ISSN 1441-6891

Volume 9 Number 2 May 2006

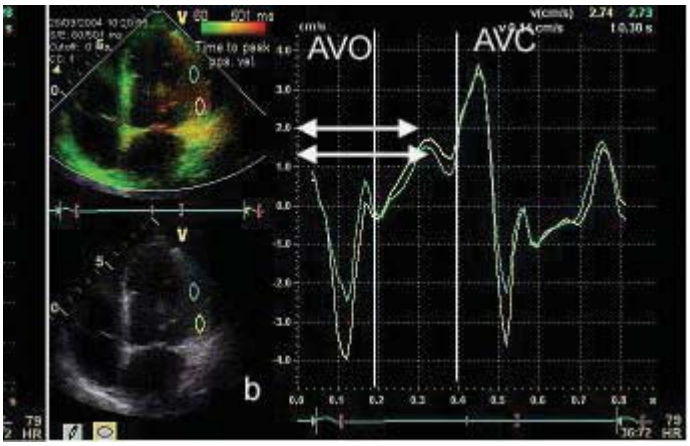
Australasian Society for Ultrasound in Medicine

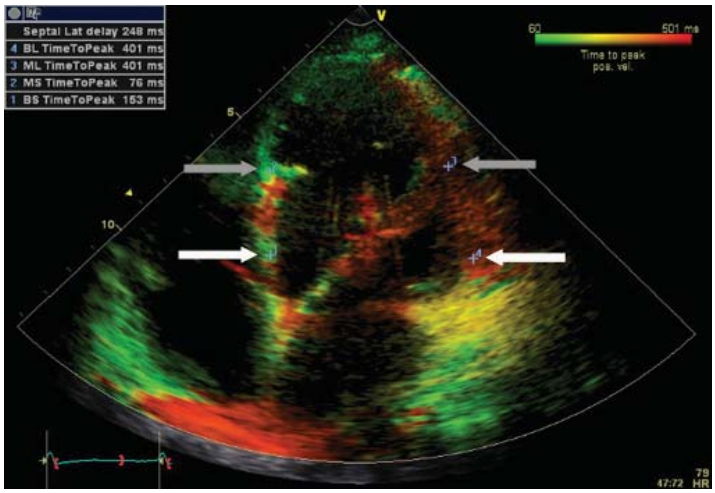
ULTRASOUND BULLETIN

ASUM (NZ Branch) 2006 Ultrasound Conference
Napier, Hawkes Bay NZ 14 – 16 July 2006

ASUM Scientific Meeting 2006 Melbourne
Melbourne 15 – 17 September 2006

ASUM Multidisciplinary Workshop
Incorporating O&G Symposium and
DDU/DMU Preparation Courses
28 February – 4 March 2007





- QRS and cardiac dyssynchrony in chronic heart failure
- Ultrasound in NZ emergency departments
- Ultrasound detection of limb reduction defects
- Changing frequency affects nuchal translucency measurement?
- Policies and Statements – Obstetric and gynaecological, Vascular and Educational protocols (Cardiac)

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ULTRASOUND BULLETIN
Official publication of
the Australasian Society
for Ultrasound in Medicine

Published quarterly
ISSN 1441-6891

Indexed by the Sociedad Iberoamericana de Informacion Cientifien (SIIC) Databases

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Original research, case reports, quiz cases, short articles, meeting reports and calendar information are invited and should be addressed to The Editor (address below)

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WFUMB 2009 Sydney

ULTRASOUND BULLETIN

ASUM Ultrasound Bulletin May 9: 2

Notes from the Editor

This issue has something for everyone.

The lead article, by Rebecca Perry and others, examines the prevalence of dyssynchrony in patients with chronic heart failure with the view to validate the novel technique of TSI as a marker of LV dyssynchrony and to determine the accuracy of QRS duration in predicting significant LV dyssynchrony.

Sampsa Kiuru's survey of emergency departments (EDs) in New Zealand is a searching report on the use of ultrasound in EDs in that country and raises questions about access, quality assurance and credentialling that hinder the effective and timely use of ultrasound in EDs.

Michelle Pedretti examined ultrasound detection of limb reduction defects in Western Australia.

Mark Bryant's forum article will stimulate some debate over nuchal translucency measurement.

This issue also features new policies and statements for vascular ultrasound, education protocols for competences required of cardiac sonographers, and the exciting ASM 2006 program for September at the Melbourne Convention Centre.

As the 2006 World Federation in Ultrasound in Medicine and Biology (WFUMB) in Seoul proceeds, it is a timely reminder that ASUM is hosting the 12th Congress in Sydney in 2009.

In 2004 ASUM Council set up the ASUM Research Fund to enable the funding of significant, innovative, locally based research projects leading up to WFUMB 2009. Readers are encouraged to consider developing new ultrasound based research in leading edge areas such as therapeutic ultrasound, high frequency ultrasound applications, or research into ultrasound of tissue elasticity.

Assoc Prof Roger Davies
Editor

WFUMB 2009 Sydney Australia
12th Congress of the World Federation for Ultrasound in Medicine and Biology
August 30 – September 3, 2009

ASUM ASM
15–17th September 2006

Friday 15th September 2006		
8.30 am – 10.00 am O&G	**Vascular**	**MSK: Shoulder**
Ultrasound of the Ovaries • How to Assess Ovarian Tumour with Ultrasound Professor Kittipong Vairojanavong • Significance of resistance and pulsitivity indices of ovarian tumour Professor Dirk Timmerman • Morphologic Ultrasound Appearance of Complex Ovarian Tumour Professor Kittipong Vairojanavong	• Exploring the Popliteal Fossa Professor John Harris • Potential Ultrasound Facilitated Overuse of Carotid Interventions Professor Gregory Moneta • Transcranial Doppler and Duplex Scanning Professor Brian Chambers	• US of the Shoulder: The Washington University Experience Professor Sharlene Teefey • Dynamic Assessment of Shoulder Pain Ms Mary Langdale • Clinical Examination of the Shoulder Dr Peter Larkins
Plenary 10.30 am – 12.30 pm		
Opening Address Utility of Duplex Scanning for Peripheral Arterial Disease in 2006 (Professor Gregory Moneta) Safety of Ultrasound (Professor Marvin Ziskin) Mathematical Models to Distinguish Benign / Malignant Tumour (Professor Dirk Timmerman) ASUM Meets China / ASUM Asia Link (Professor Yuxin Jiang)		
O&G 1.30 pm – 3.00 pm		**General**
Improving Fetal Cardiac Diagnosis • Introduction/Overview Dr James Grimwade • The Dilemma of Poor Antenatal Diagnosis Professor Dan Penny • Normal Physiology of the Fetal Heart Professor Adrian Walker • Normal/Abnormal Anatomy Professor Jim Wilkinson • Live Scanning of Normal Heart + 3-D/4-D Display Dr Mark Teoh		• Emergency Room FAST Scanning Professor John McGahan • US – Contrast Agents in Diagnosis of Focal Liver Lesions Dr Christian Nolsøe • Paediatric Orbits Mr Cain Brockley
O&G 3.30 pm – 5.30 pm		
Improving Fetal Cardiac Diagnosis • First Trimester Heart Diagnosis Dr Simon Meagher • Problem Solving of Abnormal Fetal Heart Presentations Dr Simon Meagher, Professor Charles Kleinman, Professor Sam Menahem, Dr James Grimwade • Fetal Arrhythmias Professor Charles Kleinman • Management Issues Following the Diagnosis of a Fetal Heart Abnormality Professor Sam Menahem • The Future of Fetal Cardiology Professor Charles Kleinman • Concluding Remarks Dr James Grimwade		• The Difficult Gallbladder Professor Sharlene Teefey • Interventional US Abdominal Dr Chr.istian Nolsøe • Right Lower Quadrant Ultrasound Professor John McGahan
Saturday 16th September		
7.30 am – 8.30 am Meet the Expert Breakfast		
O&G	**Vascular**	**General/breast**
The Fetal Head – MRI/Ultrasound • Understanding Ultrasound of the Fetal Head Professor John McGahan • Comparative Development Anatomy of the Fetal Brain – Ultrasound and MRI Dr Michelle Fink, Dr Amanda Sampson • Malformation of Cortical Development Dr Richard Leventer	• Ultrasound for Assessment and Interventions for Chronic Liver Disease Dr Anthony Schelleman • Mesenteric Duplex Scanning: From Development to Current Status Professor Gregory Moneta	• Breast Surgery/Perspective Integration Dr Darren Lockie/Dr Jennifer Senior • Benign vs Malignant Breast Ms Jenny Cawson • Pitfalls and Tricks for Breast Ultrasound Ms Paula King
O&G	**Vascular**	
• Examples of Fetal Brain Abnormalities Using Ultrasound/ MRI Dr Michelle Fink / Dr Amanda Sampson	• Ankle / Brachial Pressure Indices – Essential in Clinical Practice Professor John Harris • Ankle / Brachial Pressure Indices – of Limited Value These Days Professor Ken Myers • Proferred Paper – Ultrasound and Endovenous Treatment for Varicose Veins Ms Amy Clough	

PROGRAM 2006
Melbourne Convention Centre

10.30 am–12.00 pm O&G	Vascular	MSK
Premature Labour and Placenta • Ultrasound of Placental Praevia Accreta Professor David Ellwood • Transvaginal Scans of Pregnant Cervix Professor Kittipong Vairojanovong • Doppler Assessment of a Sick Fetus Dr Amamda Sampson • Predicting Placental Pathology with Ultrasound Professor David Ellwood	• Surveillance During and After Arterial Surgery Professor Philip Walker • The Problem of Non-Invasive Testing for Chronic Venous Insufficiency Professor Gregory Moneta • Ultrasound and Non-Atherosclerotic Arterial Diseases Professor Harry Gibbs	• Hip Pain Ms Mary Langdale • Functional and Sonographic Anatomy and Pathology of the Lateral Hip with Ultrasound Correlation Dr Ross McKellar • Hip Surgery Mr Elton Edwards • Paediatric Hip Mr Cain Brockley
1.00 pm – 2.30 pm O&G		**General**
3-D / 4-D Ultrasound • Role of the 3D in Gynaecology Dr Michael Bethune • Debate – The Place of Entertainment Ultrasound in Obstetrics For – Professor Lachlan de Crespigny Against – Dr Glen McNally • New Technologies in 3-D Ultrasound Dr Michael Bethune		• Testicular Microlithiasis, is it a Marker of Malignancy? Professor Sharlene Teefey • Prostate Imaging and Treatment Dr Grant Baxter • The Use of Ultrasound in Male Infertility Mr Gordon Baker • Non Gynaecological Pelvic Pathology Dr Simon Meagher
3.00 pm – 5.00 pm O&G	**Vascular**	**MSK**
Early Pregnancy • Diagnosis / Management of PULS Dr George Condus • The Ethics of Later Term Termination Associate Professor Lachlan de Crespigny / Professor David Ellwood • The Role of the 11–14 Week Scan Dr Amanda Sampson • Where Are We At With Soft Markers? Dr Michael Bethune	• Ultrasound and Haemodialysis Access Surgery – Establishing Criteria Professor Harry Gibbs • Evaluation of Upper Extremity Ischaemia Professor Gregory Moneta • Ultrasound and Renal Transplantation Ms Paula King	• The Accuracy of US for Diagnosing Focal Lesions of the Hand and Wrist Professor Sharlene Teefey • Vascularity Index of Tendons Ms Jill Cook • Trigger Finger Dr Lois Basham • Foot / Ankle Ultrasound Ms Mary Langdale
Defence of Poster and Electronic Presentations (5.00 pm – 6.00 pm)		
ASUM ASM Gala Dinner (7.00 pm – 11.00 pm)		
Sunday, 17th September 2006		
PLENARY 2 8.30 am – 10.30 am		
Ultrasound Guided Tumour Ablation (Professor John McGahan) Establishing an Ultrasound Unit in 2006 (Professor Philip Walker) Deep Vein Thrombosis – The Current Status (Professor Ken Myers Managing Expectations in Pregnancy Ultrasound and Dr Mark O'Brien)		
Morning Tea – Brunch 10.30 am – 11.00 am		
Ultrasound of the Endometrium • Differential Diagnosis of Endometrial Abnormality Professor Dirk Timmerman • Ultrasound Diagnosis of Trophoblastic Tissue Professor Kittipong Vairojanavong • Prediction of Depth of Infiltration in Endometrial Carcinoma Professor Dirk Timmerman	• Uterine Vascular Malformation Professor Dirk Timmerman • Dealing with Challenging Patients and Difficult Situations Dr Mark O'Brien	
2007 Introduction and Closing Address		

Sunday 17th September 2006 Skills Development Workshop				
	Room 1	Room 2	Room 3	Room 4
11.00 am to 12.00 pm	Counselling	What's New With Testes Mr Bob McDonald	The Advanced Shoulder Mr Chris Sykes	What the Surgeon Wants from CVI Scanning Mr Robert Ziegenbein
12.10 pm to 13.10 pm	Customer service	The Fetal Heart Scan	The Wrist and Elbow Mr Stephen Bird	AAA Scanning, With and Without Grafts Mr Robert Ziegenbein
2.10 pm to 3.10 pm	Breast Ultrasound Ms Tania Griffiths	The 12 Week Scan Ms Louise Worley	Ovarian Veins Mr Martin Necas	The Hip - Beyond the Hernia Mrs Oriana Tolo
3.20 pm to 4.20 pm	The Gynaecological Pelvic Exam Dr Amanda Sampson	OH&S for Sonographers Ms Roslyn Savage	The Ankle Ms Mary Langdaie	Salivary Glands Mr Mark Smyth

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Upcoming ASUM Meetings

14–16 July 2006 ASUM NZ Branch Ultrasound Conference
Napier Hawkes Bay New Zealand

15–17 Sept 2006 Annual Scientific Meeting
Melbourne Australia

March 2007 ASUM O&G Symposium and Multidiciplinary Workshop Australia

13–17 Sept 2007 Annual Scientific Meeting
Cairns Australia

30 Aug – 3 Sept 2009 WFUMB 2009 World Congress Sydney to be hosted by ASUM

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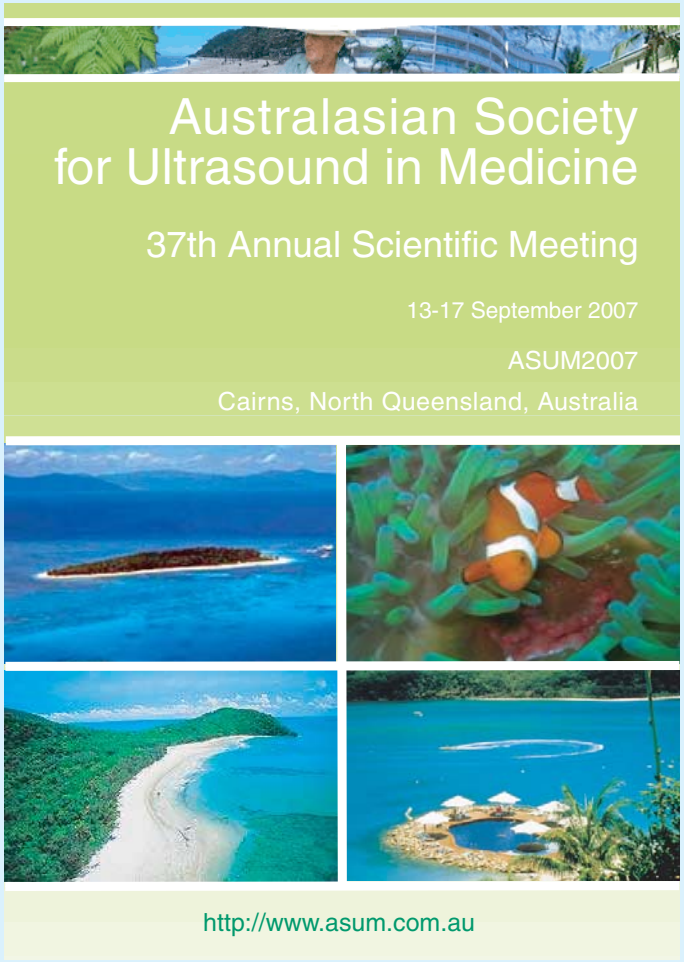

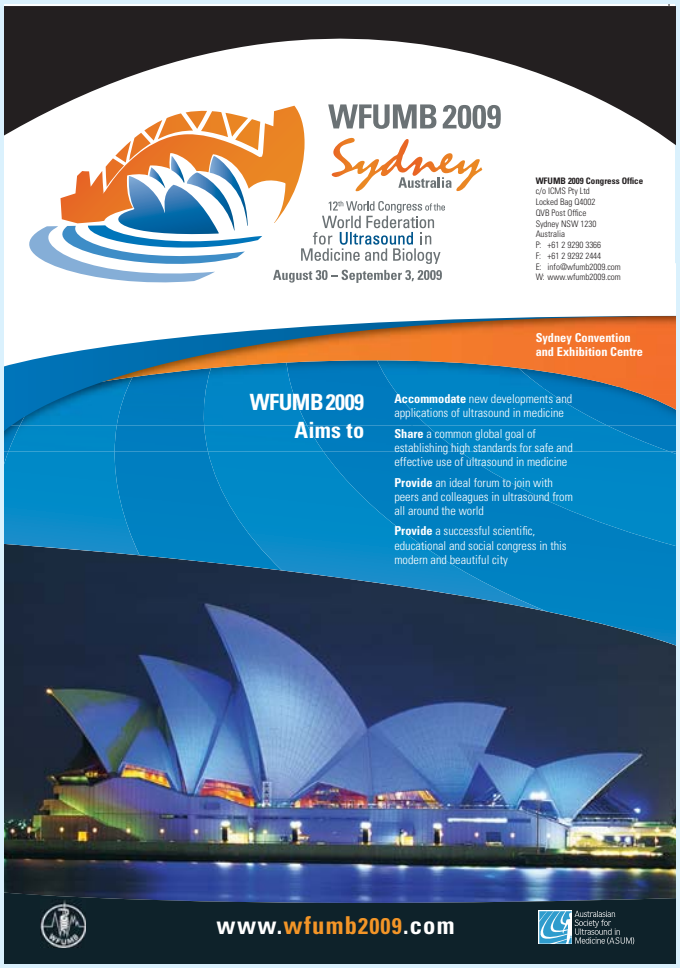

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President's message

Dr David Rogers

Hello to you all. May already, and it only seemed like the year was beginning a few weeks ago. But what a lot has happened to date.

DMU (Asia)

In early March, I had the pleasure of teaching vascular ultrasound for a week at the DMU (Asia) course in Kuala Lumpur. This course has taken a lot of work to develop on the part of ASUM and Vision College. The first intake of students has just sat the Part 2 Exam. I must say I was very impressed at the quality of the students and their training. All credit to Wee Loong Lee, Alan Williams and their dedicated team. Also thank you to other ASUM members who have recently contributed, such as Andrew Ngu and Roslyn Savage who conducted the exams, and Roger Gent who spent time teaching physics and paediatrics.

This course is of significance to the region, because, in Malaysia and in many other countries throughout Asia, the profession of sonography does not exist. All ultrasound is performed by medical practitioners, who are in short supply. Naturally, there are some political issues around this but the Malaysian Government is considering backing the course and the profession. If successful, we will feel justified in our efforts to bring about a change in the region for the better, with wider access to ultrasound for the population.

European Congress of Radiology

Caroline Hong and Matthew Andrews recently attended the European Congress of Radiology in Vienna, further building on the foundations we began last year. This is the largest radiology congress in Europe and second only in the world to the RSNA. This is a great event for us to promote WFUMB 2009 in Europe. ECR has been very helpful to us and this year ASUM had a booth, which created a lot of interest and profile for the Society; very important for us and a tribute to the hard work put in by Caroline.

Multidisciplinary Workshop

The first ASUM event for the year, the Multidisciplinary Workshop, was held at the Gold Coast in late March at Conrad Jupiters. This was a superb event with an excellent program put together by Nick Bryant and his committee.

Special thanks to the speakers who travelled far to present, such as Anil Ahuja and Terry Needham. The contribution from Jon Hyett, now becoming a local Queenslander, was outstanding. We are lucky to now be able to consider him a local speaker. The venue works very well for the format of the workshop with multiple breakout rooms to use. This is not found in many other venues throughout Australia, especially at a reasonable price.

WFUMB 2006 Seoul

The next main event on our horizon is the WFUMB Congress in Seoul, at the end of May. ASUM is sponsoring a large contingent to this meeting as it is the forerunner to our hosting of the Congress in 2009 in Sydney.

This event is considered the pinnacle of ultrasound meetings and Professor Choi and his team have been working tirelessly for years to produce a memorable event.

9th ICIU

In June, Rogers Davies and myself are presenting at the 9th International Congress on Interventional Ultrasound in Copenhagen, Denmark. This is the first European exchange of CADUCEUS, the liaison between the Danish Ultrasound Society and ASUM.

We are honoured to have Princess Mary (formerly of Australia, and now wife of the Crown Prince of Denmark) as the patron of the Congress and hope she will become the patron of the exchange program.

The meeting has an excellent program and I look forward to learning a great deal. It will also be great to see Christian Nolsøe, whom many of you will remember from the Sydney 2004 Annual Scientific Meeting. Christian has been the driving force behind CADUCEUS.

NZ Branch Conference Napier

Looking further ahead, there is the New Zealand Branch Conference in July, in Napier. For those who do not know the area, Napier is a beautiful place to visit, set in amongst picturesque vineyards, with great restaurants and many tourist attractions; worthy of a trip from Australia. The program also looks very good.

4-D 'photo shops'

ASUM continues to battle against the development of 4-D ultrasound 'photo shops' which are springing up in non medical hands. This is a difficult area as it brings up many different perspectives. There is no doubt that 4-D scanning is a bonding experience between parents and child and one which we would not like to deny to the public. There is a genuine demand for it out there and, in reality, if we don't practise our skills in a 'social' setting, when we find an abnormality, we will be poorly able to perform 4-D imaging.

Another issue which I feel we should not overly emphasise is the safety risks. As I understand, we still consider ultrasound safe, especially outside focused Doppler examinations. We would not wish to bring ultrasound into disrepute by overplaying the safety issues. However, the use of ultrasound in non medical hands frightens me. People will confuse a 'social' scan with a medical examination, with potentially disastrous consequence. Also, the general public will likely receive poor quality information if an abnormality is detected. The hardest part of our job is to deliver bad news appropriately and accurately. There are many soft signs that may be reported to parents by untrained scanners, which need to be placed in appropriate context and imaged accurately. This is the largest concern for myself and spurs me on to continue to seek regulation of this new phenomenon.

Membership renewal

Finally, membership renewal time is upon us. This is a time when many consider whether to rejoin. Inevitably some feel ASUM could do better, but in reality, ASUM is performing at a high level in all areas to do with ultrasound. There are no stones left unturned and ASUM maintains its high class educational focus. In addition, ASUM now offers an industry leading package for membership and indemnity insurance for sonographers. I strongly recommend you stay with the Society

David Rogers
President

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CEO's message

Dr Caroline Hong

Is there ever a quiet time of the year for ASUM? I do not think so. The Society is becoming increasingly busy, with so much to do and so many worthy projects progressing towards a very exciting future.

WFUMB 2009 Sydney World Congress

The 12th World Congress of the World Federation for Ultrasound in Medicine and Biology will be held in Sydney from 30th August to 3rd September 2009. This prestigious world congress will be launched in Seoul where the WFUMB 2006 Seoul World Congress is being held from 28th May to 1st June 2006.

Planning is well underway for what is hoped to be the best ever WFUMB Congress. We aim to showcase ASUM and Sydney to the rest of the world in the field of medical ultrasound when the World Congress comes to Australia. All ASUM members who register for the 2009 Congress will be eligible for a discount of $100 towards their registration, if they register to attend an ASUM meeting in 2006.

There will be an ASUM booth at the WFUMB 2006 Seoul Congress and we welcome all members and guests to visit the ASUM booth.

ASUM College of Ultrasound

A Project Director has been appointed, on a term contract, to develop the ASUM College of Ultrasound. We would like to thank all the high calibre candidates who showed interest and applied for the position.

Dr Stan Barnett is the successful candidate and commenced duties on 1st May 2006. Stan will be working with an Advisory Board and the ASUM CEO on the further development of the College over the next 12 months.

It is indeed a very exciting and opportune time in the history of the ASUM as the Society takes on the challenge of development for the delivery of courses and training.

ASUM already has many educational courses and resources. A good deal of work has already commenced, with valuable input led by Dr Glenn McNally and involving myself and key staff members from the ASUM Secretariat, Keith Henderson and James Hamilton.

We see opportunities for involvement from members who have expertise to contribute to education as the College advances in its development. ASUM is already in partnership discussions, which will ultimately lead to even higher standards of medical ultrasound being practiced by all ASUM members.

Early bird membership renewals due on 30th June 2006

Membership renewals for the year 1st July 2006 to 30th June 2007 are being processed now and will be mailed out to members in May. The early bird specials apply until 30th June 2006; once again, we strongly urge you to renew so that you will to continue to enjoy your membership benefits. There is no other society like ASUM that can provide you with so many benefits and special privileges in a truly unique professional multidisciplinary environment.

The strength of ASUM comes from the quality and the diversity of the expert contribution of its medical specialists, medical professionals, scientists, sonographers and corporate

WFUMB 2009 Sydney Australia
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August 30 – September 3, 2009

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ASUM MDW 2006 – Gold Coast

The March 2006 Multidisciplinary Workshop, at the Gold Coast, was another successful series of workshops and meetings, enjoyed by all the delegates who attended. We are grateful to all our Gold Sponsors, Philips, GE Healthcare, Toshiba and Siemens, without whom the workshops would not have been as successful.

About 400 people attended from Australia, New Zealand and overseas.

We are also grateful to the excellent keynote international and local speakers, all of whom contributed willingly to a high quality meeting.

Nick Bryant and his local organising committee worked tirelessly and we thank them for their enthusiasm and valuable contribution.

Diploma of Medical Ultrasound (DMU)

This year, 168 candidates have applied to sit the DMU examinations. This compares favourably with previous years, with 90 sitting Part I and 78 Part II. Written examinations for Part I and Part II candidates will be offered at eight major locations throughout Australia and New Zealand on Saturday 29th July 2006.

While the Part I DMU Examination remains unchanged, with two, two-hour multiple choice questionnaires (MCQ), each comprising 120 questions, the format of the Part II DMU Examination has been modified. The Part II Written Examination will now consist of two written papers, each of two-hour duration.

One paper will consist of written essay questions and the other will be a combination of MCQ and short answer questions based on clinical situations. In addition, oral examinations, or vivas, have been reinstated.

For details refer to the DMU Report in this edition or visit the DMU section of the ASUM website www.asum.com.au/open/dmu_handbook.htm.

Diploma of Diagnostic Ultrasound (DDU)

The number of DDU candidates continues to remain strong. The DDU Part I Examination and the written portion of the DDU Part II will be held on Monday 15th May 2006. The viva for DDU Part II (excluding cardiology) will be held in Sydney on Saturday 17th June 2006. Cardiology candidates for DDU Part II will sit their vivas in Melbourne on Thursday 15th June 2006. This year we have 39 Part I candidates and 22 Part II candidates.

Part I DDU candidates, from May 2006 onwards, will experience a major change in the examination format, whereby a multiple choice questionnaire, comprising 120 questions, will be used. For further information, please refer to the DDU Handbook on line at www.asum.com.au.

A major change for Part II candidates will come into effect in 2007, whereby the vivas will be moved to Melbourne. We will be alternating the sitting of the vivas between Sydney and Melbourne in future.

Dr Lizbeth Kenny RANZCR President with Dr Matthew Andrews ASUM President Elect at the ASUM booth at ECR Vienna

DMU (Asia)

The first batch of DMU (Asia) students will be graduating in the middle of 2006. Vision College has already started its second intake of students. We look forward to continuing success when these students progress their careers as sonographers, to work in Asia or elsewhere.

Dr Andrew Ngu is the Chair of the DMU (Asia) Board of Examiners, and I have been most involved in working with Andrew and Glenn McNally in its creation and the signing of the licensing agreement with Vision College in 2003. Since that time, ASUM has supported Vision College by sending lecturers, including Andrew Ngu, Roslyn Savage, Roger Gent and David Rogers to ensure that the DMU (Asia) students continue to be exposed to a high standard of tuition.

The DMU (Asia) is not the same as the ASUM DMU. However, it is of a high standard and sonographers with the DMU (Asia) will be considered with credit if they wish to enrol for the ASUM DMU qualification for practice in Australia or New Zealand.

Holders of the DMU (Asia) can acquire Accredited Student Sonographer status. In Australia, Accredited Student Status with the Australasian Sonographer Accreditation Registry (ASAR) can be secured if the DMU (Asia) holder has New Zealand or Australian citizenship or permanent residency status, or if they have a current student visa; and are (1) either registered, in Australia, in an ASAR accredited program of study, such as the ASUM DMU or an equivalent university graduate diploma, or (2) registered, in New Zealand, with the

EARLY BIRD RENEWALS – IF PAID BY 30th JUNE 2006

Medical/Scientific/ Sonographer members	$A297.00
Associate members	$A231.00
Trainee members	$A231.00
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Corporate members	$A1100.00
Corresponding ordinary members	$A185.00
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President Elect Dr Matthew Andrews and ASUM CEO Dr Caroline Hong at the ASUM booth at ECR Vienna

Medical Radiation Technology Board (NZMRTB) and enrolled in an accredited program of study, such as the ASUM DMU or an equivalent university graduate diploma.

In New Zealand, medical radiation technology (which includes ultrasound imaging) is a licensed profession and only registered practitioners and exemption holders are entitled to practice. Therefore, in order to practice ultrasound imaging in New Zealand while working towards the ASUM DMU qualification, student sonographers must apply to the NZMRTB to be considered for an exemption to practice. For further information, you should visit the DMU section of the ASUM website at www.asum.com.au/open/dmu_handbook.htm.

DMU (Asia) holders may also acquire an Accredited Medical Sonographer (AMS) status but, firstly, must be a citizen of New Zealand or a citizen or permanent resident of Australia and, secondly, they must hold an ASAR or NZMRTB accredited qualification.

In Australia, the ASAR does the assessment of Australian and New Zealand based sonographic qualifications, while all other overseas sonographic qualifications are assessed by the Australian Institute of Radiology (AIR) on behalf of Australian Education International (AEI), which is part of the Australian Department of Education, Science and Training (DEST).

Since the DMU (Asia) is neither an Australian nor a New Zealand sonographic qualification, it is currently assessed by the AIR. The AIR has been informed about the status of the DMU (Asia). Any DMU (Asia) holder who satisfies New Zealand or Australian immigration requirements may apply to sit the ASUM DMU and will be granted credit for previous study. In New Zealand, the NZMRTB does the assessment of all sonographic qualifications.

ASUM Certificate in Clinician Performed Ultrasound (CCPU)

I am pleased to report that more progress has been made with the Certificate in Clinician Performed Ultrasound (CCPU). ASUM has already received applications from the membership for these newly created certificates. The CCPU is a recognised credential based on a program of educational courses specifically designed for clinicians who perform focused, limited scope ultrasound examinations at the point of care. At this time, ASUM has developed CCPU programs for emergency medicine physicians, surgeons, obstetricians and gynaecologists. O&G programs are planned for June and July this year in both Melbourne and Sydney. All updates and registration forms for the certificates are available in the CCPU section of the ASUM website at www.asum.com.au.

ASUM NZ 2006 Annual Conference – Napier

The Final Registration Brochure for the ASUM NZ 2006 Annual Conference in Napier is now on the ASUM website.

Rowena Tyman, the ASUM New Zealand Convenor, advises that it will be an exciting and motivating scientific meeting. The program is extensive, with a wide range of topics offered by numerous national and international speakers. A student workshop is also being offered pre-conference on Thursday 13th July, by our experienced ASUM member, Martin Necas, for both DMU and other students participating in accredited ultrasound post graduate training courses.

The ASUM NZ 2006 Annual Conference in Napier will be an excellent opportunity to further, or consolidate, your knowledge as well as catch up with colleagues and friends.

ASUM Teaching Fellowships

We now have two of the four teaching fellowships for 2006 organised. The Chris Kohlenberg Teaching Fellowships sponsored by GE Healthcare will be held in South Australia, regional Victoria and southern New South Wales.

Mr David Fauchon has been appointed teaching fellow for South Australia and regional Victoria. In May 2006, he will be holding workshops/clinics and meetings in Port Augusta, Mt Gambier, Adelaide and Bendigo.

David was the 1999 recipient of the Beresford Buttery Overseas Traineeship. In April 1999, with the late Chris Kohlenberg, he taught basic and advanced ultrasound skills for a week in Port Moresby, Papua New Guinea, as part of a project for the Australian Government's overseas aid program, AusAID. He was also involved with the Skills Transfer for Aboriginal Health Workers Program, which was a collaborative program run by RANZCOG, ASUM, Nepean Hospital and James Cook University.

The teaching fellow for southern New South Wales is Dr Meiri Robertson. In June 2006, she will be holding workshop/clinics and meetings in Wagga Wagga, Nowra and Wollongong.

Dr Robertson works at the Fetal Medicine Unit at the Canberra Hospital. She came to Australia three years ago to complete her Fetal Medicine Diploma via the Fetal Medicine Foundation in London, with Kypros Nicolaides. She has worked with Prof David Ellwood during this time and completed her diploma at the end of 2005. She has been involved with teaching and training in this field in South Africa for 10 years and was the Director of the first Thomas Jefferson affiliated centre in South Africa.

Australasian Society for Ultrasound in Medicine

36th Annual Scientific Meeting

15 – 17 September 2006

Melbourne Convention Centre
Victoria, Australia

ASUM2006

www.icms.com.au/asum2006

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ASUM is Certified ISO 9001:2000 Quality Management Systems

ASUM is affiliated with WFUMB

Details are available on the ASUM website under ASUM meetings and on the ASUM Calendar.

ECR 2006 in Vienna

Together with Dr Matthew Andrews (President Elect), I was privileged to represent ASUM at the 2006 European Congress of Radiology (ECR), which was held in Vienna in March this year.

ASUM was given a complimentary society exhibition booth at this amazing congress. Supported by the RANZCR, this was the first time an Australasian society had been represented at the ECR. The ASUM booth attracted attention from delegates from many countries around the world. Proposals are also underway for establishing an *ECR Meet Australasia* session for a future meeting, either in 2008 or 2009. The team from ASUM and RANZCR enjoyed the educational and social programs hosted by the ECR 2006 President Prof Dr Andy Adam.

ECR 2007 will be held once again at the Vienna International Centre, from 9–13th March 2007.

Prof Christian Herold, a professor of radiology and director of diagnostic radiology at the University of Vienna, is the new President and he will lead next year's proceedings, including the educational and cultural sessions for ECR Meet China and ECR Meet Czech Republic. Anyone intending to register for ECR 2007 is welcome to contact me by email at caolinehong@asum.com.au.

Greece and Italy

It was a great pleasure when the executive members of the ultrasound societies of Greece and Italy visited the ASUM booth at ECR 2006. The Hellenic Society for Ultrasound in Medicine and Biology (HSUMB) on 12th February 2006, elected Dr Paul Zoumboulis, a radiologist, as their new President.

The HSUMB is keen to establish ties with ASUM and will also be participating at the WFUMB 2006 World Congress in Seoul.

The Societa Italiana di Ultrasonologia in Medicina e Biologia (SIUMB) Executive will also be present in Seoul. Various communications have already commenced between these societies and ASUM concerning educational opportunities and cooperation between the societies.

Vietnam Scholarship

I wish to express a special thank you to Dr Harley Roberts, Prof Ron Benzie, Dr Valeria Lanzarone and all the sonographers of their ultrasound team and the many others who contributed so generously to the successful training placement in Sydney of Dr Ha To Nguyen from Vietnam during February this year. I recommend Dr Ha To Nguyen's report in this issue to readers.

CADUCEUS

Dr Christoffer Brushøj, the first scholarship recipient under the CADUCEUS agreement between ASUM and the Danish Society for Diagnostic Ultrasound (DSDU) successfully completed his training with the generous assistance of Dr Cheryl Bass in Melbourne.

We are very excited about the progress in CADUCEUS and also to hear that Princess Mary of Denmark (previously from Tasmania) will be opening the Interventional Ultrasound meeting in Denmark this year. Christoffer's report is included in this issue.

ASUM BMUS Sonographer Exchange

Borsha Sarker, the first recipient of a scholarship funded by the British Medical Ultrasound Society (BMUS) in the United Kingdom, visited Sydney during April.

Borsha spent most of her time at the Liverpool Hospital working in the trauma and emergency departments, and also at the Royal North Shore Hospital with Dr Tony Joseph. More will be reported in a future *Ultrasound Bulletin.*

RANZCR QUDI Program

The RANZCR Quality Use of Diagnostic Imaging (QUDI) Program is funded by DoHA. The first annual research seminar, which presented research work in progress, was held in Sydney on 7th April 2006. It was attended by many key stakeholders, including ASUM.

Prof Bruce H Barraclough, AO MB BS FRACS DDU FACS presented the keynote address. Prof Barraclough is Chair of the Board of the NSW Clinical Excellence Commission and is President Elect of the International Society for Quality in Health Care and was Chair of the Australian Council for Safety & Quality in Health Care (2000–2005).

The QUDI Program is focussed on implementing evidence into practice in radiology in Australia under the strategic direction of the Radiology Quality and Outlays Memorandum of Understanding (MoU), in the promotion of quality use of diagnostic imaging, that aims to coordinate and focus efforts in a more strategic and systematic way and to encompass the needs of all the key stakeholders.

Current projects include:

(1) Quality Consumer Services and outcomes.
(2) Quality Referrals/Ordering.
(3) Quality Assured Services/Accredited Providers.

Of particular interest to ASUM members in the project of Quality Assured Services/Accredited Providers are:

QS1 Establish uniform best practice professional supervision and related reporting standards for all imaging services and providers, including the specific requirements of teleradiology.
QS3 Establish roles and standards for non-medical diagnostic imagers and develop a strategy to attract and retain non-medical (DI) professionals through role evolution.
QS9 Radiology Events Register (RaER).

(4) Economically Sustainable Services.

More information on all the current projects, is available at http://www.ranzcr.edu.au/qualityprograms/qudi

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UPCOMING ASUM MEETINGS

● Update Skills ● Networking ● Professional Development

WFUMB 2006 Seoul
11th Congress of the World Federation for Ultrasound in Medicine and Biology
May 28th – June 1st 2006
www.wfumb2006.com.
ASUM members who register for WFUMB 2006 Seoul are entitled to receive a discount off the ASUM Annual Scientific Meeting 2006 in Melbourne

ASUM WA Branch Physics Weekend
Saturday 10th June and Sunday 11th June 2006
http://www.asum.com.au/open/meet_ASUMWAPhysics.pdf

ASUM NZ Branch Annual Meeting Napier
14–16th July 2006 (Student workshop with Martin Necas 13th July 2006). http://www.asum.com.au/open/meet_Napier02.pdf

ASUM 2006 Annual Scientific Meeting Melbourne
15–17 September 2006
http://www.asum.com.au/asum06.htm
Call for Abstracts – submissions by 11th May 2006

For a full listing of meetings visit the ASUM website calendar at http://www.asum.com.au/open/calendar/htm

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QRS duration alone misses cardiac dyssynchrony in a substantial proportion of chronic heart failure patients

Rebecca Perry, Carmine G. De Pasquale, Derek P. Chew, Philip E. Aylward and Majo X. Joseph

Abstract

Objectives The primary determinate for the indication of cardiac resynchronisation therapy (CRT) in symptomatic chronic heart failure (CHF) currently is a prolonged QRS duration. This is based on the premise that a prolonged QRS duration is a marker of left ventricular dyssynchrony. Tissue synchronisation imaging (TSI) is an emerging technology that uses tissue Doppler velocities to determine the time to peak velocity of regions of the ventricular myocardium.

Our objectives were to determine the prevalence of dyssynchrony in a cardiomyopathic population referred for echocardiography irrespective of QRS duration, to validate the novel technique of TSI in evaluation of mechanical left ventricular (LV) dyssynchrony and to determine the accuracy of QRS duration in predicting significant LV dyssynchrony.

Methods One hundred patients with significant left ventricular dysfunction (Simpson's ejection fraction ≤ 35%) referred for echocardiography underwent TSI. Dyssynchrony was defined as a difference in time to peak contraction of > 105 msec between opposing ventricular segments.

Results Overall, 61 patients (61%) demonstrated significant dyssynchrony, while 52% had a QRS duration of greater than 120 msec. Among those with a prolonged QRS duration, significant dyssynchrony was evident in 30 (58%).

However, dyssynchrony was also common among those with a 'narrow' QRS duration (< 120 msec) (31 patients (65%)). Of the patients with dyssynchrony, 31/61 (51%) would have been missed if QRS criteria were used alone.

Conclusion A substantial proportion of patients have dyssynchrony by TSI, but do not have a prolonged QRS duration. These patients may benefit from CRT but on traditional criteria would be excluded from the therapy. Expanding the criteria for CRT to include echocardiographic parameters may extend the benefit of this technology to a greater population in need

Background

Patients with chronic heart failure (CHF) have a poor prognosis and are highly symptomatic.[1] The added insult of left ventricular (LV) dyssynchrony increases morbidity and mortality.[2,3] Cardiac resynchronisation therapy (CRT) involves the implantation of a bi-ventricular pacemaker and has been shown to improve quality of life, symptoms[4–6] and more recently mortality[7] in patients with drug refractory CHF and prolonged electrocardiographic (ECG) QRS duration (≥ 120 msec). CRT improves the ventricular activation sequence, which coordinates the left ventricular motion, giving improved ejection efficiency. However, CRT trials consistently show that 25–30% of patients with a prolonged QRS duration do not respond to CRT. This may reflect the absence of mechanical dyssynchrony in patients with a wide QRS indicating the need for additional or superior selection criteria to identify potential responders.[4–7] Moreover, it has recently been suggested that CHF patients with a 'narrow' QRS complex may also have mechanical LV dyssynchrony and therefore may benefit from CRT.[8–9]

The current criteria for CRT in symptomatic CHF patients (New York Heart Association class III – IV) is an ejection fraction less than 35% and a QRS duration on ECG of longer than 120 to 150 msec,[10] the premise being a prolonged QRS duration reflects cardiac dyssynchrony. Echocardiography and, in particular tissue Doppler imaging (TDI), have been shown to demonstrate mechanical cardiac dyssynchrony non-invasively.[11–17] Tissue synchronisation imaging (TSI) is a novel echocardiographic imaging modality that is able to rapidly assess LV mechanical dyssynchrony.[16,18,19]

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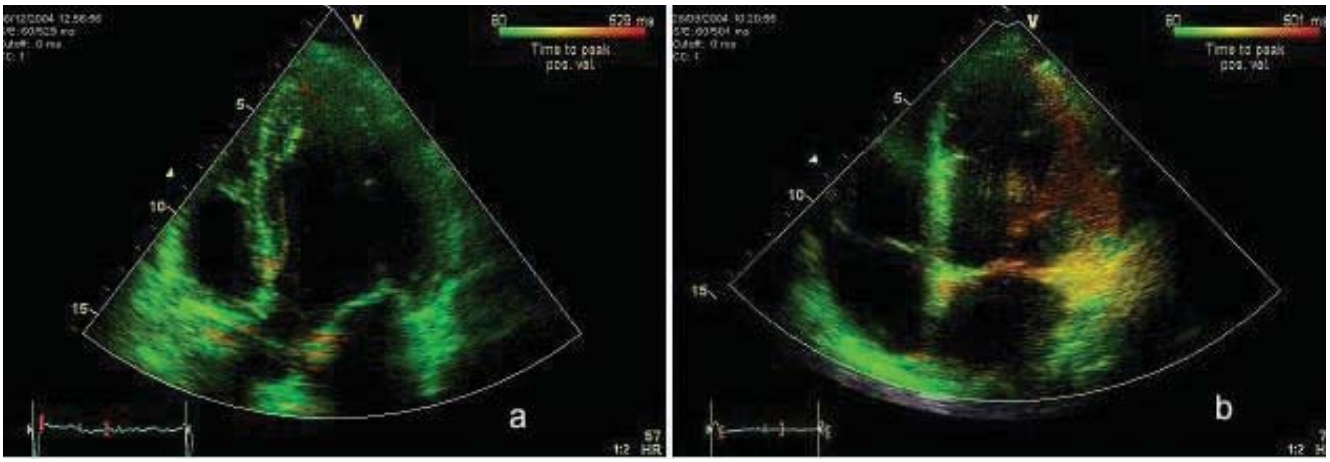

Fig. 1: Tissue synchronisation imaging. (a) Apical 4-chamber view demonstrating normal time to peak velocity data (colour coded green). (b) Apical 4-chamber view demonstrating significant lateral wall delay as shown in red with no significant delay seen in septal region.

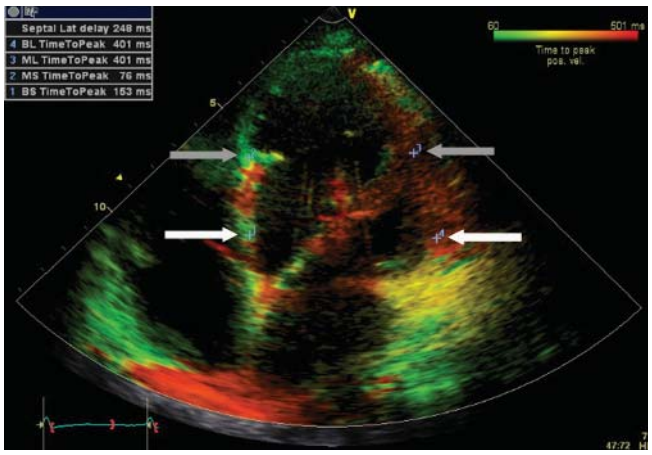

Fig. 2: Method of measuring time to peak velocity data. The tissue synchronisation image is frozen in end systole so that time to peak velocity callipers may be placed at a basal level (white arrows) and a mid level (grey arrows) on opposing wall segments. The time to peak velocity data is displayed on the screen for rapid quantitative dyssynchrony assessment.

Our aims were to:
(1) determine the prevalence of significant dyssynchrony in a general cardiomyopathic population;
(2) validate TSI as a marker of mechanical LV dyssynchrony and;
(3) determine the accuracy of QRS duration in predicting significant LV dyssynchrony.

Methods

This study was approved by the Flinders Medical Centre Research Ethics Committee.

Subjects

The subject population consisted of 100 consecutive CHF patients referred for an echocardiogram with a Simpson's ejection fraction ≤ 35% and having had a recent ECG within one month of the echocardiogram being performed. All studies were performed on a GE Vivid 7 (GE Healthcare, Australia). Patients with CRT, a pacemaker *in situ* or in atrial fibrillation were excluded from this study.

Echocardiography

Biplane Simpson's ejection fraction was calculated from the apical two- and four-chamber views. Diastolic function was assessed according to standard criteria.[20] Significant diastolic dysfunction was deemed as being present if there was a pseudonormalised or restrictive filling pattern evident from the mitral inflow pulsed wave Doppler (PW) profile.

During the echocardiography study, each apical view (two-, four- and long-axis) was overlayed by the TDI colour map, optimised to give the highest frame rate by reducing depth and sector size and then three or more cardiac cycles for each view were stored digitally. All images were analysed off-line using the EchoPac system (GE Healthcare, Australia). Only TDI images with a frame rate of greater than 100 cycles per second were considered for analysis.

Tissue synchronisation imaging assessment

The timings of mitral and aortic valve opening and closure were determined using the PW spectral tracings from each of these valves. Using these timings, the TSI interval start time was manually set to begin analysis at aortic valve opening and cease analysis at aortic valve closure to reduce interference from post systolic contraction.

TSI analyses tissue Doppler velocity signals within the ventricular myocardium, to determine the timing from the QRS to the peak systolic velocity. This time to peak velocity information is assessed for every pixel in the region of interest, and is colour coded over the 2-D image according to the timing. The time to peak velocities are colour coded green for normal timing, yellow for moderate delay, and red for a severe delay. Therefore, a ventricle with normal time to peak velocities is colour coded green over the myocardium (Fig. 1a) and a ventricle with a significant delay in one of the walls is colour coded yellow or red over the delayed wall (Fig. 1b).

For quantitative assessment the TSI images were frozen, scrolled to end systole and regions of interest (each 6 x 12 mm) placed manually on opposing walls within the LV myocardium at a basal and mid level on the following walls: septal, lateral, inferior, anterior, posterior and anteroseptal. The time to peak numbers were recorded for each apical view giving 12 measures of time to peak velocity (Fig. 2). This 12-segment model of dyssynchrony is the same as the model used by Yu *et al.* and has been found to be a reliable assessment of mechanical dyssynchrony.[11,19] The time to peak velocities of opposing walls at the same level (i.e. basal to basal and mid-wall to mid-wall) were subtracted from one another to determine the delay between the opposing walls giving six measurements of delay.

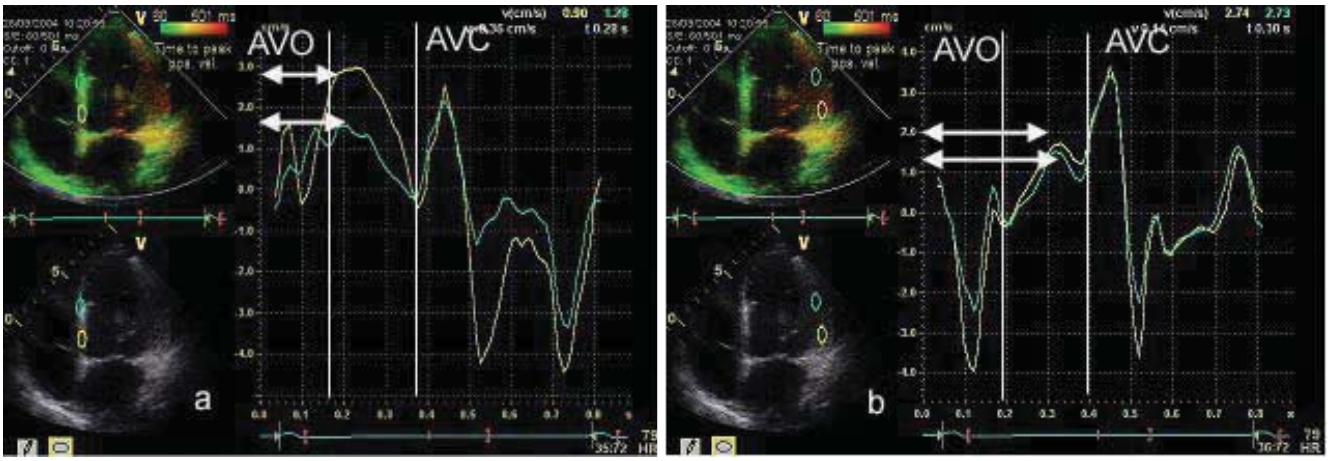

Fig. 3: Method of measuring time to peak velocity from tissue Doppler graphs. (a) The regions of interest are placed on the septal wall at a basal and mid wall level and with the timing from QRS duration to peak systolic velocity. (b) This is repeated for the lateral wall. Note that all peak systolic velocities occurring after aortic valve closure are ignored.

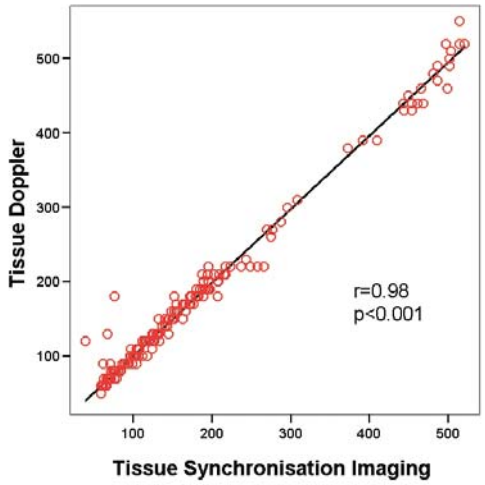

Fig. 4: Correlation graph showing comparison between tissue synchronisation imaging and tissue Doppler data.

Tissue Doppler assessment

The TDI 2-D images were also analysed with the quantitative analysis package using tissue Doppler graphs. The timings of aortic valve opening and closure were displayed on each graph. For each apical view the region of interest was placed at a basal and mid-wall level in opposing wall segments (Fig. 3). The time between the start of the QRS and the peak positive systolic velocity (occurring between aortic valve opening and closure) was measured. The timings were correlated to the time to peak data from the TSI data of the same walls at the same level.

ECG analysis

An ECG was taken using a MAC 5000 ECG machine (Marquette Medical Systems) to determine the QRS duration. The QRS duration was determined electronically using software installed in the ECG machine and was confirmed manually using callipers. QRS duration was measured from the start of the Q wave (or if no Q wave present from the start of the R wave) to the end of the S wave (the 'J' point). The ECG data was analysed independently of the echocardiography data.

Assessment of dyssynchrony

A cohort of 100 volunteers with normal LV systolic function and a normal QRS was studied to determine normal levels of dyssynchrony between opposing wall segments (basal to basal and mid-wall to mid-wall).

Abnormal dyssynchrony was then classified as the mean of this delay from the normal volunteers plus two standard deviations. The dyssynchrony was only considered significant if it was above this abnormal level between two or more opposing wall segments.

Statistical analysis

For comparison of echocardiographic data between the two QRS duration groups an unpaired *t*-test was used.

The relationship between TSI time to peak velocity data and TDI graph time from QRS to systolic peak velocity was analysed using Pearson's correlation. Intra- and inter-observer variability was also analysed using Pearson's correlation. A P value of < 0.05 was considered statistically significant.

The specificity, sensitivity, positive and negative predictive values of QRS duration compared with the TSI method was also calculated.

Results

Within the patient population, 80 patients (80%) had an ischaemic cardiomyopathy, and 14 patients had an idiopathic cardiomyopathy. The remaining six had developed a cardiomyopathy secondary to other causes (amyloidosis n = 1, sarcoidosis n = 2, alcoholic cardiomyopathy n =3).

Validation of TSI

Correlation between the TSI derived time to peak velocity and TDI graph derived time from QRS to peak systolic velocity (Ts) was calculated for all subjects. The correlation coefficient was r = 0.98 ($P < 0.001$) (Fig. 4).

The intra- and inter-observer correlations for TSI derived time to peak velocities for 10 randomly selected patients (giving 120 time to peak data points) were 0.89 and 0.85 respectively ($P < 0.001$).

Assessment of dyssynchrony

In 100 normal volunteers the mean level of LV dyssynchrony was found to be 47 ± 29 msec. The cut-off value for significant LV dyssynchrony was determined by taking the normal value plus two standard deviations, i.e. 105 msec.

Table 1: Patient characteristics for each QRS duration group.

	QRS < 120	QRS ≥ 120	*P*-value
Number of patients	48	52	
QRS duration	94 ± 16	154 ± 25	< 0.001
Age	61 ± 15	69 ± 13	NS
Gender (male)	36 (75%)	41 (79%)	NS
IHD*	37 (77%)	43 (82%)	NS
Idiopathic	7 (15%)	7 (13%)	NS
Ejection fraction	28 ± 4	24 ± 6	NS
Significant diastolic dysfunction	22 (46%)	32 (62%)	< 0.01

*IHD – ischaemic heart disease

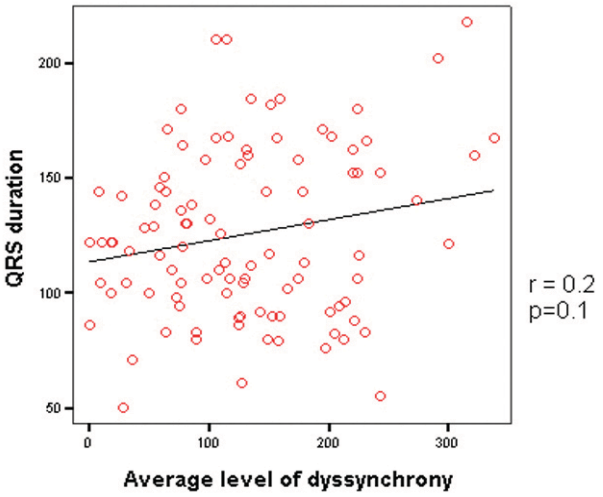

Fig. 6: The time to peak data averaged for each patient and compared with their QRS duration.

QRS duration and TSI

There were 48 patients (48%) with a QRS duration of less than 120 msec and 52 patients (52%) with a QRS duration ≥ 120 msec. Patient characteristics of each group are shown in Table 1.

There was no significant difference in age, gender, aetiology of the cardiomyopathy or ejection fraction between the two groups. However, subjects with a prolonged QRS duration were more likely to have significant diastolic dysfunction ($P < 0.01$).

In the subjects with a prolonged QRS duration, 30/52 (58%) demonstrated significant dyssynchrony with TSI. In the 'narrow' QRS duration group, 31/48 (65%) demonstrated significant dyssynchrony. Indeed, there was no significant difference between the two QRS duration groups for the presence of dyssynchrony ($P = 0.49$) (Fig. 5). The sensitivity and specificity of QRS duration as a marker of cardiac dyssynchrony was found to be 49% and 44% respectively.

The time to peak delay data collected for each patient was averaged and compared to the QRS duration. There was no correlation between QRS duration and the average degree of delay (r = 0.2, $P > 0.1$) (Fig. 6).

The positive predictive value of QRS duration to predictive value was 35%.

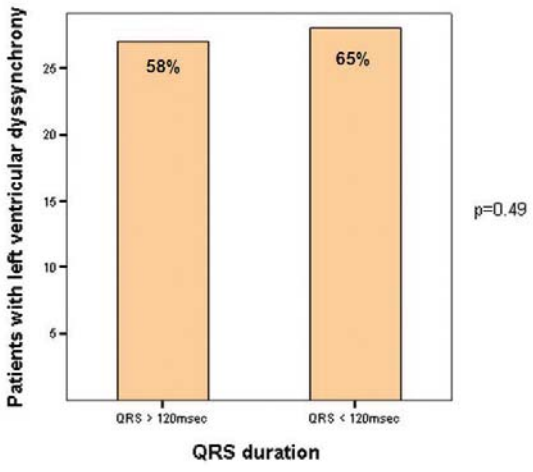

Fig. 5: The presence of significant dyssynchrony stratified into QRS duration < 120 msec and QRS duration ≥ 120 msec. The bars represent the number of patients with significant dyssynchrony as determined by tissue synchronisation imaging.

Discussion

QRS duration has limited value as a predictor of cardiac dyssynchrony. The search for a simple, non-invasive and reliable measure of mechanical dyssynchrony has been a burden for heart failure practitioners since the benefit of CRT was unequivocally demonstrated in randomised control trials.[4–7] The assertion, however, that every patient with a prolonged QRS duration has significant dyssynchrony that can be improved with CRT has significant limitations.

Validation of TSI

We found TSI was an easy to use, rapid, reliable and reproducible method of assessing mechanical LV dyssynchrony. In our hands, we felt that this novel technique was easier and quicker to use and understand than traditional methods of dyssynchrony assessment using the TDI graphs. TSI assessment of LV dyssynchrony correlated well with the TDI assessment of dyssynchrony in the same wall segments. Using TDI to assess LV dyssynchrony has been validated extensively in phantoms,[21] animal models[22,23] and human studies[24] indicating that TSI is an accurate and easy to use tool for the assessment of regional LV myocardial dyssynchrony.

Assessment of dyssynchrony

Our cut-off value of 105 msec between two or more opposing wall segments for significant dyssynchrony was determined from the dyssynchrony index of a normal population plus two standard deviations. Other studies using TDI to assess dyssynchrony have used various cut-off values ranging from 60 msec,[15] 65 msec[16] and up to 110 msec.[17] These cut-off values were determined from their CHF subject cohort retrospectively according to response to CRT. Our cut-off value is consistent with these previous studies.

QRS duration and TSI

We have shown that many patients with an ejection fraction less than 35% and prolonged QRS duration do not have significant mechanical dyssynchrony as demonstrated by TSI. This method has potential as a screening test to

determine which patients may benefit from and which may be 'non responders' to CRT.

We have also demonstrated significant dyssynchrony in patients with a 'narrow' QRS. It is possible that many patients with drug refractory CHF may benefit from CRT despite not having a broad QRS complex. We may have a method in TSI to rapidly identify this subset of patients currently being denied a potentially effective therapy.

We have found QRS duration has a poor sensitivity and specificity as a screening test for the prediction of significant mechanical dyssynchrony. This supports other data that has demonstrated these limitations in current CRT selection criteria.[15–17]

QRS duration and diastolic dysfunction

It was interesting to find that the prolonged QRS duration group tended to have more significant diastolic dysfunction (pseudonormalised or restrictive). It is possible that the long QRS duration reflects a greater degree of myocardial degeneration and fibrosis affecting the conduction system and the myocardium.

This may in turn result in decreased ventricular compliance leading to increased filling pressures. Whether any direct relationship exists between QRS duration and the level of diastolic function in patients with reduced systolic function remains to be elucidated.

We propose that further testing of this method of detection of dyssynchrony occur in CHF patients with a clinical indication for CRT to determine if TSI is able to predict response to CRT and to perhaps expand this therapy to CHF patients with a normal QRS duration.

Limitations

We did not assess symptoms or functional class of each subject, so it is not possible to tell which subjects may have been suitable for CRT from a symptomatic perspective.

Even though subject data was only included in this study if a recent (within one month of the echocardiogram) ECG had been taken, it is possible that a new bundle branch block or widening of the QRS duration may have occurred between the time of ECG and echocardiogram. This limitation, however, was minimised as the QRS duration from the ECG was correlated with the QRS duration from the lead used on the echocardiogram (lead II).

A large proportion of our subjects had an ischaemic cardiomyopathy (80%) due to our acute hospital setting, which is higher than that seen in the majority of the CRT trials. This high percentage of ischaemic patients may be a confounding factor.

Conclusion

Dyssynchrony is common in a cardiomyopathic population. Moreover, it is as common in patients with shorter QRS duration as patients with a wide QRS. QRS duration alone is not predictive of mechanical dyssynchrony as detected by tissue synchronisation imaging.

Acknowledgments

The authors acknowledge the support of the Cardiology Department at Flinders Medical Centre and in particular Lynn Brown, Judy Donovan, Tracy Hecker, Hari Koutsounis and Kinta Lim for their assistance with the echocardiography studies.

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Ultrasound in New Zealand emergency departments

Sampsa Kiuru

Abstract

Aims To survey the use of ultrasound in New Zealand emergency departments (ED). The study included the proficiency level, quality assurance (QA) programs and the scope of practice for lightweight, portable ultrasound.

Methods A 24-question survey was distributed to all 38 EDs by mail, with a final response rate of 95%. Frequencies were calculated with the available data.

Results 67% of large New Zealand hospitals (annual volume > 25,000 attendances per year) have an ED ultrasound available 24-hours, whereas only 12% of the smaller facilities do (< 25,000 attendances per year). Obtaining an out-of-department ultrasound is difficult in most facilities; 42% of departments needed more than three hours to obtain a study during normal day time hours; 33% had no access after hours; while another 33% required more than three hours. Despite the difficulty, 90% of ED directors felt that they should have 24-hour access to ultrasound. In those EDs with an ultrasound machine, 64% had established credentialling policies, although not all doctors were ultrasound credentialled. All of the EDs surveyed used ultrasound for focused abdominal sonography for trauma (FAST) and abdominal aortic aneurysm (AAA) examinations and, in 48% of the departments, for cardiac arrest patients.

Conclusions While the demand for ultrasound in New Zealand EDs is high, the level of access is relatively low, despite an expressed need for 24-hour coverage. As in other specialities, the increasing availability of high quality, portable equipment is providing clinicians with a powerful bedside diagnostic tool. While doctors are using various organisations for training and accreditation, more credentialling needs to be undertaken within the departments.

Introduction

Over the last 50 years, ultrasonography has become an increasingly important diagnostic tool in medicine and not just within radiology departments. In North America and Europe, emergency physicians commonly use ultrasound as a diagnostic tool in their daily clinical practice. Unlike North America, in Europe, while physicians are highly tuned to the use of ultrasound, emergency medicine is only recognised as a speciality in England and Ireland. The literature shows that emergency department ultrasound (EDUS), also known as emergency physician-performed ultrasonography (EPPUS) in the USA, is useful in assessing and managing patients with various emergent conditions.[1]

Despite ultrasound being widely practiced in Europe, Asia and North America, it is not as widely used in Australasian emergency departments (ED).[2] A 2002 survey in New Zealand revealed that 96% of emergency medicine clinical directors felt that urgent ultrasonography should be available 24 hours-a-day. However, only one out of the 24 New Zealand EDs surveyed had access during 'off-hours' or 'out of radiology department working hours' to ultrasound services within 15 minutes.[3] This is despite the recommendation by the Australasian College for Emergency Medicine (ACEM) that 'ultrasound examination, interpretation and clinical correlation should be available in a timely manner 24-hours-a-day for emergency medicine patients.[4,5] While ACEM is not a credentialling body, it suggests guidelines for the training and credentialling of ultrasound in emergency medicine.

Individual hospitals credential individuals to perform and interpret the ultrasound examinations. EDUS has been incorporated steadily into the training of emergency medicine registrars (New Zealand and Australia) or residents (North America).

The initial American curriculum was created in 1994.[6] Both the oral and written general examinations of the American Board of Emergency Medicine (ABEM) include questions regarding ultrasound. Ultrasound training is required in the USA by the Residency Review Committee. In 2003, 92% of ultrasound emergency medicine programs reported 24-hour EDUS availability.[1]

No study assessing the use of EDUS in New Zealand training programs has been carried out. Although ACEM does, in its policy document, encourage training programs to provide instruction and experience in bedside ultrasound imaging, this is not a requirement (as it is in the USA).[5]

The scope of EDUS has continued to expand from the initial focussed abdominal sonography for trauma (FAST)

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Received 13th December 2005 accepted for publication 13th April

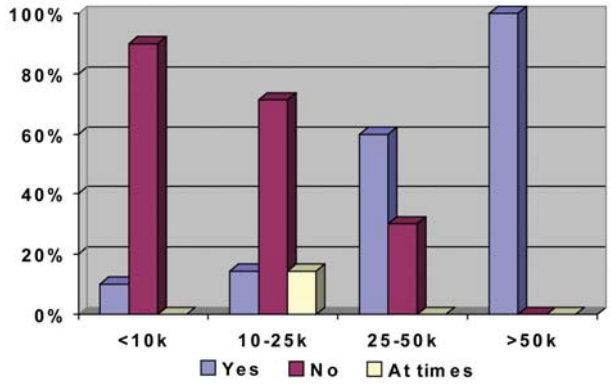

Fig. 1: Availability of emergency department-performed ultrasound to annual ED volume.

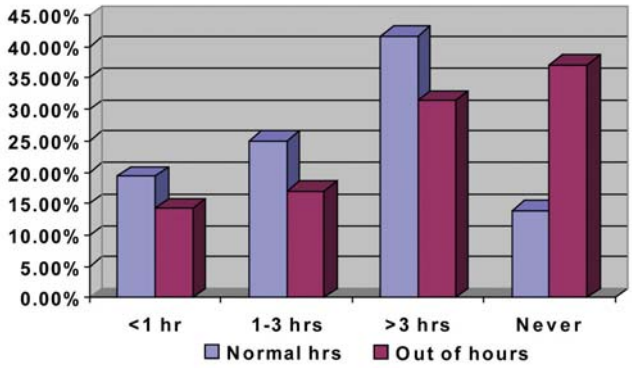

Fig. 2: Time to obtain ultrasound in and out of regular working hours.

and for abdominal aortic aneurysm (AAA). ACEM specifically supports the use of ultrasound for FAST examinations, AAA, pericardial fluid, ectopic pregnancy and evaluation of renal and biliary tract disease.[5] Recent studies have shown that central venous line placement is faster and with fewer complications under ultrasound guidance[7] and the practice may become standard of care in the future in the USA.[8] Furthermore, EDUS can be useful in cardiac arrest.[9,10]

The most contentious issue facing EDUS is training and credentialling. In 1999, the American Medical Association (AMA) issued a resolution which stated that ultrasonographic imaging is 'within the scope of practice of appropriately trained physicians'.[11] This raises the question as to what constitutes an appropriately trained physician. In New Zealand, ACEM is the certifying body for ultrasound examination in the EDs, however, this credentialling only covers FAST and AAA examinations. Studies have shown that the ACEM credentialling process has been effective in tertiary care hospitals.[12]

In the USA, the American Institute of Ultrasound in Medicine (AIUM) is the most rigorous association involved in the accreditation of ultrasound practice. Other credentialling bodies include the American College of Emergency Physicians (ACEP), the Society of Academic Emergency Medicine (SAEM) and the Australasian Society for Ultrasound in Medicine (ASUM).

Australasian emergency doctors have access to the ASUM Diploma in Diagnostic Ultrasound, while the recently introduced Certificate in Clinician Performed Ultrasound (CCPU) by ASUM, in conjunction with ACEM and RACS, offers a credential for medical practitioners who are not imaging specialists but use diagnostic ultrasonography at the point of care.

The present study was, first, designed to determine the degree of EDUS in New Zealand, both in academic and in community hospitals; second, to measure the extent of ultrasound proficiency levels, QA programs and the scope of practice for portable ultrasound; and third, to assess the extent to which there has been any change to 'out of department' and 'off-hours' ultrasound availability since 2002.

Methods

A MEDLINE literature search was performed combining the subject headings 'Ultrasound', 'Accident and emergency', 'Emergency medicine', 'Humans"' and 'New Zealand' since the 1960s. A survey used by Moore *et al.,* in the *Journal of Ultrasound Medicine*[1] was modified for use in New Zealand. Questions regarding demographics and present availability of urgent ultrasound were based on the questionnaire by Woo.[3]

The Multicentre Regional Ethics Committee approved the survey as a service quality review and exempted it from further assessment.

The 24-question survey was mailed to the clinical directors of all EDs in New Zealand. The list of EDs was obtained from the New Zealand Ministry of Health, with additional data from the District Health Boards (DHB). To obtain a complete survey of all hospital EDs in New Zealand, additional DHB data was obtained from their websites and through telephone calls.

The survey covered availability, use, training and quality assurance programs for emergency physician-performed ultrasonography. The results of the survey were strictly confidential, known only to the author, and all responses were coded. If no initial response resulted from the first mailing, an additional questionnaire was mailed and, as a last resort, a telephone follow-up was completed. As an incentive to improve the response rate, ultrasound textbooks were distributed randomly to three respondents. Responses were complied and entered into Excel (Microsoft Inc., Redmond, WA USA) and then transferred to the SPSS 8.0 (SPSS Inc. Chicago, IL USA) statistical program.

Discussion

The final response rate was 95%. Of the 40 hospital departments surveyed, 38 identified themselves as EDs and 36 completed the questionnaire. This response rate is similar to that reported by the Woo study (92%). While the overall numbers in this study are relatively small, they include a larger number of smaller hospitals than the Woo study; 14 more facilities were surveyed than in the Woo study.[3] This avoids the suggestion that the bias of larger hospitals, where the use of EDUS may be more active, could lead to an overestimation of ultrasound use. It should be noted, however, that the numbers of departments actually performing EDUS in New Zealand is relatively small and any conclusions from this study should be interpreted accordingly.

There is a correlation between the availability of ED ultrasound and hospital size. Most larger hospitals, with ED volumes greater than > 25,000 presentations annually, had an ultrasound machine in the ED (67%). In those hospitals with less than < 25,000 presentations annually, most did not

have access to 24-hour ultrasound (21/24 (88%)). The two hospitals with annual presentations of > 50,000 had an ED ultrasound machine (Fig. 1).

During normal radiology department working hours, 14% of the hospitals had no access to ultrasound and, in 42% of the hospitals surveyed, it took more than three hours to obtain a study from the hospital radiology department; only 19% of the EDs were able to obtain an ultrasound study under one hour during normal working hours.

As many life-threatening emergencies present to the ED outside regular work hours, many difficult medical decisions are made at times when ultrasound availability is lower. Thirty-seven per cent of the departments had no access to ultrasound and almost one-third (32%) required more than three hours to obtain an ultrasound study during 'off-hours' (Fig. 2). Because the present study includes all ED facilities, including the smaller hospitals, the number of facilities with no access to ultrasound (37%) is higher than that reported by Woo in 2002 (25%).[3]

It is not surprising that 90% of ED directors responding to the survey felt that ultrasound machines should be available in their departments 24-hours-a-day. This is consistent with previous results and shows that the directors are acutely aware of the need for quick access to ultrasound. Despite the fact that the ED directors felt the need for 24-hour ultrasound availability, only 31% currently had this level of access. Sixty-one per cent did not have an ED ultrasound machine in their department, and 44% had no plans to obtain an ED ultrasound machine.

Financial constraints, especially in smaller facilities, could explain these responses. This is combined with the fact that there appears to be a lack of experience in using ultrasound in patient care. One facility noted that, despite having a machine, the physicians lacked training or experience in using it.

The survey results showed that the overall level of certification in ultrasound in New Zealand is very low, even in academic EDs. In general, in New Zealand hospitals with ED ultrasound machines, the level of physician certification was less than 20%. Ten ED departments planned to purchase an ultrasound machine. This reflects the growing awareness of ultrasound as an integral part of emergency medicine as well as a growing availability of reliable and affordable, portable ultrasound machines.

Departments with an ultrasound machine available for emergency physicians

In hospitals with an ED ultrasound machine, there was a large variation in its use. Some made little use of the machine while others used ultrasound much more frequently. Close to half of the EDs (46%) used ultrasound between one to 10 times per month per physician. As would be expected, in the EDs with more frequent use of ultrasound, a greater variety of examinations were performed. In the EDs with average use per physician of more than 10 studies per month per physician, on average six different studies were performed. In contrast, only 2.5 different examinations were done in departments with less than 10 studies per month per physician. This most likely reflects the growing confidence and level of comfort that the frequent use of ultrasound brings.

The most important issue in the development of EDUS has been training and credentialling. Sixty-four per cent of the New Zealand EDs had credentialling policies in place and, of the departments where physicians held credentials, all reported following the ACEM policy guidelines on the use of ED ultrasound. This is quite different to the training programs in the USA. In 2002, only 51% of the 102 emergency medicine training programs in the USA had credentialling policies. Studies have shown that the credentialling process by ACEM has been effective in tertiary care hospitals.[12]

In New Zealand, although seven EDs had credentialling policies, few doctors were credentialled. Almost 80% of the EDs had less than 20% of their doctors credentialled and only one program had over 81% of the ED doctors credentialled. This reflects the need for training opportunities in EDUS. The literature has shown, locally, that a goal-directed use of ultrasound can be successfully taught to emergency doctors.[2] A similar pattern can be seen in the USA training programs, where 44% of the departments had fewer than 20% of their consulting physicians credentialled.

Quality assurance (QA) is another important aspect of EDUS. The present survey highlights that the level of QA in emergency ultrasound New Zealand is very low. The best method of QA in ultrasound studies is via moving images and this is done in only 18% of the EDs. Interestingly, half of the QA was done by radiologists, with the other half performed by ED consultants who had ultrasound certification and/or experience. Both radiologists and ED doctors were involved in QA at one ED.

The development of ultrasound in EDs in New Zealand needs inter-departmental support and it is encouraging to see radiologists working with ED consultants in this regard. The present survey also highlighted the absence of a coordinated approach within EDs towards the training, credentialling, teaching and professional development of emergency doctors in ultrasound. Only 20% of the ED directors reported having a coordinator responsible for the promotion, development and credentialling of ED ultrasound. Interestingly, those EDs employing an ultrasound coordinator also have an active QA program; the use of ultrasound would expand with a dedicated coordinator, who would supervise training and QA, as well as promoting research.

Of the 11 EDs that reported using ultrasound for FAST and AAA examinations, which ACEM recommends for credentialling, 46% used ultrasound in medical arrest patients and 36% used ultrasound in both procedures as well as to scan the biliary system. In 27% of the FAST and AAA EDs, ultrasound was used for transabdominal pelvic scans, as well as for examining the renal system.

ACEM training program

The area of formal training in the use of ultrasound for the registrars in emergency medicine highlighted some interesting results: 33% of EDs surveyed had no ultrasound training program in place; 33% provided less than 10 hours teaching and 33% programmed for 10–40 hours of teaching. In all cases, the hours of formal teaching would be insufficient for most certification programs.[1]

The ACEM certification recommendations do not require initial didactic hours, but suggests a certain minimum number of examinations to be completed. However, looking internationally, both ACEP and SAEM require a minimum of 40 hours of formal teaching for a physician to be certified

in the use of ultrasound. In New Zealand, 86% of EDs do not have a rotation in ultrasound for their trainees. Only one program has an elective rotation. While one training program did not provide trainees with any practical ultrasound training during their ED work, six EDs did allow examinations to be conducted under supervision. No examinations were done without supervision.

The number of registrar-performed ultrasound scans was low, with 40% of the programs recording no registrar examinations in one month of ED work. Twenty per cent of the programs had their registrars perform less than 25 ultrasound examinations during their entire training rotation. Sixty per cent of the training facilities expected the trainees to scan 25–75 examinations during the training period. One facility expected registrars to have up to 150 examinations per registrar training period. In the USA, 39% of emergency medicine programs have their trainees perform > 150 examinations during their training rotations. Again, this impacts on the credentialling because many of the accreditation programs require at least 150 ultrasound examinations to be logged.

Of the five EDs supporting training programs that responded to the survey, two had a credentialling pathway for their ED trainees, with both these programs satisfying credentialling recommendations outlined in ACEM policy requirements.

The ultrasound studies that registrars performed in all five EDs were FAST and AAA examinations. No programs noted the use of ultrasound with medical arrest, transabdominal/vaginal pelvic exams, renal, cardiac (ECHO), or to assess for deep vein thrombosis (DVT). One program assessed biliary system and used ultrasound with other procedures; the most common examinations were FAST and AAA because ACEM has a certification program for these studies.

Conclusion

Many of the EDs in New Zealand, especially the smaller facilities, lack 24-hour, seven-days-per-week access to diagnostic ultrasound from radiology departments. These small facilities generally do not perform their own EDUS, despite clinical evidence supporting the use of ultrasound in emergency settings. Overall, 90% of the New Zealand ED directors felt that they needed full-time ultrasound access in their facilities but only 33% had access to ultrasound outside normal radiology department working hours. Forty-two per cent of all EDs were unable to obtain ultrasound studies under three hours from their hospital radiology departments, while 14% had no access to ultrasound at all and only 19% of EDs could receive ultrasound results in less than one hour, even during normal radiology department working hours.

The main factors that seem to hinder the effective and timely use of diagnostic ultrasound in the EDs seem to be the lack of systematic, coordinated training and the absence of standardised certification in the use of ultrasound. While ACEM suggests the guidelines for training and credentialling in emergency medicine ultrasound, it is not the credentialling body and individual hospitals remain responsible for the performance and interpretation of the ultrasound examinations. When the resultant standard is compared to international standards, the level of proficiency in New Zealand ED ultrasound is low; there is a general lack of ED ultrasound coordination and QA programs.

Currently, the level of formal teaching for FACEM registrars and number of examinations performed in New Zealand teaching programs is low in comparison to programs in the USA.[1] However, the present study clearly highlights that, where there is coordinated, frequent use of ultrasound, doctor confidence and comfort levels grew and there was a reported, greater variety of limited ultrasound examinations being performed. In EDs with an ultrasound coordinator, there was an increased use of ultrasound.

The use of ultrasound in the EDs should be encouraged with increased access to good training programs and courses for emergency physicians.

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Ultrasound detection of limb reduction defects in Western Australia 1997–2000

Michelle Pedretti

Abstract

Objective This paper analyses the antenatal ultrasound detection rate of limb reduction defects in Western Australia. The purpose was to assess the rate of antenatal detection of limb reduction defects. The outcome of the pregnancy was also reviewed, if a limb reduction defect was antenatally diagnosed, to determine the use of intervention in the pregnancy.

Design Births between 1997 and 2000 (inclusive) were used in this study. The data were collected from the Birth Defects Registry, Western Australian Health Department. Of the 101,897 reported births during this four-year period, a total of 104 limb reduction defects were reported.

Results The overall prevalence rate of limb reduction defects among liveborn infants was 10.0 per 10,000 births. Of the 104 pregnancies with limb reduction defects 34 were diagnosed antenatally, 60 were associated with other abnormalities (seven with other limb reduction defects and 19 with other organ abnormalities). When a limb reduction defect was detected antenatally, 14 progressed to deliver a live birth (three were stillborn and 17 of the pregnancies were terminated). Of the total number of limb reduction defects demonstrated during this period 15 were associated with chromosomal abnormalities.

Conclusions These data suggest that while there is a relatively low incidence of occurrence of limb reduction defects, Western Australia has a higher incidence than the documented average. In Western Australia, 33% of these are detected prior to delivery, by antenatal ultrasound. The limb reduction defects were generally associated with multiple other anomalies, either multiple limb reduction defects or other organ abnormalities or a combination of both.

Keywords Limb reduction defects, ultrasound, detection

Introduction

Limb reduction deformities in pregnancy have been associated with a number of different causes, some of these include: amniotic band syndrome, Trisomy 13 and 18,[1] teratrogens (including cocaine,[2] oestrogens, tetracycline and thalidomide), VATER syndrome, thrombocytopenia – absent radius (TAR) syndrome and caudal regression syndrome.[3] Chorionic villus sampling (CVS) has also been associated with an increased incidence of limb reduction defects when performed in the first trimester.[4,5,6]

Limb reduction defects are relatively uncommon in their occurrence rate, especially in its more severe forms. Occurrence rates throughout the world have been documented in the range of 5–6 per 10,000 births.[7–10] Limb reduction defects are visually apparent at birth and, as such, are well reported. The published data available relating to limb reduction defects have broad coverage with reference to many things including causes, [2,4,11–14] detection[1,3,10,15,16] and incidence.[7–9,17] A number of papers have been written in relation to the suggested association between early chorionic villus sampling and limb reduction defects.[8,16]

Significant data have been published relating to the ultrasound diagnosis of limb reduction defects.[3,10,15–16] A number of regional studies have been published which, like this study, have retrospectively reviewed limb reduction defects in local geographical regions.[7–8,11,13] To tbe best of my knowledge, however, there have not been any data in published studies which have assessed the ultrasound detection of limb reduction defects in Western Australia. The Birth Defects Registry of Western Australia publishes data of the birth statistics in Western Australia on a regular basis.[18] These data include limb reduction defects, other developmental and chromosomal defects pertaining to the Western Australia population.

An issue for consideration in reviewing these papers is the significant improvement in ultrasound technology. For example, Stoll[16] was published assessing the ultrasound detection of limb reduction defects between 1979–1988 and Calzolari[7] was published reviewing data from 1978–1987. Castila[8] has the longest period of data collection extending from 1967–1992. This paper assesses limb reduction defects in deliveries between 1997–2000, in Western Australia. The ultrasound technology has significantly improved since 1988, which should also improve the overall detection of

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Table 1: Number of West Australian infants with limb reduction defects detected antenatally and postnatally. As derived from data from Western Australian Health Department records, the Birth Defects Registry.

	Single LRD only	Single LRD + other organ abnormality	Single LRD + other organ abnormality + chromosomal abnormality	Multiple limb reduction defects only	Multiple LRD + chromosomal abnormality	Multiple LRD + other organ abnormality	Multiple LRD + other organ abnormality + chromosomal abnormality	Total
Antenatal Detection of a limb reduction defect	8	1	0	7	2	13	3	34
Postnatal Detection of a limb reduction defect	19	15	2	8	0	18	8	70
Total	27	16	2	15	2	31	11	104

limb reduction defects and also allow detection at an earlier gestation than was previously available.

It is interesting to note that, even with the documented widespread use of CVS for prenatal fetal sex determination in Taiwan prior to 1993, Chen *et al*.[4] have only documented 30 cases that were delivered with a limb reduction defect, from almost 65,000 deliveries. Of these 30, only six had CVS in their pregnancy. All six cases had undergone transcervical CVS at a gestational age between seven and 10 weeks. It should be considered that CVS is not recommended prior to 10 weeks gestation. This is to reduce the possible risk of miscarriage and/or limb reduction defects that may result from CVS being performed prior to 10 weeks.[4–5,16]

Both of the papers published by Chen *et al.*[4] and Webster *et al.*[14] considered the possibility that documented limb reduction defects from chorionic villus sampling may be associated with other birth defects and may result from either vascular insufficiency or uterine compression. Hence, the recommendation from these authors is that a detailed ultrasound examination be undertaken following CVS, to improve the detection of any fetal limb defects, vascular disruption malformations and compression deformities that may have occurred as a result of the CVS.

Calzolari *et al.*[7], Castila *et al.*[8] and Stoll *et al.*[16] all review limb reduction defects in a local/regional area, respectively: Emilia Romagna, Italy,[7] South America[8] and New York,[16] while the present study reviewed limb reduction defects in Western Australia. Although a number of papers have been written relating to limb reduction defects,[4,6–9,11–13] further study is required, especially in regard to the local prevalence of limb reduction defects and the ultrasound detection of these defects.

It is often useful for the medical community to determine whether prenatal diagnosis would alter pregnancy management or outcome. The question could be asked of parents who have had a child with a limb reduction deformity, however, as this is a retrospective study no patient contact was sought. As such, the answers were sought through the available data.

This information has been obtained by assessing the number of pregnancies with antenatal detection of a limb reduction defect and of those, who opted for a termination of the birth. This would allow for anonymity of the participant and improve the validity of the results by 'insulating the people interviewed from the consequences they would suffer if others knew their opinions.[19] The problem with this type of assessment, however, is that a number of these pregnancies with the antenatal detection of a limb reduction defect also had a number of other abnormalities – either multi-organ abnormalities, chromosomal abnormalities or significant/multiple limb reduction defects (Table 1). Detection was classified according to the detection of a limb reduction defect not to the time of detection of other abnormalities.

There are two different schools of thought within the medical community and also within the community at large. One believes that it is better to know in advance of any fetal abnormalities[15–16] so that there is greater preparation of prospective parents to deal with complications and a greater choice. The other believes that is preferable to progress through the pregnancy, unaware of any problems with the abnormalities becoming evident at delivery.[6]

The antenatal detection of limb reduction deformities can often assist parents in what to expect when their child is delivered. It can also offer the opportunity for parents to meet and interact with consultants who deal with these types of abnormalities and for them to meet with other parents who have children with similar structural abnormalities prior to the delivery.

Early detection also offers the opportunity for parents to terminate the pregnancy if the defect is detected early enough, should that be what they decide and dependent upon the abnormality.

Methods

The present investigation involved assessing the rate of antenatal detection of the limb reduction cases. Where other deformities were also present in those fetuses with limb reduction defects, a further review was undertaken to assess if the deformities were detected by ultrasound.

Following a 'rationalistic' paradigm,[20] this would allow further assessment of the validity in trying to detect limb reduction deformities at earlier gestations and improvement of the overall detection rate.

Table 2: Number of infants delivered in Western Australia. As derived from data from Western Australian Health Department records, the Birth Defects Registry.

	Live	Stillborn	Terminated due to fetal abnormality	Total
1997	25,085	171	117	25,257
1998	25,504	164	112	25,668
1999	25,564	179	152	25,743
2000	25,023	206	180	25,229
Total	101,176	720	561	101,897

Table 3: Antenatal detection rates of limb reduction defects 1997–2000. Values in brackets include pregnancies detected antenatally with a limb reduction defect through antenatal chromosomal testing (e.g. Amniocentesis or chorionic villus sampling). As derived from data from Western Australian Health Department records, the Birth Defects Registry.

	Antenatal detection of a limb reduction defect	Postnatal detection of a limb reduction defect	Total
1997	7 (11)	15	22
1998	3 (5)	17	20
1999	16 (24)	23	39
2000	8 (14)	15	23
Total	34 (54)	70	104

Recruitment of the sample

Ethical approval was sought and obtained from the Princess Margaret Hospital for Children and King Edward Memorial Hospital Ethics Committee, the Confidentiality for Health Information Committee (CHIC) and Charles Sturt University Ethics Committee.

The total number of babies and the number of babies with limb reduction deformities delivered in Western Australia over the nominated four-year period, extending from 1997–2000 was collected.

The data collected were obtained from the Western Australian Health Department records, the Birth Defects Registry. These data were then subdivided into the live, stillbirths and terminations for each year (refer to Table 2).

From the values in Table 2 it is possible to establish the occurrence rate of limb reduction deformities in Western Australia by using the total number of births and total number of births with limb reduction defects born in the state, as provided by Bower *et al.*[17] These values could be then further subdivided, using the data obtained from the Health department, to assess which of these babies born with a limb reduction defect were detected prenatally. The Health Department records detail whether the defect has been detected prenatally or at what age postnatally; unfortunately the fetal age of antenatal detection is not recorded, hence it cannot be commented on.

Other issues that need to be considered when assessing limb reduction deformities include the type of the deformity, the degree and the level of the defect. These are often classified according to one of two recognised classification systems for limb reduction defects. These data are also available through the Birth Defects Registry, with all limb reduction defects classified according to the ICD-9 coding system. There is a common theme throughout the published data, in that there is currently no standard classification of limb reduction defects.

A number of utilised classification codes are currently in use, the two major ones being the EUROCAT classification[7] and the World Health Organization (WHO) International Classification Disease (ICD)-9 coding. [9,13] The EUROCAT classification system for limb reduction defects is a standard classification system used throughout Europe. The WHO ICD-9 coding is more prevalent in America and Canada.[8–9,13]

Other papers have used adaptations of these classification systems. Some authors, like Machado *et al.*[15] have tried to produce classification systems for limb reduction defects based upon the onset of their aetiological occurrence. The lack of standard classification system has posed a problem for the comparison published data from around the world.

The assessment of the different types of limb reduction defects occurring in the Western Australian population and their classification was beyond the scope of this paper. A further paper could be prepared reviewing the different types of limb reduction defects that have occurred and their prevalence, to assess whether there is an increased incidence of a certain type of limb reduction defect and if there is further association with other structural fetal abnormalities.

Results

One hundred and four infants with limb reductions defects were delivered over the four-year period extending from 1997–2000 in Western Australia (Table 3).[17] Of these, the Health Department records noted that limb reduction defects were detected in 34 of the cases using antenatal ultrasound (Tables 2 and 3).[17] The gestation of the pregnancy at the time of the detection was not recorded, hence this study has been unable to document and discuss the gestational age of the antenatal detection.

The results have shown that there is a greater incidence of limb reduction defects in Western Australia than in other parts of the world, as documented by Castilla[8] and Calzolari[7] who have quoted prevalence rates averaging around 5 per 10,000 live births. The prevalence has been documented at double this rate (10 per 10,000 live births) from the data collected in Western Australia. The reason for this is uncertain and could be an avenue for further research.

Discussion

One incidental finding of this paper was a qualitative aspect, in that the parents of 32 fetuses with limb reduction defects (94% of fetuses with antenatally diagnosed limb reduction defects or 59% including fetuses who abnormal chromosomes (Table 3) opted to terminate the pregnancy. Of the 34 cases that were detected with a limb reduction defect antenatally, five had confirmed chromosomal abnormalities (confirmed by CVS or amniocentesis), 17 had other organ

abnormalities and 25 had multiple limb reduction defects (Table 1). The gestation of the pregnancy was unknown at the time of the antenatal ultrasound /detection of the limb reduction defects as these details are not recorded by the Birth Defects Registry. This would be a beneficial aspect to review as earlier antenatal detection allows greater choices for parents.

The papers by Stoll *et al.*,[16] Calzolari *et al.*,[7] Castila *et al.*[8] and Chen *et al*[4] have had significant periods of review. Both the papers by Stoll[16] and Calzolari *et al*[7] have reviewed limb reduction defects over a 10-year period. The review by Chen *et al.*[4] extended over a nine-year period, but closely reviewed only six cases of limb reduction defects, which were associated with CVS. The paper by Castila *et al.*[8] has the longest period of data collection extending over a 26-year period from 1967–1992.

While the current paper has a smaller time frame of four years, it has provided a more manageable number of cases to review. In addition, the numbers have been restricted due to the smaller base population, as compared to the other papers. The paper by Lin and Marshall[13] covered data over a five-year period which provides a similar time period to this study. The number of limb reduction defects in Western Australia is 104 (over the four-year period), where as Lin and Marshall[13] reviewed 281 cases of limb reduction defects in the state New York. This is due to the smaller overall population in Western Australia, compared to that of the state of New York.

There are a number of assumptions that have been made with regard to this study. These include:

- That all babies born with limb reduction defects are reported to the Birth Defects Registry;
- That all pregnancies terminated due to a fetal malformation are reported to the Birth Defects Registry;[17]
- Limb reduction deformities that have been detected antenatally are reported to the Birth Defects Registry at the time of detection and these records are matched to postnatal follow-up; and
- All defects are reported, regardless of the degree.

There are a number of problems with these assumptions. These assumptions may create some inaccuracies in the data, the most likely of which is a reduction in the overall frequency and decreased antenatal detection rate. Such inaccuracies would result from babies with limb reduction defects being lost to follow-up to the private system and mild cases of limb reduction deformities not being reported (as very mild cases are often not thought significant enough to report to the Birth Defects Registry).

The development of ultrasound technology and operator skill would be expected to affect this detection rate, as would the ultrasound approach used (i.e. transabdominal or transvaginal). The ultrasound approach used for the detection of the fetal abnormalities and the gestational age of the fetus at detection has unfortunately not been documented. This information including the quality of ultrasound machine used, transabdominal or transvaginal approach and the gestational age of the fetus would all have bearing on the detection rate.

A further analysis of the data to review the types of limb reduction defects present in the Western Australian population may be worthwhile to ascertain any prevalence of certain types of limb reduction defects. It is interesting to note that 59 of the 104 reported cases of limb reduction defects had multiple limb reduction defects and 60 had other organ abnormalities, with 77 of these having both multiple limb reduction defects and other organ abnormalities (Table 1). Given this large proportion of either multiple organ abnormalities or multiple limb reduction defects, only approximately 33% of these cases were detected antenatally. The data show that almost 50% of cases were detected antenatally, where an abnormality other than a limb reduction defect was detected (Table 3). A study to assess any prenatal diagnosis or karyotyping that may have been performed in the cases of reported limb reduction defects would aid in the assessment and review of any association between prenatal diagnosis (early amniocentesis/CVS) and limb reduction defects.

In the later years of this study there has been the introduction of the first trimester screening program in Western Australia.[21] This program rates the pregnancy as either high or low risk for the assessment of Down syndrome. First trimester screening takes place between 11 and 13 weeks and 6 days gestation (CRL of 45 to 84 mm inclusive). This screening program has also allowed for an earlier assessment of the developing fetus and detection of some abnormalities. Previously, unless the patient was referred for CVS or amniocentesis, or has been referred for a dating scan, patients are often not seen until the routine anatomy scan performed between 18 and 20 weeks gestation. Dating scans were often performed early in the first trimester and, due to the small size of the fetus at this stage, the number of limb reduction defects detected has been limited. With the association of increased maternal age and Down syndrome[12] and of advanced maternal age and limb reduction defects[4] it would be beneficial to assess whether limb reduction defects could be assessed with reasonable accuracy at these first trimester screening examinations.

Acknowledgements

Thanks to Dr Carol Bower, Birth Defects Registry, King Edward Memorial Hospital who collated the data of limb reduction defects and Mrs Kym Webb who assisted in the original literature search. Thanks also to my supervisors for their assistance in this paper: Dr Carol Bower, Assoc Prof Jan Dickinson, Dr Bev Hewitt, Mrs Karen Pollard and Mrs Marilyn Zelesco.

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ASUM Ultrasound Bulletin 2006 May; 9 (2): 30–32

Changing frequency affects nuchal translucency measurement

Mark Bryant

Nuchal measurement has been described by the Fetal Medicine Foundation (FMF)[1] as a measurement that is taken between two interfaces – skin and soft tissue overlying the cervical spine. This nuchal measurement is then recorded within the FMF software and combined with first trimester blood results to give a risk factor for trisomy 21. Nicolaides *et al.*[2] have also set some of the following criteria for these nuchal measurements (Fig. 1).

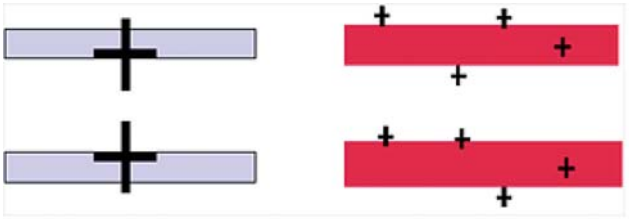

Fig. 1: criteria for nuchal measurements.

- The magnification should be as large as possible and *always* such that each slight movement of the callipers produces only a 0.1 mm change in the measurement.
- Measurements should be taken with the inner border of the horizontal line of the callipers placed *on* the line that defines the nuchal translucency thickness – the crossbar of the calliper should be such that it is hardly visible as it merges with the white line of the border, not in the nuchal fluid.

Accurate assessment is essential in the measuring of the nuchal translucency thickness. In a normal foetus it is usually less than 3 mm.

Measuring the nuchal translucency is limited by the axial resolution of the ultrasound system. Axial resolution is the ability of an ultrasound beam to separate structures at different depths along the axis of the beam and display them as separate structures.[3] It is determined mainly by spatial pulse length (SPL). The length of B-mode ultrasound pulses is typically between two and four wavelengths.

The limit of axial resolution is SPL/2. The SPL on a typical ultrasound unit may range from approximately 0.3 mm to 3 mm. This means that axial resolution may vary from 0.15 mm to 1.5 mm.

The finite length of ultrasound pulses causes thin membranes to appear thick in ultrasound images, therefore, a thin linear reflector perpendicular to the beam will be displayed with a thickness equal to the SPL.

When using higher frequency transducers, pulse length is reduced and axial resolution is improved and the two interfaces bordering the nuchal translucency appear thin (Fig. 2). As frequency decreases (SPL increases) the two interfaces become thicker and encroach on the nuchal translucency (Fig. 3).

Fig. 2

Fig. 3

Table 1: Effects of transducer frequency on filament size and spacing. Comment: Between the 3.5 and 12 MHz transducer there is a 1 mm difference in filament spacing.

Transducer frequency	Filament thickness	Filament spacing
3.5 MHz	1 mm	0.7 mm
6.0 MHz	0.7 mm	1.3 mm
12 MHz	0.2 mm	1.7 mm

Therefore, a smaller nuchal translucency thickness will be measured with a low frequency transducer than if a higher frequency transducer were to be used. This is a property of the finite length of the pulses and is demonstrated by the tissue equivalent phantom seen in Figures 4a, 4b and 4c.

Figures 5a and 5b further demonstrate the difference between a standard low frequency transducer and a high frequency transducer.

Figures 6a and 6b show the effect of changing frequency on nuchal measurements:

Conclusion

Guidelines for performance of nuchal translucency examinations have been technically strict, yet this discussion on pulse length and axial resolution shows a potential error in data collection.

It is suggested that, if accurate measurement is important, then a corrected scale for different spatial pulse lengths is required. Alternatively, the skin may be included in the nuchal translucency calculation. This measurement will not change with frequency.

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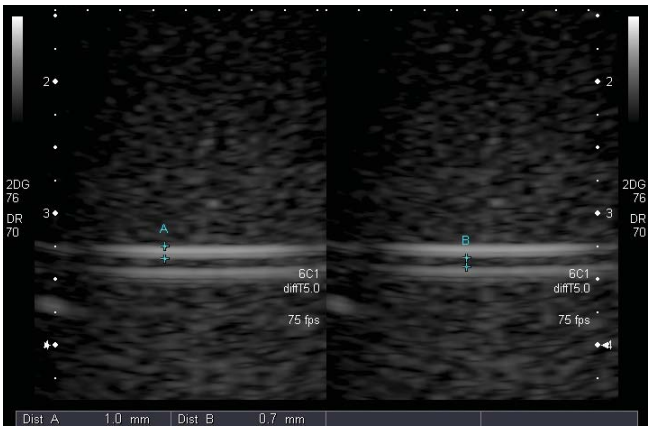

Fig. 4a: 3.5 MHz curved linear transducer.

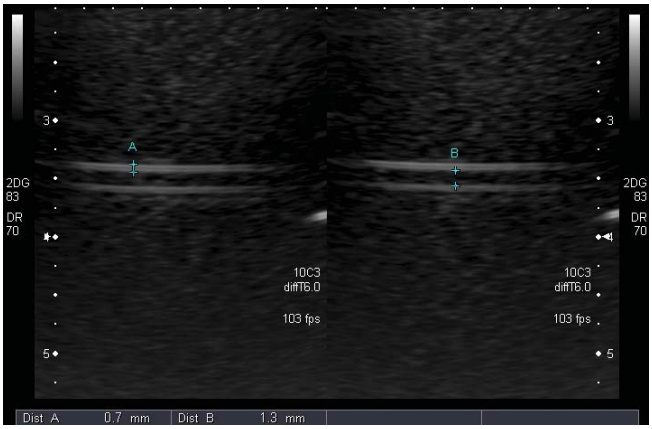

Fig. 4b: 6 MHz curved linear transducer.

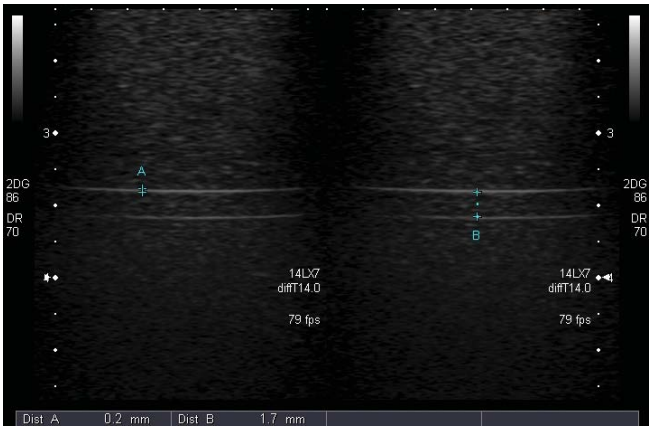

Fig. 4c: 12 MHz linear transducer.

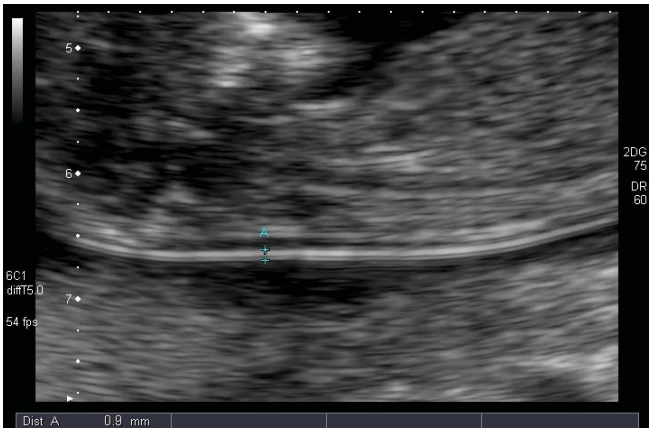

Fig. 5a: Demonstrates that with a frequency of 5 MHz the skin is 0.9 mm thick.

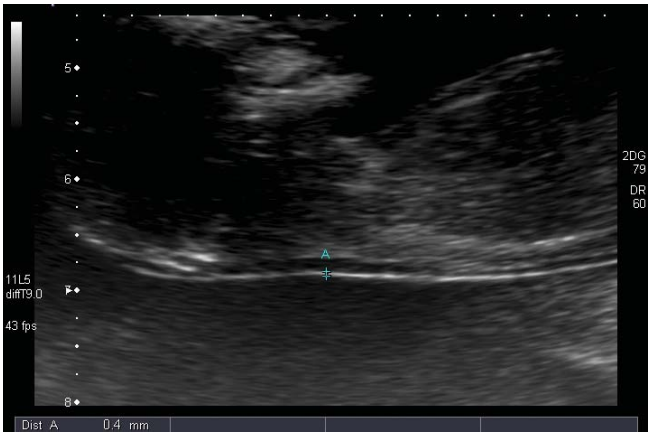

Fig. 5b: Demonstrates that as the frequency is increased to 9 MHz the skin becomes 0.4 mm thick.

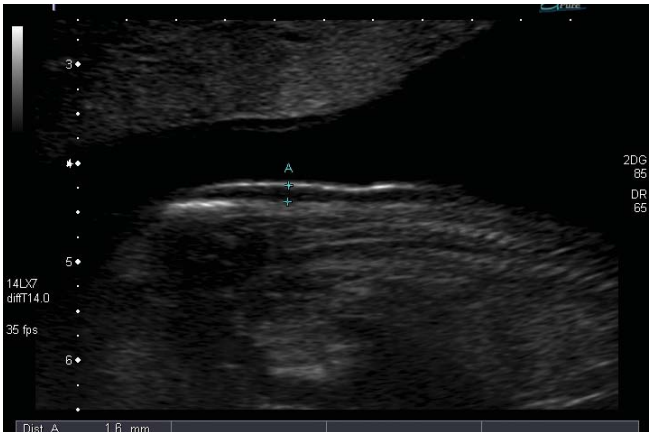

Fig. 6a: 14 MHz gives a nuchal translucency of 1.6 mm.

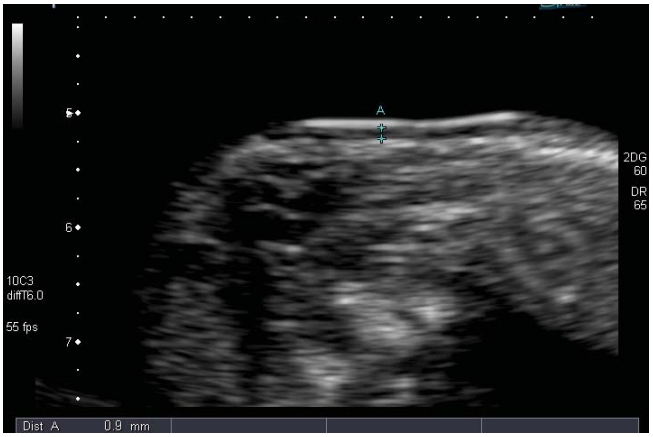

Fig. 6b: The same nuchal translucency is measured as 0.9 mm with 6 MHz.

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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. However, unless specifically indicated, opinions expressed should not be taken as those of ASUM. *See Andrew McLennan's response on the following page.*

Editor's Note

A response was invited from Dr Andrew McLennan, Chair Reference Committee Nuchal Translucency – Ultrasound, Education and Monitoring Program.

Dr McLennan's comments follow:

Mark Bryant's article makes interesting reading and should spark some debate.

I agree that higher frequency transducers can improve the image BUT:

(1) Most obstetric practices don't have probes exceeding 9 MHz (most TA probes are 7 MHz or less, and the majority of NT examinations are not done using the higher frequency TV transducers);
(2) The majority of our patients are not suitable for scanning with high resolution transducers (maternal habitus and depth of subject being the main limiting factors); and
(3) The guidelines, that the National Audit body espouses, tries to take the variability of 'apparent' skin thickness into account by emphasising:
    a) Decreasing the gain to obtain the sharpest part of the line and place the caliper on the first sharp part of the line, avoiding the 'fuzz' that surrounds it; and
    b)Not using early generation harmonics, which tend to increase the 'fuzz' around the line.

Addressing these issues has led to a reduction in the number of Australian operators who systematically 'under-measure' the nuchal translucency. Using the highest frequency transducer available/practicable could also help to reduce the number who 'under-measure'.

I am not in favour of changing the measurement to include the skin thickness as well as the nuchal translucency – it would mean ignoring an entire world body of literature on the accuracy and efficacy of NT screening as it currently stands and it would also be subject to the same vagaries and errors as the current measurement guidelines.

Andrew McLennan

PS In Figure 5b, the fetus is not truly mid-sagittal and both calipers are placed in the nuchal fluid, not on the first part of the lines making the measurement inappropriately small.

Pediatric Ultrasound: How, Why and When

Author Rose de Bruyn
Publisher Churchill Livingstone
November 2004
ISBN 0-443-07275-2
Approx Cost $A116.00

Ultrasound is one of the most widely used imaging modalities in children, but the approach and findings in this age group are different to that in the adult population.

Rose de Bruyn is a senior consultant paediatric radiologist at Great Ormond Street Hospital for Children in London, where she has been running the Ultrasound Department for many years. Her book is an excellent, holistic text, which covers the role, settings, approach, techniques and expectations of ultrasound in the paediatric environment. Unlike other texts covering paediatric ultrasound, there is a strong emphasis on approach and protocols, and developmental, anatomical and clinical background.

This book is beautifully laid out, with 12 clearly defined chapters, all of which are concisely overviewed at the onset.

The first chapter, on general issues is excellent, covering everything from the appointment letter and information leaflet, through the importance of a child friendly environment and approach, equipment, occupational injury, image storage and ultrasound safety.

The second chapter, on prenatal sonography, is also a welcome addition to a paediatric imaging book, where the continuum from prenatal to postnatal imaging is often ignored. After this, there is a separate chapter for each anatomical system. In addition, there is a comprehensive chapter on paediatric interventional ultrasound, which again is not covered in other books.

Every chapter has a section on technique, as well as covering embryology, anatomy and clinical findings as appropriate. Just about every clinical topic encountered in a busy paediatric centre is covered. The only omission I encountered (and it is very small indeed) is that of the imaging of the prepubertal breast bud.

There are plenty of black and white and colour illustrations, including ultrasound, as well as radiographic, radionuclide, magnetic resonance, clinical and pathology correlative images, explanatory diagrams, summary tables and normative charts.

A recommended reading list and a glossary of medical terms specific to paediatric conditions are useful additions at the end.

In summary, *Pediatric Ultrasound: How, Why and When* is an excellent text for anyone involved in the ultrasound of children. It is not an atlas of 'conditions', but is an innovative holistic approach to the subject, stressing the needs of children and their parents, and the contribution of well and appropriately performed and interpreted ultrasound to the clinical diagnostic pathway. This book will guide the reader towards this goal at every step.

It is a must for any practice that sees children.

Dr Michelle Fink
Paediatric Radiologist
The Royal Children's Hospital
Melbourne

Diploma of Diagnostic Ultrasound 2006 examination dates

Information pertaining to the 2006 examinations

2006 Part I
The Part I Examinations for 2006 will be held on Monday 15th May 2006.

2006 Part II
Casebooks for 2006 Part II DDU Examination were submitted January 2006.
The Written Examination for Part II will be held on Monday 15th May 2006.
The Oral Examination for Part II will be held on Saturday 17th June 2006 in Sydney. The Oral Exam for Cardiology candidates will be in Melbourne on Thursday 15th June 2006.

Results
Examination results will be mailed to candidates early July following the DDU Board of Examiners meeting.

Exam information
Information relating to changes in fees, examination dates, regulations, etc, is published regularly in the Ultrasound Bulletin.
Members are kept up to date with this and other related information by automatically receiving the *Ultrasound Bulletin*.

2006 Diploma of Medical Ultrasound Examination Dates

DMU Part II Practical Examination Period:
May – October.

DMU Part I & Part II Written Examinations will be held on Saturday 29th July.

DMU Part II Oral Examination Period: 15th September – 15th October.

DMU Part I Supplementary Written Examination will be held on Saturday 4th November.

2006 DMU Examination Fees

DMU Part I

Supplementary APP & PHY	$A600.00 + GST = $A660.00
Supplementary APP	$A300.00 + GST = $A330.00
Supplementary PHY	$A300.00 + GST = $A330.00

Component charges are listed on the ASUM website at www.asum.com.au/dmu.htm or may be obtained from the ASUM office tel +61 2 9958 7655.

Policies and Statements

Obstetric and gynaecological ultrasound

C3 Policy on vaginal scanning by sonographers

September 1996, Revised September 1999, Revised March 2006

Vaginal (transvaginal, endovaginal) scanning is now an integral part of ultrasound scanning of the female pelvis.

Sonographers performing vaginal scans should be adequately trained in both vaginal scanning techniques and interpretation of the resultant images. Sonographers should perform the examinations only with the approval of the supervising medical practitioner.

Each sonographer should develop a protocol with the supervising medical practitioner (preferably in writing) indicating the circumstances when a vaginal scan may be performed: (please also refer to Policy D8)

(1) Only if specifically requested by the referring doctor
(2) When a vaginal scan is the optimal method to achieve an accurate diagnosis, or
(3) Any other circumstances as agreed with the supervising medical practitioner.

At the time of the examination the sonographer should:

(1) Provide adequate explanation of what is involved. Many women expect the examination to be performed transabdominally – this may need time and explanation.
(2) Ensure adequate privacy to allow the woman to undress and lie on the examination couch. A sheet should be provided.
(3) Use an appropriate transducer. Offer the patient the option of introducing the transducer herself, as she would a tampon.

The presence of a third person in the room during the examination should be encouraged. ASUM supports any effort by a sonographer to have a third party present during a vaginal examination if he/she so desires.

The ASUM *Guideline on the Disinfection of Vaginal Scanning Transducers* should be adhered to.

ASUM will maintain a constant review of issues related to vaginal scanning.

One should be aware of the sensitive nature of such an examination and the potential for eliciting discomfort during the procedure. If significant discomfort is associated with the examination, assessment of the patient by the supervising medical practitioner is advised.

D8 Guidelines for the performance of a gynaecological scan

September 1993, Revised October 1999, Reaffirmed July 2005, Revised March 2006

History

An appreciation of the clinical history can be very important in reaching a diagnosis. Necessary clinical details include the presenting symptoms, the age of the patient, her parity, menstrual history and last menstrual period (LMP), any previous gynaecological surgery, any current hormonal treatment and results of any available hormonal tests for pregnancy. Careful note should be taken of any recorded clinical findings.

Facilities and preparation

Changing facilities which ensure privacy should be available and the patient should be appropriately draped during the examination.

The procedure should be fully explained before scanning is commenced, including the possibility of a vaginal scan where applicable. Written explanation in various languages may be helpful in multicultural areas where an interpreter is not readily available. When a vaginal scan is offered, the patient may choose to accept or refuse this offer and undue persuasion is inappropriate.

ASUM's *Guidelines for Disinfection of Transvaginal Transducers* (B2) should be followed.

Each practice needs to develop a strict protocol and code of conduct for performing gynaecological ultrasounds.

Equipment

High quality high frequency vaginal and abdominal transducers should be available when an examination of the female pelvis is undertaken. The availability of colour/power and spectral Doppler is advisable.

Scanning

Transabdominal and transvaginal evaluation are complementary and both should be considered. In most situations, it is recommended that an abdominal approach is employed first but the clearest images of the pelvic organs are usually obtained using the transvaginal route. Therefore a transvaginal scan should be offered in most circumstances. In certain circumstances a transvaginal scan may not be appropriate. The reason for not performing a transvaginal scan should be stated in the report.

A transperineal or transrectal examination may be appropriate if an abdominal scan cannot provide the necessary information and a transvaginal scan is inappropriate. Transperineal and transrectal scanning require adequate experience.

Pelvic scanning

The assessment of the female pelvis is best performed in real time with particular attention to each of the anatomical structures, their appearance and relation to adjacent structures, their mobility and the eliciting of tenderness and/or reproduction of symptoms, all of which must be recorded.

Uterus

– size, shape, position, mobility
– endometrium – thickness, B mode appearance, class-ification, vascularity, intracavity masses and if present their mobility
– myometrium – masses (size, number, echotexture,

D8 Guidelines for the performance of a gynaecological scan (cont.)

vascularity, position, particularly in relation to the endometrial cavity)
– serosal surface – any masses as above

Ovaries
– positive identification of both ovaries and location
– size, echotexture
– follicles, cysts, solid masses
– mobility and tenderness

Adnexa
– masses, characteristics
– free fluid

Kidneys
– position, exclude hydronephrosis

Evaluation of masses
- Site of origin, relationship to uterus and ovaries
- Dimensions
- Borders (well defined, irregular, poorly defined, thick walled)
- Cystic, solid, mixed, loculated or septated
- Contents of cysts
- Echogenicity and architecture of solid areas
- Vascularity
- Mobility

Further assessment of pelvic pathology may involve additional procedures (e.g. SIS - Saline Infustion Sonohysterography, HY-CO-SY – Hysterosalpingography with Contrast Sonography, 3 Dimensional Ultrasound.

Documentation
Such studies require adequate documentation of the technique utilised, the anatomical structures assessed and any pathological findings. Such documentation should include sonographer observation record, (demonstrating the protocol utilised) with supporting imaging evidence.

Vascular ultrasound

D15 Peripheral arterial ultrasound

May 2006

This section covers peripheral arterial assessment of upper and lower limbs using imaging and non-imaging modalities.

Section 1: instrumentation

Essential equipment
Regular equipment maintenance is to be performed on all equipment used for vascular ultrasound.

The duplex Doppler ultrasound machine is used to provide simultaneous or sequential real-time greyscale (B-mode) imaging of the vessel wall and plaque analysis of the angle corrected Doppler frequency spectrum from a selected sample volume within the vessel lumen. As well as the essential characteristics of both B-mode imaging and duplex Doppler spectral analysis for quantification of blood flow velocities (or Doppler frequency shift) the ultrasound machine should have colour Doppler imaging. Colour Doppler provides a qualitative, simultaneous display of flow information superimposed on the real time greyscale image.

Required characteristics
- Imaging frequencies as specified in anatomic regional sections
- Range-gated Doppler with the ability to adjust the position and size of the range gate/sample volume
- Provision for the measurement and display of the Doppler angle
- Provision of visual and audible output of Doppler signal
- Provision for hard copy or other form or recording

Specific characteristics
- Ankle Brachial Index
  CW Doppler with transmitting frequencies of 4-10 MHz. Sphygmomanometer and appropriate size blood pressure cuffs.
- Duplex Ultrasonography
  Imaging frequencies and focal depths must be appropriate for the vessels and structures involved. Imaging frequencies of > or = 3.5 MHz for aortoiliac vessels, and a linear array transducer with imaging frequencies of at least 5 MHz should be available. Colour Doppler imaging capabilities and Doppler transmitting frequencies of at least 3.0 MHz should be available.

Secondary techniques
Secondary techniques should be implemented using appropriate equipment and protocols. Plethysmographs should have hardcopy readout. CW Dopplers used for waveforms analysis should have hardcopy readout and bidirectional flow detection.

Section 2: indications and techniques

Indications
Peripheral arterial testing should be done for appropriate indications in patients with suspected peripheral arterial disease.

Appropriate indications include
- Exercise-related limb pain
- Limb pain at rest
- Extremity ulcer/gangrene;
- Follow-up of limb revascularisation;
- Absent peripheral pulses;
- Digital cyanosis, cold sensitivity
- Arterial trauma
- Assessment of high-risk patients
- Peripheral arterial aneurysm;
- Arterial dissection
- Arteriovenous fistula or malformation
- Dialysis access malfunction

Techniques
Appropriate techniques shall be used for evaluation of the peripheral arterial circulation.
- Ankle Brachial Index
  Systolic pressure is measured at the ankle using CW Doppler ultrasound to detect the presence of arterial

D15 Peripheral arterial ultrasound (cont.)

flow distal to the cuff. Pressures are compared to the contralateral leg and to the higher brachial systolic pressure. Doppler waveform analysis should be performed at the pedal arteries. Where appropriate, segmental limb pressure may be repeated after inducing reactive hyperaemia, treadmill exercise or active plantar pedal flexion.

- Arterial Duplex Ultrasonography

  The major arteries are evaluated and the presence and extent of disease is documented. The examination may include the abdominal aorta, iliac, femoral, popliteal and tibial arteries, as well as the extremity branches. B mode imaging, colour Doppler imaging and pulsed Doppler information should be used to evaluate these vessels. Flow characteristics are documented by Doppler sampling at both normal and abnormal vessel segments. Angle correction for Doppler angle is essential whenever spectral analysis is performed. Sites of suspected stenosis are evaluated with Doppler measurements proximal to, within and distal to maximum stenosis.

Secondary Techniques should be implemented in an accepted manner using appropriate equipment and protocols.

- Upper Extremity Arterial Testing

Upper limb segmental pressures (with and without exercise), duplex imaging, photoplethysmography and digital pressures should be performed in an accepted manner where indicated.

Section 3: diagnostic criteria

Ankle Brachial Index

The primary diagnostic criteria are the absolute segmental systolic pressures relative to systemic (higher brachial artery) pressure. Interpretation to determine haemodynamic severity of disease should be based on published criteria. Limitations of this technique, for example, the presence of vessel incompressibility or limb oedema, should be noted.

Pressure changes in response to exercise or reactive hyperaemia are measured at timed intervals and compared to the resting baseline pressure measurement.

Duplex ultrasonography

Interpretation of B-mode data should include anatomic information about the location and orientation of arterial structures as well as the site, size and extent of abnormalities. Limitations in image quality and completeness of exam should be noted. Arterial haemodynamics assessed with duplex ultrasound should categorize the severity of stenosis or presence of occlusion using validated methodologies relating Doppler velocity (frequency shift) and waveform measurements to predicted degree of disease.

Secondary techniques

Upper extremity arterial testing

As above for lower extremity.

A detailed description of the diagnostic criteria used for each examination should be able to be provided. This should accompany any charts, graphics or formulae used in the interpretation of the examination results. Specific references, including text or article, author, date, name and volume number of journal, or name of text and publisher should be provided.

Diagnostic criteria that have been developed within the vascular practice or modified from standard published criteria should be internally validated where possible.

Section 4: summary

Once the clinical indications for the examination have been elicited from the patient and the sonographer has addressed any questions or concerns raised by the patient, the examination can commence after informed consent has been obtained from the patient. A complete and thorough examination should be performed (using the guidelines above) and extended as necessary. Adequate, representative hard copy should be made of all aspects of the examination, including a written worksheet for the reporting physician.

Additional valuable information is available in the following references:

Lewis W. Duplex applications for the renal patient-evaluating renal artery stenosis and dialysis fistula. *ASUM Ultrasound Bulletin* 1998; 1 (3): 13–17.

Kidd J. Duplex ultrasound for the planning and follow-up of endovascular interventions. *ASUM Ultrasound Bulletin* 1998; 1 (3): 24–30.

D16 Intracranial cerebrovascular ultrasound

May 2006

Section 1: instrumentation

Essential equipment

Regular equipment maintenance is to be performed on all equipment used for vascular ultrasound.

The duplex Doppler ultrasound machine is used to provide simultaneous or sequential real-time greyscale (B-mode) imaging of the vessel wall and plaque analysis of the angle corrected Doppler frequency spectrum from a selected sample volume within the vessel lumen. As well as the essential characteristics of both B-mode imaging and duplex Doppler spectral analysis for quantification of blood flow velocities (or Doppler frequency shift) the ultrasound machine should have colour Doppler imaging. Colour Doppler provides a qualitative, simultaneous display of flow information superimposed on the real time greyscale image.

Required characteristics

- Imaging frequencies as specified in anatomic regional sections
- Range-gated Doppler with the ability to adjust the position and size of the range gate/sample volume
- Provision for the measurement and display of the Doppler angle
- Provision of visual and audible output of Doppler signal
- Provision for hard copy or other form or recording

Transcranial Doppler provides real-time spectral display of Doppler-shifted frequencies and digital display of velocity and pulsatility parameters, assuming an angle of insonation less than 15 degrees.

Transcranial duplex combines greyscale (B-mode) images of the intracranial vessels, superimposed colour Doppler flow images, and angle-corrected Doppler spectral analysis.

Specific characteristics

Transcranial Doppler

- Range-gated pulsed Doppler frequencies of

D16 Intracranial cerebrovascular ultrasound (cont.)

2–2.5 MHz ultrasound
- Adjustable sampling depth from 30-130 mm
- Adjustable sample volume
- Adjustable gain
- Adjustable power
- Audio output and visual display of Doppler spectrum

Transcranial duplex (in addition to above)
- Doppler angle-correction
- B-mode imaging frequency 2.0-3.5 MHz
- Colour flow Doppler imaging frequency between 2.0–2.5 MHz

Section 2: indications and techniques

Indications

Appropriate indications include:
- Demonstrated extracranial carotid disease: Transcranial Doppler examination identifies collaterals, haemodynamic insufficiency, and impaired autoregulatory reserve. Reactivity of vessels following carbon dioxide inhalation or acetazolamide administration is measured in some laboratories.
- Cerebral ischaemia with suspected intracranial stenosis/occlusion: Using Duplex or injectable contrast may improve accuracy compared to Doppler alone.
- Detection of embolic signals: Intraoperative monitoring detects high intensity transient signals (HITS) in some patients undergoing open heart surgery or carotid endarterectomy.
- Subarachnoid haemorrhage: Sequential examinations detect vasospasm before clinical deterioration, providing a window of opportunity for therapy.
- Arteriovenous malformations.
- Brain death.

Techniques

- Transcranial Doppler: The anterior, middle and posterior cerebral arteries and the distal internal carotid artery are insonated through the temporal bone ultrasonic window. The intracranial vertebral and basilar arteries are insonated through the foramen magnum. The ophthalmic and intracranial internal carotid arteries are insonated through the orbit. The manufacturer's safety limits for ultrasound power should never be exceeded, and power should be reduced to 10-25% of maximum when insonating through the orbit. In general, the sample volume should be kept as low as possible, provided there is adequate signal to noise. Velocity and pulsatility measures should be taken at (approximately 5 mm) depth increments along each vessel.
- Transcranial duplex: The principles are similar to trans-cranial Doppler except that transorbital examination is not performed.

Section 3: diagnostic criteria

Haemodynamic parameters

Velocity, pulsatility and other Doppler parameters should be based on published or internally generated criteria.

Collaterals

Periorbital and anterior communicating artery collaterals are detected by flow reversals whilst posterior communicating artery collateral is inferred from increased velocity along the length of the basilar artery.

Intracranial stenosis

Focal increase in Doppler velocity and turbulence.

Vasospasm

Diagnosis should be based on validated velocity and velocity ratio criteria.

Emboli

Identification of high intensity transient signals requires strict adherence to published consensus criteria. The dB intensity threshold should be stated in reports.

Brain death

Published criteria should be adopted.

A detailed description of the diagnostic criteria used for each examination should be able to be provided. This should accompany any charts, graphics or formulae used in the interpretation of the examination results. Specific references, including text or article, author, date, name and volume number of journal, or name of text and publisher should be provided.

Diagnostic criteria that have been developed within the vascular practice or modified from standard published criteria should be internally validated where possible.

Section 4: summary

Once the clinical indications for the examination have been elicited from the patient and the sonographer has addressed any questions or concerns raised by the patient, the examination can commence after informed consent has been obtained from the patient. A complete and thorough examination should be performed (using the guidelines above) and extended as necessary. Adequate, representative hard copy should be made of all aspects of the examination, including a written worksheet for the reporting physician.

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May 2006

Section 1: instrumentation

Regular equipment maintenance is to be performed on all equipment used for vascular ultrasound.

The duplex Doppler ultrasound machine is used to provide simultaneous or sequential real-time greyscale (B-mode) imaging of the vessel wall and plaque analysis of the angle corrected Doppler frequency spectrum from a selected sample volume within the vessel lumen. As well as the essential characteristics of both B-mode imaging and duplex Doppler spectral analysis for quantification of blood flow velocities (or Doppler frequency shift) the ultrasound machine should have colour Doppler imaging. Colour Doppler provides a qualitative, simultaneous display of flow information superimposed on the real time greyscale image.

Required characteristics
- Imaging frequencies as specified in anatomic regional sections
- Range-gated Doppler with the ability to adjust the position and size of the range gate/sample volume
- Provision for the measurement and display of the

D17 Extracranial cerebrovascular ultrasound (cont.)

Doppler angle
- Provision of visual and audible output of Doppler signal
- Provision for hard copy or other form or recording

Specific characteristics
- Imaging frequencies of 5.0 MHz or greater
- Doppler frequencies of at least 3.0 MHz
- Linear array transducer/s
- Colour Doppler capability

Section 2: indications and techniques

Indications
Cerebrovascular testing shall be done for appropriate indications. These include stroke, transient ischaemic attacks (TIAs), amaurosis fugax, presence of carotid bruit, pre-operative assessment of high risk patients or post-operative follow-up after carotid endarterectomy or other intervention.

Techniques
Appropriate techniques shall be used for evaluation of the cerebrovascular circulation.

Duplex Doppler / Colour Doppler
The course of the CCA, ICA, ECA and vertebral arteries should be evaluated from their origins as far distally as possible. Both sides must be examined. Where possible the origins of the subclavian arteries should also be examined.

Both imaging and Doppler information should be used to identify and evaluate major vessels.

Vessel anatomy and morphology should be documented with high quality imaging.

Using spectral and colour Doppler the haemodynamics of the cervical segments of the carotid and vertebral arteries should be studied and representative waveforms and velocity measurements recorded. Where possible the origins of the subclavian arteries should be studied with Doppler and abnormal haemodynamics recorded. Velocity measurements should be made with a Doppler angle of 60 degrees or less. Areas of suspected stenosis should be examined in the region proximal to the stenosis, at the point of maximum stenosis and distal to the stenosis.

Section 3: diagnostic criteria
Accepted diagnostic criteria should be used to assess the presence and severity of pathology in the extracranial cerebrovascular circulation and include assessment of both stenosis and plaque morphology.

The primary purpose of the duplex examination is to determine the presence or absence of disease in the extracranial carotid system, and if disease is present, to document its nature, location, extent and severity.

Duplex and Colour Doppler

Degree of stenosis
Vessel haemodynamics are categorized according to the severity of stenosis. Acceptable criteria for classification of stenosis might include application of published reports or the use of internally generated criteria. These criteria are based on multiple parameters such as peak systolic velocity, end-diastolic velocity, and the ratio of peak flow velocity through a stenosis to flow velocity proximal to the stenosis. Whether based on published reports or internally generated data, criteria should ideally be internally validated where possible.

Colour Doppler imaging facilitates the identification of stenotic lesions and the direction of post-stenotic jets and therefore guides the placement of the Doppler range-gate.

Plaque morphology
B-mode imaging should allow accurate localisation of atherosclerotic plaque and, wherever possible, classify plaque as hypoechoic, homogeneous, heterogeneous or calcific and describe the surface characteristics as smooth or irregular. Colour Doppler imaging and colour amplitude imaging may assist in the identification of hypoechoic plaque as an intraluminal filling defect.

A detailed description of the diagnostic criteria used for each examination should be able to be provided. This should accompany any charts, graphics or formulae used in the interpretation of the examination results. Specific references, including text or article, author, date, name and volume number of journal, or name of text and publisher should be provided.

Diagnostic criteria that have been developed within the vascular practice or modified from standard published criteria should be internally validated where possible.

Section 4: summary
Once the clinical indications for the examination have been elicited from the patient and the sonographer has addressed any questions or concerns raised by the patient, the examination can commence after informed consent has been obtained from the patient. A complete and thorough examination should be performed (using the guidelines above) and extended as necessary.

Adequate, representative hard copy should be made of all aspects of the examination, including a written worksheet for the reporting physician.

D18 Penile Doppler ultrasound

May 2006

Section 1: instrumentation

Essential equipment
Regular equipment maintenance is to be performed on all equipment used for vascular ultrasound.

The duplex Doppler ultrasound machine is used to provide simultaneous or sequential real-time greyscale (B-mode) imaging of the vessel wall and plaque analysis of the angle corrected Doppler frequency spectrum from a selected sample volume within the vessel lumen. As well as the essential characteristics of both B-mode imaging and duplex Doppler spectral analysis for quantification of blood flow velocities (or Doppler frequency shift) the ultrasound machine should have colour Doppler imaging. Colour Doppler provides a qualitative, simultaneous display of flow information superimposed on the real time greyscale image.

Required characteristics
- Imaging frequencies as specified in anatomic

D18 Penile Doppler ultrasound (cont.)

regional sections
- Range-gated Doppler with the ability to adjust the position and size of the range gate/sample volume
- Provision for the measurement and display of the Doppler angle
- Provision of visual and audible output of Doppler signal
- Provision for hard copy or other form or recording

Specific characteristics – Duplex ultrasound
- Imaging frequencies of 5.0 MHz or greater
- Doppler frequencies of at least 3.0 MHz
- Linear array transducer/s
- Colour Doppler capability

Secondary instrumentation
- CW Doppler with transmitting frequencies of 8-10 MHz
- Sphygmomanometer and appropriate sized cuffs
- Photoplethysmography (PPG)

Section 2: indications and techniques

Indications
Penile Doppler ultrasound is performed for the evaluation of erectile dysfunction.

Techniques
Appropriate techniques shall be used for evaluation of the penile circulation.

Duplex Doppler/Colour Doppler
The major vessels of the penis are to be evaluated including the cavernosal arteries before and after the administration of a vasoactive agent. The inflow vessels including the Aorta, common iliac and internal iliac arteries may also be examined if indicated.

Both imaging and Doppler information should be used to identify and evaluate these vessels.

Vessel anatomy and morphology should be documented with high quality imaging.

Using spectral and colour Doppler the haemodynamics of the cavernosal arteries should be studied and representative waveforms and velocity measurements recorded. Temporal monitoring of the Doppler velocities after the administration of a vasoactive agent is important. Velocity measurements should be made with a Doppler angle of 60 degrees or less.

Other procedures
- Might include penile/brachial indices using CW Doppler or PPG.

Section 3: diagnostic criteria
Accepted diagnostic criteria should be used to assess the presence and severity of pathology in the penis and/or inflow vessels.

The primary purpose of the duplex examination is to determine inflow to and outflow from the penis and if disease is present, to document its nature, location, extent and severity.

Duplex and Colour Doppler

Arterial insufficiency and venous leakage
The haemodynamics of the penis are determined according to waveform changes after administration of a vasoactive agent. Acceptable criteria for classification of arterial insufficiency and venous leakage are required. These criteria are based on multiple parameters such as vessel diameter, peak systolic and end-diastolic velocity. Whether based on published reports or internally generated data, criteria should be internally validated.

Colour Doppler imaging facilitates the identification of vessels and therefore guides the placement of the Doppler range-gate.

Penis morphology
B-mode imaging should identify areas of abnormal echogenicity in the corpora cavernosa. Vessel diameters are measured from the B-mode image.

A detailed description of the diagnostic criteria used for each examination should be able to be provided. This should accompany any charts, graphics or formulae used in the interpretation of the examination results. Specific references, including text or article, author, date, name and volume number of journal, or name of text and publisher should be provided.

Diagnostic criteria that have been developed within the vascular practice or modified from standard published criteria should be internally validated where possible.

Section 4: summary
Once the clinical indications for the examination have been elicited from the patient and the sonographer has addressed any questions or concerns raised by the patient, the examination can commence after informed consent has been obtained from the patient. A complete and thorough examination should be performed (using the guidelines above) and extended as necessary. Adequate, representative hard copy should be made of all aspects of the examination, including a written worksheet for the reporting physician.

D19 Visceral vascular testing using ultrasound

May 2006

Section 1: instrumentation

Essential equipment
Regular equipment maintenance is to be performed on all equipment used for vascular ultrasound.

The duplex Doppler ultrasound machine is used to provide simultaneous or sequential real-time greyscale (B-mode) imaging of the vessel wall and plaque analysis of the angle corrected Doppler frequency spectrum from a selected sample volume within the vessel lumen. As well as the essential characteristics of both B-mode imaging and duplex Doppler spectral analysis for quantification of blood flow velocities (or Doppler frequency shift) the ultrasound machine should have colour Doppler imaging. Colour Doppler provides a qualitative, simultaneous display of flow information superimposed on the real time greyscale image.

Required characteristics
- Imaging frequencies as specified in anatomic regional sections
- Range-gated Doppler with the ability to adjust the position and size of the range gate/sample volume
- Provision for the measurement and display of the Doppler angle

D19 Visceral vascular testing using ultrasound (cont.)

- Provision of visual and audible output of Doppler signal
- Provision for hard copy or other form or recording

Specific characteristics

- A wide range of imaging frequencies should be available
- A wide range of types of transducer (i.e. phased array, linear and sector) should be available
- Colour Doppler image capabilities

Section 2: indications and techniques

Indications

Indications will vary depending on clinical considerations assessed at the time of the examination. Generally accepted indications include:

- Evaluation of the mesenteric arterial system:
  Suspected coeliac/SMA insufficiency
  Aneurysm/pseudoaneurysms
- Evaluation of the hepato/portal circulation
  Suspected portal hypertension
  Suspected portal vein thrombosis
  Portal system to systemic shunt evaluation
  Suspected pseudoaneurysms/AV fistula
  Primary hepatic malignancies
  Suspected occlusion/stenosis/aneurysm
  Pre-op evaluation for hepatic transplants
  Suspected hepatic veno-occlusive disease
  Suspected heart disease/constrictive pericarditis
  Unexplained ascites
  Unexplained splenomegaly
  Pancreatic disease
- Evaluation of native renal arteries/veins
  Screening for renovascular hypertension
  Screening for ischaemic nephropathy
  Monitoring of known renal artery stenosis
  Suspected renal vein occlusion
  Monitoring and review of renal artery intervention
- Evaluation of renal transplants
  Renal transplant dysfunction
  Presence of bruit over allograft
- Evaluation of liver transplants
  Post-op hepatic dysfunction

Techniques

Appropriate techniques shall be used for the evaluation of the visceral vascular circulation. Patient preparation may be necessary to minimise bowel gas.

Evaluation of the mesenteric arterial system

The course of the abdominal aorta, coeliac axis, hepatic, splenic, superior mesenteric and inferior mesenteric arteries should be evaluated so that the presence and extent of disease can be documented.

- Imaging: The study should document vessel anatomy and morphology with high quality imaging.
- Haemodynamics: The study documents vessel haemodynamics by sampling of the appropriate vessels. Velocity determinations are made with knowledge of the angle between the ultrasound beam and the vessel being examined. Velocity or frequency measurements and spectral waveform characteristics are recorded at representative sites within the vessels.

Evaluation of the hepato/portal circulation

Examination of the hepatic and splenic parenchyma is an essential part of the examination. A thorough examination of the arteries and veins within the hepato/portal circulation using B-mode imaging, colour Doppler imaging and pulsed Doppler modalities should be carried out. The course of the main portal vein, right and left portal veins, the hepatic veins, inferior vena cava, splenic vein, superior mesenteric vein, should be evaluated so that the presence and extent of disease can be documented. Regions of possible vessel recanalisation (e.g. Ligamentum Teres for paraumbilical vein), or of varix formation, as well as the inflow and outflow vessels of portosystemic shunts are to be part of the examination.

- Imaging: The study should document vessel and organ anatomy and morphology with high quality imaging.
- Haemodynamics: The study documents vessel haemodynamics by sampling of the appropriate vessels. The presence or absence, direction and type of flow within the vessels are documented. The presence of collateral vessels should be documented. Velocity or frequency measurements and spectral waveform characteristics are recorded at representative sites within the vessels.

Evaluation of native renal arteries/veins

Renal arteries

Examination of the renal parenchyma is an essential part of the examination with the pole to pole length being measured. A thorough examination of the arteries and veins within the renal circulation using B-mode imaging, colour Doppler imaging and pulsed Doppler modalities should be carried out. The course of the abdominal aorta, renal and intra renal arteries are to be evaluated so that the presence and extent of disease can be documented.

Renal veins

Examination of the renal parenchyma is an essential part of the examination, with the renal length being measured. Evaluation of both kidneys and renal veins is essential. A thorough examination of the veins within the renal circulation using B-mode imaging, colour Doppler imaging and pulsed Doppler modalities should be carried out. The inferior vena cava, renal and intra renal veins are to be evaluated so that the presence and extent of disease can be documented.

- Imaging: The study should document vessel and organ anatomy and morphology with high quality imaging. Renal size and the documentation of the parenchyma is an important part of this study and;
- Haemodynamics: The study documents vessel haemodynamics by sampling of the appropriate vessels. Velocity determinations are made with knowledge of the angle between the ultrasound beam and the vessel being examined. Velocity or frequency measurements and spectral waveform characteristics are recorded at representative sites within the vessels.

Evaluation of renal transplants

Examination of the renal parenchyma is an essential part of the examination with the pole to pole length being measured. A thorough examination of the transplant artery(ies) and vein(s) within the renal circulation using B-mode imaging, colour Doppler imaging and pulsed Doppler modalities

D19 Visceral vascular testing using ultrasound (cont.)

should be carried out. The course of the abdominal aorta, ipsilateral iliac arteries and intra renal arteries are to be evaluated so that the presence and extent of disease can be documented.

- Imaging: The study should document vessel anatomy and morphology with high quality imaging.
- Haemodynamics: The study documents vessel haemodynamics by sampling of the appropriate vessels. Velocity determinations are made with knowledge of the angle between the ultrasound beam and the vessel being examined. Velocity or frequency measurements and spectral waveform characteristics are recorded at representative sites within the vessels.

Evaluation of liver transplants

- Imaging: The study should document vessel anatomy and morphology with high quality imaging.
- Haemodynamics: The study documents vessel haemodynamics by sampling of the appropriate vessels. Velocity determinations are made with knowledge of the angle between the ultrasound beam and the vessel being examined. Velocity or frequency measurements and spectral waveform characteristics are recorded at representative sites within the vessels.

Section 3: diagnostic criteria

Accepted diagnostic criteria are used to assess the presence and severity of abnormality in the intra-abdominal and retroperitoneal circulation. The primary purpose of the duplex examination is to determine the presence or absence of disease in the intra-abdominal and retroperitoneal circulation, and if disease is present, to document its nature, location, extent and severity.

Imaging: The image provides anatomical information about the location and orientation of vessels as well as the presence of abnormalities. Interpretation of B-mode data should include anatomic information about the location and orientation of the abdominal vasculature and abdominal organs. Limitations in image quality and completeness of the examination should be noted.

Haemodynamics: Vessel haemodynamics assessed by Doppler ultrasound (and colour Doppler imaging) should be categorised according to the presence or absence of flow (occlusion) and the severity of stenosis. Velocity determinations are made with knowledge of the angle between the ultrasound beam and the vessel being examined.

A detailed description of the diagnostic criteria used for each examination should be able to be provided. This should accompany any charts, graphics or formulae used in the interpretation of the examination results. Specific references, including text or article, author, date, name and volume number of journal, or name of text and publisher should be provided.

Diagnostic criteria that have been developed within the vascular practice or modified from standard published criteria should be internally validated where possible.

Section 4: summary

Once the clinical indications for the examination have been elicited from the patient and the sonographer has addressed any questions or concerns raised by the patient, the examination can commence after informed consent has been obtained from the patient. A complete and thorough examination should be performed (using the guidelines above) and extended as necessary. Adequate, representative hard copy should be made of all aspects of the examination, including a written worksheet for the reporting physician.

D20 Peripheral venous ultrasound

May 2006

This statement covers two types of venous ultrasound assessment, the assessment of deep and superficial vein thrombosis (DVT & SVT) and venous reflux which, in this statement, is called chronic venous insufficiency (CVI).

Duplex ultrasound must be utilised as the primary diagnostic device for peripheral venous testing.

Section 1: instrumentation

Essential equipment

Regular equipment maintenance is to be performed on all equipment used for vascular ultrasound.

The duplex Doppler ultrasound machine is used to provide simultaneous or sequential real-time greyscale (B-mode) imaging of the vessel wall and plaque analysis of the angle corrected Doppler frequency spectrum from a selected sample volume within the vessel lumen. As well as the essential characteristics of both B-mode imaging and duplex Doppler spectral analysis for quantification of blood flow velocities (or Doppler frequency shift) the ultrasound machine should have colour Doppler imaging. Colour Doppler provides a qualitative, simultaneous display of flow information superimposed on the real time greyscale image.

Required characteristics

- Imaging frequencies as specified in anatomic regional sections
- Range-gated Doppler with the ability to adjust the position and size of the range gate/sample volume
- Provision for the measurement and display of the Doppler angle
- Provision of visual and audible output of Doppler signal
- Provision for hard copy or other form or recording

Specific characteristics

- Imaging frequencies of 3.5 MHz for DVT assessment and 5 MHz for CVI assessment.
- For CVI assessment a linear array transducer is required
- Doppler frequencies ≥ 3.0 MHz, appropriate for the depth of the vessels being evaluated, should be used.
- For CVI assessment a suitable method of supporting the patient in a erect or semi erect position 60º elevation is required, allowing the patient to be safely supported whilst weight bearing on the contralateral leg.
- Colour Doppler capability.

Secondary instrumentation

Secondary techniques should be implemented in the accepted manner utilising appropriate equipment and protocol.

D20 Peripheral venous ultrasound (cont.)

All plethysmographic devices should have a simultaneous acquire and display and a method of recording the images/ traces to support the diagnosis.

Section 2: indications and techniques

Indications

Venous testing shall be done for appropriate indications and include:

- Evaluating possible venous thrombosis (DVT & SVT) or obstruction
- Venous mapping prior to bypass surgery. (Is this adequately addressed?)
- Dialysis graft or fistula flow assessment. (Is this adequately addressed?)
- CVI

Techniques

Appropriate techniques should be used for the evaluation of the venous system.

DVT – general

a) B-Mode

- Should be used to image the vein and its contents. This should be followed with compression of the vein in the transverse plane by applying pressure to bring the walls of the vein together.

b) Spectral Doppler

- Should be used to determine the direction of blood flow and to detect abnormal blood flow patterns which may suggest expanding the examination.
- Can be used as an aid to diagnose, but not to exclude DVT.

c) Colour Doppler

- May be used as a guide to the placement of the spectral Doppler sample
- May be used for the detection of thrombus as an aid to the B-mode procedure
- Is an essential requirement for assessment of veins in the abdomen and thorax.

d) Imaging recording

- Evidence to support the diagnosis should be recorded on hard copy.

DVT ultrasound assessment of the lower limb, pelvis and abdomen

a) Leg veins

- The DVT ultrasound assessment should be from the lower external iliac vein to the lower calf and include both deep and superficial veins. The examination may include one or both lower limbs depending upon clinical symptoms and departmental policy.
- The examination is required to include the iliac veins (CIV, EIV & IIV) and IVC if venous obstruction is suspected above the femoral canal. It is necessary to investigate alternative or concomitant abnormalities eg Baker's cyst, muscle tear etc. The inclusion of superficial veins into the procedure should be determined by clinical evidence.

b) Pelvic and abdominal veins

- The examination is required to include the iliac veins (CIV, EIV & IIV) and inferior vena cava.
- Colour Doppler should be used to image the lumen of the veins.
  B-Mode should be used to evaluate the paravenous structures.

DVT ultrasound assessment of the upper limb

- The examination is required to include the deep veins from the brachiocephalic venous trunk to the lower forearm. The jugular veins should also be examined.
- The examination is required to include the superficial veins of the shoulder and arm.
- Colour Doppler should be used to image the lumen of the subclavian and axillary veins.
- B-Mode should be used to evaluate the para venous structures.

CVI ultrasound assessment of the lower limb

- The CVI examination should also include an assessment to exclude venous obstruction.
- The assessment should be performed from the common femoral vein to the lower calf and all deep veins should be examined.
- The long and short saphenous veins, anterior vein of thigh and Giacomini veins should be included.
- All varicosities should be traced to their source, eg saphenous veins, perforators, vulval veins, round ligament veins etc.
- The examination may include one or both lower limbs depending upon clinical symptoms and departmental policy.

a) B-Mode assessment

- Should include a B-Mode component to examine for venous obstruction. It should also be used to assess venous anatomy and determine the placement of the Doppler spectral sample.
- Should include a recording of the diameter of the perforator as it crosses the fascial plane.

b) Doppler assessment of axial veins

- Should be taken with the patient elevated or supported in the erect position of ≥ 60º with the leg being examined non weight bearing.
- Recognised augmentation techniques should be used.

c) Doppler assessment of perforators

- Should include all perforators identified being tested using recognised augmentation techniques.
- Should be performed with the Doppler sample placed within the perforator at the level of the deep fascial plane.

Section 3: diagnostic criteria

DVT

- Accepted diagnostic criteria should be used to assess the venous flow, venous anatomy and relevant surrounding structures.
- Evidence to differentiate between chronic and acute DVT should be sought.
- Accepted diagnostic criteria should be used to evaluate the following:

a) B-Mode

- Intravascular filling defects such as thrombus, webs or calcium deposits should be recorded.
- Structures causing extrinsic compression should also be identified and recorded.

D20 Peripheral venous ultrasound (cont.)

- The particular vessel involved in an abnormal finding and to what extent should also be noted.
- The vein wall thickness and reflectivity should be noted and in equivocal situations a comparison to normal contralateral anatomy should be under taken where possible.
- The inability to compress the vein walls together in the transverse section either totally or partially should be recorded.

b) Spectral Doppler

- The cardiac or respiratory phasic Doppler flow should be recorded and evaluated.
- Direction of flow should be assessed to exclude collateral flow.
- Disruption of the normal Doppler signal should be noted.

c) Colour Doppler

- May be used to diagnose non occlusive and recanalised thrombus.
- The presence of colour fill may add evidence to the presence of flow.
- The absence of colour fill does not necessarily indicate the presence of thrombus.

Venous reflux

Accepted diagnostic criteria should be used to assess the venous flow, venous anatomy and relevant surrounding structures. Accepted diagnostic criteria should be used to evaluate the following:

- Abnormal venous anatomical pathways
- The presence and degree of venous reflux
- The particular vein and its segments involved
- The presence, position and size of perforators with abnormal flow profiles

A detailed description of the diagnostic criteria used for each examination should be able to be provided. This should accompany any charts, graphics or formulae used in the interpretation of the examination results. Specific references, including text or article, author, date, name and volume number of journal, or name of text and publisher should be provided.

Diagnostic criteria that have been developed within the vascular practice or modified from standard published criteria should be internally validated where possible.

Section 4: summary

Once the clinical indications for the examination have been elicited from the patient and the sonographer has addressed any questions or concerns raised by the patient, the examination can commence after informed consent has been obtained from the patient. A complete and thorough examination should be performed (using the guidelines above) and extended as necessary. Adequate, representative hard copy should be made of all aspects of the examination, including a written worksheet for the reporting physician.

Educational Protocol

E4 Competences required of cardiac sonographers who practice adult transthoracic cardiac ultrasound examinations

May 2006

Preface

The following echocardiography protocol outlines what competences an echo cardiac sonographer should be able to demonstrate, and apply as appropriate in the examination of patients.

This protocol represents a minimum standard adult echocardiographic acquisition and analysis protocol and should be extended according to the clinical features and findings. It is recognised that examination protocols, while a useful tool for standardisation of practice, may vary from laboratory to laboratory. Adherence to a simple protocol cannot substitute for competent acquisition, analysis and reporting of echocardiographic images.

All personnel performing cardiac ultrasound examinations should be cardiac sonographers, student cardiac sonographers or suitably qualified medical practitioners.

A complete echocardiographic examination should be conducted of each patient referred for echocardiography.

The cardiac sonographer should assess the clinical indications and patient history prior to conducting the echocardiogram and form an examination plan. If the indications are unclear or outside the capabilities of the procedure, sonographer or laboratory, the cardiac sonographer should seek further information and/or consult the supervising or referring physician.

It is recommended that blood pressure, height and weight of all patients referred for echocardiography be measured and recorded at the time of examination.

Definitions

An adult transthoracic echocardiographic examination – Multi-modal diagnostic ultrasonic examination of the adult heart and paracardiac regions from multiple transthoracic acoustic windows. This includes two-dimensional (2D) imaging, M-mode and Doppler (spectral and colour flow) imaging and analysis. 2D imaging without colour flow and spectral Doppler is not acceptable.

A complete echocardiographic examination – An adult transthoracic echocardiographic examination with comprehensive multi-modal evaluation of all cardiac and paracardiac morphology and haemodynamics from multiple transthoracic acoustic windows.

A limited echocardiographic examination (also called a problem/clinically directed, screening, focused or modified examination) – An adult transthoracic echocardiographic examination modified according to clinical indications in exceptional circumstances to acquire specific information. A limited examination does not include all of the detail of a complete study and may be a component of a specialised procedure such as stress echocardiography, pericardiocentesis or be related to post surgical or emergency evaluation. It is usual for a limited examination to have had a recent previous comprehensive examination.

E4 Competences required of cardiac sonographers who practice adult transthoracic cardiac ultrasound examinations (cont.)

Examination duration

- Patient exposure to ultrasound should be minimised in all circumstances.[15]
- A complete echocardiographic examination will take 45–60 minutes from patient encounter to patient departure.[3]
- A limited echocardiographic examination may take less than 45 minutes from patient encounter to patient departure. When the limited examination is a component of a specialised procedure the overall duration may be greater than 45 minutes.

Multiple patient-specific and pathology-specific variables determine the examination duration and it is recognised that examinations of shorter than recommended duration may be adequate while examinations of longer duration may be essential.

Documentation of the echocardiographic examination

The cardiac sonographer is responsible for the documentation of the echocardiographic examination. Documentation of the echocardiographic examination includes entry into a departmental log of examination particulars including patient name, examination date, examination type, file particulars, and indications and observations.

A record of imaging should be on video tape or digital storage media. Recorded images must display the patient identification, examination date and institution in which the study was performed and/or reported. Annotation or voice-over is recommended for non-imaging CW or unconventional views. The permanent record should consist of representative cardiac cycles of each cardiac chamber, valve and great vessel using standard 2D, M-mode, colour flow Doppler imaging, as well as pertinent evidence of diagnostic abnormalities.

The duration for which the adult patient record should be stored varies. Local requirements are available from the Health Information Department of public hospitals.

Conventional transducer locations and patient positioning

The conventional acoustic windows and patient positions, as listed below, are recommended to be used in conjunction with out-of-plane medial, lateral, anterior and posterior angulated scanning and unconventional positioning as required for a comprehensive evaluation of the heart and paracardiac regions.

- Left parasternal – left lateral decubitus position
- Apical – left lateral decubitus position
- Subcostal – supine with knees flexed
- Suprasternal – supine with neck hyperextended over a pillow
- Right parasternal - right lateral decubitus position

ECG monitoring: Lead II is recommended.

Respirometric monitoring: Recommended for complex Doppler examinations.

2D measurements and calculations[1,2,5]

The following two-dimensional measurements and calculations are recommended in accordance with the American Society of Echocardiography (ASE) guidelines.1

2D examination and recordings

Transducer location	View	Scan
Left parasternal	Long axis	Left and right heart chambers, atrio-ventricular and ventriculo-arterial valves and thoracic aorta
	Long axis oblique	Right heart, outflow tract, pulmonary valve and artery
	Short axis	Pulmonary bifurcation to the left ventricular apex
Apical	Four chamber	Chambers, valves and aorta
	Three chamber	Chambers, valves and aorta
	Two chamber	Chambers, valves and aorta
Subcostal	Four chamber	Interatrial and ventricular septa, hepatic veins and pericardium and abdominal aorta
	Short axis	Interatrial and ventricular septa, hepatic veins, pericardium
Suprasternal	Long axis	Ascending, arch (including main branches) and descending thoracic aorta and pulmonary artery
	Short axis	Ascending, arch (including main branches) and descending thoracic aorta and pulmonary artery Inter atrial and ventricular septa.

Left heart dimensions

- A quantitative estimation of ventricular systolic performance such as ejection fraction and left ventricular outflow tract systolic dimension for estimation of cardiac output.
- Measurements as required for assessment of valvular pathology.

M-mode examination

Transducer location	Structure examined
Parasternal (long or short axis)	Aortic valve Aortic root Left atrium Mitral valve Right ventricle Pericardium ± space

Colour flow Doppler may be used in conjunction with M-mode to aid in the timing of haemodynamic events in the cardiac cycle including flow propagation.

M-mode measurements and calculations[1,2,5]

The following recordings, measurements and calculations are recommended in accordance with the ASE guidelines.[6]

Measurements

- Aortic root dimension – end diastole
- Maximal aortic cusp separation
- Left atrial dimension – end systole
- Left ventricular internal dimensions – end diastole and peak systole

E4 Competences required of cardiac sonographers who practice adult transthoracic cardiac ultrasound examinations (cont.)

- Intraventricular septal thickness – end diastole
- Right ventricular dimension – end diastole

Calculations

- Left ventricular fractional shortening

Colour flow Doppler examination and recordings

Colour flow Doppler examination using orthogonal acoustic access, usually from the parasternal and apical acoustic windows, should be used to define normal and pathologic haemodynamics in the following:

- Cardiac valves and chambers
- Inflow and outflow vessels (aortic and pulmonary arteries, IVC and SVC)
- Thoracic aorta (ascending, arch and descending)
- Pulmonary artery to bifurcation
- Inter atrial and ventricular septa

Colour flow Doppler measurements and calculations

Measurements as required for the assessment of valvular pathology.

Spectral Doppler examination and recordings

Pulsed-wave (PW) Doppler flow profiles should be acquired from all cardiac inflow veins, outflow tracts and intracardiac valves (atrio-ventricular and ventriculo-arterial).

Continuous-wave (CW) Doppler in either imaging or non-imaging mode is recommended to assess peak transvalvular flow profiles (stenotic and regurgitant) and any pathologic high velocity flow, greater than that which can be unambiguously measured by PW Doppler.

It is specifically recommended that non-imaging CW Doppler be used from multiple transducer locations to assess aortic stenosis.

Spectral Doppler measurements and calculations[4]

Spectral Doppler signals are ideally acquired from insonation parallel to blood flow. Timing of cardiac events can be achieved without parallel flow/beam insonation. *Angle correction is not recommended.* Parameters derived from spectral flow profiles, including peak instantaneous velocity, peak instantaneous and mean pressure gradients and time velocity integral (TVI), are used to describe normal and pathologic haemodynamics. The rate of pressure decay (dP/dt) is used to describe specific pathologies including aortic regurgitation and mitral stenosis.

Pulsed-wave Doppler

PW Doppler measurements are recommended in the assessment of:

- Cardiac output (in conjunction with 2D measurements);
- Valves (in conjunction with 2D and continuous-wave Doppler)
- Left ventricular diastolic function

Continuous-wave Doppler

CW Doppler measurements are recommended in the assessment of:

- Stenotic valves
- Regurgitant valves
- Right sided pressure estimates (peak systolic pulmonary artery pressure derived from peak tricuspid regurgitant pressure).

Equipment recommendations

Ultrasound equipment

The minimum recommended requirements for instrumentation are:

- Two-dimensional imaging
- M-mode imaging
- Colour flow M-mode
- Colour flow Doppler imaging
- Pulsed-wave Doppler
- Imaging Continuous-wave Doppler
- Non-imaging Continuous-wave Doppler
- Phased array transducer construction (it is recognised that mechanical transducers are in use but have been superseded by phased array construction in the latest equipment).
- Sector scan of at least 80 degrees
- Image depth at least 24 cm
- Fundamental transducer frequency range of 2.5 MHz – 5MHz in single or multiple transducers
- System for permanently recording and reviewing studies

Digital acquisition and storage with offline analysis capabilities are considered to be desirable in new equipment purchases.

Harmonic imaging capabilities are considered essential in new equipment purchases, particularly for laboratories where stress echocardiography is practiced.

Examination couches

Access to the apical transducer position via a removable section facilitating steep left lateral decubitus patient positioning is desirable. This issue is further covered in the ASUM Policies and Statements C6: Guidelines for Reducing Injuries to Sonographers/Sonologists.

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Chris Kohlenberg Teaching Fellowships 2006

Sponsored by GE Healthcare

The Chris Kohlenberg Teaching Fellowship 2006 for South Australia / Regional Victoria

Mr David Fauchon has been appointed Teaching Fellow for South Australia/Regional Victoria 2006. David is Chief Sonographer of the Christopher Kohlenberg Department of Perinatal Ultrasound at Nepean Hospital in Sydney West Area Health Service. The Department is a tertiary referral centre for O&G Ultrasound.

David was the 1999 recipient of the Beresford Buttery Overseas Traineeship. In April 1999, with the late Chris Kohlenberg, David taught basic and advanced ultrasound skills for a week in Port Moresby, PNG as an AUSAID project. He was also involved with the Skills Transfer for Aboriginal Health Workers Program which was a collaborative program run by RANZCOG, ASUM, Nepean Hospital and James Cook University.

Port Augusta
Wednesday 3rd May 2006
Clinic/workshop 9 am – 5 pm
Perrett Medical Imaging
Hospital Road
Port Augusta (part of Port Augusta Hospital)
Evening meeting 5.30 pm – 7.00 pm
Perrett Medical Imaging
Hospital Road
Port Augusta (part of Port Augusta Hospital)
Contact Steve Davis stevedavis@i-med.com.au

Mt Gambier
Thursday 4th May 2006
Evening meeting: 5.30 pm – 7.00 pm
Mt Gambier Hospital Conference Rooms
Wehl Street North

Mt Gambier
Friday 5th May 2006
Clinic/workshop 9.00 am – 4.00 pm
Radiology Mt Gambier Hospital
Mt Gambier
Contact Lyn Muir la_muir@hotmail.com

Adelaide
Saturday 6th May 2006
Meeting 9.00 am – 12 noon
The Adelaide Women's and Children's Hospital
Queen Victoria Lecture Theatre
Contact Stephen Bird sjbird@ozemail.com.au

Bendigo
Monday 8th May 2006
Clinic/workshop 9.00 am – 12 noon
Bendigo Radiology Group
109 Lucan Street

Bendigo
Clinic/workshop1.00 pm – 4.00 pm
Bendigo Base Hospital
Radiology Department

Bendigo
Evening meeting 6.00 pm – 8.00 pm
Bendigo Hospital
MRI Meeting Room
62 Lucan Street
Contact Rick Ussher rickussher@yahoo.com

The Chris Kohlenberg Teaching Fellowship 2006 for southern New South Wales

The second Chris Kohlenberg Teaching Fellowship for 2006 has been awarded to Dr Meiri Robertson. She works at the Fetal Medicine Unit at the Canberra Hospital. She came to Australia three years ago to complete her Fetal Medicine Diploma via the Fetal Medicine Foundation in London, with Kypros Nicolaides.

Dr Robertson worked with Prof David Ellwood during this time and completed her diploma at the end of 2005. She has been involved with teaching and training in this field in South Africa for 10 years and was the Director of the first Thomas Jefferson affiliated centre in South Africa.

Wagga Wagga
Friday 2nd June 2006 Clinic/workshop
Saturday 3rd June 2006
Meeting
Contact Nick Stephenson nick.stephenson@ril.com.au

Nowra
Friday 16th June 2006
Clinic / workshop
Saturday 17th June 2006
Meeting
Contact Helen Taylor htaylor@wlpradiology.com.au

Wollongong
Friday 30th June 2006
Clinic / workshop
Saturday 1st July 2006
Meeting
Contact Tim Alchin tim@wlpradiology.com.au

ASUM NZ Branch 2006 Annual Conference 14–16th July 2006

Plus student workshop 13th July 2006

Napier War Memorial Conference Centre

Napier
Hawke's Bay

The art deco capital of the world




For more information contact

Rowena Tyman

rwoena.tyman@hawkesbaydhb.govt.nz

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2/181 High St
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Australia
Email asum@asum.com.au
website www.asum.com.au

ASUM seeks applications for funding for research to be presented at WFUMB 2009 in Sydney

Applications for research funding by the ASUM Research and Grants Committee should be received by 1st October. Applications which involve a presentation of results at WFUMB 2009 in Sydney, will be prioritised, but must meet the normal criteria outlined in the ASUM Research and Grants Policy.

Applicants will be notified of the decision with respect to their application two months after the 1st October deadline.

Applications must be in writing and address all of the criteria outlined in the ASUM Research and Grants Policy.

Applications to be addressed to:
The Chairman
ASUM Research and Grants Committee
2/181 High Street
Willoughby
New South Wales 2068
Australia

Enquiries to Mr Keith Henderson
tel +61 2 9958 6200
email khenderson@asum.com.au

Applications invited for ASUM Research Grants

ASUM is seeking to support research which builds on the body of existing research findings and extends our knowledge of the applications, efficacy and safety of clinical ultrasound.

Applications are particularly invited in the areas of:

1 High frequency ultrasound

2 Therapeutic ultrasound applications

3 Tissue elasticity

4 Obstetric growth parameters pertinent to the whole Australian and/or New Zealand population

5 Flow Mediated Dilatation and/or Intima Media Thickness Studies

Projects in other areas will be considered, however, it is unlikely that applications for projects that duplicate existing findings, or studies, will be successful except where it is judged that these are necessary to validate the findings of other studies.

Enquiries to Mr Keith Henderson
tel +61 2 9958 6200
email khenderson@asum.com.au

ASUM Asia Link Scholarship – Vietnam

Ms Elise Fryer, Dr Ha To Nguyen and Dr Robert Robertson

This is the second time I have visited Sydney, the beautiful city that I love so much. Seven years ago, I was fortunate to win a scholarship with Prof Felix Wong of the University of New South Wales and Dr John Dreverman of Rayscan Imaging. At that time, I studied mammography for three months in Sydney's Breastscreen Program.

Now, in 2006, on the recommendation and with the generous support of Dr Harley Roberts of Nepean Hospital, I have been awarded the ASUM Asia Link Ultrasound Scholarship.

I am really proud to become the first doctor in Vietnam and the second doctor in Asia to be awarded this scholarship.

The Nepean Hospital and Penrith Ultrasound for Women

My visit to Australia enabled me to visit three important centres for ultrasound, the Nepean Hospital together with Penrith Ultrasound for Women, the Royal North Shore Hospital and Royal Prince Alfred Hospital.

I spent most of my time in Perinatal Ultrasound at the Nepean Hospital and at Penrith Ultrasound for Women at the Nepean Private Medical Centre where I learned about 3-D ultrasound, CVS and HyCoSy procedures with Prof Ron Benzie, Dr Harley Roberts, Dr Valeria Lanzarone and all the sonographers of their ultrasound teams. They instructed me very carefully in 3-D ultrasound (especially with VCI-A and VCI-C software using a 3-D transvaginal probe).

CVS is a procedure that has not yet been deployed in my hospital. After this training I hope to commence setting up CVS in the near future.

Prof Ron Benzie showed me some interesting cases on his computer and gave me some ultrasound video CDs that will be valuable learning documents for my staff.

I also spent two mornings with Dr Henry Murry, an excellent perinatalist, with whom I hope to have further opportunities to learn about pathologic pregnancies.

Royal North Shore Hospital and Royal Prince Alfred Hospital

Dr Harley Roberts arranged for me to visit the Royal North Shore and Royal Prince Alfred Hospitals. At Royal North Shore, I was very happy to meet Prof Jonathan Morris again. He and Dr Robert Robertson visited my hospital last year and now they are supporting a scholarship *Study, Study Forever*, for Vietnam. At this hospital, I was very lucky to see Dr Robert Robertson doing CVS. I really appreciate his talent.

I was very emotional to see Royal Prince Alfred Hospital again because I remembered my time there seven years ago. I went to Eastern and Central Sydney Breastscreen nearly every day to learn mammography with Dr Mary Rickard. During this time, I met Dr Tom Boogert and watched him perform CVS and amniocentesis.

ASUM NSW Branch Meeting – Western Sydney

Dr Caroline Hong and Dr Valeria Lanzarone arranged for me to have a meeting with some doctors and sonographers at Siemens Tower. I gave a brief presentation about my hospital, the leading obstetric and gynaecology centre in Ho Chi Minh City. Close to 44,000 deliveries and 320,000 ultrasounds are performed yearly.

I was very glad to meet many doctors and sonographers in Sydney. At this meeting, I met Dr Andrew McLennan, Chairman of NT Audit Australia. He has visited the Vietnam capital, Hanoi, but is yet to visit Ho Chi Minh City, so I was very happy to have the opportunity to talk with him about my hospital and my work.

It is my hope that he will arrange to help Vietnamese doctors gain certification in 11–13 week scanning. It is our greatest hope that if my doctors had that training, we could better screen for Down syndrome with the software from the Fetal Medicine Foundation.

Thank you ASUM

I would like to thank ASUM Council and Dr Caroline Hong for awarding me this scholarship. Dr Hong is very busy, but she arranged to have a dinner and a lunch with Dr Harley Roberts and myself. She presented me with an ASUM plaque and some souvenirs for my daughter and myself. She is very, very nice.

I also would like to thank all the doctors and sonographers in Nepean Hospital, Nepean Private Medicine Centre, Royal North Shore Hospital and Royal Prince Alfred Hospital for all the time, effort and support that they put into showing me how ultrasound is used in Australia.

Finally, I would like to express my special thanks to Dr Harley Roberts and his wife, Dee, who picked me up at the airport, took me to the hospital every day and to the Opera House, the Zoo and to a beautiful restaurant over the weekend. I will never forget their kind-hearted friendship.

I think that the best way to make you happy and to show my appreciation for all the training I have received would be to apply, in my hospital, all I have learned.

Ha To Nguyen
Chief of Imaging Diagnostic Department.
Tu Du Hospital
Ho Chi Minh City
www.bvtudu.org.vn

ASUM Asia Link Vietnam Ultrasound Scholarship

Sponsored by Penrith Ultrasound for Women and the Perinatal Ultrasound Dept of Nepean Hospital

Dr Harley Roberts, Dr Ha To Nguyen and Dr Caroline Hong

As you may already know, the ASUM Asia Link Vietnam Ultrasound Scholarship was awarded to Dr Ha To Nguyen, Director of Imaging at Tu Du Hospital, Ho Chi Minh City.

Dr Nguyen arrived in Sydney on 17th February and met Dr Caroline Hong, ASUM CEO, and myself that evening and, later, received an award for her nomination of the scholarship.

She spent two weeks undergoing further ultrasound training, mainly at the Perinatal Ultrasound Department at The Nepean Hospital and also at Penrith Ultrasound for Women in the Nepean Private Medical Centre.

I was able to arrange for Dr Nguyen to attend the Royal North Shore Hospital to meet with Prof Jonathan Morris and Dr Robbie Robinson and the Royal Prince Alfred Hospital to meet with Dr Tom Boogert.

During her visit Dr Nguyen was able to see 3-D and 4-D ultrasound, as well as amniocentesis, CVS, saline contrast ultrasound and HyCoSy. Hopefully, she will be able to introduce some of these procedures into Tu Du Hospital.

The London Foetal Medicine Down Syndrome Programme, which we have in Sydney, was of particular interest to Dr Nguyen. At present, she is relying on triple screening with nuchal translucency measurement, which is not as accurate or reliable in Down syndrome risk prediction.

I gave her the London contacts to register for this program and also introduced her to Dr Andrew McLennan who is responsible for auditing Australian screening through the RANZCOG.

Dr McLennan will arrange for the course lectures to be available in Vietnam and may be able to review and licence sonographers from Tu Du Hospital after they have submitted suitable images for his review.

Dr Nguyen was able to have dinner with Prof Felix Wong, Department of Obstetrics and Gynaecology, Liverpool Hospital, as he regularly demonstrates laparoscopic surgery at Tu Du Hospital and will be visiting Vietnam again this year. Meetings were also arranged with Dr Mary Rickard and radiologists involved with mammography as she is also trying to expand the mobile breast screening facilities in southern Vietnam.

Overall, Dr Nguyen had a very successful visit and I am sure this will result in a close association between the Tu Du and the Nepean hospitals in the future.

Your donations will help to support the continuing scholarship program for the next three or four years. The 2007 scholarship will be offered to an Australian specialist in ultrasound so that the winner may visit Vietnam.

Thank you again for your generous donations; it is pleasing to know that Vietnam is now part of the ASUM Asia Link.

Dr Harley Roberts

DMU Report – exam changes

In 2004, the format of the DMU examinations was revised in response to suggestions from the DMU Advisory and Sonographer Affairs Committee. 2006 sees the final stages of these changes put into place. An oral examination or viva was reinstated in 2005, as part of the Objective and Standardised Clinical Examinations (OSCE). The new Oral Examination has been well received by candidates and examiners. A comparison of grades awarded in 2005 for the oral component and the overall OSCE results shows a strong correlation, but with a slightly higher percentage passing the new oral examination than the old OSCE format. Although these new examinations mean longer hours of work for the examiners, who work on a voluntary basis, it has benefited the candidates and proved well worth the extra effort. The Oral Examination completely replaces the OSCE in 2006.

In 2006, the format of the Part II Written Examination has been altered to better assess candidate understanding and to continue to gauge understanding of film reading in clinical settings. As a consequence, the original three-hour written examination has been expanded into a four-hour written examination delivered in two two-hour sittings. The new format is detailed in the DMU regulations, which can be viewed in the 2006 DMU handbooks at www.asum.com.au/dmu.htm.

This year, the number sitting the DMU is comparable to previous years. In total, 168 candidates have applied to sit the DMU examinations. Ninety candidates are sitting Part I, and 78 candidates have applied for the Part II Examinations. The Written Examinations for all Part I and Part II candidates will be offered in eight major locations throughout Australia and New Zealand on Saturday 29th July 2006.

The Part II Practical Examinations will be held at individual practices throughout New Zealand and Australia from August to September. The oral examinations will be conducted from mid September to mid October 2006 in Brisbane, Auckland, Melbourne and Perth.

Further details can be viewed at www.asum.com.au/dmu.htm and all enquiries should be directed to the DMU administrator:

Matt Byron

tel +61 2 9958 7655.

PhD student is first Danish / Australian exchange visitor

Cheryl Bass, Stephanie Pritchard, Mary Langdale, Christoffer Brusøj and Frank Burke

In January, Victoria House Medical Imaging was lucky enough to host the inaugural Danish-Australian exchange visitor, Christoffer Brushøj. Dr Brushøj is a Danish doctor currently enrolled in a PhD on patello-femoral pain at the Department of Radiology, Rigshospitalet, Copenhagen. He is also the team physician for swimming and football teams in Copenhagen. In the long term, he aims to complete the Danish orthopaedic specialty education, with a special interest in sports medicine; ultrasound evaluation of his own patients will be an integral part of his practice.

Victoria House Medical Imaging has a number of short stay visitors but Dr Brushøj's visit over a four-week period allowed us to form an in depth relationship with him. We enjoyed exchanging thoughts and ideas on the different health care systems of each of our countries and their differing use of ultrasound.

His main aim was to improve his technical and interpretive ultrasound skills and his enthusiasm and dedication were evident. At Victoria House Medical Imaging, he was involved in a wide variety of musculoskeletal ultrasounds and he saw a vast spectrum of pathology. Initially Dr Brushøj watched us scan, but was soon able to pick up the transducer himself, and progressed rapidly from L plate to P plate status. He watched, with interest, our injection techniques and has since been able to put this into practice in Denmark.

Dr Brushøj's delightful personality meant he was well accepted by our patients who also enjoyed hearing about this innovative exchange scheme.

While in Melbourne, he was able to spend time with a sports' medicine physician, Dr Gary Zimmerman and an orthopaedic surgeon, Mr David Young, allowing him further opportunities to contrast Danish and Australian medical practice.

Dr Jill Cook, from the Musculoskeletal Research Centre at La Trobe University, assisted him in his placements outside of Victoria House Medical Imaging and was particularly helpful in putting him in contact with Dr Kay Crossly from the Centre for Sports Medicine Research and Education at the University of Melbourne. Dr Brushøj found her work on patello-femoral knee pain very relevant to his PhD study.

He was accompanied by his wife, Been, and children Ingrid and Otto. They left a freezing Denmark on Christmas Day to be warmly welcomed by a very hot Melbourne with temperatures in the high 30s for much of their stay (and yes, it was still snowing when they got back to Copenhagen in February).

The Brushøj family made the most of their free time by visiting Melbourne's many famous attractions and, after the placement, took the opportunity to 'do' the Great Ocean Road, ending up in Adelaide.

It was a pleasure to host Dr Brushøj; the success of his visit augurs well for the future of the Danish-Australian exchange program.

Cheryl Bass

The Ugly Duckling – A Danish / Australian ultrasound fairy tale

Christoffer Brushøj makes the most of his Australian visit, maximising his scanning skills

Once upon a time in Copenhagen at the very same hospital where the little Danish-Australian prince, Christian, was born, a doctor worked in the ultrasound department. The doctor was going to be an orthopaedic surgeon, but thought that ultrasound skills could be very useful. Because he wasn't a radiologist, his ultrasound images didn't look as nice as his colleagues'. They all thought they were very important, and laughed at his images and called them ugly ducklings. The doctor was very sad and doubted if he would ever learn to scan. Then one day three fairies came to him.

The first fairy was called Caroline Hong; she was the Chief Executive Officer for ASUM. She made secret plans with her colleagues in the Danish Ultrasound Society and arranged that the doctor could be the first doctor to go on a Danish-Australian ultrasound exchange.

The second fairy was called Jill Cook; she was a senior researcher in Melbourne who knew everyone in Australia and arranged it so that the doctor could practise with the best musculo-skeletal radiologists in all Australia. She also arranged meetings with other nice people.

The third fairy was not only the best musculoskeletal radiologist in all Australia but, probably, also the nicest and most helpful one in all the land. She was called Cheryl Bass and worked at Victorian House Medical Imaging in Melbourne. At this place, there were also other good radiologists, as well as some very good sonographers. They were all very busy and did 50 musculoskeletal scans each day.

The doctor was very surprised to find sonographers doing musculo-skeletal scanning, because that didn't happen in his homeland, Denmark. He was also a little surprised when he realised that he couldn't work in his best jumper, as he was used to in Denmark, but had to wear something with a collar. He also noticed that all patients were treated very nicely and that they didn't wait for hours to be examined. All the people at Victoria House Imaging Service did their best to help the doctor and he spent four very nice weeks in the clinic.

When the day came that the doctor had to return to Denmark, he was very sad to leave his new friends and Australia. He returned to the very same hospital in Copenhagen where Prince Christian had been born.

But his colleagues didn't pick on him any longer and he couldn't understand why until, one day, he took a close look at his images on the screen and saw that they weren't ugly anymore, but had turned into beautiful swans.

The doctor was very happy and very grateful, and scanned happily ever after.

Thanks to all the people I met on this trip. I hope to be able to return the hospitality next year when ASUM will, hopefully, return the exchange torch to Denmark.

Christoffer Brushøj

CADUCEUS

The Danish-Australasian ultrasound exchange is part of the memorandum of undertaking finalised when the Collaborative Australasian Danish Undertaking for Combined Excellence in Ultrasound (CADUCEUS) was signed in March 2005.

Big turnout confirms value of MDW events

Approximately 400 registrants from all over Australasia and around the world attended the 2006 Multidisciplinary Workshop, held in March at Conrad Jupiters on the Gold Coast.

I would like to thank the Convenor, Dr Nicholas Bryant and the specialty convenors, Dr Rob Cincotta and Tony Lightfoot, for all their hard work. A special thank you also goes to Deb Coghlan who, at the last moment, took on the task of delivering many of the vascular lectures.

Thanks also go to Cathy West and Alison White for their efforts with the Cardiac Program. In addition, Cathy and Alison prepared and presented most of the Cardiac lectures for the DMU candidates.

The MDW continues to attract eminent international speakers and this year participants were graced with speakers including Dr Anil Ahuja from Hong Kong, who spoke on head and neck ultrasound, Terry Needham from the USA who spoke on vascular ultrasound and gave a workshop and Dr John Hyett who gave some obstetric presentations.

As always, there were plenty of hands-on workshops in MSK and vascular ultrasound, giving registrants an opportunity to fully experience the techniques that were so ably discussed and talked about in the presentations. This is the really unique feature of the MDW and the main reason why so many ultrasonographic practitioners and sonographers support it.

The DDU Technical Seminar and the DMU Preparation Course were held in conjunction with the MDW and attracted about 100 registrants. The candidates heard lectures from many experienced speakers, including two full days of Physical Principles of Ultrasound and Instrumentation (Physics) lectures from Rob Gill and Roger Gent.

The candidates also had many opportunities to speak to their respective examiners about how to prepare for their upcoming examinations.

The Nuchal Translucency Course was again held on the Thursday and was well attended.

Without the continuing support and generous assistance of our corporate sponsors, successful meetings such as these would not be possible. GE Healthcare, Philips, Siemens and Toshiba provided the equipment that allowed us to hold so many workshops.

Each session provided the registrants with several different options for workshops or lectures on different topics. The workshops would also not have been possible without the volunteer patients. Our thanks go to Sue and Tony Davies and Sally Ashwin for organising all of the patients.

The session on legal and ethical issues was well received. A panel of three lecturers from Griffith University presented this session, where one presenter was a general practitioner, one a lecturer in law and one a lecturer in genetic counselling.

The 2007 MDW will be held in Sydney.

Ros Savage

Multidisciplinary workshop lectures

Gold Sponsor: Toshiba

Anil Ahuja and family

Gold sponsor: GE Healthcare

Nick Bryant, left, David Rogers, Terry Needham, Chris Sykes and Anil Ahuja

Gold sponsor: Siemens

Andrew McLennan, left, Ann Robertson, Vanessa Pincham and Jon Hyett

Caroline Hong and DMU (Asia) Students at MDW 2006

Gold Sponsor: Philips

New members January – April 2005

January 2006

Full members
Con Arronis NSW
Penelope Cain NZ
Patrice Crawford NZ
Melanie Dawson NSW
Alison Fung Vic
Sanjeev Naidu Qld
Mary Norris NSW
Caroline O'Neill NZ
Monica Romeo Vic
Deborah Tansley NZ

Associate members
Meredith Bolland WA
Stacey Cameron-Dow WA
Marina Chernih Qld
Rachel Coy Qld
Michael Cursaro SA
Georgina Dumigan NSW
Kirsten Fowler Qld
Joanna Frost NZ
Imara Heart WA
Christopher King Qld
Jacqueline Kok NSW
Emma Larkin Vic
Carmen Leslie SA
Patricia Machielsen WA
Jennifer MacNeeney WA
Shayne Marriott NSW
Jane Marshall NSW
Mpho Mathibela NZ
Stefan Mazur SA
Karen Moulton WA
Conrad Ng WA
Amanda Plumridge Qld
Marion Raffaelli NZ
Zille Shehzad WA
Daniel Traves Qld
Jeremy Walsh Qld
Sara Waterman SA
Allan Whitehead Vic
Steven Wyatt NSW

Trainee member
Natalie Shaw NSW

Corresponding members
Sonia Ashrafi Bangladesh
Victoria Dransfield UK

February 2006

Full members
Manju Ambekar WA
Lisa Fox Vic
Victar Hsieh NSW
Subodh Joshi Vic
Yu Xuan Li NSW
Pamela Smith NZ

Associate members
Giovanna Baricevic Vic
Shaun Bishop WA
Zdenka Bolcevic Vic
Samantha Colin WA
Halina Dulat Qld
Robert Garcia NZ
Jasbir Kaur Vic
Claire Keen NSW
Perdeep Kumar Vic
Nicole McDonald NSW
Renelle Nisbet NZ
Catherine Norris WA
Gabrielle O'Shea Vic
Luke Porra Vic
Liesbeth Reid NSW
Lisa Ryan Vic
Megan Scott NSW
Kelly Seach NSW

Trainee members
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Sophia Chuang Vic
Rebecca Concannon NSW
Vinod Gopalan Qld
Manoj Obeyesekere Vic
Raymond Sy NSW

Corresponding member
Michelle Bourgeois UK

March 2006

Full members
Mohamed Abd Majid Qld
Ojotule Achije Nigeria
McHenry Amadi Nigeria
Mayasa Athmani NSW
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Stephen Barwick Qld
Kerry Beaumont Vic
Heinrich Betz Qld
Paula Bradly NSW
Fiona Cahill NSW
Margaret Case Qld
Ben Castle NZ
Leah Chambers Qld
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Stephanie Martin NSW
Amanda McCarthy Qld
Jan McDonald NSW
Kylie Ann Merrett Qld
Chris Mitchell Qld
Fiona Mol Qld
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Phu-Cuong Nguyen NSW
Antonia Nicolo Qld
Elizabeth Notley United Kingdom
Vincent O'Brien Qld
Tania O'Connell NZ
Lucky Osakuma Nigeria
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Helena Peake NZ
Susan Pennington Vic
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Shelley Thomson ACT
Virginia Vaithianathan SA
Janelle Vignes NSW

Corresponding member
Borsha Sarker UK

ASUM MEMBERSHIP RENEWALS 2006–2007

A reminder to all our valued members, as at the end of this financial year, 30th June 2006, all current membership with ASUM will lapse. We will endeavour to mail out the subscription renewal notices early May. In the meantime, should you have any questions or concerns regarding your membership, please feel free to contact Marie Cawood in the ASUM office via email to asum@asum.com.au

EARLYBIRD RENEWALS

Medical / Scientific / Sonographer members	$297.00 if paid by 30 June
Associate members	$231.00 if paid by 30 June
Trainee members	$231.00 if paid by 30 June
Retired members	$99.00 if paid by 30 June
Corporate members	$1100.00 if paid by 30 June
Corresponding ordinary members	$185.00 if paid by 30 June
Corresponding associate members	$140.00 if paid by 30 June

Corporate Members 2006

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nick.kapsimallis@siemens.com
General Manager: Kevin Fisher

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greg.brand@sonosite.com

Sound Medical Equipment
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Ron@soundmedical.com.au

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Toshiba
David Rigby 02 9887 8063
drigby@toshiba-tap.com
General Manager Rosina Davies

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

Thursday 18 May 2006 3 Days
World Congress of Echocardiography and Vascular Ultrasound
Venue: Marrakesh Morocco
Contact: Navin C Nanda MD
President ISCU PO Box 323 Gardendale AL 35071 USA
Tel: +1 205 934 8256
Fax: +1 205 934 6747
Email: isuc@iscu.org

Sunday 28 May 2006
5 Days 11th Triennial Congress World Federation for Ultrasound in Medicine and Biology (WFUMB)
Venue: Seoul Korea
Contact: Byung Ihn CHOI MD Congress Secretariat
Tel: +82 2 760 2515
Fax: + 82 2 743 6385
Email: choibi@radcom.snu.ac.kr
Website http://www.wfumb2006.com

Friday 2 June 2006 Chris Kohlenberg Teaching Fellowship Clinic / Workshop with Meiri Robertson
Venue: Wagga Wagga
Contact: Helen Cuneo
Tel: (02) 9958 7655
Email: education@asum.com.au

Saturday 3 June 2006
Chris Kohlenberg Teaching Fellowship Educational Meeting with Meiri Robertson
Venue: Wagga Wagga
Contact: Helen Cuneo
Tel: (02) 9958 7655
Email: education@asum.com.au

10–11 June 2006 2 days
ASUM WA Branch Physics Weekend Lectures Presented by Roger Gent and Mike Dadd
Venue: Perth Radiological Clinic Subiaco
Times: Saturday 8.30 am – 5.00 pm
Sunday 8.30 am – 3.00 pm

Monday 12 June 2006 3 Days Danish Society 9th International Congress on Interventional Ultrasound
Venue: Copenhagen Denmark
Email: secretary@interventional-ultrasound.org
www.interventional-ultrasound.org

11–14 June 2006
World Congress in Emergency Ultrasound 2nd World Conference on Ultrasound in Emergency and Critical Care
Venue: Javits Center New York City
www.WCU2006.com

13–16 June 2006 Ultrasound Techniques in Vascular Emergencies
Venue: Florence University of Medicine Italy
Post-graduate course in Ultrasound Techniques in Vascular Emergencies Florence University of Medicine
Contact: Course Director Sergio Castelani (Florence)
www.strokeforum.org/images/Firenze_giugno06.pdf or www.sinv.it/Programma_Firenze_06.pdf or www.hon.ch/cgi-bin/confevent

Friday 16 June 2006 Chris Kohlenberg Teaching Fellowship Clinic / Workshop with Meiri Robertson
Venue: Nowra
Contact: Helen Cuneo
Tel: (02) 9958 7655
Email: education@asum.com.au

Saturday 17 June 2006
Chris Kohlenberg Teaching Fellowship Educational Meeting with Meiri Robertson
Venue: Nowra
Contact: Helen Cuneo
Tel: (02) 9958 7655
Email: education@asum.com.au

Saturday 24 June 2006
2006 CCPU Program Basic Module Physics Course (Melbourne)
Venue: Royal Women's Hospital
Contact: Helen Cuneo
Tel: (02) 9958 7655
Email: education@asum.com.au

Sunday 25 June 2006
2006 CCPU Program Basic Module O&G (Melbourne)
Venue: Royal Women's Hospital
Contact: Helen Cuneo
Tel: (02) 9958 7655
Email: education@asum.com.au

Tuesday 27 June 2006
ASUM Victorian Branch Meeting
Venue: Royal Melbourne Hospital Charles Latrobe Lecture Theatre Flemington Road Parkville
Speaker: Dr Simon Meagher – The First Trimester – Anomalies
Time: 6.30 pm for 7 pm start
Contact: Monica Pahuja
Email: MPahuja@mercy.com.au

Friday 30 June 2006 Chris Kohlenberg Teaching Fellowship Clinic / Workshop with Meiri Robertson
Venue: Woollongong
Contact: Helen Cuneo
Tel: (02) 9958 7655
Email: education@asum.com.au

Saturday 1 July 2006 Chris Kohlenberg Teaching Fellowship Educational Meeting with Meiri Robertson
Venue: Wollongong NSW
Contact: Helen Cuneo
Tel: (02) 9958 7655
Email: education@asum.com.au

Thursday 13 July 2006
Student Workshop with Martin Necas
For DMU Candidates and students preparing for other ultrasound qualifications
Venue: Napier War Memorial Conference Centre Napier Hawkes Bay New Zealand
Email: rowena.tyman@hawkesbaydhb.govt.nz
or jayne.lloyd@hawkesbaydhb.govt.nz

Friday 14 July 2006 3 Days
ASUM (NZ Branch) 2006 Ultrasound Conference
Venue: Napier War Memorial Conference Centre Napier Hawkes Bay New Zealand
Email: rowena.tyman@hawkesbaydhb.govt.nz or jayne.lloyd@hawkesbaydhb.govt.nz

Thursday 20 July 2006 ASUM Victorian Branch Meeting
Combined Meeting with Royal College of Radiologists
Venue: Royal Childrens Hospital Ella Lathan Lecture Theatre Flemington Road Parkville
Time: 6.30 pm for 7 pm start
Contact: Monica Pahuja
Email: MPahuja@mercy.com.au

Saturday 29 July 2006
ASUM DMU Part 1 and Part II Written Examinations – Provisional
Venue: as allocated. Candidates receive individual notification.
Contact: DMU Administrator
Tel: +61 2 9958 0317
Fax: +61 2 9958 8002
Email: dmu@asum.com.au

Sunday 30 July 2006
2006 CCPU Program Basic Module O&G (Sydney)
Venue: Royal Hospital for Women
Contact: Helen Cuneo
Tel: (02) 9958 7655
Email: education@asum.com.au

Sunday 3 Sep 2006 5 days
16th World Congress on Ultrasound in Obstetrics and Gynaecology
Venue: Hilton London Metropole London United Kingdom
Contact: ISUOG, Unit 4 Blythe Mews Blythe Road, London W14 OHW
Tel: +44 (0) 20 7471 9955
Fx: +44 (0) 20 7471 9959
Email: congress@isuog.org www.isuog2006.com

Thursday 14 Sep 2006
ASUM DMU Practical Examiner Accreditation Day
Venue: Melbourne Convention Centre Melbourne
Contact: DMU Administrator
Tel: +61 2 9958 0317
Fax: +61 2 9958 8002
Email: dmu@asum.com.au

Friday 15 Sep 2006 3 Days
ASUM 2006 36th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine
Venue: Melbourne Convention Centre Melbourne
Contact: ASUM 2/181 High Street Willoughby NSW 2068
Tel: +61 2 9958 7655
Fax: +61 2 9958 8002
Email: asum@asum.com.au

15 Sep to 15 Oct 2006 ASUM DMU Part II Oral Examinations
Venue: as allocated. Candidates receive individual notification
Contact: DMU Administrator
Tel: +61 2 9958 0317
Fax: +61 2 9958 8002
Email: dmu@asum.com.au

Sunday 17 Sep 2006
ASUM 2006 Skills Day
Venue: Melbourne Convention Centre Melbourne
Contact: ASUM 2/181 High Street Willoughby NSW 2068
Tel: +61 2 9958 7655
Fax: +61 2 9958 8002
Email: asum@asum.com.au

October 2006
ASUM DMU Practical Examination Period
Contact: DMU Administrator
Tel: +61 2 9958 0317
Fax: +61 2 9958 8002
Email: dmu@asum.com.au

Thursday 19 Oct 2006 3 Days
ECHO Australia 2006
Venue: The Westin Sydney
1 Martin Place Sydney
Theme: Clinical Applications of Echocardiography in Clinical Cardiology and How to intergrate the latest innovations in Cardiovascular Ultrasound
Contact: Linda Rattray GE Heathcare
Tel: +61 2 9846 4735
Fax: +61 2 9846 4002
Email: Echo.Australia2006@ge.com

Thursday 19 Oct 2006
To be confirmed
ASUM Victorian Branch Meeting
Combined Meeting with RANZCR
Ultrasound and Nuclear Medicine Correlation – A Pot Pouri of Cases
Speaker: Dr Andrew Baldey
Venue: Royal Childrens Hospital Flemington Road Parkville Melbourne
Time: 6.30 pm for 7 pm start
Contact: Monica Pahuja
Email: MPahuja@mercy.com.au

Saturday 21 Oct 2006
CCPU Program Advanced Module Acute Pelvic Pathology (Melbourne)
Venue: Royal Women's Hospital
Time: 9.00 am – 5.00 pm
Contact: Helen Cuneo
Tel: (02) 9958 7655
Email: education@asum.com.au

Sunday 29 Oct 2006
CCPU Program Advanced Module Principles of Screening for Chromosomal Abnormality (Sydney)
Venue: Royal Hospital For Women
Time: 9.00 am – 5.00 pm
Contact: Helen Cuneo
Tel: (02) 9958 7655
Email: education@asum.com.au

Saturday 4 Nov 2006
ASUM DMU Part 1 Supplementary Written Examination
Venue: As allocated. Candidates receive individual notification.
Contact: DMU Administrator
Tel: +61 2 9958 0317
Fax: +61 2 9958 8002
Email: dmu@asum.com.au

Sunday 5 Nov 2006 5 Days
XVIII FIGO World Congress of Gynaecology and Obstetrics
Venue: Kuala Lumpur Malaysia
Contact: www.figo2006kl.com

2007

Wednesday 28 Feb – Sunday 4 Mar 2007 5 Days ASUM Multidisciplinary Workshop
Venue: TBA
Contact: ASUM 2/181 High Street Willoughby NSW 2068
Tel: +61 2 9958 7655
Fax: +61 2 9958 8002
www.asum.com.au

Wednesday 28 Feb – Sunday 4 Mar 2007 5 Days O&G Symposium
Venue: TBA
Contact: ASUM 2/181 High Street Willoughby NSW 2068
Tel: +61 2 9958 7655
Fax: +61 2 9958 8002
www.asum.com.au

Thursday 19 July 2007 4 days
ASUM NZ and RANZCR NZ joint Annual Scientific Meeting
Promoting Excellence in Ultrasound
Wellington New Zealand
Details to be advised. Register your interest for sponsorship, exhibition and registration to attend, initally to Dr Caroline Hong at asum@asum.com.au

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

Thursday 13 Sept 2007 5 days
ASUM 2007 37th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine
Venue: Cairns Convention Centre, Cairns North Queensland Australia
Contact: ASUM 2/181 High Street Willoughby NSW 2068
Tel: +61 2 9958 7655
Fax: +61 2 9958 8002
www.asum.com.au

2008

Saturday 26 July 2008
ASUM DMU Part I & Part II Written Examination – Provisional
Venue: As allocated. Candidates receive individual notification.
Contact: DMU Administrator
Tel: +61 2 9958 0317
Fax: +61 2 9958 8002
Email: dmu@asum.com.au

2009

Sunday 30 Aug 2009 – Thursday 3 Sep 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
2/181 High Street Willoughby
NSW 2068 Sydney Australia

Australasian Sonographer Accreditation Registry

ASAR FORUM

ASAR will be holding a one day PAG Forum on 8th July 2006 at the Rydges Jamison Hotel, Sydney.

Detailed information is available on the ASAR website at:
www.asar.com.au/pag.html

To register your interest in attending this forum, please contact the ASAR secretariat tel: (02) 8850 1144

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.

Copyright

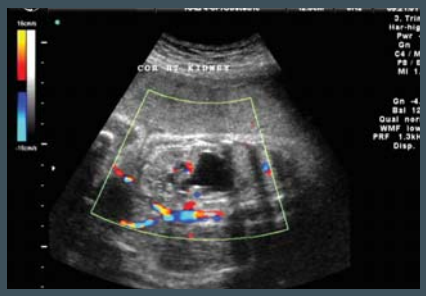
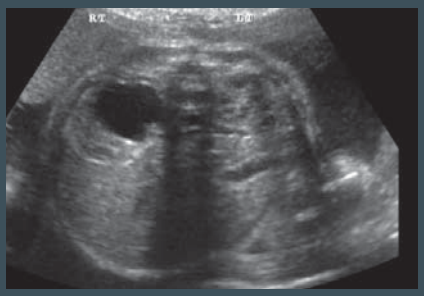
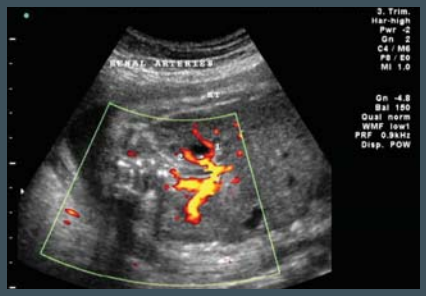
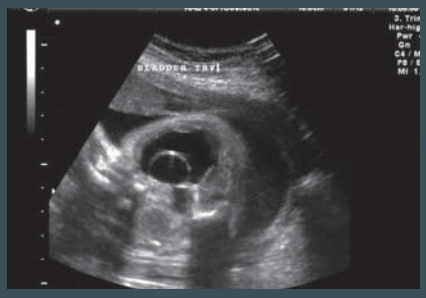
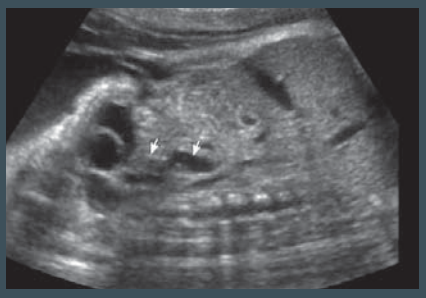
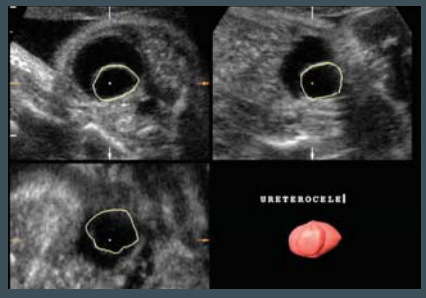
Authors are required to provide assurance that they own all property rights to submitted manuscripts, and to transfer to ASUM the right to freely reproduce and distribute the manuscript.

ULTRASOUND BULLETIN PUBLICATION DATES

	August 2006	November 2006	February 2007
Submission Deadline	10 July	9 October	15 January
Post Date	18 August	17 November	23 February

U/S = ASUM

ASUM members know what they're looking for

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Visit www.asum.com.au and download the membership application form

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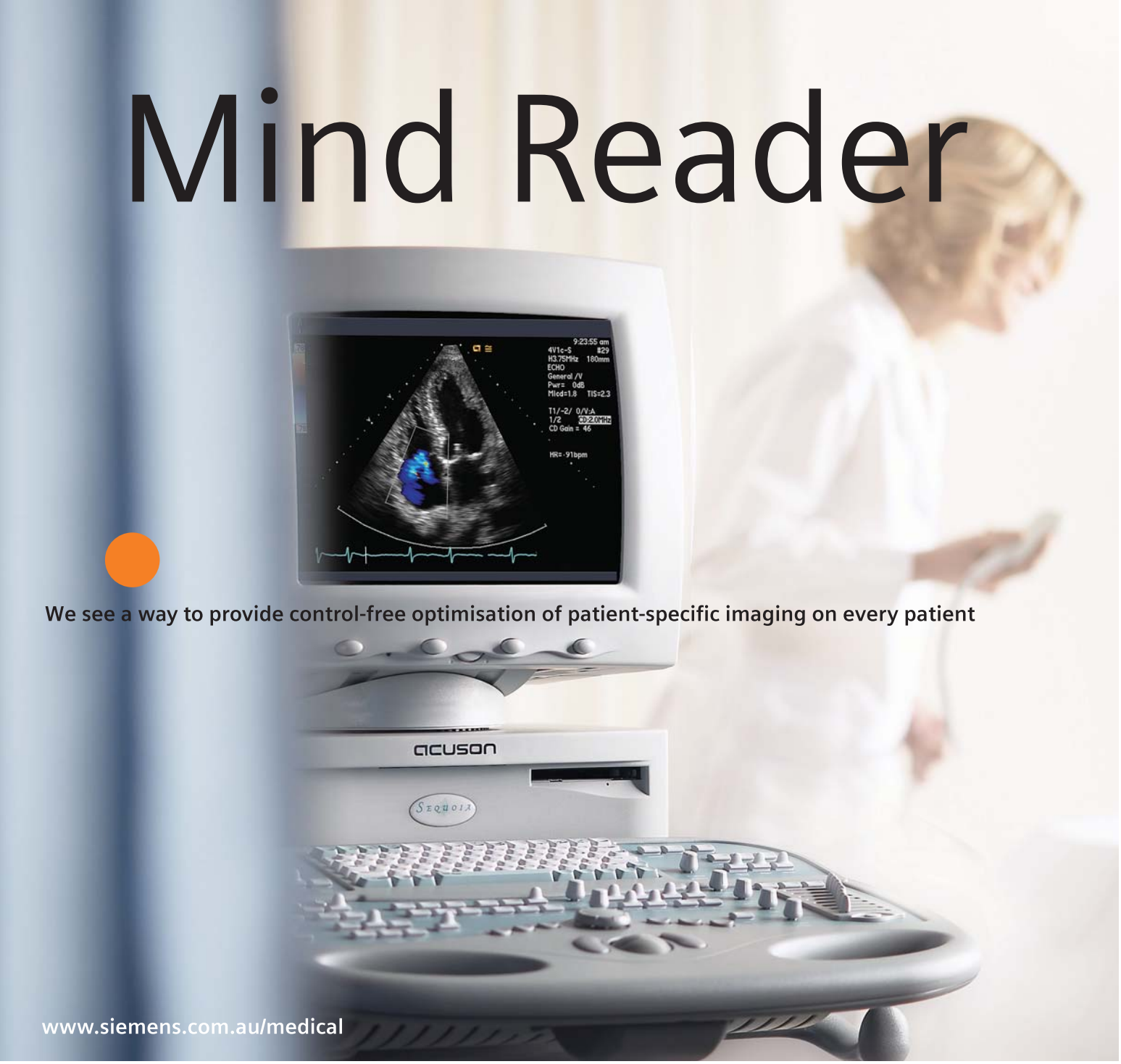
Australasian Society for Ultrasound in Medicine

Mind Reader



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