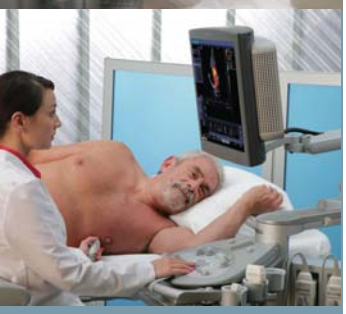

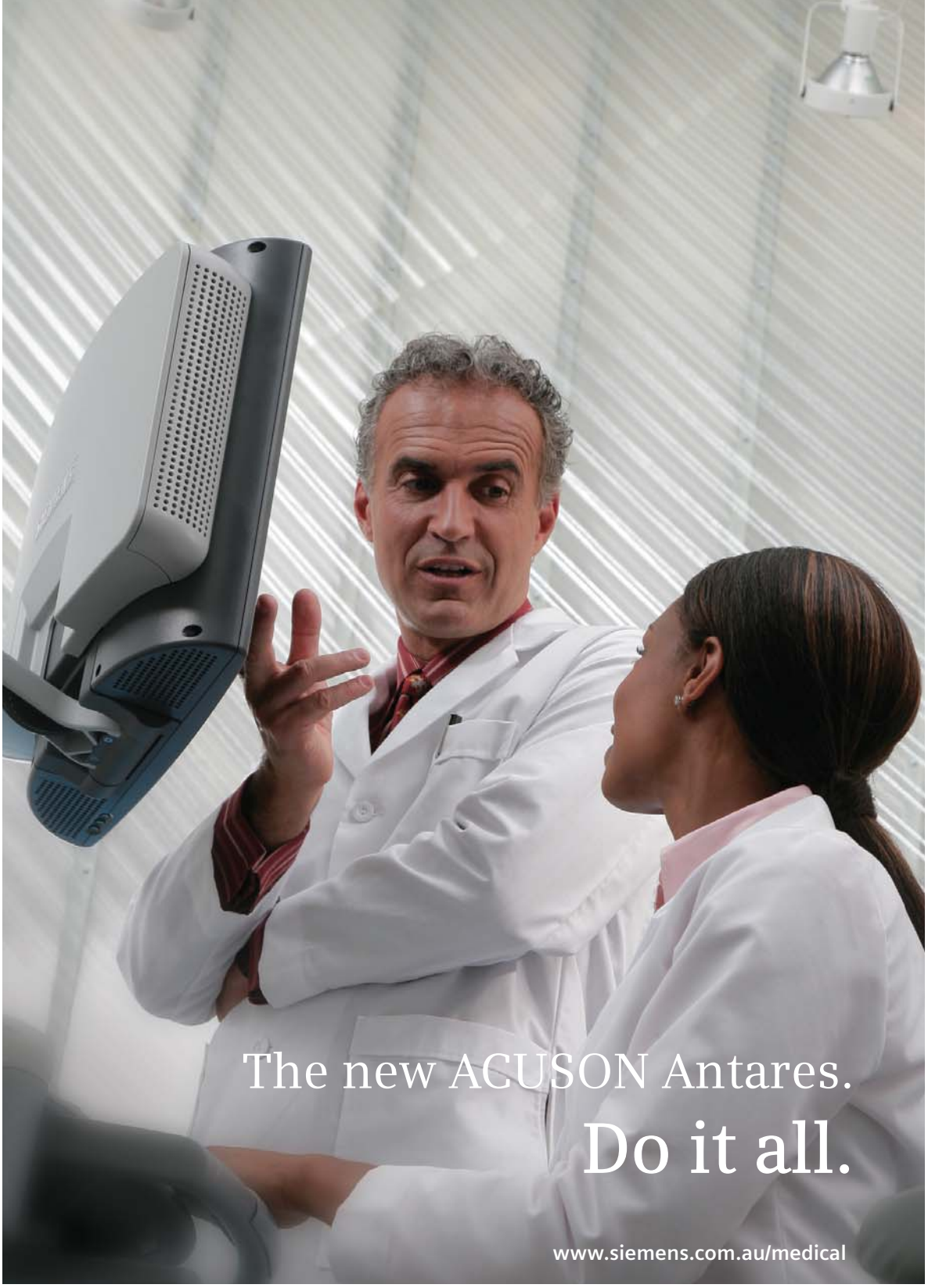

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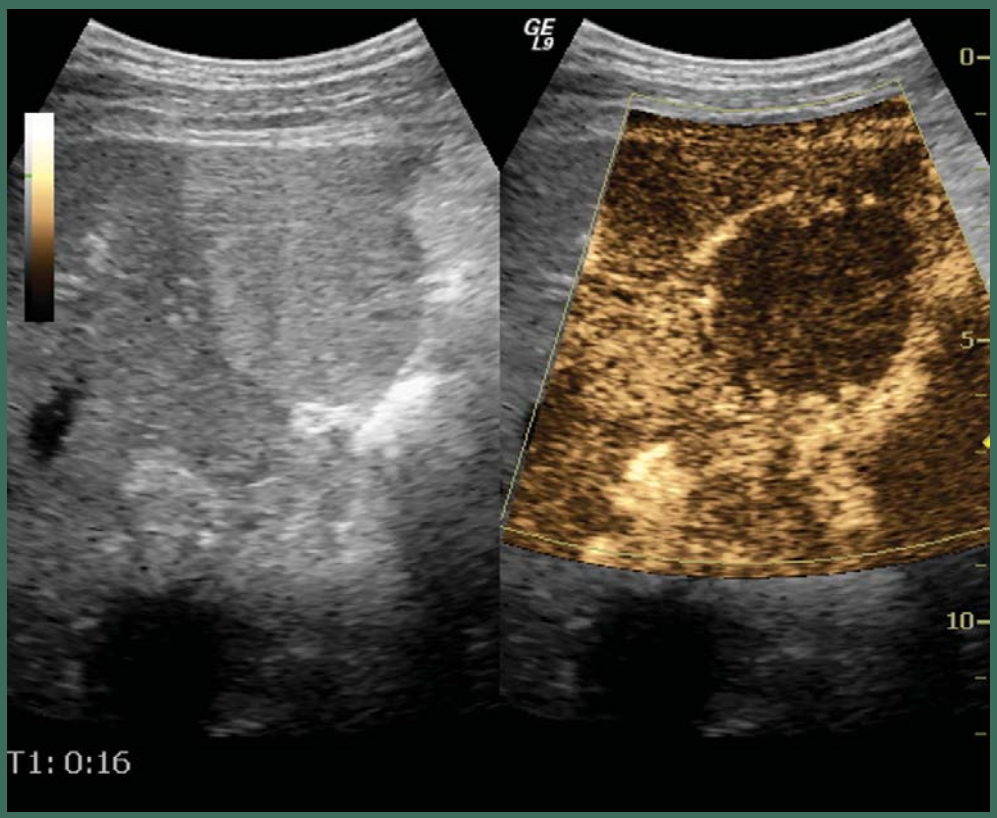
Volume 10 Issue 1 February 2007 ISSN 1441-6891

Ultrasound Bulletin

Journal of the Australasian Society for Ultrasound in Medicine



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Diploma in Medical Ultrasound (DMU)
Diploma in Diagnostic Ultrasound (DDU)
Certificate in Clinician Performed Ultrasound (CCPU)

2 Ultrasound training
The new ASUM College of Ultrasound accepts its first students in 2006

3 Online education
Free online physics education for DMU and DDU candidates

4 Online clinical handbook
A reference collection of images, cases and differential diagnoses

5 Educational resources
Extensive library of ultrasound videos, CDs and DVDs

6 Policies and statements
Guidelines, updates and worksheets used by policy makers

7 MOSIPP
Recording of CPD/CME points

8 Professional advancement
Speaking opportunities at meetings in Australia, New Zealand and Asia

9 Published author
Publish your research in the ASUM Ultrasound Bulletin

10 Research Grants
ASUM supports research which extends knowledge of clinical ultrasound

11 Service to medical ultrasound
ASUM welcomes ultrasound professionals to its Council and committees

12 Attend ASUM meetings at reduced rates
Members enjoy special registration fee discounts for the Annual Scientific Meeting and Multidisciplinary Workshops

13 Professional, quality networking
Connect with your colleagues and ultrasound systems suppliers at meetings and workshops and through high quality networks

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Advertising for staff on the ASUM website is free to ASUM members

15 Ultrasound Bulletin delivered to your door
The quarterly ASUM Ultrasound Bulletin is highly regarded both for its medical ultrasound articles and professional news content

16 Professional indemnity insurance
Peace of mind for sonographer members for a modest annual premium

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Australasian Society for Ultrasound in Medicine

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Ultrasound Bulletin

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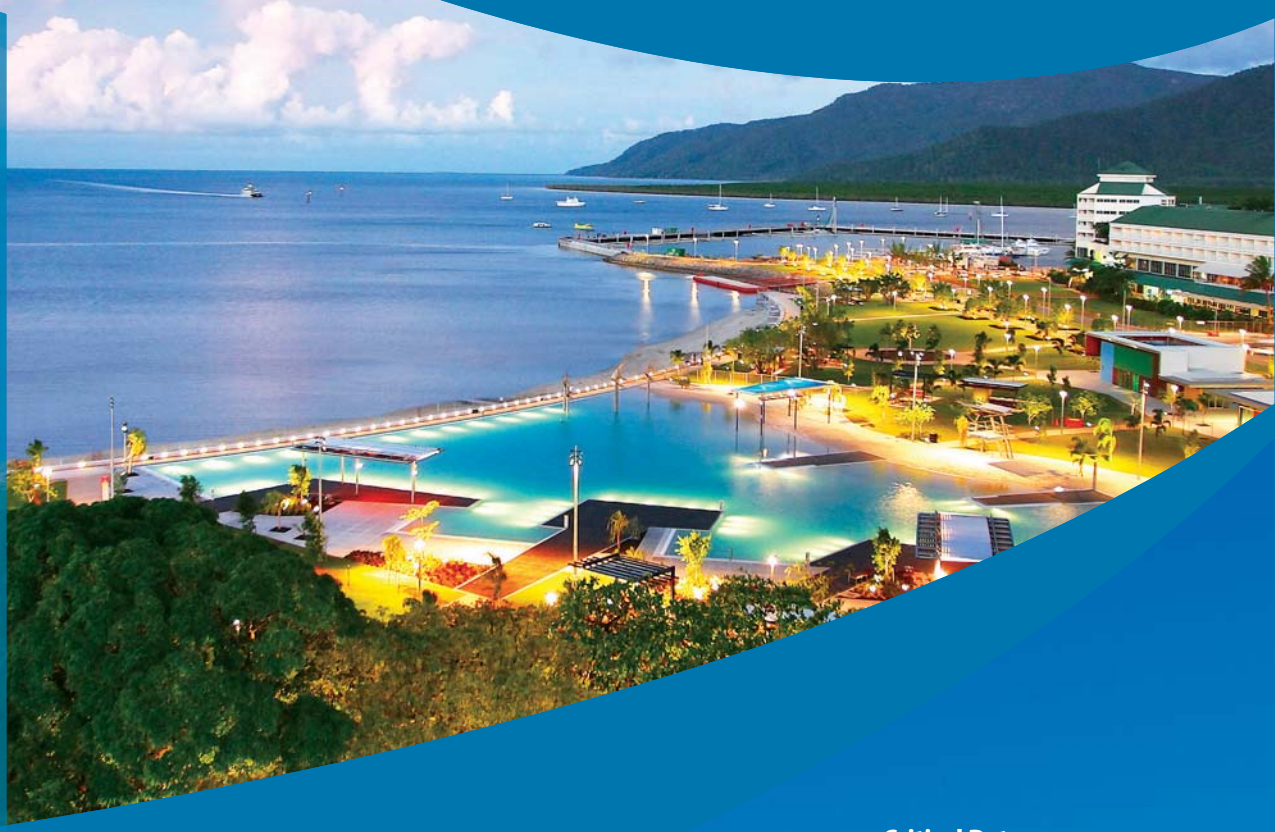

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Promoting Excellence in Ultrasound

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Critical Dates

Proffered Paper & Poster Abstract Submission Deadline
Friday, 11 May 2007

Proffered Paper & Poster Abstract Notification
Friday, 22 June 2007

Early Bird Registration Deadline
Friday, 13 July 2007

Accommodation Deadline
Monday, 6 August 2007

www.asum2007.com

President's message

Dr Matthew Andrews

I would like to wish all ASUM members and staff a very happy 2007. This year will be busy and exciting for ASUM, on multiple fronts.

Ultrasound Bulletin Editor

Prof Ron Benzie has been appointed Editor of the *Ultrasound Bulletin*, taking over from Assoc Prof Roger Davies, who has held the role for the past four years. In that time, the *Ultrasound Bulletin* has continually improved, providing a high quality educational and information resource to the membership. On behalf of ASUM I would like to thank Roger for his valuable contribution. Ron Benzie is Director of Perinatal Ultrasound at Nepean Hospital, Penrith, NSW. I would like to congratulate Ron on his appointment and I am certain that under his editorship, the *Ultrasound Bulletin* will go from strength to strength.

Congratulations

In the Australia Day Honours, Prof John Harris, a longstanding ASUM member and contributor to the Society, was awarded the Medal of the Order of Australia for service to medicine, particularly through the advancement of vascular surgery and ultrasound procedures and techniques, to medical education and curriculum development, and to public health administration. ASUM congratulates John on his award and is proud to have such an honoured member.

New ASUM office

ASUM is now the proud owner of a new home on the Pacific Highway, St. Leonards. The Secretariat moved into the office over the Christmas period and the fit-out should be complete within the next few weeks. Reflecting the growth and increased activities of the Society, the office will provide an appropriate home base. In addition to ample facilities for ASUM staff, the office will have teaching and meeting amenities. ASUM staff has worked tirelessly with the CEO, Dr Caroline Hong, over the last couple of months preparing for and orchestrating the move. When complete, members are encouraged to visit the new premises and introduce themselves to the staff, who will gladly show you around.

WFUMB World Congress 2009

Now approximately two-and-half years away, preparation for the WFUMB World Congress is well under way. Congress Convenor, Dr Stan Barnett, and Scientific Convenor, Assoc Prof Roger Davies, welcome input from ASUM members interested in participating. I strongly urge members to put up their hands, as this is literally a once-in-a-professional-lifetime opportunity to be involved in such a prestigious meeting. The scientific program is currently being developed and an ASUM delegation recently attended the Radiological Society of North America (RSNA) meeting, establishing contacts and seeking general suggestions for the direction of the program. A major theme of the feedback was that the meeting should build on previous WFUMB congresses, but also be innovative seeking new directions and themes in its overall program. Our task is to meet that challenge with as broad an input from our members as possible.

Certificate of Clinician Performed Ultrasound (CCPU)

Ultrasound is increasingly utilised as a tool by clinicians in their every day practice. There is now a large range of medical craft groups using ultrasound in their clinical practice. The ultrasound performed depends on the nature of practice, thus is often limited and specific. This clinician performed ultrasound is distinct from the traditional, more comprehensive and

A neophyte editor's appeal

Prof Ron Benzie

It is a daunting task to follow in the footsteps of successful editors of the *Ultrasound Bulletin*. People like Rob Gibson, Glen McNally and Roger Davies cast long and distinguished shadows. I consider it an honour and a privilege to have been chosen to succeed them and hope to be up to the challenge. With your help it might just be possible.

It is important that we continue to reflect the needs of our members (how is that for a motherhood statement?), so I would like to hear from you. Do you like this issue's new cover? Do we need to change our format? Would separation of the clinical from the official ASUM business content be helpful? Do you think an on-line edition would be useful? What changes in content would you like to see? Would you like to see opinion pieces from leaders in the field (both here and overseas)? Should we have an international editorial board as well as our local experts? How can you help?

These are a few of the questions that spring to mind. I hope you will contact me and let me know your opinion.

A letter section should be vibrant and controversial. Provocative viewpoints are of the essence! The recent discussion on entertainment scans was a good example of how the *Ultrasound Bulletin* can be a forum for expression of different viewpoints.

My specialist training was originally in obstetrics and gynaecology. I saw my first ultrasound machine in use when I was a registrar in Aberdeen 40 years ago. Now, of course, the ultrasound horizon reaches well beyond obstetrics and your journal should reflect that.

Please help us make this journal even more interesting and relevant.

Ron Benzie
Editor
email benzier@wahs.nsw.gov.au

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usually referred ultrasound, provided by an imaging specialist in conjunction with a sonographer. Clinicians performing ultrasound as part of their clinical practice have lacked dedicated ultrasound training. ASUM has responded to their approaches for training by establishing the CCPU. This qualification will have a common ultrasound physics component and the clinical ultrasound component will consist of modules relevant to the specific areas of clinical practice. ASUM clearly distinguishes this clinically-based qualification from its other more comprehensive medical ultrasound qualification, the Diploma of Diagnostic Ultrasound (DDU), which is at the imaging specialist standard. On behalf of ASUM, I would like to pay tribute to the tireless efforts of Dr Glenn McNally, who has driven the establishment of the CCPU.

Asia Link

Established several years ago between several Asian ultrasound societies to mutually disseminate ultrasound education and training throughout Asia, ASUM has developed invaluable relationships with its counterparts in many Asian countries. The Asia Link Program has brought many speakers to Australasian meetings and has provided opportunities for ASUM members to impart their knowledge and skills to a very wide audience. The program remains alive and well.

The 8th Congress of the Asian Federation of Societies of Ultrasound in Medicine (AFSUMB) will be held in November. The Federation has requested that ASUM provide speakers to the meeting. As part its Asia-Link commitment, ASUM Council is exploring the possibility of holding its November 2007 Council meeting in conjunction with the AFSUMB meeting with all ASUM Councillors participating as speakers. This timely contribution would not only raise ASUM's profile in the Asian region, but will serve to demonstrate to a wide audience, the quality of the WFUMB 2009 meeting ASUM will host.

Regards and Best Wishes for 2007.

Matthew Andrews
President

Clinical Director and Principal Lecturer Position DMU (Asia)
Location: Kuala Lumpur, Malaysia

Applications are invited for a sonographer-lecturer position for Vision College which is located in Kuala Lumpur, Malaysia. Vision College is seeking to appoint a DMU trained sonographer (with at least three years post-DMU experience) to provide courses in General Ultrasound. As the successful applicant, you will manage the training at Vision College and oversee the Sonography School. You would be culturally sensitive and interested in living and working in Asia. A generous, negotiable remuneration and conditions package is offered and initial expressions of interest, together with a CV, should be directed to the ASUM CEO, Dr Caroline Hong by Email: carolinehong@asum.com.au.

This is an attractive position for an ambitious sonographer who wishes to advance their career by improving their international network.

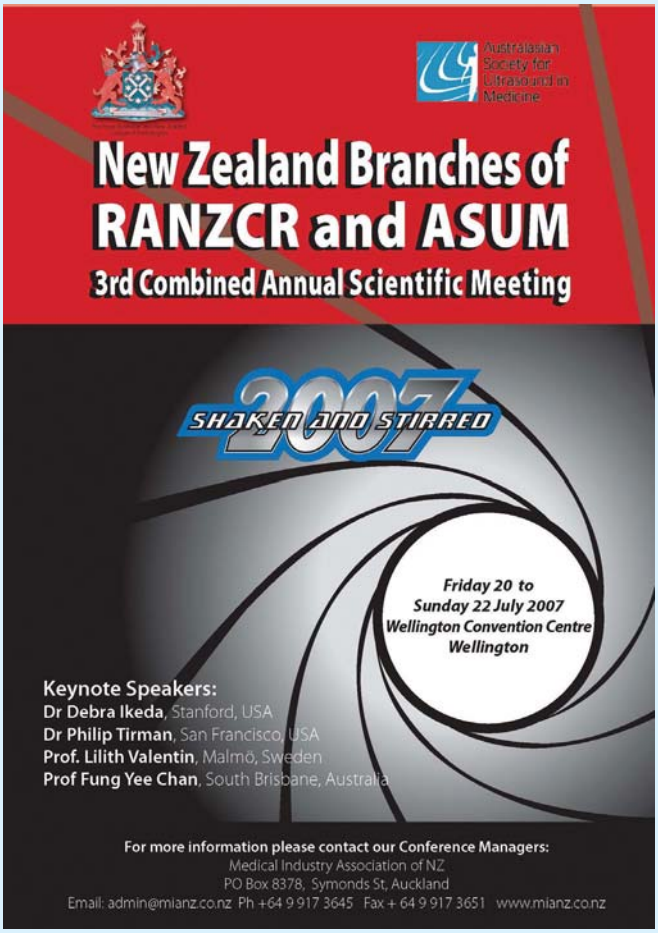
Job specification in Malaysia includes:

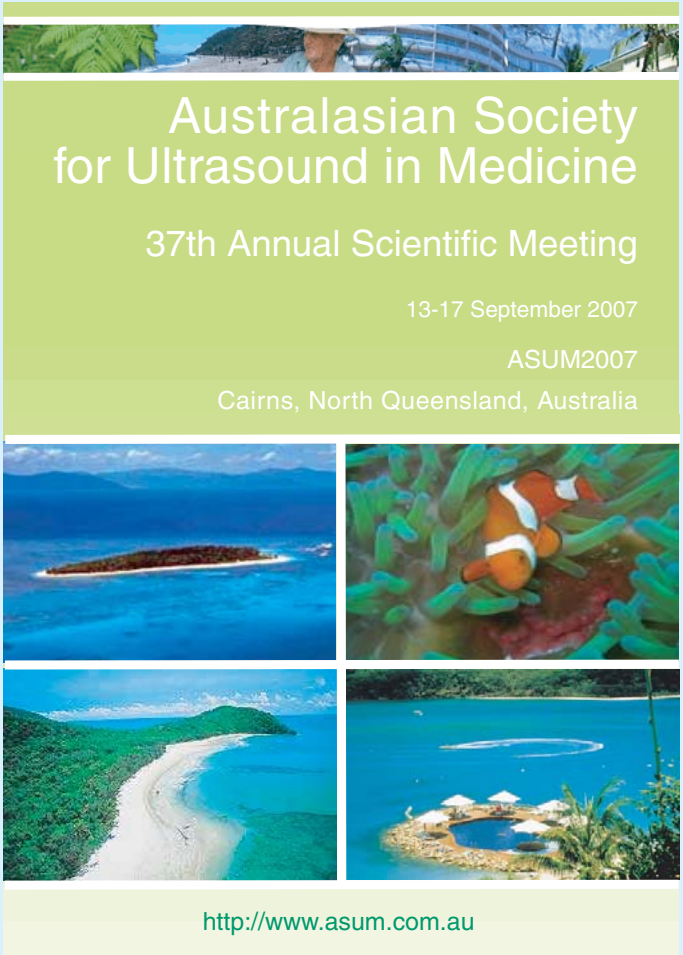
- Position of 'Clinical Director and Principal Lecturer'
- Management training at Vision College to oversee the Sonography School
- Assisted by several recently qualified Sonographers
- Overseas networking and relationships
- Sponsoring travelling opportunities to attend CME courses
- Prestigious links with renowned Hospitals in Malaysia. There are prominent hospitals that Vision is attached to and the Sonographer will be associated with these institutions
- Competitive tax-free remuneration, but low living costs. In addition, includes annual trip back to Australia/New Zealand.
- Living in a modern and progressive Asian country

Interested in an Asian Ultrasound Experience?

Vision College, in fascinating Kuala Lumpur, Malaysia, is also seeking to employ sonographers on short term contracts of 6–12 weeks to teach general sonography on campus. A generous, remuneration and conditions package is offered and initial expressions of interest, together with a CV, may also be directed to the ASUM CEO, Dr Caroline Hong by Email: carolinehong@asum.com.au.

ASUM extends a warm welcome to you at upcoming ASUM meetings





www.asum.com.au

CEO's message

Dr Caroline Hong

Greetings and Happy New Year! Now that the festive season is definitely over and we enter the first quarter of the year 2007, the ASUM Secretariat has been busy working on the year's activities, planning, following up and responding to our members' needs. Membership renewals have continued to come in steadily and we are pleased to see many new members joining ASUM each month. Applications for the DMU and DDU examinations are also being processed. Education activities are on the brew and bubbling along nicely.

Prof John Harris AM

On behalf of the ASUM Council, Secretariat and members, we congratulate Prof John Harris, a longstanding and loyal ASUM member, for his Medal of the Order of Australia on Australia Day. A more detailed report will be published in a future *Ultrasound Bulletin* about John. He was honoured and awarded with a Medal of the Order of Australia for services to medicine, particularly through the advancement of vascular surgery and ultrasound procedures and techniques, medical education and curriculum development, and to public health administration. Certainly, we all share our pride and joy with John and his family on this happy occasion

ASUM new address

I am pleased to advise that the ASUM Secretariat relocation has taken place successfully (hopefully completely by the time this *Ultrasound Bulletin* goes out), with great cooperation and enthusiasm from the staff and much patience from our members. As with any relocation, it required a lot of coordination, logistics management and hard physical work. Staff will need some time to adjust to the new environment and new systems and we hope that the process hasn't unduly affected our service to members.

The ASUM office is now located in the St Leonards and Crows Nest area on the lower north shore of Sydney, across the harbour bridge. The office is right on the boundary that demarcates the suburbs of St Leonards (associations and business precinct) and Crows Nest (café suburb). We are at close proximity to many associations, shops, bus routes, the main St Leonards train station, medical services, hospitals, teaching institutions, business facilities, banks, post office, retail therapy places, cafes and restaurants and many more.

Members are advised to use the Crows Nest PO Box address as the mailing address, although all mail that is sent to the old address will be redirected to the new office.

The change has already seen a lift in staff morale and efficiency, as we are now able to work on one floor as a dynamic team.

The previous office at Willoughby was the first permanent premises of the Society and was purchased in 1989 by the ASUM Council. It has served the Society well, but with the expansion of members' services, there was insufficient space to carry out the Society's operations and education activities.

The ASUM Council approved the Willoughby office's sale 2004 with a three-year lease back option that expires in May 2007. The new premises were bought in a timely manner and within a Council approved budget. The whole construction and fit out of the new premises with workstations and training rooms have also been completed within a Council approved budget. Two new training rooms will host examinations and education activities.

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RSNA 2006 (L–R) Dr Glenn McNally, Dr Stan Barnett, Ms Louise Archer, Dr Caroline Hong, Mr Matthew Andrews and Mr Hiroyuki Tsujino

MDW 2007 Gold Coast 28th February–4th March

Registrations remain strong for the series of workshops to be held at the Gold Coast. Early bird registrations were extended to allow members who are returning from their holiday breaks to benefit from the special rates. More than 300 registrations have been received and we anticipate more. The multidisciplinary nature of the workshops will cover the following:

- 2007 ASUM Multidisciplinary Workshop 28th February–4th March 2007.
- ASUM Fetal Echocardiography Symposium, Annual O&G Ultrasound Symposium 2nd–4th March 2007.
- 2007 DMU Preparation Courses 28th February– 4th March 2007
- 2007 DDU Technical Seminars 28th February–1st March 2007
- Nuchal Translucency Course 2nd March 2007

These 'hands-on' workshops have proven to be very popular in previous years and ASUM has organised these to respond to demand.

RSNA 2006

An ASUM delegation consisting of Dr Matthew Andrews (ASUM President), Dr Stan Barnett (WFUMB 2009 Convenor), Dr Glenn McNally (WFUMB 2009 Treasurer) and I (ASUM CEO), attended the Radiological Society of North America (RSNA) 2006 – 92nd Scientific Assembly and Annual Meeting in Chicago in November last year.

It is the largest medical congress and exhibition in the world, attracting approximately 62,000 delegates to Chicago. A staggering 28,052 exhibitors, 27,803 professionals and 6121 other category registrants attended this amazing congress and exhibition.

It was an incredible experience to participate in this congress and the logistics behind it must have been equally incredible. The ASUM team gained many new valuable networks and came home with rewarding ideas and information for the Society. RSNA offers state-of-the-art research, education and technology all in one site. The President of RSNA 2006, Robert R Hattery, in his opening address urged all participants to renew their lifelong commitment to professionalism to their patients, the public and to themselves. He said to the professionals 'We are given the privilege by the public of credentialing and maintaining ourselves as professionals. If we abuse our freedom or fall short, we risk losing our privileges.' He stressed that professionalism is 'the art and science of medicine.'

I believe that most of our ASUM members share the very same sentiments and I often feel inspired by the professionalism displayed by ASUM members in their work and public life locally and internationally.

DOHA

A letter from Mr Peter Woodley, Assistant Secretary, Diagnostic Imaging Section, Department of Health and Ageing (DOHA), invited ASUM to comment on the document called the First Working Draft of Standards for the Accreditation of Practices Providing Diagnostic Imaging Services Under the Radiology MoU. This working draft is being provided for comment to professional and industry bodies representing diagnostic imaging providers, particularly providers of services under the Radiology MoU. The Department has released three other documents to accompany the first working draft of the standards to assist stakeholders to provide comments.

The first of these additional documents requested specific feedback from ASUM about requisite qualifications, skills and training of practitioners, represented by ASUM, who provide imaging services covered by the Radiology MoU. The second was a general Feedback Form to provide comments on any or all of the draft standards, criterion and sample indicators in the working draft of the standards.

The remaining document was a version of the first working draft of the standards which includes, for comparative purposes, the relevant standards from Version 7 of the *Royal Australian and New Zealand College of Radiologists Accreditation Standards for Diagnostic and Interventional Radiology*.

ASUM has sent a response and was thankful for the opportunity to comment on the first working draft of standards relating to an accreditation scheme for practices providing radiology services under Medicare. As the consultation process is open to public scrutiny, the DOHA will be publishing all written submissions on the Department's website at www.diagnosticimaging.health.gov.au.

ASUM member book sold out

You may recall that late last year, we announced the release of a book edited by Dr George Condous on early pregnancy. The sales were so popular that it is now in its second print.

Left The Exhibition Hall and **Right** The Posters Section at RSNA 2006

Enquiries can be directed to:
Assoc Prof George Condous
Associate Professor in Gynaecology
University of Sydney,
Nepean Clinical School
Early Pregnancy and Advanced Endosurgery Unit, Nepean Hospital
Penrith, NSW 2750, Sydney,
Australia.

New Ultrasound Bulletin Editor

This issue will be the first with Prof Ron Benzie as Editor. We thank Assoc Prof Roger Davies for his contribution as Editor for the last four years. ASUM also welcomes Assoc Prof Amar Trevedi to the Editorial Committee.

ASUM NZ 2007 joint meeting with RANZCR NZ Branch

The concept of holding joint meetings with the RANZCR started several years ago and it proved so popular that the Third Combined ASM of the New Zealand Branches of RANZCR and ASUM has been organised to be held from 19th–22nd July 2007 at the Wellington Convention Centre. The Local Organising Committee has decided on a theme; '*Shaken and Stirred*'. The keynote speakers include Dr Debra Ikeda, Stanford from CA, USA; Dr Philip Tirman, San Francisco from CA, USA; Prof Lilith Valentin from Malmo, Sweden; and Prof Fung-Yee Chan from South Brisbane, Australia. The call for abstracts is now open and closes on Sunday 6th May 2007. Information is available on the ASUM website www.asum.com.au. ASUM also welcomes papers or posters from Fellows, educational affiliates, registrars and sonographers, with many prizes on offer.

ASUM 2006 Cairns Meeting 13th–16th September 2007

ASUM's Annual Scientific Meeting for 2007 will be held in Cairns at the prestigious Convention Centre. The Committee is particularly excited about the program, which includes first class speakers from all fields of ultrasound. The topics will be up-to-the-minute and will touch on both current ultrasound practices and new advances in our field. The program has strong components from obstetrics and gynaecology, musculoskeletal imaging, through to vascular ultrasound. It should appeal to anyone in the ultrasound field.

Please see the ASUM website www.asum.com.au for regular updates. The registration brochure is enclosed with this issue. Call for abstracts will close on 11th May 2007.

Travelling to Cairns is easy with the Cairns International Airport only 8 km from the city centre. The airport has daily flights from Asia, the United States and Europe (via Singapore) and from all around Australia.

Cairns, which is surrounded by tropical rainforest, deep blue seas and coral islands, is the capital of far north Queensland and is situated 2000 km north of Brisbane. The cosmopolitan city of Cairns is the premier launching point from which to visit the pristine World Heritage listed rainforests and the spectacular Great Barrier Reef. To the west are the tablelands and the outback, waterfalls, rivers and beautiful lakes, wetland areas with magnificent birdlife and the spectacular Undara Lava Tubes.

The Organising Committee consists of Dr Deborah Moir (Co-Convenor), Liz Carter (Co-Convenor),Brendan Cramp (Vascular), Craig Cairns (MSK),Teresa Clapham, Helen Goton, Sue Davies, Lynette Hassell and Dr Andrew Ngu (trade liaison).

Invited overseas speakers include Dr Joseph Polak, Dr Carlo Martinoli, Dr Yves Ville, Dr David Nyberg, Dr Eugene McNally, Dr Tom Stavros and Dr David Evans.

AFSUMB 2007 Thailand

ASUM has been approached by the AFSUMB 2007 Congress President, to support the event. The majority of ASUM councillors have responded positively, offering to present at this Congress, volunteering their expertise and time. Normally, the ASUM Council holds a meeting in Sydney every November. This year, in lieu of the meeting to be held in Sydney, councillors will consider holding the council meeting in Bangkok prior to the AFSUMB Congress.

The ASUM council has also resolved that some assistance will be provided to ASUM members if they are intending to participate in the AFSUMB Congress from 12th–16th November 2007, such as if their abstracts are accepted or if they are invited speakers. In particular, we encourage ASUM members who would like to be given speaking opportunities on behalf of ASUM.

ASAR

ASUM has been advised that the ASAR has implemented a return to clinical practice policy for sonographers who return to the workplace after an absence from clinical practice of greater than three years. From 2007, sonographers with an absence from clinical practice greater than five

years must successfully complete an ASAR approved 'short course' *Return to Clinical Practice Program* (RCPP) as part of their requirements to attain AMS status. Details are on the website www.asar.com.au.

ASUM Vietnam project

Dr Harley Roberts, Dr Andrew McLennan, Dr Jon Hyett and others were recently involved in setting up a fetal medicine program in Vietnam, following on from relationships that were established and set up by Dr Harley Roberts last year with the ASUM Vietnam project.

Harley continues to raise funds for this scholarship and has already made plans for more aid in Vietnam, in particular at the Tu Du Hospital. The Tu Du Hospital is now the first and only hospital in Vietnam to be registered with the Fetal Medicine Foundation in London and in addition eight of the hospital's doctors are now certified for Down's screening.

Further exchange programs are being planned utilising the funds donated through Harley Roberts' efforts for this project.

Dr Pham Thanh, Director of Tu Du Hospital and Dr Nguyen Ha, Director of imaging are both very supportive and appreciative of this exchange. I am privileged to be part of this project, working with Harley in facilitating the contacts, the processes and making things happen.

ISUM – Indonesia

Dr David Rogers and Dr Simon Meagher recently volunteered their time and expertise as speakers in Bandung, Indonesia. Dr Daniel Makes, President of ISUM is organising another meeting to be held in Bali from 27th–28th July 2007. Details are listed in the ASUM Calendar and on the website.

CADUCEUS – Denmark

Mary Langdale has returned from her CADUCEUS exchange in Copenhagen. A report is published elsewhere in this issue. Morten Boesen was here from Copenhagen on the exchange program. We thank Dr Cheryl Bass and her team once again for providing the training and support in this program. A report from Morten will be published in a future issue of *Ultrasound Bulletin*.

Thank you

On behalf of the ASUM Secretariat, I once again thank all members for their patience and understanding during the relocation of the office. If you are in Sydney, please feel welcome to contact me if you wish to visit the premises and to meet the ASUM staff.

We will continue to work hard to serve the Society and to contribute to its long term success under the leadership of the President and the ASUM Council. I also want to acknowledge the support of the staff and members I have worked with over the years to advance ASUM's objectives.

Dr Caroline Hong
Chief Executive Officer
carolinehong@asum.com.au

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Mailing address: PO Box 943,
Crows Nest NSW 1585, Australia
Ph: +61 2 9438 2078
Fax: +61 2 9438 3686

To the CEO

C-Gen 10: Joint Position Statement on the Appropriate Use of Diagnostic Ultrasound

Thank you for your email of 22 August 2006 to Dr Peter White, CEO RANZCOG, regarding ASUM's *Position Statement on Appropriate Use of Diagnostic Ultrasound Equipment for Non-medical Entertainment*. We note that ASUM have approved a minor amendment to this document, made by the Women's Health Committee (WHC) at the July 2006 Meeting, which involved amending 'sole' to 'primary' in the first sentence of paragraph three.

The updated Position Statement was approved as a new joint College Statement *C-Gen 10: Joint Position Statement on the Appropriate Use of Diagnostic Ultrasound,* at the WHC meeting held 24 November 2006 and was subsequently endorsed by RANZCOG Council.

This is now available on the RANZCOG website at http://www.ranzcog.edu.au/publications /statement/C-gen10.pdf and will also appear in our magazine O&G. A copy of the statement is enclosed for your refence.

College Statements are reviewed every two years, so we will be in touch with you in the future to see if the text needs to be updated.

Yours sincerely,

Dr Edward W Weaver
Chairperson
Women's Health Committee

College Statement

Title: Position Statement on the Appropriate Use of Diagnostic Ultrasound

Position Statement of The Australasian Society for Ultrasound in Medicine (ASUM), RANZCOG and the Royal Australian and New Zealand College of Radiologists (RANZCR)
Statement No. C-Gen 10
Date of this document November 2006
First endorsed by Council November 2006
Next review due: November 2008

Statement

The Australasian Society for Ultrasound in Medicine, the Royal Australian and New Zealand College of Obstetricians and Gynaecologists and the Royal Australian and New Zealand College of Radiologists are committed to ensuring the maintenance of the highest standard of medical care for pregnant women.

Diagnostic medical ultrasound technology offers enormous benefits in terms of the provision of useful diagnostic information so that pregnancy may be better assessed and managed, with optimum outcomes for mothers and babies achieved.

The use of diagnostic medical ultrasound equipment requires regulation such that its primary use is for the purpose of medical diagnosis. Such regulation should require that the diagnostic ultrasound equipment usage be restricted to appropriately qualified health care professionals.

Usage of such equipment should conform to the guidelines produced by the Australasian Society for Ultrasound in Medicine.

We urge that appropriate regulation regarding the sale, distribution and use of diagnostic ultrasound equipment be formulated with a view to ensuring that this technology continues to assist clinicians in the management of pregnancy, thereby optimising outcome for mothers and babies.

Useful website links

ASUM http://www.asum.com.au/open/home.htm
(Scroll down to 'Non-diagnostic applications' and select 'F1 Statement on the appropriate use of diagnostic ultrasound equipment for non-medical entertainment ultrasound'.)

Disclaimer

This College Statement is intended to provide general advice to Practitioners. The statement should never be relied on as a substitute for proper assessment with respect to the particular circumstances of each case and the needs of each patient.

The statement has been prepared having regard to general circumstances. It is the responsibility of each Practitioner to have regard to the particular circumstances of each case, and the application of this statement in each case. In particular, clinical management must always be responsive to the needs of the individual patient and the particular circumstances of each case.

This College statement has been prepared having regard to the information available at the time of its preparation, and each Practitioner must have regard to relevant information, research or material which may have been published or become available subsequently.

Whilst the College endeavours to ensure that College statements are accurate and current at the time of their preparation, it takes no responsibility for matters arising from changed circumstances or information or material that may have become available after the date of the statements.

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A standardised protocol for obtaining appropriate volume data sets during the fetal mid trimester morphological scan

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Abstract

Surface rendered 3D ultrasound is well known in obstetric imaging. The use of 3D volume data sets (VDS) is arguably more important to the future of ultrasound. In order to advance the scientific and educational opportunities that come with this technology, standards need to be established. These standards involve protocols for both the method of collection and for analysis for the various fetal anatomical regions. As well, they involve agreement about a uniform file format so that the storage, transmission and utility can be as global as possible. This aspect is under the control of the manufacturing companies.

The aim of this discussion paper is to share the three years of experience gained at Brisbane Ultrasound for Women (BUFW) to advance the acceptance of volume ultrasound and to encourage debate about a consensus for uniformity. It describes the protocol for collection of the VDS as a baseline for fetal morphology assessment used in over 15,000 cases at BUFW between 2002 and 2005. It includes definition of the landmarks for optimum data-set acquisition i.e. initial plane, central structure, volume angle, etc. as well as criteria for assessment of adequacy. The anatomical detail and measurements obtained from each region are listed, together with artifacts to be aware of. Other units may adjust these baseline protocols to suit their own requirements.

Introduction

Fetal biometry is useless unless there is a standard protocol for performing the measurements. Assessment of fetal anatomy for normality was very difficult until there became a standard protocol for obtaining the important imaging planes. Cardiac assessment is perhaps the best example. Comparison of examinations was not possible. Collaborative research prior to establishment of standards was limited. In recent times, there has been slow recognition that data-set analysis provides an opportunity to extend the use of 3D ultrasound (3D US) in fetal examination. The authors believed from the outset that standard protocols were necessary and established them in their practice. This paper aims to share that experience.

Standardisation is an essential requirement for the introduction and dissemination of any new technology and new techniques. There are two steps involved in establishing standardisation. First, experienced 3D US practitioners need to describe their protocols for particular examinations so that these protocols can be debated and refined. Second, standardisation involves the manufacturers agreeing to conform to a standard protocol for file storage and analysis. Unfortunately, the end user has no control over this latter requirement, but should have an input.

3D ultrasound in obstetrics

3D Ultrasound depicts the fetus in utero in the way that we view everyday life. Surface rendered 3D images show wondrous images of the surface anatomy. There is no question that 3D and 4D ultrasound enhances parental bonding. The ability to assess fetal surface detail to make diagnoses of conditions, in the way that our neonatal and genetics colleagues do with the newborn, will come with experience. When viewed in real-time it is now possible to display fetal behavior, movements, and facial expressions. These advances expand the scope of fetal assessment.

It is important, however, not to allow this great advance to detract from other aspects that 3D US technologies have bought. The collection of a volume data set (VDS) of ultrasound information may prove to be even more significant than the bonding aspects, at least from a medical and scientific viewpoint. The ability to rotate, translate, re-slice and render the collected data set gives the ability to effectively re-do the entire scan, at any time, in any place in the future. Any perspective, any plane, any orientation can be recreated from the collected data. Standard views can be readily reconstructed. The dataset is all-inclusive. A series of images can be created to match the *ASUM Guidelines for Midtrimester Scan*[1].

Standardisation

File format

The file format is beyond our control. It is, however, counterproductive to require different software if studies are performed on different machines. While it may be desirable from the company's perspective to have a tertiary centre use their machinery exclusively, that path would require a tertiary unit for each manufacturer. The result would be diminished accessibility and a significant dilution of the experience and exposure of the units. It will always be the case that different units have different needs. Hence each will choose different hardware, often within the same department, for different

Initial image plane

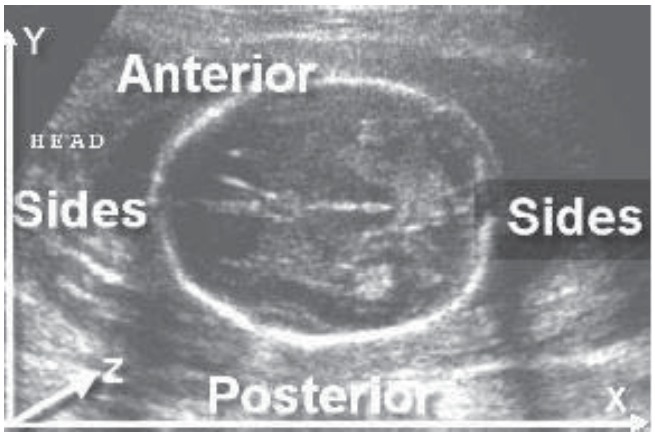

Fig. 1: Landmarks for direction.

Confirmation of adequacy

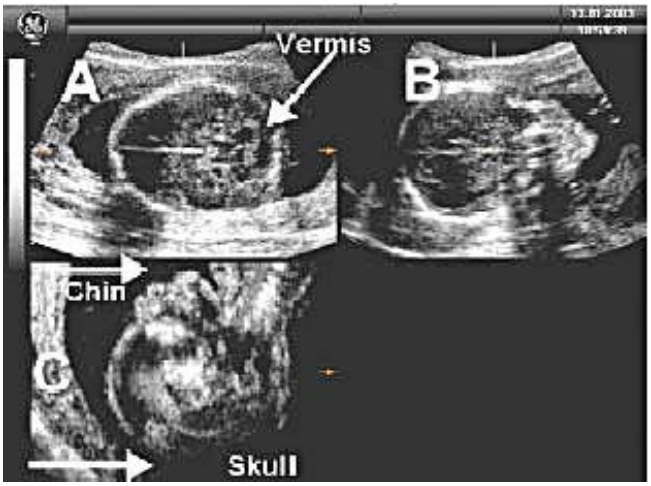

Fig. 2: Confirmation of adequacy of the head.

BUFW protocol for anatomical volume data sets at mid trimester scan

Region definitions

Landmarks for optimum data set collection
Image plane: The plane of the scan to start the VDS sweep.
Central structure: The structure in ROI where the sweep should start from.

Volume box boundaries
Anterior: Limits
Posterior: Limits
Sides: Limits of the volume box on the image
Orientation: Fetal position
Volume angle: The sweep angle or volume angle (Vol angle)
Magnification: How large all small to make the image
Timing: When to start the sweep

Comment: Any important considerations with regard to the initial point of data set collection.

Confirmation of adequacy

Section plane or 3D rendered image. The reference image is labeled A, B, or C in the orthogonal display (Fig.2). Features that suggest an artifact is present.

Assessable features

Biometry: Measurements that can be performed
Anatomy: Assessable anatomical and functional structures

Artifacts

Features that can produce errors in diagnosis. NB The list does not include every possible artifact.

File size

The average file size (uncompressed)

examinations. It is a fundamental requirement that the unit can collect, store, retrieve, and reanalyse all VDS from their various machines. It is equally fundamental that only one piece of software is required for this off-line analysis.

Collection protocol

This aspect is within our control. Using 2D ultrasound, a series of standard images are collected with defined planes, particular orientation, and precise location of measurements in order to establish normality (or otherwise) of a fetus at morphological examination. These protocols have been described and progressively adjusted over 20 or so years of obstetric imaging, taking into account the improvement in knowledge and machine technology.[1]

3D volume ultrasound needs to follow the same path. If each examination is performed in a consistent fashion and includes standard sets, with common landmarks and defined planes, subsequent re-assessment and exchange becomes less problematic and thus more reliable. Research, teaching, re-examination, second opinion, and remote diagnosis should become easier. The technology becomes both more useful and more applicable.

Re-examination protocol

Dataset manipulation has also been standardised in our unit – the protocol will be the subject of a further discussion paper. However, the basic principles for each of the anatomical regions involved have been developed. These include multiplanar display, confirmation of adequacy, identification of a linear anatomical structure (e.g. falx, interventricular septum, spine etc), rotation of that linear structure into either a vertical or horizontal orientation using the Z-axis, similar Z-axis rotation in either or both other planes, to obtain an anatomically correct image that mimicks the real time planes, then translation of the appropriate single plane image for the assessment and measurement.

Pilot study

In early 2002, a pilot study was conducted within BUFW as a quality assurance (QA) project[2] where 125 mid trimester scans were performed on a Voluson 730 (GE-Kretz Zipf Austria) by real time examination according to the standard ASUM guidelines[1] by one of four experienced sonographers (HG, MH, NP, SW). The results and findings were recorded. A series of 3D volume data sets (VDS) were collected by a single operator (GP) according to a preliminary protocol established within our department for each anatomical region, head, heart, spine and abdomen. The total data set size for each case was approximately 30 MB (uncompressed). Following de-identification, 117 VDS were re-examined off line by one of the four sonographers using a PC program, 3D View™ software (KretzTechnic

Zipf Austria). This study showed no significant difference between the real time and the reconstructed biometry. Head biometry showed no significant difference for ventriculo-atrial diameter (VAD) (mean difference 0.1 mm), cisterna magna (mean difference 0.1 mm) and nuchal skin fold (mean difference -0.2 mm). Satisfactory assessment of the fetal heart was only achieved in 40% of cases using the rapid acquisition technique designed at that time. For the other regions, satisfactory anatomical assessment was possible for 80% of structures. This small pilot study demonstrated to our satisfaction that our principles of VDS were satisfactory and showed us areas where improvement was necessary.

The protocol was modified, mainly by adding a specific protocol for fetal face assessment, and by modifying the starting point of the cardiac volume so that a rib does not shadow the origin of the left ventricular outflow tract (LVOT). The introduction of STIC™ (spatio-temporal image correlation) technology was incorporated when it became available.

Subsequently, all fetal examinations have standard data sets collected, stored and archived as the only permanent record of the examination. Videotaping is no longer performed for archival purposes.

While this protocol may not satisfy the requirements for every examination for every problem, they are basic to most morphology scans. The protocol provides a foundation for future development. Different VDS may be required for later gestations, for more complicated scans or for abnormal findings.

General points

Applicability

Brisbane Ultrasound for Women used Voluson 730 Expert machines (GE Kretz, Zipf, Austria) exclusively. The protocol has been developed on and for these machines. It is, however, applicable whichever 3D machine is used, with modification of factors such as sector angle, frame rate etc. Individual experience will allow adjustment of the protocol to suit different departmental and examination requirements.

As discussed earlier, there would need to be an off line analysis software package similar to 4D View™ for the data set to be reassessed. This software should allow multiplanar display and rotation around the 3 axis.

Protocol variations

Fetal anomaly

In some circumstances, i.e. cardiac defect, it may be appropriate to collect an additional VDS starting from a midline sagittal plane to allow a clearer image of the ductal and aortic arches. In cases of abnormality, a dataset collected with the anomaly as the central starting point for the collection (i.e. facial cleft, spinal defect) and including the whole affected region should be included.

General points

Fetal movement

If the fetus is unable to stay still for a STIC™ data set, a rapid 3D sweep may be required as described in the protocol.

Number – more is not better

It must be appreciated that multiple data sets of the same region from different orientation, do not make analysis or interpretation easier. Indeed, the opposite is true. They increase the time required for re-assessment, and require more disk space for storage, backup, or transfer. More datasets mean greater expense. It is more efficient and effective to collect one adequate dataset than it is to take multiple ones, hoping that one is adequate.

Assessment of adequacy

Proper collection of the VDS requires that the assessment of the degree of adequacy (as defined in the regional protocols) be performed at the time of collection. The features to assess are completeness of inclusion of the anatomical region and absence of artifact. If the VDS is deemed unacceptable, it should not be saved, but rather repeated and reassessed. Because this is done as part of the real time examination, it is possible to be confident that, if subsequent analysis shows there to be a problem, it is a true finding, and has not been caused by the method of collection.

Operator's role

A fundamental aspect of all ultrasound examinations is that operators use their knowledge, skill and experience to obtain the best image of the area of interest. This involves adjusting the machine settings and the ultrasound window, focusing and enlarging appropriately, to minimise artifact and to gain maximum diagnostic information. It requires the operator to assess some features of an organ, i.e. movement, that cannot be assessed from still images. In most cases, the operators use their skill to obtain a set of anatomically correct pictures so that another person, typically a doctor, can look at them and make clinical decisions. The operator still requires knowledge of what other images or areas may be needed to refine the differential diagnosis. In our practice, we became satisfied that re-analysis of datasets collected according to our protocol was sufficiently accurate to enable clinical decisions to be made from them.

There is a concern that untrained, unsupervised operators may collect the datasets, miss obvious problems and bring the technology into disrepute. Standard collection protocols, like standard image based collection protocols, continue to require a high level of US competence for quality to be maintained and for the examination to remain relevant. Professional training in both collection and re-analysis will always be needed.

Data set collection has the potential to make the examination so rapid that there could be a negative impact on the doctor-patient relationship and the parental bonding process. In fact the reverse may be true. Every user of ultrasound should adhere to the ALARA (as low as reasonably achievable) principle and try to limit fetal exposure. Off line analysis of the medical aspects of the examination (biometry, structure) may in fact allow a lessening of the total exposure to the fetus even though the same amount of time is spent using the other aspects of the 3D technology.

Artifacts

3D Ultrasound is just B-mode ultrasound collected and stored by a different method. Artifacts related to B-mode: shadowing, side-lobe, refraction etc. still occur and distort the image. B-mode artifacts are present in all planes. Unlike real time scanning, rotation of the data set does *cont'd page 23*

Initial image plane

Fig. 3: Starting plane for fetal overview.

Confirmation of adequacy

Fig. 4: Assessment of fetal adequacy overview.

Significant images

Fig. 5: Surface rendered overview.

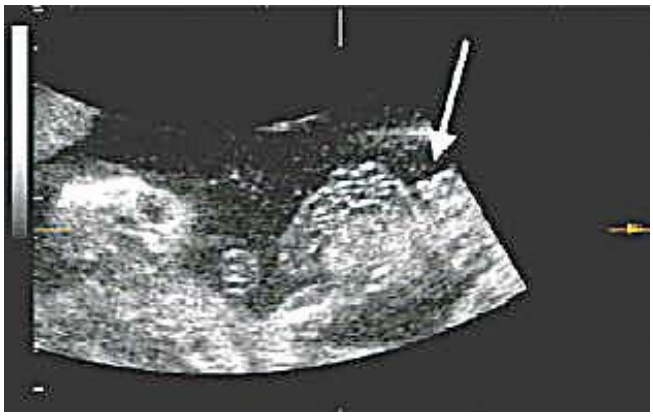

Fig. 6: Sneaky look at gender.

Region
Fetal Overview

Image plane
Sagittal anterior for preference

Landmarks for optimum data set collection
Image plane: Fetus in long axis.
Central structure: Diaphragm.

Volume box boundaries
Anterior: Maternal skin
Posterior: Maternal sacrum
Sides: As wide as possible
Orientation: The long axis of fetus is horizontal
Volume angle: Both sides of the uterus
Magnification: Reduced
Timing: No movement

Comment
This dataset takes longer because of its size. It is included as a backup to the other standard datasets for review if they are incomplete. It may allow limb measurements, but real-time examination is the best way to assess limbs.

Confirmation of adequacy
Top to bottom as much as is easily possible. No gross movement distortion.

Assessable features
Biometry: Basic biometry, liquor volume (but NOT AFI)
Anatomy: Fetus, limbs, placenta

Artifacts
Movement – significant chance for limb artifacts

File size
13 MB

Initial image plane

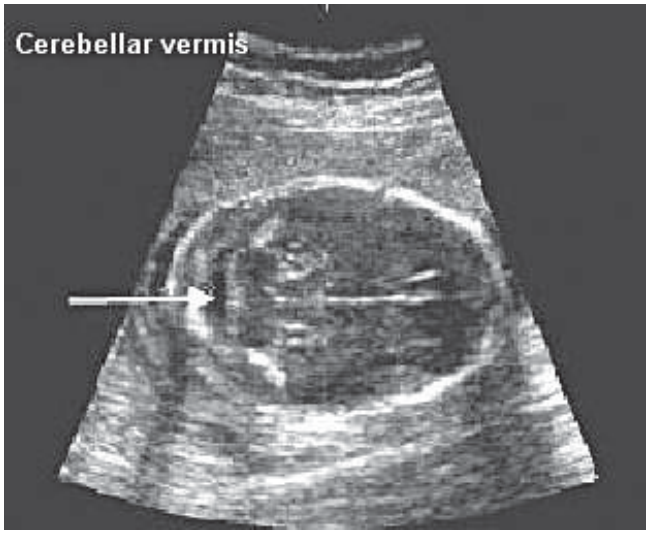

Fig. 7: Initial image plane cerebellar vermis.

Confirmation of adequacy

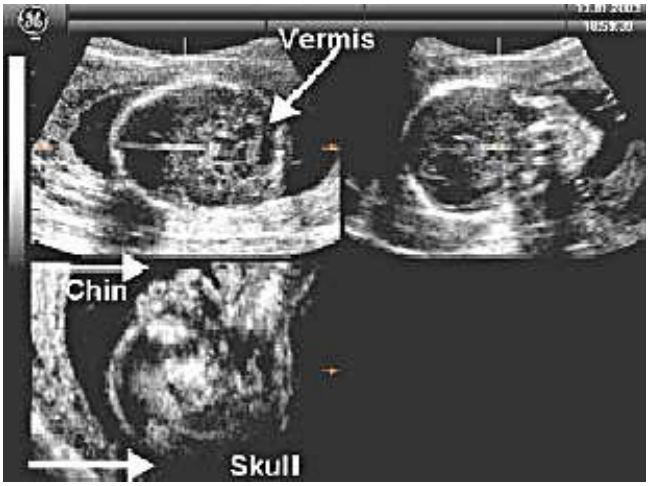

Fig. 8: Confirmation of adequacy of the head.

Significant images

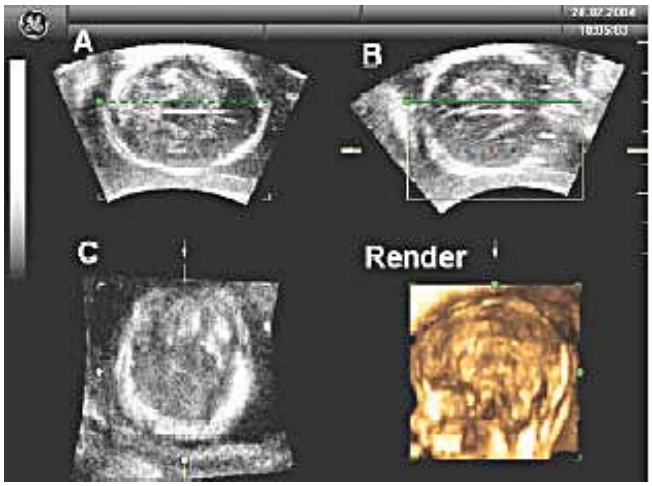

Fig. 9: Contrast rendered corpus callosum.

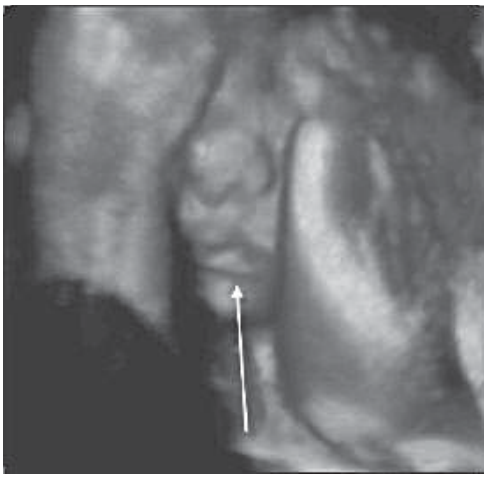

Fig. 10: Care with 3D image of the lip with movement artifact of the lip.

Region: Head

Image plane
Transverse

Landmarks for optimum data set collection
Image plane: Transverse with the falx horizontal
Central structure: Cerebellar vermis

Volume box boundaries
Anterior: Wider than skull
Posterior: Wider than skull
Sides: Wider than skull extent
Orientation: Transverse
Volume angle: 55 to 64 degrees
Magnification: Fill 80% of zoom box with the head image
Timing: Still

Comment
Begin at the level of the cerebellar vermis. The NSF is least artifactually thickened here.This data set does not give reliable face detail, particularly for the lips and lens.

Confirmation of adequacy
Section planes.

Scroll superiorly to above the head and inferiorly to below the jaw in image A. Check in image C that the jaw is included. If head is low in the pelvis, a slightly off axis set centered anteriorly on coronal suture may view Falx, CSP and CC.

Assessable features
Biometry: BPD, Head Circ, VAD, Cisterna magna, Nuchal skin fold.
Anatomy: Skull vault shape, Cranial sutures, Falx, Ventricles, Choroid plexus, Cavum septum pellucidum, Corpus callosum (contrast render), Posterior cranial fossa, Cerebellum, Nuchal skin fold, Mandible shape.

Artifacts
Movement distortion
Shadowing – corpus callosum
Lateral resolution – apparent increase in NSF

File size
6 MB

Initial image plane

Fig. 11: Coronal face starting plane.

Confirmation of adequacy

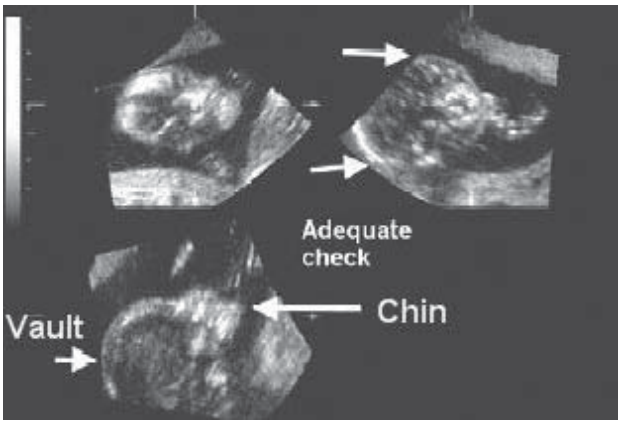

Fig. 12: Adequate face volume.

Significant images

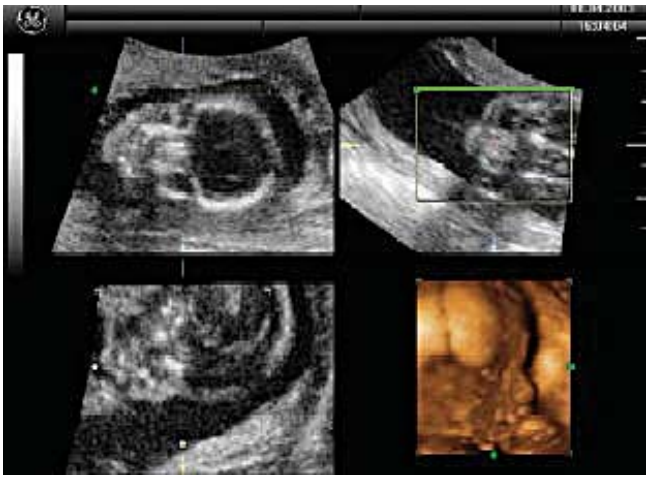

Fig. 13: A reliably good 3D face.

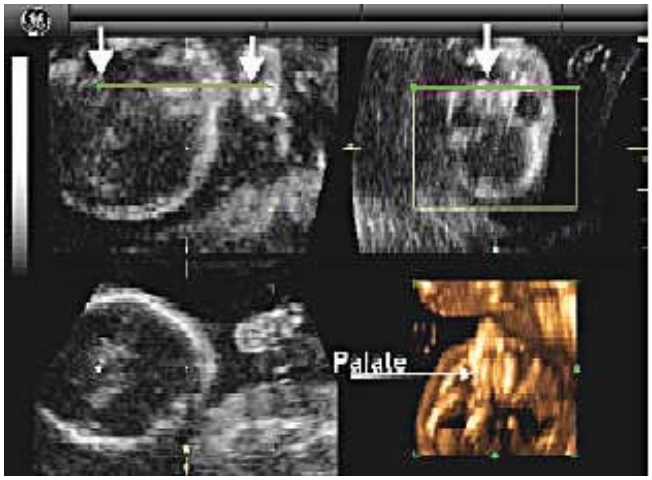

Fig. 14: Contrast rendered palate.

Region
Face

Image plane
Coronal

Landmarks for optimum data set collection
Image plane: Lens
Central structure: Both lens

Volume box boundaries
Anterior: Uterine wall
Posterior: Uterine wall
Sides: Vault of skull to upper thorax
Orientation: Horizontal z-axis 5 degrees x-axis
Volume angle: 45 degrees
Magnification: 50% box area
Timing: Not moving

Comment
Head horizontal, face at level of lens. Nose in centre of field. This dataset is included to allow a better assessment of facial morphology than can be obtained from the head dataset.

Confirmation of adequacy
Reference image C. Extent – Above skull crown to below jaw. Distal lens.

Assessable features
Biometry: Inter-orbital, Binocular distance, mandible, nasal bones.
Anatomy: Orbits, lens, lip, mandible, metopic suture, nasal bones, anterior ear, palate (contrast render) micrognathia, flat forehead.

Artifacts
Movement. Shadowing especially from a limb anterior to the region of interest and above of the volume box. Lip movement.

File size
7 MB

Initial image plane

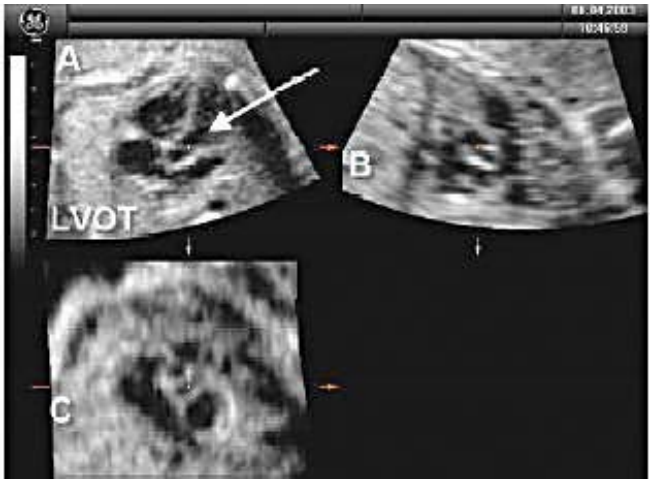

Fig. 15: Starting plane for cardiac volume – LVOT..

Confirmation of adequacy

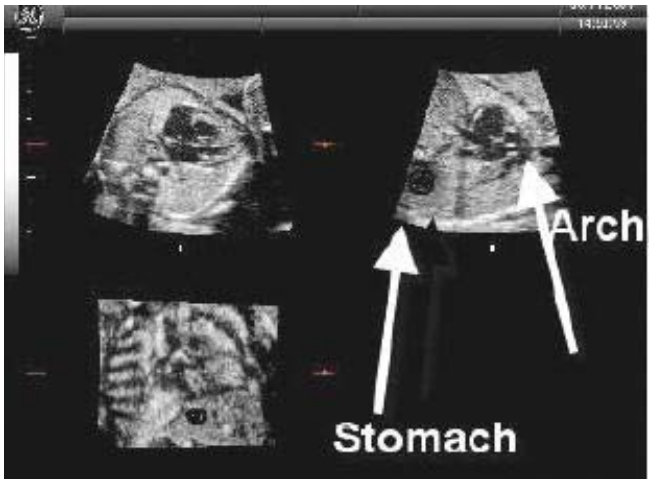

Fig. 16: Translocate image A arch to stomach.

Significant images

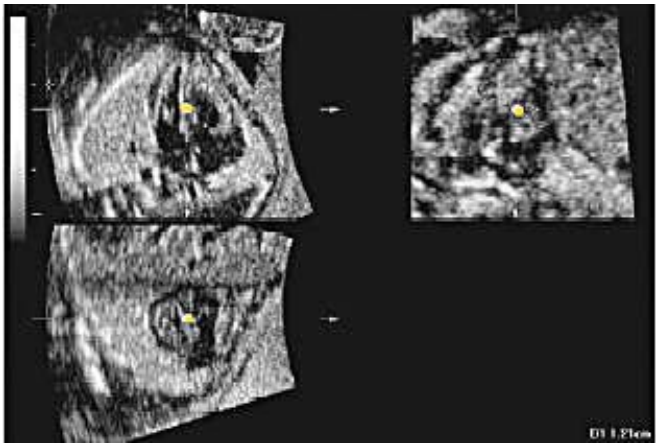

Fig. 17: The IVS is a solid structure in B.

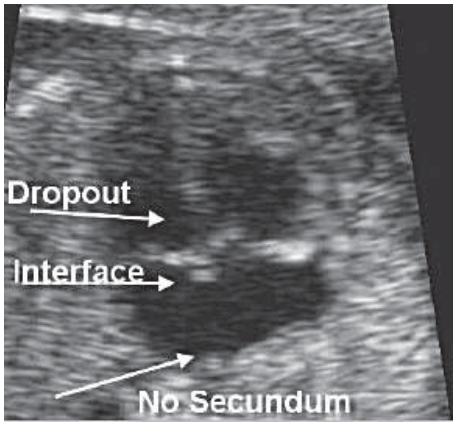

Fig. 18: Dropout artifact VSD but a real ASD.

Region Heart: Rapid Acquisition and STIC

Image plane
4-chamber view

Landmarks for optimum data set collection
Image plane: Transverse 4 chambers
Central structure: LVOT

Volume box boundaries
Anterior: Chest wall
Posterior: Spine
Sides: Includes both sides
Orientation: Not facing directly away
Volume angle: 15 to 20 degrees at 18 to 20 weeks. Bigger later
Magnification: 90% of 3D box
Timing: Cannot time adequately. STIC 7 to 10 seconds

Comment
Best position is apical 4 chamber view with the septum slightly offset from the vertical. Also adequate with the spine at 90 degrees to 135 degrees. Worst position is spine at 45 degrees from the transducer.

Confirmation of adequacy
Use translation in reference image A. Stomach below. Ductal arch above. No chest movement.

Assessable features
Biometry: Chambers, LVOT diameter, RVOT diameter.

Anatomy: 4 chambers, Atrial septum, Foramen ovale, Atrioventricular valves, Ventricular septum, LVOT, RVOT, Origin branches relationship, Great Veins, Diaphragm.

Artifacts
Dropout artifact at membraneous interventricular septum (This is particularly common). Shadowing especially of the LVOT by ribs. Caught at end of ventricular systole and oblique (i.e. 'pseudo-hypoplastic'). Movement of the chest wall – respiration or hiccoughs.

File size
Rapid sweep: 5MB STIC (Gray scale) 14 MB

Initial image plane

Fig. 19: Starting plane for abdomen and chest (and spine).

Confirmation of adequacy

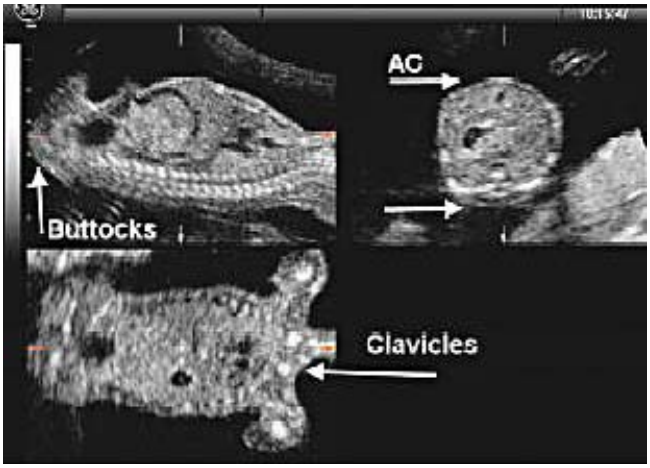

Fig. 20: Below buttocks, both sides abdomen.

Significant images

Fig. 21: Image C is the best way to assess ribs.

Fig. 22: Thanatophoric Dwarf ribs.

Region: Abdomen and chest (possibly spine).

Image plane
Sagittal spine horizontal.

Landmarks for optimum data set collection
Image plane: Neck and sacrum
Central structure: Kidneys

Volume box boundaries
Anterior: Uterine wall
Posterior: Uterine wall
Sides: Neck to beyond buttocks
Orientation: Horizontal at kidney region
Volume angle: 45 to 50 degrees
Magnification: Over 50% if the field of view allows this extent
Timing: Fetus still

Comment
This dataset may not be necessary if the abdominal organs are displayed clearly in the sagittal spine view, (and vice versa). Data set may be acquired initially from transverse (see page 22) in A plane, and the volume angle set to 65 degrees.

Confirmation of adequacy
Reference Image B: Able to measure an abdominal circumference Image A: Below buttocks at least to clavicles, cervical spine if possible.

Assessable features
Biometry: AC, Renal pelvis, Liver length, Renal length, Organ volumes
Anatomy: Stomach, Kidneys, Bladder, Cord insertion, Cord vessels alongside bladder, ? Gender, Ribs, Diaphragm, Spine 3 planes.

Artifacts
Movement. Shadowing of diaphragm by ribs. Widening of spine if flexed. Kyphosis.

File size
6MB

Initial image plane

Fig. 23: Initial plane.

Confirmation of adequacy

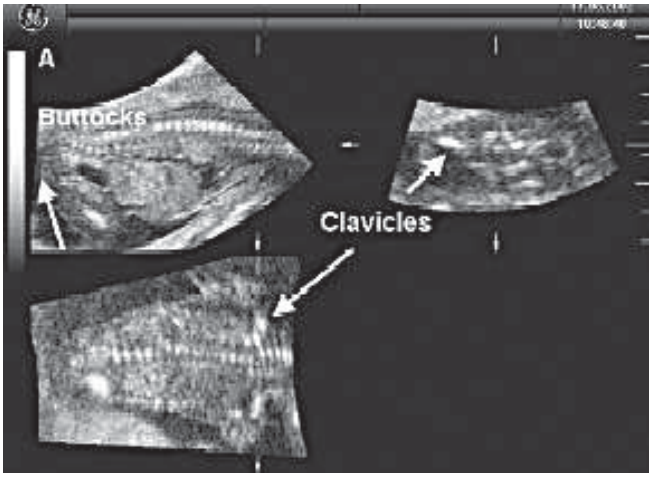

Fig. 24: Adequacy asessment with rotation.

Significant images

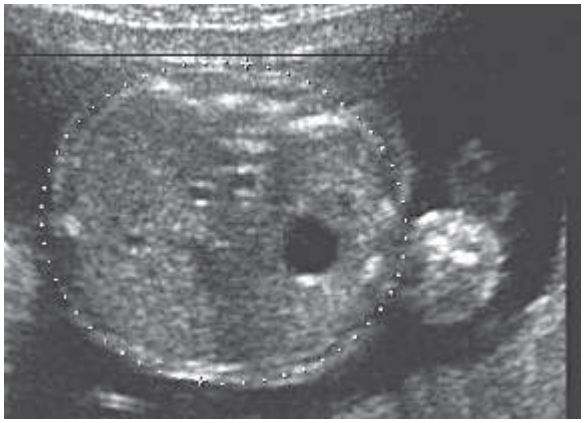

Fig. 25: Abdominal circumference measurement.

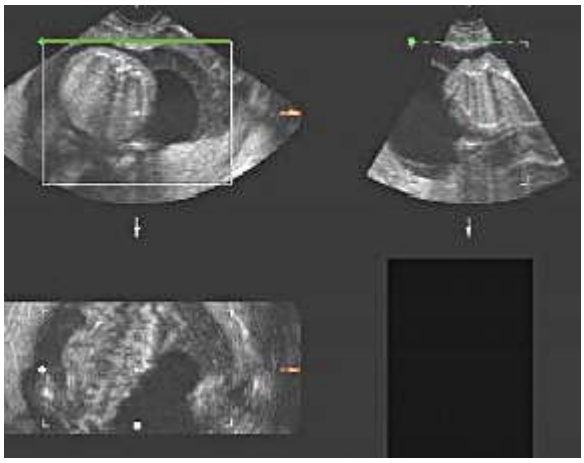

Fig. 26: Confirm that there is an adequate image in all planes. Significant movement artifact.

Region: Spine (possibly adbomen and chest)

Image plane
Sagittal Spine anterior

Landmarks for optimum data set collection
Image plane: Sagital midline
Central structure: Level of the Kidney

Volume box boundaries
Anterior: Uterine wall
Posterior: Uterine wall
Sides: Neck to beyond buttocks
Orientation: Best spine at 180 degrees. Top 0 degrees
Volume angle: 45 to 50 degrees
Magnification: 75% volume box
Timing: still

Comment
Abdominal features often available from the spine views. The diaphragm may be better obtained from directly anteriorly, i.e. spine at 180 degrees. This area sometimes needs an oblique plane to get a more coronal view if the fetus is flexed.

Confirmation of adequacy
Image B: Able to measure AC. Image C Includes clavicles above to buttocks below (may need Y-axis rotation if the fetus is flexed). On some occasions, full assessment of the spine may require 2 volume sets, neck and chest and lumbo sacral region. No significant movement.

Assessable features
Biometry: AC, Renal pelvis, Liver length, Iliac angle, Organ volumes.
Anatomy: Spine 3 views, Ribs, Lungs, Stomach, Bladder, Bowel, Kidneys, Diaphragm (NB shadowing).

Artifacts
Movement
Shadowing of the anterior abdominal wall especially cord insertion.

File size
8MB

Initial image plane

Fig. 27: Initial image plane.

Confirmation of adequacy

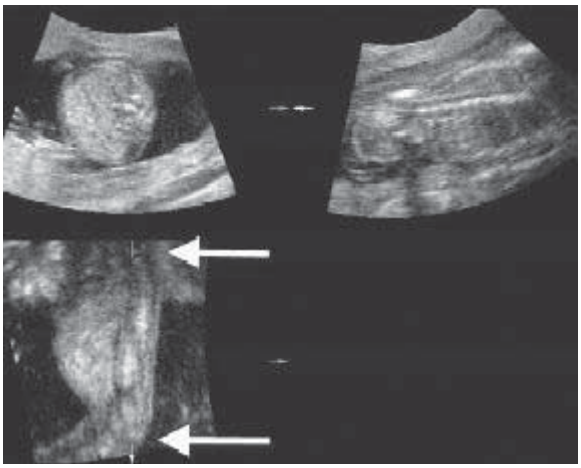

Fig. 28: Confirmation of adequacy.

Significant images

Fig. 29: Surface rendered profile.

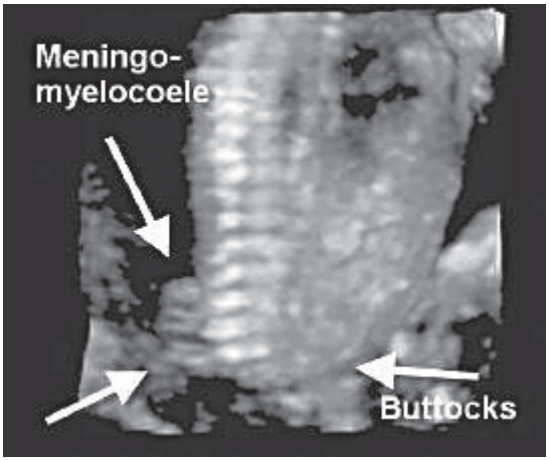

Fig. 30: Profile lumbosacral meningomyelocoele.

Region Abdomen and spine (option transverse).

Image plane
Transverse Spine at 90 degree position.

Landmarks for optimum data set collection
Image plane: Transverse
Central structure: Kidneys

Volume box boundaries
Anterior: Uterine wall
Posterior: Uterine wall
Sides: Neck to beyond buttocks
Orientation: Best spine at 90 degrees
Volume angle: 65 degrees
Magnification: 50% volume box
Timing: Still

Comment
This approach does not always easily allow assessment of the fetal neck region. It is particularly useful if the fetus is lying transversely across the pelvic inlet. If this dataset is incomplete, another projection may be necessary.

Confirmation of adequacy
Image B: Able to measure AC. Reference image C Includes above clavicle to below buttocks. Lower anterior abdominal wall included. No significant movement

Assessable features
Biometry: AC, Renal pelvis, Liver length, Iliac angle, Organ volumes.
Anatomy: Stomach, Kidneys, Cord insertion, Bladder Bowel, Genitalia (more difficult); Diaphragm (more difficult); Spine (profile skin line).

Artifacts
Movement: Fetal flexion does not allow full view of anterior abdominal wall or genitalia.

File size
5MB

Initial image plane

Fig. 31: Central image plane.

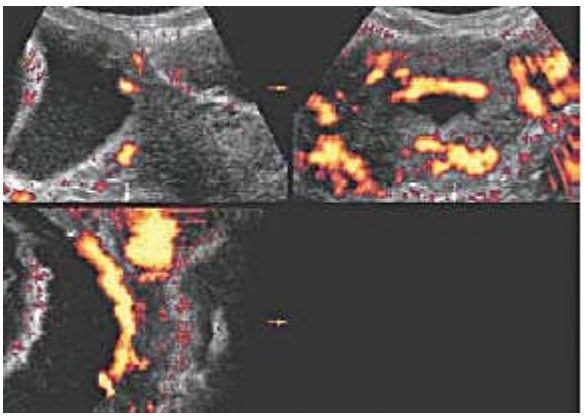

Fig. 33: Orthogonal views showing large vessel at the internal os.

Region: Placenta, uterus and cervix

Image plane
Sagittal

Landmarks for optimum data set collection
Image plane: Sagittal midline centred on internal os.
Central structure: Cervical canal.

Volume box boundaries
Anterior: Maternal skin
Posterior: Maternal sacrum
Sides: Beyond the cervix
Orientation: Sagittal
Volume angle: 40 degrees
Magnification: As seen on screen
Timing: Fetal parts are away from internal os

Comment
A VDS may not be necessary if the placenta is all well away from the cervix and the cervix is long and closed. A single image may suffice. If the placenta is low, Power doppler is recommended with a 3D Power sweep if this facility is present.

Confirmation of adequacy
Includes lower edge of placenta and external os of the cervix.

Assessable features
Biometry: Placenta to cervix Cervical length.
Anatomy: Placenta Lower segment LSCS scar Cervix Internal os, Vasa Praevia.

Artifacts
Shadowing by fetus. B mode artifacts - empty bladder, uterine contraction

File size
4 MB if a volume

Significant images

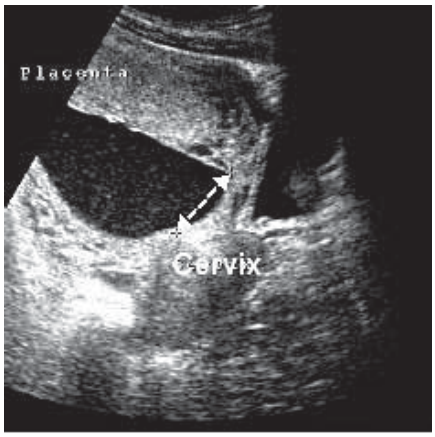

Fig. 32: Placenta with measurements (including cervix).

from page 15 not lessen them i.e. a shadow artifact. For instance, the VDS may not include the structure (i.e. limb) anterior to a region of interest (ROI) and it may not be possible to assess the VDS correctly on subsequent review. In addition, 3D introduces new artifacts, particularly movement. It may not be possible to identify that this has occurred on subsequent analysis, or it may be misinterpreted. Limb movement is a particular example i.e.; is there truly a fracture resulting in the angulation of a particular limb, or did it just move? The heart protocol was modified so that the septum was not parallel to the ultrasound beam because a 'real' VSD in the membraneous part the septum could be misinterpreted as 'usual' drop out artifact. Artifact recognition required detailed operator experience.

Benefits of a standard protocol

(1) Recognisable anatomy that mimics the real-time scan – 'infinite' rescan opportunity;
(2) Image orientation for easier 3D surface reconstruction;
(3) Time reduction in collection and analysis – a practice effect;
(4) All-inclusive data for the region; and
(5) Less exposure – fetus to US, sonographer to musculoskeletal strain.

Discussion

An established standard protocol for collection provides the opportunity for the subsequent examination to begin from a standard reference point. The time then needed to locate a recognisable feature for initial orientation is minimal. They provide the opportunity for structured re-examination, in much the same way that real time scanning does.

3D ultrasound will never make a poor 2D examination acceptable. A good 3D examination may make the examination more diagnostic in the sense that the data can be easily transported for expert opinion even if the operator has only a general knowledge of the technology, the examination requirements and/or the pathological condition. Some groups may see this as a threat to their professionalism, indeed their employment. Trained ultrasound practitioners are the best people to perform the 'remote' scan and they will remain so for the foreseeable future. While the sonographer's training does not necessarily need to be to the level of an expert, an expert second opinion may be obtained

from their volume scan. The data set is not only available to the expert, but can remain with the sonographer for later review after the second opinion is obtained. In this way, VDS analysis provides a unique learning tool. The 'bridging tool' between the 'parallel universes' eloquently described by Professor Campbell.[3] No other modality for examination storage, film, video or even digitally captured images provide this facility. Most current methods of imaging maintain hard copy on film, digital storage, or video. Successful review of an examination stored by these methods depends critically on the primary operator's decision to 'record' the particular feature in question. How often does it occur that the particular, perhaps diagnostic, feature is either poorly recorded or is not recorded at all? With a standardised recording protocol, the examination is all-inclusive. The data can be re-analysed to answer any pertinent question.

VDS are also stable over time. Storage on digital media would allow this time delay to be extended for much longer. Thus it is possible to completely 're-do' the examination, to answer a question, review a mistake or misdiagnosis or to provide material for research at some arbitrary time or place in the future. The ability to do research in this manner may require a change in the consent protocols and privacy legislation. The use of a VDS could allow research to be conducted about a new finding that was not even known about at the time of the original examination. This would introduce a new type of research – prospective analysis of retrospectively collected data. Consequently, informed consent for participation in a particular study could not have been considered nor discussed at the time of that original attendance.

VDS availability may also have medico-legal implications. What better way is there to refute 'negligence' accusations than to have an adequate VDS available – one collected correctly to a standard protocol, for the 'expert' to re-examine? Perhaps they may clearly demonstrate that an anomaly was present that, with due care, should not have been missed or equally that the anomaly was readily 'missable' and that the examination did not involve negligence, thereby shortening any legal action. We should not view this aspect as a threat, but rather as an encouragement to perform at an high standard in the first place.

Random collection methods cannot take into account the influence of artifacts, particularly from shadowing, of incorrect focal zones and of field of view inadequacy. The need to search for a recognisable anatomical structure, to manipulate the image to the usual B-mode planes before analysis prolongs the re-examination.

Conclusions

We now recognise that 3D US has much more to offer than the bonding experience relating to its surface rendering aspects. While important, the value and utility of the ultrasound dataset that can be generated by 3D examination is a more significant advance of the medical and scientific application of ultrasound technology. Standardisation of collection and storage is mandatory for the future progress of this technology. At BUFW, we have shown to our satisfaction that the data set is accurate, is permanent over time and distance and is 'all inclusive'. Our protocol is published with the hope and expectation that other authors may take this as a basis for development and improvement. Appropriately conducted clinical trials should be developed to confirm our pilot study's findings. If confirmed by others, a recommendation may be forthcoming about future usage.

The quality of sonography is unlikely to deteriorate if VDS analysis becomes the mainstay of fetal assessment. Assessment of the adequacy of the collected data is a basic necessary step prior to saving the data set and requires a trained experienced operator.

3D US is unlikely to make a bad ultrasound examination a good one. We must resist any attempt to make bad ultrasound examinations attractive ones just because there is a 3D and 4D facility.

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2 Pritchard G, Schluter P. Standardization of 3D datasets for fetal morphology examination: Comparison with real time assessment in midtrimester ultrasound examination. *Sing J Obstet Gynaecol* 2004; 35 Supplement 1: 19–20.

3 Campbell S. Parallel universes. *Ultrasound Obstet Gynaecol* 2004; 24: 701–3.

Can the anterior-posterior thigh diameter be used as an indicator for fetal age using two-dimensional sonography?

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Abstract

Introduction This study evaluates the usefulness and direct correlation of a simple new method of predicting fetal age by measurement of the anterior-posterior thigh diameter (APTD) in normal 18–28 week pregnancies using two-dimensional sonography.

Little published research exists in the area of fetal thigh biometry, specifically in the use of APTD. Continuing review of existing practices needs to be coupled with evaluation of alternate or additional methodology.

Materials and methods This was a quantitative prospective study of 55 patients in High Level General Hospital, Alberta, Canada. Anterior-posterior thigh diameters were sonographically measured and the normal range for each week of pregnancy was determined five times for reliability.

Results Significant correlation was found between APTD and fetal age from simple line regression analysis, with 99.993% confidence intervals at each week from 18 to 28 weeks gestation. There was a correlation of 1 mm APTD per 1 week of fetal age. In addition ($R > 0.9993$) and ($P < 0.001$). The residual scatter plots confirmed APTD's validity.

Discussion Anterior-posterior thigh diameter measurement is a reliable and valid method for assessing fetal age in a normal pregnancy and may be particularly useful when other parameters are unable to predict fetal age accurately. An accurate linear measurement of multiple fetal parameters allows a more complete profile of fetal growth and estimated date of delivery. The APTD measurement technique might also be useful in identifying fetal growth problems. All of the values of fetal age lie directly on the best fit regression line. Since the coefficient of determination (Rsq) is very high, this model is very effective.

Keywords: APTD, anterior-posterior thigh diameter, fetal age parameters

Introduction

To our knowledge, there is no existing literature regarding fetal thigh diameter versus fetal age and estimated date of delivery (EDD). There are many parameters that can be used in sonography, including biparietal diameter (BPD), abdominal circumference (AC), head circumference (HC), and femur length (FL). It is important to find new parameters measuring fetal growth that correlate with fetal age so fetuses that are not growing well can be identified and treated[1]. Multiple factors may influence fetal biometry including, for example, pathological factors that affect the fetal head measurements[1]. Fetal organ sizes remain small during early pregnancy, followed by a period of rapid growth with rate and time varying for individual organs[2]. Studies have shown that this period of growth can be affected by external and internal factors[3,4].

The reliability of multiple parameters

Studies have supported the use of multiple parameters to improve the accuracy of fetal age and weight estimation[5]. Studies have provided a logical explanation of why it is necessary to measure the fetal leg. Studies suggest that, sometimes, measuring the fetal head is impossible, such as when it is too low in the pelvic cavity, and therefore alternate methods must be used[6]. The formula: femur length multiplied by the square root of the cross sectional area of thigh has shown a significant correlation with fetal weight[6]. The validity of estimated fetal weight is calculated to be either below or above the normal limits by using fetal biometry formulae[7]. Formulae used to calculate fetal weight which use multiple parameters are more accurate than other fetal weight formulae[8]. Fetal thigh calf circumference ratios showed excellent results in evaluating fetal growth in high-risk patients with unknown due dates[9,11]. Using more than one fetal biometric technique can increase the reliability and accuracy of determining fetal age and estimated date of delivery, especially compared to using long bone biometry from 12 to 40 weeks gestation alone[12,13]. Limb volume has been found to be a reliable predictor of intrauterine growth restriction[14].

Fetal pathology and biometry

With the use of fetal measurements, a wide range of pathological conditions can be discovered. Among these are chromosomal abnormalities (trisomy 21, fetal nasal pathology)[15]. The ratio of femur to foot length has proven a useful parameter in assessing dysplastic limb reduction and fetal growth[16,17,18,21]. There is significant correlation between FL and orbital diameter and this may aid in future research regarding fetal orbital abnormalities[19]. The fetal kidney length in the 24 to 38 week gestational period is a more accurate fetal biometric indicator than BPD and

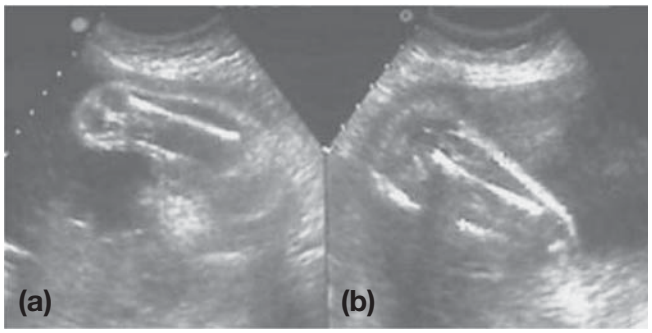


Fig.1: Label (a) shows the wrong way to measure fetal thigh (coronal). Label (b) shows the correct way to measure the anterior-posterior thigh diameter (APTD) in sagittal plane (profile).

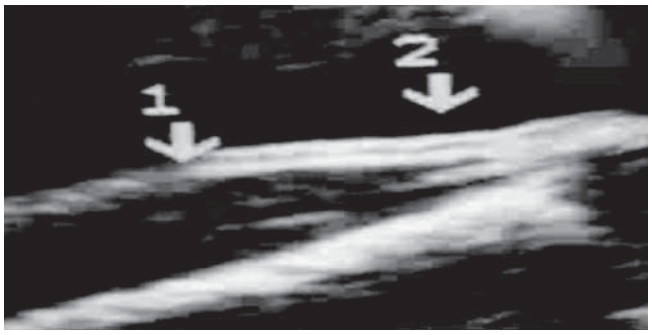


Fig. 2: The white arrow shows the double line of the fetal thigh. The correct measurement of the anterior-posterior thigh diameter would be the second line marked by the number (1) arrow in the real anterior wall of the fetal thigh as this is the true skin line. The second line marked by number (2) arrow is part of the thigh tissue as the sound waves travels through the convex area and can be corrected by scanning in a good sagittal plane.

HC[20] A combination of more than one parameter should be used to increase the reliability, sensitivity and accuracy of fetal biometry. Fetal macrosomia can be predicted by using single ultrasonic biometry[22]. Accurate measurement of fetal age is the most useful contribution sonography has made to obstetric practice[24]. So far, crown rump length (CRL), BPD and FL are considered the measurements of choice[25,26]. All these measurements were acquired before 1985 and, in some cases, before the electronic calipers were available, resulting in a need to update these procedures using new sonographic equipment.

Limitations

Before a new parameter can be used, it must be shown to correlate with fetal age in normal pregnancies. Some fetal positions can reduce the ability to measure specific areas of the fetal body, for example in the occipital anterior or occipital posterior position, it would not be possible to obtain a BPD. Serial measurements of BPD and/or head circumference alone are of no value because of the 'brain sparing' effect[27,29]. The reliability of the ratio of head circumference to abdominal circumference to predict intrauterine growth restriction is limited[26,27]. There are situations, for example pre-term labour, diabetes, breech presentation or previous caesarean section, when it is important for the attending physician to have a single estimate of the fetal size or weight at one point in time. Gestational diabetes mellitus can be associated with high birth weight and therefore can affect overall fetal measurements[10,23,28]. Femur length is a reliable measurement, but it can be affected by skeletal dysplasias and it is best measured after 14 weeks[14]. Head measurements can be used as genetic markers for frontal lobe hypoplasia[30].

Materials and methods

Fifty-five uncomplicated pregnancies were studied prospectively and quantitatively in the High Level General Hospital (North-Western Health Centre), Alberta, between 21st March 2005 and 10th May 2005. This study was approved by the Ethics Committee of Charles Sturt University, Australia. The author generated data and tables which agreed favourably with Dr Hadlock's tables for femur length[31,32].

To measure the size of the APTD, outer to outer skin surface was measured sonographically at the middle point of the fetal femur in the sagittal section and compared with the fetal age from 18 to 28 weeks gestation. The selection of the second trimester period was chosen because soft tissue accretion of the fetal thigh begins to accelerate towards the end of this period.

The inclusion criteria for this study were: singleton uncomplicated pregnancies with a normal fetus and presentation of an informed consent form, read and signed by the patients and approved by the hospital and Charles Sturt University Ethics Committee. The patients' ages ranged from 18 to 35 years, with a mean age of 26.5 years, the study population was of mixed ethnicity e.g. Germans, Native Indians, Mennonites, Irish, Hispanics, Ukrainians and East Indians. The radiologists reported major congenital malformations, chromosomal abnormalities and maternal complications, such as gestational diabetes or drug or tobacco use. No pathological information was released to the patients, who were asked to obtain their reports from their physicians. Routine transabdominal sonography was done, including FL, BPD, AC and HC. In addition, the fetal APTD was measured, from the middle point of the fetal femur in sagittal section of the fetal thigh using the femur length as a landmark. The APTD measurements were analysed and compared with fetal age using Hadlock's tables for femur length[31,32]. The equipment used in this study was an ATL 5000 and a Philips Alegra 4500. Using 5 to 3 MHz transducers, the age of each patient's fetus was determined using Dr Hadlock measurements of the FL[31,32]. A comparison was made between the anterior posterior thigh diameter and the fetal age. The correct diameter of the fetal thigh was measured in the same portion of fetal thigh every time by measuring the mid point of the femur. Eleven groups were studied, each group divided to five patients and each five patients were in the same gestational period from 18 to 28 weeks.

Technique

Starting with transducer at the fetal abdominal circumference:
(1) Move transducer inferiorly to transect the fetal bladder;
(2) Rotate transducer 30° to view the fetal femur;
(3) Rotate transducer until a sagittal view of the fetal thigh is obtained (Fig. 1);
(4) Exclude distal femoral epiphyses (usually present after 32 weeks gestation);
(5) Make sure to identify the fetal knee. If a double line is

Fig. 3: The sagittal section of the fetal thigh is showing the measurement of the femur length. The arrow is showing the fetal knee. Magnification can be a helpful tool.

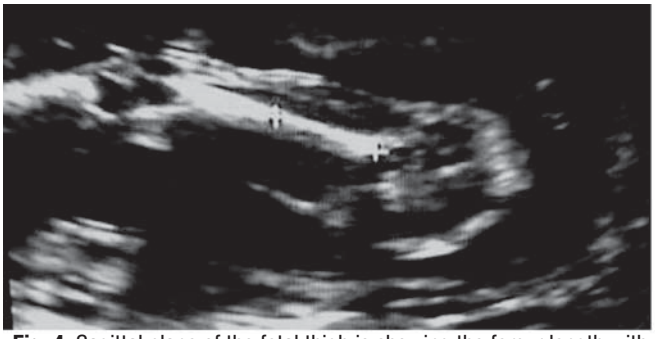


Fig. 4: Sagittal plane of the fetal thigh is showing the femur length with one of the calipers in the mid point of the femur length.

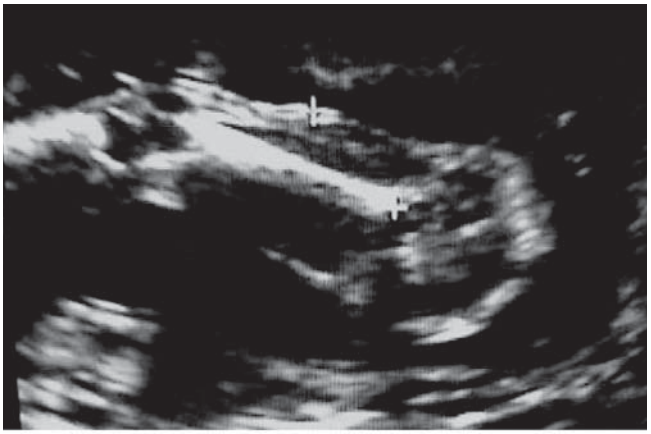


Fig. 5: The first caliper is moved to the real outer skin of the anterior wall of the fetal thigh.

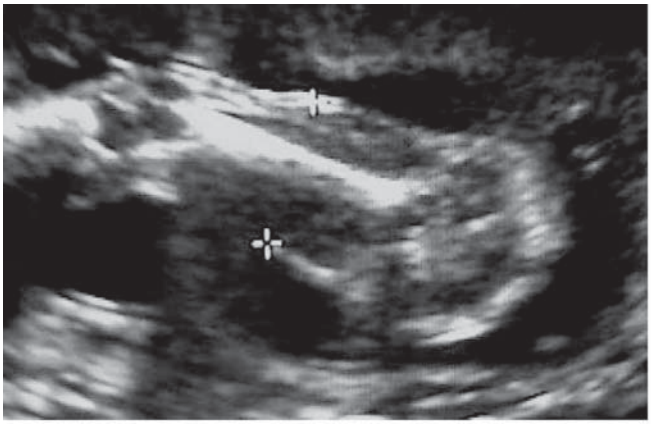


Fig. 6: The second caliper is moved to the posterior wall of the fetal thigh. Enter and log the measurement of the anterior posterior thigh diameter.

seen in the fetal thigh, measure the inner line or repeat the scan until a smooth (sagittal) line of the fetal thigh is obtained (Fig. 2). This double line can be corrected by obtaining a perfect sagittal view of the fetal thigh, otherwise the curve of the thigh adds an extra false line to the real outer skin surface of the fetal thigh in the lateral or medial section. The thigh is convex in the anterior part and concave in the posterior part, so geometrically we are dealing with a cylinder and not a flat surface;

(6) Use real-time sonographic equipment with 3.0, 3.5, and 5.0 MHz transducers frequencies to obtain the images;
(7) Freeze-frame and electronic calipers are more sensitive tools to provide accurate measurements of the fetal thigh;
(8) Use zoom capability to outline the fetal thigh (outer skin surface) which will increase the sensitivity of this measurement; and
(9) Use Dr Hadlock's tables for femur length[31,32] to compare with APTD or posterior-anterior thigh diameter (PATD).

Measurements

(1) Scan the femur length (FL) at the sagittal view (Figs. 1 and 2);
(2) Measure the femur length, then bring the first caliper to the exact middle point of the fetal femur; for example, if the femur length is 24 mm, then bring the first caliper down until the measurement reads 12 mm, (Figs. 3 and 4); and
(3) Carefully move the first caliper to the outer surface of the fetal anterior thigh (Fig. 5). Measure the real skin surface and not the extra double line created by the sound waves travelling through the convex part of the thigh in parasagittal planes. Scanning the fetal thigh in a sagittal plane can correct and smooth the skin surface of the fetal thigh. Move the second caliper to the outer surface of the posterior wall of the thigh and enter (Fig. 6).

Calculations

Each millimetre of the APTD, or the PATD measurements will be equal to one week. For example, 19 mm will be equal to 19 weeks gestation and 28 mm will be equal to 28 weeks gestation.

Multiplying any fraction of a millimetre by 1.428 – this value (1.428) having been obtained from 10 mm divided by 7 days – will give you a more precise fetal age. For example, with APTD of 26.8 mm, calculate to 26 weeks plus (0.8 x 1.428) = 0.1424 day. Adding that to the 26 weeks gives a value of 27 weeks and 1.4 days.

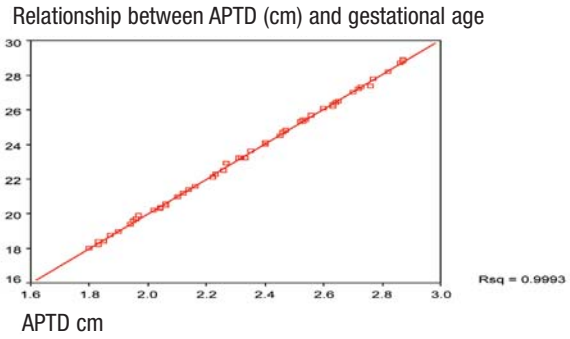
The anterior-posterior thigh measurement was found to be relatively constant, 1 mm being equal to one week. Serial measurements should be obtained. The measurements should be repeated with zooming capability and electronic calipers; the serial measurements range should be less than 1 mm. If these measurements do not match the fetal age obtained using Hadlcok's tables for femur length[31,32], a follow-up scan should be recommended.

Results

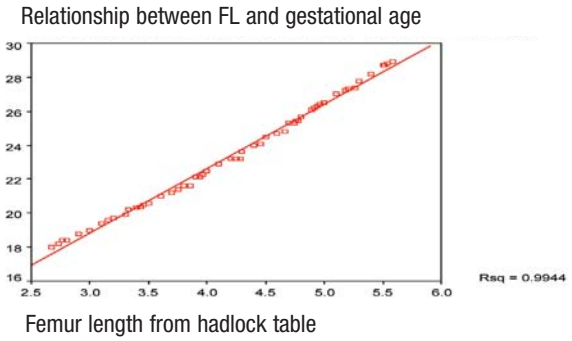
Measurements of femur lengths from 55 patients who met the criteria were correlated with the APTD and the data used to construct tables and graphs. There was significant correlation between the APTD and fetal age. Using a simple linear regression for this study, greater than 99.993 % confidence intervals were found at each week of the eleven groups from 18 to 28 weeks gestation ($R^2 > 0.9993$), and ($P > 0.001$). The anterior-posterior thigh diameter was positively corre-

Table 1 Correlation between anterior-posterior thigh diameter (APTD-CM) and fetal age (GA-WK) 50th percentile values for fetal femur length are shown below, (***n*** = 55).

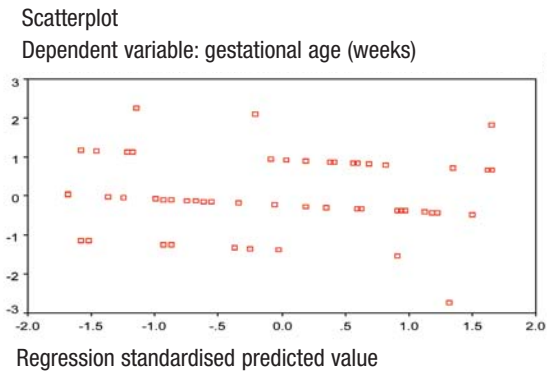
Femur Length (cm) From Hadlock Table[67, 68]	Fetal age (wk) using Hadlock Table	APTD (cm)	APTD (wk / days)	Femur Length (cm) From Hadlock Table [67,68]	Fetal age (wk) using Hadlock Table	APTD (cm)	APTD (wk / days)
2.70	18.0	1.80	18.0	4.38	2.37	2.37	23.9
2.73	18.0	1.82	18.2	4.40	24.1	2.42	24.2
2.76	18.1	1.81	18.1	4.50	24.5	2.45	24.6
2.80	18.2	1.82	18.2	4.55	24.7	2.47	24.9
2.90	18.6	1.86	18.8	4.60	24.9	2.47	24.9
3.00	19.0	1.90	19.0	4.60	24.9	2.47	24.9
3.10	19.2	1.92	19.2	4.68	25.0	2.50	25.0
3.16	19.2	1.93	19.4	4.70	25.3	2.53	25.4
3.20	19.6	1.96	19.8	4.80	25.7	2.55	25.6
3.30	19.9	1.97	19.9	4.82	25.7	2.56	25.8
3.36	20.0	2.00	20.0	4.84	25.8	2.56	25.8
3.40	20.3	2.03	20.4	4.90	26.1	2.63	26.4
3.43	20.4	2.04	20.5	4.92	26.1	2.63	26.4
3.45	20.5	2.05	20.6	4.94	26.2	2.64	26.5
3.50	20.7	2.06	20.8	5.00	26.5	2.65	26.6
3.60	21.0	2.10	21.0	5.04	26.6	2.66	26.8
3.70	21.4	2.13	21.4	5.10	27.0	2.71	27.1
3.76	21.5	2.14	21.5	5.20	27.4	2.75	27.6
3.80	21.8	2.16	21.8	5.26	27.6	2.77	27.9
3.80	21.8	2.17	21.9	5.30	27.8	2.77	27.9
3.90	22.1	2.22	22.2	5.36	27.9	2.77	27.9
3.94	22.1	2.22	22.2	5.40	28.2	2.83	28.4
3.96	22.3	2.23	22.4	5.45	28.4	2.83	28.4
4.00	22.5	2.26	22.8	5.46	28.5	2.86	28.8
4.10	22.9	2.27	22.9	5.48	28.6	2.86	28.8
4.20	23.3	2.33	23.4	5.50	28.7	2.87	28.9
4.30	23.7	2.35	23.6				
4.31	23.7	2.36	23.8				
4.35	23.8	2.36	23.8				



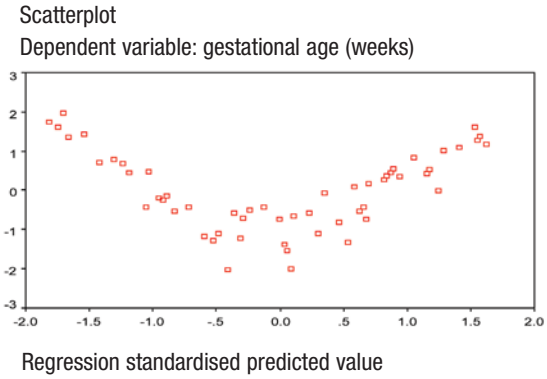
Graph 1: Regression Line for APTD All of the values of fetal age lie directly on the best fit regression line.



Graph 2: Regression Line for Femur Length and Gestational age.[31] Some of the values of fetal age in Dr Hadlock's model lie slightly above or slightly below the Best Fit Regression Line. R2 was .994 and SEE was .24362.



Graph 3: The residual (Error), Scatter plot and Validity of the (APTD) Normally distributed residuals scatter plot.



Graph 4: Residual (Error) Scatter plot – Femur Length from Dr Hadlock's table.[31] Pattern of residuals show curvilinear relationship with regression line.

lated with fetal age (Table 1 and Graphs 1, 2, 3, 4). Eleven gestational periods from 18 to 28 weeks were analysed, each period included five different measurements of the femur lengths compared to the fetal age and to the anterior-posterior thigh diameter with mean ± 2 s.d. Femur length measured from 2.7 cm to 5.5 cm over all gestational periods, the mean being 4.31–4.35. Fetal weight ranged between 310 g and 1400 g, the mean being 629 g. The anterior-posterior thigh diameter ranged between 1.80 and 2.87 cm, with the mean at 2.36 cm. Linear growth was obtained in each gestational period from 18 to 28 weeks and compared favourably with Dr Hadlock's tables[31,32]. In addition, linear growth of fetal weight was observed. The anterior-posterior thigh diameter, converted to millimetres and compared with the fetal age, was found to be a consistent and valid measurement by using the scatter plots (Graphs 2 and 3). The standard errors of estimates using APTD was significantly lower at .08664 than when using femur length which was .2436. The variability estimates from Dr Hadlock *et al's*[31]. table for femur length versus fetal age from 18 to 30 weeks have indicated ± 1.8 weeks to 2.4 weeks while the APTD table in this study has shown ± 3 days variability. Adjusted R^2 (variance) was > .99 for both models.

Statistical analysis

Regression – APTD and fetal age

The standard error of estimation (SEE) is very low at .08664. This indicates a strong goodness of fit of this model. The spread of values for the dependent variable (fetal age) around the mean value of the independent variable is very narrow. About 70% of the values of fetal age will lie ± .08664 from the mean of APTD (using ANOVA tables).

Discussion

The simplicity of APTD's application is really its greatest advantage. Accuracy of fetal age, weight and EDD will be improved if multiple predictors are used, especially when it is difficult to obtain fetal head biometry, for example, when the head is too low in the pelvis or when hydrocephalus, anencephaly or fetal renal disease are present. New methods for estimating fetal body weight and fetal age without head measurement are therefore required. Reliable new methods of fetal biometry can be very beneficial in reducing overall errors and increases its reliability. Results of this study show that APTD predicts second trimester growth with high validity and reliability. The very simple correlation between 1 mm APTD and a week of fetal age found in this study is new, useful information. Measuring thigh parameter can be a convenient method for determining fetal growth in the second trimester. The APTD technique may have a role in quality control of second trimester sonogram examination and may help in the diagnosis of fetal growth abnormalities. It might also be used as an indicator of fetal biometric disturbance, thus enabling the physician to better manage the pregnancy. Diabetes mellitus is one cause of intrauterine growth restriction (IUGR) and may affect the FL[10,23,27]. Diabetes mellitus may also affect the fetal body mass and consequently the abdominal circumference and fetal thigh.[28] Hence, the anterior-posterior thigh diameter may be used not only as indictor for fetal age but also to detect IUGR.

Renal pathology, such as hydronephrosis or congenital renal malformation, can affect the fetal abdominal circumference, making this measurement unreliable as an indicator of fetal age. Using combined parameters may be superior to the use of each measurement alone as a marker of trisomy 21[30]. In addition, it can be difficult in practice to obtain a good fetal thigh circumference, or measurements of fetal hands, feet and ears. This study shows that the fetal APTD provides an accurate linear measurement of the fetus, thus generating a more complete profile of the fetus. Significant correlations of APTD with fetal age indicate that this is a reliable method and is particularly useful when other fetal parameters may not accurately predict fetal age, or if they are difficult to obtain. If the age predicted from the APTD does not match the age using the femur length, other factors such as IUGR or maternal and fetal nutrition deficits should be considered. The soft tissue accretion of the fetal thigh also depends on the generalised nutritional status of the infant, but such increase in the soft tissue is usually more marked after the 30th week of gestation.

The APTD measurements obtained from the 11 groups correlated perfectly with the fetal age and were repeated five times for each gestational group between 18 and 28 weeks to make sure. Tables for femur length versus gestational age from 18 to 30 weeks were ± 1.8 to ± 2.4 weeks while the variability estimates in the APTD table was ± 3 days. Both models predict the fetal age very well, but compared to FL, using APTD produces a model with a better fit based on differences in the SEE between the two, and on interpreting the best fit regression lines for both models. The spread of values for the dependent variable is narrower around the mean of the independent variable in the APTD model and wider in the FL model. The SEE of .2436 obtained for FL versus gestational age is higher than that obtained in the analysis with APTD. This indicates a weaker fit for this model. The spread of values for the dependent variable around the mean value of the independent variable is wider, 68% of the values of fetal age will lie ± .2436 from the mean of APTD. Model Statistics (f, t, and standardised β) are significant for both models. β (APTD) = 10.0 (SEE =. 037), β (FL) = 3.79 (SE =. 039). t = 273.07 for GA x APTD Model = 96.87 for GA x FL Model.

Conclusion

Anterior posterior thigh diameter was found to be a valid and reliable index for estimating fetal age. Further research to study the relationship between APTD versus fetal weight and IUGR is needed.

Acknowledgements

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Ultrasound contrast agents in diagnosis of focal liver lesions

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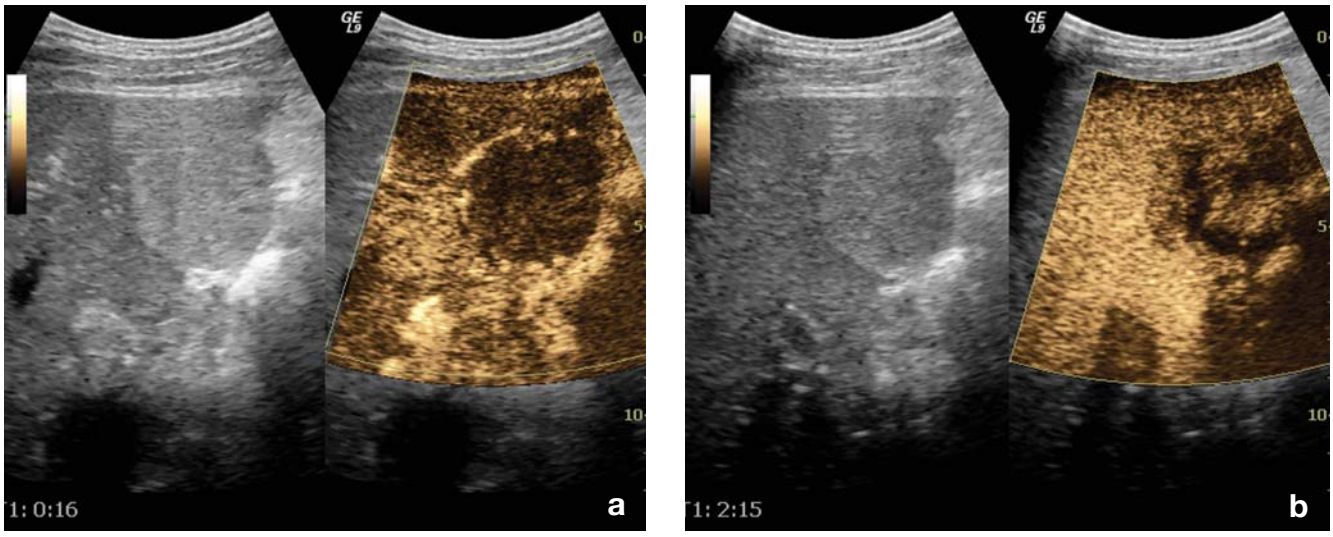

Fig. 1: Large cavernous haemangioma. Simultaneous real-time split screen showing a B-mode image (left) and a contrast enhanced image (right). The enhancement starts in the rim of the lesion (Fig. 1a). A centripetal filling pattern is observed (Fig. 1b). The stop clock was activated (T = 0) when a bolus of 2.4 mL SonoVue was administrated as a bolus intravenously.

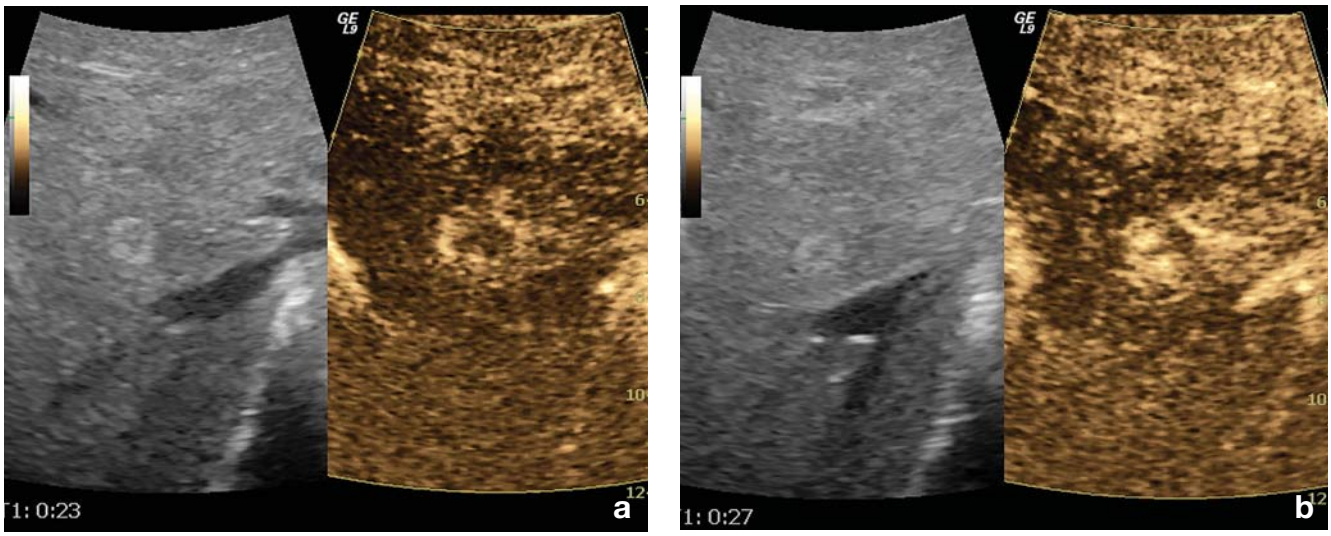

Fig. 2: Small capillary haemangioma. Rapid centripetal contrast filling is observed after a 2.4 mL bolus of Sonovue. The contrast is seen in the rim of the lesion at T = 23 sec. (Fig. 2a) and has nearly filled the lesion at T = 27 sec. (Fig. 2b). This filling pattern defines the lesion as non-malignant and with high sensitivity as a haemangioma.

Technological achievements in diagnostic imaging modalities have given a new element to the use of and indication for ultrasound-guided interventions. Ultrasound (US) contrast media, image fusion techniques and improved features of computed tomography (CT), positron emission tomography (PET) and magnetic resonance (MR) gain new possibilities in patient management and diagnostic capabilities.

Contrast enhanced ultrasonography (CEUS) requires dedicated ultrasound equipment optimised for a contrast medium. Several contrast media have been approved in Europe and most of the manufacturers of ultrasound scanners provide a range of scanners with the necessary technology to perform CEUS.

CEUS has evolved to become a decisive factor in liver imaging to detect and classify focal lesions. It increases the sensitivity of the detection of lesions and enables immediate

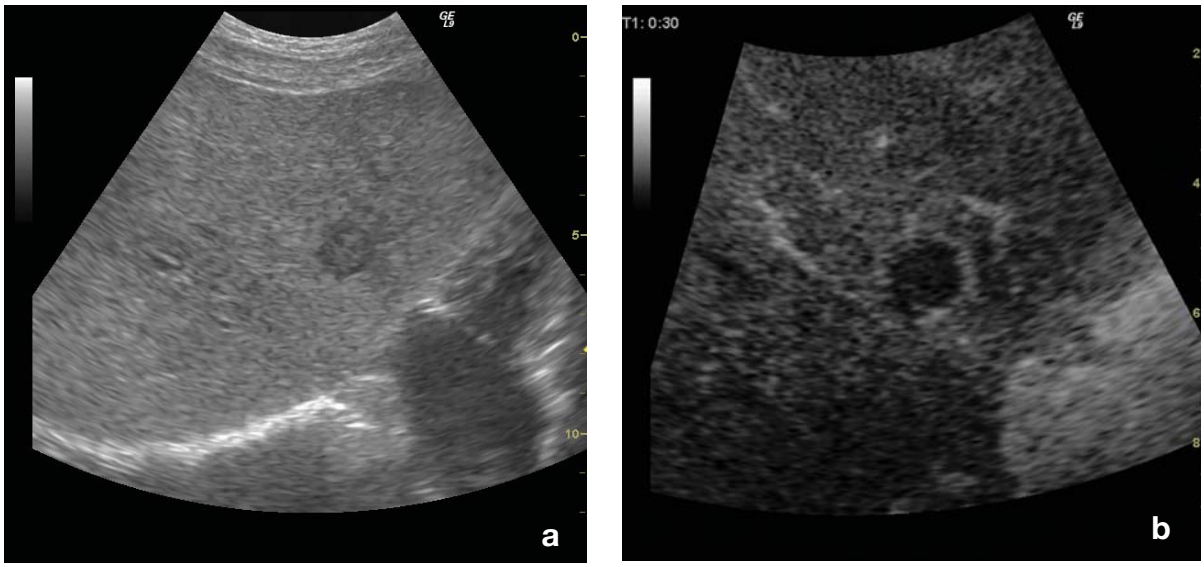

Fig. 3: Small well-defined liver metastasis from a primary colo-rectal carcinoma is defined in the liver (Fig. 3a). Initial contrast enhancement in the arterial phase are followed by a more hypoechoic appearance of the lesion in the portal and late phase, here after 30 seconds (in the portal phase) define the lesion as malignant and appearance as a metastasis.

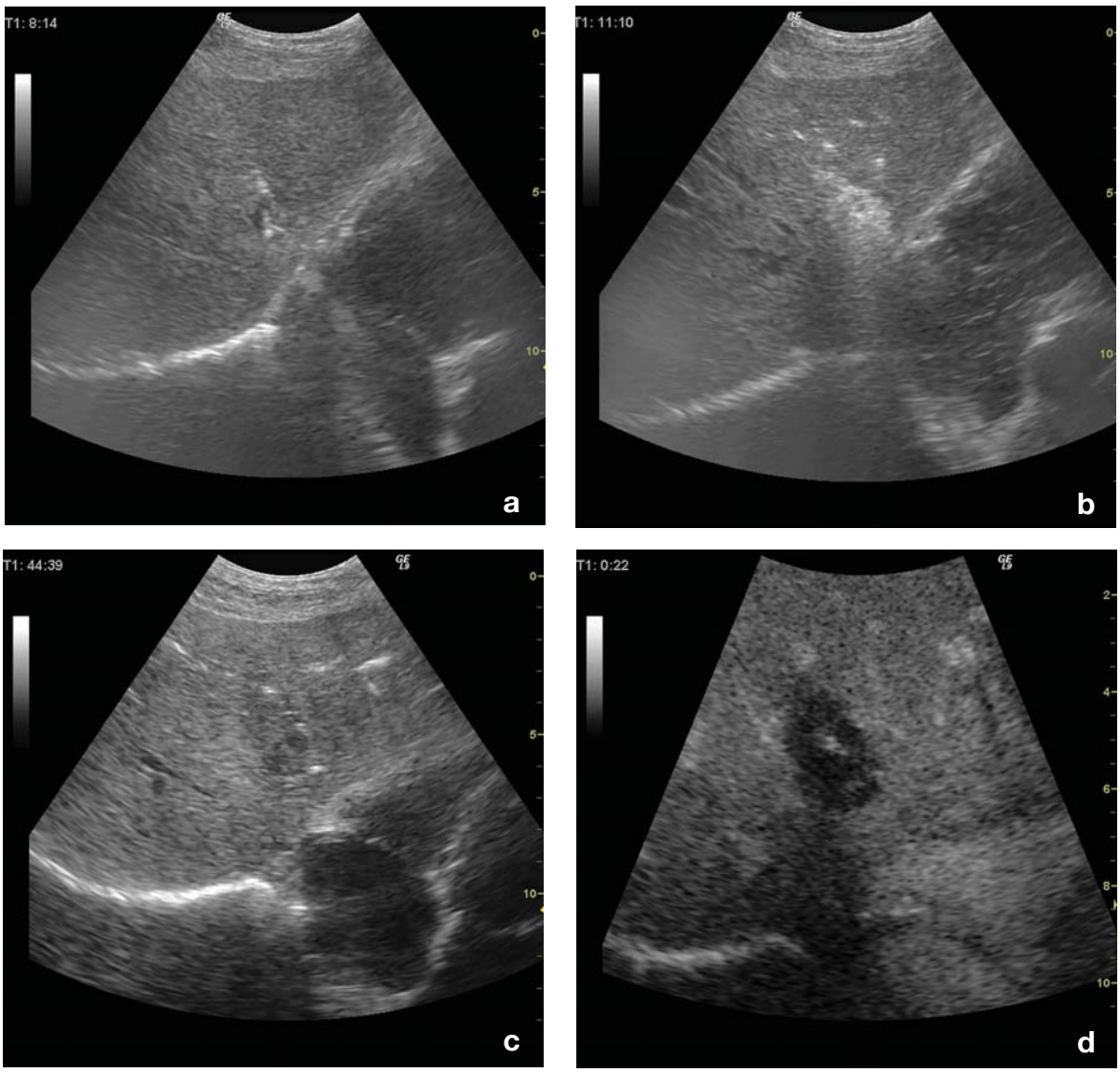

Fig. 4: US-guided RF-ablation of the metastatic lesions shown in Fig. 3. The tines of the RF (RITA) needle are seen in the lesion (Fig. 4a). During the RF treatment the lesion is heated and becomes hyper echoic (Fig. 4b). After the RF ablation the treated area appears uncharacteristic and the treatment efficacy is uncertain (Fig. 4c). CEUS (Fig. 4d) shows the treated area with well-defined borders and without vascular activity.

differential diagnosis between a malignant versus benign lesion such as haemangioma and focal nodular hyperplasia. Organs, other than the liver, are under current evaluation for similar benefits.

Advantages of CEUS

CEUS seems advantageous compared with contrast enhanced CT in evaluation of benign liver lesions. Haemangiomas vary in the time they take to present their characteristic filling-pattern (Fig. 1). In some cases, the centripetal filling is over and done already in the arterial phase (Fig. 2) which 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 and CEUS of multiple or deeply positioned lesions may be less advantageous in some cases. However, US-guided biopsy will be needed only in a few of these cases (Fig. 3).

The presence of malignant liver lesions leading to therapeutic consequences such as liver surgery, RF-ablation or chemotherapy are subject to verification before treatment is initiated. Liver surgery may be performed based on non-invasive diagnostic imaging and biopsy may be reserved to a limited number of cases. In the case of non-operability, a biopsy remains mandatory to confirm malignancy before initiation of chemotherapy.

Ultrasound-guided treatment of non-operable malignant liver lesions increasingly are performed with RF-ablation, or similar techniques (laser, cryo, microwaves) either percutaneously, laparoscopically, during laparotomy or in combination with liver surgery. Ultrasound remains the most used guiding modality for these procedures, for obvious reasons. Dedicated devices for US-guidance of these procedures are rapidly evolving and CEUS performed before and after the ablation procedure improves the treatment results (Figs. 4–6).

Non-invasive diagnostic methods such as CEUS will change the classic indications for biopsies and reduce the number of diagnostic biopsies. However, US-guided biopsies will be required in case of complex findings, uncertain findings and as a Gold-Standard in the increasing use of multi-modality investigations such as PET-CT.

In general, new image fusion modalities, such as PET-CT, improve, beyond doubt, sensitivity in detection of malignancy, but they can also generate new false positive findings that require biopsy verification. Image fusion with PET-CT-US and MR-US are technically possible but, to our knowledge, are only commercially available from one vendor. No doubt US fusion with other modalities will be generally available and increase the demand for US-guided procedures.

Differentiation between metastasis of carcinomas, lymphomas and HCC in the liver illustrates the need to obtain a firm diagnosis based on histology, since the very different treatments and prognosis are dependant on a correct classification, which, in most cases, implicates US-guided biopsies.

Dedicated US-transducers for endoscopic and endoluminal US adopting CEUS technology will be combined with other modalities and provide a range of new diagnostic and therapeutic possibilities in prostatic, gynaecological and gastro-intestinal diseases.

CEUS is applicable for essential detection of residual malignancy in laser-, RF- and cryo-ablation of malignant liver lesions. CEUS performed before and immediately after a RF treatment allows immediate re-treatment if untreated areas with malignancy are detected.

Conclusion

CEUS will reduce traditional indications for interventions such as biopsies. However, CEUS will extend the use of interventional-US with new applications and support existing applications. Interventional US will, overall, remain of importance involving more complex and dedicated techniques.

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Debate (for): The place of entertainment ultrasound in obstetrics

Assoc Prof Lachlan de Crespigny, Melbourne Ultrasound for Women, Vic

ASUM has a policy that opposes the non-medical use of ultrasound in pregnancy; opposition is primarily because of potential bio-effects.

The confidence that diagnostic ultrasound does not produce harmful bio-effects is high; ASUM would otherwise oppose the current widespread use of pregnancy ultrasound, including Doppler, clinically plus for teaching and research.

All diagnostic examinations have an element of patient entertainment, today often using 3D; the increase in exposure to provide patient entertainment varies between practices. Most would consider enhancing the pregnancy experience to be an important part of a diagnostic examination; it would be considered inappropriate not to show women images of their fetuses.

It is ridiculous to oppose one (non-medical) midtrimester ultrasound examination in this environment. Opposition to the non-medical use of ultrasound on the basis of bio-effects fails.

Other objections to 'shopping mall' ultrasound are similarly questionable. They no more trivialise ultrasound than we all do in our daily practices when we attempt to satisfy patient needs by demonstrating fetal images.

Concerns about missing abnormalities and potential communication problems are satisfied if there is appropriate information for customers in advance. Providers are unlikely to pretend that they offer a diagnostic service.

We need to be careful before encouraging legislation against 'shopping mall' clinics, particularly as the practices used in these clinics are the same, to a greater or lesser extent, as those in diagnostic practices. We would be asking for legislation to draw a very fine line between medical and non-medical services.

The answer is not legislation to prevent 'shopping mall' fetal ultrasound; the answer is for us to do more to satisfy the needs of our patients.

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Testicular microlithiasis: a marker of malignancy?

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

This lecture will review the prevalence of testicular microlithiasis and the prevalence of germ cell tumours in patients with testicular microlithiasis, as well as discuss intratubular germ cell neoplasia, and the association between testicular microlithiasis and intratubular germ cell neoplasia and germ cell tumour. Reported recommendations as to how to follow these patients will also be discussed including results from a survey of the Society of Radiologists in Ultrasound.

The reported prevalence of testicular microlithiasis has a wide range (0.6%–18.1%). This is most likely due to the demographics of the patient population, the study design, and the definition of microlithiasis. The prevalence of germ cell tumour in patients with testicular microlithiasis also has a wide range between 6% and 46%, again, likely a function of the abovementioned factors. Although there is an association between testicular microlithiasis and intratubular germ cell neoplasia/germ cell tumour, the question as to whether there is a causal relationship is largely unknown. Recommendations for follow up of these patients vary widely in the literature as well as amongst radiologists and urologists in the United States. Recommendations for follow up of these patients will be discussed. In addition, a brief overview of the different types of testicular germ cell tumours as well as sonographic findings will be presented.

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Prostate imaging and treatment

Dr Grant Baxter, Western Infirmary, Glasgow, United Kingdom

The incidence of prostate cancer has increased steadily over the last 10 years. It is the second most frequently diagnosed cancer in men and will affect one in 12 men at some time in their lives.

Ultrasound plays a major role in this disease; not just in the diagnosis of the condition but also in the delivery of one of the treatment options, i.e. brachytherapy.

The diagnosis is confirmed with transrectal ultrasound-guided biopsy of the prostate normally following an abnormal DRE, PSA level or both. Traditionally, prostate cancer is hypoechoic relative to the prostate gland, however, with the increased and widespread use of PSA testing it is not uncommon for the gland to look normal. The biopsy method and technique will de discussed.

Once prostate cancer is diagnosed there are a number of treatment options including radical prostatectomy, active monitoring, radiotherapy, hormones or brachytherapy. Not all patients are suitable for all treatments. The increased use of PSA screening has resulted in an increase in the detection of early stage disease suitable for brachytherapy.

Prostate brachytherapy is now well established in the therapeutic armamentarium. Technological developments have resulted in the delivery of high doses of radiation to the gland in a consistent and reproducible manner. Ten-year data confirm that it is equally as effective as either radical prostatectomy or radiotherapy in patients with similar prognostic factors. We will describe referral criteria, the technique in place at our centre and review the anticipated side effects and long-term outcome.

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The use of ultrasound in male infertility

Prof Gordon Baker, University of Melbourne and The Royal Women's Hospital, Vic

Objective

To summarise ultrasound use in men with infertility.

Abstract

Currently, scrotal ultrasound has an established place for investigating specific clinical situations, particularly impalpable testes and suspected tumours. Transrectal ultrasound is crucial for diagnosis of distal genital tract obstruction. Patients with low semen volume and pH without other causes, such as partial retrograde ejaculation or androgen deficiency, may have treatable ejaculatory duct obstructions by a prostatic utricle cyst, other malformations or chronic inflammation.

Ultrasound can also be used to measure testicular volume, particularly of small testes and to diagnose varicocele and, possibly, chronic prostatitis. However testicular size is routinely assessed by orchiometry with similar accuracy and attempting to treat varicocele or chronic prostatitis to improve fertility is now out of favour because of lack of evidence of benefit.

Occasional uses of ultrasound are to demonstrate undescended testes in the inguinal canal or at the external ring, to check for associated renal malformations such as an absent kidney on the same side as unilateral congenital absence of the vas, and to check blood flow in a painful testis following a complicated testis biopsy to exclude torsion.

Azoospermic men with severe primary spermatogenic disorders such as Klinefelter syndrome or idiopathic Sertoli Cell Only syndrome may have some seminiferous tubules with small areas of spermatogenesis and spermatids obtained by open testicular biopsies can be used for intracytoplasmic sperm injection. Whether ultrasound assessed blood flow patterns in testicular vessels or parenchyma will predict or guide successful sperm retrieval in such patients is being investigated.

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Non gynaecological pelvic pathology

Dr Simon Meagher, Monash Ultrasound for Women, Vic

Pelvic pain most commonly arises from physiological or pathological processes in the female genital tract, including the ovaries, uterus and cervix, fallopian tubes parametrium and vagina. Other organs from which pain may also originate include the intestine, appendix, urinary bladder, kidneys, pelvic peritoneum, umbilicus and pelvic blood vessels. Less commonly, pain may originate from the anterior abdominal wall and pelvic musculature, nervous and bony tissue.

This talk gives an outline to the sonographic appearances to the common and rare pelvic pathologies which may at times give reason to the cause of the pelvic pain or distract from the correct diagnosis. Video clip demonstrations outline the sonographic appearances of inflammatory bowel disease, appendicitis, malignant bowel disease, atypical endometriosis, cystitis and pelvic congestion syndrome.

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Diagnosis and management of pregnancies of unknown location (PULs)

Dr George Condous, University of Sydney, NSW

Pregnancies of unknown location (PULs) are defined as a situation in which there is a positive pregnancy test with no signs of either an intra- or extrauterine pregnancy on

transvaginal ultrasonography.

Expectant management has been prospectively validated in many studies. A 'wait-and-see' approach has been shown to be safe, to reduce the need for unnecessary surgical intervention and is not associated with any serious adverse outcomes. The prevalence of PULs is dependent on the quality of scanning for a given early pregnancy unit. The higher the quality of scanning, the better the detection of ectopic pregnancy using ultrasound as a single diagnostic test, this in turn results in fewer women being classified with a PUL.

Varying the discriminatory zone does not significantly improve the detection of ectopic pregnancies in a PUL population. A single serum human chorionic gonadotrophin (hCG), when used in a specialised transvaginal scanning unit, is not only potentially falsely reassuring but unhelpful in excluding the presence of an ectopic pregnancy. A single-visit approach has also been shown to be ineffective.

The vast majority of women with a PUL are at low-risk for ectopic pregnancy. When the location of a pregnancy cannot be confirmed on the basis of an ultrasound scan, serum hCG and progesterone are measured at presentation and also at 48 h. It is the change in serum hCG over time, the hCG ratio (hCG at 48 h/hCG at 0 h), and the absolute level of progesterone at presentation which can be used to reliably predict the failing PULs and intrauterine pregnancies within a PUL population, but not the ectopic pregnancies.

This justifies the recent development and use of new mathematical modelling techniques to predict ectopic pregnancies in the PUL population. Prospective studies are needed to assess the reproducibility of these models in different centres on different populations. Hopefully, the use of such models in the future will enable the clinician to correctly classify PULs earlier, in turn reducing the number of follow up visits.

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Ethical and legal aspects of late termination of pregnancy

Assoc Prof Lachlan de Crespigny, Melbourne Ultrasound for Women, Vic, Prof David Ellwood, The Australian National University, ACT

Late termination of pregnancy (LTOP) is usually considered to be one carried out at greater than 20 weeks gestation. It is unclear how many LTOPs are carried out each year, but there are reliable figures from some states and extrapolating from these data suggests that the total number is between 500–1000. However, there is no specific national data collection, so the circumstances that may lead to a request for LTOP are not always known. In many cases, the request follows the late diagnosis of a severe or lethal fetal anomaly and, as such, those who practice obstetric ultrasound have a significant interest in this difficult area.

The legal framework within which LTOP is carried out differs between the different jurisdictions. In WA, there is an appointed medical committee which makes decisions about LTOP and whose actions are defined in legislation. In both NSW and Victoria there are processes of review and approval, which are defined either by the Health Department or individual hospitals. However, the legal restrictions are not understood well as, essentially, all 'not-unlawful' LTOPs are defined by the woman's request to prevent harm to herself rather than the fetus. In the ACT, termination is no longer specified in the *Crimes Act,* but there is a rigorous process of review and approval managed by the territory's major hospital.

The varying legal framework impacts significantly on some of the ethical issues. There is, undoubtedly, some variation in clinical practice across the country, which means that women are presented with different options depending on where they live. There is evidence that some women travel significant distances to gain access to LTOP. This presentation will examine the geographical legal differences, and explore how they impact on women's reproductive choices.

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The role of the 11- to 14-week scan

Dr Amanda Sampson, Royal Women's Hospital, Vic

This scan continues to be very popular with obstetricians and their pregnant patients. The mother will enjoy images of her tiny fetus at a time when the whole fetus and its movements are clearly seen.

This examination is primarily for the risk assessment for aneuploidy, particularly Down syndrome. There is a 90% detection rate for trisomy 21 with the combined screen. Recent research has been further reducing the false positive rate without a reduction in detection rate (e.g nasal bone). By reducing the false positive rate, the numbers of women having a risky procedure such as CVS or amniocentesis will be reduced and so fewer normal fetuses will be lost due to the screening test.

From a medical perspective, this scan has many other advantages for the obstetrician, especially in highlighting the at-risk fetus. These advantages include

(1) Early dating;
(2) Early diagnosis of multiple pregnancies and early chorionicity assessment. Potential early diagnosis of twin-to-twin transfusion syndrome in MCDA pregnancies;
(3) Diagnosis of unexpected failed pregnancies;
(4) Other pathologies such as cysts which may need treatment in pregnancy;
(5) Early assessment of cervical length in at risk women;
(6) Detection of uterine abnormalities, which may not be apparent as the pregnancy grows;
(7) Major detectable abnormalities are discovered at an earlier gestation, such as anencephaly, absent limbs, holoprosencephaly, single chambered hearts, bladder outlet obstruction, skeletal dysplasias, conjoined twins etc; and
(8) The fetus with a thick nuchal translucency and normal karyotype is at risk of fetal demise, growth issues and other abnormalities.

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Antenatal detection of single umbilical artery and subsequent pregnancy outcome

Dr Stanley Ng, Women's Diagnostic Ultrasound, NSW, Dr Shawn Choong, Mercy Hospital for Women, Vic

Aim

To evaluate pregnancy outcomes following detection of a single umbilical artery (SUA), in isolation and together with other anomalies.

Methods

All fetuses with SUA seen on antenatal ultrasound in the Medical Imaging Department at Mercy Hospital for Women in Victoria between 1995 and 2002 were identified. Obstetric, ultrasound, pediatric and histopathology records

were reviewed. Only fetuses with SUA confirmed by visual inspection of the umbilical cord at delivery or histopathological examination were included.

Results

A total of 82 fetuses met the study criteria. SUA was seen on ultrasound as an isolated finding in 61 fetuses (74.4%) and with other anomalies in 21 (25.6%). Eight (13.1%) of the 61 fetuses with apparently isolated SUA had additional anomalies, although the majority of these were minor in nature or would not have been seen or reliably seen on ultrasound.

There were no chromosomal abnormalities in fetuses with SUA alone or together with minor markers. At least one in four SUA fetuses with a major malformation had aneuploidy.

SUA fetuses with major malformations tended to have lower mean gestations and weights at delivery as well as significantly increased low birthweight, preterm delivery, aneuploidy and perinatal mortality rates compared to fetuses with isolated SUA.

Conclusions

SUA may be complicated by congenital anomalies and poor pregnancy outcomes. These outcomes are worse for SUA fetuses with major malformations than for isolated SUA. The finding of a SUA on ultrasound necessitates a detailed search for other anomalies. Karyotyping should be offered for SUA fetuses with a major anomaly.

337

Where are we at with soft markers?

Dr Michael Bethune, The Mercy Hospital for Women, Vic

Mid trimester soft markers have been linked with Down syndrome and other aneuploidies. There are many other prenatal screening tests available with better detection rates for Down syndrome than the mid trimester ultrasound. Many patients confronted with the diagnosis of a soft marker become anxious and may request a diagnostic test (amniocentesis) despite the associated risk of miscarriage.

A review of the current literature for each of the soft markers is given. Each soft marker has different associations and individual management plans for each of these soft markers are presented.

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Ultrasound and haemodialysis fistulas – establishing criteria

Prof Harry Gibbs, Princess Alexandra Hospital, Qld

Arteriovenous fistulas are required for long term dialysis. Fistula thrombosis necessitates urgent intervention to allow ongoing dialysis and may not be able to restore fistula function, leading to the need for the creation of a new fistula. Impending fistula failure may be detected by abnormal haemodynamic function during dialysis or by duplex ultrasound surveillance. A number of duplex ultrasound criteria have been proposed to detect fistula dysfunction that predicts failure. These include alterations of velocity and volume flows but are not universally accepted. This presentation will review the current literature and present the authors experience and approach to this problem.

339

Evaluation of upper extremity ischemia

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

Upper extremity ischemia accounts for only a small percentage of any vascular surgical practice, but nevertheless results in many diagnostic and management inquiries. The differential diagnosis is large and includes systemic disorders such as connective tissue disease, Burgers disease, large artery inflammatory processes such as Takayasu's disease and temporal arteries and degenerative and atherosclerotic lesions of upper extremity arteries proximal to the wrist.

Evaluation of upper extremity ischemia involves many of the same principles as evaluation of lower extremity ischemia. A well performed history and physical examination is important. However, evaluation of upper extremity ischemia involves greater dependence on digital artery studies, serologic testing (ANA and rheumatoid factor) and bilateral studies than evaluation of lower extremity ischemia. The role of duplex scanning in the upper extremity is fairly limited in comparison to the lower extremity. The key points in the evaluation of upper extremity ischemia are outlined as follows:

(1) Most patients with significant chronic upper extremity ischemia present with Raynauds. Raynauds may be secondary to vasospastic or occlusive digital artery disease;
(2) Raynauds should be regarded as a symptom, not a diagnosis. One must discover the etiology of the Raynauds syndrome. Vascular laboratory testing, serologic testing, hand and cervical spine x-rays, and catheter based contrast angiography are all important;
(3) Tissue loss is secondary to digital artery occlusion, not vasospasm;
(4) Digital artery occlusions may involve one or both hands. Digital artery occlusions may be diagnosed by finger PPG studies and/or angiography. Cold testing is not needed;
(5) The principle role of cold testing is objective conformation of vasospastic Raynauds syndrome in patients with normal finger PPG waveforms with hand warming;
(6) Think embolisation to the digital arteries in patients with unilateral chronic upper extremity ischemia. Chronic embolisation in the upper extremity responds poorly to thrombolysis. The goal is treatment of the embolic source;
(7) Significant chronic embolisation to upper extremity digital arteries may occur from obvious large artery aneurysms or sites of minimal luminal irregularity. Angiography is generally required to diagnose the latter;
(8) Bilateral vascular laboratory studies are essential. A normal finger digital artery to brachial artery blood pressure ratio is > 0.6. False negative finger PPG studies may occur in patients with extensive digital artery occlusions as long as one digital artery is patent proximal to the finger PPG cuff;
(9) Patients with normal PPGs of the digital arteries and negative serologies have an excellent prognosis. They are very unlikely to lose tissue. Patients with obstructive PPG studies and positive serologies have a poor prognosis. Over 30% will lose tissue;
(10) Hand x-rays to evaluate for calcinosis and cervical spine films to evaluate for cervical ribs are part of the work up of upper extremity ischemia;
(11) Most (> 90%) of patients with significant upper

extremity ischemia have a systemic disorder;
(12) Positional arterial testing of the upper extremity is not indicated in the evaluation of possible neurogenic thoracic outlet syndrome; and
(13) First decide if the patient has large artery or small artery disease, then determine if the process is unilateral or bilateral, and finally determine if there is digital artery obstruction.

340

Ultrasound and renal transplantation

Ms Paula King, Royal Melbourne Hospital, Vic

Ultrasound of the renal patient in the case of the transplant kidney mainly involves monitoring the life of the transplant kidney in its new home.

The transplant patient may have some pre-op ultrasound vascular assesment.

It is possible to divide the transplant assessment into three stages:
(1) Acute postoperative;
(2) Early transplant life; and
(3) Post first year

In these areas, I will look at common post transplant complications, blood flow assessments and ultrasound role in aiding transplant biopsy, and other interventions such as drainages or vascular stenting. Another concept to consider is the role of ultrasound as an adjunct to nuclear medicine studies and other clinical tests. I am keen to establish renal transplant ultrasound as both a patient/clinician friendly examination.

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Hip pain

Ms Mary Langdale, Victoria House Medical Imaging, Vic

The hip is a dynamic joint, being a ball and socket joint. The range of movements is extensive, consisting of flexion, extension, adduction, abduction and rotation. These movements are possible due to the interaction of different groups of the muscles. Many musculoskeletal units of the hip cross both the hip and knee joints, hence are at an increased risk of injury.

Hip pain is experienced by all age groups and from the athletic to the aged. It may be caused by trauma, repetitive overuse, by or a degenerative process.

A broad spectrum of causes of hip pain exists, some of which can be assessed with ultrasound imaging. The pain may be due to pathology in the pelvic bone, femur, hip joint, muscles, tendons, bursae and nerves.

This talk will cover some of this pathology as diagnosed with ultrasound, including evaluation of the hip joint, flexors, hamstrings, abductor and adductor tendons and muscles. The severity of muscle damage will be discussed. A selection of case studies and the sonographic findings will be included.

342

Functional anatomy and pathology of the lateral hip with ultrasound correlation

Dr Ross McKellar, Victoria House Medical Imaging, Vic

Objectives

The objectives of the presentation are: to review the functional anatomy of the lateral hip; to outline an approach to the sonographic assessment of the lateral hip; and to demonstrate the sonographic appearances of lateral hip pathology.

Abstract

The functional anatomy of the lateral hip is reviewed. Gross anatomy will be demonstrated diagrammatically and, where relevant, using MRI images. Particular emphasis will be placed on gluteus medius and minimus, plus their associated bursae. The function of these two muscles will be assessed with reference to the current literature.

Our approach to ultrasound of the lateral hip will be outlined. This can involve both static and dynamic scanning. Normal sonographic appearances of the lateral hip will be demonstrated.

The sonographic appearances of lateral hip pathology will be reviewed. Particular emphasis will be placed on the gluteus medius and minimus tendons plus their associated bursae. Tendonopathy and tears of these tendons are a major cause of lateral hip pain and dysfunction in middle to older age women. They are also seen following total hip arthroplasty by an anterolateral approach. The usefulness of ultrasound in assessing for these changes will be illustrated with our own study data. Pathology affecting the tensor fascia lata and gluteus maximus tendons plus the iliotibial band will also be discussed.

343

Tears of the gluteal tendons – a surgeon's perspective

Mr Elton Edwards, National Trauma Research Institute, Vic

Objective

Surgical repair of tears of the gluteal tendons is an infrequent procedure. This presentation will describe an individual surgeon's experience with this procedure, highlighting the clinical presentation, physical signs, ultrasound and MRI findings, surgical findings and surgical technique. A classification of tears will be presented.

Abstract

Patients are predominately female and generally in the sixth decade or beyond. Pain occurs with activity and is frequently very troublesome at night. Symptoms are rarely absent. Limp is infrequent. Clinical signs are minimal and generally consist of local tenderness only. Ultrasound provides significant diagnostic assistance, as does MRI.

No modality has had 100% correlation with surgery. Surgery is recommended for those with persistent symptoms after failed conservative measures. Thorough examination of the tendons, in particular the deep surface, is essential at surgery. Multiple tear configurations exist and require individual repair techniques. Postoperative management is determined based on the technique employed at the procedure. Generally, the postoperative management involves strict adherence to guidelines which substantially restrict function for six weeks. Pain is rapidly and reliably resolved, however the long-term outcome remains unknown.

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Ultrasound of the paediatric hip

Mr Cain Brockley, Royal Children's Hospital, Vic

Ultrasound of the paediatric hip is one of the most common and yet difficult paediatric ultrasound scans that sonographers

will encounter. There are many and varying techniques and views that can be used for this examination. The minimum standard incorporates a morphological assessment of the acetabulum and dynamic stability assessment of the femoral head. By using the correct techniques, it is impossible to make an abnormal hip look normal. However, a normal hip can easily be made to look abnormal if the correct views are not satisfactorily acquired, therefore the use of correct technique and views is essential for accurate diagnosis.

The aim of this presentation is to provide an overview of the basic techniques of hip ultrasound and to provide some useful tips and hints on how to optimise the views to obtain the best possible examination. It will also cover the classification of the acetabular morphology and dynamic stability.

401

Ultrasound-guided tumour ablation

Professor John McGahan, University of California, USA

Radiofrequency liver

Radiofrequency electrocautery is most commonly used for ablation of hepatocellular carcinomas and metastases to the liver. Hepatic applications have included RF electrocautery using percutaneous laparoscopic or intraoperative needle placement. HCC and colon metastasis have been shown to have favourable response with RF treatment.

Radiofrequency kidney

RFA has been shown to be very effective in treatment of renal cell carcinoma. In most situations, RFA of RCC requires biopsy before or during RFA. Most cases are performed under CT guidance, although CT combined with sonography, or sonography alone can be used to guide treatment. Best results are for RCC are those that are exophytic and less than 3 cm in size.

Other applications

RF is effective in ablation of osteoid osteomas. Radiofrequency had also been applied to a number of other areas of the body, including painful bony metastases.

RF is very effective in treatment of lung tumours that otherwise would be un-resectable. However, lung RFA is usually performed under CT guidance.

There are currently a number of different studies in humans using RF ablation for treatment of breast cancer. Usually these tumours are then resected to see the ablation area of RF electrocautery. RFA of breast malignancies is performed under sonographic guidance.

402

Establishing an ultrasound unit in 2006

Assoc Prof Phillip Walker, University of Queensland, Qld

Establishing an ultrasound unit, like any new venture which is ultimately rewarding when achieved successfully, can be difficult and anxiety provoking, and potentially fraught with problems. This is regardless of whether you are establishing a unit in the private or public sector. Put simply, you require good people and good equipment with the aim of always providing a high quality diagnostic service. There are, however, many more facets to consider to ensure that this aim is achieved. Vital areas to consider include but are not limited to:

- agreeing on the raison d'etre for the unit;
- market research;
- financing and business planning;
- legal issues and company/partnership arrangements;
- premises;
- equipment;
- technical and administrative personnel;
- personnel management;
- office administration;
- scheduling;
- study protocols;
- reporting protocols and diagnostic criteria;
- patient considerations and education;
- interaction with and education of referrers;
- advertising and promotion;
- study archiving;
- quality assurance;
- CPD;
- training;
- research;
- billing policies and arrangement;s
- government regulatory and accreditation issues; and
- record keeping and tax and financial management.

This presentation will share my thoughts on some of the important issues to consider when establishing an ultrasound unit, based on my involvement in establishing vascular ultrasound units in both the public and private sector over the last 15 years.

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Venous thrombosis – the current status

Prof Ken Myers, The Epworth Centre, Vic

There is strong evidence to define the incidence of venous thromboembolism (VTE) in high-risk situations, underlying haematological factors that increase the risk, short- and long-term sequelae and optimal management.

VTE is particularly frequent following abdominal and lower limb orthopaedic surgery. The duration for increased risk, for example, after joint replacement operations, is now known to be prolonged for some 4–6 weeks. There is also convincing evidence to relate VTE to many medical disorders and to travellers' thrombosis.

Underlying coagulation abnormalities that increase the risk are endogenous due to thrombophilia, and exogenous from intercurrent illness, blood dyscrasias, oral contraception or hormone-replacement therapy.

Spontaneous VTE is usually due to one or more of these predisposing factors. Prophylaxis regimens have been developed for subjects at increased risk, varying from simple lower limb compression through regimens with low molecular weight heparin, oral warfarin or newer agents.

Trials show reduced incidence of deep vein thrombosis or non-fatal pulmonary embolism, but no reduction for fatal pulmonary embolism, undoubtedly reflecting the need for larger patient numbers. If VTE is detected, therapeutic regimens are proven to minimise risk of serious early or late sequelae; a major advance has been to safely manage most patients out of hospital. The problem in practice is to strictly implement prophylactic and therapeutic regimes in all patients.

Acute clinical deep vein thrombosis is best detected or excluded by the duplex ultrasound scan. A negative D-dimer test can define most patients who do not have deep vein thrombosis but is, realistically, only an excuse to avoid performing ultrasound scans out of hours. Prophylactic

ultrasound screening may be cost-effective in high-risk patients as so many have silent VTE that could present with fatal pulmonary embolism or late post-phlebitic syndrome.

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Differential diagnosis of endometrial abnormality

Prof Dirk Timmerman, Universitaire Ziekenhuizen Leuven, Belgium, Jasper Verguts, Katholieke Universiteit Leuven, Belgium, Caroline Van Holsbeke, University Hospitals KU Leuven, Belgium, Dominique Van Schoubroeck, Katholieke Universiteit Leuven, Sweden, Thierry Van Den Bosch, Katholieke Universiteit Leuven, Belgium, Sabine Van Huffel, Katholieke Universiteit Leuven, Belgium

Gray-scale transvaginal ultrasonography is not accurate in the detection of focal endometrial pathology. Currently, second stage tests, such as saline contrast sonohysterography and office hysteroscopy, are used for diagnosis of endometrial lesions. Both these second stage tests have limitations and side effects.

We proposed the 'pedicle artery sign' at colour Doppler imaging as an indicator of focal endometrial pathology, and assessed its use in a prospective observational study of 3099 consecutive patients.

Of 2037 premenopausal and 1062 postmenopausal asymptomatic women (82%), or women with abnormal bleeding (18%), no gold standard was available in 2230 because surgery or hysteroscopy was not clinically indicated. These patients were excluded from further analysis.

There were only 28 patients that were test-positive and who did not have a gold standard.

In the 869 patients where a gold standard was available, 182 had one or more endometrial polyps. The 'pedicle artery sign' has an apparent sensitivity for endometrial polyps of 76.4%, a specificity of 95.3%, positive predictive value (PPV) of 81.3%, and negative predictive value (NPV) of 93.8 %. When extending the test to the prediction of any focal intracavitary pathology the PPV is 94.2%.

We conclude that the 'pedicle artery test' has a very high PPV for focal intracavitary pathology and we expect that in the majority of patients with an endometrial polyp the 'pedicle artery' test may replace more invasive established second stage tests, such as saline contrast sonohysterography and office hysteroscopy.

406

Ultrasound diagnosis of uncommon ectopic pregnancy

Dr Kittipong Vairojanavong, Rajavithi Hospital, Thailand

Objective

To study retrospectively the criteria to improve the accuracy of diagnosis of uncommon ectopic pregnancy by ultrasound.

Method

Using gray scale ultrasound to diagnose the uncommon ectopic pregnancy, all cases, recorded by polaroids or sonopapers were analysed.

Results

Three cases of abdominal pregnancies showed fetal head, trunk and placenta being outside the uterus and covered by thin membranes containing a small amount of amniotic fluid. Maternal bowel with gas shadow was found lying between the maternal abdominal walls and the fetus.

In two cases of interstitial pregnancy, the gestational sac was eccentrically placed and covered by thin myometrium. A pseudogestational sac was noted in the uterine cavity.

In the case of pregnancy in the rudimentary horn of the uterus, the fetus was surrounded by a normal looking myometrial wall which looked like a normal pregnancy but a non-pregnant uterus, noted in the pelvic cavity will be helpful for this uncommon diagnosis.

Conclusion

Uncommon ectopic pregnancies are difficult to diagnose correctly by ultrasound. The operator who has come across these uncommon cases of ectopic pregnancies will be able to diagnose them correctly.

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What information on fetal anatomy can a single transabdominal first trimester three-dimensional sweep provide?

Mr David Fauchon, Nepean Hospital, University of Sydney, NSW, Prof Ron Benzie, Nepean Hospital, University of Sydney, NSW, Ms Deborah Wye, Nepean Hospital, University of Sydney, NSW, Mr Ravy Thavaravy, Nepean Hospital, University of Sydney

Objectives

To determine how much of the fetal anatomy listed in The Fetal Medicine Foundation (FMF) Program software can be visualised using the stored data set of a single transabdominal three-dimensional volume sweep of the entire fetus between 11 to 13 weeks and 6 days gestation.

Methods

A transabdominal three-dimensional volume sweep of the entire fetus was performed in the mid-sagittal plane. The data set was stored on the hard drive of the Voluson 730 Expert (GE Medical Systems) ultrasound machine and copied to a compact disc. It was then manipulated on the 4D View GE Medical Systems Kretz Ultrasound software using the sectional planes mode. Each data set was manipulated and analysed by two separate investigators, blinded to each others' results.

Results

Results of the first 153 cases of this ongoing study are shown in the following table:

n = 153	% seen
Skull	97.3
Falx	95.1
Choroid plexus	94.5
Skin line over spine	90.7
Vertebrae	90.3
Hands	89.8
Stomach	83.0
Abdominal wall	74.6
Feet	74.4
Bladder	39.0

Conclusions

We conclude that a single transabdominal three-dimensional sweep of the first trimester fetus can visualise the majority of anatomical structures listed in the FMF Program software.

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How to predict depth of myometrial infiltration in endometrial carcinoma patients?

Prof Dirk Timmerman, Universitaire Ziekenhuizen Leuven, Belgium, Josh De Brabanter, University Hospitals, Katholieke Universiteit Leuven, Belgium, Nathalie Pochet, University Hospitals, Katholieke Universiteit Leuven, Belgium, Thierry Van Den Bosch, Katholieke Universiteit Leuven, Belgium, Caroline Van Holsbeke, University Hospitals KU Leuven, Belgium, Bart De Moor, University Hospitals, Katholieke Universiteit Leuven, Belgium, Ignace Vergote, Katholieke Universiteit Leuven, Belgium, Frank De Smet, Alliance of Christian Sickness Funds, Belgium

Preoperative knowledge of the depth of myometrial infiltration is important in patients with endometrial carcinoma. We aimed at assessing the value of histopathological parameters obtained from an endometrial biopsy (Pipelle® de Cornier – results available preoperatively) and ultrasound measurements obtained after transvaginal sonography (TVS) with color Doppler imaging (CDI) in the preoperative prediction of the depth of myometrial invasion as determined by the final histopathological examination of the hysterectomy specimen (gold standard).

We first collected ultrasound and histopathological data from 97 consecutive women with endometrial carcinoma and divided them into two groups according to the surgical stage (stage Ia and Ib vs stage Ic and higher). Subsequently, we used these data to train a logistic regression model and Least Squares Support Vector Machines (LS-SVM) with linear and RBF (Radial Basis Function) kernels. Finally, these models were validated prospectively on data from 78 new patients in order to make a preoperative prediction of the depth of invasion.

The ratio of the endometrial and uterine volume (EV / UV) had the largest AUC (78%) from all ultrasound parameters, while the AUC of the subjective assessment was 79%. The AUCs of the parameters obtained after CDI were low (range 51%–64%). Stepwise logistic regression selected the degree of differentiation, the number of fibroids, the endometrial thickness and volume of the tumour. Compared with the AUC (72%) of the subjective assessment, prospective evaluation of the mathematical models resulted in a higher AUC (77%) for the LS-SVM model with an RBF kernel, but this difference was not significant.

We conclude that single morphological parameters are not sufficient in making accurate prediction of depth of myometrial invasion of endometrial cancer and color Doppler parameters do not contribute to the prediction of the stage. In our study, an LS-SVM model with an RBF kernel gave the best prediction and might be more reliable than the subjective assessment. Before applying mathematical models in clinical practice they have to be tested in large prospective and multicentre studies.

409

Fetal cardiac diagnosis and its influence on the pregnancy and newborn - a tertiary centre experience

Dr Boon Kian Yeu, Southern Health Fetal Cardiac Unit, Monash Medical Centre, Vic, Dr Rebecca Chalmers, Monash Medical Centre, Vic, Dr Paul Shekleton, Southern Health Fetal Cardiac Unit, Monash Medical Centre, Vic, Dr James Grimwade, Women's Diagnostic Ultrasound Centre, Vic, Prof Sam Menahem, Monash Medical Centre, Vic

Objectives

To evaluate the implications of an abnormal fetal cardiac scan on the management of the pregnancy and outcome of the newborn.

Purpose

To review the impact of an abnormal fetal cardiac scan on the outcome of the affected pregnancy and the newborn.

Methods

This retrospective and prospective study reviewed all pregnancies from January to December 2005 referred to a tertiary centre when there was an abnormal fetal cardiac ultrasound. The scans were repeated and diagnoses confirmed by an obstetrician ultrasonologist and paediatric cardiologist.

The influence of the abnormal findings on the pregnancy, treatment and outcome of the newborn was reviewed. The diagnoses were confirmed by echocardiography following delivery.

Results

Between January and December 2005, 157 abnormal fetal cardiac scans were carried out on 77 fetuses. Six women opted for termination. Two fetuses were successfully treated during pregnancy for hydrops fetalis arising from tachyarrhythmia. One was induced early because of increasing fetal cardiac size and fetal deterioration. Of the women, 42, were advised to be delivered in a tertiary hospital with anticipation of newborn intensive care monitoring. Sixteen newborns needed prostaglandin infusion before surgery. Two required intensive care for associated malformations. Sixteen infants survived cardiac surgery and there were two deaths. Two newborns died before surgery due to severe tricuspid valve regurgitation, one with septicaemia, the surgery having been deferred.

Conclusions

Early detection of fetal cardiac malformation offers the options of termination of pregnancy, ongoing antenatal care with a planned site and timing of delivery and anticipatory post natal intervention for optimal outcomes.

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Diagnosis and management of uterine vascular malformations

Prof Dirk Timmerman, Universitaire Ziekenhuizen Leuven, Belgium, Dominique Van Schoubroeck, Katholieke Universiteit Leuven, Sweden, Geert Maleux, University Hospitals, Katholieke Universiteit Leuven, Belgium, Thierry Van Den Bosch, Katholieke Universiteit Leuven, Belgium, Caroline Van Holsbeke, University Hospitals KU Leuven, Belgium, Bernard Spitz, University Hospitals, Katholieke Universiteit Leuven, Belgium

We assessed the spontaneous outcome of uterine vascular malformations detected with ultrasonography and colour Doppler and evaluated the predictive value of colour Doppler imaging as to which patients require invasive treatment.

In a prospective observational study, we included all consecutive patients diagnosed with a uterine vascular malformation at ultrasonography and colour Doppler imaging. Spectral analysis included measurement of flow velocities, pulsatility index (PI), and resistance index (RI). Close follow-up was arranged in all cases and the outcome was recorded.

A total of 30 consecutive patients with uterine vascular malformations were included in the study. Spectral analysis of the vessels in the vascular malformations within the myometrium and endometrium showed the presence of a low-impedance and high-velocity flow. The average values for

pulsatility index (PI), resistance index (RI), peak sysytolic velocity (PSV) and time-averaged maximum velocity (TAMXV) were 0.50, 0.38, 0.63 m/s and 0.46 m/s, respectively.

Eight patients (27 %) eventually needed embolisation of the uterine arteries and three of the eight had true arteriovenous malformations confirmed at angiography. PSV values of 0.83 m/s or higher were associated with higher probabilities of further treatment, such as an embolisation, whereas not any vascular malformation with PSV value below 0.39 m/s needed embolisation.

We conclude that conservative management is possible in more than two-thirds of patients presenting with uterine vascular malformations diagnosed with colour Doppler sonography. Despite considerable overlap PSV values seem useful for distinguishing between low- and high-risk patients.

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Sonographic diagnosis of placenta accreta in the first trimester – a case report

Hong Soo Wong, Wellington School of Medicine and Health Sciences, University of Otago, New Zealand, Ms Linda Strand, Women's Health Service, Capital and Coast District Health Board, New Zealand, Ms Paula Carryer, Women's Health Service, Capital and Coast District Health Board, New Zealand, Dr Jane Zuccollo, Wellington School of Medicine and Health Sciences, University of Otago, New Zealand, Dr John Tait, Women's Health Service, Capital and Coast District Health Board, New Zealand, Prof Kevin Pringle, Wellington School of Medicine and Health Sciences, University of Otago, New Zealand

Objective

To present the first trimester sonographic findings of a case of histologically confirmed placenta accreta.

Method

A patient with a previous caesarean section was referred for ultrasound examination at six weeks gestation in an IVF pregnancy. Placenta accreta was suspected sonographically and confirmed histologically at delivery. The findings on first trimester ultrasound examination are presented.

Result

On ultrasound examination, the gestational sac was noted to be low in the uterine cavity. Part of the lining of the gestational sac was embedded in the previous caesarean section scar. The decidual layer was irregular with thinning of the underlying uterine wall at areas crossed by communicating vessels. In the third trimester, the placenta was noted to be posterior and low lying with an anterior succenturiate lobe. Following rupture of membranes at 36 weeks, an emergency caesarean section was performed for breech presentation and preterm labour. The placenta was noted to be adherent over both the anterior and posterior walls of uterus. An attempt at separating the placenta resulted in severe haemorrhage and hysterectomy was required. Placenta accreta was confirmed histologically.

Conclusion

Placenta accreta can be suspected based on these findings on a first trimester ultrasound examination.

502

The dilemma of minor cardiac findings

Mrs Narelle Kennedy, Perinatal Ultrasound, Nepean Hospital, NSW, Prof Ron Benzie, Nepean Hospital, University of Sydney, NSW

Cardiac abnormalities are often difficult to detect and this has been well documented in the journals. Over the years, operators have been attempting to improve their ability to detect these anomalies prenatally. Early detection may improve the outcome of these pregnancies by offering early intervention or delivery in a tertiary hospital.

In our department, this has led to the inclusion of additional views in the routine fetal anomaly ultrasounds, which has led to more time being spent by the operator examining the fetal heart.

The improvements in ultrasound technology have made it possible to produce images of higher resolution.

Studies have indicated that the likelihood of detecting a cardiac anomaly increases with the level of experience and the knowledge of the operator. Time has been spent in our department to teach fetal heart anatomy and function and the appearance of anomalies to our staff. This includes practical training as well as CD-Rom based learning.

Due to these improvements, we have found that we are now finding single minor anomalies that are not part of a series of changes seen in the progression of a complex heart defect.

This poster covers four cases of single findings in the heart: the more common ventricular septal defect, a prominent superior vena cava, aortic stenosis and aberrant tricuspid spectral trace. Are these normal variants or the beginning of progressive heart problems?

508

Cornelia De Lange syndrome: the value of 3D and 4D ultrasound – a case review

Mr Benjamin Micallef, Nepean Hospital, University of Sydney, NSW, Prof Ron Benzie, Nepean Hospital, University of Sydney, NSW, Mr David Fauchon, Nepean Hospital, University of Sydney, NSW

This poster will present a case of Cornelia De Lange syndrome. This syndrome is characterised by pre- and postnatal growth retardation, microcephaly, severe mental retardation and major malformations including limb abnormalities and facial dysmorphism.

The poster will include 2D, 3D and postmortem photos of the fetus, and will also include comparison 3D images of this fetus and a subsequent normal fetus.

The poster will discuss the value of 3D and 4D imaging when assessing facial and limb abnormalities, and counseling the parents.

509

Uterine rupture at cesarean scar – ultrasound findings

Siew-Chern Wong, Singapore General Hospital, Singapore, Ms Wai-Leng Wong, Singapore, Ms Sook-Ling Lee, Westmead Hospital, NSW, Singapore, Dr Hak-Koon Tan, Singapore

Introduction

Rupture of the gravid uterus is a life-threatening obstetric complication. We present a case of rupture at lower segment caesarean section (LSCS) scar.

Case report

The patient was a 30-year-old female with history of two previous caesarean sections. She opted for termination of pregnancy after a dating scan at 14 weeks. She had

cervagem inserted in the morning of admission. She subsequently developed vaginal bleeding and abdominal pain.

On Day 2, she complained of back pain and was still experiencing abdominal pain and vaginal bleeding. A pelvic ultrasound was performed. Findings: intrauterine pregnancy; lower posterior placenta. An ill-defined area measuring 7.4 x 6.0 x 6.8 cm was noted in the right upper posterolateral wall of the uterus. A small amount of fluid was noted in POD, right flank and Morrison's pouch.

She had abdominal and back pain from Day 3 to Day 6, and her Hb dropped from 13.4 to 9 g/dl. A repeat ultrasound showed a viable pregnancy in the left adnexal region. An inhomogeneous hyperechoic area of 5.0 x 3.0 x 4.4 cm was noted in the lower anterior wall. An emergency laparotomy was performed, which revealed an uterine rupture at LSCS scar. The whole of the fetus, with intact sac, was extruded through the rupture.

Discussion and conclusion

The first scan noted a hypoechoic area, probably hematoma, located in right upper postero-lateral wall. There was no obvious defect in the uterine wall. The bleeding had probably tracked from the ruptured site to this region and there was probably some rotation of the uterus along its axis.

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Role of carotid ultrasonography in patients with snoring and obstructive sleep apnoea

Garth Rickert, Westmead Hospital, NSW, Ms Sook-Ling Lee, Westmead Hospital, NSW, Dr T C Amis, Sydney University and Westmead Hospital, NSW, Dr T Robinson, Westmead Hospital, NSW, Ms M Madronio, Westmead Hospital, NSW, Mr V M Borodzicz, Westmead Hospital, NSW, Dr J R Wheatley, Sydney University and Westmead Hospital, NSW, Dr G Larcos, Sydney University and Westmead Hospital, NSW

Objectives

Physiologic and epidemiologic data suggest that chronic vibrations in the neck may predispose to arterial wall damage. The aim of our study is to explore whether snoring and obstructive sleep apnoea (OSA) may be risk factors for carotid artery disease.

Abstract

We prospectively investigated 110 subjects (59 men, 51 women, > 45 y.o.) with carotid ultrasonography (US) using a Philips iU22 or ATL 5000 and linear 7-4 or 8-4MHz transducers.

All subjects also underwent US of the femoral arteries, polysomnography and snore detection using a room microphone. Snoring and OSA were defined according to oxygen desaturation (> 3%) events/hour (normal < 5 events/hr) and proportion of snoring/sleep time (normal <15%). There were 47 controls, 42 snorers and 21 patients with untreated OSA. OSA patients had a higher BMI (31.3 ± 4.4) and were more likely to be men when compared to the other groups. There was no significant difference in the mean age between controls (60 y.o.) and OSA pts (62.2 y.o.), but snorers were younger (54.8 y.o., $P < 0.004$).

Carotid and femoral artery disease was scored as either present or absent by a blinded experienced sonologist. There was a statistically significant increase in carotid artery disease in OSA pts (50%, $p < 0.05$) and snorers (35%, $p < 0.04$) compared to controls (21%). There were no differences between groups for femoral artery disease (27% for OSA, 19% for snorers and 21% for controls). We conclude that snoring and OSA are specific risk factors for carotid artery disease.

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Late diagnosis of neural tube defect followed through the third trimester

Ms Frances Miceli, Nepean Hospital, NSW

Neural tube defects (NTD) range in severity from relatively minor to lethal. With increasing technology, most are diagnosed prenatally by 19–20 weeks gestation. Depending on the choice of the parents, the more severe cases are then commonly terminated and not seen again by prenatal ultrasound.

This is a case of an exceedingly large spina bifida and meningomyelocele that was imaged and followed up throughout pregnancy from 29–35 weeks gestation. 2D, 3D and 4D ultrasound scans were used to image the NTD and help the parents better understand the nature and extent of the abnormality.

512

The prenatal diagnosis of holoprosencephaly

Mrs Alison Webb, Nepean Hospital, NSW, Prof Ron Benzie, Nepean Hospital, University of Sydney, NSW

Holoprosencephaly results from failure of the normal separation of the embryologic forebrain during the fourth to eigth week of gestation. At its most severe, this results in the formation of a single ventricle and absent falx and a spectrum of associated midline facial defects.

Chromosomal abnormality accounts for approximately 30% of cases of holoprosencephaly, most commonly trisomies 13 and 18. Three types of the condition are recognised: alobar, semilobar and lobar holoprosencephaly; alobar being the most severe.

The sonographic features of holoprosencephaly may be as subtle as absence of the cavum septum pellucidum, or as gross as a single dilated cerebral ventricle with midline facial abnormalities such as cyclopia and a proboscis.

This poster describes the types of holoprosencephaly and sonographic features, and presents a case review of alobar holoprosencephaly in a fetus with trisomy 13, diagnosed at 19 weeks using 2D and 3D ultrasound.

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Case report of a twin pregnancy: coexisting normal fetus and complete hydatidiform mole (diagnosis in the first trimester)

Ms Sharon Watson, Nepean Hospital, NSW, Prof Ron Benzie, Nepean Hospital, Unversity of Sydney, NSW

Hydatidiform mole is the benign form of gestational trophoblastic disease characterised by marked trophoblastic proliferation and hydropic degeneration of the chorionic villi. Although rare, complete and partial moles can be found in association with a normal fetus in twin pregnancies, occurring in 1 in 20 000 to 1 in 100 000 pregnancies.

Patients typically present in the first trimester with vaginal bleeding, hyperemesis gravidarum and rapid uterine enlargement.

A recent review of the literature by Wee and Juaniaux suggests that a woman with a coexistent mole and fetus has a one-in-four chance of a live birth. There is a high risk of both maternal and fetal complications including preeclampsia, persistent trophoblastic diseases, hyper-

thyroidism, theca lutein cysts, spontaneous miscarriage, intrauterine death and preterm labour.

This poster will review the progressive sonographic changes in a case of coexistent twin and complete hydatidiform mole occurring between initial presentation at 6 weeks gestation and diagnosis at 12 weeks. The sonographic findings will be correlated with biochemistry and histopathology results.

Reference

1 Wee L, Jauniaux E. Prenatal diagnosis and management of twin pregnancies complicated by a coexisting molar pregnancy. *Prenatal Diagnosis* 2005; 25: 772–776.

514

Process audit – a necessary evil

Ms Andrea Gibb, Waikato Hospital, New Zealand

Women with problems in early pregnancy have often been poorly managed, adding to their stress levels and often delaying necessary intervention or vice versa. For this reason, Waikato Hospital decided to establish an Early Pregnancy Assessment Clinic (EPAC) where women could be seen by a midwife (under the direction of an obstetrician, counselled, have ultrasound, and if necessary be booked for F/U or ERPOC.

This clinic was formalised in 1998 and procedures and protocols for referral formulated (no review of the system was undertaken). If the patient met the referral criteria and had a BHCG level they could be booked to EPAC either from the community or through the Emergency Department (ED).

Although this resulted in a reasonable service, there was considerable dissatisfaction from both EPAC and ultrasound due to referral protocols not being followed. This was thought to limit the quality and effectiveness of the service. An audit of the service was carried out in early 2006. This revealed severe exceptions in all aspects of the referral procedures for EPAC. These results have led to a total redesign of the EPAC process, in consultation with its referrers and support services.

The aim of this redesign is to facilitate referral mainly from the community rather than ED and to enforce the necessary criteria and tests for referral. This study aims to show the importance of an audit in gaining information about how effective processes are. It also demonstrates the need for regular review of processes to make sure that they still work in current conditions.

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Ultrasound demonstration of agenesis of the fetal septum pellucidum

Miss Ruth Duggan, Royal Brisbane and Women's Hospital, Qld, Ms Toni Halligan, Royal Brisbane and Women's Hospital, Qld, Dr Mark Davies, Royal Brisbane and Women's Hospital, Qld, Dr Mary-Louise Greer, Royal Children's Hospital, Qld, Dr Carol Portmann, Royal Brisbane and Women's Hospital, Qld

Septo-optic dysplasia is a rare congenital disorder including hypopituitarism and hypoplasia of the optic nerves. Prenatal diagnosis is difficult, requiring recognition of absence of the septum pellucidum.

We report a case recognised in the third trimester and discuss the prenatal features used of agenesis of the septum pellucidum.

An 18-year-old primigravida woman attended for a growth scan at 33 weeks of gestation. She had had an uncomplicated pregnancy, booking late at 24 weeks gestation and having an apparently normal scan at this stage. During biometric assessment, absence of the septum pellucidum was demonstrated. There were no other abnormal structural features visualised on ultrasound, particularly within the brain. An MRI demonstrated presence of the corpus callosum but absence of the optic tracts was suspected. After birth the neonate was found to be hypoglycaemic, which is associated with hypopituitarism. A second MRI confirmed the diagnosis of septo-optic dysplasia.

Traditional teaching suggests the septum pellucidum is identified in the axial plane as a rectangular structure interrupting the falx anteriorly. With agenesis, the walls of the lateral ventricles may fall into the midline giving a similar appearance so the diagnosis is frequently missed. In this case axial views demonstrated a large triangular shaped echolucent area in the midline rather than a well-defined rectangular structure. Coronal views demonstrated the characteristic heart shaped appearance of agenesis of the septum pellucidum. We suggest that formal assessment of the septum pellucidum is only complete if coronal views are included.

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An ultrasound technique for in-utero transplantation of human stem cells into pre-immune fetal sheep

Hsin M Low, Monash University, Vic, Prof Graham Jenkin, Monash University, Vic, Ms Tania Griffiths, Monash University, Vic

Objective

The main model to study differentiation capacity of stem cells is and has been severe combined immune deficient mice. The use of a larger more robust animal model would be advantageous. This project aims to investigate the engraftment potential of stem cells in the pre-immune sheep model.

Method

For each transplantation, the pregnant ewe is anesthetised and the uterus is exposed following a mini laparotomy. The fetal position is located and the intraperitoneum is visualised by ultrasound. CRL and fetal HR are documented. A procedure needle is introduced into the fetal peritoneum. Once the needle tip is inside the peritoneal cavity, the stem cells are injected into the cavity. Fetal viability and HR will be checked one week post-transplantation and one week pre-postmortem.

Protocol

In-utero transplantation to be performed at 30, 40 and 50 days. The human stem cells used in this experiment are cord blood-derived mesenchymal stem cells and haematopoietic stem cells and Wharton's jelly-derived mesenchymal stem cells. Volumes injected vary from 200 μmL to 1.5 mL. The fetuses are sacrificed approximately two months post-surgery. Maternal and fetal blood, brain, heart, lung, thymus, liver, spleen, kidney and long bones will be collected. The identification of human cells in the fetus is performed using a variety of Immunocytochemistry techniques.

Potential

This technique has potential clinical application for

treatment of severe genetic diseases in the fetus such as errors in metabolism and lymphohaematopoiesis. In addition, the pluripotentiality of these stem cells will also be investigated.

518

A new method for ultrasound evaluation of the distal biceps brachii tendon

Mr Stephen Bird, Benson Radiology, SA

Sonographic evaluation of the distal biceps brachii insertion is difficult using the conventional sagittal approach via the antecubital fossa due to the anatomical course of the tendon as it passes to the radial tuberosity. This course results in a tendon which has a steep and deep course in the proximal forearm with anisotropy artifact and refraction from overlying muscle edges causing image degradation.

I describe a new sonographic technique utilising the pronator teres muscle belly as an acoustic window, forearm supination and a steeply angled approach from the ulnar aspect. This technique allows excellent visualisation of the entire tendon, insertion site and bicipitoradial bursa. The pronator teres acoustic window avoids refraction artifact and allows perpendicular imaging of the tendon fibres free of anisotropy. Coincidently, a slight modification to the technique produces excellent images of the median nerve as it passes between the heads of the pronator teres, which is traditionally another technically challenging area.

519

A new method for ultrasound evaluation of the iliopsoas tendon insertion

Mr Stephen Bird, Benson Radiology, SA

Sonographic evaluation of the iliopsoas insertion is difficult using the traditional sagittal approach from the anterior aspect of the hip. The difficulties arise due to the depth of the tendon and the steep course to the lesser trochanter resulting in anisotropy. Refraction artifact from the overlying sartorius, rectus femoris and vastus medialis muscle edges, combined with the femoral neurovascular bundle further degrade the image.

I describe a new sonographic technique which overcomes these difficulties and produces images of excellent definition. Abduction and external rotation of the hip, combined with an approach angled steeply through the pectineus, adductor longus and adductor brevis muscle bellies provides an excellent acoustic window and imaging perpendicular to the tendon insertion free of anisotropy.

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The booby trap

Mrs Lorelei Mason, Maroondah Hospital, Vic, Mrs Kylie Griggs, Maroondah Hospital, Vic

The aim of the poster is to illustrate techniques to assist the sonographer with alternatives to improve demonstration of anatomy and pathology of the breast. Comparative scans or diagrams of different techniques are illustrated on the poster. Techniques include: Compounding, Colour, Fremitus, Compression, Ballottement, Body position changes, Transducer angle, Transducer orientation and Gain. A short discussion of optimisation tips is included in the results.

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Pelvic congestion syndrome (PCS)

Mrs Melissa Borg, Rayscan Imaging Liverpool, NSW

PCS is a persistent pain in the lower abdomen combined with varices in the pelvis minor. Prominent symptoms are a heavy feeling in the lower abdomen, deep dyspareunia and post coital ache.

The ovarian veins drain to the inferior vena cava and left renal vein in the mid abdomen. Valves have been described as either usually absent or present in up to 90% of cases, in the latter studies, valves were more likely to be absent in parous women.

Valves at the ovarian vein terminations weaken, as a result blood flows under gravity down into the pelvis, gross dilatation and incompetence of one or both ovarian veins can occur. As a result, pelvic varices develop, thigh and vulval varices may also develop.

Both transabdominal and transvaginal scans are performed to assess prominent varices and allows visualisation of the uterine plexus and broad ligament varices. Valsalva is performed and if there is a significant increase in diameter of the varices, this is documented.

Normal ovarian veins should measure 2 mm–3 mm. colour and pulse Doppler is used to assess the blood flow with the ovarian vein.

The diagnosis of PCS can be confirmed using venography and the patient may be treated effectively with embolotherapy.

Women with chronic pelvic pain require a thorough history and physical examination. Women with chronic pelvic pain, in whom ultrasound has given positive results, should undergo selective ovarian vein venography with the intent to treat varices if found.

Ultrasound for Surgeons (2nd Edition)

Editors Junji Machi and Edgar D. Staren
Publisher Lippincott Williams & Wilkins, Philadelphia, USA
ISBN 078174299
Cost $A222.05

This 506-page, hard cover text has 34 authors (31 surgeons, one gastroenterologist, one cardiologist and one radiologist). All are American and many are members of the National Ultrasound Faculty of the American College of Surgeons.

In recognition of the increasing use of diagnostic ultrasound by surgeons of many disciplines in the office, bedside, emergency room, operating theatre and endoscopy clinics, the first edition of this book was compiled to help facilitate ultrasound education and training for surgeons and surgical residents

The second edition has been produced to update the changes in technology and applications for ultrasound in surgical practice. It also addresses training, accreditation and continuing professional development – much of which is being handled by the American College of Surgeons.

It is an excellent book, written by surgeons, for surgeons. It is a high quality ultrasound text which takes the subject to another plane; its clinical applications. Its authors are 'thinking imagers' who relate the ultrasound findings to the clinical situation and how it may improve patient management. Ultrasound is often used early in the patient examination and assessment, it contributes to management, operative planning and guidance before, during and after surgery.

The book is easy to read, with good use of tables and boxes to highlight the main messages of each section. The ultrasound images are mostly excellent, and relevant to the text. The physics and basic principles are clear, relevant and appropriate. Instrumentation and scanning techniques are also addressed well. It covers all the areas we would expect and includes trauma, transrectal, interventional, intraoperative, endoscopic and laparoscopic ultrasound.

It gives advice on getting started and discusses the scope and role of the surgeon, working with the radiology department and other colleagues. For example, the vascular surgeons have high regard for the vascular technologists and the work of the vascular laboratory. They use the information gained in the laboratory to enable them, with the help of the vascular sonographer, to take ultrasound into the operating room for direct identification and subsequent repair of lesions and immediate assessment of the patency of vascular grafts and other surgical procedures.

The only chapter I felt was below the rest of the book's standard is the chapter on breast ultrasound. The quality of the images used is often substandard and I was concerned that one of the authors who, while appropriately advising radial scanning, following the clock-face, localising lesions by their position on the clock face and distance from nipple, advises keeping the nipple at the top left hand corner of the screen, thereby causing half the images to be upside down. This deviation from generally accepted international orientation of images is concerning. Another defect in an otherwise excellent publication is the fact that some references are not as current as one would expect.

The rapidly increasing use of ultrasound by surgeons of all disciplines makes a book such as this very relevant and although it is written for surgeons of the American College of Surgeons, it is very relevant for Australian and New Zealand surgeons. I would strongly recommend it to those surgeons who use or could use diagnostic ultrasound in their sphere of practice. It would be a useful aid to getting started, associated with participation in appropriate training and accreditation programs.

Dr Beverley Barraclough
Partner
North Shore Obstetric and Gynaecological Ultrasound

Ultrasonography in Urology: a Practical Approach to Clinical Problems

Editors Edward I. Bluth, Peter H. Arger, Carol B. Benson, Philip W. Ralls, Marilyn J. Seigal
Publisher Thieme Medical Publishers (May 2001)
ISBN: 1588900517
Approx cost $A160

This is a book that does not quite fulfil a definite role. It is neither a comprehensive text, nor an atlas of common conditions, rather it is a brief overview on certain subjects.

The book is not large (204 pages), covering 16 chapters. The images are of variable quality, ranging from good quality colour images to very poor grey scale images.

The text is also somewhat variable, with some chapters of higher quality (e.g. the chapters on appendicitis, elevated PSA and erectile dysfunction), yet others are light on (e.g. the haematuria guidelines).

I'm a little unclear as to who would be likely to benefit from the book. A junior trainee sonographer or sonologist is more likely to require a more thorough text, and more senior trainees will not gain very much from the brief text. Most of the subjects covered are well covered in more comprehensive texts.

This wouldn't be my first choice for a urological ultrasonography text.

Dr Rick Dowling
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Ultrasound of the Urogenital System

Authors Grant M. Baxter, Paul S. Sidhu
Publisher Thieme Medical Publishers
ISBN 3131374411
Approx cost $A220.00

According to the authors, this book sets out to be a comprehensive guide to the applications of ultrasound in everyday investigation of the renal tract, aiming to appeal to radiologists, sonographers, physicians and trainees.

It is a very good book. The first thing you notice is that the 450 images are of very good quality, and well labelled. The text is easy to read, as well as succinct. This has enabled the authors to cover a wide range of topics in just 276 pages.

The book is divided into five sections. The first covers medical renal conditions, the second covers surgical conditions, followed by a paediatric section, a section on other modalities and finally a summary of new developments.

The book reads as though experienced operators have written it. Handy hints and pitfalls are dotted throughout and each chapter has summary points included, briefly outlining the most

salient.

Particularly well done are the chapters on prostate, interventions and transplant kidneys, though all chapters are worthwhile. All major topics are covered.

This is the sort of book that is brief enough for trainees to use as a reasonably comprehensive overview of the subject, particularly on the lead up to exams. It would also appeal to those physicians wishing to undertake their own imaging.

Dr Rick Dowling
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Essentials of Sonography and Patient Care (2nd Edition)

Author Marveen Craig
Publisher Saunders Elsevier
ISBN 1416001700
Cost $A69.00

This book provides the basic information required to succeed in the classroom and the clinic.

Introduction to Ultrasonography and Patient Care was first published 10 years ago. This second edition was prepared as a response to the changes in ultrasound technology, the delivery of health care, the practice of diagnostic ultrasound and changes in sonography education.

It does not deal with instrumentation, anatomy, or pathology, rather it examines those other essential aspects of clinical work that make a sonographer a capable practitioner.

The book is a compact, soft covered volume of 294 pages. It contains 11 chapters. Each chapter begins with a list of general objectives and key terms, designed to assist the reader to understand the material. The chapters close with a summary and bibliography.

Covered are such topics as study techniques, patient care clinical assessments and sonographic techniques, communication and critical thinking, safety issues, ethics, medico-legal aspects, professional development and leadership.

It also contains five appendices that include pertinent clinical laboratory tests, medical terminology and common medical abbreviations.

It opens with a chapter detailing the evolution of medical sonography. We are taken through a brief history of the origins of the science of acoustics, starting with Pythagoras' observations on the relationship between sound and frequency, first studied in 500 B.C., through the first experiments with frequencies above the limits of human hearing, conducted in 1793, to the work of Austrian Karl Dussik, who, in 1942, was one of the first physicians to use reflected sound waves (a-mode) to visualise tumours of the brain.

The description of breakthroughs in b-mode, real-time, Doppler, 3D and 4D, contrast agents and harmonic imaging show not only how this imaging modality evolved, but suggest that the future of ultrasound is secure in medicine as its diagnostic and therapeutic potential continues to be explored.

This approach set the tone for the book, as the author has used the device of revisiting absolute fundamentals to enhance our understanding of the topics being discussed.

For all of the information covered, the chapters are concise, containing thorough explanations, and essential points of relevance.

Whether the reader is a student, a practicing sonographer, or the supervisor of an ultrasound unit, the book contains an abundance of practical material to help with the delivery of a quality service.

It should be of great assistance to students as they embark on their training, with a revision of learning techniques. To help ease students into the working profession, there is advice on career opportunities, CV preparation, interview techniques, even points to consider when engaging in salary negotiation.

For practicing sonographers, there are guidelines for cultivating technical and communication and patient care skills, as well as an examination of ethics and professional development and leadership

For supervisors and department heads, there are factors to consider when selecting candidates for ultrasound training and with running a workplace, strategies for creating a safe scanning environment (with an emphasis on ergonomics), for coordinating staff, mediating problems, and generally serving as a conduit for administrators, medical personnel, MITs, ancillary health staff and patients.

It could be a useful resource for defining, drafting and implementing mission statements, and protocol and procedure manuals.

The motivated, intelligent individual may well accumulate this valuable information through reading, research, and discussion, but the process will be hastened by studying this book.

It struck me as being the equivalent of a global positioning system – it will help guide you, with some precision, on your path to a safe, successful, rewarding career in medical sonography.

Judy Lees
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The CardioVascular Centre – exporting vascular expertise to China

Warren Lewis instructs during the Shanghai visit

The CardioVascular Centre in Newcastle has specialised in vascular ultrasound for over 20 years. For the last 10 years, one of the CardioVascular Centre's supervising specialists, Dr Alan Bray, has been developing a training relationship with Chinese vascular surgeons on the techniques of angioplasty, stenting and endoluminal grafts.

For the last five years, surgeons and doctors in ultrasound, from all over China, have been visiting Newcastle. During their visits, they learn surgical techniques and how ultrasound is used to evaluate the success of such procedures. Medical practice in China differs to our system and ultrasound is seen and practiced as a field of medicine in its own right. In China, doctors perform all ultrasound examinations and there are no sonographers.

One of the specialists, Dr Chaoyang Wen, is a doctor in ultrasound at the Peoples Liberation Army General Hospital in Beijing. Through working closely with him for several months, I was invited to Beijing to speak at the inaugural conference for the Chinese Society of Ultrasound in Vessels and Superficial Organs (CSUVSO), 22nd–24th September 2006. This new Chinese medical society aims to encourage research and to promote better application of ultrasound in the

Warren Lewis on China's booming appetite for ultrasound education

diagnosis and treatment of vascular disease.

I gave two presentations, one was on renal artery scanning and the other on abdominal aortic aneurysm (AAA), AAA endoluminal grafts and mesenteric artery scanning.

The following day Dr Wen conducted a two-hour workshop on renal artery scanning and lower leg arterial scanning to an enthusiastic audience of over 300 people. This inaugural conference was very important for this new vascular ultrasound society. It was a great honour to be invited to present to the 450 ultrasound doctors from all over China and to receive very positive feedback on how much they had learned from the presentations. I found the attendees were eager to ask a lot of questions and learn even more.

I managed a few days of sightseeing in Xian and Beijing, the highlights were walking along the Great Wall, viewing the Terracotta Warriors, experiencing the cuisine and cultures of the Chinese people and watching the thousands of Chinese performing their morning rituals of exercise and socialising in the park on the grounds of the Temple of Heaven in Beijing. This was truly fascinating as there were thousands of people in groups performing Tai Chi, or dancing, or playing hacky-sac, singing, playing music, knitting, playing cards and more.

On my return from China, I received an invitation from Dr Bao Junmin, a vascular surgeon who had visited the CardioVascular Centre in Newcastle, to speak at Endovascology 2006, an international vascular surgeons' conference in Shanghai, China on 10th–13th November 2006. On this occasion, I gave a presentation on the use of colour flow duplex ultrasound to assess AAA endoluminal grafts, which is a popular technique used for treating AAA. I also spoke on the ultrasound assessment of carotid artery stents.

Shanghai is the largest city in China with a population just under that of Australia. It is a blend of the very old and the ultra modern. Apparently, nearly 60% of the world's building cranes are used in Shanghai for skyscraper construction.

The people of China, during my stay, were very kind and helpful. Their country is developing at a rapid pace and the people have a hunger for knowledge and expertise. It is personally very satisfying to know that I am helping to educate a rapidly developing country in the area of vascular ultrasound.

I wish to acknowledge everyone at the CardioVascular Centre for their continuing efforts to create an organisation that strives for excellence in vascular ultrasound diagnosis. It is a credit to Dr Alan Bray, whose vision in establishing the CardioVascular Centre and his pioneering educational work with the Chinese, that has made it all possible. My thanks also go to Toshiba and the Hunter Imaging Group for their financial assistance, without which the Shanghai visit would not have been possible.

Moving? New job?
Don't forget to tell ASUM:
email asum@asum.com.au

ASUM – Vietnam Link four-day seminar

Clockwise: Tu Du Hospital's busy maternity unit; Dr Jon Hyett and Dr Andrew McLennan presenting 11–14 week NT screening program; Lunch with Vietnamese friends

In March of this year, Dr Nguyen Ha, Director of Imaging at Tu Du Hospital, which is the main maternity hospital in Ho Chi Minh City, visited Sydney as the first recipient of the ASUM-Vietnam Scholarship.

The scholarship had been established the previous year and is supported by Penrith Ultrasound for Women and the Department of Perinatal Ultrasound at The Nepean Hospital. Their hospital delivers approximately 43,000 babies each year. More than 300,000 scans are performed.

Down sydrome screening program

During her visit, Dr Nguyen met with Dr Andrew McLennan and at that time she asked about the possibility of the London Foetal Medicine Foundation Down syndrome screening program being available for her hospital. There were a number of constraints, not the least financial considerations, and the question about who would carry out the six-monthly audits etc.

After discussions with Dr Jon Hyett and with support from London, a program was arranged for doctors Andrew McLennan, Jon Hyett and Robert Ogle from Australia, along with Prof George Yoe and Dr Ann Tan from Singapore, to present the lecture series.

With myself as coordinator, we would also supervise practical

Harley Roberts writes on strengthening regional ties through education

scanning for eight selected doctors from Tu Du Hospital, who would then be certified with London to access the software. These doctors would also supervise the subsequent training of other doctors from Vietnam who had attended the lecture course so that they in turn could register to obtain the software from London for their individual hospitals.

Our travel was self-funded, but there was financial assistance from donations to the RANZCOG, GE Ultrasound (South East Asia) and Tu Du Hospital for delegates who registered for the course, which commenced on 19th November 2006.

Busy four-day seminar

Our accommodation at the New World Hotel was close to the Hospital and we were taken by hospital transport each day for the lectures and practical scanning. The program extended over four days, finishing on the Thursday with a free day at the end of the week. Lunch was provided each day at the Hospital and in the evening we were taken by the senior doctors from the hospital to a variety of excellent restaurants, where we enjoyed the best of Vietnamese cooking.

On the Friday, we were all taken on a tour of the Mekong Delta – an interesting region of South Vietnam. We were able to experience village life and learn of their culture before returning for a farewell luncheon, again at an excellent Vietnamese restaurant.

A particularly rewarding feature of the seminar was the attendance and enthusiasm of the participants, who were all keen to learn and asked interesting questions relevant to the subject of 11–13-week six-day Down syndrome screening.

The audio-visual arrangements in the lecture theatre were excellent, with slides duplicated, one side with English titles and the other in Vietnamese; quite a number of the delegates had little English. Practical training was with the available hospital ultrasound machines, which were variable as to their suitability for nuchal measurement but GE Ultrasound had installed a Voluson Expert, which was excellent for both the NT screening and the CVS teaching.

Overall, the seminar was very successful and Tu Du Hospital is now the first in Vietnam to be able to perform 11–13 week six-day week screening. During this visit, several doctors from the Hospital were given practical instruction in performing CVS by Dr Jon Hyett, and Dr Robert Ogle was able to offer valuable

Arrival in Saigon

assistance and advice to the Cytogenetics Department.

The program was quite intense and each day was committed to morning lectures with practical scanning in the afternoons.

All the lecturers worked hard to present their papers at the seminar and also be involved in the practical scanning for NT measurement. At the end of each day, we all looked forward to relaxing around the hotel's pool to discuss the day's events.

I think it would be fair to say that the success of the seminar exceeded the expectations of our visiting lecturers and Tu Du Hospital is delighted that it was able to host the seminar and complete all the teaching and practical training necessary to obtain registration for the 11–13 week six-day Down syndrome screening.

Dr Harley Roberts
Coordinator

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.

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; and
- Protection of the title 'sonographer'.

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

Mary from Tasmania visits Denmark

Left: Nyhavn, Copenhagen; **Right:** Frederiksberg Hospital

Mary Langdale reports on her two-week CADUCEUS Scholarship in Copenhagen

In November 2006, the CADUCEUS scholarship supported me with the opportunity to spend two weeks in Copenhagen, Denmark. With my interests in musculoskeletal ultrasound and education, the members of DSDU kindly arranged for me to visit four major hospitals and a private practice, in different areas of the country.

Copenhagen was at the end of daylight savings and the beginnings of winter, hence the daylight hours were short and the weather rather chilly, even experiencing snow on the second day. Needless to say, the little sight seeing I managed was spectacular. Copenhagen is a picturesque medieval city and the Danish designs in jewellery, furniture and architecture for which the country is famous, helped make it even more interesting.

My visit began at the Frederiksberg Hospital, the home of Dr Christian Nolsøe – DSDU President and honorary member of ASUM. Christian provided me with an extensive tour of his department and an insight into ultrasound in Denmark. I spent the majority of my time at the Parker Institute, which is a partly privately funded research institute of the hospital, focusing on research in common diseases of the locomotor system. This is headed by rheumatologists, Prof Bente Danneskiold-Samsoe and Prof Henning Bliddal. The department consists of about 30 staff and is also the support for a variety of Phd students. Dr Soren Torp-Pedersen, radiologist, and Dr Morten Boesen, orthopaedic trainee, dressed me up in a white coat and made me feel very welcome in the ultrasound department. Their work includes investigating soft tissue hyperaemia, following patients in biological treatment for rheumatoid arthritis, and image fusion with MRI. The department is flush with high grade quality equipment, used for the diagnosis of various complaints of rheumatologic patients and the ongoing research.

Dr Boesen is currently doing his PhD in Achilles tendinopathy, part of which involves treatment of patients with ultrasound guided coagulation. He is the next Danish recipient of CADUCEUS so will be joining me in January 2007 at Victoria House during his Australian visit.

He has a special interest in sports medicine and, as the team doctor for FC Copenhagen, invited me to a very important soccer match between the top two teams of the country at Parken, Denmark's national stadium and the home of his team, the country's premier team.

We were joined by last years CADUCEUS recipient, Christoffer Brushoff, who spent January 2006 with me at Victoria House, which made a nice opportunity for us to catch up. Soccer, along with badminton are the major sports in the country. The boys were happy with the result as the best team won three-nil.

Copenhagen lends itself to cycling, and bicycles are a main form of transport for the locals. The department loaned me a bike which I made good use of when it wasn't raining.

Prof Danneskiold-Samsoe very kindly invited me to her house for family lunch on the weekend. I took this opportunity to ride along the harbour promenade, enjoying some of the major tourist attractions including Nyhavn, Amalienborg Palace and the statue of The Little Mermaid, whose sculptor was inspired by a Hans Christian Andersen story.

On Sunday, Christian Nolsøe invited me to an art exhibition at Galleri Astel in Copenhagen, where the work of Dr Steen Karstrup, radiologist at Roskilde, was on show. His work is very inspiring and obviously a relaxing adjunct to his busy work life.

I spent a day with Dr Karstrup at Roskilde Sygehus, where he is one of only two radiologists and a registrar. The hospital is the major one in Roskilde, a small town 30 km from Copenhagen. The corridor walls are adorned by inspiring posters he has painted, which are very popular with his many oncology patients.

The morning started early, before the working day began, as Steen had invited me to speak to about 30 of his staff on the education of sonographers in Australia.

In Denmark, the majority of ultrasound scans are performed by

Left to right: Lars Blovig, Niels Bang and nurse Jaenette at Aarhus Sygehus; Christoffer Brushoff and Morten Boesen at the soccer

radiologists and registrars. The few others who do scan are self-taught, being a mix of radiographers performing general scans, nurses, the gynaecology scans and midwives, the obstetric scans.

Denmark does not have a structured ultrasound course for sonographers. It was a delight for me to be able to express my keen interest and passion for ultrasound, highlight the importance of sonographers in the workplace and existence of accreditation and also to discuss the types of training courses that have been developed in Australia.

At lunchtime I delivered another talk, this one to the radiologists of the department on dynamic shoulder ultrasound.

Dr Karstrup has very busy days, including visiting intensive care with a portable machine and performing a huge variety of cases in the department. His main expertise is directed at the use of contrast with ultrasound for guidance of tissue ablation of liver lesions and for the assessment of post traumatic hepatic and splenic lesions.

A three-hour train trip landed me in Aarhus, over on the west of the country. At the Aarhus Sygehus, I was welcomed by radiologist Lars Bolvig, co-president DSDU and his colleague Niels Bang. One of Lars' interest lies in real-time tissue elastography, and he showed me some interesting research he has recently been doing. He is involved in much musculoskeletal work, both in public and private and has developed a website for patient information regarding treatment of injuries. This is particularly useful for the patient's management following ultrasound guided treatment.

Back in Copenhagen at Rigshospitalet, the University Hospital which is the city's tertiary referring centre, I was welcomed by Dr Michael Bachmann Nielsen, radiologist and education committee chairman of DSDU.

After an extensive tour of the very large radiology department, I had the opportunity to spend time with three of his PhD students. Dr Bachmann Nielsen also runs ultrasound training courses for the radiologists.

Lunch was followed by an afternoon session at his private sports clinic, where he has a full list of patients for musculoskeletal scanning. This was followed by an early evening session held jointly with Per Holmich, an orthopaedic surgeon. The patients are assessed by Dr Holmich and then diagnosed and treated under ultrasound control by Dr Bachmann Nielsen, all in the one appointment.

I spent my last day having brunch with Christoffer Brushoff's family at his house. This was followed with a walk around the Free State of Christiania and along the famous canals of Christianshavn.

I wish to thank ASUM and DSDU for this great opportunity, and a special thankyou to those in Denmark who helped make my visit a wonderful experience.

Visiting the ultrasound practices in Denmark gave me an insight into the extensive research being carried out and into some of the latest techniques developed in ultrasound.

Hopefully, my visit may inspire DSDU to support the incorporation of sonographers into the ultrasound workplace and to set up formal education for sonography accreditation in the future.

CADUCEUS: Collaborative Australasian Danish Undertaking for Continued Excellence in Ultrasound

Expressions for interest in the CADUCEUS Scholarship should to be directed to the ASUM CEO, Dr Caroline Hong, by email to carolinehong@asum.com.au

The CADUCEUS scholarship and exchange program has been possible as a result of a Memorandum of Agreement which was signed on 8th April 2005.

The signatories were Dr David Rogers and Dr Caroline Hong on behalf of the Australasian Society For Ultrasound In Medicine (ASUM) and Dr Christian Nolsøe and Dr Michael Bachmann Nielsen on behalf of the Danish Society For Diagnostic Ultrasound (DSDU).

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.

DDU reports 2006

2006 Examination Report

2006 saw a number of changes in both the ASUM DMU Board of Examiners and in the DMU Examinations.

In 2006, I handed over the chairmanship of the ASUM DMU Board of Examiners to Stephen Bird. I am sure that the DMU is in very capable hands and that Stephen will treat his DMU duties with the same diligence with which he addresses all his other duties with ASUM.

2006 also saw the first complete Oral Examinations that were held throughout Australia and New Zealand. Candidates seemed to cope well with the new format and pass rates were good. The DMU Part I Written Examinations were available in both July and November and the ASUM DMU Board of Examiners plans to provide increasing flexibility with the timing of examinations in the future.

As has been the trend in recent years, there were a large number of Cardiac candidates with General candidate numbers declining due to the availability of a large number of university-based qualifications. The overall numbers, however, remain steady.

I would like to thank all the volunteers who assisted with the examinations during the past few years. Without their help, the DMU could not exist.

I encourage anyone who is able to help in some way with the examinations to do so; it is a lot of hard work but is very satisfying when you see people develop as they complete their qualifications.

I wish also to acknowledge Dr Denise Ladwig, who resigned from the ASUM DMU Board of Examiners last year, for her outstanding contribution and professional commitment to DMU.

Ros Savage

Board of Examiners' Report

2006 has been a very successful year for the ASUM DMU under the expert guidance of Roslyn Savage as the Chairperson of the ASUM DMU Board of Examiners.

In the middle of the year, Roslyn stepped down from the position and I would like to congratulate her on the enormous contribution she made to the DMU process during her time as Chairperson. It has been a time where the DMU has been modified significantly to become more flexible in its delivery, of greater rigor and consistency.

The development of the DMU process under Roslyn's guidance culminated in the DMU obtaining full five-year accreditation by ASAR, which is a magnificent achievement and a vote of confidence in the DMU process. It is an honour for me to take over from Ros as Chairperson and guide the DMU through the next few years.

Members of the ASUM DMU Board of Examiners are among the hardest working and most professionally committed members of ASUM. They sacrifice a great many hours working in an honorary capacity to ensure the next generation of student sonographers has access to the DMU pathway to fulfill their aspirations of becoming accredited medical sonographers. The greatest pleasure, for me, in joining the ASUM DMU Board of Examiners is working with such inspirational individuals.

2006 saw a total of 69 new candidates entering the DMU process by attempting their Part 1 examinations. From this group of 69 new student sonographers 57 (83%) were successful and will now go on to hone their clinical skills and gather theoretical knowledge in preparation for their Part 2 examinations.

A total of 60 individuals presented for various components of the Part 2 exams, 48% Cardiac, 37% General, 8% Vascular and 7% Obstetric. From these candidates, 48 Diplomas in Medical Ultrasonography were recommended by the ASUM DMU Board of Examiners to ASUM Council. It is very satisfying to see 48 well deserving individuals join the ranks of Australasian Accredited Medical Sonographers as proud holders of the ASUM DMU.

2007 will be another busy year for the ASUM DMU Board of Examiners with the DMU process continuing its evolution to meet the needs of credentialling modern sonography clinical practice.

Stephen Bird
Chairperson ASUM DMU Board of Examiners

The ASUM DMU Board of Examiners for 2006–2007

Chairman
Stephen Bird

President
Matthew Andrews

Honorary Secretary
Roslyn Savage

Committee Secretary
Naomi Rasmussen

Committee Members
Margaret Condon
Mike Dadd
Roger Gent
Alison Lee-Tannock
Martin Necas
Rob Philips
Christopher Sykes
Alison White
Robert Zeigenbein

Two of the below members will be appointed by the ASUM DMU Board of Examiners:
Jill Fawcett
Cathy Davis
Adam Lo

Moving? New job? New workplace? Don't forget to tell ASUM: tel +61 2 9438 2078 email asum@asum.com.au

DMU 2006 statistics

Part 1 results statistics 2006

MCQ	Component	Tatal	Pass	Fail	Pass percentage
APP	General	36	28	8	77%
APP	Cardiac	16	15	1	93.75%
APP	Obstetric	7	5	2	71%
APP	Vascular	9	9	0	100%
PHY	Common	69	59	10	85.55%

Cardiac

Component	Total	Pass	Fail	Pass percentage
MCQ	29	29	0	100%
Short ans	29	27	2	93%
Essay ans	29	26	3	89.6%
Practical	23	19	4	82.60%
Oral	22	18	4	82%

Vascular

Component	Total	Pass	Fail	Pass percentage
MCQ	4	4	0	100%
Short ans	4	3	1	75%
Practical	5	5	0	100%
Oral	5	4	1	80%

Part 2 results statistics 2006

General

Component	Total	Pass	Fail	Pass percentage
MCQ	20	17	3	85%
Short ans	20	19	1	95%
Essay ans	20	19	1	95%
Practical	28	22	6	78.57%
Oral	24	18	6	75%

Obstetric

Component	Total	Pass	Fail	Pass percentage
MCQ	4	4	0	100%
Short ans	4	2	2	50%
Essay ans	4	3	1	75%
Practical	4	4	0	100%
Oral	4	2	2	50%

Forty-eight candidates were awarded the DMU in 2006.

DMU passes 2006

Kam Aldridge Qld DMU (Cardiac)
Nadia Barkla SA DMU (Cardiac)
Colin Burke New Zealand DMU (Cardiac)
Karen Cole WA DMU (Cardiac)
Irena Cukovski Qld DMU (Cardiac)
Thomas Curnow Vic DMU (Cardiac)
Haritha Gadde Qld DMU (Cardiac)
Jason Gibson Qld DMU (Cardiac)
Rebecca Haupt SA DMU (Cardiac)
Rachael Hellyer NSW DMU (Cardiac)
Christopher Hunter Vic DMU (Cardiac)
Belinda Lee Qld DMU (Cardiac)
Katrina O'Neil WA DMU (Cardiac)
David Scicluna Vic DMU (Cardiac)
Rachael Stevenson New Zealand DMU (Cardiac)
Paul Stoodley NSW DMU (Cardiac)
Helen Strickland NSW DMU (Cardiac)
Katrina Timmins Vic DMU (Cardiac)
Kimara Wallace Vic DMU (Cardiac)
Andrew Yeadon New Zealand DMU (Cardiac)
Rebecca Bary New Zealand DMU (General)
Katie Becker NSW DMU (General)
Jane Bucholz New Zealand DMU (General)
Sandra Carter NSW DMU (General)
Susan Donald New Zealand DMU (General)
Carolyn Fredericks WA DMU (General)
Omaya Hammad NSW DMU (General)
Rochelle Luke New Zealand DMU (General)
Emma Mcalpine New Zealand DMU (General)
Jennifer Mcclymont NSW DMU (General)
Graham McraeNew Zealand DMU (General)
Shareni Moodley New Zealand DMU (General)
Sarah Morgan New Zealand DMU (General)
Direshni Naidu WADMU (General)
Gabrielle O'Grady New Zealand DMU (General)
Gemma Penn New Zealand DMU (General)
Louisa Platt New Zealand DMU (General)
Shameen Ramlall New Zealand DMU (General)
Sarah Shortus NSW DMU (General)
Antoinett Van Rensburg WA DMU (General)
Sophy Worth New Zealand DMU (General)
Jeanette Hiew Vic DMU (Obstetric)
Kimberly Mcconchie Vic DMU (Obstetric)
Patricia Simpson New Zealand DMU (Obstetric)
Karin Fitzgerald NSW DMU (Vascular)
Nilesh Kumar NSW DMU (Vascular)
Jonathan Meredith New Zealand DMU (Vascular)
Newman Yukari WA DMU (Cardiac)

New ASUM address and contact details:
Australasian Society for Ultrasound in Medicine
511 Pacific Highway St Leonards
NSW 2065, Sydney Australia
Mailing address:
PO Box 943, Crows Nest NSW 1585, Australia
Ph: +61 2 9438 2078
Fax: +61 2 9438 3686

ASUM CCPU Report

Speciality	Registered	Completed Physics	Completed a Basic Module	Completed an Advanced Module
CCPU (Emergency)	23	13	7	4
CCPU (O&G)	22	18	14	1
CCPU (Surgical)	5	3	-	-

The CCPU program is currently open to Fellows or Registrars in the second or subsequent year of their training of the Australasian College for Emergency Medicine (ACEM), the Royal Australasian College of Surgeons (RACS) and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG). The CCPU is overseen by the ASUM CCPU Certification Board, with representatives appointed by ASUM, ACEM, RACS and RANZCOG.

2006 has been a year of expansion and development for the Certificate in Clinician Performed Ultrasound (CCPU) with Basic CCPU Module courses and Advanced Module courses for the CCPU (Emergency) and the CCPU (O&G) conducted in Sydney and Melbourne.

The CCPU is awarded by the ASUM Council in the disciplines of Emergency Medicine, O&G, Rheumatology, Sports and Exercise Medicine and Surgical Practice. Discussions are in progress with the Colleges of Rheumatology, Phlebology, Neonatology and the Australian and New Zealand Society of Nephrology (ANZSN) to prepare appropriate ultrasound training curricula for their individual members. It is intended that we will be offering the CCPU in these areas from 2007.

Registered in CCPU

Discussions are also currently being held with the Australian Defence Forces (ADF) with the view to formulating an appropriate curriculum for a certificate for ADF Medical Officers. This new certificate will be called the Certificate in Clinical Military Ultrasound (CCMU). It is intended that Medical Officers, upon completion of their military service, may progress to the CCPU by completion of an Advanced Module in Emergency, O&G or Surgical Practice and by fulfilling the appropriate Advanced Module Logbook Requirements.

2007 CCPU Course Dates:

Date	Course
Sat 28th Apr	Basic Module
Sun 29th Apr	Basic Module
Sat 12th May	Advanced Modules
Sun 13th May	Advanced Modules
Sat 7th Jul	Basic Module
Sun 8th Jul	Basic Module
Sat 14th Jul	Advanced Modules
Sun 15th Jul	Advanced Modules
Sat 10th Nov	Basic Module
Sun 11th Nov	Basic Module
Sat 17th Nov	Advanced Modules
Sun 18th Nov	Advanced Modules

South Australia Branch Annual General Meeting

Ian Murphy and Dr Margaret Furness

The ASUM South Australian Branch held its Annual General Meeting and dinner at the Archer Hotel on Wednesday 29th November. The dinner was well attended by local ASUM members and the evening was a great success.

The SA Branch would like to thank Rosie Franklin, Leah Kallos and Kaye Burgess for their contributions to the state branch over the last few years.

The ASUM South Australian Branch Special Recognition Award is presented annually to an individual who has made an outstanding contribution to medical ultrasound in South Australia. Previous recipients include Dr Brian Pridmore, Pru Pratten, Roger Gent, Dr Garry Lequesne and Dr Barry Chatterton.

This year, two worthy recipients were chosen by the State Branch to receive the award. Dr Margaret Furness was honoured for her outstanding and unprecedented contribution to obstetric ultrasound in South Australia.

Ian Murphy was honoured for his 30 plus years of trade involvement in South Australia. South Australia is privileged to have outstanding individuals such as Margaret and Ian who, through their work, have fostered the growth of medical ultrasound and the high standards of practice we enjoy today. The South Australian Branch Committee would like to extend its congratulations to Margaret and Ian for their awards.

The new State Branch Committee elected at the AGM comprises:

Chairperson
Dr Denise Roach

Treasurer
Julie-Anne Winchester

Secretary
Cheryl Buckingham

Committee Members
Stephen Bird
Dr Jane Copley
Anne Delon
Dr Megan Gun
Dr Peter Muller
Julie Olsen
Amanda Walsh

Interstate members

Moving? New job?

New workplace?

Don't forget to tell

ASUM:

tel +61 2 9438 2078

email

asum@asum.com.au

ASUM Corporate Members 2007

Australian Medical Couches (Couch Manufacturer)
Marcus Egli (03) 9376 0060
claudia@australianmedicalcouches.com

Bambach Saddle Seat Pty Ltd
Sue Johnston (02) 9939 8325
sjohnston@bambach.com.au

Bristol-Myers Squibb Medical Imaging
(Ultrasound Contrast & Nuclear Imaging Agents)
Wayne Melville (02) 9701 9108
mobile 0409 985 011
wayne.melville@bms.com

Central Data Networks P/L
(CDN. Affordable PACS & Medical Imaging Networks)
Robert Zanier 1300 722 632
mobile 0407 069 307
info@cdn.com.au

Focus Medical Technologies
Laurence Heron (02) 9209 4530
info@focusmedical.com.au

GE Healthcare
Stephanie Mason
(02) 9846 4000
stephanie.mason@ge.com
General Manager: Kevin Potter

Healthsite Recruitment Australia
(Allied Health Recruitment Agency)
Ian Stewart (07) 5445 4604
ian.stewart@healthsiterecruitment.com

CR Kennedy – Hitachi Ultrasound
(Medical Distributor)
Graham Hines (03) 9823 1515
gshines@crkennedy

Meditron Pty Ltd
(Acoustic Imaging, Dornier, Kontron)
Michael Fehrmann
(03) 9879 6200
michaelf@dornier.meditron.com.au

Peninsular Vascular Diagnostics
(Vascular Ultrasound Educ)
Claire Johnston (03) 9781 5001
pvdvic@austarmetro.com.au

Philips Medical Systems Australasia P/L
(incorporating formerly ATL, HP, Agilent)
Kathryn Davis (02) 9947 0158
kathryn.davis@philips.com
General Manager: Wayne Spittle

Queensland X-Ray
(Radiology)
James Abbott (07) 3343 9466
James.abbott@qldxray.com.au

Siemens Ltd – Medical Solutions
(Acuson)
Nick Kapsimallis
(02) 9491 5863
nick.kapsimallis@siemens.com
Marketing General Manager: Cameron Marcuccio

Sonosite Australasia Pty Ltd
(Portable Ultrasound)
Matthew Tucker 1300 663 516
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 its corporate members and invites suppliers of medical equipment, services and consumables to join the Society. Call Dr Caroline Hong on tel +61 2 9438 2078 for further information

ASUM 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 (79)
Bjarke Aaso Vic
Anthea Allen Qld
Deborah Allix Vic
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

November 2006
Full (3)
Buraya Phattanachindakun NSW
Nasser Shehata NZ
Clifford Tan NSW

Associate (6)
Timothy Baker Vic
Jennifer Knight NZ
Anil Nair NZ
Alex Paspaliaris Vic
Katherine Reid Qld
David Richmond NSW

Trainee (2)
John Bridgman SA
Michael Dinh NSW

Corresponding (12)
Marian Ab.Malik Malaysia
Nur Marni Ahmad Malaysia
Seow Yen Chan Malaysia
Siew Keay Foo Malaysia
Kanimozhi Kumaravelu Malaysia
Xiao Hui Lai Malaysia
Pei Yee Lee Malaysia
Chai Kim Leong Malaysia
Hui Ting Low Malaysia
Bee Khee Ngeoh Malaysia
Siang Joo Yeo Malaysia
Chooi Fong Yong Malaysia

December 2006
Full (2)
Russell Piercy NSW
Rebecca Tod NZ

Associate (2)
Troy Keith Vic
Van Nguyen NSW

Trainee (1)
Melinda Van Oosterum SA

Moving? New job?
New workplace?
Don't forget to tell ASUM:
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2007

Saturday 24th March – Friday 30th March 2007
Giulia Franco Teaching Fellowship 2007
ASUM WA Branch
Presented by Mr Stephen Bird

Saturday 24th March – Perth
Contact: Marilyn Zelesco / Elvie Haluszkiewicz
Ph: (08) 9224 2121
www.asum.com.au/open/tmp/GF_24Mar07.pdf

Monday 26th March – Bunbury
Contact: Kevin Jones
Ph: (08) 9726 6999
www.asum.com.au/open/tmp/GF_26Mar07Bunbury.pdf

Tuesday 27th March – Albany
Contact: Les Rickman
Ph: (08) 9892 2232
www.asum.com.au/open/tmp/GF_27Mar07Albany.pdf

Thursday 29th March – Friday 30th March - Kalgoorlie
Contact: Michelle Pedretti/Margaret Christie
Ph: (08) 9080 5644
www.asum.com.au/open/tmp/GF_29March07Kalgoorlie.pdf

9–11th May 2007
3rd World Congress on Ultrasound in Emergency and Critical Care Medicine
Cité des Sciences et de l'Industrie
30 Avenue Corentin-Cariou
F-75930 Paris cedex 19
www.cite-sciences.fr
Contact: Administrative Secretariat,
3rd World Congress on Ultrasound in Emergency and Critical Care Medicine
MCO Congrès
27 rue du Four à Chaux
F-13007 Marseille, France
Ph: +33 4 9509 3800
Fx: +33 4 9509 3801
Email: secretary@wcu2007.org
www.wcu2007.org

Thursday 19th July 2007
4 days – ASUM NZ and RANZCR NZ Third Combined Scientific Meeting 2007
Venue Wellington Convention Centre
Wellington New Zealand
http://www.mianz.co.nz/events/task,view_detail/agid,29/year,2007/month,07/day,19/Itemid,51

Friday 27th July 2007
2 days 2nd ABDA Educational Programme
(1st Annual Indonesian Society of Oncologic Imaging (ISOI) & 12th Annual ISUM Meeting)
Venue: Balihai Resort & SPA, Kuta, Bali
Contact: Secretariat ISUM/ISOI, Jl. Raya Radio Dalam IB, Kebayoran Baru, Jakarta Selatan 12140, Indonesia
Ph: +62 21 723 0060, 725 8135
Fx +62 21 723 0061
Email: isum@centrin.net.id / intium@cbn.net.id

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 9438 2078 Fx +61 29438 3686
Email: dmu@asum.com.au

Thursday 13th September 2007
4 days ASUM 2007 37th Annual Scientific Meeting
Contact: ASUM Level 1, 511 Pacific Highway
St Leonards NSW 2065 Australia
Ph: +61 2 9438 2078 Fx +61 2 9438 3686
www.asum.com.au

7–11th October 2007
17th World Congress on Ultrasound in Obstetrics & Gynaecology.
Venue Palazzo dei Congress/Palazzo degli Affari
Florence, Italy
Contact:www.isuog2007.com or congress@isuog2007.com
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 rate deadline

2008
September 2008
ASUM Annual Scientific Meeting, New Zealand

2009
Sunday 30th August – 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
Email: carolinehong@asum.com.au or asum@asum.com.au
ASUM Head Office: PO Box 943, Crows Nest, NSW 1585, Sydney Australia

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.

- Font size: maximum 12 pt, minimum 10 pt
- Double spacing for all pages
- Each manuscript should have the following:

Title page, abstract, text, references, tables, legends for illustrations.

- Title page should include the:

Title of manuscript, the full names of the authors listed in order of their contribution to the work, the department or practice from which the work originated, and their position.

Corresponding author's name, contact address, contact telephone number and facsimile number (where available) for correspondence.

- Abbreviations may be used after being first written in full with abbreviation in parentheses.
- References should be cited using the Vancouver style, numbered according to the sequence of citation in the text, and listed in numerical order in the bibliography. Examples of Vancouver style:

1 In-text citation Superscript. If at the end of a sentence the number(s) should be placed before the full stop or comma.

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.

Abstract

Manuscripts for feature articles and original research must include an abstract not exceeding 200 words, which describes the scope, major findings and principal conclusions. The abstract should be meaningful without reference to the main text.

Images

Images may be submitted as hard copy (in triplicate) or in digital format. Images sent must have all personal and hospital or practice identifiers removed. Do not embed images in text. Separate images are required for publication purposes.

A figure legend must be provided for each image. Hard copy images should be presented as glossy print or original film. Any labelling should be entered on the front of the glossy print using removable labels. Send one copy of illustrations without labelling as this can be added electronically prior to publication. On the back of the print include the author's name, figure number and a directional arrow indicating the top of the print.

Digitised graphics should be supplied as JPG or TIFF files on PC formatted 3.5" diskette or CD, which must be clearly labelled with the author's name and the names of the image files.

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2007 ULTRASOUND BULLETIN PUBLICATION DATES

	May 2007	August 2007	November 2007
Submission Deadline	3 April	10 July	10 October
Post Date	12 May	15 August	15 November