (1996–1999) Susan represented the ASUM's interest at the World Federation of Sonographers in 1988 and 1997, respectively.

Her inherent aptitude for sonography makes her an obvious choice as an invitee to the ASUM's scientific and vocational workshops.

The first was the 1980 Annual Scientific Meeting (ASM), followed by the 1991, 2000, 2001 ASMs and ASUM NZ 2006.

In particular, Susan was contracted through the AIU to conduct the ASUM DMU Examiner Workshops (2003–2005), attendance at which was a requirement for certification as an ASUM DMU Examiner.

Locally, Susan represented ASUM in the Victorian, South Australian and Queensland Branches as an educator and as an ASUM Councillor, a Committee member, keynote speaker, advocate, educator and as a meeting convenor.

Internationally, Susan has represented ASUM at WFUMB meetings and as an educator and speaker.

Ever vigorous in all her endeavours, always professional in her pursuits, and graced with empathy and humour, ASUM Council is proud to appoint Susan Davies as an Honorary Fellow of the Society.

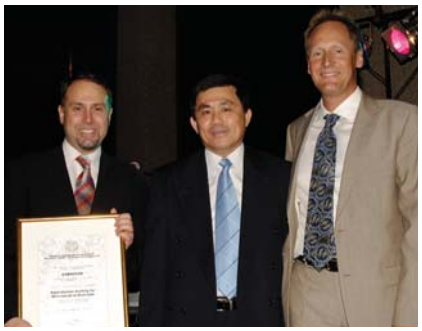
ASUM HEAD OFFICE IS MOVING TO
Level 2, 511 Pacific Highway
St Leonards NSW 2065

Move dates and new phone and fax numbers will be announced on the ASUM website www.asum.com.au

Honorary Member – Christian Nolsøe MD PhD

Assoc Prof Christiaan Nolsøe was granted honorary membership by ASUM Council on 15th September 2006. Christian Nolsøe is the President of the Danish Society of Diagnostic Ultrasound (DSDU). He is consultant radiologist at Department Radiology, Frederiksberg Hospital, University of Copenhagen, Denmark and associate professor at Department of Circulation and Medical Imaging, Norwegian University of Science and Technology, Trondheim, Norway. He generated dialogue between the DSDU and ASUM that led to the establishment of the CADUCEUS exchange program.

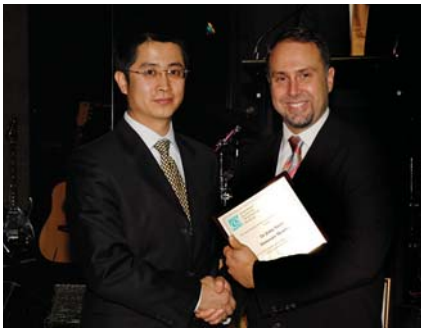
Ms Mary Langdale – 2006 CADUCEUS presented by Dr David Rogers



Assoc Prof Christian Nolsøe – 2006 CADUCEUS presented by Dr David Rogers, Dr Andrew Ngu

Prof David Ellwood – UI UL Presentation presented by Dr David Rogers

Dr Grant Baxter – ASUM BMUS Presidential Exchange presented by Dr David Rogers



Honorary Member – Dr Yu Xia representing Prof Yuxin Jiang

Prof Yuxin Jiang was granted honorary membership by ASUM Council on 15th September 2006. Professor Yuxin Jiang is President of the Society for Ultrasound in Medicine, Chinese Medical Association (SUM/CMA). He is professor of the Chinese Academy of Medical Sciences and professor of the Peking Union Medical College, Beijing. He is the Director of the Department of Diagnostic Ultrasound, Peking Union Medical College Hospital Beijing, China.

As President of the peak ultrasound body in China, he is in dialogue with ASUM, as part of the Asia-Link program, working towards expanding ultrasound ties and relationships between in Australia and China.

Mr David Fauchon – The GE Chris Kholenberg Teaching Fellow presented by Mr Kevin Potter (GE Healthcare) and Dr David Rogers

Mr Stephen Bird – Philips 2006 Best Sonographer's Research Presentation Award presented by Ian Schroen Philips Medical imaging and Dr David Rogers

Dr Rebecca Charmers – Siemens 2006 Best Research Presentation Award presented by Kevin Fisher (Siemens) and Dr David Rogers

Mr Stephen Bird – The Toshiba Giulia Franco Teaching Fellow Presentation Awards presented by David Rigby (Toshiba) and Dr David Rogers

Reassessment of lateral cerebral ventricle measurement

Andrew McLennan, Vanessa Pincham and Helen Peters

Abstract

Lateral cerebral ventriculomegaly is commonly defined as a lateral ventricular atrium of greater than 10 mm width when measured in the appropriate plane. Review of the literature reveals a lack of precise criteria for ventricular atrium measurement.

This paper examines the experience at Sydney Ultrasound for Women in the establishment of an assessment protocol and measurement of the lateral ventricular atrium in an unselected low-risk population. In 237 fetuses the ventricular atrium measured 7.74 mm ± 2.07 mm (mean ± 3 s.d.), was independent of gestational age, and using the technique described could be reproducibly measured with excellent agreement between experienced operators.

This study defines criteria for the accurate and reproducible measurement of the lateral cerebral ventricular atrium and confirms an atrial width of 10 mm as an appropriate measurement at which to initiate counselling and further investigation for pathology.

Keywords: cerebral, fetal, hydrocephalus, ultrasound, ventriculomegaly

Introduction

Enlargement of the lateral cerebral ventricles is associated with a variety of fetal pathologies, including neural tube defect, fetal infection, chromosome abnormality or incipient hydrocephalus. Even when isolated and apparently non-progressive, ventriculomegaly may herald later neurodevelopmental delay, ranging in incidence from approximately 4% when ventriculomegaly is mild, to 50% when severe.[1–5] It is therefore important for the normal dimensions of the lateral cerebral ventricle to be known and for techniques of measurement to be standardised.

The definition of fetal cerebral ventriculomegaly varies considerably in the literature. Some authors have determined the mean width of the lateral ventricular atrium in their own population and have elected to use a width greater than two or three standard deviations above the mean to define ventriculomegaly locally.[6] Other writers define mild ventriculomegaly as separation of the glomus of the choroid from the medial wall of the lateral cerebral ventricle of between 3 mm and 8 mm.[7] However, the most widely accepted definition of fetal ventriculomegaly is a ventricular atrial width greater than 10 mm at any stage of gestation[8–10] with 10–12 mm considered mild, 12–15 mm moderate and 15 mm or greater considered ventriculomegaly of a severe degree.[1]

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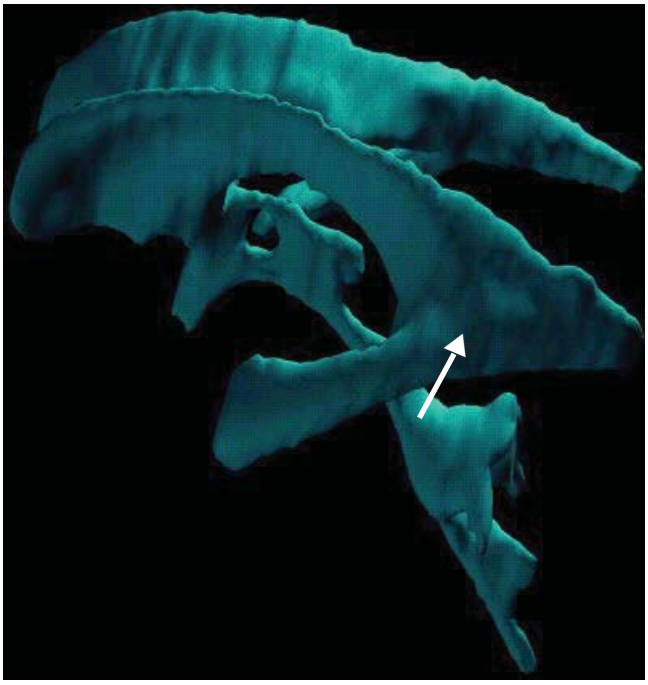

Fig. 1: 3D reconstruction of the cerebral ventricular system (Arrow indicates the ventricular atrium; junction between frontal, temporal and occipital horns of the lateral ventricle).

In practice, there is a lack of appreciation that the atrium of the lateral ventricle defines the junction of the frontal, temporal and occipital horns and that it contains the thickest portion of the choroid plexus; the glomus (Fig. 1). Consequently, there is considerable variability between operators with regard to the chosen plane of assessment, identification of the atrium, and caliper placement when attempting to accurately measure the dimensions of the

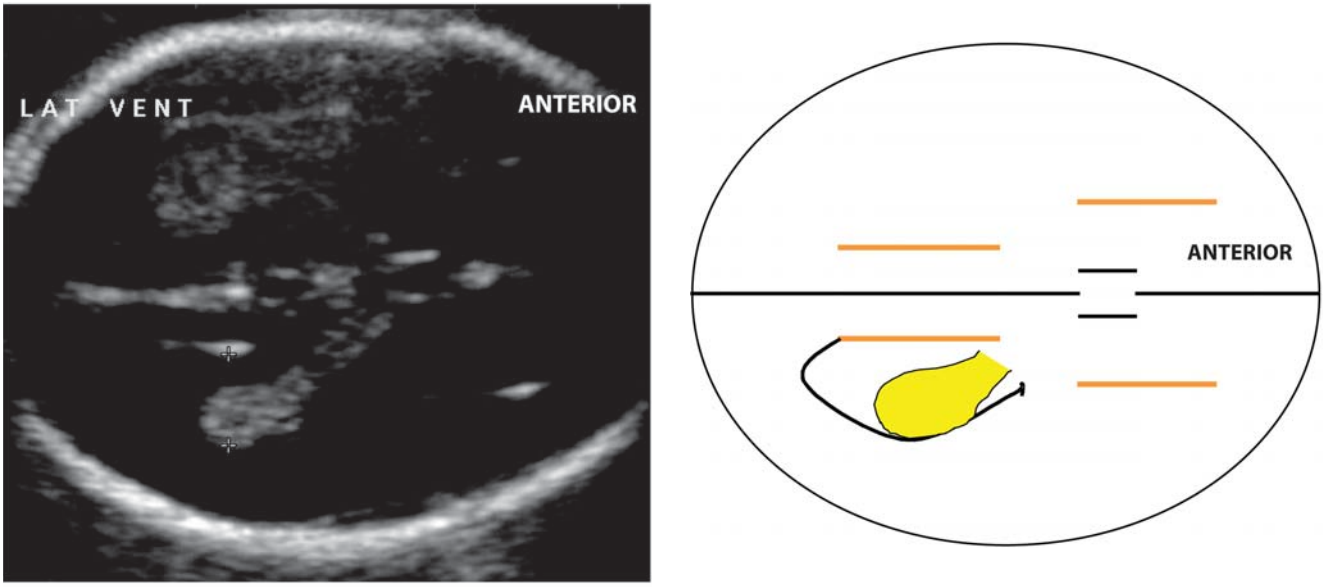

Fig. 2: Ultrasound image demonstrating the '4 line' sign to ensure symmetricality. The '4 line' sign: Solid arrows – medial walls of the posterior horn of the lateral ventricle Dashed arrows – lateral walls of the anterior horn of the lateral ventricle.

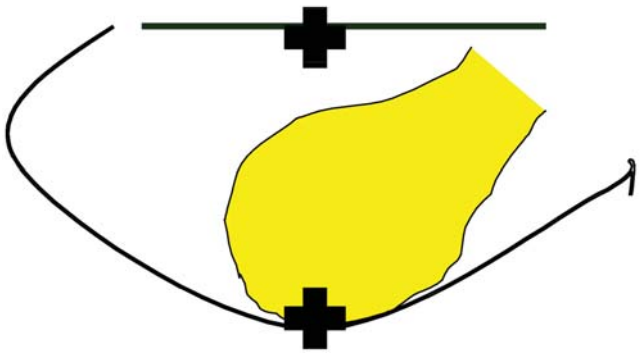

Fig. 3: Schematic of caliper placement in the measure of the lateral ventricular atrium.

lateral cerebral ventricular atrium.[2]

This study describes the experience at Sydney Ultrasound for Women (SUFW) in implementing a standard measurement protocol with the aim of improving accuracy and reproducibility. The normal range of ventricular atrial measurements in our low-risk population is also established.

Methods

Following a review of the ultrasound literature, the following protocol for measurement of the lateral cerebral ventricular atrium was established.

(1) In a coronal view of the fetal head, obtain a plane just superior to the plane for biparietal diameter/head circumference measurement. The view is to include the cavum septum pellucidum but not the thalami;
(2) Obtain the 'four line sign' to ensure a symmetrical scan plane:
   - The four lines refer to both medial walls of the occipital horns of the lateral ventricle and the lateral walls of the anterior horns (Fig. 2);
   - These lines should be equidistant from the falx cerebri to prevent an oblique ventricular view; and
(3) To measure the atrium, place the calipers between the inner aspects of the ventricular walls across the largest part of the glomus of the choroid plexus, in a line perpendicular to the falx cerebri (Fig. 3).

Four sonographers and one sonologist undertook training in the lateral ventricle measurement protocol and performed all examinations. All measurements were obtained transabdominally using Philips HDI 5000 machines (Philips Medical Systems, USA) with curvilinear 5 MHz transducers.

Prior to data collection for determination of the normal range of ventricular atrium width, an inter-observer study using the measurement protocol was undertaken to assess the reliability of image acquisition and caliper placement. Two experienced operators each assessed the lateral ventricle measurement on 27 images frozen on the ultrasound monitor ('frozen') and in 25 real-time ('live') examinations. They were each blinded to the other's results. The results were compared using paired samples *t*-test and the Bland-Altman 95% limits of agreement plot.[11]

Lateral ventricular atrial width was then collected prospectively in 237 fetuses of women referred to SUFW for second trimester fetal morphology assessment. Fetal morphology was assessed in accordance of ASUM guidelines.[12] All fetuses included in the study had either a normal karyotype or had been assessed as low risk for aneuploidy on first trimester screening. The fetal gender was not documented. Multiple pregnancies and fetuses with a sonographically evident structural abnormality were excluded. Pregnancy outcomes were not known.

Results

The inter-observer study showed no significant difference in measurement for either the frozen or real-time image assessment between experienced operators (*t*–test, $P = 0.32$ for the 27 frozen images and $P = 0.05$ for the 25 live images). The 95% limits of agreement were -1.11 – +0.91 for the frozen images and -0.98 to +0.64 for the live images. The coefficient of repeatability was 1.03 mm for the frozen images and 0.82 mm for the live images. This indicates a stronger agreement in the real-time image assessment (Fig. 4).

In the prospective study of lateral cerebral ventricle atrial width in 237 consecutive low-risk fetuses, the median maternal age was 32.1 years and the median gestational age

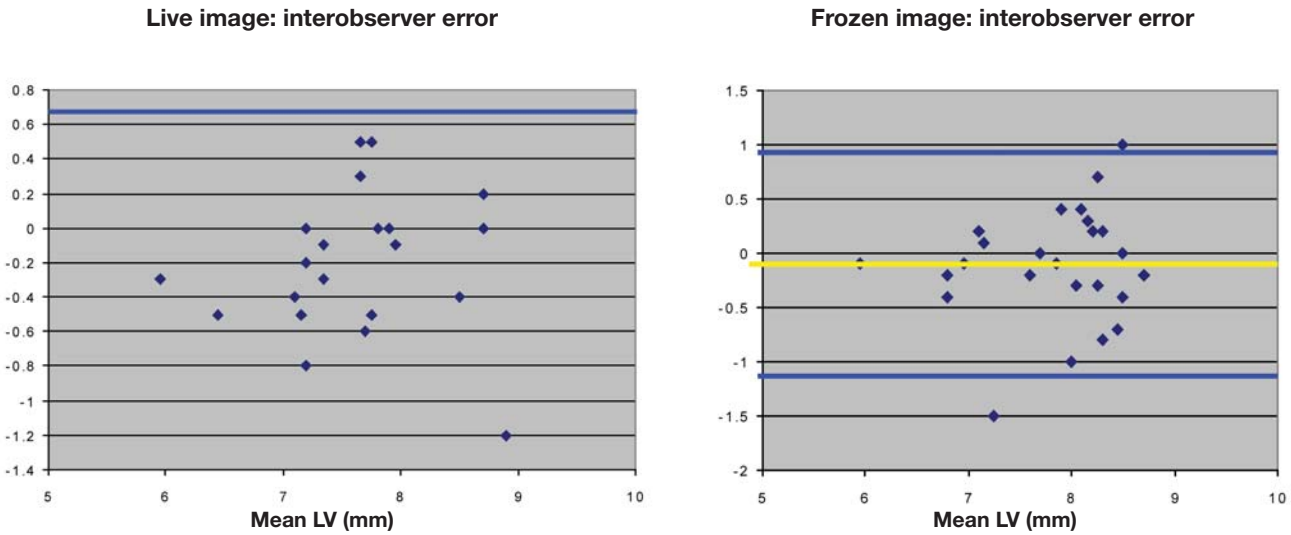

Fig. 4: Bland-Altman 95% limits of agreement plot for live and frozen image measurement assessment.

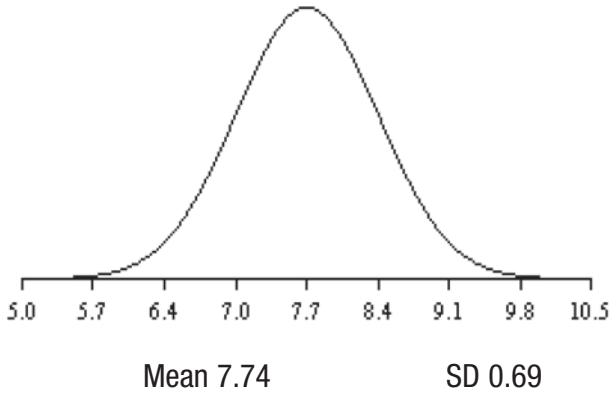

Fig. 5: Normal range of SUFW study lateral ventricle measurements (*n* = 237).

was 19 weeks and two days (range = 17 weeks six days – 23 weeks 0 days).

The mean width of the lateral ventricle atrium was 7.74 mm (range = 5.90–9.4 mm; s.d. = 0.69 mm). The measurements were normally distributed (mean = 7.74 mm, median = 7.7 mm, mode = 7.80 mm) and unrelated to gestational age (Fig. 5). The range representing three standard deviations above and below the mean atrial width (incorporating 99.7% of measurements) was 5.67–9.81 mm.

Discussion

Prenatal ultrasound measurement of the lateral ventricle atrium has a history of uncertainty. Many authors have failed to define the ventricular atrium accurately and there has been no consistency in description of the acquisition plane or technique of measurement. In practice, this has influenced the reproducibility of this measurement.

The diagnosis of isolated cerebral ventriculomegaly leads to complex counselling due to the uncertainty of outcomes. The majority of fetuses with ventricular measurements between 10 and 15 mm have normal outcomes. However, a proportion will have neurodevelopmental delay that will not be apparent for many months after delivery and there are no prenatal tests to exclude this outcome. Progressive ventricular dilatation is a poor prognostic sign but is often not apparent until well into the second half of the pregnancy, making decisions about termination of pregnancy difficult.

It is, therefore, vital that the technique for measurement of the lateral ventricle atrium be unambiguous, with a clearly defined range of normality, in order to reduce the false positive rate of screening and limit unnecessary anxiety. The SUFW protocol clearly defines the acquisition plane, anatomical landmarks and caliper placement criteria to ensure accurate and reproducible measurement. Using these criteria, a width of 10 mm is confirmed as being greater than three standard deviations above the mean and therefore an appropriate measure at which to:

(1) Diagnose ventriculomegaly;
(2) Search meticulously for additional sonographically evident structural anomalies (both intracranial and extracranial);
(3) Discuss possible associations and outcomes and offer karyotyping and infection screening;
(4) Arrange serial ultrasound assessment, the first in 2–3 weeks, to exclude progressive enlargement of the ventricles, which is known to be associated with a worse prognosis; and
(5) Consider prenatal magnetic resonance imaging of the fetal brain to help exclude sonographically difficult diagnoses such as partial or complete agenesis of the corpus callosum, which may affect outcome.[12,13]

Conclusion

The SUFW study defines a clear set of criteria that enables accurate and reproducible sonographic measurement of the lateral cerebral ventricle.

In an unselected, low risk Australian population, an atrial width of 10 mm is an acceptable measurement at which to diagnose ventriculomegaly, initiate counselling and conduct further investigations.

Acknowledgements

We would like to thank sonographers Tirith Treatt and Linda Young for their participation in this study.

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Prostatic ultrasound: a central role in brachytherapy

G.M. Baxter, M. Glegg, D. Dodds

Abstract

Prostate brachytherapy is now well established in the therapeutic armamentarium in the treatment of prostate cancer and can now reproducibly deliver high doses of radiation to the gland effectively. Ten-year data confirm that it is equally as effective as either radical prostatectomy or radiation therapy in patients with similar prognostic factors. In this article, we will describe the current technique at our centre, the central role of ultrasound and review the potential side effects of this treatment.

Keywords: brachytherapy, prostate carcinoma, prostate, seed implantation, ultrasound

Introduction

The incidence of prostate cancer has increased steadily over the last 10 years; it is currently the second most frequently diagnosed cancer in men of all ages with approximately one in 12 men expected to be diagnosed at some point in their lives. The acceptance of prostate specific antigen (PSA) screening has resulted in an increase in the detection of early stage disease suitable for brachytherapy.[1,2] The technique is mainly used as monotherapy and although it can be combined with external beam or hormone therapy, the indications and potential benefits of this remain controversial. The number of procedures in the USA in the last five years has risen rapidly and reflects a combination of patient convenience, low morbidity and cost effectiveness. An increasing number of centres in the UK and across Europe now also offer this treatment.

Brachytherapy involves the delivery of high radiation doses to a tumour with rapid drop off in dose at short distance, thus sparing normal tissue from damage. The earliest implants date from the early twentieth century when Radium 226 was delivered through the urethra by Pasteau and Degrais[3] and then through the perineum by Barringer.[4]

In the 1970s prostate brachytherapy was revisited by Whitmore *et al.* using an open retro-pubic approach.[5] This was unsuccessful due to very poor radiation dose distribution and, as a result, the concept was abandoned. It was not until the early 1980s that interest was again revived by Blasko and colleagues[6] who inserted radioactive seeds directly into the prostate through the perineum under transrectal ultrasonic guidance with the aid of a perineal template device, thus paving the way for the current technique.

Patient selection

Prostate brachytherapy is only suitable for prostate cancer patients who fulfil a number of specific criteria. The selection criteria in use at our centre would reflect those used at many others (Table 1).

As with all cancer treatment procedures, appropriate counselling regarding all treatment options is mandatory. In addition, all patients have a baseline International Prostate Symptom Score (IPSS) undertaken, which indicates the likelihood of postoperative urinary complications and functional outcome post treatment. Those who record a high IPSS score are at increased risk of prolonged urethritis[7] and retention[8] post implantation. If the maximum flow rate, (Q max) is < 10 mL per second, an alternative treatment method is normally recommended.

Histological confirmation with Gleason grading is mandatory for all patients. The procedure is only suitable for early, organ-confined disease and, therefore, lymph node and bone metastasis should be excluded by MRI and bone scan respectively. There is no role at present for laparoscopic

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Table 1

Brachytherapy
• Histological diagnosis of prostatic adenocarcinoma
• Life expectancy greater than 10 years
• Early stage disease i.e. stage T1/T2
• Normal isotope bone scan
• No pelvic lymphadenopathy on MRI scan
• Gland volume less than 50 cc
• No previous TURP in the last six months
• PSA less than 30
• Urinary flow rate greater than 10 mL/sec

lymph node sampling. Any patient with a life expectancy of less than 10 years would not normally be accepted for any form of potentially curative prostate cancer treatment.

Patients with a measured prostate volume > 50 cc are excluded for two main reasons; the risk of developing acute urinary retention and the high likelihood of incomplete physical access to the gland from the pubic arch. Hormone therapy can be given to patients to downsize the gland in suitable patients.

Those patients who have had a previous transurethral resection of the prostate (TURP) are at increased risk of urinary incontinence after brachytherapy and, certainly, those with large residual central defects are better advised to undergo an alternative treatment method like seed distribution. Dose homogeneity is likely to be sub-optimal. However, in those patients with prostatic regrowth, there is less chance of urethral necrosis and incontinence. In our centre, patients who wish to undergo brachytherapy have a volume study not less than six months following TURP and the images are carefully studied before a final consensus decision is made as to whether to proceed.

With pre-treatment prostate specific antigen (PSA) levels of > 50 there is a very high chance of extra-prostatic disease and therefore local treatment alone is unlikely to be curative. Similarly, those receiving any form of localised treatment with a pre-diagnosis PSA > 20 have a high chance of biochemical failure in the first two years,[9] although some studies do indicate some chance of biochemical control.[10,11] At our centre, the maximum PSA level deemed acceptable is 20.

Treatment options

There are a number of treatment options available to patients with prostate cancer. A number of factors dictate which is most appropriate e.g. extent of disease, co-morbidity factors, etc. Treatment options include the following.

Watchful waiting (active monitoring)

This implies regular assessment comprising digital rectal examination and measurement of PSA but without any initial active therapy. This option is appropriate for patients whose disease is diagnosed incidentally or those with significant co-morbidity.[12] The histological tumour grade is also important as moderately to poorly differentiated tumours progress in up to 50% of cases.[13]

Radical prostatectomy

This operation involves the complete anatomical removal of the prostate and preservation of the neurovascular bundles. It can be combined with pelvic lymph node sampling and may be performed either by the conventional open technique or laparoscopically.

The usual pre-treatment prognostic factors, i.e. PSA, tumour stage and histological grading apply equally to prostatectomy as to non-surgical therapy. The risk of long term incontinence is 1–6%.[14] While the risk of long term impotence after surgery which preserves the neurovascular bundles is better, impaired potency rates of 30–50% are still quoted.[15] Unlike other forms of treatment, prostatectomy has a low but recognised mortality rate, with one study reporting a 30-day mortality of 1%.[16]

Recently, the use of neo-adjuvant hormone therapy prior to external beam treatment has been shown to have a significant survival benefit in some groups of patients (see next paragraph) however, such benefit has not been demonstrated prior to radical prostatectomy, although the incidence of positive surgical margins is reduced.[17]

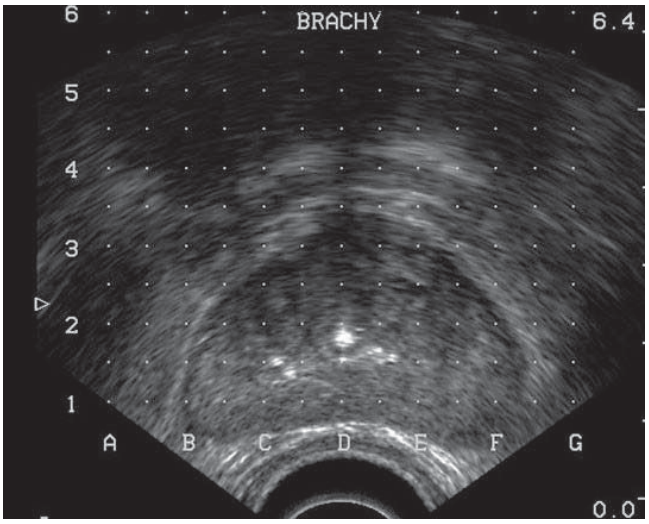


Fig. 1: Axial ultrasonic image of the prostate with catheter in situ defining the position of the urethra (arrow).

Radical external beam radiotherapy

In some patients with good prognosis, early stage disease can undoubtedly be cured by high doses of carefully fractionated radiotherapy. Patients who have T3/T4 disease, PSA > 20, Gleason score 8–10 and/or pelvic lymph node involvement are likely to fail radiation therapy alone. For such high-risk patients a combination of androgen ablation and radiation therapy is often prescribed. With 3D conformal radiotherapy and the introduction of intensity modulated radiation therapy (IMRT) higher doses can be delivered at the same time as reducing the risk of rectal toxicity.[18]

Brachytherapy

Once the histological diagnosis of carcinoma has been confirmed and the selection criteria (Table 1) fulfilled, brachytherapy can be discussed as a therapeutic option. Currently, in the UK, the process is a two stage procedure i.e.:

(1) The patient first attends for a volume study of the prostate; and
(2) Attends for the seed implantation, which takes place on a separate sitting generally within 2–3 weeks following the initial study.

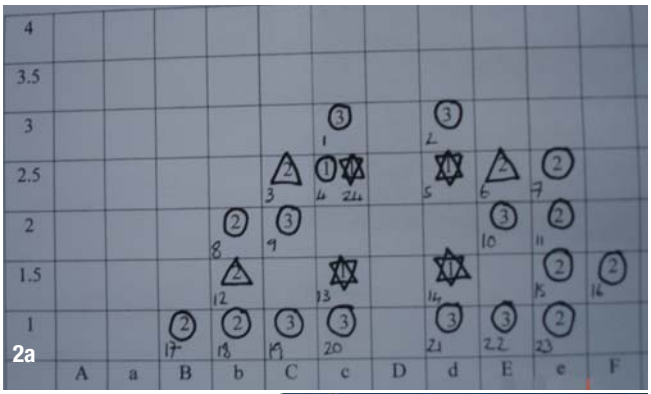
As technology progresses, there is a move to performing a single stage procedure, which has many advantages and, undoubtedly, in the future this may represent standard practice. At present, however, the process is performed in two stages.

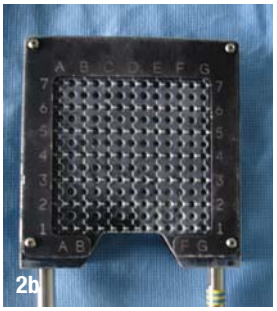
Volume study

The aims of the volume study are three-fold:

(a) To accurately measure the volume of the prostate gland;
(b) To outline the circumference of the gland relative to the implant grid; and
(c) To check for possible pubic arch interference both with ultrasound and by manual palpation.

With regard to the prostate, simple but important anatomical points to remember are that, generally, the apex of the gland is higher than the base, the vas and seminal vesicles enter posteriorly and the urethra is not specifically visualised, although its position can be inferred. This accounts





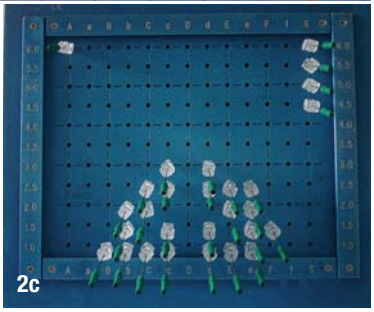


Fig. 2a: Paper copy of a prostate implant. The key includes a shape e.g. circle, triangle, square, etc. which reflects the distance from the base of the gland. The number within the shape reflects the number of seeds within the needle.
2b: Prior to the implant the needles are held in a plastic grid on a sterile trolley. This is an exact replica of the planned implant.
2c: A small grid that corresponds to the paper print, pre insertion plastic grid and the electronic on screen grid, is attached to the Accuseed. The needles are inserted into the perineum through this device.

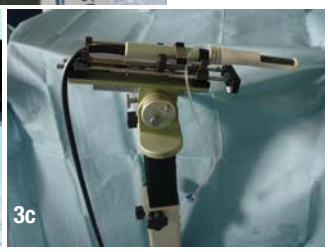


Fig. 3a: The Accuseed machine.
3b: A view from above of the Accuseed. As mentioned the probe is angled posteriorly normally approximately 12⁰ (long arrow) while the stepper moves in 5 mm intervals (short arrow).
3c: The Accuseed with cradle and probe inserted. Water can be inserted via the tubing (long arrow) to inflate the balloon in order to lift the posterior aspect of the prostate gland above the first grid line. The plastic grid is slotted into two holes in the black retainer (short arrow).

for the slight posterior angulation of the probe within the rectum of between 10–15° (we use approximately 12°). With regard to urethral visualisation, a catheter is inserted and contrast injected to outline the urethra for ultrasonic localisation (Fig. 1).

The volume study is undoubtedly the most accurate method of prostate volume calculation among all methods. The procedure is performed with a dedicated endoluminal prostatic system i.e., B&K Medical (Herlev, Denmark). The ultrasound probe is fixed in a cradle, thus removing an element of human subjectivity. The probe is biplanar in both the axial and longitudinal axes, these being easily interchangeable by the use of a push button. The system contains appropriate software for volume calculations and an on screen electronic grid that corresponds exactly to the physical grid, which will be used at the time of the brachytherapy implant (Fig.2).

In addition to being biplanar, the probe is used in a stand-off fashion i.e. an average of 10–25 mL of water is injected to raise the posterior aspect of the prostate gland above the first grid line. The probe is fixed in a cradle, i.e. it is not hand-held and this immobilisation supports accurate volume calculation and subsequent implantation. The cradle etc. is part of the Accuseed system that allows the probe to move in and out of the rectum at 5 mm intervals. As mentioned previously, the prostate normally lies beneath the first grid line and so appropriate amounts of water are required to lift the prostate gland anteriorly to enable implantation (Fig. 3).

As the prostate volume pre-plans the prostate seed implant, it is important that both studies are performed with the patient in exactly the same position. A short general anaesthetic is therefore used and the patient is positioned in the same dorsal lithotomy position for both procedures. The ultrasound probe is within the same fixation device (Accuseed), stepping at 5 mm intervals. To begin, the probe is inserted into the rectum and the base of the gland visualised – this is known as the zero or baseline. The urethra should be positioned on the D line (in general terms seed implantation is never performed on the D line) (Fig. 4). The probe is then retracted at 5 mm intervals and images taken at each level from base to apex. Using the rollerball or light pen (we prefer the former) an outline of the gland is drawn at each section level and the volume of the gland automatically calculated by the on-board software and displayed on screen. Thus, the accumulated volume at each level is seen throughout the gland. When drawing around the gland, a more generous margin can be afforded at the apex and base. However, a tight margin is used posteriorly, because of the potential dosing risk to the rectum. With regard to the implant, every needle (and the seed/s it contains) has three coordinates predetermined for insertion into the gland i.e., an x- and y-coordinate with reference to the grid and the z coordinate with reference to the base line (Fig. 4).

Difficulties may arise with a patient who has a narrow pubic arch as this can interfere with lateral seed placement. Methods of assessing the pubic arch include plain radiographs (not performed), CT and 3D reconstructions (not performed) and ultrasound during the volume study.

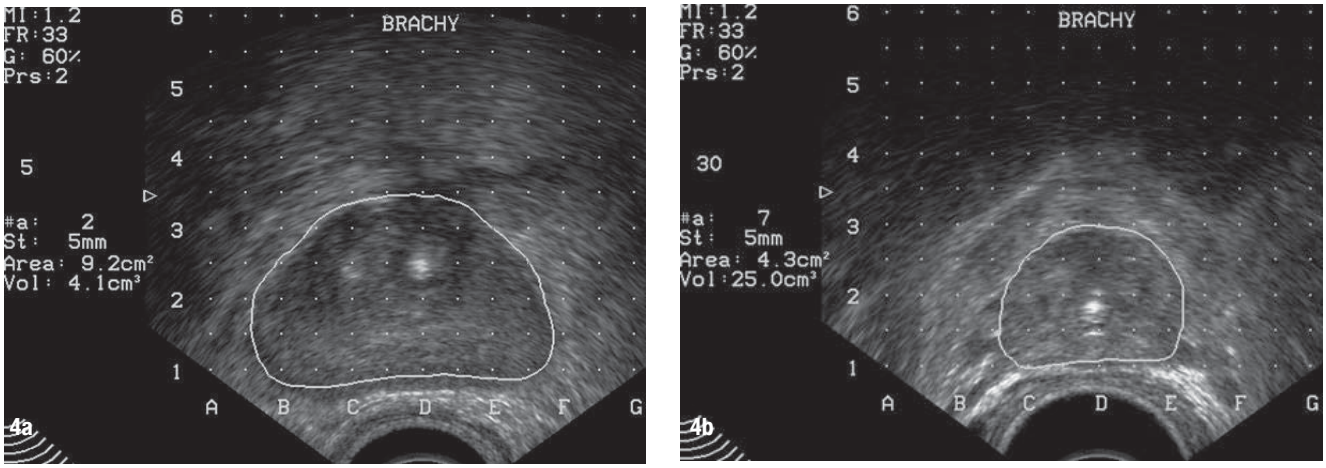


Fig. 4: Selected images from a prostate volume study. This is performed at 5 mm intervals beginning at the base (0) of the gland and finishing at the apex. The gland has been outlined with a light pencil.
4a: Image at 5 mm (arrow) from the base of prostate. The volume is 4.1 cc.
4b: Image at 30 mm (arrow) from the base of the prostate towards the apex of the gland. The volume is now 25 cc.

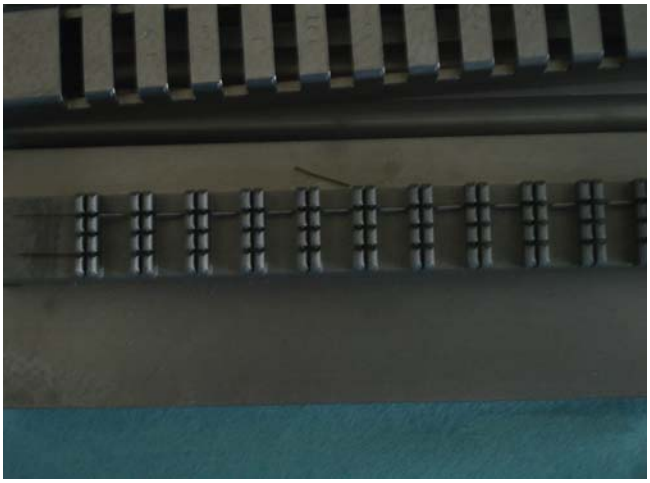


Fig. 5: Iodine-125 strand (arrows) being prepared. The strand can be cut easily to the desired length depending upon the number of seeds required for each needle.

We have found in practice that a combination of ultrasound and clinical palpation at the volume study as the most useful clinical assessment.

Having performed a successful volume study and confirmed that the patient fulfils the implantation criteria, the information from the volume study is then used to calculate the number and position of seeds required to satisfactorily implant the gland.

The physics and planning of implantation

Once the volume study is complete, the images are transferred to a treatment planning system (TPS) to facilitate pre-planning of seed positions and calculation of the dose distribution. Grid points are passed to the treatment planning system by registering the grid with a template generated by the TPS. Precise registration of the grid and template is a pre-requisite of accurate dose calculation and correct treatment delivery.

The target volume and organs at risk (OAR) are defined by manually outlining them, i.e. the prostate capsule as it appears on ultrasound (target volume) and the rectum and urethra.

Both Iodine-125 (I-125) and Palladium-103 (Pd-103) are used for prostate brachytherapy treatments, the former being almost universally used in the UK in the form of strands of interlocking seeds and spacers. The structure of these seeds, and techniques for their use has been described in detail by Butler *et al.*[19] In summary, seeds of length 4.5 mm are bonded to spacers of length 5.5 mm in a stiff, absorbable suture material, giving a distance of 10 mm between successive seed centres (Fig. 5). The strand is cut to the required length and inserted into an 18-guage implant needle and plugged with a suitable suppository material, such as Anusol-HC™.

Iodine-125 emits a range of photons with an average energy of 27 keV and half-life of 60 days while Pd-103 has a half-life of 17 days and average photon energy of 21 keV. The radiobiological consequences of this were considered by Ling *et al.*[20], who concluded that predicted cell kill is better for Pd-103 in rapidly proliferating tumours and better for I-125 in slower-growing tumours. There is currently no consensus, nor any formal recommendations on choice of radionuclide.[21] In order to achieve satisfactory implantation as a monotherapy, the minimum peripheral dose (MPD) as recommended by the American Brachytherapy Society[21] is a prescription dose of 145 Gy for I-125 seeds and 110–115 Gy for Pd-103.

With regard to the method of implantation, a modified peripheral loading technique, in which more seeds are placed at the periphery of the prostate than at the centre, is now the most commonly employed technique. As excessive urethral doses result in increased urinary morbidity,[22,23] the reduction in urethral dose using this technique is advantageous. A common rule of thumb is to limit the maximum urethral dose to 217 Gy (or 150% of the mPD). It is common practice to arrange seeds such that a small margin (typically 3 mm) is left between the prostate capsule and the surface enclosed by the mPD, especially at the base, apex and the lateral margins of the prostate. This allows for microscopic spread of disease beyond the capsule, small movements of seeds post-implantation and small positional errors during seed loading. Posteriorly, the margin is reduced to zero to reduce dose to the rectum.

Parameters of particular interest include V100, V150 and V200 (the fractional volume of prostate receiving 100%, 150% and 200% respectively of the mPD) and the D90 (the minimum dose received by 90% of the prostate). The primary dosimetric objective of pre-planning is to obtain a V100 as close to 100% as possible. Dose homogeneity within

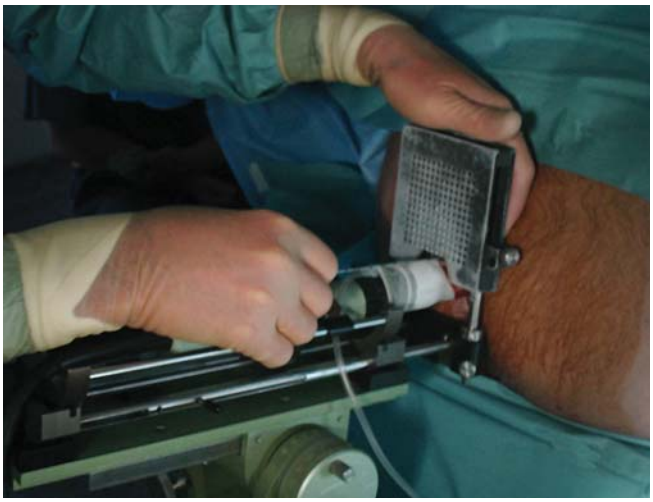


Fig. 6: Brachytherapy implant. A needle is inserted into the perineum through the appropriate coordinate.

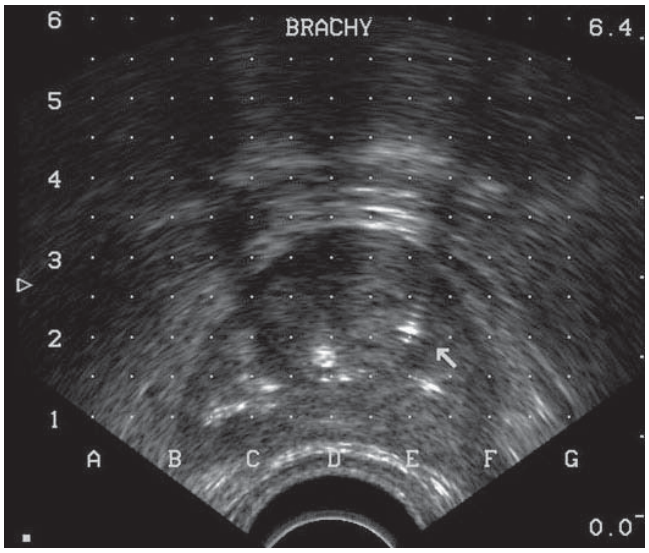
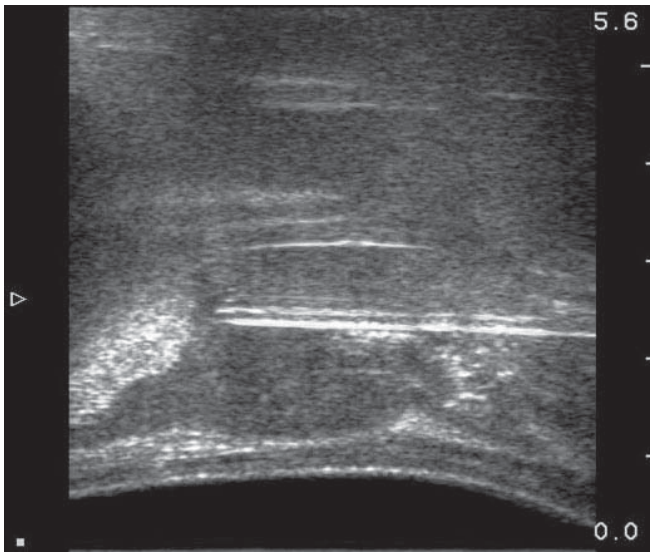


Fig. 7a: Axial image of the prostate during an implant. The needle has been inserted into position E2 (arrow). The double echo signifying the tip of the needle is easily visualised with further weaker echoes (reverberation) noted anteriorly.



7b: Longitudinal image of the same needle showing its position relative to the base of the gland. The tip of the needle (thick arrow) is seen in good position at the base of the prostate gland. The seminal vesicle can also be visualised.

the prostate capsule, indicated quantitatively by the values of V150 and V200, should also achieve an acceptable level.

When the pre-plan is finalised, a hardcopy treatment plan is recorded (Fig. 2a). Details of seed numbers to be ordered and of the subsequent preparation of RapidStrands and needle loading are also produced.

Seed implantation study

The implant is performed under exactly the same conditions as the volume study to replicate it as closely as possible. Again, the patient has a general anaesthetic, is placed in the dorsal lithotomy position and a urinary catheter inserted, with contrast to outline the bladder and urethra. The patient receives 120 mg of gentamycin intravenously just prior to the procedure and continues on oral Ciproxin for seven days. The ultrasound probe and stepping unit are then manipulated to replicate the volume study exactly.

With the optimal set-up, a needle is inserted through the template grid and the prostate until the base of the bladder is reached on ultrasound. This is confirmed on x-ray screening; the distance from the grid to the hub of the needle is measured and marks the zero retraction plane. The stepping unit is moved in 5 mm increments with all needle position references made to the zero retraction plane. Initially, we used two stabilisation needles, one in each side of the gland. However, we found these sometimes interfered with needle insertion and were of no great benefit, so we no longer use them.

Needles are inserted through the template and perineum into the prostate as determined by the plan (Fig. 6). There are many different modes of insertion – all are acceptable. In general, we begin with the anterior coordinates and work posteriorly, in a right to left fashion. When the needle tip reaches the correct depth within the gland, a double echo appears on the monitor corresponding to the tip of the needle and the radioiodine seeds are then deposited (Fig. 7). A double check on the coordinates and depth can be made by the combination of fluoroscopy, ultrasound and physical measurement. The use of the biplanar probe allows needle visualisation in both a transverse and longitudinal plane; this is advantageous, although for the majority of needles the transverse image is preferred and is generally all that is required.

When all the needles have been inserted, the fluoroscopic and ultrasonic images are reviewed and compared with the plan of the implant. Any residual 'cold areas' are implanted with seeds freshly made up at that time. Occasionally problems arise, e.g. the pubic arch may prevent some of the lateral needles reaching their destination – manipulation of the height of the gland relative to the first grid line may resolve this. Other problems that we have encountered include bursting the balloon and 'sticky' needles that deploy incorrectly. Generally, throughout an implant, a re-adjustment of the base is required as the prostate becomes oedematous.

Post implantation

Implant quality

Implant quality can be assessed in a number of ways. An immediate post implant plain pelvic x-ray is taken so that the number of seeds implanted and their overall distribution

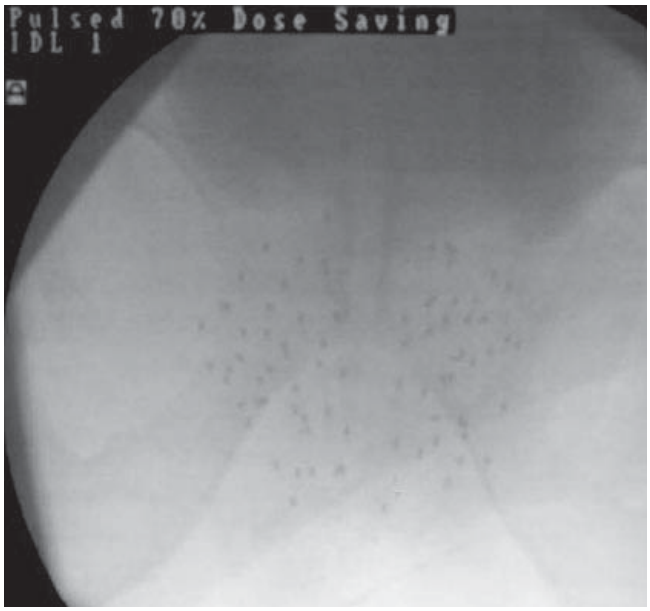


Fig. 8: On-table x-ray immediately following implantation showing good seed distribution.

can be seen and compared with the computer generated pre plan seed map (Fig. 8).

In line with other centres, we perform thin section (3 mm slices) CT scanning of the implanted area approximately six weeks following the implant. This time delay allows post treatment oedema to settle. The CT scanning allows a computer calculated prostate dose and can again be compared with the pre-plan values (Fig. 9). The importance of post -implant dosimetry was demonstrated by Stock *et al.* who showed that patients receiving a D90 of < 140 Gy had a PSA relapse free survival of 68% compared with 92% for those with a D90 >140 Gy.[24]

Patient advice

Patients are routinely discharged within 24 hours of their implant and are given a card detailing the type and quantity of isotope implanted to comply with the *Ionising Radiation Regulations 1999.*[25]

Due to the risk of seed ejection, it is common practice to discourage sexual activity for two months after the procedure and prolonged contact with young children and pregnant women during this period. Otherwise, a normal lifestyle may be resumed immediately post-implant.

Complications

Acute

Perioperative complications are relatively rare. As pre- and postoperative antibiotics are given, the risk of urinary tract infection is very low. Perineal haematoma formation is also low at about 1–5% and haematuria, while common immediately post implantation, usually settles within 24 hours. Clot retention is very uncommon. The risk of acute urinary retention is greater if the prostate volume exceeds 50 mL (not normally implanted) and also if there is any evidence of impaired flow preoperatively. Simple urethral catheterisation is the treatment of choice and retention usually resolves after 1–3 months. Of the first 150 patients treated at our centre, five required temporary catheterisation. One patient required a limited TURP 18 months post implant. This was completely successful and he is fully continent. One patient still has an indwelling urinary catheter 10 months post implant. Because of the long half-life of I125, it is important to delay any operative procedures for at least a year post implant.

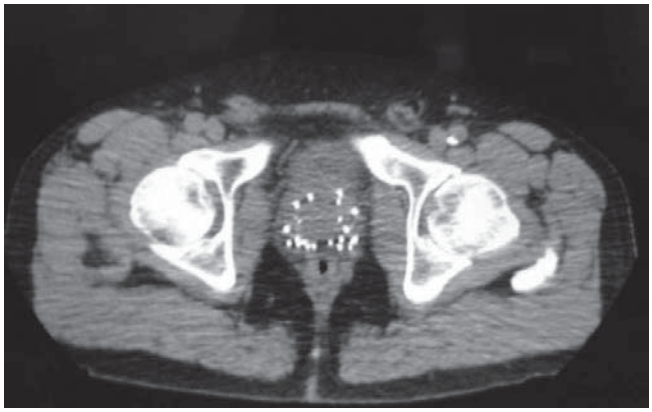


Fig. 9: Post implant axial CT image of the prostate showing good peripheral seed loading.

Early side effects are relatively common and are mainly urinary. Most patients experience mild obstructive and irritative symptoms due to urethral and bladder base irradiaton, for which they are routinely prescribed alpha blocker therapy for a three-month period, although some require to take this for up to one year.[26]

Patients are warned of the possibility of initial ejaculatory pain and haematospermia following implantation. This requires no specific therapy and usually settles spontaneously.

Acute rectal side effects are also common, occurring in 2–20% of patients.[27] Topical steroids can be given; rectal biopsy is actively discouraged due to the risk of fistula formation. Acute proctitis normally settles within a three-month period.

Late / chronic

The risk of late side effects is low. In the urinary system, the most common late side effect is urethral stricture in up to 2–12% of cases for which dilatation for symptomatic relief maybe required. The risk of rectal fistula formation is 1%.

It is difficult to put a figure on erectile dysfunction rate following prostate implantation. Initially, 85% potency rates were reported in previously potent men three years following implantation.[28] This has been questioned recently, however, the rate of sexual dysfunction in the normal, ageing population must be remembered. More recent data quote the risk of erectile dysfunction post implant of greater than 40%,[29] which is very similar to those of external beam therapy.

Outcome following brachytherapy

There are several caveats in the interpretation of published results in prostate brachytherapy. The majority of the treated population has a relatively good disease and the natural history of the untreated disease must be borne in mind i.e. active monitoring (watchful waiting). There are no randomised controlled trials comparing outcome between the various forms of therapy available in localised disease and the vagaries of patient selection, follow up regime and method of assessment of success must be remembered. However, monotherapy with I-125 in early stage disease has similar results to those expected with either radical prostatectomy or external beam radiation therapy.

What is clear and appears consistent, is that patients with poor prognostic factors tend to fare badly whatever the

primary treatment. There is a high rate of failure in those patients with a pre-diagnosis PSA > 20, therefore we do not recommend brachytherapy to this group. Another major prognostic factor is the Gleeson tumour grade with high grade tumours, defined as Gleeson 8–10, showing a statistically significant inferior PSA failure rate when treated by brachytherapy alone.[30]

Relapse and treatment options

The definition of biochemical failure is three consecutive PSA rises with at least three months between each (ASTRO consensus statement 1997). This, however, does not indicate the site of failure, local or distant, and is not necessarily an indication for immediate treatment. The phenomenon of PSA bounce is also recognised, whereby a rise in PSA level develops between one and two years after implantation but settles spontaneously.[31] The timing of salvage therapy is as difficult after implant therapy as after any localised treatment.

Recommendations based on PSA doubling time to start salvage therapy vary but, in general, a doubling time of six to 12 months once the PSA level reaches 10 is taken as a cut off.

Treatment following relapse is mainly hormonal blockade. Other possibilities include radical prostatectomy, cryotherapy or a second seed implant. All of these options have a relatively high risk of significant Grade 4 (i.e. requiring surgical correction) complications with the possible exception of salvage cryotherapy.[32,33]

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Endemicity of hepatitis B viral infection and its association with hepatocellular carcinoma in South East Asia

Alan Williams

Abstract

Chronic hepatitis B virus (HBV) is a serious disease globally and the medical and socioeconomic burden of the infection and its adverse clinical sequelae justify early therapy. The hepatitis B virus is highly infectious and is in fact 100 times more infectious than the HIV virus.[1] The estimated number of carriers in the world today stands at a staggering 350 million, with over one million carriers dying each year as a result of liver related complications.[2] While up to 90% acute hepatitis cases resolve without complication, up to 10% of cases persist beyond six months and enter a chronic phase that may last for months or years.[3]

There is a strong correlation between the age of infection and chronicity. Vertical transmission from mother to child during birth is the single most important feature of viral infection where the virus is endemic. Perinatal infection produces the highest rate of chronic HBV infection.[4] On the other hand, communities in areas where incidence is low demonstrate a tendency towards horizontal transmission of the virus via dialysis, needle-stick injuries among health workers, intravenous drug abuse and sexual transmission (homosexual or heterosexual). Hepatitis B and its chronicity is of particular importance in the Asia-Pacific region where the prevalence is high and because of its strong association with hepatocellular carcinoma (HCC). Carriers of HBV have a 230-fold greater risk of developing HCC than the general population.[2] Hepatocellular carcinoma is the most common cancer of the liver and while aetiological factors include cirrhosis, haemochromatosis, drugs, chemical toxins including alcohol and aflatoxins, HBV is still the main cause.[3] Worldwide, the incidence of HCC is estimated at 1 000 000 with a male to female ratio of 4:1.[5] According to a recent document titled *Consensus on the screening for hepatocellular carcinoma and its treatment* released by a committee of medical specialists chaired by the Director-General of Health Malaysia, Dato Dr Mohd Ismail Merican, HCC is the eighth most common malignant tumour in males and the fourth most common cause of death in Hospital Kuala Lumpur (HKL). This same committee found that in a review of 133 cases of HCC at HKL, 70% were attributed to HBV infection and 44% were of Chinese origin. The overall male to female ratio of patients with HCC was 5.3:1.[4] This document addresses the incidence of HBV and its progression to HCC and presents recommendations for screening which have become an accepted part of the management of patients with end stage liver disease in Malaysia.

Hepatitis B

The Hepatitis B virus is a double-stranded hepatotropic DNA virus and is a member of a group of animal viruses called hepadnaviruses, for which humans are the natural host. It is resilient and can withstand extreme conditions of temperature and humidity and may survive in physiologic and pathologic fluids, with the exception of faecal material. The virus is spread through contact with blood and body fluids such as semen, saliva, sweat, tears, breast milk and pathologic effusions. It can be spread from an infected mother to her offspring during birth or soon after (vertical transmission), through sexual contact, through transfusion of blood products (precluding communities where blood screening is mandatory), through contaminated needles and sharing of razor blades and tooth brushes. The virus can survive outside the body for up to one week, which makes transmission through open sores a factor.

The essential life-giving constituent of the small virus is nucleic acid embedded in a coat of protein. The intact environ is a double-shelled particle with an envelope of HBV surface antigen (HBsAg), an inner nucleocapsid of core antigen (HBcAg) and an active polymerase enzyme that is linked to a single molecule of double-stranded HBV DNA. Viral replication takes place predominantly in hepatocytes and to a lesser extent in the kidney, pancreas, bone marrow and spleen. Replication of HBV DNA occurs in the nucleus of hepatocytes and mistakes made during this process gives rise to different strains of the virus. The HBsAg appears in the blood one to six weeks post infection and is the earliest

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indicator of acute HBV.[1] The antigen appears before any symptoms are evident. The incubation of HBV in an infected individual is between six to 25 weeks.

Hepatitis B causes acute and chronic hepatitis. Acute HBV can range from subclinical disease to fulminant hepatic failure in about 2% of cases.[6] An insidious onset of nausea, anorexia, malaise and fatigue, or flu-like symptoms, such as pharyngitis, cough, photophobia, headache and myalgias may precede the onset of jaundice.[7] Unlike hepatitis A, fever is uncommon. In cases of fulminant hepatic failure, orthotopic liver transplantation is performed as a life-saving measure.

Hepatitis B is not directly cytopathogenic and chronic HBV infection is a dynamic state of interactions between the virus, hepatocytes and the host immune system.[5] The natural course of chronic HBV infection in Southeast Asia consists of three phases.[4] An initial phase of immune tolerance which manifests typically during perinatally acquired infection is followed by a phase of immune clearance with replicative virus and active liver disease. The intensity and duration of the second phase (including episodes of reactivation) will determine the degree of long-term liver damage. Once HBV-infected liver cells are destroyed by the immune system, patients enter the third phase when active replication ceases and HBeAg protein disappears. The third phase is that of non-replicative infection and inactive liver disease. Adult-acquired chronic HBV infection begins with the phase of immune clearance where hepatitis activity and increased alanine transaminase (ALT) levels up to five times the upper limit of normal may occur.[8] Liver ALT normalises and patients have no or minimal symptoms. Serum HBV DNA is no longer detected and the liver is deemed in remission.

During the third phase, the patient continues life as a 'healthy carrier', with evidence of residual liver damage. A carrier state is defined as a condition of harbouring an infective organism without manifesting symptoms of infection.[9] While no abnormality shows up on laboratory testing, these patients are still potentially infectious.

Of great concern in regions of high endemicity is the alarming number of children who acquire the disease through vertical transmission. The risk of developing chronic infection, defined as the persistence of HBsAg in the blood for more than six months,[1] is dependent on the age and immune function of the patient at the time of initial infection. Chronic infection with infants infected at birth constitutes a staggering 90% of cases, of which, about 5% to 10% become carriers. While it is unusual for neonates to have been infected with HBV *in utero*, alternately, infection due to traumatic delivery or through breast milk are considered to be means of transmission.[1] Why infants fail to clear the virus is unknown. During pregnancy, an infected mother may pass HBeAg across the placenta and a theory holds that this may suppress the development of the cellular immune response to nucleocapsid proteins (HBc) that are the target during immune clearance of infected hepatocytes.[1]

Treatment of HBV

Prevention of HBV is always a preferable option to treating already infected patients. It has been shown that in areas such as Asia, where HBV is endemic, universal vaccination at birth is highly effective.[8] On the other hand, treatment for infected HBV patients is available, and there are several potentially effective therapeutic agents that have been accepted and used in clinical practice or are undergoing clinical trials at the present time.[4] An attempt to treat HBV through sustained viral suppression is the key to reducing or preventing hepatic injury and disease progression.[4] This means that the primary goal is to eliminate or permanently suppress HBV. Currently, interferon-alpha-2, lamivudine and adefovir have been licensed globally.[5] In a recent study involving 48 weeks of adefovir dipoxil therapy, the results showed a significant decrease in serum HBsAg titer in chronic HBV patients.[10] Thymosin-alpha-1 has been approved in more than 30 countries, mainly in Asia.[12]

In the Asia-Pacific region, traditional Chinese medicines and other herbal remedies are used as either complimentary or alternative medicines for HBV treatment. While there is reported therapeutic potential in their effectiveness in treating chronic HBV, the quality of existing studies is poor and further, large-scale randomised trials are required to confirm their efficacy.[4]

Hepatocellular carcinoma

The relationship between persistent HBV infection and hepatocellular carcinoma (HCC), which usually develops decades post infection, has been well documented.[1] Hepatocellular carcinoma is the most common primary cancer of the liver and is associated with a very poor prognosis.[6] The prognosis of patients with HCC is determined not only by the stage of the cancer, but also the functional status of the underlying liver. Reported survival rates for untreated symptomatic patients vary from 0% at four months to 1% at two years.[5] Evidence shows that a greater predisposition to HCC exists through perinatal transmission than through adult acquisition of HBV which signifies the difference in incubation time.[1] Studies in Western Caucasian populations have reported the risk of developing HCC in carriers from low endemic areas where transmission occurs mainly in later life is likely to be very low.[1]

There is a striking correlation between worldwide geographic incidence of HCC and the prevalence of HBsAg chronic carriers.[4] In support of this epidemiological trend is the molecular-based evidence that HCC cell lines demonstrate HBV DNA integration in association with HBsAg secretion which implicates viral protein based aetiology.[5] Of 8804 patients screened in 1996 at the Institute for Medical Research in Malaysia, 20.5% were HBsAg positive, of this group 57% had had HBV DNA detected.[4] In a prospective study conducted on 22 707 male Chinese by Beasely and colleagues in Taiwan, it was found that the risk of HCC was 223 times greater among carriers of HBsAg than among non-carriers. In some patients spontaneous seroclearance of HBsAg may occur which is associated with excellent prognosis.[4] However, HCC may prevail if cirrhosis had already developed before HBsAg seroclearance.[4]

Cirrhosis is the non-specific, end-stage manifestation of hepatocyte injury that leads, ultimately, to tissue necrosis, fibrosis and the attempted regeneration of liver tissue. Ultrasound has a high sensitivity in its diagnosis. The sonographic appearance characterising cirrhosis is illustrated in Fig. 1. On ultrasound, the liver parenchyma is coarse and echogenic with overall poor penetration by the sound beam. The irregular surface, due to regenerating nodules, is easily demonstrated in the presence of ascites.

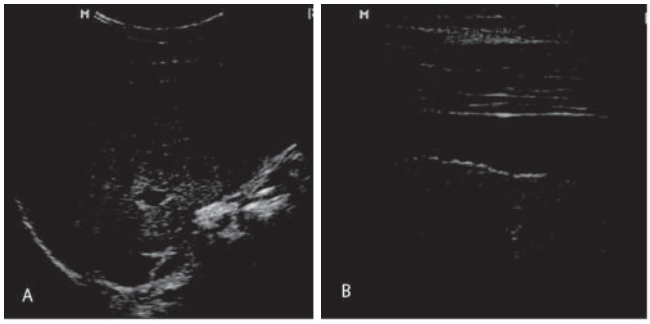

Fig. 1: Morphologic findings of hepatic cirrhosis. A: sagital view of a cirrhotic liver showing increased echogenicity and coarseness in the presence of ascites. B: The nodular surface of liver in the background of ascites is clearly demonstrated using a high frequency linear transducer.

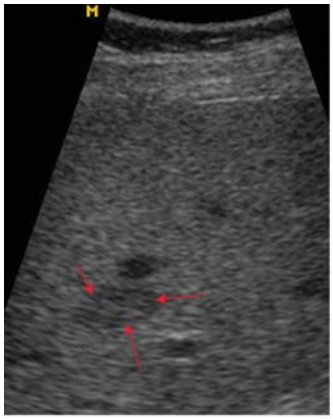

Fig 2: Hepatocellular carcinoma of the right hepatic lobe. A 1.9 cm solid lesion (arrows) located in segment six of the liver was picked up with reasonable ease on ultrasound. This 32-year-old female of Chinese origin was infected with HBV through blood transfusion at an early age. The lesion was proven to be HCC at biopsy. No alpha-phetoprotein testing had been conducted prior to this ultrasound.

Screening of HCC

Hepatocellular carcinoma follows two phases in the course of its natural history; a preclinical phase and a symptomatic phase.[4] The former can be further divided into a non-detectable and a detectable phase. It is the detectable phase that is targeted with screening techniques. There is a time-frame of one year between the preclinical and symptomatic phase and the tumour doubling time of asymptomatic HCC has been estimated to be six months, with a range of one to 19 months.[4] Understanding the natural history of HCC has important implications on its management and treatment.

Screening of end-stage liver disease patients is accepted clinical practice in Malaysia. Screening is defined as the one-time application of a test that allows for detection of a disease at a stage where intervention may significantly modify its natural course and outcome.[4] A recent study investigating the potential outcome of screening 1125 patients with chronic HBV and hepatitis C virus concluded that routine screening be reserved for patients with severe chronic hepatitis, cirrhosis or both.[4] In Malaysia, it has been recommended that screening be reserved for the high-risk groups only, and include:

- All cirrhotics;
- HBV carriers over the age of 40 years;
- HBV carriers less than 40 years of age with at least two risk factors; inclusive of a family history of HCC; and
- HCV sero-positive individuals over the age of 40 years.

Currently, the screening tests used and accepted are the serum alpha-fetoprotein (AFP) measurements and abdominal ultrasonography. In order that screening is effective, tests must be safe, simple, reproducible, valid and must demonstrate an early and reliable detection rate.[4] Tests should also be available and affordable to patients.

Interpreting results

Interpreting results of serum AFP levels is based on cut-off levels. The sensitivity and specificity of the tests depend largely on these cut-off levels. Cut-off levels set too high may lead to smaller tumors being missed initially, only to be detected at a later stage.

For example, in one study it was found that if the level was more than 100 ng/mL, 65% of HCCs 2 cm or less in diameter would have been missed and if the level chosen was more than 400 ng/mL, 75% of the cases of HCC would have been missed.[4]

Ultrasound used in collaboration with serum AFP testing is a simple, quick, cost effective and reproducible means off detecting tumors of the liver. Using AFP testing on its own is shown to be less effective in screening for HCC.[4] Evidence shows that 50% of tumors less than 3 cm in diameter can be missed when AFP testing is conducted alone.[4] As seen in Fig. 2, lesions as small as 1.9 cm can be demonstrated on ultrasound. As a guide, Merican *et al.* suggest that ultrasound examination be carried out in all patients with AFP levels greater than 20 ng/mL, especially if increases in AFP levels do not correlate with corresponding increases in serum ALT levels. Serial AFP measurements which show a rising trend that does not correlate correspondingly with the serum ALT levels is suggestive of HCC.[4]

Limitations of serum AFP and ultrasonographic screening for HCC have been documented. First, it must be remembered that AFP is not specific to HCC and that low levels are found in patients with acute hepatitis, germ cell tumors and pregnancy. Second, the use of AFP test data without collaborative ultrasound examination does reduce screening sensitivity. Third, the sensitivity and specificity of tumour detection using ultrasonography varies with cirrhotics and non-cirrhotics and last, ultrasound, as we know, is also operator dependant and will demonstrate interobserver variability.

Recommendations for screening

The big question is: when should screening be performed and how often should ultrasound be used for targeted individuals? If we consider the estimated doubling time of pre-symptomatic HCC to be six months and taking into account data from studies in China, a six-month surveillance interval would be a logical approach. The study in China showed that a rapidly dividing tumour took five months to increase in size from 1 cm to 3 cm.[4] In Malaysia, Merican *et al.* suggest that, based on this information, a recommended screening interval to detect HCC growing from an undetected size should be six months and that both AFP and ultrasonography be used in the instance of non-cirrhotics. In the case of cirrhotics, however, they believe that AFP levels should be assessed at three months while ultrasound still be performed at six months.

While effective screening may be the answer to the early

detection of HCC, the question of benefits to the patient in terms of treatment and outcomes need to be considered. This means that the treatment regime must improve the patient's prognosis in order that screening is considered worthwhile. For early treatment to be considered effective, it must increase the patient's survival time by at least the length of the interval between the pre-symptomatic diagnosis and symptomatic recognition. This is referred to as the 'lead time'.[4]

Conclusion

While several studies conducted on Western populations have reported that there was no prolongation of survival since the introduction of screening for HCC, others have indicated that a large number of smaller asymptomatic lesions were being detected at an early stage. Detecting smaller lesions in a well-preserved liver does improve the prospect of curable treatment such as surgical resection.

Screening policies are subject to economic restraints. Large scale screening in endemic regions has the potential to produce a larger than expected number of positive findings. This may lead to the increased demand for curative intervention and treatment that has important economic ramifications. Here in Asia, feasibility studies to assess the cost-effectiveness of screening programs have not yet emerged. There are limited data to support the notion that screening programs are not worthwhile.

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Evaluation of the arterial circulation of the lower extremities

Deb Coghlan

Purpose

i) To determine presence and extent of arterial insufficiency of the lower extremities, including degree of stenosis or length of occlusion;
ii) To identify abnormal structures that may interfere with the arterial circulation;
iii) To distinguish arterial insufficiency from non-vascular conditions; and
iv) To evaluate the efficacy of therapeutic interventions.

Indications

i) Single or bilateral leg pain or weakness;
ii) Absent or reduced pulses;
iii) Claudication;
iv) Ischaemic rest pain;
v) Femoral bruit;
vii) Distal embolisation;
viii) Pulsatile mass of femoral or popliteal veins;
ix) To exclude aneurysmal formation;
x) Evaluation post interventional procedures;
xiii) Progression of disease by comparison with a previous study; and
xiv) Compartment syndromes.

Types of testing – indirect and direct

i) *Indirect physiological tests*
   a) Resting ankle-brachial indices; and
   b) Treadmill testing, pending no contraindications or limitations.
ii) *Direct testing using Duplex imaging* of the arterial segments of the lower extremities.

Equipment and supplies

1) Indirect Physiological Testing;

a) Doppler instrumentation with 5.0–8.0 MHz continuous wave Doppler transducer, pressure manometer and automatic cuff inflator (if available) (Fig. 1.)
b) Otherwise manual inflation (Fig. 1a)

i) Four blood pressure cuffs with (ranging from 10–12 cm) bladders. The width of the cuff should be at least 20% greater than the diameter of the limb so that the artery under evaluation can be compressed when the bladder is inflated;

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Fig. 1.

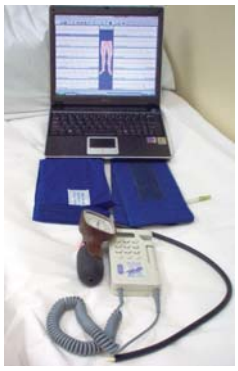

Fig. 1a.

ii) Acoustic gel;
iii) Treadmill with speed variability and changeable grade/elevation capacity;
iv) Stopwatch.

2) Direct imaging study

i) High-resolution real-time image with integrated, pulsed, range-gated Doppler capabilities, with colour flow imaging;
ii) Transducer with 3.5, 5.0 and 7.5 MHz as needed, based on patient's size and condition;
iii) Acoustic gel;
iv) Printer for hard copy documentation; and
v) Transducer cleaning solution.

Patient preparation

i) Explain the procedure to patient. Assure patient that the study is non-invasive in nature. Allow time for questions;
ii) Prior to testing it is important to obtain a good patient history with a description of the current symptoms; and
iii) Have patient disrobe so that there is access to both legs up to the groin as well as access to chest (for ECG), if indicated.

Physiological testing

i) Resting ankle-brachial indices (ABI):

General considerations

All patients undergoing arterial evaluation should have at least resting Ankle/Brachial Index (ABI);

- ABI = compares the systolic blood pressure of the ankle to that of the arm; these measurements are simple and reproducible and useful in the assessment, follow-up and treatment of patients with peripheral vascular disease (PVD). ABIs are helpful in determining whether an ulcer is due to neuropathy, venous stasis, or ischaemia and in deciding whether leg pain is primarily neuropathic or ischaemic in nature.

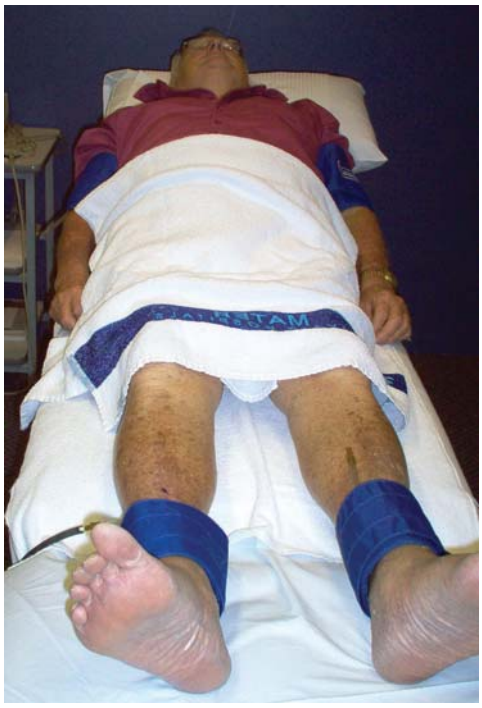

Fig. 2.

- The cuffs should be placed around both ankles and on arms as in Fig. 2. Tissue, not bony structures, must be compressed;
- Cuffs must be placed 'straight' on the extremity site and should fit snugly so that the bladder inflation transmits the pressure into the tissue;
- When inflating the cuff, inflate 15–20 mmHg above the audible arterial Doppler signal;
- Deflating the cuff should be done slowly (2-4 mmHg per second) while listening for the return of blood flow to the distal part of the limb. Note the pressure reading when the first arterial signal is heard. This is considered the systolic pressure at the level of the cuff;
- If the pressure measurement needs to be repeated, the cuff should be fully deflated for about 1 min. prior to each inflation; and
- The optimal velocity signal should be obtained. Place acoustic gel between the probe and the skin. The probe should be placed 45–60° to the angle of the vessel (Fig. 3).

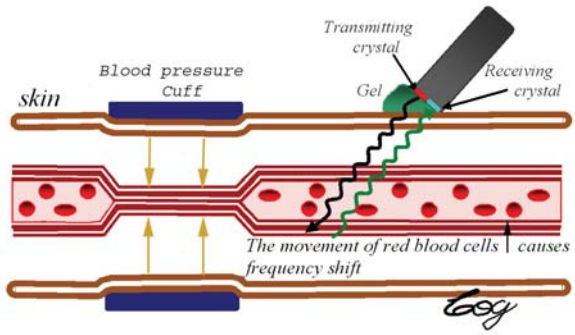

Fig. 3.

Waveform analysis

- Simply inspecting the contour of the velocity waveform is often of considerable diagnostic value.
- The normal velocity waveform is triphasic (Fig. 4). Velocity increases rapidly in early systole, reaches a peak, and then drops almost equally as rapidly, reversing in early diastole. In late diastole, the velocity tracing again becomes positive before returning to the zero-flow baseline.
- Atherosclerotic disease in the arteries proximal to the site of the probe initially produces a subtle change in the contour of the systolic forward-flow wave at the peak or in the early deceleration phase (Fig. 5.)
- With increasing proximal stenosis, the reverse-flow component is dampened and then disappears entirely (Fig. 6a), as the stenosis becomes more severe, progressing to total occlusion, the rate of acceleration of the forward-flow wave decreases, the peak becomes rounded, and the wave becomes less pulsatile (Fig. 6b).

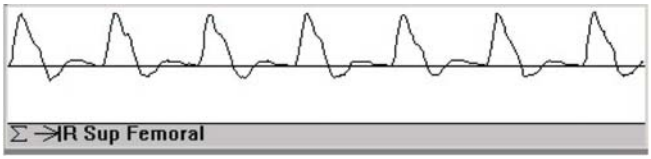

Fig. 4 Normal triphasic waveform.

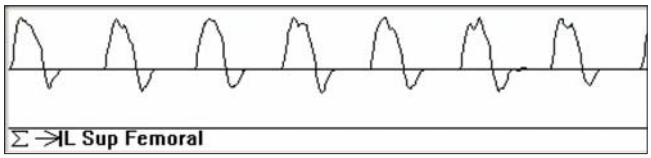

Fig. 5 Biphasic flow – loss of positive flow after negative flow. Note rounded peak. There will be a decrease in amplitude.

Monophasic flow, note the loss of reverse (negative) flow.

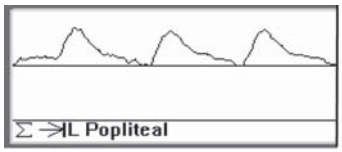

Fig. 6a

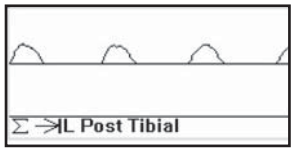

Fig. 6b

Doppler criteria

Criteria used at Queensland Vascular Diagnosis for elderly patients based on Bernstein E[4]

Clinical category	ABI
Calcified vessels (diabetic) (In incompressible discontinue testing)	> 1.25
Normal	0.9–1.25
Claudication	0.0–0.89
Rest pain	0.25–0.49
Severe arterial compromise (Ischaemic rest pain, trophic changes)	< 0.25

Protocol

The protocol below represents full physiological testing. Many practices only obtain brachial, Posterior tibial artery (PTA) and Dorsalis pedis artery (DP) readings.

- Obtain bilateral brachial arm pressures. If pressures differ by 20 mmHg or more, or if any audible abnormality is noted, record both brachial waveforms; and
- Locate the CFA, (Fig. 7b). Obtain a Doppler signal (Fig. 7a) and a hard copy representation from the CFA in both legs.

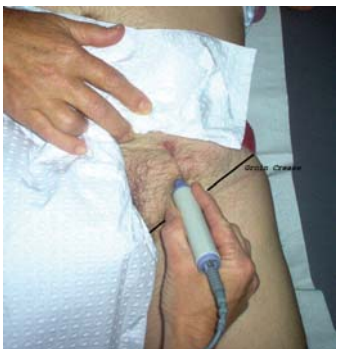

Fig. 7a.

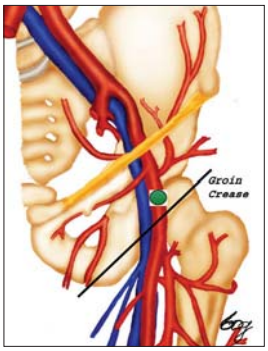

Fig. 7b.

At this point the artery is slightly lateral to the vein.

- *Represents strongest signal in most limbs.*
- Locate the popliteal artery (Fig. 8b), (flexion of the knee and mild external rotation of the leg provide access to the popliteal artery (Fig. 8a)). Obtain a Doppler signal and a hard copy representation from the popliteal arteries in both legs.

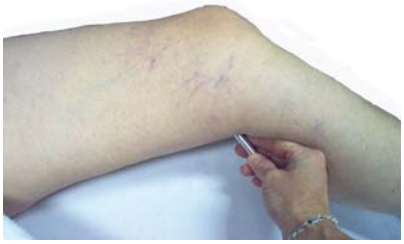

Fig. 8a.

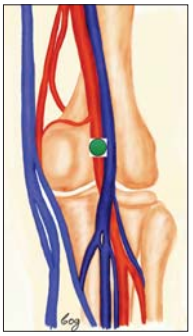

Fig. 8b.

- Apply cuffs 2–3 cm above medial malleolus on both legs if possible.
- On the right side locate the PTA Fig. 9b. Obtain a Doppler signal, (Fig. 9a) hard copy representation and systolic pressure.

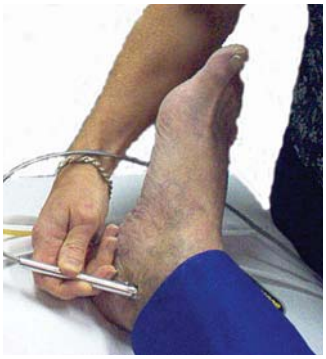

Fig. 9a.

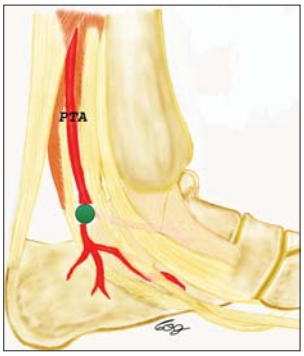

Fig. 9b.

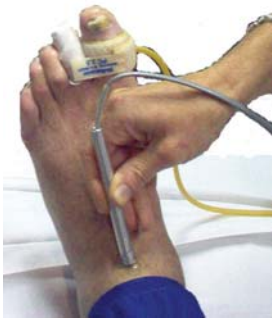

Fig. 10a.

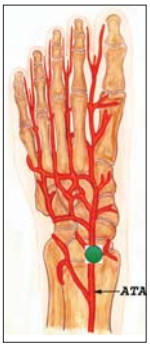

Fig. 10b.

- Locate the anterior tibial artery (ATA) Fig. 10b. Obtain a Doppler signal, (Fig. 10a) take hard copy representation and systolic pressure.
- Locate the dorsalis pedis artery (DP) Fig. 11b. Obtain a Doppler signal (Fig. 11a), hard copy representation and systolic pressure.

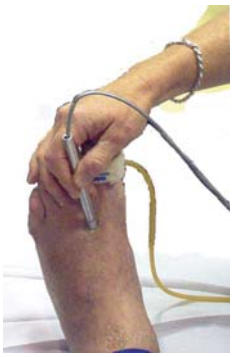

Fig. 11a.

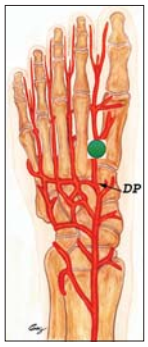

Fig. 11b.

- Repeat examination on the other side.
- If patient is a candidate for exercise testing, continue on to exercise test.
- If patient is not a candidate for exercise testing, continue on to protocol for duplex imaging.

Exercise treadmill test

Limitations / contraindications

i) History of unstable angina or recent myocardial infarction, or other significant cardiac conditions;
ii) Hypertension (resting systolic BP > 200 mmHg);
iii) Shortness of breath;
iv) Inability to walk on treadmill;
v) Ischaemic rest pain;
vi) Patients with extensive bandages or casts on lower limbs which cannot be removed;
vii) Any site of trauma, surgery, ulceration, etc which should not be compressed by a blood pressure cuff; and
viii) Patients with calcified vessels that render falsely elevaed pressures. These include many diabetics and patients with end-stage renal disease.

General considerations

- Reducing peripheral vascular resistance by walking exercise is an effective physiologic method of stressing the lower extremity circulation. Under stress, lesions that may not appear to be significant at rest can be evaluated. Exercise testing enables the surgeon to better appreciate the functional disability that the arterial lesions produce.
- During exercise there is an increased metabolic demand for oxygenated blood. Heart rate will also increase to try and meet the demands, and an increase in peripheral blood pressure will occur.
- Therefore the peak systolic brachial and ankle pressures should be higher at peak exercise than those recorded in the resting state.
- In limbs with restricted arterial inflow a pressure drop will occur after exercise. (A reduction of > 20 mmHg from the resting pressure indicates haemodynamically significant PVD).

- Patients with advanced arterial ischemia (ABI < 0.40) can be evaluated by simple resting pressures only as these patients usually have multi-segment disease and will not tolerate treadmill testing.

Protocol

- The ankle blood pressure cuffs are left in place and the ends of the cuffs are taped or tucked in so that they do not get in the patient's way during the exercise;
- Only one arm blood pressure cuff is needed (use the side that had the higher resting pressure);
- Have patient walk to treadmill. Explain that the speed and grade are low and not the same as a stress test used in cardiac evaluations;
- Set the treadmill machine for a speed of 2.4 km/h with a 10% grade. Start treadmill. Begin timing test for 5 min;
- During the exercise period, ascertain from the patient onset, location and extent of leg pain that s/he may be experienced;
- Ascertain any problems other than claudication, i.e. shortness of breath (SOB), angina, chest discomfort, dizziness or other problems;
- Treadmill testing should be stopped when any of the following occur:
  - If patient complains of chest pain and/or SOB; and
  - At the end of 5 min (or less, if patient is symptomatic before full 5 min reached);
- At the end of the test, assist patient back to the exam table;
- Obtain and record ankle pressures (from the vessel that had the highest pressure) at 1, 2, 4, 6, 8 and 10 min or until pressures return to baseline;
  NB. In many practices it is acceptable to only record immediate post exercise pressures, and then proceed to duplex imaging; and
- Brachial pressures are taken after leg pressure measurement.

Documentation

- The following information is entered onto the lab worksheet.
  i) The patient's symptoms, the time they occurred during the exercise and any other pertinent observations;
  ii) The duration of the exercise;
  iii) The speed and grade along with any changes made in exercise parameters during the exercise period;
  iv) Post-exercise blood pressure measurements; and
  v) Any adverse responses or other pertinent observations noted.

Interpretation

- Although the ankle and arm blood pressures usually increase after exercise, a finding of no change or a minimum drop may be within normal limits.
- If shortness of breath occurs, it is important to note that this fact, rather than symptoms in the legs, was the reason that the patient stopped walking. The patient may still have claudication, but shortness of breath may be more disabling than the leg pain.
- In patients with symptomatic disease, post-exercise changes can be divided into the following:
  a) Ankle pressures that fall to low or virtually unrecordable levels immediately after exercise and then increase towards the resting level within 2–6 min suggest a single level occlusion or obstruction; and
  b) Ankle pressures that remain decreased or unrecordable for 10 min suggest multilevel arterial obstructions. It is important to note that such findings are rare in cases of isolated iliac artery occlusion.

Use the above criteria in determining target areas in the duplex imaging test.

Duplex imaging studies

Contraindications and limitations

i) Bowel gas;
ii) Obesity;
iii) Recent surgery, dressings/bandaging in area to be scanned; and
iv) Diffuse arterial wall calcification eg renal patients and diabetics.

General considerations

- In transverse view, obtain images of arteries, including major bifurcations. Look for presence and extent of disease.
- In longitudinal view, measure Doppler flow velocities in all segments of interest. Velocity ratios are calculated from the proximal normal artery approaching the stenosis and the stenotic segment.
- Use colour flow to help identify areas of increased velocity. (Fig. 12) (imaging angles are kept between 45 and 60 degrees, colour aliasing will indicate a stenosis.)

With velocities over 400 cm/sec aliasing will often occur.

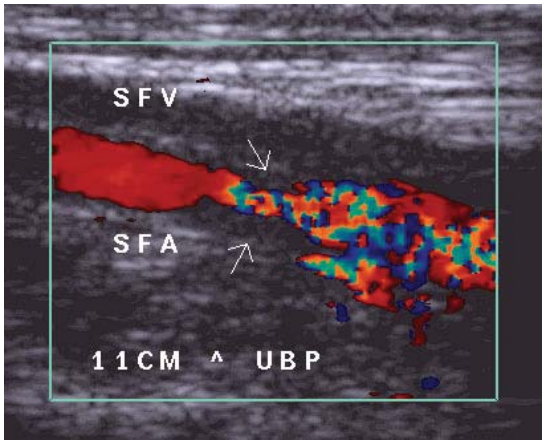

Fig. 12.

- When there is disease noted peak systolic velocities are

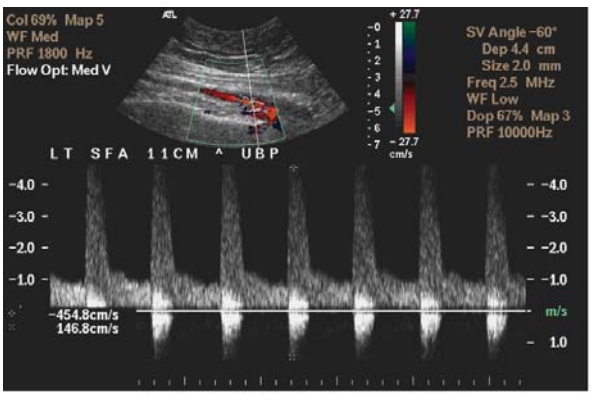

Fig. 13.

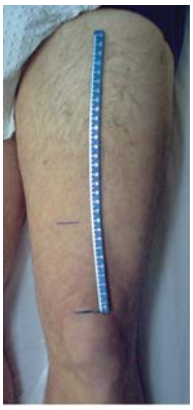

Fig. 14.

recorded at site of highest Doppler shift. (Fig 13)

- A skin marker is used to locate the stenosis from a prominent landmark, (Fig 14) i.e. _cm above upper border of the patella (UBP), or _cm below the groin crease. A watercolour pencil is ideal.
- The length of the occlusive or stenotic segments should be measured and located above or below the preferred landmarks.
- If an occlusion is suspected you may need to decrease the colour gain (lower sensitivity), and colour PRF to insure no 'trickle flow' is present. Note any collateral vessels at the point of obstruction.
- In areas of dense calcification it is important to image the vessel from various angles, and the Doppler gain may have to be increased in order to penetrate through the dense calcification. These areas should be noted as they can be a source of 'false positive' occlusions.
- It is important to note if the waveform profile changes, proximal to an occlusion you may see high resistance low amplitude Doppler signal (Fig. 15a–15b).

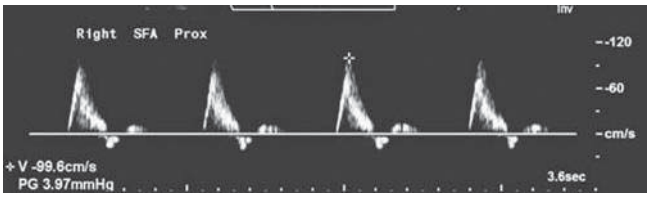

Fig. 15a. Triphasic waveform upstream from the occlusion. You may notice a slight broadening of the waveform.

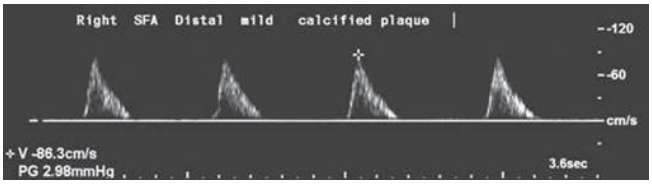

Fig. 15b. High resistance flow proximal to occlusion.

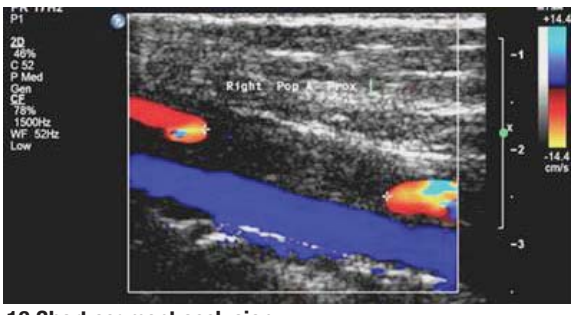

Fig. 16 Short segment occlusion.

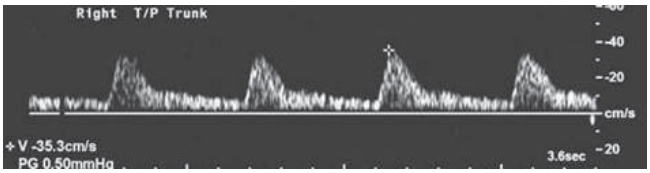

Fig. 16a Dampened monophasic waveform distal to the occlusion.

- Distal to an occlusion (Fig. 16) there is usually a monophasic profile, (Fig. 16a) rounded due to the delay in upstroke.

Anatomy
Test protocol

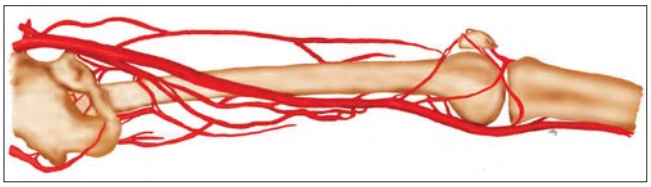

Fig. 17. Anatomical supine picture from the CFA to the Tibio-peroneal trunk.

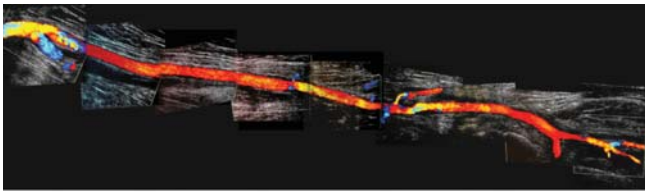

Fig. 18. Colour Doppler picture of the same anatomical section.

Ideally, the aorto-iliac segment should be evaluated on all patients with suspected atherosclerotic disease in the lower extremities.

- The lower extremity examination begins with the patient supine at the level of the groin crease in the transverse position and the leg slightly externally rotated (Fig. 19).
- This will allow evaluation of the CFA and profunda

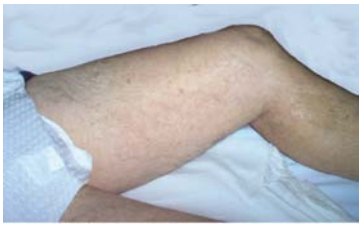

Fig. 19.

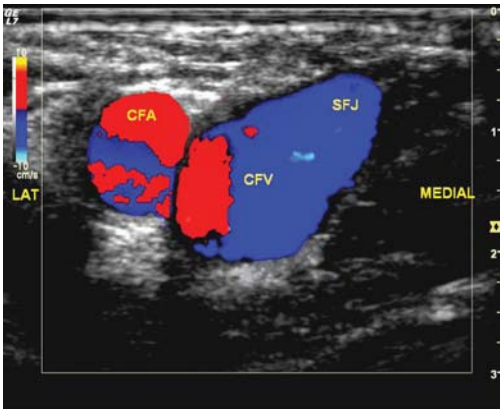

Fig. 20.

bifurcation, noting any aneurysmal dilatation (Fig. 20).

The CFA lies laterally to the common femoral vein (CFV) – (usually larger than the artery), and just before the bifurcation the Sapheno-femoral junction (SFJ) can be imaged medially.

- Turn the transducer longitudinal, and angling superiorly to ensure the distal external iliac artery is imaged, the artery is followed to the femoral bifurcation. Obtain peak systolic velocity (PSV) and spectral waveform.
- At the bifurcation, the profunda artery courses posteriorly and the femoral artery (FA), anteriorly (Fig. 21).
- Obtain spectral waveform and PSV from origins of the

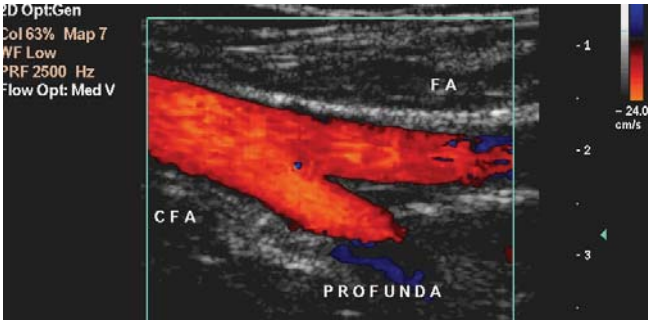

Fig. 21.

femoral and profunda arteries.

- The entire length of the FA is then interrogated from the origin to the adductor. Waveforms and PSV measurements are taken, noting any areas of increase velocity or plaque formation.
- As the FA dives deep into the adductor region it may be useful to use the anterior approach (Fig. 22), (using the vastus medius muscle). If imaging is still suboptimal, try using the 3.5 curved linear probe.
- The popliteal artery is best assessed with the leg exter-

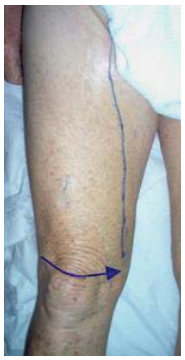

Fig. 22.

nally rotated to the side (Fig. 23).

- If you have difficulty imaging the proximal artery, rotate the patient away from you and image the artery from the lateral side (Fig. 24).

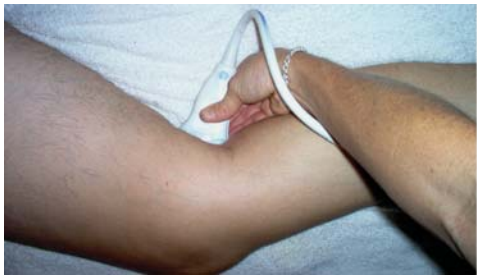

Fig. 23. Angle superiorly to ensure the imaged area has overlapped from the anterior approach.

- Interrogate the entire artery down to and including the tibio-peroneal trunk (Fig 25).

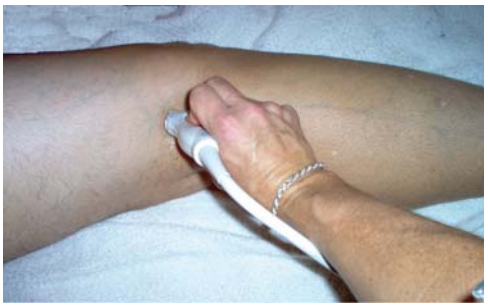

Fig. 24.

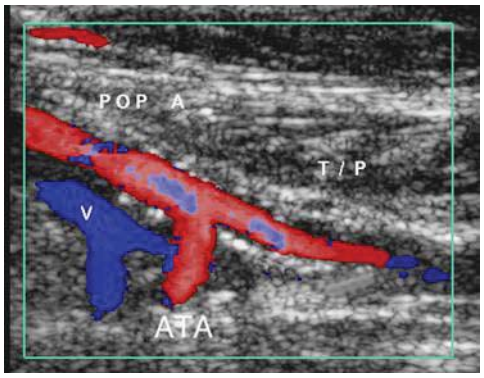

Fig. 25 At this point the anterior tibial artery should be seen coursing posteriorly. A Doppler reading may be taken at this point.

- Distally, the tibio-peroneal trunk divides into the posterior tibial and peroneal arteries (Fig. 26).

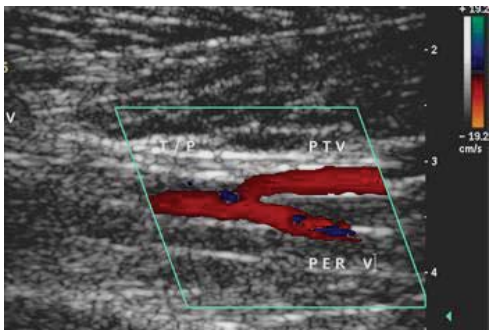

Fig. 26.

- The calf arteries are then imaged from their origins to the ankle, with a waveform and PSV taken, noting any stenosis or occlusions.
- The PTA is located medial to the medial border of the tibia and, from the mid calf, courses quite anteriorly. Follow the PTA from its origin to the ankle noting any areas of increased velocity or occlusion (Fig. 27).

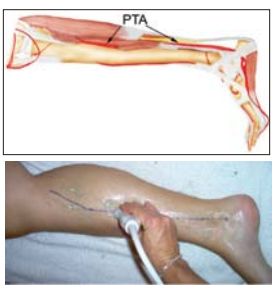

Fig. 27 If you have difficulty locating the PTA it may be easier to start from the ankle coursing cephalically.

- The peroneal artery is posterior to the PTA in this position, and runs almost parallel (Fig. 28).

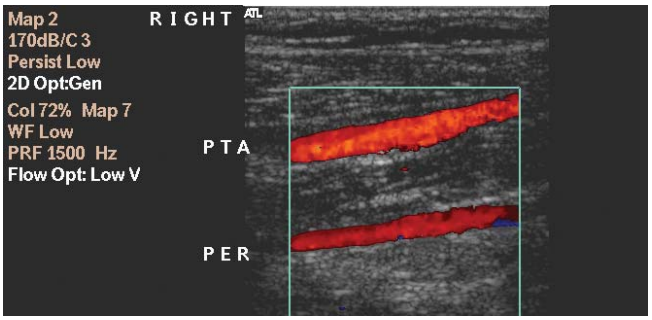

Fig. 28.

- If you are unable to image the peroneal artery from this position, turn the patient away from you, find the fibular and angle up behind the fibular (Fig. 29).

Locate the fibular head and place the transducer between the fibular and tibia.

- The ATA can be imaged either with the leg straight or bent upwards (Fig. 30).
- In this position the ATA courses anteriorly from the popliteal artery (Fig 31).
- The ATA courses beneath the tibialis anterior muscle proximally and distally courses anterior to the tibia. (Fig. 32)

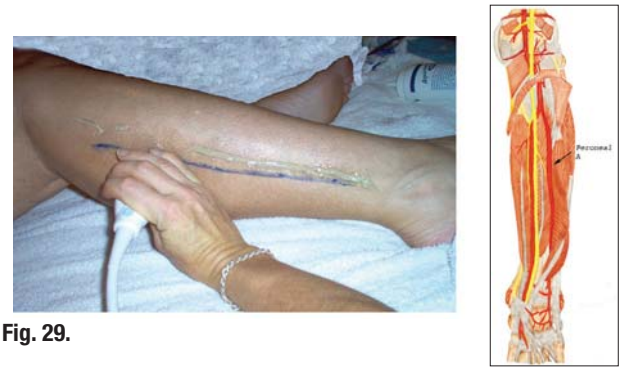

Fig. 29.

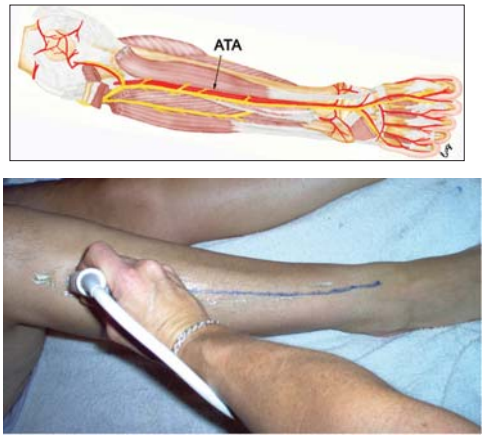

Fig. 30.

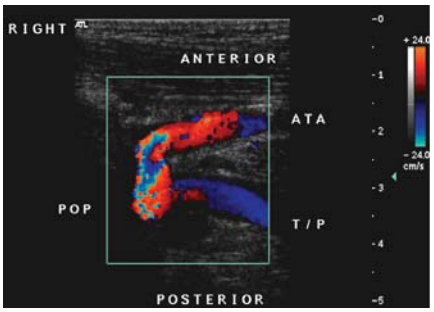

Fig. 31.

Interpretation

Duplex-derived velocity spectra		
% Stenosis	Peak Systolic Velocity	Ratio
Normal	< 150 cm/sec	< 1.5
< 50	150–200 cm/sec	1.5–2.0
50–75	200–400 cm/sec	2.0–4.0
> 75	> 400 cm/sec	> 4.0
Occlusion	No flow by colour Doppler/pulsed Doppler spectra From Cossman *et al.* JVS 1989	

Documentation

Still prints of representative segments of the examination should be taken. These should include, but are not limited to, the following:

i) The major bifurcation/s;
   a) In most examinations, this would be the common femoral, profunda, femoral, popliteal, tibio-peroneal trunk, posterior tibial, anterior tibial and peroneal arteries as seen in a longitudinal view.

ii) Area of greatest stenosis;
   a) This should be labelled showing its exact location and include the velocity profiles demonstrating the highest measurements.
   b) Images and PSV of vessel proximal to the stenosis, this will be needed when determining the ratio.
   c) And distal to stenosis, including the velocity profiles.

iii) Any other prints which show pertinent information to the study.

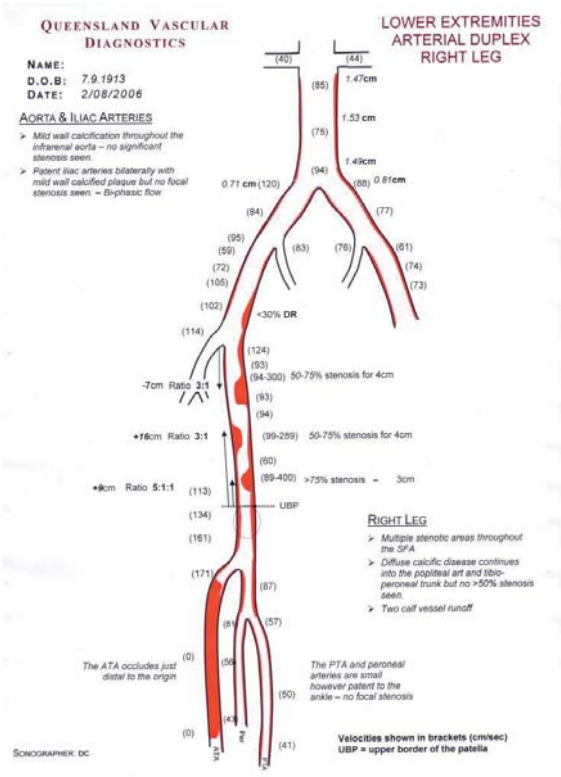

Fig. 32 Worksheet for lower exremities arterial duplex right leg.

Worksheets (Fig. 32) detailed diagrams containing pathology, velocity information and other details, can be presented professionally to allow the referring doctor to quickly assess the information.

Cleaning and care of equipment

i) The continuous wave Doppler transducer and duplex imaging transducer are wiped clean of gel and cleaned with approved disinfectant.
ii) The scan head is stored in a secure holding place on the duplex scanner. The cords are tucked out of the way of the wheels.
iii) The cuffs are kept free of gel and are washed regularly.

Conclusion

The combination of indirect and direct testing methods can provide valuable functional and haemodynamic information and should be performed to rule out arterial stenosis or occlusion in native arteries.

Acknowledgements

I would like to acknowledge the following colleagues for their help and inspiration: Prof John Harris, Assoc Prof Phillip Walker and, especially, Ms Jeni Kidd.

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Abstracts from the 36th Annual Scientific Meeting 2006 Melbourne, Victoria: Part 1

Author Index

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How to assess ovarian tumour with ultrasound

Dr Kittipong Vairojanavong, Rajavithi Hospital, Thailand

Objective

To determine the accuracy in ultrasound diagnosis of benign and malignant ovarian tumours by using a morphologic score of 4 and above, resistance index (RI) of 0.4 and lower and pulsatility index (PI) of 1 and lower.

Method

Among 177 ovarian masses, a morphologic score was given according to the ultrasound findings whether uni- or multilocular, condition of the inner wall of the tumour, homogenous or echogenic fluid content, cystic, complex or solid, presence of proliferation and ascites.

For RI and PI, 167 cases were assessed, at least five samples inside the mass were applied and the lowest one was used for interpretation.

Results

A morphologic score of 4 and below was noted in 143 ovarian tumours, all were histologically confirmed to be benign and 21 of 34 masses with morphologic score higher than 4 were histologically malignant (61.7%). Among 55 cases that were histologically proved to be malignant, 50 cases showed RI of 4 and below (90.9%) while PI was noted below 1 in 52 of 55 malignant cases (94.5%).

Conclusion

Morphologic score, RI and PI can be used in differentiating benign and malignant ovarian tumours. PI gives highest accuracy in diagnosis of malignant ovarian tumour.

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Fetal biometry – ellipse vs trace circumference measurements

Ms Susan Westerway, North Shore Private Hospital, NSW

Head and abdominal circumference measurements are now performed routinely when assessing fetal size/growth. All modern ultrasound systems allow for both ellipse and trace measuring, but is there a difference in the resulting circumference measurement?

Objective

The objective of this study was to analyse the circumference measurements obtained by direct trace and ellipse mode and to determine if there was any significant difference seen between the two methods of measuring the head and abdominal circumference.

Method

Two hundred consecutive head and abdomen images were collected from pregnancies with gestation between 14 weeks and term. Each image was measured by both the trace and ellipse mode. The mean of the two measurements and difference (ellipse mode – direct trace) from the mean in mm was calculated and plotted. The relationship between the mean and the difference for each stage of gestation was then analysed.

Results

There was a statistically significant difference between the two measuring methods for the abdominal circumference. In the third trimester, 17% of abdominal circumferences were non-elliptical, thus making the ellipse mode unreliable. No statistically significant difference was seen between the head circumference methods. Trace method gave a larger reading by 1.6% in abdominal circumference assessment and 0.7% in head measurements.

Conclusion

Ellipse mode measuring, although convenient, should only be used if there is a suitable line of fit – particularly in the third trimester when images may be non-elliptical.

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Morphologic ultrasound appearance of complex ovarian tumour

Dr Kittipong Vairojanavong, Rajavithi Hospital, Thailand

Most complex ovarian tumours show classical or typical morphologic appearances, compatible with its histo-pathological findings. By ultrasound, some complex ovarian cystic lesions such as endometriotic cyst may show sonolucent or echogenic fluid content. Depending also on gain control setting, clots can be seen as a white solid part inside the cyst in case of severe dysmenorrhea. Most typical cases of endometriotic cyst show a thin wall, irregular and thick wall cyst containing typical echogenic fluid content. There may be a septum in the cyst. Dermoids or benign teratoma shows various types of features. Content may be sonolucent or echogenic, the contents may be teeth, hair or brownish balls which are a typical feature of benign cystic teratoma.

In malignant ovarian tumours, morphologic appearances are more typical, given ultrasound features for each kind of histo-pathologic appearance. Various complex ovarian tumours will be shown ultrasonically demonstrating their typical ultrasound findings. This presentation is aimed to share the experience of the author on morphologic ultrasound appearance of various complex ovarian tumours.

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Does it matter? The effect of ultrasound machine settings on small measurements

Dr Rebecca Chalmers, Monash Medical Centre, Vic, Dr Andrew Edwards, Monash Medical Centre, Vic, Dr Mark Teoh, Monash Medical Centre, Vic, Ms Lisa Clarke, Monash Medical Centre, Vic

Objective

To establish the impact of ultrasound machine settings on small measurements in terms of the distance measured, repeatability and observer error.

Abstract

Image enhancing modalities are widely incorporated into ultrasound machine design, providing improved image quality and artifact reduction. However, little evidence exists analysing the effect of such techniques on the accuracy of small measurements, particularly nuchal translucency assessments.

This study utilises an *in-vitro* experimental set-up, mimicking a nuchal translucency measurement. Two membrane layers are separated by a variable metal ring and immersed in a water bath to create a fluid filled structure of a defined thickness. The effect of multiple machine settings were assessed independently, including compound imaging, harmonics, XRes®, gain, dynamic range, magnification and transducer frequency and design. Accredited participants performed multiple blinded measurements of this structure using the standard nuchal translucency protocol.

Our results confirmed minimal intraobserver and interobserver variability of measurements recorded. For an estimated 2.3 mm measurement, the machine settings producing the greatest difference were:

75% image magnification versus 200% magnification – 0.31 mm larger measurement

harmonics off versus on – 0.27 mm larger

low versus high gain – 0.25 mm larger

low versus high dynamic range – 0.15 mm larger

Altering the other variables had minimal impact.

This study confirms that image magnification, harmonics, gain and dynamic range settings have a significant impact upon small measurements and quantifies the impact of these changes in detail. For nuchal translucency measurements this could result in risk assessment alteration and may require standardisation of machine settings.

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Exploring the popliteal fossa

Professor John Harris, University of Sydney, NSW

Although over 90% of arterial pathology affecting lower extremity arteries is related to atherosclerosis, rare conditions do occur and are encountered uniquely in the popliteal fossa. This relates in part to the embryological derivation of the popliteal artery and the proximity of that vessel to the knee joint.

Unique conditions include popliteal arterial entrapment, whereby abnormalities of the gastrocnemius or popliteus muscles intermittently compress the popliteal artery, causing claudication in young patients. Another rare cause of claudication is adventitial cystic disease where a ganglion like collection of viscous synovial fluid, possibly arising from a communication with the knee joint, infiltrates the arterial wall causing compression of the arterial lumen.

Popliteal aneurysms behave differently to aortic aneurysms, tending to embolise or thrombose. These can be now treated by endovascular means, so accurate measurement of the aneurismal extent and the diameters of the adjacent popliteal arterial lumen are needed in pre-procedural planning.

Unique anomalies are also seen during the venous examination. In the differential diagnosis of venous thrombosis, Baker's cysts are often seen in the popliteal fossa, as are occasional popliteal venous aneurysms.

All these conditions have distinguishing ultrasound and other imaging characteristics, so background knowledge of these conditions and requisite skill on the part of the sonographer is needed to clearly delineate these unusual conditions.

Reference

1 Levien L. Non atheromatous causes of popliteal arterial disease. In: Rutherford RB, ed., Vascular Surgery, 6th ed WB Saunders, Philadelphia, 2006.

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Potential ultrasound facilitated overuse of carotid interventions

Prof Gregory Moneta, Portland Veterans Affairs Medical Center, Oregon, USA

Ultrasound has clearly emerged as the primary method of stratification of atherosclerosis-induced internal carotid artery (ICA) stenosis. It has replaced angiography as the test of choice prior to carotid endarterectomy.

For such a widely accepted diagnostic test, carotid ultrasound is subject to a surprising number of factors that contribute to its variability. Technologists, laboratory protocols, physicians, the ultrasound machines used, the method of measuring angiographic stenosis, and individual patient populations can all influence proposed criteria for ultrasound stratification of ICA stenosis. Given these many potential sources of variability, it is not surprising there exists great discrepancy in proposed criteria for stratification of ICA stenosis.

This well acknowledged variability of carotid ultrasound led to the largest accrediting organisation for vascular laboratories, the ICAVL, to demand individual laboratories adhere to laboratory specific protocols, and perform validation of diagnostic criteria to receive accreditation in the performance of ultrasound studies of the cervical carotid artery.

It was one of the prime motivating factors for the Society of Radiology in Ultrasound (SRU) Carotid Consensus Conference. Participants in the conference were charged with reviewing recent literature and developing a reasonable set of criteria for performance and interpretation of carotid ultrasound studies and for stratification of ICA stenosis.

Conference participants easily agreed that adherence to protocols with consistently applied diagnostic criteria by all individuals within a laboratory is highly desirable. Participants also agreed that any proposed diagnostic criteria deriving from the conference, potentially, should have maximum clinical relevance. This meant proposing criteria relevant to incorporating threshold values of stenosis pertinent to the results of the randomised trials of carotid endarterectomy. Thus the criteria agreed to incorporate 50%, 60% and 70% levels of stenosis and minimise the importance of stratifying minor (< 50%) degrees of ICA stenosis.

It is certain the opinions deriving from the conference will not please everyone. In particular, the relatively low flow velocities that the conference participants agreed upon to suggest > 50%, > 60% and > 70% ICA stenosis have profound implications in selection of patients for prophylactic carotid endarterectomy. Given the marginal therapeutic benefit of prophylactic carotid endarterectomy documented by ACAS and the recently published European trial of carotid endarterectomy for asymptomatic carotid stenosis, strict adherence to the SRU consensus conference guidelines may contribute to an even greater increase in carotid endarectomy for asymptomatic disease.

The conference emphasised sensitivity for predicting ICA stenosis. However, while sensitivity is important for the current clinical care of patients, positive and negative predictive values are perhaps of more value. This derives from the fact that the randomised trials of carotid endarectomy have established threshold levels of angiographic ICA stenosis beyond which symptomatic and asymptomatic patients benefit from carotid endarterectomy.

When the therapeutic index for a carotid intervention is relatively broad, i.e., the risk of a procedure is relatively small in comparison to the natural history of the disease, a non-invasive test that has a high negative predictive value to exclude the presence of disease is desirable. Lower positive predictive values may be acceptable. In such cases it is likely patients with lesions just below the 'optimal' threshold will also statistically derive some benefit from the procedure. Consider a patient with symptomatic ICA stenosis. High-grade, > 70% symptomatic ICA stenosis, has a relatively high therapeutic index for carotid endarterectomy. NASCET data also indicates that patients with < 70% to 50% symptomatic ICA stenosis also benefit from carotid endarterectomy, although to a lesser extent. It follows that it is undesirable to fail to identify a patient with symptoms referable to the carotid artery who also has a > 70% ICA stenosis. A high negative predictive value is desirable to be sure the patient does not have an appropriate lesion for treatment, as treatment in such cases is very likely to be effective in preventing stroke. A high positive predictive value is not as important. Even if the lesion is somewhat 'overcalled' it likely also will benefit from endarterectomy.

The opposite is true for patients with asymptomatic carotid stenosis. The data suggest a relatively narrow therapeutic index for prophylactic carotid endarterectomy in patients with asymptomatic ICA stenosis. In such cases, given the marginal proven benefit of carotid endarterectomy, one does not mind avoiding operation on some patients with a > 60% (ACAS threshold) ICA asymptomatic stenosis. Since only about 1 in 20 will derive benefit from the operation in five years, failure to operate for an ACAS threshold lesion is less of a problem than failure to operate for a high-grade symptomatic ICA stenosis. For asymptomatic disease, therefore, negative predictive value is not so important. Conversely, one does not wish to subject asymptomatic patients with less than a threshold lesion to prophylactic carotid endarterectomy. For preoperative non-invasive evaluation of ICA stenosis in asymptomatic patients, one wishes the non-invasive test to have a high positive predictive value to avoid subjecting patients to a potentially dangerous procedure that carries only a small proven benefit.

Data derived from a prospective NIH-funded study of progression of atherosclerosis conducted at our institution suggests using even the SRU ctiteria for > 70% ICA stenosis to select patients for a prophylactic carotid intervention would result in significant overuse of prophylactic carotid intervention. The risk of an unheralded stroke in asymptomatic patients with ICA stenosis and an ICA peak systolic velocity > 230 cm/s but less than 290 cm/s is sufficiently small that the risk of intervention likely exceeds the risk associated with the natural history of ICA stenoses with PSV between 230 and 290 cm/s.

In the future, stratification of diagnostic criteria of ICA stenosis should focus on sensitivity and specificity but also on positive and negative predictive values. Sensitivity and specificity data are very important for research studies and for assessing the accuracy of a diagnostic modality. However,

if clinicians wish to utilise the SRU consensus guidelines for threshold levels of stenosis as a means to determine who is a candidate for carotid intervention, negative and positive predictive values for identifying threshold lesions are more important than sensitivity and specificity.

The consensus conference-proposed diagnostic criteria will, therefore, not be acceptable to all laboratories or to all physicians. They should not be utilised by all laboratories. The SRU criteria would clearly result in over utilisation of carotid intervention at our institution. Vascular laboratories with sufficient volume of material to perform onsite validation studies should continue to do so. A locally validated set of diagnostic criteria in an individual laboratory currently remains the standard to which all laboratories should strive to achieve.

The criteria derived from the conference should be tested with respect to their implications for clinical practice, especially with regard to asymptomatic carotid stenosis. The results of such testing should influence the desire of laboratories to adopt the criteria deriving from the conference.

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Transcranial Doppler and duplex scanning

Assoc Prof Brian Chambers, University of Melbourne, Austin Health, Vic

Transcranial Doppler ultrasound (TCD) has been used in some hospitals in Australia for more than 15 years. In the last five years, most of the commercially available duplex scanners have been supplied with transcranial colour-coded duplex (TCCD) capability. In addition, there have been significant advances in TCD technology, such as power M-mode, making TCD easier to use. Over the same period, the role of transcranial ultrasound has changed from being a research tool, to providing important diagnostic information in the clinical management of patients with cerebrovascular disorders.

In addition, we are on the threshold of using TCD as a therapy in patients with acute ischaemic stroke. Some of the clinical applications of TCD/TCCD include diagnosis of vasospasm in patients with subarachnoid haemorrhage, assessment of intracranial and extracranial stenosis, diagnosis of brain death, monitoring for microembolic signals and ultrasound-enhanced thrombolysis. All acute care hospitals providing a stroke service should have transcranial ultrasound capability.

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Ultrasound examination of upper and lower limb arterial compression

Mr Robert Ziegenbein, Monash University, Vic

Popliteal entrapment syndrome, thoracic outlet syndrome and iliac artery fibrosis or kinking are relatively uncommon in the general population, but can cause substantial disability in those involved in active occupations or sport. Symptoms result from neural or vascular compression in these regions and, if left undiagnosed, continued arterial compression can result in severe complications such as aneurysm formation, embolisation to distal arteries or arterial occlusion.

Duplex ultrasound scanning contributes to the diagnosis of these conditions by confirming the presence and location of arterial or venous compression, while pressure studies quantify the fall in arterial pressure consequent on arterial stenosis. Ultrasound complements various methods for angiography that also help to locate the site of compression as well as identifying the nature of the bony, muscular or fibrous tissue anomaly that causes the conditions.

This presentation will highlight the similarities and differences between these pathologies and describe the role of the duplex scan and pressure studies in each of the conditions. Technical aspects of the ultrasound investigations will also be discussed.

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Ultrasound of the shoulder: the Washington University experience

Prof Sharlene Teefey, Mallinckrodt Institute of Radiology, St Louis, USA

This lecture will provide an overview of the research that has been done, in collaboration with the Department of Orthopedic Surgery at Washington University, on ultrasound of the rotator cuff. The lecture will discuss the demographics and morphology of rotator cuff disease to provide an insight into the natural history of cuff disease as well as factors important in the development of the disease and its symptoms.

The accuracy of ultrasound for diagnosing full and partial thickness rotator cuff tears and biceps tendon pathology will be presented, as well as a comparative study evaluating ultrasound, MR imaging, and arthroscopic findings in a consecutive series of patients with cuff tears. This latter study showed that ultrasound is as accurate as MR imaging for diagnosing full and partial thickness tears, as well as for measuring tear size.

Our research has also shown that ultrasound is very accurate for diagnosing recurrent cuff tears in the painful postoperative shoulder. Potential pitfalls, including misinterpreting large bursal size and extensive partial thickness tears for full thickness tears when diagnosing cuff disease with ultrasound will be discussed. Finally, current research examining asymptomatic cuff tears as a model for pain development and its clinical implications will be presented.

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Dynamic shoulder ultrasound

Ms Mary Langdale, Victoria House Medical Imaging, Vic

Dynamic shoulder ultrasound is a clinical examination of the shoulder, with the added bonus of being able to observe internal structures as they move, which is not possible with other imaging modalities. Movement can be active or passive and the examination needs to be tailored to each patient. Prior to any study, a short history and examination are essential. Often, a diagnosis such as adhesive capsulitis can be made before the patient is scanned.

One of the main prerequisites for understanding and performing a dynamic study is to understand the surgical term ‘impingement syndrome’, i.e. pain on abduction due to abnormal compression of the supraspinatus tendon and overlying subacromial bursa between the humeral head and coracoacromial arch. Movement of the tendon and bursa are observed, as well as any abnormal movement of, for example, the scapula. In some impingement, buckling and bunching of the tendon and bursa deep to the coracoacromial ligament is seen. This is also called ‘subacromial crowding’. Surgeons have slightly varying definitions of impingement and would probably appreciate your subtle but strong suggestion of impingement rather than a diagnosis.

Shoulder ultrasound is performed to assess the cause of

shoulder pain. Besides impingement, other less common causes of shoulder pain will be mentioned. The causes of shoulder pain and how to perform a dynamic study will be discussed.

Importantly, a dynamic study of the shoulder should be included in your standard shoulder ultrasound examination.

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Clinical examination of the shoulder

Dr Peter Larkins, Melbourne Sports Medicine Centre, Vic

In everyday MSK and sports medicine practice, shoulder problems are a frequent cause of patient presentations.The shoulder is the third most common joint injury in sport, after ankle and knee.

In recent years, injuries to high profile athletes such as Pat Rafter (tennis), Michael Klim and Grant Hackett (swimmers) and Shane Warne (cricket) have raised the awareness of shoulder injuries. Even the general public has become educated on investigative and treatment options available in modern clinical settings.

Until recently, the accuracy of shoulder diagnoses languished behind the more common knee and ankle problems. However, with increased sub specialisation in MSK and sports medicine practices, the drive for advances in diagnosis and treatment continues to develop and the often overlooked shoulder joint has benefited from this progress.

Patients are more demanding of clinical information than in the past (not just the athletes) and treatment programs can be much better planned when the diagnosis is clear to the therapist.

Pain in and around the shoulder can arise from a multitude of structures and tissue types. One needs to consider bone, tendon, ligament, capsule, labrum and others (or a combination) as the source of patient symptoms.

This presentation will look at the common clinical settings for shoulder pain and address approaches to in office assessments and the rationale for investigations including the use of ultrasonography as an adjunct to diagnosis.

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Utility of duplex scanning for peripheral arterial disease in 2006

Prof Gregory Moneta, Portland Veterans Affairs Medical Center, Oregon, USA

Flow velocities are well known in normal peripheral arteries. Normal velocities are presented in the Table. Associated waveforms are triphasic.

Artery	Peak systolic velocity (cm/s)
External iliac	119.3 ± 21.7
Common femoral	114.1 ± 24.9
Superior femoral	90.8 ± 13.6
Popliteal	68.8 ± 13.5

Abnormal velocities and waveforms describing arterial stenosis have also been described:

1%–19% stenosis: normal waveforms and velocities with minor spectral broadening on the down slope of the systolic portion of the waveform.

20%–49% stenosis: marked spectral broadening is combined with at least a 30% increase in peak systolic velocity but the end-systolic reverse flow component of the waveform is preserved.

50%–99% stenosis: extensive spectral broadening is combined with at least a 100% increase In peak systolic velocity and the reverse flow component is lost.

Occluded: no flow is detected in an adequately visualised arterial segment. A peak systolic velocity > 200 cm/s in a lower extremity artery is indicative of a = 50% angiographic stenosis.

These observations have been extended to tibial arteries. Tibial artery flow velocities have been quantitated in normals and in patients with occlusive disease involving either the aortoiliac segments, femoropopliteal arteries or both supra and infrainguinal arteries. The data indicate (1) proximal occlusive disease reduces peak velocities in tibial arteries; (2) there are no significant differences in peak systolic velocities of the three crural vessels; and (3) there is little drop in peak systolic velocity going from proximal to distal in a continuously patent tibial artery.

In arteries proximal to the tibials, sensitivities, specificities, PPVs, and NPVs for color flow duplex scanning in comparison to angiography in detecting a > 50% stenosis or occlusion generally exceed 85%. There are no substantial differences in the accuracy of duplex scanning in limbs with differing patterns of atherosclerosis. In arterial segments that are either occluded or contain a > 50% stenosis, duplex scanning can distinguish angiographic stenosis from occlusion in 98% of cases. Compared to angiographic controls, duplex scanning predicts interruption of continuous patency of the anterior and posterior tibial arteries with sensitivities and specificities exceeding 90%.

Based on such data, many centres are now utilising lower extremity arterial duplex scanning routinely in the care of patients with lower extremity arterial disease. The accuracy of the technique is clearly gaining acceptance. Recent studies report excellent results using duplex scanning of ilio-femoral-popliteal arteries to localise stenoses in the selection of patients for transluminal angioplasty without antecedent angiography and in the selection of patients for lower extremity arterial bypass, including selection of distal anastomotic sites. The technique is accurate in determining if a patient is suitable for a percutaneous intervention and can aid in helping a patient decide if he or she wishes intervention for intermittent claudication. Peripheral duplex scanning is also the preferred method for follow-up of lower extremity vein grafts and angioplasty sites in the lower extremity arteries. The ease of access and accuracy of arterial duplex scanning make it the preferred imaging modality for many patients with peripheral arterial disease.

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Safety of ultrasound

Prof Marvin Ziskin, Temple University Medical School, Philadelphia, USA

The acoustic outputs of diagnostic machines have increased up to seven times greater than they were prior to 1992, the year that the US Food and Drug Administration raised their limits. Although there have been no reports of any adverse effect in humans, in the absence of contrast agents, occurring from the ultrasound exposure, there is concern, since nearly all of the epidemiological evidence is from studies performed before the rise in outputs. In the laboratory, there is evidence that biological effects can be produced in animals at diagnostic ultrasound intensities. Furthermore, when contrast agents have been employed in humans, premature

ventricular contractions and other cardiac arrhythmias have occurred. There is also concern over the growing use of ultrasound for non-medical purposes such as the taking of 'keep-sake' ultrasound photos of the fetus. This lecture will present mechanisms underlying the production of ultrasound bio-effects, and the latest thinking in the safe use of ultrasound in diagnostic medicine.

The WFUMB Ultrasound Safety Committee has responded to this concern by organising several symposia for evaluating internationally agreed upon recommendations and guidelines for the safe use of diagnostic ultrasound. These symposia included leading experts in ultrasound safety for all parts of the world. Each expert was instructed to participate as an independent scientist and not as a representative of any group or governmental body. One symposium focused on bio-effects arising for a thermal mechanism, another focused on bio-effects arising from non-thermal mechanisms. In each case, a set of recommendations and guidelines were voted on. Approved recommendations and guideline were ultimately adopted by WFUMB as official policy.

The WFUMB Ultrasound Safety Committee has also been collecting the regulations and guidelines of national and international organisations, such as the International Electrotechnical Commission (IEC), the European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB), the American Institute of Ultrasound in Medicine (AIUM), the Australasian Society for Ultrasound in Medicine (ASUM) and the United States Food and Drug Administration (FDA). We find that there is great agreement amongst these organisations. Differences tend to be more related to specific values than to any principle. Perhaps, an important reason for this agreement is the unusually good working relationships amongst scientists that have developed through international conferences and symposia.

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Understanding quality care – signposts on the path to excellence

Prof Bruce Barraclough AO, Board Chair, NSW Clinical Excellence Commission, NSW

Health care is about creating 'Public Value', which is meeting the desires and perceptions of individuals, expressed through representative government. Our community values safe health care above the other dimensions of quality, which include safety, appropriateness, access, consumer-centeredness, effectiveness and efficiency. If we are to meet the community's expectations, we need health professionals with competencies to support this agenda. Health professionals and health care organisations need measures including audited results of work done in order to understand their performance and the vulnerabilities of the system in which they work. Also needed are tools to help support improved care, including standards, education, guidelines and new methodologies. Good governance of health care organisations is vital to high quality care and in the modern era this is often 'networked governance' i.e. mobilised and linked networks of power.

A suggestion to ASUM is to encourage audit for accountability and benchmarking and to invest further in education in the skills, behaviours and attitudes to meet the requirements of the safety and quality agenda.

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Mathematical models to distinguish between malignant and benign adnexal masses: results from a multicentre study by the International Ovarian Tumour Analysis (IOTA) Group

Prof Dirk Timmerman, Universitaire Ziekenhuizen Leuven, Belgium, Antonia Testa, Istituto di Clinica Ostetrica e Ginecologica, Università Cattolica del Sacro Cuore, Roma, Italy, Tom Bourne, St. George's Hospital Medical School, University of London, United Kingdom, Enrico Ferrazzi, DCS Sacco, Università di Milano, Milano, Italy, Lieveke Ameye, Katholieke Universiteit Leuven, Belgium, Caroline Van Holsbeke, University Hospitals KU Leuven, Belgium, Ben Van Calster, Katholieke Universiteit Leuven, Belgium, William Collins, King's College London, United Kingdom, Ignace Vergote, Katholieke Universiteit Leuven, Belgium, Sabine Van Huffel, Katholieke Universiteit Leuven, Belgium, Lil Valentin, University Hospital Malmö, Sweden

There is still a need for the development of non-invasive methods to distinguish between the malignant and benign adnexal tumour before surgery.

In a prospective multicentre study, patients with at least one persistent adnexal mass were scanned transvaginally using gray scale and color Doppler imaging. Over 50 endpoint variables were defined prospectively and recorded for analysis. The outcome measure was the histological classification of excised tissues as malignant or benign.

Data from 1066 patients recruited from nine European centres were included in the analysis; 800 patients (75%) had benign tumours and 266 (25%) had malignant tumours. The most useful independent prognostic variables for the logistic regression model were: (1) personal history of ovarian cancer, (2) hormonal therapy, (3) age, (4) maximum diameter of lesion, (5) pain, (6) ascites, (7) blood flow within a solid papillary projection, (8) presence of an entirely solid tumour, (9) maximal diameter of solid component, (10) irregular internal cyst walls, (11) acoustic shadows, and (12) a color score of intra-tumoural blood flow.

The model containing all 12 variables gave an area under the receiver operating characteristic curve of 0.95 for the development data set (n = 754). The corresponding value for the test data set (n = 312) was 0.94; and a probability cut-off value of 0.10 gave a sensitivity of 93% and a specificity of 76%. Since the model was constructed from multicentre data, it is more likely to be generally applicable. The effectiveness of the model will be tested prospectively at different centres.

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Contrast-enhanced ultrasound (CEUS) features of liver abscess

Dr Yu Xia, Peking Union Medical College Hospital, China, Prof Yuxin Jiang, Peking Union Medical College Hospital, China

Introduction

Liver abscess is an uncommon disease. However, it is relatively common in rural areas. Contrast-enhanced ultrasound (CEUS) is a new and promising technique that allows micro vessels to be observed in real time.

Purpose

To investigate contrast enhanced ultrasound features of liver abscess.

Subjects and methods

Study population: nine patients with 13 abscesses were

evaluated with CEUS (three male, six female; mean age, 42.3 years; age range, 32–63 years). The mean diameter of the abscesses was 4.8 cm (range, 2.0–8.5cm). Of these patients, seven were confirmed with the final diagnosis of abscess by US-guided percutaneous needle biopsy and the remaining two were diagnosed with an abscess by follow-up. Eight of the nine patients had fever, ranging from 37.4 C–39.5 C with a mean of 38.1 C. The remaining patient had a history of fever 20 days previously. All nine patients had elevated white cells count; eight patients had been treated with antibiotics or were receiving antibiotic treatment.

Contrast-enhanced ultrasound

With contrast harmonic imaging mode SonoVue a bolus dose of 2.4 mL was injected intravenously followed by a 5 mL saline flush. The ultrasonogists reviewed the patients' clinical histories, but without knowing all other imaging findings. The CEUS diagnosis was made on the basis of enhancement patterns of the lesion and clinical features of the patients.

Results

Baseline sonographic features of 13 abscesses in Table 1 can be summarised into four types and CEUS features of 13 abscesses in Table 2 can also be summarised into four types.

Conclusions

CEUS is helpful for the diagnosis of liver abscesses; enhancement patterns of the abscess are variable. However, they are different from the most enhancement patterns which were seen in the malignant tumours.

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Introduction / overview – improving fetal cardiac diagnosis

Dr James Grimwade, Women's Diagnostic Ultrasound Centre, Vic

'Improving fetal cardiac diagnosis' aims to elucidate fetal diagnosis of congenital heart disease. These presentations will highlight normal and abnormal fetal cardiac anatomy and physiology, problem solving of abnormal fetal heart appearances, and clarification of management options.

The workshop aims to be comprehensive and of value to all obstetric sonographers / sonologists regardless of experience. The need to identify a cardiac abnormality will be defined. Live scanning of the normal heart will be presented. First and second trimester diagnosis will be compared, and abnormal cardiac structure and arrhythmias discussed with the accent on problem solving. The 'future of fetal cardiology' will provide an insight as to where this subspecialty is heading.

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The dilemma of poor antenatal diagnosis of congenital heart disease. The dilemma of poor antenatal diagnosis

Prof Dan Penny, The Royal Children's Hospital, University of Melbourne and Murdoch Children's Research Institute, Vic

Background

Congenital heart disease (CHD) is the most common birth defect and an important cause of infant and childhood mortality and morbidity. Antenatal diagnosis enables parental counselling and facilitates changes in obstetric management, which ultimately reduce the mortality and morbidity.

We have recently undertaken studies to, first, determine the proportion of sick neonates presenting with serious CHD who have had an antenatal diagnosis and second, to evaluate the effectiveness of mass screening for the detection of CHD in Victoria.

Method

In an institution-based study at the Royal Children's Hospital (RCH), all infants born between 1994–2002, who presented with severe CHD defined, were examined. Main outcome measures were antenatal diagnosis and whether the individual lesion would have been expected to be detected on a four-chamber view or ventricular outflow tract view during a routine anomaly ultrasound.

In a population-based study using state-wide data, seven sentinel defects were selected for examination, including atrio-ventricular septal defect (AVSD), simple coarctation of the aorta (CoA), double inlet or outlet ventricle (DIV / DOV), hypoplastic left heart syndrome (HLHS), simple transposition of the great arteries (TGA), tetralogy of fallot (TOF) and truncus arteriosus (TA). All patients born between 1999-2002 with one of these defects were reviewed. Outcome measures were antenatal diagnosis, pregnancy outcome and associated malformations.

Results

Of 610 patients presenting to the RCH with severe CHD, 164 had an antenatal diagnosis. Thus the antenatal detection rate was 26.8%. However, given ideal routine anomaly ultrasound, 63.9% of study cases could have been detected on four-chamber view alone and 83.6% if the ventricular outflow tract view was also visualised. This was significantly higher than the observed antenatal detection rate. Time-trend analysis demonstrated a 9% annual improvement over the study period.

The birth and live birth prevalence of CHD in Victoria was 7.8 and 6.9 per 1000, respectively. Of 451 cases diagnosed with at least one of the selected defects, 238 had an antenatal diagnosis of CHD. Thus the antenatal detection rate was 52.8%. However, analysis demonstrated that 73.4% could have been detected on four-chamber view and 89.8% if the ventricular outflow tract view was also visualised during routine anomaly ultrasound. This was significantly higher than the observed detection rate. There was wide heterogeneity in antenatal diagnosis, with the best detection of HLHS (84.6%) and worst of TGA (17.0%). The overall termination of pregnancy (TOP) rate, following an antenatal diagnosis, was 47.5%, with the highest TOP rate associated with HLHS. Finally, the antenatal detection rate was significantly higher if associated extracardiac malformations were present.

Conclusion

Despite widespread screening for birth defects in Victoria with routine anomaly ultrasounds, a large proportion of neonates with severe CHD still present without an antenatal diagnosis. Furthermore, there is wide variation in the antenatal detection of selected CHD, with detection of common CHD lesions below achievable 'best-practice' estimates.

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Normal physiology of the fetal heart

Prof Adrian Walker, Monash University, Vic, Dr Daniel Grant, Monash University, Vic

Objective

To describe perinatal cardiac physiology.

Major cardiovascular transformations are essential to

increment oxygen transport to vital organs promptly at birth to avert serious implications for wellbeing of the newborn, but perinatal cardiac physiology is dominated by an apparent contradiction. In fetal life, circulatory compensations are principally dependent upon redistribution of blood flow, as the fetal heart has only a limited ability to increase its output beyond the basal level. Yet at birth, left ventricular (LV) output almost trebles, increasing from a fetal level of 150 mL/kg to 400 mL/kg in the neonate and right ventricular (RV) output increases from a fetal level of 300 mL/kg to 400 mL/kg in the neonate. Although increase in heart rate contributes, this increase is largely derived from an increase in stroke volume. Our studies provide fundamental insight into the mechanisms that limit fetal LV function and that allow the increase at birth. We have shown that the thoracic tissues (chest wall, liquid-filled lungs, and the pericardium) exert a powerful mechanical constraint upon the filling of the fetal LV and RV (preload) and, through the Frank-Starling mechanism, limit stroke volume. The increase in LV volume that accompanies birth, which is essential for the increase in LV stroke volume, is facilitated by a relief of ventricular constraint following lung aeration at birth.

This presentation deals with the interactions between the heart and the lungs which have substantial implications for LV and RV function throughout fetal life, birth, and the immediate newborn period.

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Normal and abnormal anatomy of the heart

Prof James Wilkinson, Royal Children's Hospital, Vic

Familiarity with the normal anatomy of the heart is fundamental to the understanding of images of the fetal heart. Similarly, some knowledge of the range of deviations from the normal that are seen in the presence of congenital heart disease in the fetus is vital. The cardiac defects which are readily detectable during fetal development are often major / complex. Although the detection of such anomalies is often relatively straightforward, with appropriate training in scanning techniques, many ultrasonographers have difficulty in understanding the nature and significance of such defects. This reflects the inevitable fact that congenital heart disease presents a very wide spectrum of anatomic defects with wide ranging clinical consequences.

Cardiac anatomy, both normal and abnormal, can best be appreciated and understood by knowledge of the limited ways in which the cardiac segments and major vessels can be arranged and connected to each other. By adopting a logical sequential approach to analysing and describing each segment it becomes relatively simple to document even very complex defects. Once the ultrasonographer is familiar with such an approach and can apply it with confidence, the mysteries of complex congenital heart disease are easily resolved.

The system of analysis is referred to as 'Sequential segmental analysis' and the nomenclature for cardiac structures which it encompasses is largely unambiguous and explicit, resulting in a system for description of cardiac anomalies that is easily understandable for technologists, students and physicians – even without specialist training in pediatric cardiology.

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Live cardiac scanning

Dr Mark Teoh, Monash Medical Centre, Vic

This session will be a live scanning display of the normal fetal heart. An illustration of the steps taken to screen for common structural anomalies of the heart is performed. This is an interactive session attempting to cover all aspects of fetal diagnosis in the setting of scanning techniques. If time permits a 3D/4D display will be made including a brief discussion of the current status of 3D/4D fetal echocardiography.

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Emergency room FAST scanning

Prof John McGahan, University of California, United States

Ultrasound techique

The ultrasound examination of patients with blunt abdominal trauma is focused at detection of free intraperitoneal fluid.

Ultrasound findings

Free intraperitoneal hemorrhage is usually hypoechoic in appearance. However, with more active hemorrhage, the blood may become more echogenic, with swirling debris noted within the fluid. The amount of free fluid will be dependent on the type of organ injury. In our experience, we have found that, with ruptured hollow viscus, such as a ruptured colon, the amount of free fluid is minimal. However, with complete splenic rupture, massive amounts of free fluid can be detected throughout the entire abdomen and pelvis.

Ultrasound findings – organ injury

Ultrasound has shown greatest sensitivity in detection of splenic injuries. Sonographically, splenic injuries demonstrating a disorganised appearance to the spleen are often noted. Injuries to the liver and kidney are more difficult to identify with sonography. Liver lesions are often isoechoic with the rest of the liver.

Role of ultrasound contrast

Ultrasound contrast has been shown to be very helpful in identifying organ injuries including solid organ lacerations. There is enhancement in the liver, spleen and kidney that appears echogenic while the organ laceration appears hypoechoic.

The thorax

Sonography has been shown to easily identify both pleural fluid and pericardial fluid. Pericardial fluid is necessary to detect before the patient develops a cardiac tamponade. Sonography is helpful to detect the normal visceral pleural 'sliding' relationship to the parietal pleura. Lack of the 'sliding' lung is helpful to diagnosis a pneumothorax.

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US-contrast agents in diagnosis of focal liver lesions

Dr Christian Nolsøe, Danish Society of Diagnostic Ultrasound, Denmark

Contrast enhanced ultrasonography (CEUS) requires dedicated ultrasound equipment optimised for a contrast medium. Several contrast media have been approved in Europe and most high-end ultrasound scanners are equipped with the necessary technology to perform CEUS.

Detection and classification of focal liver lesions are presently the main indication for CEUS, but a number of other organs and applications are currently being evaluated. In the liver, CEUS increases the sensitivity of lesion detection and enables immediate differentiation between malignant and benign lesion such as haemangiomas and FNH

versus metastases or primary liver cancer. Thus, CEUS has become a decisive factor in liver imaging.

CEUS seems advantageous compared with contrast enhanced CT in evaluation of benign liver lesions. Haemangiomas vary in the time it takes to present the characteristic filling pattern, and in some cases the centripetal filling is over with the arterial phase. This may disturb optimal recording with CT. CEUS allows repeated visualisation of the filling behaviour of a lesion by bursting the contrast microbubbles in the image field. But not all lesions behave typically. CEUS of multiple or deeply positioned lesions may be less equivocal and thus in some cases US-guided biopsy will be needed.

The presence of malignant liver lesions that may lead to liver resection, RF-ablation or chemotherapy is subject to verification before treatment. Liver surgery in most cases may be performed based on imaging alone and biopsy reserved to a limited number. In case of non-operability, however, a biopsy remains mandatory to confirm malignancy before initiation of chemotherapy.

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Ultrasound of the paediatric eye

Mr Cain Brockley, Royal Children's Hospital, Vic

Ultrasound of the paediatric eye is a simple diagnostic investigation that compliments clinical ophthalmological examination. Ultrasound enables both eyes to be examined by scanning directly through the eyelids, using a high frequency linear transducer, with a combination of B-mode, colour and Doppler ultrasound. The technical aspects of this modality and the ease with which it can be applied for paediatric patients make it an invaluable tool in the diagnosis and detection of orbital pathology.

A wide range of pathologies, which may be inconclusive or undetectable on fundoscopic examination, can be examined and diagnosed on ultrasound. This presentation will provide an overview of the more commonly encountered pathologies, including a range of congenital, traumatic and neoplastic abnormalities that can occur in the paediatric age group. Many of these conditions demonstrate characteristic sonographic appearances that can assist the ophthalmologist with clinical diagnosis and decision-making.

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Diagnosis of fetal cardiac malformation in the first trimester

Dr Simon Meagher, Monash Ultrasound for Women, Vic

First trimester ultrasound is widely accepted as an effective screening tool for trisomy 21 and other chromosomal abnormalities. This examination also provides an opportunity to detect many structural abnormalities between 11 + 0 and 13 + 6 weeks.

Recent data suggest that up to 80% of major abnormalities may be detected at this time.[1] With regard to cardiac diagnosis, an increased nuchal translucency provides an unique clue to the diagnosis of cardiac malformation; a clue that is not present later in the pregnancy either at the routine mid trimester screening scan or in the third trimester and this applies to both aneuploid and euploid fetuses. Indeed, 5% of all patient who present with an increased nuchal translucency and, following testing, have normal chromosomes, will be found later to have a major cardiac defect. The greater the nuchal translucency, the greater the chance of cardiac malformation (2.5% have cardiac anomalies when the NT is 2.5 mm–3.4 mm and 7% when the NT is > 3.5 mm.[2]

An outline of the sonographic assessment of the normal and abnormal heart at 11–14 weeks will be presented.

References

1 Detailed screening for fetal anomalies and cardiac defects at the 1–13-week scan. Becker R *et al*. *Ultrasound Obstet Gynecol.* 2006; 27 (6): 613–8.

2 Incidence of major structural cardiac defects with increased nuchal translucency but normal karyotype. Ghi *et al*. *Ultrasound Obstet Gynecol* 2001; 18 (6): 610–4.

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Problem solving of abnormal fetal heart presentations

Prof Sam Menahem, Monash Medical Centre, Vic, Prof Charles Kleinman, Children's Hospital of New York, USA, Dr James Grimwade, Women's Diagnostic Ultrasound Centre, Vic, Dr Simon Meagher, Monash Ultrasound for Women, Vic

Frequently observed groupings of fetal cardiac abnormalities will be presented to highlight the approach required to arrive at a correct and complete diagnosis. For example, what abnormality should one consider when one observes an over-riding aorta, or parallel outflow tracts?

Fetal images displaying well-recognised abnormalities will be shown and discussed by members of the panel with comments and questions from the audience. The lesions will include:

1) An over-riding aorta;
2) Parallel outflow tracts;
3) Evolving hypoplasia of the left and right ventricles;
4) Ventricular septal defect compared to atrioventricular septal defect (AV canal); and
5) Increased size of the right ventricle.

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Management issues following the diagnosis of a fetal heart abnormality

Prof Sam Menahem, Monash Medical Centre, Vic

The prenatal diagnosis, usually by 20 weeks, of a fetal cardiac abnormality precipitates a crisis for the affected parents. In a setting of emotional distress, there is a challenge to provide meaningful information of the abnormality, the need and risks of intervention and likely outcomes, to allow the parents if given the option, to decide whether to continue the pregnancy.

Further scans are indicated for a significant arrhythmia. Developing cardiac failure may require early delivery once the fetus is viable, if medication proves unsuccessful. Pulmonary compression from increasing cardiac size, for example from severe incompetence of an Ebstein or dysplastic tricuspid valve, may also warrant early delivery. Evolving cardiac lesions such as a hypoplastic left or right heart warrants further cardiac scans to plan management.

A fetus with the above lesions or a duct dependent circulation e.g., a severe Fallot's, warrants delivery at a tertiary centre with appropriate obstetric and neonatal intensive care, to allow, for example, a prostaglandin infusion and possible ventilation. Early confirmation of the prenatal diagnosis is essential, to plan management and facilitate mother-infant handling and bonding.

In contrast, the fetus with a minor cardiac lesion or one that leads to a left to right shunt even if substantial, may be delivered at the hospital of choice, as usually the neonate

remains asymptomatic. Once again early confirmation is important.

The prenatal diagnosis of a cardiac abnormality allows for counselling of the affected parents, appropriate management of the pregnancy and perinatal period to ensure an optimal outcome.

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The difficult gallbladder

Prof Sharlene Teefey, Mallinckrodt Institute of Radiology, St Louis, USA

This lecture will review the demographics, risk factors, pathogenesis, signs and symptoms, and sonographic findings of the more complicated types of cholecystitis including: gangrenous, emphysematous, and acalculous cholecystitis.

Gangrenous cholecystitis can develop in the patient with acute cholecystitis and can also be a complication of acute acalculous cholecystitis or emphysematous cholecystitis. Signs and symptoms may be quite subtle delaying the diagnosis.

Sonographic findings such as a striated wall, intraluminal membranes, wall irregularity and perforation will be discussed as well as the differential diagnosis of these findings.

Acute acalculous cholecystitis is seen, typically, in the intensive care unit patient who has undergone major surgery or severe trauma, is septic, or in multi-organ system failure. The diagnosis can be challenging due to poorly localising signs and symptoms and nonspecific sonographic findings.

Emphysematous cholecystitis, though rare, may also have a subtle clinical presentation. It is due to an occlusion of the cystic artery and its branches with secondary anaerobic infection.

Examples of the sonographic findings of intramural and intraluminal gas will be shown. Because these complicated types of cholecystitis have a high morbidity and mortality rate and often atypical presentation, it is important to interpret the sonographic findings, many of which are nonspecific, in the context of the patient's overall clinical status.

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A prospective study of hepatic veins as a marker of cirrhosis

Dr Sheida Vessal, Royal Melbourne Hospital, Vic, Dr James Hosdon, Royal Melbourne Hospital, Vic, Dr Shankara Naidon, Royal Melbourne Hospital, Vic, Dr Damien Stella, Royal Melbourne Hospital, Vic, Prof Robert N Gibson, Royal Melbourne Hospital, Vic

The assessment of the liver external surface for nodularity has been described extensively as a marker of cirrhosis. We present a prospective pilot study describing the sonographic morphological changes of the hepatic vein wall, comparing normal and cirrhotic livers, as a sensitive supplementary indicator of disease.

One hundred patients were included in the study. Twenty-nine normal livers, 26 biopsy-proven cirrhotic livers and 45 patients with abnormal LFTs were evaluated.

The liver was imaged in both conventional and compound modes with SonoCT both on and off in 78%. Ha copy images were reviewed by two consultant radiologists who were blinded to the diagnosis. A minimum 15 mm length of hepatic vein wall was evaluated and graded for straightness and for uniformity of vein wall echogenicity.

The 45 patients without biopsy proven disease were excluded from the study. Twenty-three out of 24 cirrhotic livers were graded as having non-straight or non-uniform vein wall morphology with SonoCT on producing a sensitivity of 96% and specificity of 84%. Without SonoCT a sensitivity of 100% was achieved (26/26) and specificity of 66%.

Studies evaluating liver surface nodularity describe sensitivities of between 53 and 86%. This initial study evaluating hepatic vein wall morphology describes a promising supplementary and possibly more sensitive sign of cirrhosis.

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Interventional US abdominal

Dr Christian Nolsøe, Danish Society of Diagnostic Ultrasound, Denmark

Ultrasound has numerous outstanding applications recognised by medical professionals throughout a wide range of specialties. One of its most versatile features is the capability to visualise in real time a handheld needle passing through layers of muscles, fat and organs on its way to a target, decided by you, deep inside the body. No other imaging modality can compete with ultrasound regarding degree of freedom when choosing the puncture route, thereby optimising the possibility of placing the needle correctly in the target and simultaneously minimising the risk of complications.

The applications of interventional ultrasound can be divided into two major groups: diagnostic intervention and therapeutic intervention. Diagnostic interventions include biopsy of solid tissue, aspiration of fluid and instillation of diagnostic material such as, for instance, contrast agents through a catheter. Therapeutic interventions comprise drainage of fluid collections like ascites, pleural and pericardial effusions, lymphoceles and abscesses, tubulation of hollow organs as in nephrostomies, gastrostomies and cholecystostomies and tissue ablation by means of heat, frost or radiation.

The basic principle of ultrasound guidance is either the 'needle guide' or the 'free-hand' technique. Some interventionalists speak strongly in favour of one over the other. This, in my opinion, is a wrong attitude. Both techniques are excellent tools but each, like everything else in life, has its upside and downside.

Interventional ultrasound at its present stage has countless applications but without doubt will continue to inspire new users to develop impressive new procedures to the benefit of patients and the medical community.

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Do not speak to the driver – by the way, what did you see?

Ms Andrea Gibb, Waikato Hospital, New Zealand

The unique bonding opportunity that obstetric ultrasound has provided has led to an expectation that these conditions exist for all US examinations. This is especially so in New Zealand due to the collective nature of Maori society. As a result, family members also wish to attend general US examinations. This causes major problems for the sonographer both in terms of distraction and confidentiality. At the same time, patients, increasingly, want the results of their US on the day.

There has been a tendency for doctors to instruct the sonographer not to say anything to the patient about the results, as a way of controlling this situation. This is simplistic at best and not well accepted by patients who are well informed and who wish to control all that happens to them.

This presentation will explore the scientific evidence about noise distraction, obtain opinion from patient advocates and Maori Health liaisons as well as promote discussion around the problem of immediate results.

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Right lower quadrant ultrasound

Prof John McGahan, University of California, USA

Ultrasound findings

Ultrasound findings of acute appendicitis include a blind-ending non-compressible fluid-filled structure with a wall thickness of 3 mm or greater and an outer diameter of 7 mm or more. A circumferential colour-flow may be identified around the appendix. There may also be free fluid noted in the right lower quadrant of the abdomen and the pelvis, and there may be echogenic mesentery.

If appendiceal perforation has occurred, an ill-defined and/or fluid filled abscess may be identified. While 6 mm is usually identified as the cut-off between normal and abnormal appendix, in some instances 5 mm is used as the upper limits of normal, while 7 mm is considered to be positive for acute appendicitis. Thus, in some instances a measurement between 5 and 7 mm is considered to be equivocal.

Other etiologies of right lower quadrant pain

There are a number of other etiologies of right lower quadrant pain, including other bowel disease, disease of the mesentery or other processes involving the appendix including appendiceal tumours. In addition, organs that surround the appendix may be etiologies of right lower quadrant pain. This could include gynecological disease, gallbladder disease, renal disease, or disease of the retroperitoneal.

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Development and validation of transperineal ultrasound as a non-invasive method to measure prostate volumes for population studies

Ms Kaye Griffiths, Concord Hospital and ANZAC Research Institute, University of Sydney, NSW, Lam Ly, Concord Hospital and ANZAC Research Institute, University of Sydney, NSW, Jane Fonda, Concord Hospital, NSW, Sue M Wishart, Concord Hospital, NSW, Amanda J Idan, Concord Hospital, NSW, John Rogers, Concord Hospital, NSW, Bo Jin, Concord Hospital, NSW, Lewis Chan, Concord Hospital, NSW, David J Handelsman, Concord Hospital and ANZAC Research Institute, University of Sydney, NSW

Background

Benign prostate hypertrophy (BPH) is a common, troublesome and expensive medical problem among older men and prevention requires population-based studies during the decades-long asymptomatic phase.

Ultrasound provides accurate and convenient measurement of prostate volume (PV), but the invasive transrectal (TR) method deters young men from participating in studies so we developed an alternative non-invasive transperineal (TP) approach that may be more acceptable.

Objectives

To validate the TP ultrasound (TPUS) method against TR ultrasound (TRUS).

Methods

Healthy men (n = 288) without known prostate disease underwent PV measurement by a 7.5-5 MHz intra-cavity (TRUS) and a 5-3.5 MHz mechanical sector (TPUS) transducer. Total and central PV were calculated by ellipsoidal formula. Agreement between methods was evaluated by intra-class correlation coefficient (ICC) and by Bland-Altman methodology.

Results

The methods were highly correlated for total (ICC = 0.809) and central (ICC = 0.769) PV. TPUS showed minimal (-4%) bias for total (mean bias 1.1 mL, 95% CI 0.16–1.96 mL) and no bias for central (mean bias -0.10 mL, 95% CI -5.58–5.38 mL) PV. Deviation between methods was reduced by > 40% compared with TRUS alone. TPUS was much more acceptable than TRUS but had higher technical failure rate (14% *v.* 1% for total, 24% vs 4% for central PV).

Conclusions

TPUS provides accurate and acceptable results for population-based prostate surveillance.

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Understanding ultrasound of the fetal head

Prof John McGahan, University of California, USA

Recommendations from most organisations include that the second trimester ultrasound should include examination of the cerebral ventricles, posterior fossa and nuchal thickness.

Important measurements:

(1) Atrium – Upper limits of normal (downside) – 10 mm;
(2) Cisterna magna (anterior – posterior measurement) 2–10mm cerebellar diameter;
(3) Increases 1 mm/wk 15–21 wks and less after 21 wks; and
(4) Nuchal thickness < 5 mm, 5 mm–6 mm borderline, > 6 mm abnormal.

Pitfalls

There are several pitfalls that should be avoided when examining the fetal brain, this includes recognition of true ventriculomegaly from that of pseudohydrocephalas. Precise anatomical planes must be obtained when obtaining fetal head measurement. For instance, when measuring the nuchal thickness, the plane should include the cavum septum pelludium, the peducles and the celebellar hemispheres.

A number of intracranial abnormalities are easily recognised. The three most common etiologies or generalised cystic collections with an intact cranial vault include: hydrocephalus, hydranencephaly or holoprosencephaly. There are a number of focal cystic abnormalities of the brain. These may include such abnormalities as: arachnoid cyst, porencephaly, schizencephaly, Dandy-Walker cyst, and Vein of Galen aneurysm.

Finally, when encountering a grossly deformed or absent fetal cranium, a differential includes: anencephaly, fetal demise, acrania, microcephaly, amniotic band syndrome, limb-body-wall complex, and lemon head from an open neural tube defect.

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Comparative developmental anatomy of the fetal brain

Dr Amanda Sampson, Royal Women's Hospital, Vic, Dr Michelle Fink, Royal Children's Hospital and Royal Women's Hospital, Vic

Ultrasound is the modality of first choice for the assessment

of the fetal brain. Its use in the screening for fetal brain anomalies is well understood. As ultrasound images have improved, the assessment of the brain has become more detailed. However, there continue to be difficulties related to the modality itself. Difficulties arise due to the poor acoustic windows, unfavourable fetal lie, oligohydramnios and large maternal habitus. Ultrasound remains limited in the assessment of the peripheral brain parenchyma, brain stem and the subtle destructive lesions.

MRI has become the second line choice for the assessment of fetal brain anomalies when they have been diagnosed or suspected with ultrasound imaging. However, MRI images of the normal fetal brain are uncommon in the midtrimester, though there is much experience in the late gestation brain. Some areas of the brain are much better seen with MRI, particularly by late gestations. MRI is not affected by the bony calvarium, maternal size and oligohydramnios. It is thus much more sensitive to malformations of the cerebral cortex and destructive lesions of the cerebrum and cerebellum.

This talk will concentrate on the development of the fetal brain from 18 weeks to term, with comparative images at different gestations to demonstrate developmental milestones.

18 to 20 week scan – corpus callosum, cerebellum
28 weeks – operculation of the insula
25 to 28 weeks – primary sulcation
28 to 34 weeks – secondary sulcation

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Malformation of cortical development

Dr Richard Leventer, Royal Children's Hospital, Vic

Cortical malformations are being recognised increasingly as significant causes of developmental delay, congenital neurological deficit and epilepsy. Many of these malformations present in the neonatal period or infancy. It is rare to diagnose these malformations *in-utero* until late in the pregnancy, although the presence of microcephaly or abnormalities of the corpus callosum, lateral ventricles or cerebellum may be the first detectable sign of a more extensive brain malformation involving the cerebral cortex.

Dr Leventer will review the most common human cortical malformations, highlighting those that present early in life or may be associated with non-cortical abnormalities evident during in utero ultrasound or foetal magnetic resonance imaging. The clinical, imaging and genetic features of each malformation will be presented, including a number of case studies where the first suspicion of a cortical malformation was raised by in utero investigations.

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Examples of fetal brain abnormalities using ultrasound and MRI

Dr Amanda Sampson, Royal Women's Hospital, Vic, Dr Michelle Fink, Royal Children's Hospital and Royal Women's Hospital, Vic

Abnormalities of the fetal brain will be demonstrated with both US and MRI. These will cover the areas of:

(1) Midline defect such as ACC, absent septum pellucidum, pericallosal lipoma;
(2) Posterior fossa anomalies – rhombencephalosynapsis, Dandy-Walker malformation, encephalocoele;
(3) Destructive lesions such as schizencephaly, porencephaly and haemorrhage;
(4) Tumours – teratoma, tuberous sclerosis; and
(5) Vascular anomalies – Vein of Galen aneurysm.

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Ultrasound for assessment and interventions for chronic liver disease

Dr Anthony Schelleman, Austin Health, Vic

There are many causes of chronic liver disease, including chronic viral hepatitis, alcoholic liver disease, biliary cirrhosis, sclerosing cholangitis and vascular diseases such as Budd-Chiari syndrome. The B-mode and Doppler features common to all forms of chronic liver disease will be discussed, as well as manifestations which are specific to particular aetiologies. Ultrasound assessment of, and assistance with, therapeutic procedures such as TIPS, percutaneous alcohol injection, and radiofrequency ablation, will also be covered.

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Mesenteric duplex scanning

Prof Gregory Moneta, Portland Veterans Affairs Medical Center, Oregon, USA

In healthy individuals, fasting blood flow velocity waveforms differ in the SMA vs the CA. Arterial waveforms reflect end organ vascular resistance. The liver and spleen have relatively high constant metabolic requirements and are therefore low resistance organs. As a result, CA waveforms are generally biphasic, with a peak systolic component, no reversal of end systolic flow and a relatively high end-diastolic velocity. The normal fasting SMA velocity waveform is triphasic, reflecting the high vascular resistance of the intestinal tract at rest. There is a peak systolic component, often an end-systolic reverse flow component, and a minimal diastolic flow component.

Changes in Doppler-derived arterial waveforms in response to feeding are also different in the CA and SMA. Because the liver and spleen have, basically, fixed metabolic demands, there is no significant change in CA velocity waveform after eating. Blood flow in the SMA, however, increases markedly after a meal reflecting a marked decrease in intestinal arterial resistance. The waveform changes in the SMA postprandially include a near doubling of systolic velocity, tripling of the end diastolic velocity, and loss of end-systolic reversal of blood flow. In addition, there is a detectable increase in the diameter of the SMA after eating. The diameter of the SMA has been shown to be 0.60 ± 0.09 cm in the fasting state and 0.67 ± 0.09 cm after a meal ($P < 0.0001$). These changes are maximal at 45 minutes after ingestion of a test meal and are dependent on the composition of the meal ingested. Mixed composition meals produce the greatest flow increase in the SMA when compared with equal caloric meals composed solely of fat, glucose, or protein.

Duplex ultrasound can detect hemodynamically significant stenoses in splanchnic vessels. In 1986, investigators at the University of Washington found that flow velocities in stenotic SMA and CA were significantly increased when compared with normal controls. Quantitative criteria for splanchnic artery stenosis were first developed and validated at Oregon Health and Science University.

In a blinded prospective study of 100 patients who

underwent mesenteric artery duplex scanning and lateral aortography, A PSV in the SMA of 275 cm/sec or more indicated a ³70% SMA stenosis with a sensitivity of 92%, a specificity of 96%, a positive predictive value of 80%, and a negative predictive value of 99% and an accuracy of 96. In the same study, a PSV of ³200 cm/sec identified a ³70% angiographic celiac artery stenosis with a sensitivity of 87%, a specificity of 80%, a positive predictive value of 63%, a negative predictive value of 94%, and an accuracy of 82%.

Other duplex criteria for mesenteric artery stenoses are also in use. A SMA end diastolic velocity (EDV) greater than 45 cm/sec correlates with a ³50% SMA stenosis with a specificity of 92% and a sensitivity of 100%, while a CA EDV of 55 cm/sec or greater predicts a ³50% CA stenosis with a sensitivity of 93%, specificity of 100%, and accuracy of 95%.

Postprandial mesenteric duplex scanning as an adjunct to the diagnosis of mesenteric stenosis was evaluated in a study of 25 healthy controls and 80 patients with vascular disease. Preprandial SMA PSVs in controls and patients with < 70% SMA stenosis did not differ and postprandial SMA PSVs in controls and patients with 70% SMA stenosis did not differ. The percent increase in SMA PSV was lower in patients with ³70% SMA stenosis than in controls. In normal patients with < 70% SMA stenosis, the postprandial SMA PSV increases more than 20% over baseline.

The specificity for the combination of fasting SMA PSVs and postprandial PSVs was only marginally improved over that provided by a fasting duplex scan alone. Therefore, while theoretically attractive, postprandial duplex scanning offers no significant improvement over fasting mesenteric duplex scanning and does not need to by routinely utilised as part of ultrasound assessment of mesenteric artery stenosis.

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Ankle/brachial pressure indices: essential in clinical practice

Prof John Harris, University of Sydney, NSW

Measurement of the ankle brachial index (ABI) is safe, easy to do and is an integral part of the assessment of the lower extremity circulation. The value of the measurement of lower extremity arterial pressure was recognised in the 1950s with the introduction of plethysmography and was applied more generally when CW Doppler became available as a simple way to detect peripheral arterial flow.

As the ABI is derived by comparing the systolic pressure in the ankle arteries, with that in the upper extremities, it provides an objective index of the severity of any ischaemia present. Its value is further enhanced by measurement before and after exercise. This is particularly important in differentiating vascular from nonvascular causes of claudication.

The ABI is of particular importance in determining success after open or endovascular intervention. This can only be done if a pre-procedural measurement has been obtained. If the ABI does not improve after intervention then there is a haemodynamic problem that should be further defined and corrected.

With few exceptions, all imaging modalities provide anatomic and pathological data but no haemodynamic information about arterial perfusion. Imaging, coupled with ABI measurement, therefore provides complementary information in the evaluation of lower extremity circulation. ABI measurement is essential in clinical practice.

Reference

1 Zierler RE, Sumner DS. Physiologic assessment of peripheral arterial occlusive disease. In: Rutherford RB, ed., Vascular Surgery, 6th ed WB Saunders, Philadelphia, 2006.

308

Ankle/brachial pressure indices – now of limited value

Prof Ken Myers, The Epworth Centre, Vic

Ankle-brachial pressure indices (ABIs) served the vascular laboratory well prior to widespread introduction of duplex scanning, but we consider that they are now irrelevant for patients with occlusive atherosclerotic disease. ABIs are frequently performed to detect disease, but a careful history and examination should distinguish arterial disease from other pathology just as well. ABIs may be requested to decide whether a patient requires a duplex scan and if this needs to be for one side or both; duplication of time and expense to perform both in many patients, is less efficient than going straight to the duplex scan alone in all.

Complete examination for ABIs at rest and following exercise is a time-consuming, expensive investigation with little reward – an experienced sonographer can perform a full bilateral lower limb arterial duplex scan in about the same time. Interobserver variability for ABIs is high. ABIs tell no more than whether or not there is reduced pressure due to a stenosis or occlusion. There is little correlation between ABIs and the severity of clinical disease. There is no correlation with measured walking distances. Attempts to define critical ischaemia based on ABIs or ankle pressures failed. Nor is there correlation between ABIs and the site of disease. Far more anatomical and physiological information is gained from the duplex scan. Reduced ABIs relate to future risk of cardiac and cerebrovascular events and this may warrant screening.

ABIs are valuable to investigate arterial entrapment syndromes. However, we stopped recommending ABIs for patients with lower limb occlusive arterial disease long ago.

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Ultrasound for endovenous treatment of varicose veins

Ms Christine Bolton, Vic

Superficial venous reflux is associated with varicose veins and complications of chronic venous disease in most patients. Available methods to treat superficial venous disease include surgery, ultrasound-guided sclerotherapy (UGS), endovenous laser therapy (EVLT) and radiofrequency (VNUS) closure.

Non-surgical endovenous techniques have the attraction of avoiding admission to hospital and anaesthesia, with no surgical scars. Selection of the most appropriate endovenous procedure requires careful ultrasound scanning to map the diseased veins and their tortuosity and diameters.

During UGS, the sonographer must demonstrate the vein to be treated to allow guidance of the injecting needle, follow foamed sclerosant through the treated vein and its tributaries, and occlude saphenous junctions and perforators.

During EVLT, the sonographer must mark out the vein to be treated, guide the angiogram needle into the vein, follow the guide wire and sheath to the saphenous junction, and guide needles to place perivenous anaesthetic solutions. It is general practice to survey the limb a few days after the

procedure to ensure closure of the treated vein and exclude deep venous complications. Experienced ultrasound assessment before, during and after these procedures may make the difference between success and failure.

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Pitfalls and tricks for breast ultrasound

Ms Paula King, Royal Melbourne Hospital, Vic

In this presentation I hope to cover areas of dilemma when dealing with breasts. We will look at this by dividing breast ultrasound in to three basic queries. A breast ultrasound examination may be answering one of these questions, or often a combination of all three.

1) The ultrasound to go with the mammogram and sort out a mammo question;
2) The ultrasound directed to the clinical lump; and
3) The ultrasound as a breast survey or screening tool.

Area 1. We will look at some mammographic images, discuss sectioning of the mammogram and look at some specific mammo queries and their ultrasound outcome.

Area 2. I hope to demonstrate some common 'lump' appearances and put forward some tips and tricks for opimising the resulting images.

Area 3. To screen or not to screen? That is the question. Well it isn't really, because we are already doing it. In this section I will endeavour to put forward a survey method and emphasis the important questions to answer, so you don't get bogged down in the busy or big breast.

In conclusion I hope to provide some ideas to make the sonographer a more effective and respected member of the breast imaging team.

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Ultrasound of placental praevia and accreta

Prof David Ellwood, The Australian National University, ACT

Placenta praevia and accreta are significant obstetric complications that contribute to maternal and perinatal morbidity and mortality. Although they are relatively uncommon, with praevia affecting about 0.5%–1% of pregnancies, and accreta only about 1 in 1000, their clinical significances are much greater due to the risk of major bleeding, both in pregnancy and during birth.

Prior uterine surgery such as caesarean section is an important risk factor for placenta praevia, and for accreta if the placental location is over the previous uterine scar. The rising caesarean section rate is likely to lead to an increase in both conditions as it is becoming more common to encounter women who have had two or more prior caesarean sections. The use of assisted reproductive technologies (ART) and the rise in maternal age may also be contributors.

Improving outcome from these pregnancy complications can be assisted by early recognition and accurate description of the nature of the placental site. This will enable further imaging to be carried out (e.g. MRI) and for careful planning to be made to optimise the management of the patient. In some cases, this may require a change to the place, timing and mode of birth. Therefore, the sonologist has a vital role in alerting the obstetrician to the existence of placenta praevia, the possibility of accreta and the likelihood of catastrophic haemorrhage requiring complex surgical solutions such as peripartum hysterectomy.

This presentation will look at the risk factors for placenta praevia and accreta that may be obtained from the patient's history, the ultrasound features that may be present in the first half of pregnancy, and the features of the third trimester scan which predict accreta. The peri-operative management of placenta praevia and accreta will be discussed, and the importance of pre-surgery ultrasound to guide the operating team.

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Transvaginal scans of pregnant cervix

Dr Kittipong Vairojanavong, Rajavithi Hospital, Thailand

Purpose

To evaluate the change of the uterine cervix and the pathology that can be assessed during pregnancy by transvaginal scan.

Method

Three-hundred-and fifty-six pregnant women eight to 20 weeks of gestation who presented with vaginal bleeding, pelvic pain and/or history of multiple abortions were scanned. Another 80 cases with gestation of 21 weeks to term, with 15 sets of twins were included.

In the first group, the shape of the cervix at the internal os, defined as T or Y-shape, funneling or V-shape and ballooning or U-shape were recorded, while cervical lengths and abnormal placental implantation were also recorded in the second group.

Results

In 356 cases of 8 to 20 weeks of gestation, there were 182 subchorionic haemorrhages with 137 live and 45 dead fetuses. There were 72 normal pregnancies or marginal sinus bleeding; 32 blighted ovum; 21 ectopic pregnancy; 20 incomplete, 18 complete and two inevitable abortions. Four placenta previa totalis and five cases of hydatidiform moles were noted.

In the second group, 73 were of normal, in T or Y-shape, five were V-shape and two were U-shape. Cervical cerclage was performed for the U-shape group and both cases were stable until term. The second group also showed four cases of placenta previa totalis. Shortening of cervical lengths with progress of the gestation were noted at the last trimester.

Conclusion

Transvaginal scan is beneficial in assessing the changes of the uterine cervix as well as the pathology that can be found at or around the internal os.

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Doppler assessment of a sick fetus

Dr Amanda Sampson, Royal Women's Hospital, Vic

How sick is this fetus? Obstetricians often have a difficult balancing act in deciding when to deliver a very premature sick fetus with intrauterine growth restriction. A few days can mean the difference between a chance at survival or not. This applies particularly to the late-mid gestation of 24 to 28 weeks. After 28 weeks, delivery means that that the fetus will almost certainly survive, thanks to huge advances in neonatal care.

Helping the obstetrician make a decision can mean long laborious repeated scans assessing several facets of fetal wellbeing. Fetal vascular Doppler is now better understood physiologically and can be used to time delivery with more precision than in the past.

The most useful fetal vessels to assess are the

umbilical artery and vein, middle cerebral artery, and the Ductus Venosus. The fetal heart and the tricuspid valve also need assessing for signs of right heart failure. Often, changes over a few days or weeks will signal deterioration of the fetus and prompt delivery. The deterioration in these vascular parameters tends to follow a well-defined pathway to fetal demise. Recognising when very ill fetuses need expert assessment will be discussed.

Fetal anaemia and the use of the MCA Doppler will also be discussed.

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Predicting placental pathology with ultrasound

Prof David Ellwood, The Australian National University, ACT

The last two decades have seen remarkable advances in ultrasound technology. Most of the new techniques have been directed to improving our ability to image the fetus, primarily for the detection of fetal abnormalities. However, from an obstetric perspective, improving the ability to predict adverse pregnancy outcome in terms of fetal wellbeing is just as important.

Perinatal asphyxia is still a significant obstetric problem, as is 'unexplained' late pregnancy stillbirth, both of which may have their origins in sub-optimal placental function. Unfortunately, ultrasound assessment of fetal health is restricted to observations on fetal biometry, the assessment of amniotic fluid volume and the use of Doppler ultrasound to assess the fetal circulation. Although Doppler is an important tool in managing high-risk pregnancy, it is only an indirect measure of placental function.

Ultrasound of the placenta is usually restricted to comments about the placental site, unless very unusual features are noted. It is unusual to see comments about placental size, even though this is a good predictor of perinatal outcome, including stillbirth.

Placental histopathology is now a sophisticated science that can provide the obstetrician with important retrospective information about the way the placenta has performed during the pregnancy. As such, it can be said to be the 'diary of the pregnancy' and there are now many placental pathologies that can be identified, some of which are associated with particular maternal conditions.

Studies on the ability of ultrasound to predict particular placental pathology are limited, probably because it is difficult to correlate ultrasound appearances with the placenta after birth. This presentation will look at the different pathological processes which operate within the placenta, and the possibility that ultrasound may predict specific problems. A pilot study will be presented which attempts to correlate the postpartum histopathological findings with the prenatal ultrasound appearances. The possibility will be discussed that ultrasound of the third trimester placenta can be made more informative, giving guidance to the obstetrician when there is placental pathology which may impact on perinatal outcome.

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Surveillance during and after arterial surgery

Assoc Prof Phillip Walker, University of Queensland, Qld

A variety of techniques have been utilised for surveillance after arterial surgery, including clinical evaluation for symptomatic recurrence, pulse palpation, Doppler interrogation and pressure measurement (ABIs), flow measurement, impedance analysis, treadmill exercise studies, and imaging modalities including angiography, angioscopy, duplex ultrasound scanning and more recently CTA and MRA.

Surveillance after arterial surgery should be simple and safe, preferably non-invasive, acceptable to the patient and cost effective. Ideally, surveillance following arterial surgery should begin in the operating room, but depending on the arterial bed being operated on this is not always possible or accurate.

Unfortunately, while many algorithms exist for surveillance after arterial reconstruction, there are a paucity of data demonstrating efficacy and even fewer studies evaluating the cost benefit of proposed surveillance regimes.

The efficacy and cost-effectiveness of surveillance after arterial reconstruction varies depending on the specific arterial bed and the nature of the intervention (e.g. open surgery versus endovascular treatment; autogenous conduits versus prosthetics). Recently, a number of bodies including the AHA/ACC PAD Coalition have developed recommendations for the management of PAD, which include recommendations for follow-up post surgery.

It should be remembered that surveillance should not be seen as a panacea for reducing the risk of failure after arterial surgery. Strict control of cardiovascular risk factors will greatly contribute to reducing the risk of late occlusive events by slowing or halting the evolution of the atherosclerotic process.

This presentation will discuss surveillance algorithms following arterial surgery in the different vascular beds, with special emphasis on the evidence for surveillance and the role of duplex scanning and the vascular laboratory.

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Noninvasive tests of venous hemodynamics: what we know and don't know in the era of CEAP

Prof Gregory Moneta, Portland Veterans Affairs Medical Center, Oregon, USA

For years, the ankle brachial index (ABI) has served as a well-accepted method for quantifying the severity of lower extremity arterial ischemia, following severity of ischemia over time and also for assessing the results of interventions for lower extremity arterial ischemia.

Quantifying hemodynamic abnormalities in the lower extremity venous system in patients with chronic venous insufficiency (CVI) is also necessary to monitor hemodynamic abnormalities over time, assess severity of disease and the results of venous interventions. Venous hemodynamics, however, are much more complicated than arterial hemodynamics. In the venous system, overall hemodynamics are influenced by collateralisation, obstruction, function of the calf muscle pump, as well as reflux. In addition, abnormalities of the superficial, deep and perforator systems can, in individual patients, differentially contribute to the overall venous hemodynamic changes. The clinical picture may, however, be the same despite many different combinations of obstruction and reflux in the deep, superficial and perforating veins.

There are several widely employed non-invasive tests of venous function. These examinations include both plethysmographic and ultrasound based evaluations. Proper interpretation of the results of an examination requires knowl-

edge of the variability of the examination and the conditions under which performance of the examination are most likely to lead to a consistent and therefore reliable result.

Examination results can be classified as normal or abnormal. Interventions to improve venous hemodynamics may, however, result in changes in the result of the examination that, while different from a pre-intervention value, may still lie within the 'abnormal' range. However, despite an 'abnormal' result, the patient may be clinically improved after the intervention, i.e. less oedema, less pain or a healed ulcer. This problem has been previously recognised and other examinations, such as arm-foot venous pressure differentials have been suggested.

Currently, the CEAP classification system of chronic venous disease is required by the *Journal of Vascular Surgery Reporting Standards in Venous Disease* for papers concerning CVI.

While air plethysmography determined residual volume fraction and venous filling index, photoplethysmography determined venous refill times and duplex determined valve closure times have roughly correlated with a previous SVS/ISCVS classification system of CVI, they have not been stratified by the CEAP classification system. In addition, parameters of variability have not been determined for tests of venous hemodynamic function and it is unknown if variability and reproducibility of venous hemodynamic testing will vary according to the CEAP classification category of the individual limb under examination. To evaluate the meaning of changes in venous hemodynamic parameters in the era of CEAP, confidence intervals for each test should be determined in limbs stratified according to the CEAP classification system and repeated over time and different testing conditions.

Preliminary data from our laboratory assessing inter-observer variability, diurnal variation, and temporal variation suggest current tests for venous hemodynamics are reproducible over time in patients with lower CEAP categories of CVI but have unacceptably large 95% confidence intervals in the higher CEAP categories. Since it is limbs with the higher CEAP classes that are generally targeted for interventions to improve venous hemodynamics, alternative forms of venous testing, other than those currently available, may be required to assess hemodynamic results of venous interventions and to serially assess venous hemodynamics in limbs with higher CEAP classification values.

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Ultrasound and non-atherosclerotic arterial disease

Professor Harry Gibbs, Princess Alexandra Hospital, Qld

Arterial duplex ultrasound is most commonly performed to assess the presence and severity of atherosclerotic arterial disease. Non-atherosclerotic arterial diseases occur much less commonly but duplex ultrasound assessment may be helpful for their diagnosis and follow-up. This presentation will discuss the clinical and ultrasound features of the following conditions:

(1) Takayasu's arteritis;
(2) Giant cell arteritis;
(3) Arterial compression syndromes;
(4) Pseudoxanthoma elasticum;
(5) Carotid artery dissection; and
(6) Fibromuscular disease.

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Identification of unusual patterns of lower limb venous reflux: a review

Mr Peter Coombs, Monash Medical Centre, Vic

Purpose

Chronic venous Insufficiency (CVI) is a significant source of morbidity in the general population. Up to 30% of the adult population has some clinical complication of this disorder with 0.3% having the debilitation of venous ulcers.[1] Colour duplex ultrasound has considerably improved the understanding and diagnosis of CVI. Additional information about the source and distribution of venous reflux has enabled much more informed, precise and directed treatment.

Most commonly, at the ultrasound assessment, varicose veins are related to reflux arising from the sapheno-femoral or sapheno-popliteal junctions. Incompetent perforators may also be identified as a primary source but usually are secondary, minor contribution perforators. More recently, it has become recognised that a significant proportion of patients have a reflux contribution from the pelvis. Around 10% of cases will have reflux solely from the pelvis while a significant number more will have saphenous reflux with a pelvic contribution.[2]

This paper reports a number of unusual sources and patterns of venous insufficiency from clinical experience and from the literature. These include:

(1) Atypical accessory saphenous veins;
(2) Pelvic tributaries including the external pudendal vein, the superfical epigastric vein and the Vein of Giacomini;
(3) Gluteal and sciatic veins deep in the posterior thigh and;
(4) Genicular veins.

Rare congenital abnormalities including the lower leg cavernous haemangioma and thrombotic disorders will be considered.

Post-surgical recurrence also presents uncommon patterns of venous insufficiency. This paper will review variations that may be seen with careful evaluation.

Objectives

The sonographic evaluation of CVI is one of the most challenging examinations of clinical ultrasound practise. This objective of this paper is to alert the observer to many of these unusual patterns of pathology, which can be the source of confusion. In doing so, the accuracy of this examination will be improved presenting the clinician with the opportunity for more directed treatment.

References

1 Nicolaides AN. Investigation of chronic venous insufficiency: A consensus statement (France, March 5–9, 1997). *Circulation* 2000; 102 (20): E 126–63.

2 Labropoulos N, Tiongson J, Pryor L, Tassiopoulos AK, Kang SS, Mansour MA, *et al.* Nonsaphenous superficial vein reflux. *J Vasc Surg* 2001; 34 (5): 872–7.

321

The accuracy of ultrasound for diagnosing focal lesions of the hand and wrist

Prof Sharlene Teefey, Mallinckrodt Institute of Radiology, St Louis, USA

This lecture will present the results of a recent study that compared the accuracy of ultrasound against the recorded initial

clinical impression of the hand surgeon for diagnosing focal lesions of the hand and wrist. Ultrasound was shown to correctly diagnose 84% of all focal lesions as well as correctly diagnose 71% of cases where the initial clinical impression was incorrect. Examples of pitfalls on ultrasound will be shown. The demographics, pathologic findings, signs and symptoms and sonographic findings of several different benign soft tissue lesions of the hand and wrist will also be discussed, including ganglions, giant cell tumours of the tendon sheath, hemangiomas, glomus tumours, nerve tumours, lipomas, epidermal inclusion cysts, and nodular fasciitis. Tenosynovitis, which when focal can mimic a solid or cystic lesion, will also be discussed including its etiologies and the sonographic findings.

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Blood vessels: their role in tendon pain and pathology

Assoc Prof Jill Cook, La Trobe University Centre for Physical Activity & Nutrition Research, Deakin University, Vic

Doppler US gives clear indication of vessels in abnormal tendons, in normal tendons no vascularity is evident. Increased vascularity can be seen in the patellar, Achilles and elbow tendons. Deeper and smaller tendons, or those with large amounts of fibrocartilage are more difficult to image. Increased vascularity can be accurately estimated and measured clinically.

In the abnormal tendon, there is clear evidence of neural ingrowth associated with blood vessels. Clinically, those tendons with increased vascularity have more pain, however, the association is not absolute. Longitudinal studies on outcomes have shown that the presence of vascularity at baseline has not been shown to be associated with poorer outcome.

Ohberg and colleagues in Sweden have been directly treating the neovascularisation in painful tendons with sclerosing injections.The effectiveness of this treatment has been demonstrated in a randomised double-blind study. The treatment appears to be less successful in those with bony changes at the Achilles insertion and in jumping athletes with patellar tendinopathy. The effect of the treatment may not be only on the vessels, as the sclerosing substance used also is mildly neurotoxic. Further research is needed to further clarify the role of vascularity in tendon pain and to elucidate the most effective treatment options.

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Trigger finger

Dr Lois Basham, Victoria House Medical Imaging, Vic

Objectives

The purpose of this presentation is to describe and demonstrate the ultrasound technique and findings of 'Trigger finger' and the ultrasound guided treatment of this condition.

Abstract

'Trigger finger' is a stenosing tenosynovitis of the flexor tendons of the finger or thumb, in which the digit locks in the bent position and may have to be released by forceful passive extension. The cause is mostly idiopathic but can be associated with diabetes, rheumatoid arthritis, gout or repetitive gripping actions.

Patients often present to musculoskeletal ultrasound practices with this condition for diagnostic imaging and ultrasound guided treatment with steroid injections. Steroid together with a local anaesthetic is instilled into the tendon sheath of the involved finger in the region of the A1 pulley. The success rate of this treatment with one injection is approximately 50% and with two consecutive injections 75%.

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Morton's or not

Ms Mary Langdale, Victoria House Medical Imaging, Vic

Metatarsalgia describes a painful condition around the forefoot. Patients present with plantar foot pain, often described as dull or throbbing, a sensation of walking with a stone in the shoe, burning, numbness and tingling. They may experience pain with walking or night pain. It is often exacerbated by activity and by wearing shoes. It can be relieved with rest. It is more common with women in the middle age group.

Conditions such as synovitis and stress fractures can have similar presentations but different treatments and are often overlooked. This talk will describe the ultrasound findings of the various pathological appearances associated with metatarsalgia, focusing on the Morton's neuroma.

The results of a retrospective analysis of a group of patients scanned for metatarsalgia at Victoria House Imaging will also be presented. The imaging findings were correlated with surgical findings.

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New technologies in 3D ultrasound

Dr Michael Bethune, Melbourne Ultrasound For Women, Vic

There are constant advances in 3D technologies. These advances make it easier not only to produce 'pretty pictures' but also to enhance the detection and evaluation of a range of abnormalities. Some of the new technologies available will be explored. The presentation will focus on the practical application of these technologies.

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Role of 3D in gynaecology

Dr Michael Bethune, Melbourne Ultrasound for Women, Vic

Although 3D ultrasound has most of its publicity and popularity in obstetrics, gynaecology is the area where 3D has the potential to have the most impact on day-to-day scanning. The use of 3D in gynaecology greatly enhances our ability to visualise many pelvic structures.

Practical Guide to Emergency Ultrasound

Editors Cosby K.S. and Kendall J.L.
Publisher Lippincott Williams and Wilkins
ISBN: 07817 7858 1
Approx cost $A143.59

Karen Cosby and John Kendall are the editors of as well as major contributors to *Practical Guide to Emergency Ultrasound.* The 26 contributors are all practicing emergency physicians, they have produced a practical, comprehensive, current and easy to read book on emergency ultrasound.

The first two chapters are written, essentially, from a United States perspective and are more of historical interest. The endeavour and theme of the chapters, such as the education process and credentialling, however, are relevant to the Australasian reader.

The third chapter has a clear explanation of ultrasound physics, knobology, artifacts and equipment. The subsequent nine chapters deal with areas of the body in a systematic well-organised manner. Each chapter begins with image acquisition and explanation, followed by a description of normal ultrasound anatomy, pathology, 'artifacts and pitfalls' of clinical decision-making and some clinical cases. The chapters covered are trauma, (including the *FAST* examination), echocardiography, first trimester pregnancy, general gynecology, liver and gall bladder, aorta, renal, lower limb venous and testes. The final two chapters relate to procedural applications of ultrasound, soft tissue imaging and foreign body detection. The diagrams and images are well labelled, relevant and of good quality, illustrating both normal and abnormal pathological examples. They are accompanied by clear explanations.

I was most impressed by the textbook *Practical Guide to Emergency Ultrasound.* This book would appeal to a variety of clinicians and specialists, as well as its prime audience of emergency physicians. The book would well serve the *ab initio* user to give a solid grounding in ultrasound as well as a stand alone reference book for the advanced user who may also wish to further develop skills in ultrasound. At $A143.59, this book is a little more costly than other available textbooks on ultrasound but I believe it is good value for money and would recommend it.

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Emergency Physician
The Royal Melbourne Hospital

Emergency Ultrasound: Principles and Practice

Authors Gaspari R.J., Fox J.C., Sierzenski P.R.
Publisher Mosby and Elsevier
ISBN: 032303750X
Approx cost $A119.00

Emergency ultrasound is an increasingly important skill for the emergency physician. *Emergency Ultrasound: Principles and Practice* is a textbook written by emergency physicians, familiar with emergency department ultrasound practice, with the aim of being 'a practical reference on how to acquire the images needed to perform a focussed ultrasound.'

The textbook is easy to read and is divided into six sections, five of which are protocols for anatomical regions and one for non-protocol (procedural) driven ultrasound. The chapters then describe in systematic step-by-step detail, how to obtain 'optimal' images. There are clear examples of normal anatomy using both scanned and comparative diagrammatic illustrations and examples showing the non-optimal images, which have resulted from inadequate probe placement or technique. Except for a few images included in the 'non-protocol driven ultrasound section,' there are no illustrations of 'pathological' findings, so the reader is not able to compare optimal 'normal' and 'pathological' images. The textbook also assumes the reader is familiar with the essential physics of ultrasound and topics, such as image optimisation or artefacts, and measurements (normal and abnormal values) have not been included.

Emergency Ultrasound: Principles and Practice would be useful for the emergency doctor who already has a fundamental understanding of ultrasound and wishes to improve and advance his/her image quality. As the book contains so many examples of optimal and suboptimal images, it would be very good tool for self-critique and self-education. The 'non-protocol driven' (procedural) section would benefit the doctor who is broadening his/her skills of application of ultrasound in the emergency department. However, the textbook does not cover the required basic information for an *ab initio* doctor to be considered a sole knowledge resource for emergency department ultrasound.

M Melinda Truesdale
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Step-by-step Ultrasound in Gynaecology

Authors Kuldeep Singh and Narendra Malhotro
Publisher McGraw-Hill Professional
ISBN 0071446559
Approx cost $A75.00

Step-by-step Ultrasound in Gynaecology serves as a very good starting point for physicians who are beginning their career in obstetrics and gynaecology and want to perform gynaecologic ultrasound. The book consists of 130 pages and is divided into 8 chapters.

Chapter 1 describes the basic history required, the preparation for a gynaecology ultrasound and the appropriate equipment, equipment settings and transducer selection for pelvic ultrasound. It also includes a summary of the information required when reporting the findings of a pelvic ultrasound.

Chapter 2 describes the aim of having a training schedule to acquire the relevant skills to perform a pelvic ultrasound. It also includes a small theatrical section of a training program and concludes with a description of the normal female anatomy and physiology.

Chapter 3 describes the normal ultrasound findings of the female reproductive organs at various stages of the menstrual cycle. It also includes a small section on Doppler evaluation of the pelvic organs and 3D evaluation of the pelvic organs.

Chapter 4 describes the pathology in the uterus, organised by disorders in the myometrium, endometrium, the shape and size of the uterus and, last, the uterine cavity evaluation. It is accompanied by ultrasound pictures of the common disorders of the uterus.

Chapter 6 describes the ultrasound features of ovarian pathology. It describes the three basic lesions: the anechoic, the complex and the solid ovarian mass lesions.

Chapter 7 describes the recurrence of miscellaneous pathology in the female genital tract, divided into cervical disorders, abnormal vaginal problems, abnormal fallopian tube disorders, and abnormalities in the Pouch of Douglas.

Chapter 8 is very good. It describes the various, common gynaecological disorders and how ultrasound fits in the investigation of such disorders. There are 25 flow charts, giving the reader the ability to see the big picture of pathology and where ultrasound investigation can pinpoint where the pathology lies in the reproductive organs. There is a very useful summary of the normal measurements of the reproductive organs in the appendix.

In summary, *Step-by-step Ultrasound in Gynaecology* is a very useful, pocket size book for physicians who have just started performing gynaecological ultrasound. While the ultrasound pictures in the book are not of high standard, they would suffice for the purposes of beginners in the detection of pelvic pathology. A DVD comes with the book for those who want images of higher resolution.

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Royal Women's Hospital Melbourne

Step-by-step Ultrasound in Obstetrics

Authors Kuldeep Singh and Narendra Malhotro
Pblisher: McGraw-Hill Professional
ISBN: 0071446540
Approx cost US$29.95

This pocket-sized book is divided into five chapters, with many illustrations of ultrasound scans.

Chapter 1 introduces the reader to obtaining relevant information prior to the examination. It then describes the preparation and the position of the patient, together with the appropriate choice of machine, transducers and machine settings to perform the obstetric examination. It concludes by summarising the essential features that are required and the importance of the reporting of such an examination.

Chapter 2 describes the training that is required to perform an obstetric ultrasound. It starts by detailing the theoretical aspect of such an examination and the objectives and schedule that should be enforced for such a training exercise. It also details some of the minimum criteria for a trained sonologist and a proposed certification for an ultrasonologist in obstetrics and gynaecology.

Chapter 3 is devoted to the ultrasound examination of the fetus in the first trimester. It starts by listing all the indications for examination in the first trimester. This is followed by normal first trimester embryonic/fetal evaluation and the parameters that should be measured. The ultrasound findings in abnormal intrauterine pregnancy in the first-trimester are then described, followed by features of extra uterine pregnancy as seen by ultrasound. This chapter contains a very useful sono-embryologic chart of conception from ovulation to week 11 as seen by ultrasound examination. It concludes with a flow chart of findings in the first trimester that helps in the diagnosis of a normal early pregnancy.

Chapter 4 devotes itself to the ultrasound findings of the second trimester. It starts by listing the indications for an examination at this stage of the pregnancy, followed by fetal evaluation and measurements. This is followed by a systematic description of normal and abnormal pathology as seen by ultrasound from head to toe. It also includes a section of colour Doppler in the second trimester and 3D and 4D scan in the second trimester. In spite of the book's size, it contains a very comprehensive description of fetal abnormalities in the second trimester.

Chapter 5 describes the ultrasound in the third trimester of pregnancy. It starts by listing the indications for examination followed by the various parameters to evaluate in a third trimester. The evaluation of fetal growth, amniotic fluid, and evaluation of fetal wellbeing by performing biophysical profile are described. There is also a section for interpretation of biophysical profile and the indication for serial evaluation. Indications for colour Doppler in the third trimester and the indication for delivery are also discussed.

In summary, the pocket sized *Step-by-step Ultrasound in Obstetrics*, describing the use of ultrasound in obstetrics, is a very useful tool for physicians performing ultrasound at elementary to secondary levels. The ultrasound pictures provided in this book are not of a high quality, but they are sufficiently clear for the purpose for which the book is designed. The cost of the book is very reasonable and it comes with a CD ROM for those who want to access better images.

Andrew Ngu
Royal Women's Hospital Melbourne

FAST scanning Down Under

Borsha Sarker

Borsha Sarker describes her weeks at Liverpool Hospital, Sydney as the 2005 ASUM BMUS exchange awardee

Borsha with the trauma secretaries at Liverpool and (right) Trauma call: preparing for a trauma arrival

Fancy a trip to Australia to learn more about medical ultrasound? That's what the advertisement said, and who would say no?

For the last two years at Queen Elizabeth Hospital in the UK, I have been training our accident and emergency (A&E) consultants in emergency ultrasound, which includes Focussed Assessment with Sonography for Trauma (FAST), ultrasound assessment of Abdominal Aortic Aneurysm (AAA) and ultrasound-guided line placements. Working with the A&E consultants exposed some training issues and challenges and we want to encourage all UK emergency department (ED) physicians to enrol in an approved FAST AAA course.

At the Queen Elizabeth Hospital, FAST and AAA ultrasound training takes place only on outpatients and some ward patients. Ideally, a proportion of this training should take place in the emergency room on real trauma patients. Few sonographers have wide experience of such situations and, therefore, find it difficult to train effectively. I wanted some practical experience of FAST.

To do this I needed to travel to Liverpool Hospital in Sydney, Australia, where FAST scanning is widely used, to gain ultrasound experience in the emergency clinical setting, and to compare their training methods with ours. I hoped this would help me to support our ED physicians. I also wanted to explore how annual accreditation and maintenance of ultrasound skills is achieved and, hopefully, return home with some recommendations for a robust system of training physicians and a credentialling system that could be introduced regionally, if not nationally.

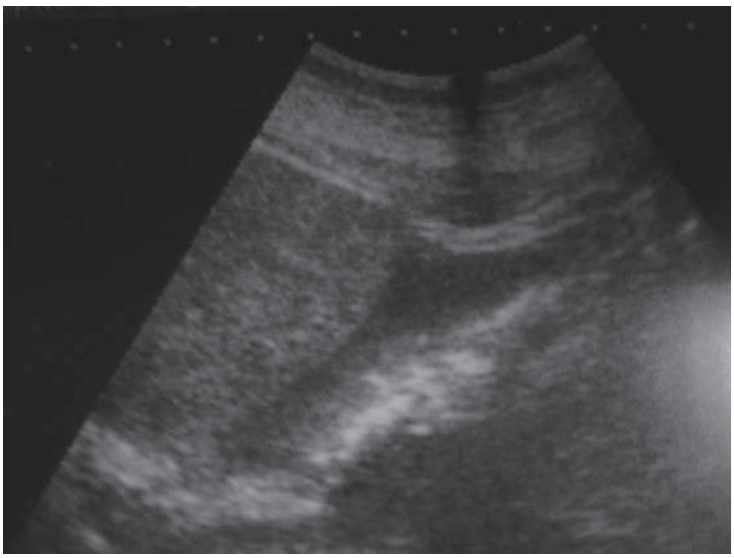
The good thing about the ASUM and BMUS Australian Exchange Award is that it aims to promote a 'short program of learning'. I had worked previously in Sydney (1993–1995) and had some professional contacts, lots of friends to help me and some idea of the cost. I applied to visit the Trauma Department at Liverpool Hospital in South-West Sydney. It is renowned internationally for its expert practice and innovation, sees large numbers of trauma patients and is the source of many publications and textbooks. We wanted to develop local clinical networks at home, but also foster links with our own trauma unit and the unit at Liverpool Hospital.

I wrote to the Director of Liverpool Trauma Department, Dr Michael Sugrue, and explained that I wanted to see exactly how, when and why FAST scanning was used in real trauma. Liverpool Hospital is relatively unusual as it serves a large geographical area and, due to the locality, sees a large amount of both blunt and penetrating chest and abdominal trauma. I was told that ultrasound is used in approximately 80% of trauma calls. They have a number of years of experience in FAST scanning in the ED Resuscitation Room (Resus).

A FAST scan involves four key spot views:

i) hepato-renal angle and Right Upper Quadrant (RUQ);
ii) spleno-renal angle and Left Upper Quadrant (LUQ);
iii) pelvis in two planes; and
iv) pericardium (sub-xiphoid or parasternal view).

Back home, when our ED physicians first approached radiology to train them, our instinctive reaction was to say no. We thought they would rampage unchecked into our territory, resulting in untold numbers of unnecessary investigations. Eventually, we did agree, on the condition that they enrolled on a focussed emergency ultrasound course, offered by our local university at Teesside and limited their



FAST scan in Resus

Borsha Sarker with Caroline Hong at ASUM headquarters

practice to the agreed areas in which they would receive training. The course gave them the underpinning theory. We provided the practical tuition and mentoring during their training.

Initially, they were required to complete 35 hours. This was achieved by visiting radiology for one morning per week. We started off trying to teach them as we would a student sonographer or radiology registrar. After a few weeks, we could see this approach was slow and failing to give rapid results. We then concentrated on only obtaining the five views of the pericardium, RUQ, LUQ, pelvis and aorta. While this was more effective, it was still difficult to get suitable patients with pathology from which to learn. At 30–35 hours, while the ED physicians were confident with their views and could identify more obvious pathology in easier subjects, they still struggled with more subtle pathology and difficult subjects. We advised that the number of required practical hours be increased to 60 or 100 cases for them to be competent and confident.

I, therefore, found it difficult to understand how a one-day course could produce competent FAST practitioners as is claimed in the Australian and American literature. This is one of the reasons why I wanted to see practice in Australia and see whether and where we were going wrong in Gateshead. I also wanted to see if we could make any recommendations for FAST training in the UK and wanted some experience in the Resus room, so that I could pass this on to my FAST students.

Before departing for far-off Australia, I completed arrangements with the Liverpool Hospital, ran the gauntlet of Australian Immigration, obtained a working visa, and completed security and criminal record background checks (maybe they don't accept convicts anymore?). The trip over was fine and, after a few days holiday to get over the jetlag, I was ready for work. I wasn't sure what to expect from my first day.

I was given an office (fantastic – I don't even have one at home), my own PC, a pager, hospital ID and access tags to the secure parts of the hospital that I would need to get to or through at night. Dr Sugrue had a program prepared for me, in addition to my own agenda, and introduced me to the Trauma and ED staff during an orientation on my first morning. This was invaluable.

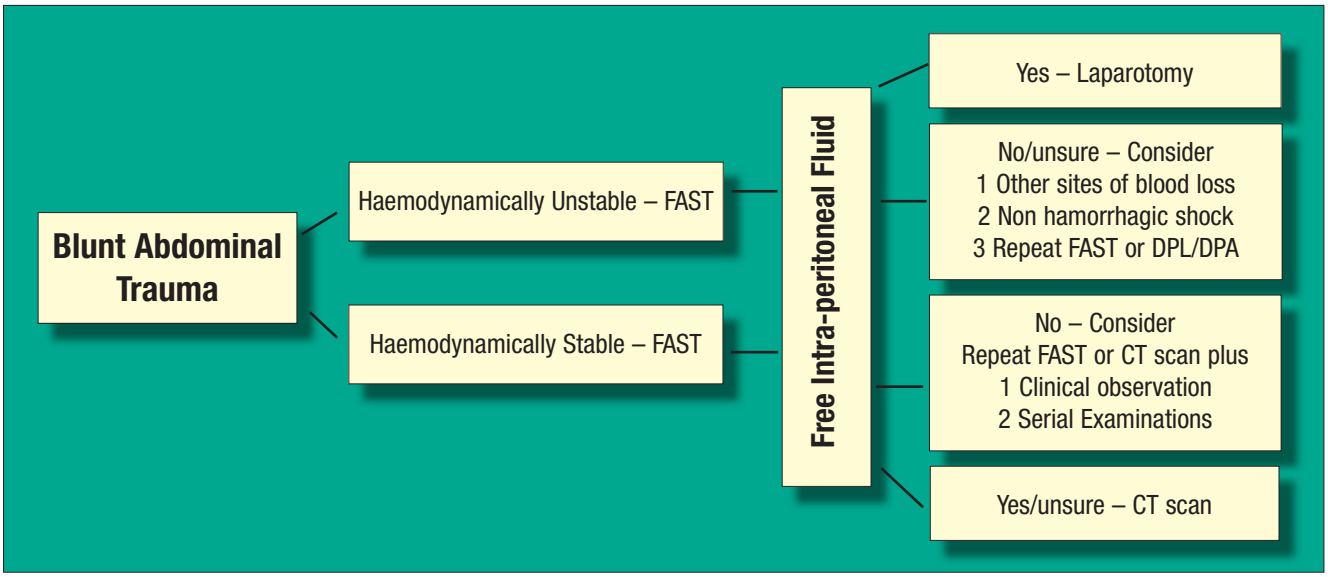
In many places, FAST has replaced diagnostic peritoneal aspiration (DPA). DPA is used to detect gross blood in the abdomen of a trauma patient and if gross aspiration is negative, smaller amounts of blood can be detected using lavage fluid and microscopic red blood cell counts. This diagnostic peritoneal lavage (DPL) can be sensitive enough to detect amounts of blood as small as 20 mL. However, both DPA and DPL are invasive tests with their own associated morbidity (wound infections and a small risk of perforated bowel or bleeding if a blood vessel is punctured).

DPA/DPL are carried out by inserting a catheter into the peritoneal cavity, between the umbilicus and the symphysis pubis and aspirating to determine if there is gross haemoperitoneum (the DPA) followed by the infusion of l L of saline, aspiration of the mixed peritoneal and lavage fluid (the DPL) and the sending of this fluid to the lab for analysis. This requires a significant level of surgical skill and cannot be repeated. It has very high sensitivity, but low specificity with an associated false negative rate (between 3 and 5%) and false positive rate due to misplacement of the catheter. If one were to use the red blood cell count one would end up with a 30% non-therapeutic laparotomy rate.

FAST has obvious advantages as it is quick, non-invasive and can be easily repeated. It is most useful in haemodynamically unstable patients as a quick way of screening the abdomen as a source of major haemorrhage in the multi-trauma patient, but also in the penetrating chest injury patient, to assess for the presence of fluid in the pericardium. It is sensitive to small amounts of free fluid (probably 20–50 mL), but this is more operator dependent and not always reliable.

Learning the technique is reported to be relatively easy, with a steep initial learning curve, but ongoing accuracy is dependent on sufficient practice and ongoing quality assurance. One can see why it is so attractive clinically for trauma surgeons and emergency physicians. The potential problems we found in our UK practice were associated with the credentialling process and ensuring ongoing competency of the operators, so that the test remains useful.

In general, trauma care in Australia is more systematically organised than in the UK. Australian catchment areas are larger and, therefore, more



Basic algorithm for FAST in the diagnostic pathway for blunt abdominal trauma

episodes of severe trauma per individual emergency physician are seen. This is why, we have provided the bulk of our training within radiology at my hospital. I was concerned that the pathology we see in patients from the ward could present and look quite different in the trauma situation and was worried as to how transferable the skills we were teaching would be.

I started watching some trauma calls and gradually helped out more. I was at Liverpool for 19 days and in that time there were 58 trauma calls. I attended almost 50 of these, including night and weekend calls. At least 40 calls had a FAST performed and seven of these were positive – two for abdominal blood and five for chest fluid. While I took very few hours off I, typically, managed to miss the only two positive abdominal FAST scans, both liver ruptures.

Some FAST cases, involving unstable patients, were very useful to observe even though the FAST was negative. One patient had two negative FAST scans before the source of bleeding was found elsewhere (vascular limb injury). While our ED physicians would say that they would not rely on a negative FAST scan for a final diagnosis (a worry for radiology), it was clearly useful to help decision making while a patient was being stabilised i.e. theatre, immediate Computerised (Axial) Tomography (CT) or delayed CT after stabilising the patient (Ollerton, *et al. Journal of Trauma* 2006 60 (4): 785–791).

The CT scanner is colloquially known as the 'tunnel of death' as it is a place that no-one wants to be caught out with an unstable trauma patient. Although one could argue that FAST scans are unnecessary as most patients need CT anyway and this should be based on good clinical examination and decision making, most ED staff would want to know that a CT was needed and that they had chosen the optimum time to take the patient to x-ray i.e. when stable and alternative sources of bleeding had been excluded. The most useful part of my visit was to experience 'life on the other side' and understand the clinical scenarios where FAST in use. Some of the patients are already intubated and ventilated with a soft abdomen and any clinical signs indicating abdominal injury are masked by anaesthetic agents.

At Liverpool Hospital, the result of a FAST scan can only be used if it is carried out by or supervised by an accredited member of staff. The trauma team is largely made up of a skeleton team of more junior staff at night and on weekends, and I saw that FAST was clearly a benefit at these times. When I attended some trauma calls, I was the only FAST accredited member of staff present and this allowed juniors to attempt a FAST under supervision that they would otherwise not have tried. I was able to fulfil this role during my visit, which allowed some of the juniors to rapidly accumulate a few supervised scans for their logbooks and accreditation process.

The routine incorporation of FAST into the trauma survey allows training to occur and more confidence in juniors when the scan is really clinically indicated. This is something I could see the value of as a direct result being there. However, the accumulation of cases is a lengthy task for the ED junior staff and there is clearly a need for more accredited staff.

I also identified some new personal training needs, e.g. basic echo training, as I found the para-sternal cardiac view was more reliably obtained than the sub-xiphoid view on emergency patients. I learned from assisting junior doctors in Resus, the practical pitfalls that I usually avoid without thinking by making my own small adjustments. Once I learned how to describe what I was doing, this clearly helped the juniors and some tips were even found useful by the experienced and long accredited emergency physicians.

While I was at Liverpool Hospital I also did some ultrasound training sessions with the trauma fellows and ED registrars. However, I realised that my visit was just too short to be able to finish all that I would have wished. My main regret is that I did not ask for a longer attachment. A visit of even six weeks would probably have yielded a few more positive scans. However, after three weeks of being almost constantly on-call, sleep deprivation may have stopped me first.

I have to say that I learnt a tremendous amount from the Trauma and ED staff who are immensely patient, helpful and made me feel at home. I could not have asked to work with a nicer bunch of people and had an absolutely fantastic time. Especial thanks would have to go to Michael Sugrue, Scott D'Amours, Justin Bowra, Alvaro Manovel, Erica Caldwell, Sally Horder,

The major trauma resuscitation bay in the Emergency Department at Liverpool Hospital

Thelma Allen and all the nursing and medical staff in the ED, who were great.

My thanks formally to the Trauma Department and Emergency Department of Liverpool Hospital for accepting me as a visitor for three weeks and also to Dr Caroline Hong and ASUM.

During my stay I visited the ASUM headquarters in Willoughby and Caroline, your CEO, kindly treated me to lunch. I hope my enthusiasm came across for the work I was doing, the lessons I was learning and the opportunity that I had been given by ASUM and BMUS.

Caroline put me in touch with Dr Tony Joseph at the Royal North Shore Hospital and I was lucky enough to attend and help out at one of his courses on emergency ultrasound, provided for the Australian military, assisted by SonoSite. This was a valuable experience because of my interest in effective training methods for FAST and I would like to extend my thanks to Tony and his staff, who were very welcoming.

After my experiences in Australia, I most highly recommend the ASUM and BMUS Australian Exchange Award scheme to anyone considering undertaking the opportunity of a 'short program of learning'. The pity is it was too short and there was so much to learn. Thank you BMUS; thank you ASUM; thank you Liverpool Hospital.

ASUM HEAD OFFICE IS MOVING .....

OUR NEW ADDRESS WILL BE:
ASUM Head Office
Level 2
511 Pacific Highway
St Leonards NSW 2065
SYDNEY AUSTRALIA

Details of move dates and new phone and fax numbers will be announced on the ASUM website
www.asum.com.au

Learning about vascular ultrasound in Sydney

Maria Isobel Gonzales

ASUM/WFUMB exchange student reports on her three-month scholarship

Learning ultrasound the Australian way, and Maria with staff from Liverpool Hospital

The ASUM – WFUMB Exchange Scholarship

I arrived in Australia in July 2006 under a World Federation of Ultrasound in Medicine and Biology (WFUMB) scholarship program sponsored locally by ASUM. Three scholarships are granted annually to doctors worldwide with the aim of improving ultrasound knowledge in a specialty of need within a developing country. I first heard of the scholarship scheme in June 2005 at the National Annual Ultrasound Meeting in the Bolivarian Republic of Venezuela.

Training

Getting to Australia from Venezuela was a feat in itself, with all sorts of immigration, travel and communications obstacles to be overcome. I arrived safely in Sydney after a 36-hour, non-stop flight (no DVT to report).

I was expected to complete a three-month fellowship, with planned rotations throughout different vascular laboratories around Sydney. The objective was to enable me to have a better understanding of vascular ultrasound and the different approaches to vascular diseases.

My vascular ultrasound training was organised by Dr John Crozier, Director of Vascular Department and Ms Jacqui Robinson, Head Sonographer at Vascular Laboratory, Liverpool Hospital. In a way, I had a peek at the Australian health system (public and private), and got a picture of its strengths and weaknesses. May I point out, that compared to Australia, the Venezuelan public health system lacks all sorts of resources so we have to work with what we have and be very creative, what you might call 'weaknesses' don't appear as such to me.

South Western Vascular Services

The first two weeks, armed with an Australian slang book in my pocket and struggling with the awful jet lag, I started my training in Australian vascular sonography. This took place at the private practice of South Western Vascular Services, associated with Liverpool Vascular Laboratory under the direction of Dr Eric Farmer and supervision of Mr Robert Van den Dolder. I had the opportunity to evaluate vascular patients from a surgical perspective. I was formally introduced to the value of the physiological examinations and made aware of the importance of their interpretations. Unfortunately, for technical reasons, I had not used this technique in my prior experience. Rob almost had a heart attack. He patiently taught me and provided me with tonnes of reading material.

St Vincent's Vascular Laboratory

For the next four weeks the excellent St. Vincent's Vascular Laboratory working team, under the direction of Dr Michael McGrath, supervised by

Mrs Debbie Hamilton and the rest of the group, took charge of my training. It was a wonderful place to observe highly skilled technologists in action. From them I learned the critical value of questioning yourself before, during and after the tests (physiological or imaging). They taught me to emphasise the production of high quality images that answer the questions raised by the surgeons and non-conclusive results from other imaging modalities. The importance of haemodynamic data supplied by ultrasound was highlighted during the weekly radiological-surgical meetings. I also have to mention that they raised my interest on transcranial imaging, especially in those cases where the purpose of this test was to complete a pathological carotid study.

Royal Prince Alfred Hospital

For the following four weeks I attended the Vascular Laboratory at Royal Prince Alfred Hospital (RPAH), which is a major teaching facility affiliated with the University of Sydney. Prof John Harris, Alison Burnett, Virginia Makeham and Cathy Kovatch were engaged in helping me in the consolidation of knowledge. Here, the world of endoluminal devices and dialysis AV fistulas was opened up to me.

I also visited Camperdown Vascular Laboratory, associated with the RPAH Vascular Laboratory. This enabled me to follow the patients from their pre-surgical evaluations, observe in the operating theatres and then perform their post-surgical physiological test and scans.

Weekly combined imaging meetings (interventional radiology, vascular surgery and vascular sonography) were educational and completed the picture since the cases were discussed from different points of view.

Cardiovascular Research Unit

Following the meeting I would pay a visit to the vascular ward patients, where I made some very nice friends.

Not all my activities at RPAH were surgically focused. The Cardiovascular Research Unit, under the direction of Prof. David Celermajer, in the Intima Media Complex was a new experience for me; the approach to vascular disease was not surgical but medical. Mr Jason Harmer briefed me on the investigations developed at the unit and their use in clinical practice.

The medical approach to pathologies with vascular repercussions was completed when I was introduced to Prof. Dennis Yue, Director of the Diabetic Clinic and the High Risk Foot Clinic.

The Haemodialysis Unit was fascinating for me, considering the fact that I come from a country where training a patient to be self-dialysed is unthinkable, not to mention the patient having one of those machines at home.

At the North Shore Vascular Laboratory, Dr Charles Fisher and Mr Craig Hume welcomed me for my last two weeks in Sydney. I was able, during this short period, to critically analyse and debate on topics that I had dealt with during my rotations. With the knowledge acquired during this overall consolidated experience, I was allowed (or at least pretended) to 'show off'.

ASUM ASM and closure

I was highly delighted when I received support from ASUM and WFUMB to attend the ASUM Annual Scintific Meeting (ASM) in Melbourne. It was a pleasure to listen to such a group of distinguished international and national speakers and to share with them in this successful event. It was a wonderful learning experience for me.

Ankle brachial index

Regardless of how much I understood and learned about vascular ultrasound, there is still a 'rocky area' of general agreement with respect to ankle brachial index (ABI) and post-exercise testing and this issue was brought out at the ASM as well, during the lectures of Prof. John Harris and Prof. Ken Myers.

If there is a lesson I am taking back home, it is this: I learned that ABI is a basic method that confirms the presence of peripheral arterial disease (PAD) suspected on the clinical scenario, and from this point of view the arterial duplex scan is a compliment that provides anatomical and haemodynamic data answering where, how and what is going on. In the case of patients with subclinical PAD, post-exercise ABI has a high predictive value of long term morbidity and mortality and can be performed when patient risk factors are being assessed, in order to unmask the lesion. It gives treatment guidelines when deciding a surgical *v.* conservatory approach and it is of critical value when assessing wound healing prognosis. Special care should also be taken by learners, like myself, not get over-confident and assume that it is an easy test to perform.

Protocols

An interesting observation, for me, was that all the vascular laboratories where I spent time followed the same protocols when performing an examination, even though individual sonographers 'coloured' their studies with their own personal touches, consistency was achieved, allowing reproducible results.

Acknowledgements

My experience in Sydney far exceeded all my expectations, in every sense. I was taught by highly qualified vascular technologists, who are not only highly professional but who also possessed that most necessary disposition for teaching, patience.

Thank you for all you have taught me and for your generosity, support and friendship.

Most of the things in life have an end and, unfortunately, my time in Sydney went faster than I realised. I am leaving a piece of my heart in this city but I will have beautiful memories and special friends forever.

I want to express my gratitude to all those who helped me to come to Australia and to all who guided, befriended and taught me so much during my stay. I have many to thank, especially: WFUMB representatives: Dr Marvin Ziskin, Dr Giovanni Cerri, Dr Leandro Fernandez, Dr Masatoshi Kudo, Dr Stan Barnett, Dr Beryl Benacerraf, Dr Elisabetta Buscarini, Dr Barry Goldberg, Dr Michael Claudon.

In Australia: Dr Caroline Hong, Mr Keith Henderson, Mr Glenn McNally, Dr John Crozier, Ms Jacqui Robinson, Dr Michael McGrath, Mrs Debbie Hamilton, Mrs Liz Pluis, Ms Lee Williams, Mr Patrick Nielsen, Mr Michael Taranto, Mr Rick Grebert, Prof. John Harris, Dr Raffi Qasabian, Prof. Geoffrey White, Ms Alison Burnett, Ms Virginia Makeham, Ms Cathy Kovatch, Ms Catherine Bush, Ms Kate Gerahty, Dr. Charles Fisher and Mr Craig Hume.

In Venezuela: My husband and kids who were able to survive during these three months.

36th Annual Scientific Meeting attracts 600 delegates to Melbourne

Clockwise from top left, Christian Nølsoe awarded by Matthew Andrews, David Rogers and Andrew Ngu; ASM reception; the Gold Sponsor presentation and plenary session

The recent 36th Annual Scientific Meeting (ASM) in Melbourne held from 15–17th September was attended by over 600 registrants. They were fortunate to experience a powerful overseas and local faculty presenting a detailed and wide range of topics.

Reflecting ASUM's diverse membership, presentations comprehensively covered O&G, vascular, musculoskeletal, abdominal, and interventional and breast ultrasound.

Safety, quality and patient issue talks were relevant to all attendees.

A large number of high quality poster and proffered papers also enhanced the meeting.

The Nuchal Translucency Program again attracted a large audience.

Several changes were introduced at this year's ASM. The Skills Day was held on the weekend rather than during the week. This made it easier for locals to attend this part of the meeting and, very importantly, also meant that our volunteers, who are so necessary to the successful running of any event, did not have to sacrifice a day's work.

Poster presentations had the option of being in an electronic format for the first time. There were only a few posters presented digitally, however, the option will be continued for future meetings.

The session dedicated to managing patient expectations recognised ultrasound as more than just providing an imaging service, but as being part of overall patient management.

The *Meet the Expert Breakfast* again provided a popular forum for attendees to chat informally with overseas speakers, who contributed cheerfully, despite the early hour.

The lunchtime symposias provided by the major sponsors Philips, Toshiba, Siemens and GE Healthcare, were well attended.

The trade exhibition displayed a wide range of cutting-edge new technologies, services and products for the ultrasound industry.

I would like to thank my co-convenor, Andrew Ngu, and the local organising committee members Cheryl Bass, Margaret Condon, Ken Myers, Monica Pahuja and James Grimwade. The meeting would not have succeeded without the many overseas and local contributors, the sponsors, trade exhibitors, ICMS (the conference organisers) and the ASUM secretariat.

I would also like to thank the large number of registrants who, I am confident, will practice significantly better ultrasound as result of attending.

Finally, ASUM is keen to continually improve and build on its ASMs, so we would appreciate any feedback, positive or negative, from attendees. It can be anonymous and should be sent through the ASUM Secretariat.

Matthew Andrews

ASM Gold Sponsors. clockwise from top left: GE Healthcare, Toshiba, Philips and Siemens

Well done, and thanks to everyone involved

It was indeed a privilege to be a co-convenor of the 36th ASUM Annual Scientific Meeting held in Melbourne recently. The meeting was a great success and I must thank all the participants who attended despite their busy schedules. I hope that you caught up with friends and colleagues and had a wonderful time networking and also gained some knowledge in the process.

I must thank my co-convenor, Mathew Andrews, and the committee members who all worked so very hard in the preceding 12 months to make this happen. I would like to also thank our generous sponsors, particularly the four gold sponsors – Phillips, Siemens, Toshiba and GE Healthcare. Without their support the meeting would not have been possible. I would also like to express my deep appreciation to the international and local speakers who contributed enormously to the scientific program. My sincere thanks should also be extended to the ASUM Secretariat and the conference organiser, ICMS Pty Ltd, for assisting the committee right through the planning stages and, of course, on the days of the conference. Your help made the conference run smoothly and without any problems.

The scientific content of the meeting was of the highest quality (as Matthew has discussed) and, from the feedback received so far, the participants were very impressed with the program. The cardiac seminar on Friday was very well attended and it certainly proved to be a very popular segment of the program.

The conference dinner was held in a very unique environment and was well attended by the participants. During the evening, awards were presented to various members of the Society, and I would like to congratulate the recipients of Life Members, Honorary Fellow and Honorary Members. It was a very memorable evening for myself and, hopefully, for all who attended.

Finally, I was very pleased to be part of the organising committee and am indebted to Matthew Andrews, Margaret Condon, Cheryl Bass, Ken Myers, James Grimwade and Monica Pahuja who all worked so very hard to put on this event. We are very proud with the result of the meeting. Thank you all for your support.

Dr Andrew Ngu

Images from the 36th ASUM ASM

ASUM Teaching Fellowships 2007

ASUM Chris Kohlenberg Teaching Fellowships

Proudly sponsored by GE Healthcare

Since its foundation, GE Healthcare has constantly been at the forefront of research and technical innovation, with GE today being recognised as a world leader in the supply of diagnostic imaging systems.

The Chris Kohlenberg Teaching Fellowships were established by ASUM in association with GE Healthcare to increase the opportunity for members outside the main centres to have access to quality education opportunities. It has been awarded annually since 1998 to commemorate Dr Chris Kohlenberg, who died while travelling to educate sonographers.

ASUM office is moving in December.
Watch the website for
new tel & fax numbers
www.asum.com.au

ASUM Giulia Franco Teaching Fellowship

Proudly sponsored by Toshiba Medical

Since the introduction of ultrasound, Toshiba has been at the technological forefront of this diagnostic imaging technology. Throughout the years, Toshiba's innovations have set new standards and created new applications that have significantly extended ultrasound capabilities.

The Giulia Franco Teaching Fellowship was established by ASUM in association with Toshiba Medical to provide educational opportunities for sonographers in all parts of Australia and New Zealand. It is named to commemorate Giulia Franco whose passion for ultrasound took her to all parts of Australia and New Zealand, and continued as she moved into a business career with Toshiba. It was first awarded in 2004.

The Giulia Franco Teaching Fellowship will focus on major city centres.

ASUM Beresford Buttery Teaching Fellowship

Proudly sponsored by GE Healthcare

The Beresford Buttery Teaching Fellowship replaces the Beresford Buttery Overseas Traineeship, which was established in 1996 in conjunction with GE Healthcare in memory of Beresford Buttery FRACOG, DDU, COGUS who passed away in China in 1995 while serving as ASUM's representative on WFUMB.

Beresford enthusiastically promoted ultrasound education and worked tirelessly for ASUM throughout most of his professional career.

The Beresford Buttery Teaching Fellowship focuses on major city centres in Australia and New Zealand.

We are very excited about these new arrangements as more of our members will be able to benefit by attending these workshops and meetings.

ASUM New Members

New Members – August 2006
Full (18)
Rachael Caton Qld
Carolyn Challenger NZ
Paul Dukes NZ
Jennifer Evanson NZ
John Goulden NZ
Susan Heather NZ
Alyson Hobbs NZ
Heather James NZ
Alexei Jarkov NZ
Andrew Kirke WA
Cathy Low NZ
Karen McCall NZ
Amy McGill NZ
Elspeth McKinnon NZ
Jonathan Meredith NZ
Tania Neatherway NZ
Pramod Phadke NSW
Helen Walker NZ

Associate (7)
Mary Burman Vic
Sharon Cook NSW
Elisabeth Elder NSW
Amy Leigh Qld
Daniel Lopez Vic
Vijay Manivel NSW
Sujatha Rajendran NSW

New Members – September 2006
Full (21)
Dara Arya NSW
Corinne Beuchat NSW
Elizabeth Coupe NSW
Nicholas Daher NSW
Hong Dinh SA
Tiffany Farmham NSW
Adrian Fiorito NSW
Julia Frame NSW
Roopa Ghanta NSW
Marc Hull Vic
Sampsa Kiuru NZ
Gabriel Movawad NSW
Shilpa Nagaraj NSW
Thi Nhu Hanh Phan NSW
Martina Preda NSW
Monica Siluk NSW
Su Swe NSW
Thayanjali Thayaparan NSW
Heidi Vogelbusch Qld
Andrea Whitaker Vic
Ingrid Yuile NSW

Associate (5)
Alicia Bartlett Qld
Janet Franks NZ
Maryann Karsakis Qld
Rebecca Taylor Qld
Shane Yole Vic

Corresponding (1)
Mmaselemo Tsuari Sth Africa

New Members – October 2006
Full (42)
Peter Banting Vic
Stewart Begg Vic
Anne Blue NZ
Wa Cheung Vic
Bruce Clark SA
George Condous NSW
Leila Dekker WA
Afshin Eimany Vic
Marilyn Fooks Vic
Conrad Galland NZ
Lisa Gower WA
Alyson Hobbs NZ
Peter Hudson NSW
Nigel Hunter NSW
Andrea Hurren NZ
Judith Krones Vic
Surekha Kumbla Vic
Kong Foong Liew NSW
David McClure Vic
Therese McGee NSW
Thomas McHattie NZ
Carola Mulitze Tas
Shiela Mulvey Vic
Anne Murray NSW
Julie Naylor Qld
Fleur O'Leary NZ
Michael Petrucco Vic
Alexander Pitman Vic
Moeng Pitsoe NSW
Siva Rajaratnam NSW
Jennifer Schnell Qld
Dennis Shandler Vic
Michael Shepherd Vic
Gerard Smith Vic
Mike Smith Vic
Vivienne Stockton NSW
Rodney Strahan Vic
Sujatha Thomas NT
Enn Tohver NSW
Mark Tuck Vic
Seamus Walker NZ
John Weir NZ

Associate (80)
Bjarke Aaso Vic
Anthea Allen Qld
Deborah Allix Vic
Toni Amiet NT
Lee Bailey NSW
Colleen Baker NSW
Vernon Barlow Vic
William Bender USA
Madeleine Bresson SA
Suzanne Brinkman Vic
Deanne Brown SA
Segri Bunsee NSW
Leon Carroll NSW
Joanne Cleary Vic
Brendon Cosford NZ
Brian Cox WA
Sarah Dick NT
Joannne Douglas SA
Geraldine Dwyer NSW
Christopher Edwards Qld
Donna Elphick NSW
Pick Ming Fong Singapore
Grant Foster Vic
Gaynor Frazer Vic
Annette Fry Vic
Jodie Gallagher Qld
Davina Gamble NSW
Rowena Gibson NSW
Tanya Glynn NSW
Brendon Goode Vic
Lara Graham NSW
Toni Halligan Qld
Melinda Happer Vic
Kui Huang Vic
Tim Huynh Vic
Sian James Vic
Wayne Kroll Qld
Siu Fong Lau NSW
Jacqueline Lunt Vic
Iain Mackinnon NSW
Kate Maruff Vic
Lindsay McCallum NZ
Clieve McCosker NSW
Andrew McDonald Qld
Leah McFadden ACT
Natalie McIntosh Vic
Linda Miles Vic
Kristine Morris NSW
Marie Mould Vic
Devendree Naidoo Vic
Jennifer Neilson SA
Ian Ng Tas
Andrew O'Reilly Vic
Daniella Pager Vic
Lori Rafferty ACT
Garth Rickert NSW
Kristy Rokahr Vic
Geoffrey Rush NSW
Phillip Russo Vic
Kristen Sako NSW
John Shen NSW
Toni Shurmer NSW
Brad Simmons NSW
Rhys Straw Qld
Danielle Suffolk Qld
George Tabua NSW
Kaye Thomson NZ
Julie Thwaites Vic
Khai Tran SA
Mmaselemo Tsuari Sth Africa
Coleen Turner WA
Le Uyen Vu NSW
Brett Wallace Vic
David Walter WA
Karen Webster ACT
Aled Williams WA
Lei Wong Singapore
Christopher Worne NSW
Lynette Wrench Vic
Lily Zamani Vic

2006
Friday 8th Dec 2006 (2 days) ASUM – ISUM Asia Link Ultrasound Meeting 8th ISUM Congress
Venue: Bandung Indonesia
Enquiries: Dr Daniel Makes
Email: d_m@cbn.net.id

2007
Wednesday 28th February 2007 (5 days) DDU Technical seminar Venue: Conrad Jupiters Gold Coast Australia
Contact: ASUM 2/181 High Street Willoughby NSW 2068
Ph +61 2 9958 7655 Fx +61 2 9958 8002
www.asum.com.au

Wednesday 28th February 2007 (5 days) DMU Prep Course Venue: Conrad Jupiters Gold Coast Australia
Contact: ASUM 2/181 High Street Willoughby NSW 2068
Ph +61 2 9958 7655 Fx +61 2 9958 8002
www.asum.com.au

Friday 2nd March 2007 (3 days) ASUM Multidisciplinary Workshop Venue: Conrad Jupiters Gold Coast Australia
Contact ASUM 2/181 High Street Willoughby NSW 2068
Ph +61 2 9958 7655 Fx +61 2 9958 8002
www.asum.com.au

Friday 2nd March 2007 (2 days) Obstetric & Gynaecological Ultrasound Symposium
Venue: Conrad Jupiters Gold Coast Australia
Contact: ASUM 2/181 High Street Willoughby NSW 2068 Ph +61 2 9958 7655
Fx +61 2 9958 8002 www.asum.com.au

Friday 9th March 2007 European Congress of Radiology 2007 (ECR 2007)
Venue: Vienna, Austria
Contact: ECR Office
www.ecr.org

Tuesday 17th April: 17th World Congress on Ultrasound in Obstetrics & Gynaecology Abstract Submission and reduced registration rate deadline.
Contact: www.isuog2007.com
Email: congress@isuog.org

Thursday 19th July 2007 (4 days) ASUM NZ and RANZCR NZ Third Combined Scientific Meeting 2007 New Zealand
Venue: Wellington Convention Centre, Wellington, New Zealand Information: http://www.asum.com.au/open/meet_NZ2007Wellington.pdf

Saturday 28th July 2007 ASUM DMU Part I & Part II Written Examinations – Provisional
Venue: As allocated. Candidates receive individual notification.
Contact: DMU Coordinator
Ph +61 2 9958 0317 Fx +61 2 9958 8002
Email: dmu@asum.com.au

Tuesday 7th August: 17th World Congress on Ultrasound in Obstetrics & Gynaecology Early bird registration rate deadline
Contact: www.isuog2007.com
Email: congress@isuog.org

Thursday 13th Sept 2007 (4 days) ASUM 2007 37th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine
Venue: Cairns Convention Centre, Cairns North Queensland Australia
Contact: ASUM 2/181 High Street Willoughby NSW 2068
Ph +61 2 9958 7655 Fx +61 2 9958 8002
www.asum.com.au

7–11 October 2007 17th World Congress on Ultrasound in Obstetrics & Gynaecology
Venue: Palazzo dei Congress/Palazzo degli Affari, Florence, Italy
Contact: www.isuog2007.com
Email: congress@isuog.org Ph +44 0 20 7471 9955 Fx +44 0 20 7471 9959
(Critical dates 2007)
17th April: Abstract submission and reduced registration rate deadline
7th August: Early bird registration deadline

2009
Sunday 30th August 2009 – Thursday 3rd September 2009 ASUM hosts WFUMB 2009 World Congress in Sydney Australia
Venue: Sydney Convention and Exhibition Centre
Contact: Dr Caroline Hong ASUM CEO carolinehong@asum.com.au or asum@asum.com.au
ASUM Head Office 2/181 High Street Willoughby NSW 2068 Sydney Australia

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matt.tucker@sonosite.com

Toshiba (Aust) P/L Medical Division
(Toshiba)
Louise Archer (02) 9887 8041
larcher@toshiba-tap.com
General Manager: Rosina Davies

ASUM values the support of our corporate members and invites suppliers of medical equipment, services and consumables to join the Society. Call Dr Caroline Hong tel +61 2 9958 7655 for further information

Guidelines for authors

Authors are invited to submit papers for publication in the categories described below. Final responsibility for accepting material lies with the Editor, and the right is reserved to introduce changes necessary to ensure conformity with the editorial standards of the *Ultrasound Bulletin.*

Original research

Manuscripts will be subject to expert referee prior to acceptance for publication. Manuscripts will be accepted on the understanding that they are contributed solely to the *Ultrasound Bulletin.*

Quiz cases

A case study presented as a quiz, involving no more than three or four images and a paragraph briefly summarising the clinical history as it was known at the time. It will pose two or three questions, and a short explanation.

Case reports

Case reports are more substantial presentations resembling short scientific papers which illustrate new information, or a new or important aspect of established knowledge.

Review articles

Review articles are original papers, or articles reviewing significant areas in ultrasound and will normally be illustrated with relevant images and line drawings. Unless specifically commissioned by the Editor, articles will be subject to expert referee prior to acceptance for publication.

Forum articles

Members are invited to contribute short articles expressing their observations, opinions and ideas. Forum articles should not normally exceed 1000 words. They will not be refereed but will be subject to editorial approval.

Calendar items

Organisers of meetings and educational events relevant to medical ultrasound are invited to submit details for publication. Each listing must contain: activity title, dates, venue, organising body and contact details including name, address, telephone and facsimile numbers (where available) and email address (where available). Notices will not usually be accepted for courses run by commercial organisations.

Corporate news

Corporate members are invited to publish news about the company, including structural changes, staff movements and product developments. Each corporate member may submit one article of about 200 words annually. Logos, illustrations and tables cannot be published in this section.

Format

Manuscripts should be submitted in triplicate in print and on PC formatted diskette as MS Word documents.
Images must be supplied separately and not embedded. PowerPoint presentations are not accepted.

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2 Journal article Britten J, Golding RH, Cooperberg PL. Sludge balls to gall stones. *J Ultrasound Med* 1984; 3: 81–84.

3 Book: Strunk W Jr, White EB. The elements of style (3rd ed.). New York: Macmillan, 1979.

4. Book section Kriegshauser JS, Carroll BA. The urinary tract. In: Rumack CM, Wilson SR, Charboneau JW, eds. *Diagnostic Ultrasound*. St Louis, 1991: 209–260.

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Ultrasound Bulletin Publication Dates – 2007

	February issue	May issue	August issue	November issue
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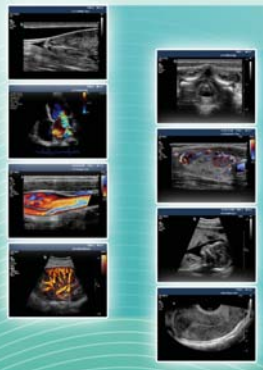

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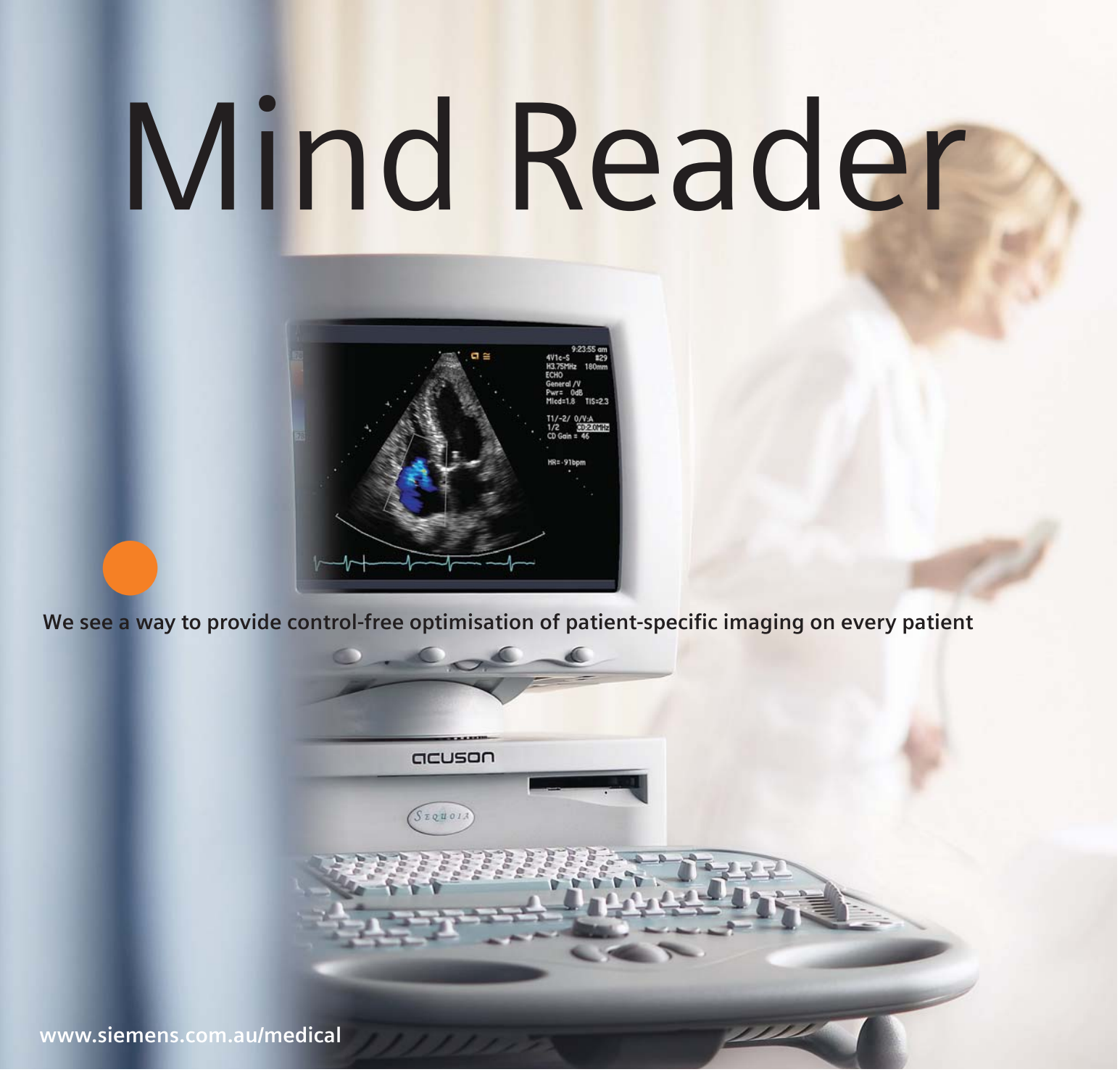

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