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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ULTRASOUND BULLETIN

Ultrasound Bulletin November 2003 6: 4

Notes from the Editor

This Issue of the Bulletin is a 'bumper' pre-Christmas edition, with some excellent information contained in the scientific sections.

It contains a combination of ASUM news, academic articles, book reviews, draft worksheets for the female and obstetric pelvis and abstracts from the Annual Scientific meeting in Perth. Announcements and sponsors' information are of interest to all readers.

ASUM's significant and increasing international presence is reflected in this issue of the Bulletin.

Any reader who knows of the whereabouts of a Diasonics Synergy machine is asked to read the Letters to the Editor.

All readers are encouraged to review the eye-catching articles on lacrimal gland ultrasound, wrist sonography, enhanced ultrasound imaging of the liver and informative case reports.

Mike Dadd reports with sadness on the twilight of the Ultrasonics Institute.

Readers are asked for feedback on the draft worksheets for obstetrics and gynaecology examinations – the worksheets represent an amalgam of ideas from leading centres around Australasia. The aim is to stimulate a review of your own worksheets so that the relevant elements from the draft worksheets can be incorporated into your own daily practice. Additional suggestions and ideas are welcome.

In the last section of the Bulletin, readers will find a fascinating and diverse range of abstracts from ASUM 2003 ASM, reflecting the superb Perth meeting.

This issue is the first involving our new publishers, Minnis Communications. We have taken the opportunity to introduce a new look. Readers are invited to comment on this new look Bulletin.

Read, enjoy and have a safe and happy Festive Season.

Roger Davies
Editor

Australasian Society for Ultrasound in Medicine

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President's message

Glenn McNally

Year-end nears and it is appropriate to review the Society's work over the past year and contemplate our future direction.

WFUMB 2009

ASUM's success in our bid to host the WFUMB 2009 Congress in Sydney provides a wonderful opportunity for the Society to showcase the achievement of the diagnostic ultrasound community in Australia and New Zealand. Much work now needs to commence which will include a significant promotion of the meeting and ASUM. I would ask those of you attending major international meetings to liaise with our CEO, Dr Caroline Hong, as to how you may assist in the promotion of WFUMB 2009.

ASUM meetings

Our two major meetings this year were unqualified successes. The initial Multidisciplinary Workshop held early in the year in Sydney attracted a large number of registrants, with excellent feedback from the participants. The recent ASM in Perth had over 500 registrants for both the workshop component and the scientific meeting. Again, feedback from registrants, speakers and sponsors has been very favourable. There has been discussion in recent years about concentrating major meetings between a small number of major cities on the Eastern seaboard and in New Zealand. I believe that it is important that the Society attempts to run its meetings in as many locations throughout Australia and New Zealand as is feasible. Where a strong program is put in place, our members have generally responded well in their participation and this was certainly the case in Perth. Congratulations go to the Organising Committee, namely Jan Dickinson, Chelsea Hunter, Michelle Pedretti and Elvie Halausckwiez.

Asia Link program

The Asia Link program is going well. Contact with the Korean Medical Ultrasound Society and the Bangladesh Society has been strengthened in this past year. We are likely to be providing education and assessment support to the latter in the next year. Our first joint meeting to be held with the Medical Ultrasound Society of Thailand took place in early November and was well attended by both Thai Society members, ASUM members and other overseas registrants. The increasing activity and success of the Asia Link program is largely due to the efforts of its chair, Dr Stan Barnett and we are grateful for his contribution.

Members honoured

All members of the Society offer our sincere congratulations to Dr George Kossoff who has been honoured by the Prime Minister with the awarding of a Centennial Medal. We also awarded life memberships, an honorary membership and an honorary fellowship at the recent Perth ASM. New Life Members are Dr Stan Barnett and Dr Dave Carpenter. The new Honorary Member is Prof Byung Ihn Choi from Korea. An Honorary Fellowship was awarded to Roger Gent for his outstanding contribution to the Society over many years. Congratulations to each recipient.

Education resources for clinicians

Discussions have been occurring over the past few months with representatives from the Royal Australasian

Australasian Society for Ultrasound in Medicine

ASUM Meetings 2004

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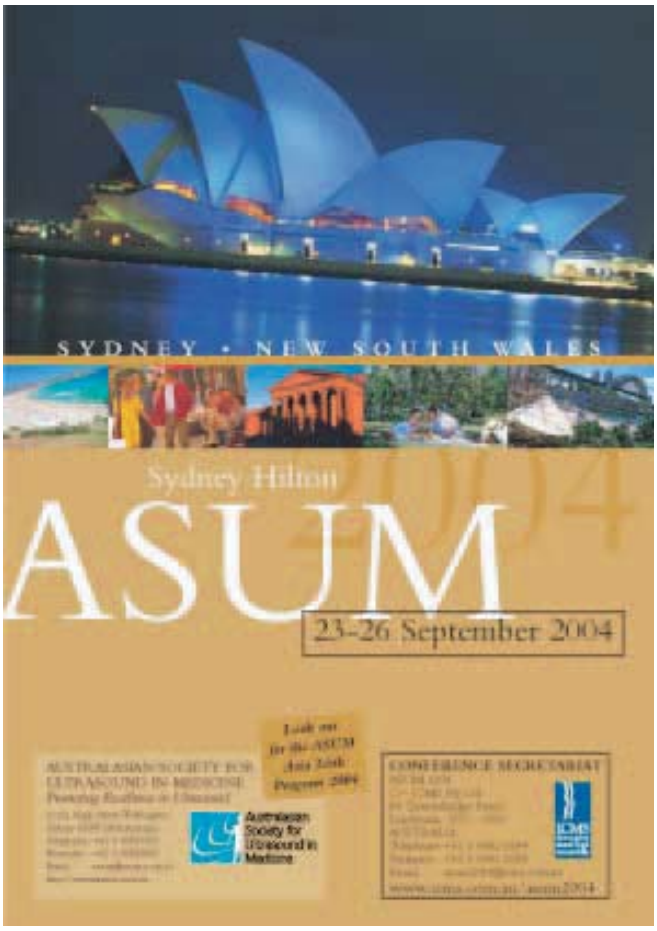

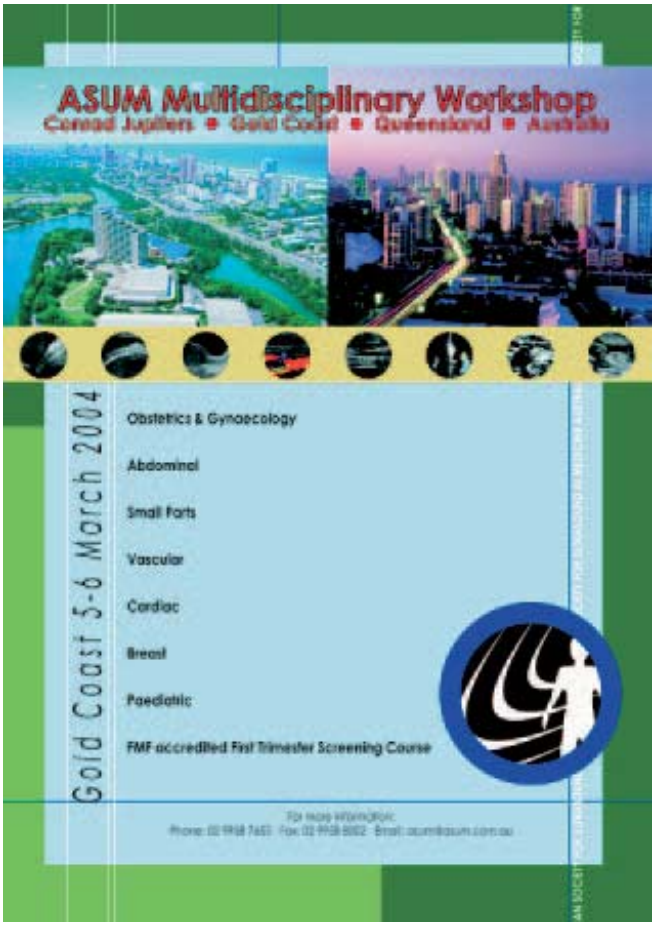

Australasian Society for Ultrasound in Medicine

DMU & DDU Preparation Courses, Sydney

DMU Part 1 Preparation Course **4th to 8th February 2004**

The purpose of this course is to provide an overview of the knowledge and understanding of anatomy, physiology, pathology, instrumentation and relevant physical principles of ultrasound. Participants will also have the opportunity to seek guidance concerning the interpretation of the DMU Syllabus and preparation strategies for the DMU Part 1 Examination.

DMU Part 2 Preparation Course **4th to 8th February 2004**

The purpose of this course is to provide registrants with an interactive program to assist their preparation for the DMU Part 2 Examination. Tutorials and Workshop Sessions will include study methods for the DMU examination, physics program, pathology, film reading and the opportunity to talk to DMU examiners.

DDU Technical Seminars **5th to 7th February 2004**

The purpose of this course is to provide an overview of the knowledge and understanding of anatomy, physiology, pathology, instrumentation and relevant physical principles of ultrasound and instrumentation. Participants will also have the opportunity to seek guidance concerning the interpretation of the DDU Syllabus and preparation strategies for the DDU part 1 Examination.

For further Information:
Contact: Mike Blee
Email: education@asum.com.au Ph: 02 9958 6200
Website address: www.asum.com.au

College of Surgeons and the Australian College of Emergency Medicine regarding the provision of education resources to clinicians seeking to perform limited, targeted ultrasound examinations. ASUM Council feels that this trend is in some ways inevitable and we intend that benefits to patients will be achieved through education and the attainment of appropriate standards of practice. We envisage education modules being offered to these groups in 2004 and look to the contribution of many of our members to assist developing this process.

DMU recognition

ASUM recently presented its application for recognition of the DMU by the Australasian Sonographer Accreditation Registry. Thanks go to Margo Gill for the enormous amount of work that she put into preparation of our application. Indeed, all of the DMU Board of Examiners worked tirelessly to produce a high quality application. Part of this process involves looking at many of the activities of the DMU to improve the transparency of our processes and to make the DMU accessible while retaining a high standard.

UK Sonographer exchange

Discussion has taken place between representatives of ASUM Council and the British Medical Ultrasound Society with the view to creating a sonographer exchange between Australia and New Zealand and the United Kingdom. It is proposed that a sonographer would visit the United Kingdom every two years to participate in a specific research project. We would appreciate any member interested in this exchange to provide us with ideas of research projects and any units interested in accepting sonographers from the United Kingdom. We would certainly like to hear from you.

Well done, Roger and Keith

Once again, an excellent Bulletin has been prepared by our tireless Editor, Dr Roger Davies. Roger and Keith Henderson are to be congratulated for maintaining the high standard of the Bulletin over the last year.

The next Bulletin won't be until February 2004 so please accept my best wishes for the holiday season and I look forward to seeing many of you in 2004.

Glenn McNally
President ASUM

DMU REACCREDITED

ASAR has advised that the ASUM DMU has been granted full accreditation status for the statutory period of 5 years.

George Kossoff awarded the Centenary Medal, Prime Minister's Award

George Kossoff has been awarded the Centenary Medal, Prime Minister's Award, for 'services to the Australian society in ultrasonics in medicine'. He is among 100 Australians to receive the medal, on the centenary anniversary of the establishment of Australia's Constitution. The medal recognises Australian citizens who have made a difference to our society.

George, who is an ASUM Life Member, came to ultrasound research in 1959 as Senior Physicist, Ultrasound Research Section, Commonwealth Acoustic Labs, Sydney. As the Foundation Director of the Ultrasonics Institute he was responsible for guiding a team of about 30 scientists, engineers and technical professional personnel to undertake research and liaise with academia and industry to provide services into diagnostic, surgical and bioeffects applications of ultrasound. This research was undertaken in collaboration with a number of medical specialists in the fields of obstetrics, radiology, nuclear medicine, surgery, otology, cardiology and ophthalmology. The evaluation of the developed technology was performed in major hospitals in Sydney, where these specialists had academic and clinical appointments. On transfer to the CSIRO, the research expanded into non-medical applications of ultrasound and into other medical imaging technology. Major programs were thus also undertaken into assessment of marbling of meat in livestock, into 3-D real time underwater imaging of objects in turbid waters and into computer assisted diagnosis of medical images.

George Kossoff receives his medal from Federal Minister for Education Brendan Nelson

He has published over 240 articles on the technical, clinical and bioeffects of ultrasound, is editor of eight books and a slide series and is the holder of 23 patents on technical aspects of ultrasound. George has been President of the AIUM; ASUM (foundation) and WFUMB; he has eight Fellowships in learned colleges or scientific societies and has received six other international awards for his contributions to ultrasound.

George Kossoff's achievements are well known and ASUM congratulates him on receipt of this well deserved award.

ASUM Multidisciplinary Workshop

Conrad Jupiters ● Gold Coast ● Queensland ● Australia

Gold Coast 5-6 March 2004

Obstetrics & Gynaecology featuring Prof Lilith Valentin

Abdominal

Small Parts

Vascular

Cardiac

Breast

Paediatric

FMF accredited First Trimester Screening Course

A Registration Brochure is included with this *Ultrasound Bulletin*
and can be viewed online at http://www.asum.com.au

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The CEO's desk: coming up – WFUMB 2009

Dr Caroline Hong

WFUMB Sydney 2009

Since my last message, promotional activities by ASUM have already started for the WFUMB 2009 World Congress to be held in Sydney from 5–9 September 2009.

Dr Stan Barnett, Convenor of WFUMB 2009 was one of 15 invited overseas speakers to participate in a combined meeting of Latin American Federation of Medicine in Biology and Ultrasound Associations (FLAUS). He shared the podium with such luminaries as Dr Barry Goldberg, Thomas Jefferson University, Dr Alfred Kratochvil, Vienna, Dr Byung Ihn Choi, Seoul National University and Dr Giovanni Cerri, Sao Paulo, Brazil.

As well as delivering four papers at Cancun, Stan took every opportunity to promote ASUM, Sydney and WFUMB 2009. His presentation and distribution of Sydney postcards to the delegates have already generated a lot of interest.

If any ASUM member is travelling overseas as an international speaker and wishes to include slides of WFUMB 2009 and Sydney in your presentation please contact me at carolinehong@asum.com.au

33rd ASUM 2003 Annual Scientific Meeting

ASUM had a fantastic response at the 33rd ASUM 2003 ASM. The meeting attracted about 500 delegates and exhibitors over the four days. The first day was a Skills Day with concurrent workshops. The next three days consisted of plenary and concurrent sessions.

ASUM was privileged to sponsor Prof Hiroki Watanabe, Immediate Past President of WFUMB, to present the WFUMB Lecture on the topic of *Accreditation for Ultrasound in the World*.

Dr Kanu Bala was also sponsored by ASUM to attend the meeting. He presented on the topic of *Ultrasound Education in Bangladesh*. Invited international keynote speakers included Prof Anil Ahuja from Hong Kong, Prof Wolfgang Holzgreve from Switzerland, Dr Thomas Stavros from USA, Mr Timothy Hartshorne from the United Kingdom and Prof Seung Hyup Kim from Korea. ASUM was also very fortunate to be supported by more than 50 local speakers of very high standards from Australia.

Assoc Prof Jan Dickinson, Convenor, and her local organising committee, Michelle Pedretti, Chelsea Hunter and Elvie Halausckwiez are to be congratulated for the success of this meeting.

The continuing support of our sponsors, in particular, Toshiba, our platinum sponsor, GE, Philips and Siemens also contributed to the overall success of the meeting.

March 2004: Multidisciplinary Workshop

We are proud to announce, as a result of popular demand for our recent multidisciplinary workshop (MDW) held this year, that we will hold another one on 5–6 March 2004 at the Gold Coast, Queensland, Australia. It is a great concept – with ultrasound workshops running concurrently in general, obstetrics and gynaecology, vascular, cardiac, abdominal, breast and others.

The FMF accredited Nuchal Translucency course will be held on Thursday 4 March 2004. This MDW is also a great opportunity to network in one venue with colleagues from all disciplines of ultrasound. If you have always wanted to visit Australia and in particular, visit the stunning beaches, subtropical rainforests and great entertainment theme parks at the Gold Coast, WFUMB and affiliated society members are welcome to attend at ASUM member rates. Email to asum@asum.com.au or visit our website at www.asum.com.au

September 2004: 34th ASM

Sydney has once again been chosen as the city to hold the 34th ASUM 2004 ASM. We promise an interesting scientific and social program.

Prof Giovanni Cerri will be the WFUMB lecturer and will be sponsored by ASUM. We also have international invited keynote speakers including Jane Bates from the United Kingdom, Kathleen Carter, Dr Harris Finberg and Dr John McGahan from USA.

Sydney is one of the world's great cities and hosted the 'Best Olympic Games ever' in 2000 according to Juan Antonio Samaranch when five million visitors attended the Olympic city. For overseas colleagues, if you have never been to Australia before, Sydney is the gateway to this beautiful country, with beautiful sandy beaches, great cosmopolitan lifestyle and world-class modern and sophisticated infrastructure. All WFUMB and affiliated society members are welcome to attend at ASUM member rates. Email asum@asum.com.au or visit our website at www.asum.com.au

Research and grants

We were fortunate to be able to allocate the surplus from last year's ASM to research and grants. Several projects are being considered, including a proposal between ASUM and BMUS on a sonographer exchange program for research projects, to be started soon.

ASUM–BMUS presidential exchange

The ASUM–BMUS Presidential exchange, which started during Dr Stan Barnett's presidency, will continue. Jane

Bates, President of BMUS has been invited as a guest speaker at ASUM 2004 ASM to be held in Sydney. Dr Glenn McNally, ASUM President will also attend as an invited guest of the BMUS 2004 meeting.

The Asia Link program

ASUM continues to liaise with ultrasound societies in Indonesia (ISUM), Malaysia (MSUM), Korea (KMSU), MUST (Thailand), Pakistan (USP), Bangladesh (BSU), Singapore (MUSS) and Japan (JSUM).

The ASUM and KMSU exchange program remains strong, with invited speakers from both societies at the annual scientific meetings each year.

Prof Seung Hyup Kim was the keynote invited speaker at ASUM 2003 in Perth. Dr Roger Davies is the invited speaker at KMSU 2004 in Seoul.

MUST and ASUM hosted a joint meeting in Bangkok from 6–7 November 2003. The speakers at this meeting were Dr Stan Barnett, Dr Glenn McNally, Dr Simon Meagher, Prof John Harris, Mrs Jenifer Kidd, Dr Kittipong Vairojanavong, Dr Laddawan Vajragupta, Dr Ekachai Kovavisarach, Dr Walailak Chaiyasoot and Ms Marsha Neumyer.

WFUMB 2009 Promotions Team

The WFUMB 2009 World Congress Promotions Team from ASUM, consisting of Dr Stan Barnett, Dr Glenn McNally and Dr Caroline Hong will be attending the AFSUMB 2004 Congress to be held in Utsunomiya, Japan in May 2004. Prof Kouichi Itoh, President of JSUM, has kindly offered promotional opportunities for the ASUM and WFUMB 2009 meetings at this Congress. Members are welcome to contact the AFSUMB 2004 Congress Secretariat by email to afsumb2004@congre.co.jp to register for the meeting, which will be held from 17–21 May 2004. This is an opportunity to visit Japan and also to meet ultrasound colleagues from all parts of Asia at this meeting.

Corresponding members of ASUM welcomed

Members of all WFUMB and AFSUMB affiliated societies are welcome to join as Corresponding Members of ASUM for a small fee. Application forms can be downloaded from the ASUM website www.asum.com.au. This allows access to many benefits, including: discounted registrations at ASUM meetings and workshops, complimentary subscription to the quarterly ASUM Ultrasound Bulletin and periodic CD ROM image libraries, and to be on our mailing list for educational material and news about all the latest meetings and workshops.

Dr Caroline Hong CEO
email carolinehong@asum.com.au
website www.asum.com.au

ASUM Prizes and Awards announced at Annual Scientific Meeting

Chris Kohlenberg Teaching Fellowships 2003
Sponsored by GE Medical Systems Ultrasound: Value $6000
Mrs Jenifer Kidd NSW
Dr Matthew Andrews Vic
In 2003/4 the Teaching Fellows will conduct meetings in Queensland, South Australia and the Northern Territory

Best Research Presentation Award
Sponsored by Siemens: Value $1500
Awarded for the best proffered research paper at ASUM 2003
Dr Neil MacPherson NSW

Beresford Buttery Overseas Traineeship 2003
Sponsored by GE Medical Systems Ultrasound: Value $6,000
Ms Teresa Clapham Qld

Best Sonographers Research Presentation Award
Sponsored by Philips Medical Systems Ultrasound: Value $2000
Awarded for the best research paper proffered by a sonographer at ASUM 2003
Mr Peter Coombs Vic

Best Clinical Presentation Award
Sponsored by Siemens: Value $1000 plus a shield
Awarded for the best clinical presentation proffered as a paper or poster at ASUM
Mrs Rae Roberts WA

The Australiasian Society of Ultrasound in Medcine wishes to express our most sincere congratulations to all of the very worthy winners.

Obituary

Dr Brian Pridmore 1939–2003

Dr Brian Pridmore was a dedicated member of the ultrasound and obstetric community in South Australia for many years, until his recent death. He will be greatly missed both by his contemporaries and those of us fortunate enough to have learned from him over the years.

His commitment to ultrasound and education dates back to 1974 when the first contact ultrasound scanner was purchased for the obstetric department at The Queen Elizabeth Hospital (TQEH) where he was a resident obstetrician, having just completed his O&G training in England. This scanner was primarily used for obstetric work but, with advances in technology and increasing interest, the range of studies expanded and Dr Pridmore maintained a keen interest. His involvement with TQEH ultrasound department continued throughout his career and he had a significant input to teaching of both sonographers and radiology registrars.

He was a supporter of the South Australian Clinical Ultrasound Group, formed in 1977, and later incorporated as the South Australian branch of ASUM. He was a long serving local branch committee member and federal councillor and chaired the standards of practice committee for many years. He was a major contributor to the organisation of ASUM scientific meetings when held in Adelaide, including the first in 1978.

He had a longstanding commitment to obstetric services at the hospital as well as a private practice, setting a very high standard for patient care which he passed on to the junior medical staff under his supervision. He also provided extensive clinical support to the ultrasound department.

He is survived by his wife and his two daughters.

Dr Jane Copley

Letters to the Editor

Having a 'say' about CPE activities

Dear Editor,

Survey

Professionals everywhere seem to have accepted the fact that they do not, and cannot, learn all they need to know to be effective in their profession from their first degree. So we have CPE or CE or CPD or PD or CME or CVE or CLE. These educational activities recognise both the limitations of the first degree but also the willingness of the practitioners to continue to learn.

The fact is that practitioners must usually participate in some form of CPE to maintain their competence but also their right to practise, or membership of their association, or the use of some special designation or to reduce their insurance liability. These circumstances of course are very favourable for those who provide these CPE activities. They have a guaranteed audience. This situation has meant that some argue that the CPE providers are not necessarily very concerned about the quality or organisational details or costs of some of their CPE offerings. In fact, serious evaluations of CPE activities are not common. Yet CPE providers continue to make 'claims' about their programs and their value and impact.

So, I wish to undertake a different style of 'evaluation'. I am interested in hearing from practitioners about their 'bad' experiences with CPE activities. When has a CPE activity 'not delivered the goods' because of poor presenters or notes or technology that did not work. When has the heating (too much or too little) or the lack of time to socialise with other participants prevented you from making more from an activity. The reasons are probably as numerous as the people concerned.

Filling in a 'happy sheet' at the end of the activity does not provide much satisfaction for a dissatisfied practitioner. I am asking practitioners to tell me about their less than happy experiences at CPE events. I will analyse the responses and present the findings at a CPE Conference in Canberra in March 2004.

Telling me about that bad experience may just make you feel a little better about the experience and your approach to CPE.

I am not interested in the names of providers or presenters or of specific locations, for obvious reasons.

Your contributions will also remain anonymous. But tell me about the CPE activity and why for you it was unsatisfactory. I will categorise the responses and seek to locate the problem areas for providers. I already have reports of some practitioners' bad CPE experiences but they are not up to date and from a limited number of professions.

Participation for most professionals in CPE is now mandatory.

Participation in this project is of course voluntary. I will make no claims about the results of your participation but will try to ensure that the results are widely communicated to CPE providers.

Barrie Brennan
Honorary Fellow UNE
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54 Roderick St Tamworth
NSW 2340

Samoan hospital needs probes for donated Diasonics Synergy

Dear Editor,

Excelray Australia Pty.Ltd. has kindly donated to the Tupua Tamesese Maiola Hospital, Apia, Independent Samoa, a Diasonics Synergy ultrasound machine, circa 1997. It has a 3.5 MHz curved phased array and a 7.5 MHz transvaginal probe. The utility of the machine would be greatly enhanced if more probes could be obtained for it. Are there any of your readers who have compatible probes in good working order that they would be willing to donate to the imaging department of the TTM hospital?

The imaging department of the national hospital, with one radiologist scanning and supervising two ultrasound technicians performed 8000 ultrasound examinations last year. A Medison 1000 ultrasound machine is used as the main machine, and an Aloka SSD 2000 colour Doppler unit is being nursed along after eight year's service, but now has a limited life as the heavily worked probes start to delaminate and elements drop out.

Greater reliance is placed on ultrasound to diagnose pathology in Samoa in the absence of CT or MRI. The types of ultrasound examinations performed cross the full gamut of examinations requested in Australia, and in the case of disease that cannot be treated locally, helps decide who should be transferred to New Zealand for further treatment.

Samoa is a developing country that places a high value on education. It has a well-educated workforce in Apia, with western expectations of health care, as well as more traditional culture and lifestyle in the many villages. It has a highly educated medical workforce.

This Diasonics Synergy machine will make quite an impact on local health care delivery.

If any of your readers can help, please contact:

Dr Ian Cappe
North Coast Radiology
16 Keen St Lismore NSW 2480
tel +61 2 6622 2288
mob 0402 261 955

Classification systems for head and neck

Dear Editor,

One difficulty that we have as ultrasound enthusiasts is convincing our surgical colleagues of its utility in areas that they believe is the sole domain of other modalities such as CT. An excellent example is neck ultrasound and the ENT surgeon.

Michael Ying and colleagues provide us a welcome overview of the use of ultrasound in evaluating the cervical lymph nodes by ultrasound.[1] Ultrasound is an invaluable tool in evaluating nodal masses in the neck particularly in the paediatric setting.

Unfortunately, the article is not state-of-the-art in referring to the American Joint Committee on Cancer (AJCC) lymph node classification This classification system serves the surgeon but not the imaging community. The AJCC classification was superseded in 2000 by the imaging-based nodal classification proposed by Som and Curtin.[2] The advantage of this imaging-based classification is the use of readily identifiable anatomical landmarks. This contrasts with the AJCC system, that uses landmarks such as the spinal accessory nerve which I challenge anyone to identify on ultrasound.

If we are to extend our areas of expertise we need to sell them to our colleagues. In order to sell them to our colleagues we need to be confident of our facts. If people wish to use ultrasound for the evaluation of neck nodes then I recommend they familiarise themselves with the imaging-based classification proposed by Som and Curtin.

Stephen Busby
Consultant Radiologist (and part time sonographer)
Nelson Hospital, New Zealand

References

1 Ultrasound evaluation of neck lymph nodes. Ying M et al ASUM Ultrasound Bulletin. 2003 August; 6: 3.
2 Imaging-based nodal classification for evaluation of neck metastatic adenopathy. Som P and Curtin H. AJR. 2000; 174: 837–844.

Author's response

In our article, we did not suggest the American Joint Committee on Cancer (AJCC) classification to be used in ultrasound examinations of the neck. The AJCC classification is not used in ultrasound because some nodal groups which are common sites of metastases are not included in the classification, whereas some nodal groups in this classification may be difficult to be assessed with ultrasound. This explanation was included in our article. However, we recommended another classification which was developed by Hajek et al.[1] for ultrasound examination of the neck lymph nodes. This alternative classification is based on the location of the lymph nodes in the neck, which is determined by the anatomical structures demonstrated on ultrasound images, and the classification is used to ensure that the neck nodes, which can be assessed with ultrasound, are examined in a systematic way.

Michael Ying

References

1 Hajek PC, Salomonowitz E, Turk R, Tscholakoff D, Kumpan W, Czembirek H. Lymph nodes of the neck: evaluation with US. Radiology 1986;158:739-42.

A Latin-American experience at the FLAUS/ FMAUS Conference Mexico

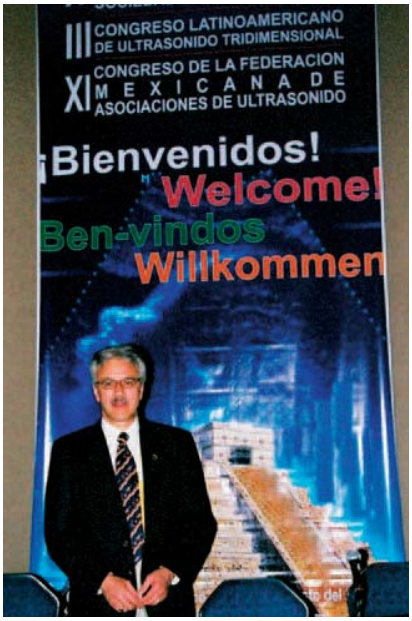
Dr Stan Barnett

The Conference

It was indeed a great pleasure to attend and participate in a combined meeting of Latin American Federations of ultrasound societies. This was, without doubt, one of the most hospitable and friendly conferences that I have ever attended. The atmosphere throughout the four-days was relaxed and most convivial. There was also a great deal of attention paid to formality, in particular during the official opening ceremony when the considerable contributions of the pioneers in the application of ultrasound in Latin America were duly recognised. It was a privilege for me to be invited as an honoured guest (together with Dr Byung Ihn Choi, Korea) to sit at the head table and participate in the official opening ceremony.

The conference was organised by a central group of experienced and dedicated professionals who are concerned about advancing standards of practice and attention to safety issues in the use of diagnostic ultrasound in Latin America. This was a combined meeting; the 11th Congress of Federation of Latin American Ultrasound Societies (FLAUS), the 12th Congress of the Federation of Mexican Ultrasound Associations (FMAUS), the 3rd Congress of the Federation of Latin American Societies of Ultrasound and the 3rd World Congress of Ultrasound in 3-D and 4-D. As an overseas invited speaker, I shared the podium with such luminaries as Dr Barry Goldberg, Thomas Jefferson University, Dr Alfred Kratochvil, Vienna, Dr Choi, Seoul National University and Dr Giovanni Cerri, Sao Paulo, Brazil. My attendance at this conference continues to promote a high level scientific profile for both ASUM and CSIRO.

The conference scientific committee Chair and chief organiser, Dr Miguel Angel Taboada went to great lengths to ensure that the overseas visitors were made to feel welcome. He was constantly involved in formalities of



the opening ceremony, presentation of awards, overseeing sessions, and the endless behind-the-scenes activities that are demanded by running a conference of this kind. He was also supported by his family – who all deserve a vote of thanks for their tireless efforts. Dr Leandro Fernandez, President of FLAUS, and Dr Fernando Chable Salazar, Chairman of the Federation of Mexican Medicine and Biology Ultrasound Associations, also had a hand in ensuring the success of this meeting. Leandro Fernandez, in particular, was instrumental in inviting me to present papers on safety, standards of practice and education. It is extremely difficult to resist his unrelenting enthusiasm and energetic approach. Dr Fernandez undertook an extremely demanding task load during the conference by delivering papers in almost every session, giving official speeches and awarding diplomas and medals.

I delivered four papers:

The use of pulsed Doppler ultrasound in 1st trimester uncomplicated pregnancy: is there cause for concern?

Spectral Doppler ultrasound can significantly heat intracranial tissue, but is there a serious risk to the fetus or neonate?

What has WFUMB done to develop guidelines for safe and effective use of diagnostic ultrasound?

Ultrasound training, standards of practice and accreditation by ASUM.

All major industry players were present, with Medison and Aloka taking prime positions in the exhibition area. Medison has a large market share in Latin America. All exhibitors held live scanning demonstrations with pregnant models throughout the meeting. The models were strictly demonstration.

The conference was attended by more than 200 delegates and was held in the Moon Palace Resort, a huge newly built complex nestled amongst many hundreds of acres of reclaimed jungle in the state of Quintana-Roo. The Resort has its own strip of beach on the Caribbean Sea and is located approximately 30 minutes drive from

the commercial town of Cancun.

The meeting and exhibition areas were ideal for a conference of this size. Four auditoria were located adjacent to the exhibit area, with two on each side. All delegates entered through the main doorway into the exhibit area before accessing the auditoria. The audio-visual facilities and staff were excellent and simultaneous translation was provided throughout the conference.

Dr. Leandro Fernandez (Chairman of FLAUS) and Dr. Miguel Jimenez Taboada (Conference Scientific Committee Chairman)

FLAUS concerned about standards and standardisation

The absence of standardisation in education and accreditation together with general lack of awareness of the need for caution is of concern to some senior members of FLAUS. Concern was also expressed about the commercialism of ultrasound in the non-clinical use by untrained and non-accredited practitioners who simply provide videos or photos of the developing fetus. It was agreed that future conferences in Latin America would promote issues of safety and hold more plenary sessions to widen the scope of interest.

The FLAUS organisers clearly look towards WFUMB to help in this regard. I hope to be able to assist in some way through my activities as Chair of Safety Committee or as Secretary of WFUMB. There was a high level of interest in discussions on regulation, safety and standardisation and legal implications. In fact, the level of interest and attention is substantially higher than that generally experienced in annual conferences of ultrasound societies like ASUM or AIUM. I would strongly recommend that ASUM Council endeavour to maintain this linkage with FLAUS to our mutual benefit.

Unrestricted live model scanning

There are no restrictions on the use of live models for scanning at exhibitions in Latin America. Although this was a general meeting with four parallel sessions, the models were virtually all for obstetrics, over the entire range of pregnancies. Some ultrasound exhibitors tended to have more displays of 3-D and 4-D. Models were scanned throughout the four-day conference. There were no male models.

There was clearly no concern about possible risk and apparently little awareness of the output display standard used by the FDA to regulate ultrasound equipment in the USA.

WFUMB 2009 promotion

I took the opportunity to promote ASUM ASM 2004 in Sydney Sydney and WFUMB 2009 with every presentation. In addition, 200 postcards were handed to delegates as they entered the exhibit area.

There is a great deal of interest and I look forward to further discussions with Latin American colleagues on the logistics involved in bringing a group to Sydney to attend the Congress. In the meantime, we look forward to hosting the world-renowned Dr Giovanni Cerri (President Elect of WFUMB and Past President of FLAUS) as a guest speaker during our ASUM ASM 2004.

World Congress in 3-D, 4-D ultrasound

The Congress also advertised the 3rd World Congress in 3- and 4-D ultrasonography. There were a number of presentations with varying degrees of expertise and technical development.

The exhibition area also provided many demonstrations. Medison has a particularly strong involvement and much of the time demonstrating live scanning was carried out with 3-D imaging using selected late pregnancy models. It is interesting to see how much emphasis is placed on this imaging application. Certainly, there have been great advances in the acquisition of data and generation of real-time images. Nevertheless, the application remains somewhat limited.

Dr Renato Ximenez showed some detailed and anatomically correct (by comparison with text book pictures) images of embryonic neural system development from 30 to 50 days gestation. These were quasi-three dimensional surface renditions of 10–20 mm embryos.

A well organised event

This combined Congress of Federations of Latin American ultrasound societies was well organised and the enthusiasm of all participants was maintained throughout. The organisers of the meeting deserve to be congratulated. In particular, Dr. Miguel Taboada went to extraordinary lengths to ensure the event achieved a unique level of friendliness and hospitality. He succeeded admirably.

The next FLAUS Conference will be held in 2005 in Chile.

Dr Stan Barnett

Secretary/ Convenor WFUMB

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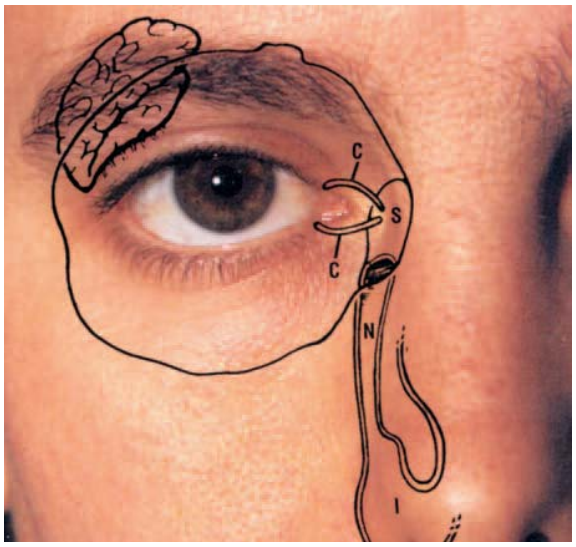
Lacrimal gland ultrasound

Niki Koutrouza-Tavlaridis and Ayman Elzarka

Introduction

The lacrimal gland is located at the supratemporal orbit, it consists of two lobes, the orbital lobe and the much smaller palpebral lobe. Only the palpebral lobe can be visualised clinically. Hence, disease processes, which only affect the orbital lobe, can only be detected later in the course of these conditions.

Figure 1 The lacrimal gland



Materials and methods

The study group was formed of 50 volunteers, 27 females and 23 males. The mean age was 40.2 years ± SD 12.8. The age range was 20–64 years. We imaged 100 normal lacrimal glands.

Ultrasound examination of the lacrimal glands was performed using a high frequency compact linear 10-5 MHz transducer on a Philips 5000 machine. B-mode and colour Doppler were performed.

The volunteers were positioned in the supine position with their eyes closed. The probe was placed in the upper outer portion of the upper lid, They were asked to 'look' away from the side the lacrimal gland was imaged. Sterile gel was used while scanning.

Images were obtained in the sagittal and transverse planes in relation to the anatomic axis of the gland. Three dimensions were recorded of each gland and calculation of the gland volume was undertaken.

The lacrimal artery was also identified with colour Doppler. A spectral trace was recorded. Peak systolic and end diastolic values were established.

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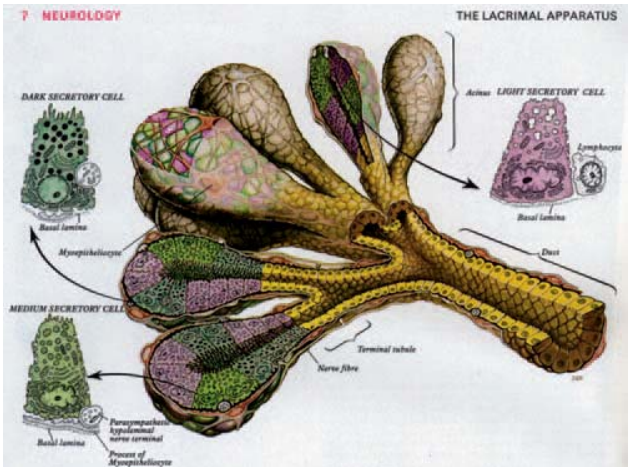
Table 1 normal lacrimal gland volumes

Volume	Mean volume	Range
Male	0.19 cc ± SD 0.02	0.06–0.5 cc
Female	0.17 cc ± SD 0.15	0.01–0.54 cc

Peak systolic velocity	Mean	Range
Male	16.49 cm/s ± SD 6.28	6.0–32.0 cm/s
Female	13.38 cm/s ± SD 5.	4.7–27.8 cm/s

End diastolic velocity	Mean	Range
Male	5.08 cm/s ± SD 2.33	1.6–11.8 cm/s
Female	4.19 cm/s ± SD 2.16	1.5–10.3 cm/s

Figure 2 Structure of the lacrimal gland



Results

We found that there is no statistically significant difference between the mean volume, peak systolic or end diastolic of the right and left lacrimal gland in either female or male subjects.

In female subjects, the mean volume of the lacrimal gland is 0.17 cc ± SD 0.15 and the range is 0.01–0.54 cc. The median volume is 0.1 cc.

In male subjects the mean volume of the lacrimal gland is 0.19 cc ± SD 0.12 and the range is 0.06-0.5 cc. The median volume is 0.13 cc.

However, we found that difference in the median values of lacrimal gland volume between the two groups (male and female) than would be expected by chance; there is a statistically significant difference ($p = 0.014$).

RANZCOG/ ASUM Beresford Buttery Travel Grant 2004

Following consideration of the Scholarly Selection Committee and ratification by the Board of Directors of the RANZCOG Research Foundation, the award of the 2004 Beresford Buttery Travel Grant will be made to Dr Jodie Dodd of the Department of Obstetrics and Gynaecology at the Univeristy of Adelaide.

Dr Dodd's study visit will be a two-month visit to Bristol University, Queen Charlotte's Hospital and Queen's Medical Centre, United Kingdom to gain experience in high riskmaternal fetal medicine units, with a view to establishing a maternal fetal medicine unit at the Women's and Children's Hospital Adelaide.

The Scholarship Committee was assisted on behalf of ASUM by Professor Lachlan de Crespigny.

Applications for the 2005 Beresford Buttery Travel Grant will be advertised in April 2004.

This grant is distinct from the ASUM Beresford Buttery Overseas Traineeship which is awarded annually and is sponsored by GE Medical Systems Ultrasound.

Appplications for the 2004 ASUM Beresford Buttery Overseas Traineeship will be advertised in the February Bulletin.

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There is also a statistically significant difference ($p = 0.008$) between the mean peak systolic velocities of the lacrimal gland artery in female subjects (13.38 cm/s ± SD 5.3) and male subjects peak systolic velocities (16.49 cm/s ± SD 6.28). Similar statistically significant difference ($p = 0.024$) is found between the median end diastolic velocities in female subjects (3.03 cm/s) and male subjects (4.75 cm/s). The mean end diastolic velocity of lacrimal gland

Figure 3 Sagital scanning

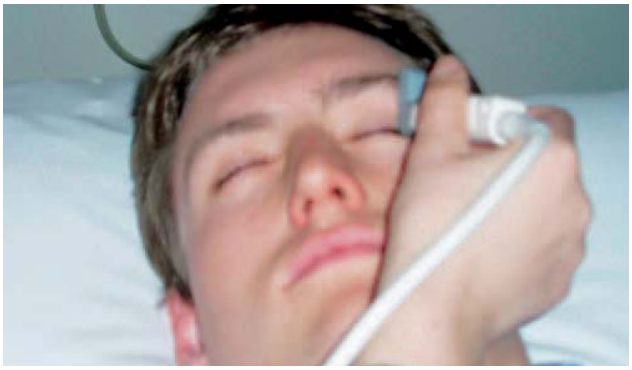
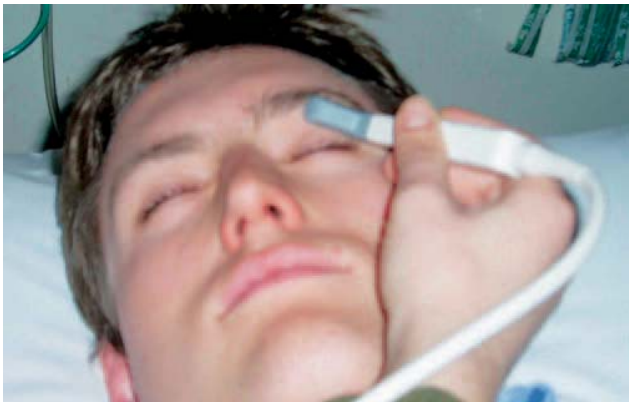


Figure 4 Transverse scanning



artery in female subjects is 4.19 cm/s ± SD 2.16. the range is 1.5–10.3 cm/s. In male subjects the mean end diastolic velocity is 5.08 cm/s and diastolic velocity is 5.08 cm/s ± SD 2.33. The range is 1.6–11.8 cm/s.

Conclusion

Ultrasound examinations of the lacrimal gland can provide a fast, non-radiation modality for imaging. This could be helpful for detecting early disease processes which can affect the lacrimal glands, such as sarcoidosis lymphoma of Sjogren syndrome.

In this study we attempted to develop a standard normal value for ultrasound of the lacrimal gland and the Doppler signal of the lacrimal artery studied. We propose that the normal lacrimal gland volumes are those laid out in Table 1.

While our study group was small, we found that there is statistical difference in volume and Doppler signal between the normal lacrimal gland in male and female subjects.

Acknowledgement

Andrew Tshaikiwsky

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Demonstration of the palmar extrinsic wrist ligaments with high resolution sonography

Lynne Johnson and Richard Zwar

Introduction

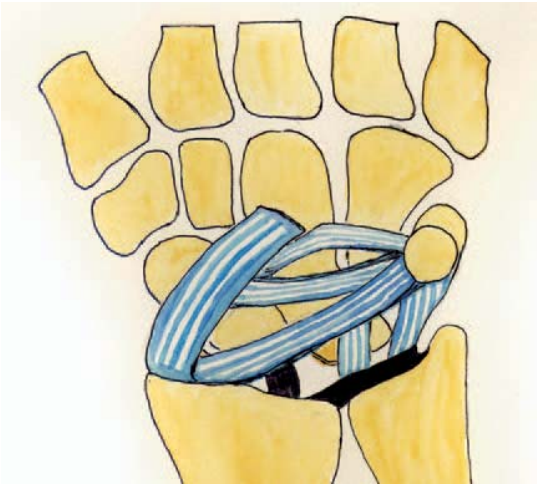
Chronic wrist pain may be the result of carpal instability caused by ligamentous injury, or the pain may be due to injury to the ligaments without instability. This often causes a difficult diagnostic problem.

The ligaments of the wrist have been classified by Taleisnik,[1] into intrinsic – entirely within the carpus and extrinsic – having an attachment to the carpus and passing out of the carpus. Injury to these wrist ligaments can be observed in high resolution wrist images obtained by MRI, Theumann et al, Rominger et al, Smith et al.[2,3,4] However we describe the technique of using high resolution sonography to accurately define the internal substance and attachments of the palmar extrinsic ligaments.

Materials and method

We took 10 normal volunteers without symptoms of wrist pain or a history of arthritis or chronic medical conditions. Using a high frequency transducer, a 12–5 MHz linear array probe with Sono-CTTM (Philips, Bothell, WA) we observed the normal bony landmarks of the carpal bones and distal radius and ulnar, on their palmar aspects, then defined the course and attachment of the extrinsic palmar carpal ligaments with the knowledge of their previously described course[1] and the knowledge of the normal features of ligamentous structures in the human body as seen by ultrasound.

Structure of the wrist



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The ultrasound features of ligaments

Ligaments are tightly bound bundles of collagen and thus exhibit similar properties to tendons on ultrasound. They have a fibrillar echogenic appearance and sharply bordered superficial and deep surfaces by a thin hypoechoic band (Figure 1, image of anterior talofibular ligament at lateral ankle). In order to appreciate these features on ultrasound and avoid anisotropy, particular attention must be paid to technique. The highest frequency transducer must be used with the gain settings at a minimum to reduce noise. The transducer alignment must be precise so that the probe is perpendicular to the ligament and along the long or short axis. Correct heel/ toe angulation needs to be used to permit visualisation. Anisotropy may be used to advantage to locate and confirm visualisation of ligaments. However, in ligaments that have a curved course the entire ligament may not appear hyperechoic at one orientation, and heel/ toe manipulation of the probe may be required to see all parts of the ligament, particularly at attachments to bone.

The bony landmarks of the carpal bones using ultrasound

In general, bony landmarks allow the localisation of the ligaments. The cortical surface of the bones appears as an echogenic line on an ultrasound image, and with appropriate gain settings there should be little or no signal deep to the cortical surface. At first the distal radius is located in a sagittal orientation and the radiocarpal joint is noted. If the transducer is then aligned in this plane in the mid palm then the lunate and its more distal articulation with the capitate can be appreciated (Figures 3,7). If the transducer is translated radial to this the radioscaphoid articulation is seen and the scaphoid is appreciated as a peanut shaped bone (Figure 4). If the transducer is swivelled with one end remaining on the scaphoid and then turned at right angles to its current location then the pisiform is seen, with its articulation with the triquetrum, on the ulnar side of the image and the scaphoid tuberosity on the radial side of the image. (Figures 5,6).

A general appreciation of the carpal anatomy having been gained, the individual ligaments can be located by finding their radial or ulnar attachments and then orienting the transducer along the known long axis of the ligaments to their respective insertions (lunate, scaphoid, capitate, triquetrum). The palmar scaphotriquetral ligament can be similarly located.

Radiolunotriquetral ligament

The radiolunotriquetral (RLT) ligament arises from the palmar aspect of the radial styloid process. It courses through the groove of the scaphoid and inserts widely on the palmar aspect of the lunate. Sonographically, the ligament is seen to

Figure 1 Example of a ligament – anterior talofibular ligament. T = talus F = fibula

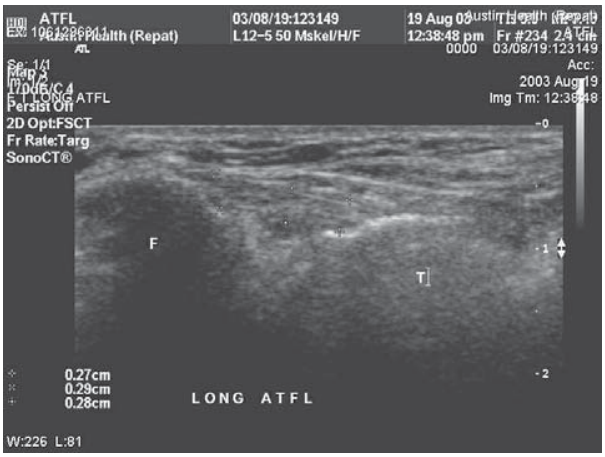


Figure 3 Parasagital image of carpal bones. C = capitate L = lunate R = radius

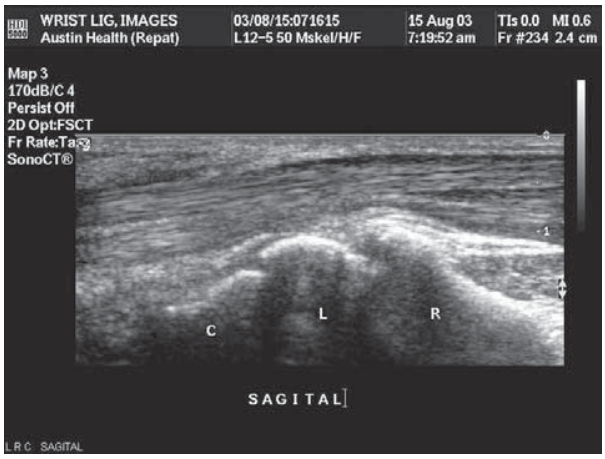


Figure 4 Radial parasagital image of carpal bones. S = scaphoid R = radius

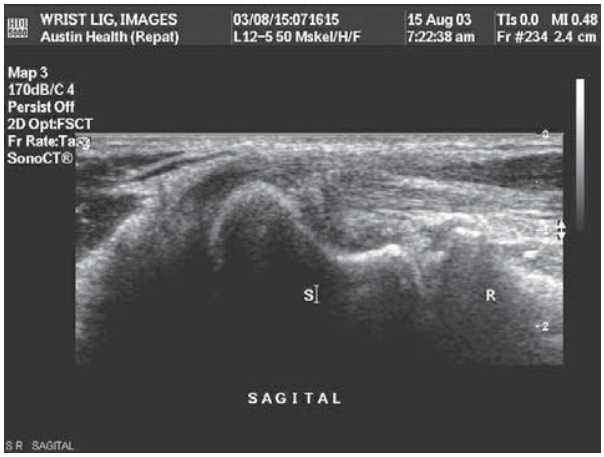


Figure 5

Figure 6 Transverse US image of carpus at the level of the scaphoid tuberosity. S = schaploid P = pisiform T = triquetrum

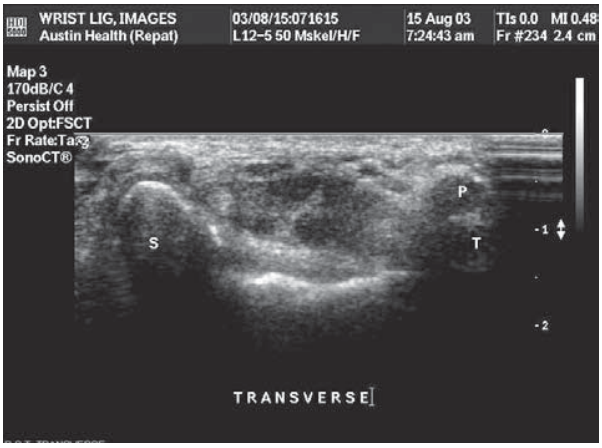


Figure 7

Figure 8 Oblique US image in the line of the RSC ligament. C = capitate S = scaphoid R = radius. Calipers on ligament

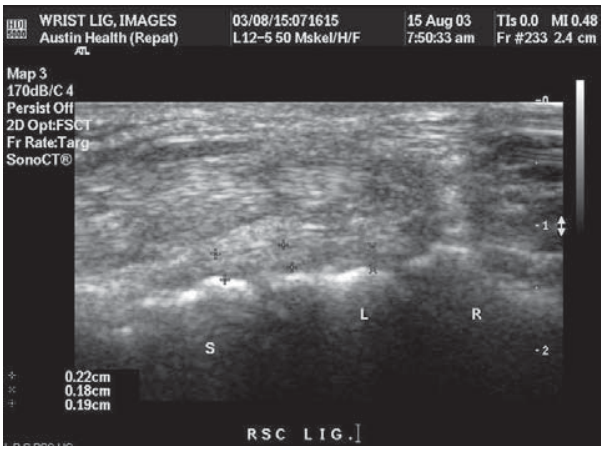


Figure 9 with heel/ toe angulation to demonstrate the more proximal portion of the RSC ligament

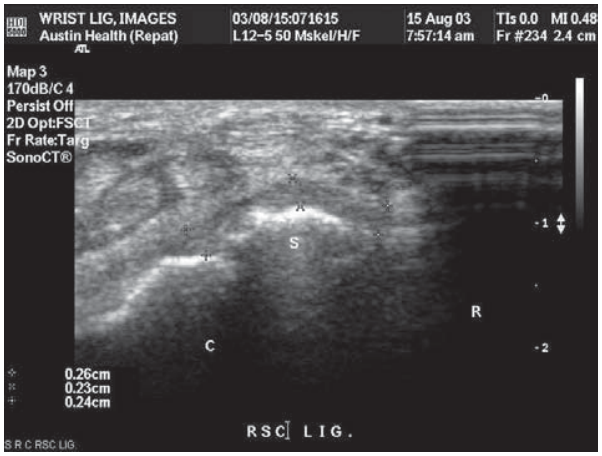


Figure 10

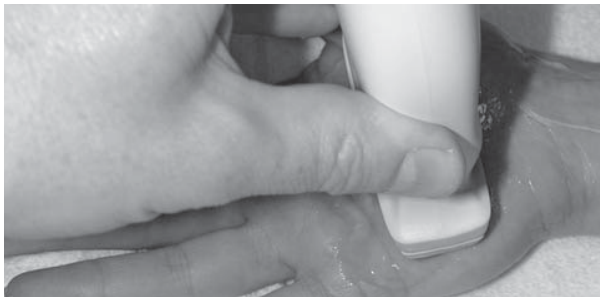


Figure 11 Transverse US image of the distal carpus at the level of the proximal band of ST ligament. S = scaphoid T = triquetrum P = pisiform

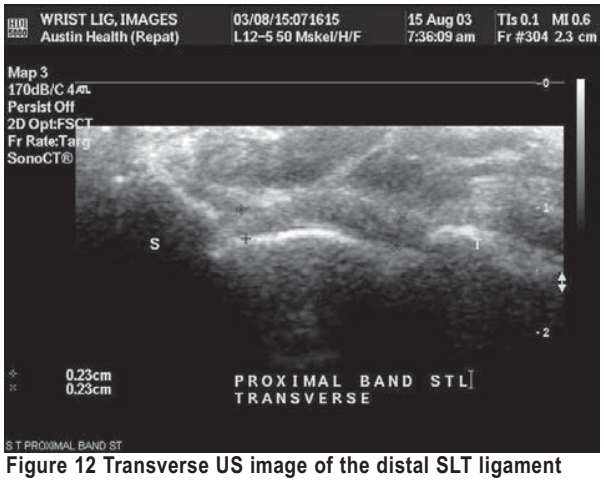


Figure 12 Transverse US image of the distal SLT ligament with heel/ toe transducer angulation to demonstrate the different components

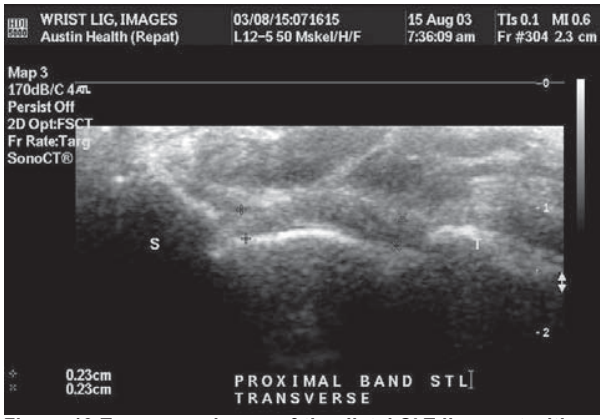


Figure 13 Transverse image of the distal SLT ligament with heel/ toe transducer angulation to demonstrate the different components. C = capitate T = triquetrum S = Scaphoid

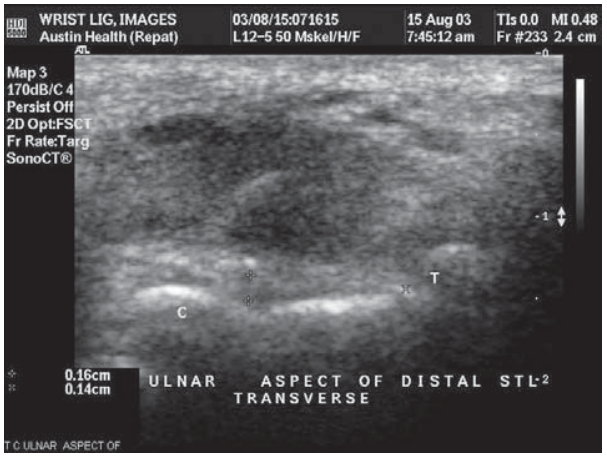


Figure 14

Figure 15 Oblique US image along the course of the RLT ligament. T = triquetrum L = lunate R = radius

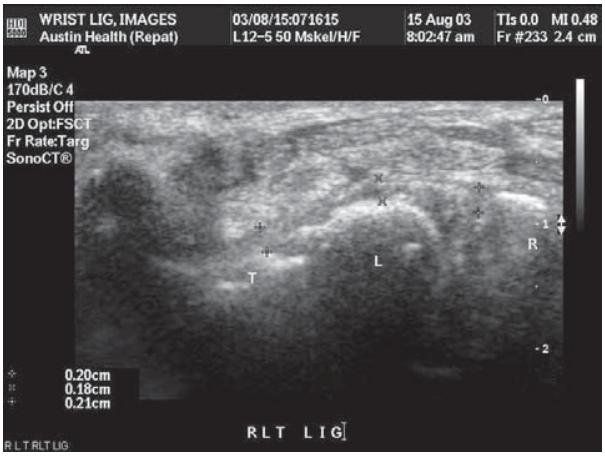


Figure 16 with heel/ toe angulation to demonstrate distal portion of the LT component of the RLT

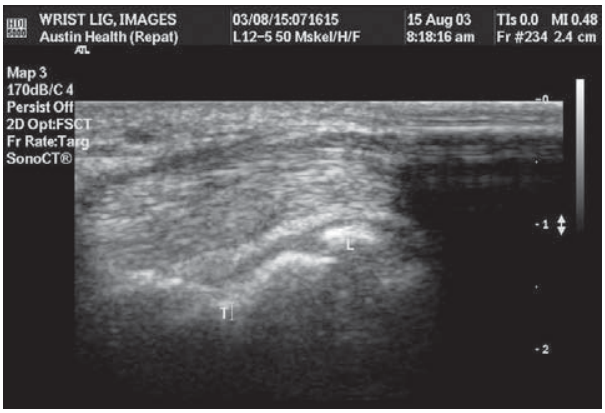
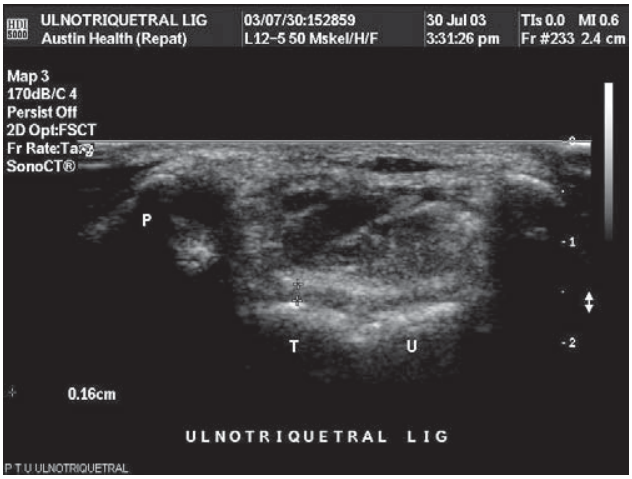


Figure 17

Figure 18 Parasagital US image of the carpus demonstrating the UT ligament



narrow over the lunate, and distally to this the ulnotriquetral portion is seen. To achieve this the transducer is obliqued from the radial head to the triquetrum and pisiform bones, incorporating the lunate bone centrally (Figures 14,15,16). As the ligament has two sections, it is necessary to 'heel' and 'toe' the probe to see both sections to keep the beam perpendicular to the ligament (Figure 16).

Radioscaphocapitate ligament

The radioscaphocapitate (RSC) originates from the distal radius to about the middle of the scaphoid fossa. It forms the entire radial radiocarpal and part of the palmar radiocarpal joint capsule. It attaches to the proximal cortex of the distal pole of the scaphoid as it enters the midcarpal joint. Only about 10% of fibres insert into the palmar cortex of the body of the capitate. Visualisation of this ligament is achieved by locating the styloid process of the radius and obliquing it toward the capitate bone incorporating the scaphoid centrally (Figures 7,8). As the ligament dives deeply toward the capitate bone it is necessary to 'heel' the probe toward the radius (Figure 9).

Scaphotriquetral ligament

The palmar scaphotriquetral (ST) ligament arises in common with the fibrous band of the RSC ligament from the scaphoid and extends distally as two parallel bands. The proximal band runs to the triquetrum. The distal band forms an arch and inserts into the palmar aspect of the capitate, the palmar aspect of the hamate, and the triquetrum in common with the proximal band. The ST ligament may be localised by placing the transducer transversely on the mid-palmar region and identifying the scaphoid and triquetrum bones (Figure 10). There are two bands – a proximal band runs directly from the scaphoid to the triquetrum, and a distal band forming an arch from the scaphoid to the capitate, hamate and triquetrum (Figures 11,12,13).

Ulnotriquetral ligament

The ulnotriquetral (UT) ligament originates proximally from the palmar radioulnar ligament and attaches to the proximal and ulnar surface of the triquetrum and may have some proximal fibres attaching to the ulnar styloid process. The UT may be localised by finding the ulnar styloid process in sagittal plane and identifying the pisiform and triquetrum bones (Figures 17,18).

Conclusion

High-resolution ultrasound imaging can demonstrate the extrinsic palmar wrist ligaments once the bony landmarks and normal course of the ligaments are understood.

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CASE REPORT

Cornual 'ectopic' in a sub-septate type bicornuate uterus

YP Gounden

Introduction

Interstitial pregnancy occurs in 2–4% of ectopic pregnancies and is defined as implantation of the trophoblast in the interstitial part of the tuba uterina.[1] The distinction must be made between an ectopic pregnancy in the interstitial portion of the tube or a rudimentary uterine horn, and a pregnancy implanted in the horn (cornu) of a bicornuate uterus or cornual pregnancy.

In the absence of previous documentation of a bicornuate uterus, the ultrasonic distinction between a true cornual ectopic or interstitial pregnancy and a cornual pregnancy in the horn of a bicornuate uterus is difficult, as they share similar sonographic features.[2] The distinction is clinically important as management of these two conditions is very different. Interstitial pregnancy is described as typically rupturing in the second trimester with catastrophic often life threatening haemorrhage. This paper describes a case in which the ultrasound examination was indistinguishable from a cornual ectopic but the pregnancy was shown at laparoscopy to be in the horn of a bicornuate uterus.

Case report

A 34-year-old presented with a history of irregular periods and vaginal bleeding.

Clinical examination revealed a well patient with a non-surgical abdomen and a positive pregnancy test. Ultrasound suggested a gestational sac with a fetal pole and no cardiac activity located in the cornu. The myometrial mantle was thinned out. There was no free fluid in the Pouch of Douglas. There was a provisional diagnosis of an unruptured non-viable cornual ectopic (Figure 1a, 1b). The 'interstitial line sign' was not identified prospectively.

Laparoscopy was therefore performed and this demonstrated a bicornuate uterus with normal tubes and ovaries. Medical termination with misoprostol was carried out. Subsequent management involved serial beta HCG measurement. A repeat ultrasound after 4 weeks revealed a sub-septate type bicornuate uterus (Figure 2a, 2b over page).

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Discussion

Sonographic features of a cornual ectopic have evolved pari passu with experience and technical improvement in equipment. Eccentric location of the gestational sac was the first reported sonographic feature.[2] Later thinning of the myometrial mantle and the presence of myometrium between the sac and uterine cavity were added.[3]

With the advent of transvaginal sonography criteria for diagnosis included an empty uterine cavity, a sac located and seen separately > 1 cm from the lateral most edge of the uterine cavity and a thin myometrial mantle (< 5 mm) surrounding the sac.[4] The 'interstitial line sign' was later reported to have a high sensitivity and specificity.[5] The sign is an echogenic line that extends into the cornual region and abuts the mid-portion of the sac. In an early cornual ectopic it may represent the interstitial portion of the fallopian tube

Figure 1a

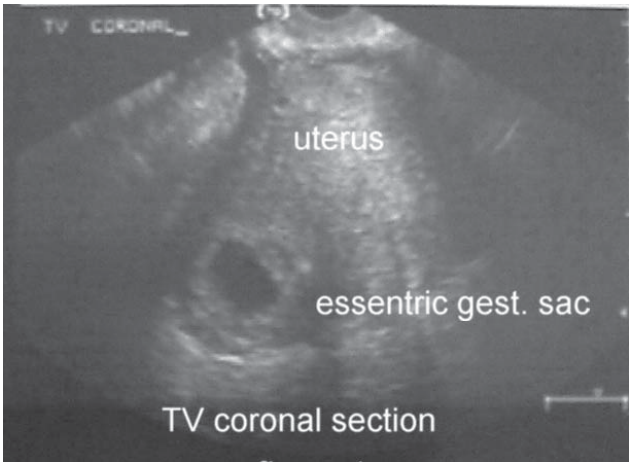


Figure 1b

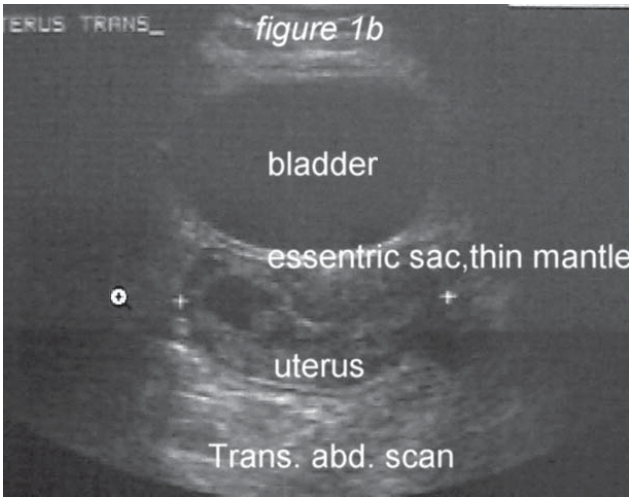


Figure 2a

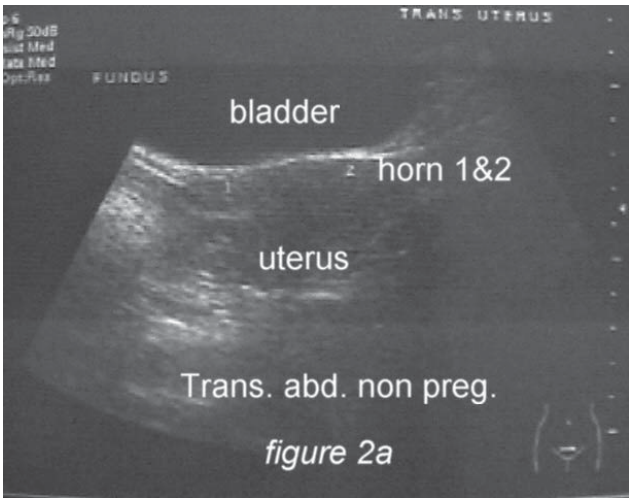
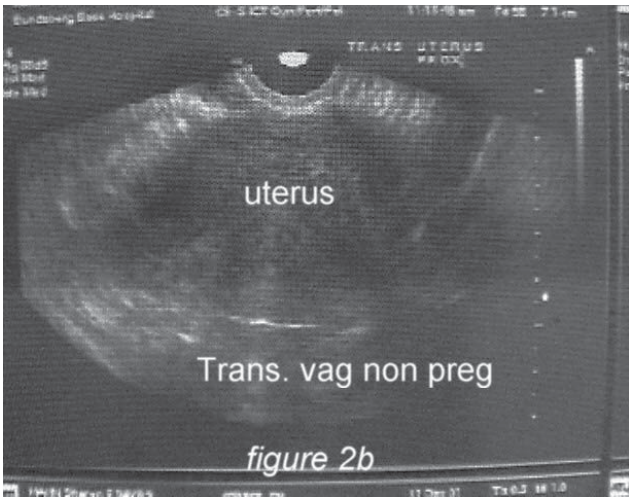


Figure 2b



and in larger cornual ectopics the line is thought represents the endometrial canal.

More recently, magnetic resonance imaging has been proposed as a diagnostic modality in equivocal cases[6] as well as for follow-up after methotrexate treatment.[1]

When the diagnosis is in doubt laparoscopy offers a diagnostic option. It is particularly useful if there is an uterine anomaly, as was evident in this case. The above case demonstrates that ultrasound features of cornual ectopics are similar to a cornual pregnancy can be found in the horn of a bicornuate uterus. With increasing adoption of ultrasound in the emergency department setting undertaken by physicians without imaging specialist input, the potential for misdiagnosis of interstitial ectopic pregnancy has been identified.[7]

Acknowledgements

Professor Khoo Royal Womens' Hospital Brisbane for useful suggestions on the original draft.
Dr Sinnott, Imaging Department, Royal Brisbane for evaluation of the ultrasound images.

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RESEARCH

Contrast ultrasound scan versus contrast enhanced computed tomography in detection of liver metastases: preliminary results

J Kew, RP Davies, D Gluis and T Andrews

Introduction

Pulse inversion harmonic imaging (PIHI) in combination with contrast-enhanced ultrasound (CUS) has improved detection of lesions particularly in the liver.[1-4] Levovist (Schering AG, Berlin) is an ultrasound contrast agent consisting of microbubbles of air covered by a thin layer of palmitic acid in a galactose solution.[1]

Purpose of the study

A prospective study was performed to confirm the reported clinical efficacy of CUS versus contrast enhanced computed tomography (CECT) scan in detecting focal lesions including carcinoma secondaries of the liver. Preliminary results are reported here. To the best of our knowledge, there are few, if any, reports in the literature comparing multi-slice CT and CUS.

Methods and materials

Ethics approval was obtained for the study. Forty-one adult patients undergoing clinically indicated CECT scan for known or suspected liver metastases were recruited. Patient exclusion criteria included galactosemia (Levovist contains galactose) and severe cardiac failure (NYHA stage IV). Five patients were excluded from the study due to poor visualisation caused by severe dyspnoea.

CT scanning

Ten patients were scanned in a Siemens Somatom Plus 4 spiral scanner (Siemens AG, Forscheim, Germany). Routine dual phase arterial and venous CECT scans were performed through the liver. Intravenous contrast (Ultravist 370, Schering AG, Berlin) at a dose of 1 ml/kg to a maximum dose of 125 ml at an injection rate of 2.5 ml/sec was administered. Scanning parameters used were 300 mA at 0.5 sec and 120 kV with 8 mm collimation scans at a pitch of 1.5 reconstructed in contiguous slices. A scanning delay time of 35 seconds for the arterial phase and 70 seconds for the venous phase was used. The remainder of the patients were scanned using 4 slice scanner (Toshiba Aquilion, Japan) with the following parameters – 350 mA at 0.5 sec/rotation, 135 kV, 3 mm collimation, 5.5:1 pitch reconstructed at 2 mm intervals. 80 ml of intravenous iodinated contrast (Ultravist 370, Schering AG, Berlin) was injected. Images were acquired commencing at 30 seconds post injection for arterial and 70 seconds for venous phase imaging.

J Kew – Radiologist
RP Davies – Radiologist
D Gluis – Sonographer
T Andrews – Sonographer

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Adelaide
South Australia 5011

Ultrasound

Pre- and post-contrast (Levovist, Schering AG, Berlin) scans of the entire liver were obtained in the transverse and sagittal planes using a curved array transducer (3.5–7 MHz) (ATL, Bothwell, Washington, USA). Images were recorded on video for later analysis.

Two separate boluses of Levovist (30 ml 300 mg/ml at 2 ml per second intravenous injection) were administered using a Medrad injector (Imaxeon, per Schering AG, Berlin) followed by a 10 ml saline flush.[5,6] Scanning was performed 2 minutes after each dose. Ultrasound settings used included contrast specific imaging (CSI) mode 1, low/ medium frame rate, low line density, compression and map at 150 dB/C4, with the focal zone set at 1/3 and 2/3 from the top of the sector and power mechanical index (MI) = 1.

The patient was asked to suspend respiration. The probe was placed in a 'Freeze' mode prior to scanning to avoid premature rupture of the contrast microbubbles. The liver volume was interrogated in a single sweep in orthogonal planes. Commencing on the left and sweeping to the right improved image acquisition in the sagittal plane. Probe placement in 'Freeze' mode in the xiphisternum allowed more reliable anatomical orientation close to the left margin of the liver immediately scanning commenced. The sweep to the right could then be judged on the real-time appearances. In the transverse plane, separate sweeps of left and right lobes were required as the field of view was insufficient to encompass both lobes simultaneously.

This sequence of three sweeps was first performed using the focal zone in the superficial third of the liver. A second sequence of three sweeps was then performed with the focal zone set to the deep third of the liver. The superficial contrast microbubbles were largely exhausted during the second sweep using the deeper focal zone.

A second series of acquisitions was performed after the

Figure 1 Para-sagittal section of the left lobe of the liver before administration of ultrasound contrast agent (Levovist). Multiple low echogenicity areas are seen in the liver parenchyma. The largest lesion in segment 2 close to the diaphragm on the left of the image is not well defined

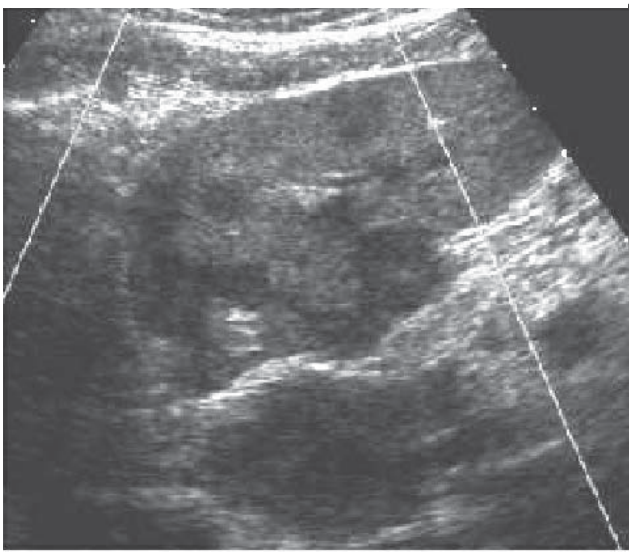
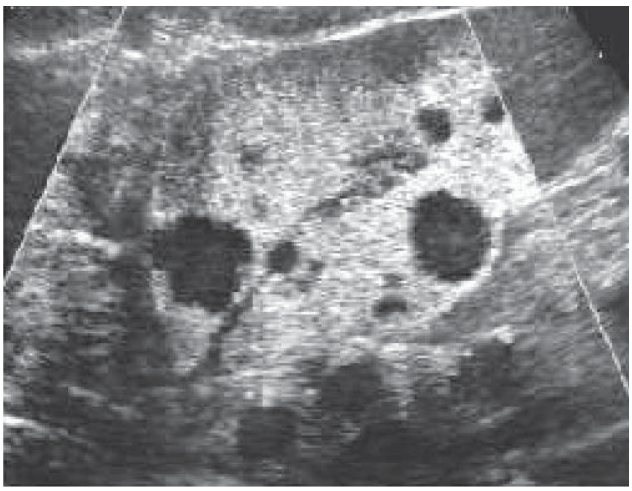


Figure 2 Para-sagittal section of the left lobe of the liver following administration of intravenous contrast agent. The lesion in segment 2 adjacent to the diaphragm is now clearly defined and hypoechoic compared to the brightly enhancing normal liver parenchyma



second injection of contrast. The deeper focal zone was selected first for this series. There was a tendency for the superficial regions of the liver to show less enhancement if the focal zone was first set to scan the deeper regions.

Video recording of this image acquisition sequence was essential to adequately review the findings. CECT and CUS scans were assessed separately and interpreted in a blinded fashion by two radiologists (JK, RPD).

Results

Thirty-six patients are included in this analysis. There were 19 males and 17 females with an age range 29–88 years. By CUS, there were no lesions in 19 cases (53%), and lesions in 17. Fewer than 5 lesions were found in 7 patients (19%) and greater than 5 lesions in 10 patients (28%). Contrast enhanced ultrasound detected more lesions than CECT in one case (5.3%), equal number of lesions in 12 patients (63.2%) and fewer lesions in 4 (21.5%). In 2 cases, CUS missed a single lesion lesion seen on CECT (10%). In no case did CUS identify a lesion where none was found on CECT. There were 3 cases of poor visualisation of sub-diaphragmatic and deep areas. Lesion conspicuity increased with contrast in all CUS cases.

Discussion

From the literature, detection by contrast enhanced ultrasound (CUS) of more lesions than CECT varies between 12 to 22%, equal number of lesions (74% to 67%) and fewer lesions in 14% to 11%.[2,7] Comparing pre-contrast ultrasound to CUS, our data concurs with the reported increased lesion conspicuity after contrast.[8,9] Dalla Palma et al found that accuracy was lower in both deep liver areas and in anterior superficial regions.[2] Demonstration of superficial regions in this study appeared adequate. This may reflect the technique used whereby the superficial regions were first interrogated using the shallower focal zone setting. This reinforces the requirement for familiarity with the technique and the importance of a comprehensive scanning protocol. Manipulation of the focal zone as described may improve conspicuity of both deep and superficial lesions.

Whilst CUS in this series was slightly less sensitive in detecting single lesions than CECT compared to other reports in the literature, the difference was modest in this small series. Detection by the dual phase multi-slice CT technique may also be improved, compared with literature reports based on older single slice technology.

In a limited health care economy it is important to know the cost of diagnostic radiological procedures in order to best-use available resources. A second part of the study to be reported will evaluate the cost effectiveness of CUS as an alternative to CECT. Potential benefits of CUS include high patient tolerance, ability to perform 'bedside' scans outside the imaging department, the reduced radiation exposure to the patient and availability for use in patients with known contrast sensitivity or contra-indications including renal impairment. In areas where CT availability is restricted compared with US, CUS may have a more prominent role. Further study of these aspects is required.

Acknowledgements

Schering AG, Australia for Levovist, Imaxeon–Medrad for use of the injector, ATL, Acuson (Siemens) for technical support and NWAHS US and CT radiographers for technical skills.

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Ultrasonics Institute: ultrasound pioneeers mark the end of an era

Mike Dadd

A dinner was held on 10th October to farewell some ex Ultrasonics Institute (UI) staff members. While UI has been disbanded over the past 10 years and some of the early members of the earlier UI are still working on related projects, the numbers have reduced to the point where the dinner became, by consensus, a celebration of the passing of an exceptional research organisation.

The Ultrasonics Institute began in 1959 as part of the Commonwealth Acoustic Laboratories, led by George Kossoff and administered by the Commonwealth Department of Health. By 1962 the first of many echoscopes went into clinical trial at the Royal Hospital for Women in Paddington and the group soon earned a reputation as leaders in ultrasound imaging technology.

The development of grey scale imaging by the Sydney group at the end of the 1960s and the beginning of the 1970s led directly to an explosion in investment in the medical ultrasound industry and the practice of ultrasound as we know it today. Why was a small research group in Australia so successful?

Ultrasonics Institute staff posed for this group photograph in 1980. Back row George Radovanovich, Barry O'Connor, Ian Shepherd, Stan Barnett, Jack Jellins, Dave Robinson. Middle Row, Mike Dadd, George Kossoff, Dave Carpenter, Kay Griffiths (seated) Rob Gill, Paul Knight, Laurie Wilson, Graham Lange, Peter Isaacs, Roger Hanlon. Front, Sandra Barnstable, Margaret Tabrett, Marie Moriarty, Jasmine Irani

1 The combination of people. It is a cliché that you need good people to achieve success but UI had an exceptionally wide breadth of talents amongst the staff and the many medical consultants.

2 Many of the group, including the consultants, worked together for a long time, typically over 20 years.

3 The depth of the mutual respect and cooperation between the scientists and all the medical consultants. As one consultant remarked to me at the dinner: "UI should be the model for all medical technology research".

4 The belief that it was essential that our technology needed more than technical quality. To be accepted by the medical profession not only did we need to address real medical problems but the profession needed help to make the best use of it. Education and support of ASUM were always seen as a core UI activity.

5 Finally, something which is now very rare in research, the scientists were left alone to get on with the job. While there were always budgetary limitations I was aware that decisions were nearly always focussed on how to get a good medical imaging result. There were remarkably little overheads imposed on the group by the Department of Health. My own belief is that this probably doubled the effective scientific output.

I have spent a large part of my career as an engineer working amongst friends in an organisation where you could feel not only that what you were doing was worthwhile, but you could also have fun doing it. I feel lucky and privileged to have been part of the Ultrasonics Institute.

Fewer in number by 2003 but still actively engaged in ultrasound. From left, and in about the same positions as in the 1980 photograph. Back row: Ian Shepherd, Stan Barnett, Jack Jellins, Dave Robinson. Middle row Mike Dadd, George Kossoff, Dave Carpenter, Rob Gill, Laurie Wilson and Roger Hanlon. Front, Kaye Griffiths and Sandra Barnstable

Annual conference was highly successful – 500 attend Perth ASUM 2003 ASM

The 33rd Annual Scientific Meeting of ASUM was held in Perth, Western Australia on 4–7 September 2003. The Meeting was very well supported, with over 500 registrations. Considering the distances involved for most delegates, this was a remarkable effort.

The venue – Burswood Casino Resort and Convention Centre proved to be outstanding. It has recently been enlarged and refurbished and provided an extensive area for the conference. The Trade Exhibition area was adjacent to the main lecture room and was of a size that facilitated the viewing of the latest technology.

The Skills Day Workshops, with three concurrent sessions, were fully booked and covered a broad range of topics in a practical learning environment.

Dr Tom Stavros, Mr Tim Hartshorne and Dr Anil Ahuja, three of the invited faculty, participated in the Skills Day Workshops, as well as our excellent Australian experts. A Nuchal Translucency Course was held in concert with the workshops and attracted over 50 registrants. My thanks to Anne Robertson, from the Royal Australian and New Zealand College of Obstetricians and Gynaecologists, and Dr Bev Hewitt for facilitating this course.

The invited faculty provided an outstanding series of lectures covering a broad range of topics, both directly related to the practice of ultrasound and the clinical medicine that our imaging facility supports. To all the speakers who so generously donated their time and shared their knowledge and expertise with us, I am truly grateful.

This year we experimented with a new approach to the Poster Session, conducting it in the setting of a wine and cheese tasting, which was sponsored by We're Wines, a local Western Australian vineyard. This was an outstanding success, so much so that we had difficulty in closing the session.

It was evident that this new approach facilitated viewing and discussing the posters, which have often been a neglected part of previous ASMs. I was most impressed by the number and quality of the presentations and congratulate the authors on their scientific endeavours.

The social events were well attended and superbly organised by Rae Roberts and Sarah Court. The Saturday dinner was very successful with a remarkable after dinner speech by Prof John Newnham, ably assisted by Mrs Karen Reid. The audience participation was enthusiastic; congratulations to the winners of his 'awards'.

It has been my honour to act as Convenor for ASUM 2003. I wish to thank Mrs Michelle Pedretti, Mrs Chelsea Hunter and Mrs Elvie Halausckiewicz who worked tirelessly to ensure its success. To Caroline Hong, the ASUM Council and ICMS, I give my thanks for your wisdom and encouragement. Additionally, to all my colleagues who so generously assisted me when I asked of them, I am so very grateful. To my friends and colleagues at The Department of Diagnostic Imaging, King Edward Memorial Hospital for Women, I am indebted for your unwavering support, tolerance and enthusiasm during the planning and conduct of the 2003 meeting.

Jan Dickinson
Convenor ASUM 2003 ASM


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ASUM membership honours

Awards presented at the Perth ASM

Stanley Brian Barnett PhD Life Member

Stanley 'Stan' Brian Barnett was elected to Life Membership following 33 years in medical ultrasound research. His contributions to the world's understanding of, and its establishment of, recommendations for the safe practice of medical ultrasound have been steadfast.

Stan's 1969 zoology/ physiology BSc thesis on Molossid bats in flight, directed by his supervisor, an expert in echo-location techniques, at the University of London King's College, England, led to his employment at the Commonwealth Acoustic Laboratories* (CAL) in 1970.

In the early 1970s, research at CAL involved a range of diagnostic applications (obstetrics, ophthmology, the breast, cardiology) and the ultrasonic treatment of Meniere's disease, the 'round window' procedure – a treatment achieved by insertion of a miniturised ultrasound probe through the external auditory meatus to allow ultrasound to be transmitted into the inner ear. This ultrasound treatment was revolutionary,† but patients, whose vertigo was cured and hearing preserved, suffered partial facial paralysis in significant numbers. Experiments demonstrated this was due to the conductive heating of the facial nerve from the surrounding temporal bone irradiated by the ultrasound.

Stan's 1970 introduction to the Sydney group began by undertaking research – in the operating theatre; repeating the procedures with animal models; and making multiple measurements – to determine the histological effects on the heating effects of the 'round window procedure'. Refinements to the technique resulted in his publication – Barnett et al 1973. The last author (GM Clark) in this publication went on to develop a distinguished career as Professor of Otolaryngology at Melbourne University, with his pioneering research into the bionic ear.

Stan's research in intensive studies of the thermal and mechanical effects of diagnostic and therapeutic ultrasound, as well as other sources of energy, has led to further and broader collaborations, as well as recognitions, both nationally and internationally. He has been involved in five international collaborative research projects, in universities or in defense.

Stan, whose CV includes more than 200 publications; papers in scientific journals, including invited papers, monographs, book chapters and conference proceedings; has been rightly recognised.

His contributions include:

Member: Editorial Board *Ultrasound in Medicine & Biology*

Member: Editorial Board *Ultrasound Review*

Chair: Standards of Practice & Safety Committee, ASUM

1986/'92/'98 Guest Editor of WFUMB Symposia on Safety in Ultrasound in Medicine

1995/6 Invited participant in *Windows on Science Scheme*, US Air Force of Scientific Research, Asian Office of Aerospace Research and Development

Professional recognitions include:

1980 Associate Fellow RANZCR

1988 Fellow AIUM

2003 ASUM Life Member

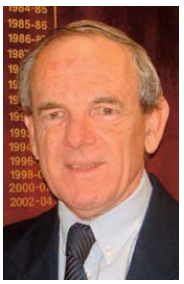
Stan is the Immediate Past President of the Society and he has served the ASUM for many years, particularly as the Chair of the Standards of Practice & Safety Committee since 1992, as ASUM's representative on the AIUM, Bioeffects Committee and the Standards Australia, HE/3 Committee for Medical Electrical Equipment.

He initiated, and is the Chair of, ASUM/ Asia Link and recently steered ASUM's successful bid for WFUMB 2009. Stan has agreed to continue his commitment to the Society by agreeing to convene that conference.

His is a deserving Life Member of ASUM.

*CAL, part of the Australian Commonwealth Department of Health, underwent several name changes, significantly being named the Ultrasonics Institute until its transfer to the CSIRO when it was renamed the Ultrasonics Laboratory, CSIRO. The Ultrasonics Institute is recognized worldwide as a preeminent contributor to diagnostic medical ultrasound.

†The treatment of Meniere's disease, prior to the introduction of the inner-ear ultrasound transducer technique, required surgical craniotomy.



David Arthur Carpenter PhD Life Member

David Carpenter was elected to Life Membership following 35 years of commitment to research, in ultrasound practice.

He came, as an engineer Level II, to the Ultrasonics Research Section of the Commonwealth Acoustics Laboratory* (CAL) via the PMG in 1968 and is, today, a Senior Principal Research Scientist, Ultrasonics, CSIRO.

His research began in beam steering and delay techniques, leading to development of the first Annular Array transducer system. Following the introduction of grey scale ultrasound in Sydney, he introduced grey scale sonography imaging to the abdomen in 1972–73, when he accepted Ken Taylor's invited two-year appointment as Senior Hospital Physicist, Institute of Cancer and Royal Marsden Hospital, London.

On his return to Sydney, David further developed imaging in the abdomen, while becoming project leader, in collaboration with Kossoff, Robinson and their medical consultants et al, at the Ultrasonics Institute, for the prototype Octoson – an automated eight-transducer scanner which introduced the first orthogonal imaging planes to sonography. It also revolutionised paediatric, breast and encephalography ultrasound examinations of the day.

The Octoson's production in Australia lead to the setting-up of an 80-employee

company and international and national sales of over $A20 million

David's PhD Thesis *The effect of overlying tissue layers on medical ultrasound imaging* lead to a successful correction system for these distortions used in today's ultrasound machines. His collaboration in high-resolution underwater imaging for the Royal Australian Navy is considerable, as is his responsibility for the setting up, and operations, of the standards facility at the Ultrasonics Laboratory since 1978, which has been accepted by the American FDA for certification of ultrasound equipment. His achievements also include publication of 86 scientific papers; seven patents; four book chapters and 15 international reports.

David's professional contributions and recognitions to the ASUM and to other organizations are, justly, made known all members:

ASUM: 1974–79 Honorary Secretary
1974–79 Member Standards of Practice Committee
1981–82 President
1983–84 ASUM Councillor
1983–92 Scientific Councillor
Member board of Examiners, DDU
Treasurer ASUM; a position in which he continues to contribute to ASUM

Education

Throughout his career his teaching appointments have included lectures for the: RACR, Sydney University; DMRT, Sydney University; Medical Physics Degree, University NSW, and many ASUM education seminars.

He has been rightly recognised for his dedication by being awarded as a:

1986 Fellow of the Institution of Radio and Electronic Engineers, Australia
1988 Pioneer of Medical Ultrasound. Presented by WFUMB and AIUM
1992 Fellow of the Institute of Engineers Australia
1997 Fellow of the American Institute of Ultrasound in Medicine
2003 Life Member ASUM

David Carpenter, engineer, researcher and pursuer of excellence, is an inspiration those who have, do, and will work in Medical Ultrasonography. The Society's members recognise that by electing him to lifetime membership ASUM is truly enriched.

*CAL, part of the Federal Department of Health, underwent several name changes, significantly being named the Ultrasonics Institute until its transfer to the CSIRO when it was called the Ultrasonics Laboratory.

Roger Gent Honorary Fellow

The list of ASUM Honorary Fellows is short and contains the names of individuals who have made a valuable and sustained contribution to ASUM. Roger is known to all ASUM members in Australia and New Zealand mostly as the great educator of physics and technology of ultrasound.

He completed his own DMU in 1979 and then embarked upon a remarkable journey of developing the profession of sonography and teaching of others. Roger's contributions have been mainly in the areas of paediatric ultrasound, ultrasound physics and the pursuit of high standards to govern the use of diagnostic ultrasound.

His contributions include:

1985– present DMU Examiner
1996– present Member, DMU Board of Examiners
Member, Competency Based Standards Panel (Sonography), 1992 Competency Based Standards Project, Department of Employment Education and Training, Federal Government of Australia. This panel established the Competency Based Standards for Sonographers, which the current version is still in use by ASAR today.
1993–1994 Member, Competency Based Assessment Panel (Sonography), Competency Based Assessment Project, Department of Employment Education and Training, Federal Government of Australia.
1993–1994 Member of the ASUM Ultrasound Qualifications Advisory Committee (which was the precursor to ASAR) and then continued this work as the DMU Board of Examiners representative to ASAR from 1994–1999.
1996–2001 Member of ASUM Education Committee.
Presenter of innumerable scientific papers at ASUM State and National meetings and author of at least 15 published journal articles.

Perhaps Roger's most extraordinary contribution has been as the Honorary Physics Technology Lecturer for the DMU Lecture Course from 1981 to the present day. In South Australia this has entailed physics lectures every Tuesday night from March to July to enthusiastic young DMU candidates. In addition Roger has lectured at DMU preparation weekend courses throughout Australia and New Zealand.

Outside the ASUM umbrella Roger has assisted numerous Australian Universities in the development of their ultrasound physics and technology subjects.

In 1997 He wrote the text book sonographers and sonologists had been looking for *Applied Physics and Technology of Diagnostic Ultrasound*. This 400-page text has become the standard reference for student sonographers as it provides in depth information written in an understandable way by a sonographer who speaks the same language as his students.

Virtually all sonographers who have trained in Australia or New Zealand over the past 20 years would have come in contact with Roger and learned something from him. Honorary Fellowship of ASUM certainly befits such an individual.

Professor Byung Ihn Choi MD PhD Honorary Member

ASUM was justly honored when Professor Byung Ihn Choi MD PhD, Seoul radiologist, agreed to accept Honorary Membership of the Australasian Society for Ultrasound in Medicine. How lucky is the ASUM to have Professor Choi as a member! He is well known to us via his scientific ultrasound publications and several visits to our scientific meetings in

Australia, being instrumental in the development of ASUM's Asia Links.

Professor Choi is Professor of Radiology, Seoul National University, College of Medicine and also Chief, Section of Gastrointestinal Radiology and Abdominal Imaging, Department of Radiology at the Seoul National University Hospital, Seoul Korea.

His gastrointestinal research has realised 399 scientific paper publications, probably more by the time this article reaches members. His recent publication on the value of 4-D ultrasonography in US-guided biopsy of hepatic masses is cutting-edge technology.

Choi has a dozen academic and professional appointments, including eight offshore – either as a Visiting Research Fellow or Visiting Professor of Radiology in distinguished universities in the USA or Japan.

Additional to his research, clinical practice and family, he is a member of the Editorial Boards of *JUMB, Abdominal Imaging*, and of *Radiation Medicine*. He is also a co-opted councilor of WFUMB; President-Elect of the Asian Federation for Ultrasound in Medicine and Biology (AFSUMB) and Conveyor of WFUMB 2006. This allows him some extra time to devote his interests in the Korean Society of Medical Ultrasound (KSMU), of which he is currently the Chairman of the Board of Directors.

Our Society is grateful for his contributions to ultrasound; for his commitments to the Asia Links program and for being our neighbor; and in particular, for joining the ASUM as a truly honored member.

DIARY DATES

Check the ultrasound calendar on page 41 of this issue for local and overseas events in 2004.

Beau, piano and motorsport

Roslyn Savage reveals her life outside ultrasound

What is your favourite colour?

Purple.

Outside of work hours, what are your interests?

Beau, he's a tan Staffordshire Bull Terrier who walks me every morning and helps to keep me fit.

Playing the piano (badly).

Playing golf (also badly).

Motorsport.

What prompted your interest in motor sport?

A case of if you can't beat 'em then join 'em. My husband, Mark, is a keen motorcycle enthusiast and has been involved in the motorcycle industry and in motorcycle racing since we were in our late teens.

We have always owned a motorcycle and have been involved in the Motorcycle Riders Association as President and Secretary and the Motorcycle Sportsmen (a racing club).

We have organised many race meetings and several of the MRA's annual Toy Runs where all the bike riders donate gifts for underprivileged children.

We used to travel to Bathurst at Easter for the motorcycle races and camped on the hill and, yes, we were there for the riots when they burned a media car. I have always thought that it was most likely staged to make a good story on the news.

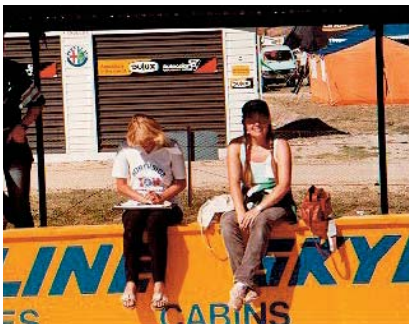
We have been to Phillip Island several times for both the Superbikes and the Grand Prix races. We rode down on the motorbike only about three years ago.

Mark owned a motorcycle tyre business for a time and has raced a motorcycle, and race-prepared a Ducati Superbike for a friend. My job on the team was time-keeping, for long distance races I fed the riders a drink at pit stops (out of an enema bag but don't ever tell them what it was. The bag hung nicely on the fuel tower and I could put the end of the tube through their helmets).

My cars have included:

Purple Holden panel van
Triumph Dolomite
MX5
Saab Convertible
Several BMWs
Currently a Subaru WRX

No I have never lost my driver's license but Mark says it's just luck.



Life outside work for Ros Savage includes her dog, piano, motorsport and husband Mark

PRELIMINARY ANNOUNCEMENT

AND CALL FOR PAPERS

11th Annual National Conference

Australian Sonographers Association

Melbourne Convention Centre

Friday 28 – Sunday 30 May 2004

- **Includes "CARDIAC DAY" on Saturday 29 May 2004 – with scientific presentations and workshops tailored to all levels.**
- **Registration Brochure will be available shortly – full details will be on the web site, or available by contacting our National Office.**
- **Why not consider presenting a paper or poster? Great prizes on offer. Online abstract submittal available now via our website.**

Further information can be obtained from our website at:
www.A-S-A.com.au

or by contacting:

ASA National Office
PO Box 709 Moorabbin Vic 3189
Ph: +61 3 9585 2996 Fax: +61 3 9585 2331
Email: enquiries@A-S-A.com.au

Book reviews

Diagnostic Ultrasound Physics and Equipment

Editors PR Hoskins, A Thrush, K Martin, TA Whittingham
Publisher Greenwich Medical Media
Published 2003
Price $A112.25

This new volume is edited by a group of medical physicists from the UK, with contributions from several other scientists. Its quality as a comprehensive but concise volume on the physics and equipment of diagnostic ultrasound should ensure that it will become very popular in the medical ultrasound imaging community.

The editors intend this to be an introductory text appropriate for sonographers and clinical users in general, as well as a first introduction for physicists and engineers interested in the area. It succeeds admirably in this aim.

As the editors claim, it concentrates on explanations of principles that underpin the clinical use of ultrasound systems with explanations following a 'need to know' philosophy. Consequently, complicated explanations and mathematical formulae do not figure prominently.

All of the ultrasound instrumentation in use currently, including some of the emerging tissue Doppler imaging functions and contrast agents are covered, although the latter receive brief but clear coverage.

The clear text is complemented by numerous schematic diagrams and ultrasound images, as appropriate, and it is highly readable with a very clear organisation of chapters and contents within chapters.

I would strongly recommend this as an introductory text to physics and instrumentation of medical ultrasound imaging. For those who are involved with medical ultrasound but who have no access to up-to-date text of this type, this is one worth considering for purchase.

Dr Robert N Gibson

Atlas of Musculoskeletal Ultrasound Anatomy

ISBN 9 781841 101187
Authors Mike Bradley and Paul O'Donnell
Publisher Greenwich Medical Media
Published 2002
Price $A72.00

In today's radiology practice, where musculoskeletal ultrasound is forever on the increase, an atlas such as this is always topical.

This paperback atlas is aimed at familiarising the radiology trainee, general radiologists and sonographers occasionally exposed to musculoskeletal work, and clinicians with basic musculoskeletal ultrasound anatomy. It provides basic labelled grey-scale images of various anatomical regions in relevant planes accompanied by diagrams demonstrating probe position and orientation. It touches very briefly on normal echogenicity of various structures. Concise anatomical descriptions of regions and structures are also included when relevant. Ample space is allocated on each page for additional notes.

Anatomical regions are separated into chapters and it is easy to find relevant information for quick reference. While I believe anatomy is probably better learned in practice with reference to formal anatomy texts, this atlas introduces the radiologist to the basics of the normal appearance of various musculoskeletal structures. It provides a useful concise reference in the ultrasound room. It includes little in the way of explanation of these appearances, unlike its counterpart the *Peripheral MSK Ultrasound Atlas* by Dondelinger, which is also larger, more cumbersome and more expensive (about $330 compared with $72).

Compared to Dondelinger, this book contains no images of pathology and much less explanatory text. The images are also of lesser quality, printed on matt paper which is not as pleasing to the eye as Dondelinger's glossy prints which appear of greater resolution and contrast and more like the images one would aim to reproduce.

While in a different league compared to Dondelinger, both in terms of price and quality of print, it nevertheless appeals because of its portability and conciseness which make it a useful basic text for one occasionally exposed to musculoskeletal ultrasound. It can be personalised by the addition of notes in the provided spaces. It will be quickly outgrown, however, by anyone wishing to gain more in-depth knowledge of the topic.

Dr Patrick Page

Dorlands Medical Dictionary 30th edition

ISBN 0-7216-0146-4
Publisher Saunders/ Elsevier Science
Websitewww.elsevier.com.au
Published 2003
Price $A82.50

This dictionary is in its 30th edition in just over 100 years, testimony to its popularity and usefulness. Over 120,000 terms in approximately 2200 pages provide a very comprehensive and easy to use quick reference, although by its very nature it cannot cover any one topic in depth. The dictionary format is supplemented by a reasonably comprehensive set of anatomical illustrations as well as illustrations of a range of pathologies. It also includes definitions of commonly use abbreviations. This new edition includes over 3000 new terms which helps ensure its currency. Also included with the dictionary is a CD-ROM that enables computers to recognise 119,000 medical terms and electronic spell-check.

This is probably the most comprehensive dictionary of its type and represents good value. A wide range of medical and allied health professionals as well as others dealing with medical terminology will find this an extremely helpful reference to have on the shelf or desktop.

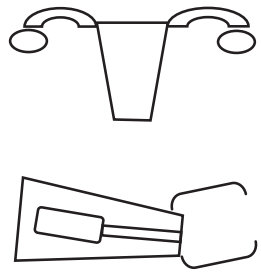
Dr Robert N Gibson

Name of Imaging Service

Gynaecological Worksheet

Name		Notes
Date of Birth (Age)		
Patient Number		
Episode Number		
Imaging Location		

LMP…/…../…	Regular ☐ Irregular ☐	Cycle Length (days) … …	Parity (G/P) … …
Prev US…/…../… …	OCP Y☐/N☐	Implant Y☐/N☐	HRT Y☐/N☐

Diagram	**Uterus**	**Myometrium**	**Endometrium**
	Normal Y☐/N☐	Normal Y☐/N☐	Normal Y☐/N☐
	Anteverted Y☐/N☐	Fibroids Y☐/N☐	Non-specific ☐
	Retroverted Y☐/N☐	Dimensions (Largest)	Proliferative Y☐/N☐
	Axial Y☐/N☐	… …mm/… …mm/… …mm	Secretory Y☐/N☐
	Dimensions L * W * D	Dimensions (Second Largest)	Dimension (Thickness)
	…mm/… …mm/… …mm	… …mm/… …mm/… …mm	… … mm
	Bulky Y☐/N☐	Adenomyosis Y☐/N☐	SIS Y☐/N☐Findings?
	Other	Other	

Ovaries	**Left**	**Right**
Seen	Y☐/N☐	Y☐/N☐
Normal	Y☐/N☐	Y☐/N☐
Mobile	Y☐/N☐	Y☐/N☐
Tender	Y☐/N☐	Y☐/N☐
Vascularity	Normal Y☐/N☐	Normal Y☐/N☐
Size L* B* T (*0.52 = Volume)	… …mm/… …mm/… …mm	… …mm/… …mm/… …mm
Volume Estimate cc	… … cc	… … cc
Follicle Number/Size of largest	… …/… …mm	… …/… …mm
Corpus Luteum	Y☐/N☐ … …mm	Y☐/N☐ … …mm
Lesion/Altered echotexture	Y☐/N☐ … …mm	Y☐/N☐ … …mm
	Cystic ☐ /Solid ☐ /Mixed ☐	Cystic ☐ /Solid ☐ /Mixed ☐

Comments:

Adnexal Regions	**Left**	**Right**
Mass	Y☐/N☐ …mm/… …mm/… …mm	Y☐/N☐ …mm/… …mm/… …mm
	Cystic ☐ /Solid ☐ /Mixed ☐	Cystic ☐ /Solid ☐ /Mixed ☐
Vascularity	Hyper ☐ /Hypo ☐ /Mixed ☐/Avascular ☐	Hyper ☐ /Hypo ☐ /Mixed ☐/Avascular ☐

Other Findings:	**Left**	**Right**
Inflammatory mass inc Appendix	Y☐/N☐ Describe	Y☐/N☐ Describe
Free Fluid	Y☐/N☐ Describe	Y☐/N☐ Describe
Renal Abnormality Yq/Nq Describe	Y☐/N☐ Describe	

Other Comments:

Sonographer		Reported by:	

Name of Imaging Service Obstetric Worksheet – 18+ Weeks Morphology

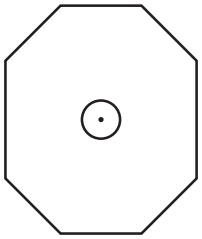
(complete sections as required for specific scan indications)

Name		Notes
Date of Birth (Age)		
Patient Number		
Episode Number		
Imaging Location		
Overall scan quality	Poor/Average/Good/ Reason?	

LMP…/..…/…	EDD(LMP) …/..…/…	Current Gest … ….w….d	Parity
Prev US…/..…/…(…w…d)	EDD(US) …/..…/…	Singleton/Multiple No. …	Fetus No.

Foetal Lie and Biometry:

Mobile ☐	Cephalic ☐	Breech ☐	Oblique ☐	Transverse ☐	Spine to maternal L ☐ /R ☐	Legs Flexed ☐/ Extended ☐



BPD	… … mm	Corr BPD	… … mm
HC	… … mm	Cerebellum	… … mm
AC	… … mm	Nuchal Fold	… … mm
FL	… … mm	Average gest age estimate	… … w … … d
HL	… … mm	EFW (+/- 15%)	… … g
Concordance with previous estimates of gestational age		LMP Y☐/N☐ Earlier US Y☐/N☐ Discordance 1-2 wk ☐ > 2 weeks ☐	
Comment			

Placental Position	Fundal Y☐/N☐	Anterior ☐ Posterior ☐	Clear of os Y☐/N☐	Lower placenta to int. os … … mm
		Reaches Int Os Y☐/N☐	Covers Int os Y☐/N☐	Distance across int. os … … mm

Foetal Anatomy: Circle if abnormal and describe

Head/Neck				*Abdomen/Pelvis*		*Spine*		
Cerebellum	☐	Ant Horns mm		Stomach	☐	Skin Line	Intact ❑	
Post Fossa	☐	Post Horns mm		Bowel	☐	*Limbs*	Rt (cm)	Lt (cm)
Cavum S P	☐	Cerebellum mm		Abdo wall	☐	Humerus	… … ☐	… … ☐
Ventricle R	☐	*Thorax*		3 vessel cord	☐	Radius	… … ☐	… … ☐
Ventricle L	☐	Diaphragm	☐	Bladder Full	☐	Ulna	… … ☐	… … ☐
Choroid Plexus	☐	Lungs	☐	Bladder empty	☐	Hands	… … ☐	… … ☐
Bony Face	☐	4 Chamber views	☐	Kidney Rt … …mm		Femora	… … ☐	… … ☐
Palate	☐	A-V valves	☐	Kidney Lt … … mm		Tibii	… … ☐	… … ☐
Nose/Lips	☐	LOT/ROT	☐	Pelvis Rt … … mm		Fibulae	… … ☐	… … ☐
Orbits	☐	Arch	☐	Pelvis Lt … … mm		Feet/Toes	… … ☐	… … ☐
Eyes/lens		Rhythm	☐	Aorta/Renals	☐			
Profile	☐	Heart Rate BPM						

Comments	

Amniotic Fluid	Total (mm) … …	In Normal Range Y☐/N☐	RU Quadrant … … mm	LU Quadrant … … mm	RL Quadrant … … mm	LL Quadrant … … mm

Umbilical Cord Dopplers	S/D ratio(s) … … … …	In Normal Range Y☐/N☐	PI … … … …	In Normal Range Y☐/N☐	MCA PI … … … …	MCA/Cord PI ratio … … …
Uterine Artery	Rt RI … …	Notched Y☐/N☐		Lt RI … …	Notched Y☐/N☐	
Cervical Len.	Cm … …	Beaking ? Y☐/N☐		*Comment*		

Sonographer		Reported by:	

Name of Imaging Service Obstetric Worksheet – 18+ Weeks Followup U/S

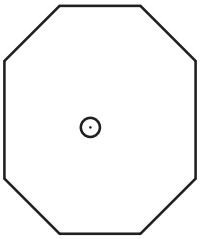
(complete sections as required for specific scan indications)

Name		Notes
Date of Birth (Age)		
Patient Number		
Episode Number		
Imaging Location		
Overall scan quality	Poor/Average/Good/ Reason?	

LMP…/…../…	EDD(LMP) …/…../…	Current Gest … ….w….d	Parity
Prev US…/…../…(…w…d)	EDD(US) …/…../…	Singleton/Multiple No. …	Fetus No.

Foetal Lie and Biometry:

Mobile	Cephalic	Breech	Oblique	Transverse	Spine to maternal	Legs Flexed ☐ Extended ☐
☐	☐	☐	☐	☐	L ☐ /R ☐	



BPD	… … mm	Corr BPD … … mm
HC	… … mm	Average gest age estimate … … w … … d
AC	… … mm	EFW (+/- 15%) … … g … … centile
FL	… … mm	
Concordance with previous estimates of gestational age		LMP Y❑/N❑ Earlier US Y❑/N❑ Discordance 1-2 wk ❑ > 2 weeks ❑
Comment		

Placental Position	Fundal Y☐/N☐	Anterior ☐ Posterior ☐	Clear of os Y☐/N☐	Lower placenta to int. os … … mm
	Accreta/ Percreta ☐	Reaches Int Os Y☐/N☐	Covers Int os Y☐/N☐	Distance across int. os … … mm

Foetal Anatomy: Circle if abnormal and describe

Head/Neck		*Thorax*		*Abdomen/Pelvis*		*Biophysical profile*	
Cerebellum	☐	Diaphragm	☐	Stomach	☐	Breathing	Normal ☐ … …
Ventricle R	☐	4 Chamber views	☐	Bowel	☐	Tone	Normal ☐ … …
Ventricle L	☐	LOT/ROT	☐	Bladder Full	☐	Movements	Normal ☐ … …
Bony Face	☐	C/T ratio		Bladder empty		Maternal noted	Normal ☐ … …
						movements	
		Heart Rate BPM		Kidney Rt … …mm		AFI	Normal ☐ … …
		Rhythm	☐	Kidney Lt … … mm		Score	
						(out of 8)	… …
				Pelvis Rt … … mm			
				Pelvis Lt … … mm			
				Abdo wall	☐		

Comments	

Amniotic Fluid	Total (mm) … …	In Normal Range Y☐/N☐	Quadrant … … mm	LU Quadrant … … mm	RL Quadrant … … mm	LL Quadrant … … mm

Umbilical Cord Dopplers	S/D ratio(s) … … … …	In Normal Range Y☐/N☐	PI … … … …	In Normal Range Y☐/N☐	MCA PI … … … ..	MCA/Cord PI ratio … … …
Uterine Artery	Rt RI … …	Notched Y☐/N☐		Lt RI … …	Notched Y☐/N☐	
Cervical Len.	Cm … …	Beaking ? Y☐/N☐		*Comment*		

Sonographer		Reported by:	

Name of Imaging Service Obstetric U/S Worksheet 5 to 17 weeks

Name		Notes
Date of Birth (Age)		
Patient Number		
Episode Number		
Scan Location		

LMP…/…../…	EDD(LMP) …/…../…	**This scan Gest est …w …d**	Parity (G) …
Prev US…/…../…(…w…d)	EDD(US) …/…../…	Singleton ☐ /Multiple No. …	Fetus No. (P) …

EARLY PREGNANCY	Viable IU preg ☐	Non-viable IU preg ☐	RE-scan in 7 days ☐ F.pole<5mm, no FH seen, MSD <2cm

Comment on viability	

Mean Sac Dia. Calc.

Diameter 1 =	… mm		**CRL**			**NT Assessment**	Note range for NT measurement CRL from
Diameter 2 =	… mm					CRL 4.5mm	11 w 4d
Diameter 3 =	… mm		… …mm	=… w … d		CRL 8.4mm	13 w 6 d
Total =	….. /3 = ..… mm		Yolk Sac	☐		**Nuchal Translucency**	… … mm
						Background risk	
						Adjusted risk	

Foetal Biometry (12 wk +)

BPD = … mm	Ave US age Est.	Placental Location	CVS/Amnio Performed ? Y ☐
HC = … mm			FH seen post procedure? Y ☐
AC = … mm	… w …. d	Placental Haem ☐	
FL = … mm			Performed by ? ……

Foetal Anatomy

Mark if All Structures seen in each Section	A ☐	B ☐	C ☐	D ☐

A: 8-9 weeks	Head ☐	Trunk ☐	Limbs ☐	Spine ☐	HR ☐ … bpm	Yolk Sac ☐

B: 10-11 weeks	*Head*	Thorax	Abdomen	Limbs	Spine
	Skull ☐	2 A-V valves	Stomach ☐	Long Bones ☐	Ossified?
	Choroid Plexus ☐	……☐	Bladder ☐	Hands/Feet ☐	
	Falx ☐	FH Rhythm ☐		Movements ☐	Y☐/N☐

C: 11-12 weeks	Orbits ☐	Diaphragm ☐	Kidneys ☐		

D: 12–17 weeks	Nose/chin ☐	4 ch heart ☐	Cord insertion ☐	Fingers ☐	Spine ☐
	Profile ☐	RVOT ☐	Gender XX / XY	Toes ☐	Skin line ☐
	Ventricles ☐	LVOT ☐			
	Cavum ☐	Axis ☐			
	Cerebellum ☐	Lung ☐			

Pelvis

Uterus Right	*Ovary Left ovary*	*Pouch of Douglas*	*Other*	*Comments:*
Fibroid Y / N	Corpus luteum Y☐/N☐	Corpus luteum Y☐/N☐	Fluid Y☐/N☐	
Other	Adnexal mass Y☐/N☐	Adnexal mass Y☐/N☐	Comment	

Sonographer		Reported by:	

IMPORTANT DMU information for 2004

2004 DMU Handbooks will be posted on the ASUM website in early December, following the DMU Board of Examiners Meeting. There will be changes to the Syllabii, Reading Lists and Regulations.

DMU Examination Fees are unchanged from 2003

Closing dates 2004

Examination Applications to DMU
Part I and Part II
Saturday 31 January.

Exemption applications to DMU
Part I and Part II
Saturday 31 January

Student Status Applications
Saturday 31st January
(See Footnote 1)

Examination dates 2004

Part I and II Written Examinations
Saturday 31July

Part II Objective & Standardised Clinical Examinations (OSCEs) and
Oral Examinations (See Footnote 2):

Cardiac
Saturday 16 October
General
Saturday 23 October
Obstetric
Saturday 23 October
Vascular
Saturday 16 October

Part II Practical Examinations
Completed between August to October.

Footnote 1
Australian Trainee Sonographers are required to register annually with the Australasian Sonographers' Accreditation Registry (ASAR). Candidates applying to sit either the DMU Part I or DMU Part II Examinations DO NOT need to apply for ASUM Student Status since acceptance to sit the DMU Examinations includes Student Status. Examination candidates need only submit their ASUM DMU Examination Acceptance letter, together with their ASAR application and registration fee to the ASAR in order to secure their 2004 ASAR registration. For further information and ASAR application material please visit the ASAR website (http://www.asar.com.au)

New Zealand Sonographers are required to register annually with the Medical Radiation Technology Board (MRTB) to practice. Trainee sonographers wishing to practice in New Zealand while undergoing training are, therefore, required to apply to the MRTB to be considered for an exemption to practice.

Exemption Application Forms are available from:

The Board Secretary
Medical Radiation Technology Board
PO Box 10 – 140
Wellington, New Zealand

Footnote 2
The DMU Board of Examiners will determine the locations for the OSCEs and Oral Examinations once the final candidate numbers, venue availability and Examiner requirements are known.

Candidates are also reminded that while the dates for the OSCE/ Oral Examinations are fixed, all modalities will not necessarily be examined at every centre.

DDU dates and fees 2004

Part I Examination Fee

A$990.00 (includes GST) for ASUM Members A$1,254.00 (includes GST) for Non members

Part II Examination Fee

A$1,760.00 (includes GST) for ASUM Members A$2,024.00 (includes GST) for Non members

Part II Casebook Fee

A$330.00 (includes GST)

Application forms may be downloaded from our website www.asum.com.au
Fees quoted above are from July 1 2002 and may be subject to change.

Information pertaining to the next examinations

2004 Part I The Part I Examinations for 2004 will be held on Monday 17 May 2004 with applications closing on Monday 22 March 2004.

2004 Part II Casebooks for 2004 Part II DDU Examination must be submitted by Monday 19 January 2004 and accompanied by the prescribed fee of A$330.00 for all participants.
The Written Examination for Part II will be held on Monday 17 May 2004 with the closing date being Monday 22 March 2004.
The Oral Examination for Part II will be held on Saturday 19 June 2004 in Sydney.
The Oral Exam for Cardiology candidates will be in Melbourne on Thursday 17 June 2004.

Results

Examination results will be mailed to candidates early July following the DDU Board of Examiners meeting.
The ASUM Bulletin publishes information relating to changes in fees, examination dates, Regulations, etc. Members are kept up to date with this and other related information by automatically receiving the Bulletin.

The ultrasound calendar

2003

Mon 8 Dec 2003 Fetal Echocardiography
Contact Ian Dalziel
tel +61 2 6201 6140, email
Ian.dalziel@calvary-act.com.au

Wed 10 Dec 2003 – 3 days BMUS 35th Annual Scientific Meeting and Exhibition
Harrogate International Centre, United Kingdom
Contact The British Medical Ultrasound Society tel +44 20 7636 3714, email bmus2003@bmus.org, website: www.bmus.org

2004

Mon 19 Jan 2004 Casebook submission for 2004 Part II DDU examination close date
Contact DDU Coordinator tel +61 2 9958 7655, email ddu@asum.com.au

Fri 5 Mar 2004 – 2 days ASUM Multidisciplinary workshop
Conrad Jupiters, Gold Coast, Qeensland, Australia
Contact ASUM tel +61 2 9958 7655, fax: +61 2 9958 8002, email asum@asum.com.au

Mon 22 Mar 2004 Applications close for DDU Part I examination and DDU Part II written examination
Contact DDU Coordinator tel +61 2 9958 7655, email ddu@asum.com.au

Fri 7 May 2004 – 4 days VIII World Congress of Echocardiography and Vascular Ultrasound
Antalya, Turkey
Contact Navin C Nanda, President ISCU, PO Box 323, Gardendale, AL 35071, USA tel +1 205 934 8256, fax:+1 205 934 6747, email isuc@iscu.org

Mon 17 May 2004 DDU Part II Written Examination
Contact DDU Coordinator tel +61 2 9958 7655, email ddu@asum.com.au

Mon 17 May 2004 DDU Part I Exam
Contact DDU Coordinator, tel +61 2 9958 7655, email ddu@asum.com.au

Mon 17 May 2004 – 6 days 7th Congress of the Asian Federation of Societies for Ultrasound in Medicine and Biology (AFSUMB), 77th Meeting Japan Society of Ultrasonics in Medicine
Utsunomyia City, Tochiqi, Japan
Contact Prof K Itoh, Dept of Clinical Lab Medicine, Jichi Medical School, Minamikawachi, Tochiqi-ken 329 0498, Japan tel +81 285 587 385, fax +81 285 448 249, email itokoiti.@jichi.ac.jp, website http://www.congre.co.jp/afsumb2004/

Wed 19 May 2004 – 4 days IXth International MASU Congress and International Course
Al Assad University Hospital, Damascus, Syria
Contact MASU website
http://www.agonet.it/masu

Thur 17 Jun 2004 DDU Part II Oral Examination – cardiology only
Melbourne
Contact DDU Coordinator tel +61 2 9958 7655, email ddu@asum.com.au

Sat 19 Jun 2004 DDU Part II Oral Examination
Sydney
Contact DDU Coordinator tel +61 2 9958 7655, email ddu@asum.com.au

Sun 20 Jun 2004 – 2 days Advanced Course in Fetal Medicine
Paphos Cyprus
Contact www.fetalmedicine.com

Sun 20 Jun 2004 – 4 days 2004 AIUM Annual Convention
Desert Ridge Resort, Phoenix AZ USA
Contact Brenda Kinney AIUM tel +1 301 498 4100, email bkinney@aium.org website www.aium.org

Tues 22 Jun 2004 – 2 days Third World Congress in Fetal Medicine
Nicosia Cyprus
Contact www.fetalmedicine.com

Sat 31 Jul 2004 DMU Part I and Part II Written Examinations
Contact James Hamilton DMU Coordinator tel +61 2 9958 0317, fax +61 2 9958 8002, email dmu@asum.com.au

Tues 31 Aug 2004 – 4 days 14th World Congress on Ultrasound in Obstetrics and Gynecology
Stockholm Sweden
Contact S Johnson Ex Dir ISUOG, 3rd Fl, Lanesborough Wing, St Georges Hospital Medical School, Cranmer Terrace, London SW 17 ORE United Kingdom tel 44 20 8725 2505, fax +44 20 8725 0212, email johnson@sghms.ac.uk

Thurs 23 Sep 2004 – 4 days ASUM 2004 34th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine
Sydney
Contact ASUM tel +61 2 9958 7655, fax +61 2 9958 8002, email asum@asum.com.au

Fri 8 Oct 2003 – 2 days Research and Developments meeting. The Fetal Medicine Foundation
London United Kingdom
Contact website www.fetalmedicine.com

Wed 8 Dec 2004 – 3 days 36th BMUS Annual Scientific Meeting and Exhibition
Manchester, United Kingdom
Contact The British Medical Ultrasound Society, tel +44 20 7636 3714, email secretariat@bmus.org

2005

Sun 19 June 2005 – 3 days 2005 AIUM Annual Convention
Walt Disney World Swan and Dolphin Orlando, FL USA
Brenda Kinney AIUM tel +1 301 498 4100, email bkinney@aium.org, website www.aium.org

Sat 30 Jul 2005. DMU Part I and Part II Written Examinations – provisional
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29 Sep – 2 Oct 2005 ASUM 2005 35th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine
Adelaide Convention Centre, Adelaide
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2006

18 May 2006 – 3 days X World Congress of Echocardiography and Vascular Ultrasound
Marrakesh, Morocco
Contact Navin C Nanda President ISCU PO Box 323 Gardendale AL 35071 USA tel +1 205 934 8256, fax +1 205 934 6747, email isuc@iscu.org

28 May 2006 – 5 days 11th Triennial Congress World Federation for Ultrasound in Medicine and Biology

Seoul Korea
Contact Byung Ihn Choi Congress Secretariat tel +82 2 760 2515, fax + 82 2 743 6385, email choibi@radcom.snu.ac.kr, web http://www.wfumb2006.com

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2007

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2008

Sat 26 Jul 2008
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2009

Thurs 5 – Sun 9 Sept 2009 – 5 days
ASUM hosts WFUMB 2009 World Congress
Sydney Australia
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
If you would like further information on any of the events listed, you can contact us by email at asum@asum.com.au

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ASUM WELCOMES NEW MEMBERS

AUGUST 2003

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Associate member
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Full member corresponding
Kanu Bala Bangladesh, Shuk Han Miranda Cheung Hong Kong, Chia Li Chong Singpore, Claude Jaumin Belgium, James Khoo Singapore, Sabine Lenoir Belgium, Chen Hoong Low Singapore

SEPTEMBER 2003

Full member
Steven Grant New Zealand, Maureen Pauchlicz SA, Peter Rosenow Vic.

Associate member
Sarah Javillonar NSW, Simone McKee NSW, Carolyn Raynor WA

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 in length. 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 in the Ultrasound Bulletin. 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.

Vancouver style should be used.

Examples of Vancouver style:

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

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

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

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

Abstract

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

Images

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

A figure legend must be provided for each image. Hard copy images should be presented as glossy print or original film. Any labelling should be entered on the front of the glossy print using removable labels. Send one copy of illustrations without labelling as this can be added electronically prior to publication. On the back of the print include the author's name, figure number and a directional arrow indicating the top of the print. Digitised graphics should be supplied as JPG or TIFF files on PC formatted 3.5" diskette or CD, which must be clearly labelled with the author's name and the names of the image files.

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Abstracts 33rd Annual Scientific Meeting 2003 Perth, Western Australia

Fetal cells and DNA as predictors for fetal and maternal diseases. Could it replace ultrasound?

Abstract not available at time of printing.

Advances in breast US sonographic evaluation of complex breast cysts

Dr Tom Stavros, Radiology Imaging Associates, United States

Breast cysts can be classified as simple or complex, but most complex breast cysts (CBC) are not worrisome and merely represent part of the wide spectrum of benign fibrocystic change (FCC). With recent equipment improvements the percentage of all cysts that are complex is increasing because:

1 Higher resolution equipment can better demonstrate real internal echoes caused by FCC.

2 Higher frequency, wider bandwidth, and higher dynamic range used in newer equipment creates more artifacts within cysts.

Current study characterisation of solid breast nodules			
	Benign histology	Malignant histology	
Negative US (BIRADS 2,3)	287 (TN)	1 (FN)	288
Positive US (BIRADS 4a, 4b, 5)	610 (FP)	477 (TP)	1087
	897	478	1375
Sensitivity = 477/ 478 = 99.8% Negative predictive value = 287/288 = 99.6% Specificity = 287/ 897 = 32% Positive predictive value = 477/1087 = 43.91% Accuracy = (287 + 477) /1325 = 57.7% Negative/ positive biopst ratio = 1.9			

To evaluate complex cysts for the rare intracystic malignancy, we assign a Breast Imaging Reporting and Data System (BIRADS) risk to each cyst. The precedent assigning BIRADS categories exists in mammography and sonography of solid breast nodules in some institutions. We employ the BIRADS categories and evaluation algorithm that we have previously learned from mammography and sonography of solid breast nodules and apply it directly to sonographic evaluation of CBCs.

The mammographic algorithm and similar sonographic algorithm for evaluating solid breast nodules is designed to err on the side of caution. Because intracystic breast cancer is heterogeneous, we need multiple suspicious findings. First we look for suspicious (BIRADS ≥ 4) findings. If even one BIRADS 4 finding is found, the lesion must be classified as BIRADS 4 and histology obtained. Only if there are no BIRADS 4 findings, can definitively benign BIRADS 2 findings be sought. If BIRADS 2 findings are present, the lesion is classified as BIRADS 2 and follow-up, aspiration, or biopsy can be obviated. If BIRADS 2 findings are not found, probably benign BIRADS 3 findings are sought. If identified, the patient is offered the option of follow up aspiration, or biopsy. If BIRADS 3 findings are not found, the lesion must be classified as BIRADS 4 and must undergo biopsy.

The sonographic findings used, the histopathologic basis for their BIRADS category assignment, and the algorithm used will be discussed and demonstrated.

Prospective characterisation of 1211 solid nodules into BIRADS categories (All 1211 nodules have undergone biopsy)				
BIRADS category	No of nodules biopsied	No of malignant nodules	Expected risk of CA	Actual risk of CA
2	17	0	0%	0%
3	271	1	≤ 2%	0.4%
4a	558	64	3–49%	12%
4b	217	133	50–89%	61%
5	312	280	≥ 90%	99%
Totals	1325	478		35%

Fetal cardiac imaging: improving your view

Mrs Joan Sharpe, Princess Margaret Hospital, Perth, Western Australia

Sonographers are educated to optimise gain settings, set the focus, select appropriate transducers, use the best colour maps etc. as a normal course of any examination. To reinforce this discipline I have listed the following, some obvious and some which will hopefully be helpful to show that elusive view or structure:

1 Understand the anatomy, try to get a 3D understanding.

2 Be opportunistic, use Doppler when angle is best.

3 Confirm an abnormality or clarify an uncertainty, view in at least 2 planes, beware of dropout in membranous regions.

4 Change the things you can eg. maternal bladder – too full or empty.

5 Maternal umbilicus can be annoying or an additional window.

6 Transvaginal imaging for a better view?

7 May be necessary to repeat when structures are larger, however be mindful of gestational age as karyotyping or TOP may be considered.

8 Polyhydramnios? A better view after amnio-reduction.

9 Experiment with various machine capabilities: harmonics, sono CT, colour energy. Zoom and narrow the field to increase line rate and PRF, play with colour sensitivity, scale and persistence. Use multiple frequencies in broadband transducers, change from curvilinear to other transducer types.

10 Use M-mode for rhythm abnormalities.

11 Another machine?

12 Another person? Local or refer to specialist.

13 Tricuspid regurgitation may be physiological.

14 Follow up – neonatal or post-mortem results.

15 New advances – eg. Doppler tissue imaging for rhythm assessment and diastolic function, TEI index, still mostly research tools.

Fetal cardiac anomalies

Dr Luigi D'Orosgna, Princess Margaret Hospital, Western Australia

Cardiac anomalies represent one of the largest groups of abnormalities that affect the fetus. While most significant cardiac anomalies can be defined antenatally, the majority still present after birth. Therefore, fetal detection of cardiac anomalies remains a challenge for sonographers involved in antenatal mid-trimester screening.

Fetal cardiac anomalies can be classified as:

a) Structural abnormalities (congenital heart disease).
b) Cardiac rhythm disturbances.
c) Functional abnormalities with structurally normal heart.

Using the sequential and segmental approach to fetal echocardiography, most structural abnormalities can be well defined. The assessment of fetal cardiac dysrhythmias involves two-dimensional, M-mode and Doppler echocardiography modalities which are also helpful in the evaluation of functional abnormalities of the heart.

The management of fetal cardiac anomalies requires a sound understanding of congenital heart disease and cardiac arrhythmias with current knowledge of the treatment options available both antenatally and postnatally. This is especially important when counselling mothers, as the outcome of the pregnancy with fetal cardiac abnormality will be influenced by the natural history of the condition and the long-term prognosis associated with or without treatment.

Management and outcomes of congenital cardiac defects

Dr Terence Robertson, Princess Margaret Hospital for Children, Perth, Western Australia

Advances in the management of congenital cardiac defects have resulted in some form of correction or palliation being offered to almost every infant identified as having a congenital cardiac defect. These advances have resulted in many infants, who would previously have died in infancy, living into their teens or beyond.

The management strategies for an infant with a major congenital heart defect can be divided initially into those where 'corrective' surgery, or biventricular repair can be offered, or where 'palliative' surgery, or univentricular repair is offered. Those in which corrective surgery can be offered include most of the obstructive and shunt lesions, as well as many of the more complex lesions. Some defects, which in the past required surgery, can now be repaired using cardiac catheter intervention techniques. A palliative approach is generally used for those where it is impossible to septate the heart due to hypoplastic chambers, absent valves or straddling AV valve apparatus.

Outcomes for such infants vary considerably, often influenced by other congenital abnormalities associated with their heart condition. Those offered initial corrective surgery may not necessarily be cured, with some going on to require additional cardiac surgery for valve or conduit replacement, or correction of other cardiac lesions that develop later. Palliative surgery usually involves the creation of a fontan circulation, which frequently requires three or more separate surgeries.

Fetal cardiac arrhythmias

Dr Craig Pennell, King Edward Memorial Hospital, Western Australia

Fetal arrhythmias have been reported to account for approximately 15% of referrals for fetal echocardiography. Although the majority of these are due to benign extrasystoles or transient heart rate variation, 10–20% of fetal arrhythmias are caused by sustained clinically significant bradycardia or tachycardia. These potentially life threatening arrhythmias are the focus of this presentation along with an overview of the diagnosis and management of irregular fetal heart rhythms.

The assessment of a suspected fetal arrhythmia involves confirmation of the rate and rhythm typically by intensive fetal heart rate monitoring. If a sustained arrhythmia is found, fetal echocardiography is recommended:

1 For direct imaging of cardiac wall motion for rhythm.
2 For an assessment of cardiac structure.
3 For assessment of cardiac function.
4 To assess fetal well-being.

The evaluation and management of fetal arrhythmias requires a close collaboration between the fetal medicine specialist and the paediatric cardiologist for an integrated approach.

Ultrasound guided breast biopsy

Dr Tom Stavros, Radiology Imaging Associates, United States

Ultrasound guided breast biopsy is usually reserved for solid breast lesions (with the exception of certain complex or recurrent cysts as noted above). There are three general categories of ultrasound guided breast biopsy: Fine Needle Aspiration Biopsy (FNAB), Automated Large Core Biopsy, and Directional Vacuum Assisted Biopsy (Mammotome).

Fine needle aspiration biopsy

FNAB has been used with ultrasound guidance for over 20 years. Since the technique relies on cytology instead of histology, it could never match the definitive diagnoses provided by surgical histology. Because of the considerable false negative rate and occasional false positive results, appropriate follow up/treatment could not be carried out without further intervention or uncertainty. Therefore, at least in the United States, FNAB has fallen out of favour in most locales.

Automated large core biopsy

Techniques were developed in the 1980s to automate and adapt different types of core biopsy needles for that task. Presently, the choice of what kind of ultrasound guided, histological biopsy to perform is largely dictated by the size of the lesion. Since a review of our 12-year experience of performing image-guided breast biopsy has revealed no false negatives following 14-gauge automated core biopsy of masses larger than 1.5 cm, we continue to use this method for larger masses. We usually obtain 5 large core needle specimens from a solid mass. Rather than obtaining these randomly, and risking over sampling in some areas of the nodule and under sampling in other areas, we systematically biopsy the centre of the lesion, then the anterior aspect, followed by similar peripheral biopsies in the posterior,

medial and lateral aspects of the lesion. One can use a 13 gauge 'thin wall' coaxial needle and reorient the coaxial needle accordingly between passes or one can make multiple insertions at the appropriate different angles with the 14 gauge automated core needle alone.

Directional vacuum assisted biopsy (Mammotome)

Because our data has shown that false negative diagnoses do occur after 14-gauge automated core biopsy of small masses (≤ 1.5cm), we prefer to use the ultrasound guided mammotomy technique for these lesions in order to eliminate any potential for sampling error. As noted above, we also use this technique for biopsy of recurrent or suspicious complex cysts. A hand-held mammotome has become available which has largely supplanted the articulated arm approach. The mammotome is advanced under real time guidance to a position just posterior to the lesion. The aperture of the probe is opened and minor adjustments made to position the centre of the aperture beneath the centre of the lesion. The tissue acquisition sequence is then beg.un, acquiring tissue at the 10:30, 12:00, and 1:30 positions until all or almost all visualised evidence of the lesion is removed. A metallic marker is then placed within the resultant biopsy cavity. We prefer the SenoRx GelMark post biopsy marking device since it is visible with both ultrasound and mammography.

For lesions between 1.5 and 2.5 cm that are felt to most likely be benign but which the patient would prefer to have removed, we use an 8-gauge hand held mammotome. We perform these biopsies when the patient is insistent that the lesion be removed and would go to surgery otherwise.

A consumer's perspective of breast cancer imaging

Ms Carol Bishop, Breast Cancer Network Australia, Western Australia

The Breast Cancer Network Australia is an organisation that reflects the views and offers the perspective of the consumers. In the past, much of the responsibility for improving outcomes for those with breast cancer has been with health planners, health professionals, researchers and politicians. More recently women to whom services are directed, and women and their families who have been affected by breast cancer have been involved in policy development and the planning and provision of services. The involvement of consumers is recognised as a useful and effective way of ensuring that services meet the need of those on the receiving end.

The internationally recognised *A Seat at the Table* Program has been developed by the Network to assist organisations and groups in the inclusion of effective consumer input and trains and supports women to be effective consumers.

The Program features:

- A process for recruiting and selecting consumer representatives;
- A data base of consumer representatives;
- Guidelines and resources to assist women in their consumer role, and to assist organisations in including consumers; and
- Training programs for representatives.

Breast anatomy redefined by ultrasound in the lactating breast

Mrs Donna Ramsay, Dr Jacqueline Kent and Prof Peter Hartmann, The University of Western Australia, Western Australia

Diagrams of the anatomy of the lactating breast have been standardised for over 150 years. Our aim was to re-examine the anatomy of the normal lactating breast using ultrasound.

Method

Breastfeeding women (n = 21) 1–6 months postpartum were scanned using an ACUSON XP10 (5–10 MHz linear array probe). The distribution of glandular and adipose tissue was recorded, number of main ducts measured and ductal morphology (n = 62) determined. Breast milk was scanned to determine its echogenicity.

Results

Ducts appeared as hypoechoic tubular structures with echogenic walls that often contained echoes. Ducts were easily compressed and did not display typical sinuses. All ducts branched within the areolar radius, the first branch occurring 8.0 ± 5.5 mm from the nipple. Duct diameter was 1.9 ± 0.6 mm, 2.09 ± 0.7 mm and number of main ducts was 9.6 ± 2.9, 9.2 ± 2.9, n = 17, for left and right breast, respectively. The distribution of adipose and glandular tissue showed wide variation between women but not between breasts, within women. The amount of glandular and fat tissue, number and size of ducts was not related to milk production. Separated breast milk demonstrated an echogenic ëfatí layer above a hypoechoic, aqueous layer.

Conclusions

Milk ducts are superficial, easily compressible and echoes within the duct represent fat globules in breast milk. The low number and size of the ducts, the rapid branching under the areola and the absence of sinuses suggest that ducts transport, rather than store, breast milk. This study highlights inconsistencies in anatomical literature that impacts on breast physiology, breastfeeding management and ultrasound assessment. Furthermore observations suggest non-compressible ducts indicate pathological changes associated with duct blockages in the lactating breast.

Barriers to breast imaging for indigenous women

Ms June Councillor, Public Health and Purchasing, Australia

BreastScreen Western Australa is is a fully accredited partner in the BreastScreen Australia program. The program aims to reduce morbidity and mortality attributed to breast cancer by the early detection of the disease. BSWA provides a free screening mammography service to asymptomatic women in the target age group 50–69 years. Women from 40 years are also eligible to attend.

The National Accreditation standard for the recruitment of indigenous women in the target age group 50–69 years is 70%. BSWA does not presently meet the required standard with the current participation rate for Indigenous women being 35%.

There are many barriers that prevent indigenous women from accessing breast screen services, which BSWA aims to address through the development of appropriate and effective strategies.

BSWA established the *Indigenous Program* in 2001 to promote the service to indigenous communities with the aim of increasing the participation rate of indigenous women. Specific strategies are being implemented to address the needs of this group.

These include: appointment of an Indigenous Project Officer (IPO); development of new resources and establishment of an Indigenous Women's Reference Group with representation state-wide. The new resources were launched at Mirrabooka in February 2003 and in response to community request, were also launched at Halls Creek in the Kimberley region in May 2003.

Other strategies include block bookings, transport, refreshments, client support, community visits, yarning, and partnerships in addressing holistic women's health for indigenous women.

The role of the vascular lab in the management of patients suffering from vascular diseases

Mr Tim Hartshorne, Leicester Royal Infirmary, United Kingdom

The evolution and accuracy of non-invasive vascular imaging has closely mirrored the technological advancement of colour duplex systems. In the majority of large hospitals vascular imaging services are provided by the radiology department or by a dedicated vascular laboratory.

Regardless of the setting, duplex scanning and Doppler techniques have assumed a central role in the decision making process of treating patients with peripheral arterial and venous disorders. This has led to a significant reduction in the number of diagnostic angiograms and venograms performed in many major vascular units.

Ultrasound imaging is non-invasive, relatively cheap and versatile. It can be performed for simple screening tests, such as aneurysm detection on a one-stop outpatient basis, or for complex investigations. An example is the detailed preoperative planning of lower limb bypass procedures. The management of venous disorders has been revolutionised with the aid of duplex imaging, to the extent that vascular surgeons are often dependent on the outcome of the scan prior to treating the patient.

In the future it is possible that there could be medico-legal implications for surgeons who have not requested a scan prior to surgery or treatment. So are there any disadvantages or pitfalls in the use of a duplex vascular service? Yes, is the simple answer. Ultrasound is highly operator dependent and a vascular imaging service will soon lose its reputation without adequately trained staff, of which there seems a chronic shortage.

Cerebral hyperperfusion syndrome following revascularisation procedures of the craniocervical arteries

Dr Con Phatouros, Royal Perth Hospital, Western Australia

Revascularisation procedures of the craniocervical arteries, either by open surgical or endovascular techniques, are frequently performed. Cerebral hyperperfusion syndrome (CHS) is a poorly recognised complication following such procedures. Although the incidence is relatively low, the sequelae, which include major stroke and death, may be devastating. Therefore, it is important that medical and paramedical practitioners alike are aware of this syndrome so that prompt recognition of symptoms may lead to appropriate investigations, diagnosis, and treatment. Transcranial Doppler (TCD) studies play an important role in this regard.

In this presentation we will examine the pathophysiology, predisposing features, symptoms and signs, relevant investigations including TCD, and therapy of CHS.

AV fistulas

Dr Kishore Sieunarine, Western Australia

Abstract not available at time of printing.

Improve your waveform surfing

Dr John Fraser, SKG Radiology, Western Australia

Duplex ultrasound is well established as one of the first investigations in the assessment of vascular disease both centrally and in the periphery. Since the advent of high-resolution colour Doppler imaging, anatomical images similar to those obtained at angiography are produced on a routine basis.

Stenotic lesions can be assessed by direct measurement from the colour image, or more commonly from peak velocity ratio assessment. However, it is important not to overlook the high level of functional and temporal information that can be retrieved from the Doppler waveforms. Subtle variations from the normal pattern can be interpreted in the light of a basic understanding of fluid dynamics. The configuration of each systolic/ diastolic waveform contains information that not only relates to the status of the vessel at the point of interrogation, but also to flow patterns upstream and downstream.

Correct waveform interpretation can help focus the search for stenotic lesions or abnormal collateral pathways, reducing the examination time and thence operator fatigue. The presentation will include the relevance of variations in systolic shortening, damping and the analysis of bi-directional flow patterns, most commonly encountered in the vertebral arteries, but also at other sites in the periphery.

Imaging of the salivary glands

Edmund HY Yuen, KT Wong, Ann D King, The Chinese University of Hong Kong, Hong Kong

Salivary gland diseases may present clinically as a facial or neck lump, diffuse swelling and/ or pain/ tenderness. After a careful history and physical examination, ultrasound is the ideal initial investigation of choice. It provides the clinician with adequate information regarding most lesions in the salivary glands. It helps to select patients who may require further imaging studies such as sialography, CT and MRI, and guide procedures of needle aspiration or biopsy if clinically warranted.

The aims of this presentation include:

1 Review of the sonographic anatomy and appearances of normal salivary glands and anatomical landmarks.

2 Discussion of the sonographic features of the commonly encountered salivary gland lesions including calculi and acute inflammatory disease, chronic inflammatory conditions, trauma, salivary gland tumors, and miscellaneous 'parotid' lesions.

Doppler ultrasound of the kidney

Prof Seung Hyup Kim, Seoul National University, Korea

Doppler ultrasound is an easy and noninvasive technique for evaluation of renal blood flow. Color and power Doppler ultrasound easily demonstrate the general decrease or increase of renal parenchymal blood flow, but hemodynamic changes of the renal blood flow should be assessed by Doppler spectral analysis. The upper normal limit of resistive index (RI) is considered 0.7 and mean normal values ranged around 0.6. Certain factors such as age and systemic blood pressure may affect RI.

Renal parenchymal diseases primarily involving tubulointerstitial or vascular compartments generally resulted in an elevated RI, whereas diseases limited to the glomeruli do not. Repeated Doppler ultrasound with monitoring the changes of RI may be of help in predicting the course of ARF and in judging the management policy. The value of Doppler ultrasound in the differentiation of obstructive and nonobstructive hydronephrosis is controversial. Only in cases of acute and severe obstruction, Doppler ultrasound may be useful since RI is usually elevated.

Hemodynamically significant stenosis of renal artery causes a dampened pulse in the downstream arterial network, producing intrarenal waveform of decreased amplitude with delayed acceleration (pulsus parvus and tardus). In the transplanted kidney, RI higher than 0.9 highly suggests acute rejection or renal vein thrombosis. However, clinical correlation is important and the cause of transplant dysfunction is usually determined by renal biopsy. Contrast-enhanced Doppler ultrasound may be useful in the evaluation of the indeterminate renal masses by demonstrating tumor vascularity better.

WFUMB Lecture – accreditation for ultrasound in the world

Prof Hiroki Watanabe, WFUMB, Japan

Ultrasound education is now one of the most important activities of WFUMB, as well as of area federations or national societies affiliated to WFUMB. When we are concerned with education, accreditation can not be neglected. However, the system of accreditation is very varied in each country. Common knowledge on accreditation in a country will not always be applicable in another country.

The system of accreditation relates closely to the medicare system and the education system, or in a broader sense, to the history and culture of each country. We have to be very careful not to look at or evaluate the system in another country from our own viewpoint or comprehension.

The author is now collecting information on the accreditation system for ultrasound in many countries in the world by a simple questionnaire and wishes to classify these systems into three categories, to understand the dissociation among countries.

Ultrasound education in Bangladesh

Prof Kanu Bala, University of Science and Technology, Chittagong, Bangladesh

Bangladesh is a developing country with a population of 140 million people. This accounts for 2% of the world's population, making Bangladesh the eighth biggest country in the world. In 1980, ultrasonography was first introduced in Bangladesh for diagnostic purposes. Since then the technique has been used increasingly. As such, the educational aspects have become very important. The Bangladesh Society of Ultrasonography, the national nrganisation of the sonologists in Bangladesh, has formulated a two-step education program.

Step 1 Education in ultrasonography

This program is for doctors who are not exposed to or have little exposure to ultrasound but are wanting to come into this field. This 12-week long *Certificate in Clinical Ultrasonography* program is very popular. After completing this course the physicians are able to do basic abdominal and pelvic ultrasound examinations accurately and safely.

Step 2 Education in ultrasonography

This is for doctors who are in active practice in the field of ultrasound for at least two years. It is an advanced program run by the Bangladesh Institute of Ultrasound in Medicine and Research under the University of Science and Technology Chittagong. Presently an one year long *Diploma in Medical Ultrasound Diagnosis* course is running. In future Masters and Doctoral courses will be introduced.

Ultrasound of peripheral nerve pathology

Dr Bill Breidahl, Royal Perth Hospital, Western Australia

Craniospinal nerve fibres (ie. axons and their surrounding schwann cells) are grouped into fasiculi of widely varying numbers. The size, number and pattern of fasiculi vary in different nerves and at different levels along their path – where nerves are subjected to pressure (eg. deep to a retinaculum) fasculi are increased in number but reduced in size and the associated connective tissue also increases.

The connective tissue sheaths of peripheral nerves has 3 layers:

1 Epineurium – condensation of areolar connective tissue – constitutes 30–70% of nerve cross-sectional area – echogenic on ultrasound.

2 Perineurium – alternating fibroblasts and collagen fibres, dividing axon bundles into fasiculi.

3 Endoneurium – fibrous matrix surrounding individual schwann cell-axon units.

The perineurium and endoneurium appear hypoechoic.

A much smaller number of fasicles are visualised on ultrasound than are present anatomically.

Neural fibrolipoma is a disorder of unknown aetiology. It presents in childhood or adolescence as a soft, slowly enlarging mass. The upper extremity is involved in 80–95% with a marked predilection for the median nerve. In 1/3 to 1/2 of cases it is associated with macrodactyly and referred to as macrodystrophia lipomatosa. Ultrasound of neural fibrolipoma shows alternating hyperechoic and hypoechoic bands (cable-like appearances).

Traumatic neuromas are the non-neoplastic proliferation of the proximal end of a transected or injured nerve. They can be subdivided into two groups:

1 Terminal neuromas

- The result of partial or total nerve transection
- Bulbous end in continuity with the normal nerve proximally

• Pathologically, there is total disorganisation of neural tissue
• They arise 1–12 months following injury.

On ultrasound they are usually reasonably well defined, ovoid and hypoechoic with a nerve visualised entering or leaving.

2 Spindle neuroma

Injured but intact neural trunk. A Morton's neuroma pathologically consists of fusiform neural enlargement and perineural fibrosis with a high collagen content. On ultrasound, they are again oval, hypoechoic and well defined. They are compressible and there is often an associated intermetatarsal bursa. They have been reported as demonstrating hyperemia on power and colour Doppler, but this is not my experience.

Hypertrophic (intraneural) perineuromas are rare, with approximately 40 cases described in the literature. Pathologically, there is replacement of normal nerve architecture by concentric whirls of perineural cells, creating an 'onion-bulb' appearance. They are typically elongated, with only mild fusiform enlargement of the affected area.

There are 2 classically described benign peripheral nerve sheath tumors. Schwannoma (neurilemmoma) are usually solitary, ≤ 5 cm and exhibit slow growth. The tumour is eccentric in its relationship to the involved nerve, with nerve fibres splayed about the neoplasm, although both are contained within the epineurium. Large lesions may undergo degenerative changes including cyst formation, calcification and haemorrhage.

Neurofibromas are also most commonly solitary – the vast majority are not associated with NF 1. Localised lesions often affect superficial cutaneous nerves. The neurofibroma is intimately intermixed and inseparable from normal nerve tissue. Both neurofibromas and neurilemmomas are fusiform, well-defined hypoechoic masses on ultrasound with an entering and exiting nerve, seen as a thin tubular structure. If cystic degeneration is present (uncommon) this is highly suggestive of a neurilemmoma. The 'split fat' sign of peripheral nerve sheath tumours (PNST) described on magnetic resonance imaging is more difficult to perceive on ultrasound. A 'sonographic target' sign has been described in neurofibromas in one patient with a hyperechoic central region and hypoechoic periphery.

In general, the distinction between the PNST on all imaging modalities is difficult due to the similar intrinsic imaging characteristics of the tumors.

The diagnosis of nerve entrapment at osteofibrous tunnels relies primarily on clinical and electromyography (EMG) findings. In cases with atypical features, ultrasound allows documentation of changes in nerve shape and echotexture that occurs in compressive syndromes.

Carpal tunnel syndrome is a clinical syndrome supported by EMG findings. Diagnostic ultrasound may be helpful in cases of carpal tunnel syndrome with unusual or atypical manifestations, particularly for the exclusion of a soft tissue mass or flexor tenosynovitis. A number of ultrasound findings have been found to be present in idiopathic carpal tunnel syndrome.

Subjective

1 Enlargement of the median nerve as it enters the carpal tunnel with flattening distally.
2 Lack of deformity with finger motion.

Objective

1 Cross-sectional area of the median nerve ≥10 cm^2 at the level of pisiform.
2 Flattening ratio – transverse diameter/ AP diameter ≥ 4:1 at the level of the hamate.
3 Volar bulging of the flexor retinaculum ≥ 3 mm.

Nerve instability may be a cause of a peripheral neuropathy. The classical location for this to occur is the ulnar nerve at the cubital tunnel. The nerve normally moves medially with elbow flexion but it should remain lateral to the tip of the medial epiondyle. Asymptomatic subluxation is present in up to 15% of the population.

The muscle changes resulting from nerve pathology can be imaged with ultrasound, even if the affected nerves cannot be directly visualised. Peripheral nerve pathology may result in the following muscle changes:

1 Atrophy – reduced bulk; diffusely echogenic, due to fatty replacement eg. Parsonage Turner syndrome; quadrilateral space syndrome.
2 Psuedohypertophy – a combination of true muscle hypertrophy and fat infiltration.
3 True Hypertrophy – muscle is of normal echotexture, but asymmetrically enlarged. EMG demonstrates neuromytonia (complex repetitive discharge).

It may be – generalised – Isaacs syndrome (autoimmune) – local – nerve 'injury' (although no cause is demonstrated in the majority of cases).

Ultrasound diagnosis in chronic ankle pain

Ms Susan Farnan, Dr Jones and Partners, South Australia

Chronic ankle pain is a frustrating and debilitating condition that affects a large number of people from all walks of life. It is also a condition that frequently persists despite innumerable diagnostic tests and treatment regimes and hence often becomes a cause of considerable consternation for both the patient and referring clinician.

The problem seems to arise because of the complexity of the ankle joint and the probability that the initial obvious injury may not be the only one sustained. Other injuries may have occurred but gone undiagnosed. These occult injuries are often exacerbated by the altered mechanics of the ankle joint due to the original obvious injury.

A chronic ankle condition often follows an inversion sprain injury. At time of injury, the lateral ligaments that provide lateral stability are stretched and often torn, particularly the anterior talofibular and calcaneofibular ligaments. These tears can be demonstrated with high-resolution ultrasound in the hands of a skilled sonographer at the time of injury. However, other less obvious damage can occur with the same traumatic event. Not infrequently, there is associated crushing of the deep fibres of the medial deltoid ligament between the medial side of the talus and the medial edge of the tibia. This crush damage over time may give rise to a fibrotic lesion, which, in turn, can develop, into a posteromedial impingement syndrome.

This is only one example of the complex nature of chronic ankle conditions. Many of these patients undergo numerous diagnostic tests including plain X-ray, CT scanning, nuclear medicine and MRI. However, very little investigation with ultrasound seems to have been utilised.

I would like to show in this presentation that, in the hands of a highly skilled sonographer, who is aware of the possible complications arising from ankle injuries and prepared to 'look outside the square', ultrasound can be a very useful diagnostic tool in the investigation of this complex region.

Plantar plate of the lesser metatarsals: ultrasound imaging versus MRI

Ms Julie Gregg, Mayne Health Diagnostic Imaging, Victoria

Purpose

To assess the diagnostic potential of ultrasound of the plantar plate by comparing and contrasting with MRI. When patients proceeded to surgery, correlation with surgical findings was achieved.

Materials and methods

Ultrasound and MRI was performed on 40 symptomatic feet and 40 asymptomatic feet (320 plantar plates of the lesser toes). Ultrasound of the plate in longitudinal and transverse sections, with static and dynamic scanning was performed. MRI of the forefoot in sagittal, coronal and axial planes using T2 fat saturated and proton density sequences were obtained.

Results

The plantar plate appears in the longitudinal and transverse planes on ultrasound similar to MRI in contour. The plantar plate, like all fibrocartilage is homogenously hyperechoic on ultrasound, with its high number of collagen fibres. Tears are seen on ultrasound as a loss of this homogeneity in two planes. MRI tears are identified by T2 hyper intense signal within the plantar plate.

Conclusion

Ultrasound offers itself as a superb alternative to MRI in the assessment of the plantar plate dysfunction of the lesser metatarsophalangeal joints.

Ultrasound and sports medicine

Dr Ken Maguire, Rheumatic Diseases and Sports Medicine

Medical care of exercising persons is said to be the role of those involved in sports medicine. Cardiovascular ultrasound to detect lesions or diseases likely to increase the risk of sudden death in sports activities is of great value.

Hypertrophic cardiomyopathies, vascular heart disease and aortic root anomalies (in those with Marfanoid features) increase the risk of cardiovascular mortality and require detection, often as part of screening procedures or after episodes of faints.

Athletic amenorrhoea is often seen as part of the female athlete triad and includes weight loss and eating disorders. However, a range of gynaecological problems require exclusion, including the use of gynaecological ultrasound, before exercise induced changes to the hypothalamic-pituitary-gonadal axis are accepted as causative.

Musculoskeletal ultrasound has enormous value in sports injury assessment and management. Studies can be undertaken in static and dynamic modes. Correlation between ultrasound findings and clinical severity, however, may be lacking. This is especially seen in tendinopathy disorders. Newer techniques enabling vascularity studies of soft tissue offer great possibilities to improve the imaging-clinical correlation.

Ultrasound guided injection and aspiration techniques have greatly improved management options for sports injuries.

Spinal pain management using dynamic musculoskeletal ultrasound of abdominal musculature is a significant advance in accessing the effectiveness of treatment regimens.

The groin – injuries and management

Mr Simon Bowman, Western Australia

Abstract not available at time of printing.

Professional indemnity insurance for sonographers

Ms Carol Barden, Locum, Sessional and Tutor Sonographer, Australia

Do sonographers require their own professional indemnity insurance?

The simple answer to this question is yes. This presentation will aim to outline the reasons why this is an essential requirement for the sonographer and not an optional extra. Employers will see that the importance of ensuring their sonographer is insured is just as important as ensuring they are accredited.

Medico-legal issues for radiologists

Dr Fiona Bettenay, King Edward Memorial Hospital, Western Australia

The major medico-legal problem perceived by doctors is litigation. In over 50% of cases of medical negligence against radiologists the allegation is that there has been an error of diagnosis (failure to diagnose or misdiagnosis). In 20% of cases there is no medical misadventure, but there are problems with system failures and/ or consent. Improperly performed procedures, failure to recognise a complication and failure to supervise or monitor are the next most frequent errors.

The major disease processes are failure to diagnose breast cancer, failure to detect fractures and failure to diagnose cancer of the bronchus and colon.

In over 50% of cases the modality involved is plain films (including mammography), with CT and intravenous contrast studies the next most frequent.

Ultrasound is an uncommon modality to be involved in litigation against radiologists and is involved in less than 10% of cases, however breast ultrasound and obstetric ultrasound are recognised as areas of medico-legal concern.

Risk management strategies will be discussed to reduce the chance of litigation and improve your chances of defending yourself against charges of medical negligence.

The general principles of risk reduction, external, internal and personal audits will be reviewed.

Specific risk reduction strategies for breast US and obstetric US will be presented.

The issue of vicarious liability of the radiologist for the sonographer will be canvassed.

Medico-legal aspects of ultrasound imaging from a legal viewpoint

Mrs Deborah Williams, Central Law Courts, Western Australia

It is almost axiomatic that in 2003 every medical practitioner in Australia and New Zealand should assume that they are likely to be involved in legal proceedings, either as a party to an action, or as a witness, at some time in their professional career. In this paper I will look at the types of matters which can give rise to claims, or which have been the subject of claims, by reference to various Australian legal cases that have involved sonographers. I will also discuss the varied issues that every medical practitioner needs to consider in everyday practice, such as best practice, relationship with other medical practitioners and allied health workers, discussion of material risks inherent in treatment, patient confidentiality, follow-up treatment, education, bedside manner and medical record documentation. Finally, I will set out the matters to bear in mind when giving evidence at trial, either as an expert witness, or as a witness of fact.

Colour duplex sonographic evaluation of acute scrotal pain

Dr Tom Stavros, Radiology Imaging Associates, United States

The chief differential diagnosis for acute scrotal pain is torsion versus infection. Torsion represents a surgical emergency, with most cases of infection (apart from abscess) requiring only antibiotics, anti-inflammatory drugs and analgesics. The prevalence of torsion and infection varies with age. Torsion is more common in children, while infection is far more prevalent in adults. Colour duplex sonography is the method of choice for evaluating these patients.

Colour, power, and pulsed Doppler parameters should be set for maximum sensitivity. Split screen imaging of mirror image right and left structures is also invaluable.

The imaging findings of infection and torsion are very similar. Differences in the sonographic appearances of torsion and infection are subtle and difficult to detect.

Colour Doppler is the key to distinguishing torsion from infection. Torsion causes absence or decrease in flow within the affected testis, while infection usually causes obvious hyperemia of the involved structures. The pattern of inflammatory hyperemia varies with the pattern of oedema.

Demonstration of oligemia or absent flow is most reliable for intratesticular vessels (centripetal arteries) rather than capsular vessels because in chronic torsion, the inflamed tunica vaginalis can adhere to the testis. The vessels that supply the adherent tunica vaginalis can be mistaken for capsular testicular arteries. Occasionally, pulsed Doppler spectral analysis may show asymmetry when obvious colour Doppler asymmetry is not present.

There are two main caveats for colour Doppler evaluation of acute scrotal pain.

1 Cases of 90–1800 torsion may only decrease flow, not completely stop it.

2 Severe infection can lead to secondary ischemia and infarction.

Torsion of the appendix testis or appendix epididymis is a fairly common cause of scrotal pain in children. Sonography will show a pea-sized, avascular, echogenic nodule medial to a focally enlarged, inflamed, and hyperemic epididymal head and spermatic cord.

Trauma can also cause acute scrotal pain. Sonography can be helpful in determining whether the testis is intact. In cases of testicular rupture or laceration, early surgical treatment is beneficial.

Doppler ultrasound for evaluation of erectile dysfunction

Prof Seung Hyup Kim, Seoul National University, Korea

The hemodynamic function of the penis can be evaluated noninvasively by performing color or power Doppler ultrasound with spectral analysis following injection of a vasoactive pharmacologic agent. The parameters most commonly used to quantify penile blood flow are peak systolic velocity (PSV) and end diastolic velocity (EDV). PSV less than 25 cm/s indicates arterial insufficiency, that greater than 30 cm/s normal, and between 25 cm/s and 30 cm/s is equivocal. PSV varies significantly according to the sampling location along the course of a cavernosal artery. The proximal carvenosal artery where it angles posteriorly toward the crus should be used as the standard sampling location for Doppler u;trasound of the cavernosal arteries.

The parameters that indicate the presence of arterial disease are a subnormal clinical response to vasoactive agents, a less than 60% increase in the diameter of the cavernosal artery, and a PSV of the cavernosal arteries less than 30 cm/s. If a significant discrepancy exists between the velocities, two cavernosal arteries (≥ 10 cm/s difference), unilateral arterial disease may be present. In the presence of normal arterial function, Doppler findings suggestive of an abnormal venous leak are persistent EDV of the cavernosal artery greater than 5 cm/s and demonstration of flow in the deep dorsal vein. The development of diastolic flow reversal after an intracavernosal injection of vasoactive agents has been found to be a reliable indicator of venous competence. Other conditions of the penis that may be evaluated with ultrasound and Doppler ultrasound are congenital anomalies, masses, priapism, Peyronie's disease, and trauma-related abnormalities.

Transrectal ultrasound of the prostate: the patient's and the pathologist's perspective

Dr Jim Anderson, Royal Perth Hospital, Western Australia

Purpose

To review ultrasound directed prostate biopsy techniques from the patient's and pathologist's perspective.

Methods

In Study 1, patients were asked to complete questionnaires soliciting responses to questions exploring biopsy acceptability. These patients either underwent transrectal ultrasound biopsy (TRUS) (4 systematic cores) or transperineal ultrasound biopsy (TPUS) (11 systematic cores).

A single investigator performed all the biopsies by TRUS (102 patients recruited) (n = 102) and a different single investigator performed all the biopsies by TPUS (40 patients recruited) (n = 40).

In Study 2 the histology of patients undergoing radical prostatectomy was compared to the histology at the time of the initial diagnosis of prostate cancer, the latter had been obtained

Patients experiencing pain or discomfort immediately post bioposy and % 72 hours post biopsy

% of patients experiencing pain or discomfort		Immediately post biopsy		72 hours post biopsy	
		Transrectal	Transperineal	Transrectal	Transperineal
DISCOMFORT	None	7.5	21	30	46
	Mild	55	62	43	36
	Moderate	27.5	17	13	13
	Severe	5	0	5	
PAIN	None	27.5	38		
	Mild	52.5	47		
	Moderate	15	13		
	Severe	2.5			

either by the TRUS or the TPUS technique. Individual urologists using the standard sextant technique had performed the TRUS biopsies; a single radiologist taking 11 core samples had performed The TPUS biopsies. One hundred radical prostatectomy specimens were reviewed by a single uropathologist. 36 patients underwent TPUS and 64 underwent TRUS.

Results

Study 1 results see table above.

Study 2
Six of 8 significant transition zone cancers were identified preoperatively in the TPUS group, none in the TRUS group despite additional transition zone biopsies in 4 cases. Trans perineal biopsies yielded longer tumour lengths (1.25 mm longer). There was no difference in the tumour grade in the 2 groups.

Conclusion

Study 1
The patients undergoing the transperineal biopsy technique, despite having to submit to nearly 3 times as many biopsies found this technique at least as acceptable as the patients undergoing transrectal biopsies.

Study 2
The TRUS (sextant) technique does not sample the transition zone and therefore can fail to detect significant cancers in this region.

Ultrasound assessment of the potentially infertile male

Mr Nevile Phillips, Obstetric and Gynaecological Ultrasound, Wembley, Western Australia

If failing to conceive after 12 months is taken as a baseline definition of infertility, it follows that 20% of couples overall fall into that category. The long accepted criteria for the distribution of infertility has been considered to be one-third female factor, one-third male factor and one-third of unknown cause. It is with the hard core group that fail to conceive on the less complex fertility treatment regimens that the presence of poor sperm characteristics becomes more apparent.

Fertility units are now performing intra cytoplasmic sperm injection (ICSI) for male factor problems on up to 50% of IVF treatment cycles, suggesting that for the most complex procedures male and female infertility factors apply almost equally.

Infertile couples seen at the PIVET Medical Centre in Perth, Western Australia have routinely undergone ultrasound examinations as part of their initial clinical assessment, the male genitourinary tract being included.

Data on 494 men relating to testicular and prostate volumes, the presence of varicocoeles and other ultrasound diagnosed abnormalities have been correlated. The most common finding has been the varicocoele being present in 43% of those men. To ligate, embolise or to leave the varicocoele well alone has been a contentious issue, however surgical intervention is becoming a more accepted treatment for a small group of patients. Our data has been compared to sperm concentration and motility findings taken on the day of the ultrasound and its value in the infertile couple's overall clinical assessment has been established.

Prenatal ultrasound exposure in childhood outcomes

Prof John Newnham, The University of Western Australia, Western Australia

Despite the widespread use of prenatal ultrasound studies, there are no published data from randomised controlled trials describing childhood outcomes that may possibly be influenced by the use of repeated exposures. We conducted a randomised controlled trial to evaluate the effects of multiple studies on childhood outcomes.

Pregnant women were allocated at random to a protocol of 5 ultrasound imaging and umbilical artery Doppler flow velocity waveform studies between 18 and 38 weeks gestation (intensive group n = 1490) or a single imaging study at 18 weeks gestation (regular group n = 1477). Those pregnancies allocated to receive multiple examinations had an unexplained and significant increase in the proportion of growth restricted newborns.

Examinations were conducted on these children at 1, 2, 3, 5 and 8 years of age. The follow up rate at 1 year was 85% and at 8 years was 75%. By one year of age and thereafter,

physical sizes were similar in the two groups. There were no significant differences indicating deleterious bio-effects of repeated ultrasound studies at any age as measured by tests of intellect, behaviour and language. We have concluded that exposure to multiple prenatal ultrasound examinations may be associated with a small effect on fetal growth but is followed in childhood by growth and measures of developmental outcome similar to those in children who had been allocated to receive a single prenatal scan. The greater intensities of insonation currently in use, however, indicate a need for ongoing study of potential bio-effects.

Experiences in an ultrasound and biochemistry first trimester screening program

Prof Wolfgang Holzgreve, Switzerland

Abstract not available at time of printing.

The correlation of ultrasound and surgical findings in vascular disease

Mr Tim Hartshorne, Leicester Royal Infirmary, United Kingdom

Until recently, the majority of comparative studies involving vascular ultrasound looked at the accuracy of duplex imaging compared to lower limb and carotid angiography. A significant number of publications have now confirmed the accuracy of duplex imaging in these regions. This has ultimately led to surgical interventions being performed on the basis of duplex imaging alone, allowing for direct comparison of results. There is good correlation between the significance of duplex graded carotid stenoses and surgical findings but less certainty about grading of plaque types and composition. This remains an elusive goal in the puzzle of stroke risk.

A number of studies have shown good agreement between preoperative duplex scans and surgery for lower limb bypass procedures, including pedal vessel assessment for siting the distal end of the graft. Some true or false aneurysms can be safely treated on the basis of duplex imaging alone, demonstrating excellent correlation with surgical findings. In venous disorders, there has been a dramatic increase in the use of preoperative scanning and markings, especially for sapheno-popliteal junction identification, making direct comparisons frequent and easy. Ironically, duplex scanning has probably revealed more about venous anatomy and anatomical variations than was previously described in vascular surgery text books. One such example is the variability of the so called Giacomini vein.

Good communication between the sonographer and surgeon is the key to maintaining accuracy and it is increasingly important that the sonographer has some understanding of the surgical procedures and techniques involved in vascular surgery. In this way the report can be written to provide maximum information to the referring surgeon.

Online Ultrasound Clinical Handbook

Dr Dave Rogers, New Zealand

ASUM wishes to unveil the online ultrasound clinical handbook. This is the culmination of over two years work by the Education Committee to produce an online educational resource that has significant clinical relevance.

In ultrasound clinical practice, when an abnormality is found, there is considerable time pressure to produce a definitive report. Often, this is not immediately possible as some research is required to cover all options, especially when the ultrasound practitioner is not working in their specialty area.

The Online Clinical Ultrasound Handbook has been designed to provide instant access, wherever you are, to relevant clinical information, including journal references and images. An online database has been professionally developed to provide an easy to follow structure that presents information in an optimal format.

The Online Ultrasound Clinical Handbook will be demonstrated live in its current form. The structure is fully developed, however, further contribution is required to provide a comprehensive resource. An online contribution module enables entry of articles with considerable ease. A list of required topics has been developed, and each section has a person responsible for editing content.

The Online Ultrasound Clinical Handbook is available live in development form through the ASUM web site. Over the next six months, all sections will be filled, and the handbook will be considered complete in March 2004. The Handbook will be available online initially freely, however, access may later be restricted as a member benefit to ASUM members. All members are invited to look at the Handbook and to consider contribution. It is hoped that this resource will also form of the backbone of an online syllabus for DMU candidates.

We wish to thank all contributors thus far who have put in a great deal of work to bring this project to practical completion.

Prospective evaluation of a first trimester screening program for Down syndrome and other chromosomal abnormalities using maternal age, nuchal translucency and biochemistry in an Australian population

Dr Fergus Scott, Mrs Helen Peters, Dr Andrew McLennan, Dr Antheunis Boogert, Dr Robert Robertson, Dr John Anderson, Mrs Margo Gill, Sydney Ultrasound for Women, New South Wales
Dr Greg Kesby, Royal Prince Alfred Hospital for Women. and Babies, Sydney, New South Wales
Dr Michael Bonifacio, Sydney Genetics, New South Wales

Background

Until recently, the best screening test for chromosomal abnormality has been ultrasound assessment nuchal translucency (NT) combined with maternal age. In the United Kingdom, serology in addition to NT screening was shown to be beneficial.

Aims

To establish the screening sensitivity for chromosomal abnormalities in an Australian population using a combination of maternal age, NT and maternal serum biochemistry.

Methods

A prospective study in a private obstetric ultrasound practice. Over 22 months, 2121 patients were screened and data was analysed for sensitivity (detection) and false positive rates for all chromosome abnormalities.

Results

There were 17 chromosomal abnormalities, 5 of which were Down syndrome. Using maternal age alone or age + biochemistry, 4 of the Down syndrome cases were detected for a 29% and 19% false positive rate respectively. Using age + NT or age + NT + biochemistry, all the Down syndrome cases were detected, for a false positive rate of 5.7% and 7.2% respectively. The difference in detection rates for Down syndrome or other chromosomal abnormalities, using the 4 screening methods, did not reach statistical significance. However the false positive rates in screening methods without ultrasound to assess the NT was significantly higher ($p \leq 0.01$).

Conclusions

A combination of maternal age, NT and maternal serum biochemistry gives a high detection rate for both trisomy 21 and other chromosomal abnormalities. This is comparable to international studies. Maternal age alone or age + biochemistry have high false positive rates, so should be used in conjunction with ultrasound to confirm the gestational age and assess the NT.

Uterine arteriovenous malformations

Dr Kristy Milward, Dr Suhanna Abdul-Hamid, Mrs Dawn Voges and Dr Joanne P Ludlow, King Edward Memorial Hospital, Perth, Western Australia

Uterine arteriovenous malformations (AVM) are rare and poorly understood. There are less than 100 reported in the literature. These lesions may be congenital or acquired. They have been reported following gestational trophoblastic disease, miscarriage, termination of pregnancy, full term pregnancy, uterine surgery and infection.

The clinical presentation is variable but is usually ongoing vaginal bleeding following dilatation and curettage in the first trimester of pregnancy. Ultrasound is the main diagnostic modality. Angiography may be necessary for confirmatory diagnosis and treatment.

Dilatation and curettage is contraindicated. Management options include conservative treatment, ergot alkaloids, embolisation and hysterectomy. A recent report,[1] and the experience in our institution over the last two yers has suggested that uterine AVMs may not be as rare as intitially suggested.

We present the clinical features, sonographic findings, management and subsequent outcomes of seven cases of uterine AVM. We will discuss the incidence and possible aetiology for this phenomena.

1 Timmerman D et al. Vascular malformations in the uterus: ultrasonographic diagnosis and conservative management.

An ultrasound study of nipple position in term infant breastfeeding

Mrs Lorili Jacobs, King Edward Memorial Hospital, Western Australia

When there are breastfeeding problems, the external observation of positioning, attachment and other maternal milk supply factors may appear to be normal. The internal landmarks believed to effect breastfeeding can be observed on ultrasound during feeding. This pilot study describes the typical nipple position relative to the junction of the hard and soft palate measured in the median sagittal plane using the submental ultrasound approach.

A sample of 18 normal newborn babies with their mothers who had previously successfully breastfed was scanned while feeding in the first and fourth weeks of life. The number of observations measured was 1,386 on still images extracted from the feeding ultrasound videotapes. Observations were divided into three groups based on the time from start of breastfeed. The times of zero, two and 5 minutes were chosen to represent respectively, the nipple position before letdown, after letdown and end of feed.

Milk transfer and its sequence of events appeared to differ from most of the descriptions in lactation literature and further research to measure the sequence of sucking with submental feeding ultrasound is recommended.

Median distance from the nipple tip to the distal end of the bony hard palate was 5 mm (inter-quartile range 4–6 mm). The distance was not significantly affected by age. There was a statistical, but not clinically relevant, difference of 1 mm in the nipple position between zero and two minutes from start of feed ($p = 0.06$). This normal nipple position for infants up to 1 month old begins the use of feeding ultrasound as an assessment tool in breastfeeding problems.

Ultrasound of Implanon (a lost contraceptive device in the arm)

Mrs Rae Roberts, King Edward Memorial Hospital, Perth, Western Australia

Six women in Perth with a non-palpable Implanon rod in the medial upper arm were scanned using a linear array transducer prior to surgical removal. There are several pitfalls: failure of insertion when the operator has inadvertently left the device in the applicator; the device been placed in a deeper anatomical plane than intended; the device been inserted in an 'ectopic' site?

It is important to check for the visible scar site then start at 90 degrees to presumed longitudinal direction on the implant. Look for an echogenic focus with acoustic shadowing behind it then obtain a longitudinal view of the implant. It is most commonly found 3–4 mm below the skin surface. Use minimal compression of the skin and note that the distance from skin surface to implant will vary. The Implanon rod can also be angled deeper at one end than the other and curled rather than straight. Migration does happen. Check the whole length and breadth of both upper arms.

The Implanon rod is not visible using plain X-ray or computerised tomography scans. MRI is unequivocal in the location of Implanon but expensive and not widely available. Musculoskeletal equipment settings and a high frequency linear transducer make ultrasound localisation of Implanon relatively simple. This only becomes a difficult exercise with smaller ultrasound equipment and curved linear transducers. Referred ultrasound is readily available and simple to use for localisation of the lost contraceptive device in the arm.

Sonography of thyroid nodules

Edmund HY Yuen, KT Wong, Ann D King, Prof Anil Ahuja, The Chinese University of Hong Kong, Hong Kong

Patients with thyroid problems may present systemically with abnormal metabolic rate (hyperthyroidism or hypothy-

roidism) and/ or locally as palpable diffuse (goiter) or focal (nodular) enlargement. While the physiological derangement can be rather accurately assessed by clinical examination and laboratory biochemical assays, ultrasound is the ideal modality for the evaluation of any structural anomaly.

The major indications for sonography of the thyroid gland include:

1 To confirm that the clinically palpated nodule/mass arises from the thyroid gland and to try to determine the nature of the lesion.

2 To accurately guide fine needle aspiration/ biopsy.

3 To follow-up patients post-operatively to exclude local, regional recurrence.

4 To screen patients with increased risk of developing thyroid malignancies, eg. patients with Hashimoto thyroiditis and thus increased risk of thyroid lymphoma.

This presentation will discuss the scanning technique and sonographic anatomy of the thyroid, followed by discussion of the important sonographic features of thyroid nodules, and conclude by a review of the sonographic features of the commonly encountered thyroid lesions including multinodular thyroid, thyroid malignancies and thyroiditis.

Imaging of the fat infiltrated liver

Dr Richard Price, Sir Charles Gairdner Hospital, Western Australia

A review of the imaging appearances of diffuse fatty infiltration and focal fatty sparing of the liver parenchyma. Cases illustrating fatty infiltration complicating the expected appearances of liver masses will be discussed.

I have been a consultant radiologist at Sir Charles Gairdner Hospital, Perth since 2002 where I have an interest in oncology, body and chest imaging. I qualified in medicine from the University of London in 1990 before studying radiology at Southampton University Hospital.

The role of ultrasound in the acute abdomen

Dr Richard Mendelson, Royal Perth Hospital, Western Australia

CT has gained wide acceptance as the initial imaging of choice in the 'acute abdomen'. In many situations CT has undoubted advantages over US, but in young patients, and especially in young women, it has the major disadvantage of ionising radiation and has poor accuracy for pelvic gynaecological disease. A tailored approach to imaging is suggested, based on patient age, gender and symptom complex.

Most patients with definable symptom complexes present with (a) suspected bowel obstruction (b) suspected perforation/ severe generalised pain with peritonism (c) right iliac fossa (RIF) pain (d) left iliac fossa (LIF) pain (e) right upper quadrant (RUQ) pain (f) suspected renal colic.

If (a) and (b) require imaging beyond plain radiographs, CT is usually the modality of choice, while typical renal colic is usually investigated with limited IVP or non-enhanced CT.

For young patients with RIF pain, imaging may reduce false-positive appendicectomies. US or targeted CT of RIF are both highly accurate in the diagnosis of appendicitis and the choice may be dictated by local expertise or availability; there are few direct comparative studies. Ultrasound avoids ionising radiation and should be the first choice, especially in females (± transvaginal ultrasound) as it may also diagnose or exclude gynaecological causes. CT may be reserved for difficult cases.

Similarly, in young patients with LIF or pelvic pain, ultrasound is indicated, although in older patients more likely to have acute diverticulitis, CT is preferred.

The commonest cause of acute RUQ pain is hepatobiliary disease and is best imaged with ultrasound.

While most patients can be categorised as above, many present with atypical symptoms. It is for these that judgement by clinician and radiologist in consultation is important to determine the modality of imaging required.

Assessment of the abdominal aortic aneurysms post endoluminal repair

Dr Martin Marshall, Royal Perth Hospital, Western Australia

The treatment of abdominal aortic aneurysms with stent grafts has gained increasing popularity and now is the treatment of choice for patients in multiple centres. One of the prerequisites post repair is the long term radiological assessment of these patients evaluating them for graft failure as well as for the presence of endoleaks, and CT has been used as the gold standard in the follow-up of these patients. However, well performed colour Doppler sonography is extremely useful and accurate in patients post aneurysm repair and is almost comparable to that of CT angiography although it has been shown that there is a tendency to miss small posterior branch leaks which, without aneurysm expansion, are not particularly significant. Hence, ultrasound may be used for the routine surveillance and routine follow-up of these patients.

Ovarian ultrasound

Dr Joanne Ludlow, King Edward Memorial Hospital, Western Australia

Ultrasound of the ovary is indicated in the management of early pregnancy bleeding, undiagnosed pelvic pain to exclude ovarian cysts/masses, reproductive endocrinology to assess for polycystic ovaries and response to treatment (follicle tracking), and ovarian cancer screening.

Transvaginal ultrasound can be used to characterise accurately the majority of ovarian masses. Such masses need to be classified as physiological or pathological and if the latter, whether more likely to be benign or malignant. Physiological cysts are very common and it is important to identify them to avoid unnecessary surgery.

For the general gynaecologist the clinical questions that need to be answered are:

1 Does this cyst need to be removed?

2 Can this cyst be removed laparoscopically?

3 Does this patient need to be referred to a gynaecological oncologist?

The quality of information obtained and reported from the ultrasound as well as clinical factors determines the answers to these questions.

Mathematical models based on ultrasound characteristics of the cyst/mass plus or minus clinical features have been employed. However, subjective impression of the likely nature of an ovarian mass by an experienced operator is highly accurate and, to date, performs better than statistical models.

I will demonstrate normal ovarian appearances and important distinguishing sonographic features. The way in which this assists clinical decision making in all areas of gynaecological practice will be outlined.

Management of adnexal masses

Dr Yee Leung, King Edward Memorial Hospital, Perth, Western Australia

Women who have an adnexal mass confirmed on ultrasonography are often anxious about the nature of the mass. The role of the clinician is to provide accurate assessment and appropriate counselling on the management of the mass.

To this end, researchers have formulated various 'risk' scores or 'malignancy index' scores to assist the clinician in the preoperative assessment of these masses. The patient's age, sonographic features of the mass and serum tumour marker levels are considered.

This presentation provides you with insight into how one clinician utilises the available clinical information to manage patients with adnexal masses. Various cases will be presented to highlight the clinical relevance of these scores.

Endometrial management

Dr Roger Hart,and Dr Martha Hickey, King Edward Memorial Hospital, Western Australia

The initial step in the management of endometrial disorders is investigation. The blind biopsy of the endometrium has now given way to visualisation of the endometrium and directed biopsy, if required. The 'gold standard' method used to visualise the endometrial cavity is outpatient hysteroscopy, however increasingly the perceived 'less-invasive' approach of saline infusion sonography or contrast infusion sonography is being performed. The advantage of the hysteroscopic approach is that it is possible at the time of the hysteroscopy to perform a directed biopsy of the endometrium or potentially remove an endometrial polyp. Larger lesions require the patient to be admitted to hospital and undergo a general anaesthetic.

With the patient anaesthetised it is possible to perform the surgical procedures of transcervical resection of polyps, fibroids and septae.

Those patients without any endometrial pathology can then be labelled as 'dsyfunctional uterine bleeding', the management of which consists of cycle regulations by hormonal manipulation for those women with irregular bleeding. Those women with heavy but regular bleeding will require medication to reduce the amount of bleeding. This is usually tranexamic acid or the levenorgestrel containing intra-uterine contraceptive device.

Ultrasound assessment of the cervix in preterm delivery prediction

Prof Wolfgang Holzgreve, Switzerland

Abstract not available at time of printing.

Fetal gastroschisis

Mrs Karen Reid, King Edward Memorial Hospital, Western Australia, Mr Ian Gollow, Princess Margaret Hospital, Western Australia

Congenital gastroschisis is an anterior abdominal wall malformation comprising a full thickness defect adjacent, and usually to the right of, the umbilical cord insertion. The defect results in herniation of the abdominal contents, usually fetal intestine, into the amniotic cavity to float freely. The precise etiology remains uncertain.

Internationally the incidence of gastroschisis has been rising. The United Kingdom has reported an increase in incidence from 0.65 per 10,000 births to 1.39 per 10,000 births. A Western Australian population incidence study from 1980 to 2002 has reported a sustained increase in incidence from 1.1 per 10,000 births during 1980–90, peaking at 5.5 per 10,000 births in 1997–98. ($p \leq 0.001$) The median maternal age was 22 years. The perinatal mortality rate for congenital gastroschisis in this series was 12.7% with a stillbirth rate of 9.8%. There was a significant association between stillbirth and low amniotic fluid volume ($p = 0.046$).

The median gestational age at diagnosis of gastroschisis is 19 weeks corresponding to the timing of fetal anatomy ultrasound. Gastroschisis was diagnosed by ultrasound in 60% of cases prior to 1993, increasing to greater than 90% detection after this period.

All cases of gastroschisis are managed at King Edward Memorial Hospital, the sole tertiary referral centre for obstetrics in Western Australia. Excellent neonatal outcomes have been achieved, however, despite alterations in antenatal management strategies the third trimester stillbirth rate persists.

Obstructive renal disorders

Dr Craig Pennell, King Edward Meorial Hospital, Dr Andrew Barker, Princess Margaret Hospital, Western Australia

Obstructive renal disorders present in 1 in 80 antenatal ultrasounds.

The antenatal findings of renal pelvic dilatation, ureteric dilatation or a bladder that doesn't empty can be found postnatally to range from a normal urinary tract to obstruction associated with renal failure.

The major antenatal diagnoses are dilated renal pelves, PUJ obstruction, multicystic dysplastic kidneys, duplex renal anomalies, VUJ obstruction, ureterocoeles, ectopic ureters, posterior urethral valves and prune belly syndrome.

The antenatal findings and the postnatal outcome for these conditions are discussed.

Sydney Ultrasound for Women – initial experience with fetal nasal bone assessment in the first trimester

Mrs Vanessa Pincham, Dr Andrew McLennan and Mrs Margo Gill, Sydney Ultrasound for Women, New South Wales

Trisomy 21 (Down syndrome) occurs in 1.2/1,000 live births in Australia and accounts for 60% of all chromosome abnormalities in live born babies. Current screening methods have shifted towards the first trimester with the introduction of nuchal translucency (NT) assessment that has a detection rate of around 80%. The recent introduction of first trimester maternal serum biochemistry (PAPP-A and free beta HCG) combined with NT assessment has been shown to further increase the detection rate to around 90%, with a false positive rate of approximately 5%.

Nasal hypoplasia was noted by Langdon Down in his early observations of the common characteristics of patients with trisomy 21. Cicero et al (2001) examined the fetal profile

for the presence or absence of a nasal bone (NB) at 11–14 weeks. The study found that the NB was absent in 73% of trisomy 21 fetuses but absent in only 0.5 % of chromosomally normal fetuses. They postulated that a combination of maternal age, fetal nuchal translucency, first trimester serum screening and NB assessment could result in a substantial reduction in the false positive rate (1%) whilst maintaining 90% sensitivity.

This study examines the initial experiences in first trimester nasal bone assessment at Sydney Ultrasound for Women.

Between November 2001 and January 2003, NB assessment was performed on 150 fetuses prior to karyotyping for advanced maternal age or increased risk from first trimester screening. The NB was absent in 5/8 (62.5%) trisomy 21 fetuses and in only 4/142 (2.8%) fetuses with normal chromosomes. The likelihood ratio for trisomy 21 is 22.3 for absent NB and 0.39 for present NB. These preliminary results, although based on small numbers, show a similar trend to Cicero's data and provide further evidence that NB absence is likely to be a strong indicator for trisomy 21. Larger numbers are, however, needed to better assess the validity of fetal nasal bone assessment.

Diagnosing an atrio-ventricular septal defect in the fetus

Ms Ann Quinton andJohn Smoleniec, Feto-Maternal Unit, Liverpool Health Service, New South Wales

An atrio-ventricular septal defect (AVSD) is a heart abnormality that should ideally be diagnosed by the four-chamber heart view. However, the rate of detection of an AVSD is less than 50%. This is an important heart defect to detect because of the association with chromosome abnormalities, in particular trisomy 21. In a review of our own cases, 50% of fetuses with an AVSD had an abnormal karyotype and 50% of the trisomy 21 fetuses had an AVSD.

AVSD has been categorised into partial and complete types. A partial AVSD is recognised when the ostium primum of the atrial septum is absent. The in utero diagnosis of a complete AVSD can be made by ultrasound because the crux of the heart is abnormal. This is best appreciated by recognising the absence of the ostium primum, the atrioventricular valves are not offset and there is a membranous ventricular septal defect.

This presentation will show examples of AVSDs at different gestations as well as at different stages of the cardiac cycle (systole and diastole) to give an appreciation of how the ultrasound appearance of the defect changes with gestation and whilst scanning. An example of a false positive diagnosis and how this can be avoided will also be given.

Postnatal ultrasound assessment of normal brain maturation

Dr Sven Thonell, Princess Margaret Hospital for Children, Western Australia

Knowing the stage of postnatal development of the brain is important for several reasons. The effect of hypoxic or ischaemic insult to the brain varies with brain maturity as does subsequent neurological outcome. An ultrasound appearance which does not correlate with known gestational age may be due to abnormal, or interruption of, neuronal cell migration from teratogenic effects of drugs and toxins, infection, intrauterine hypoxic ischaemic events and chromosomal causes. Without the direct comparison of the given gestational age with the ultrasound appearance of brain development, the diagnosis of neuronal migrational disorders may be missed or misdiagnosed. On the other hand, the appearance may raise the suspicion of a wrong given gestational age that may have clinical or legal consequences.

The purpose of the presentation is to attempt to familiarise the audience with the ultrasound appearance of normal brain maturation from severe prematurity to term and to the recognition of stages of development of the sulcal pattern and blood flow parameters. Some pathological states are also illustrated

Ultrasound imaging of abdominal pain in children

Dr Sven Thonell, Princess Margaret Hospital for Children, Western Australia

By far the most common request for acute ultrasound examination in children is for investigation of abdominal pain. The localisation of the pain may be difficult in infants and younger children and the clinical history may not be reliable. It is therefore important to have an open mind when investigating the abdomen in children and to consider alternative causes when the initial clinical diagnosis has been excluded.

The talk will discuss the ultrasound investigation of the more common causes of abdominal pain in children.

Errors of interpretation in renal ultrasound

Dr Fiona Bettenay, King Edward Memorial Hospital, Perth, Western Australia

Paediatric kidneys are not just little adult kidneys. There are disease processes peculiar to childhood, and subtleties on renal ultrasound that have different interpretations in the paediatric population compared to the adult population.

The following will be reviewed:

Parenchymal patterns – what is normal?

Renal length and volume.

Distension of the collecting system.

Some peculiar renal disorders of children.

Paediatric abdominal masses

Dr Ros Thomson, Princess Margaret Hospital for Children, Perth, Western Australia

The role of ultrasound in the diagnosis and follow up of paediatric abdominal masses will be discussed. Ultrasound appearances of common paediatric masses will be described, with features allowing differential diagnosis, and some potential confounding factors.

Some examples of more unusual lesions will be described.

Ultrasound applications in intervention

Dr Roger Davies, Queen Elizabeth Hospital, Adelaide, South Australia

Ultrasound is an imaging modality that is widely used for needle placements, fluid aspiration and tissue biopsy. It is increasingly being used for therapeutic procedures including

ultrasound-guided placement of percutaneous drainage catheters, vascular access, percutaneous tissue ablation and percutaneous retrieval of foreign bodies. New technology with endoluminal and endovascular probes is allowing development of novel techniques for interventional procedures, eg. retrieval of biliary calculi and TIPS procedures. Ultrasound is an ideal guiding procedure for several reasons, including portability, absence or minimising radiation exposure, real time guidance and monitoring application of therapy eg. cryotherapy or alcohol ablation. Examples of current and evolving use in interventional procedures will be discussed.

Application of radiology to forensic investigation

Dr Karin Margolius, Western Australian Centre for Pathology and Medical Research, Western Australia

Diagnostic radiology is an important tool in forensic investigation. There is an extensive range of uses, some of which will be illustrated.

Full skeletal survey is undertaken on every apparent cot death to exclude injuries and signs of child abuse. Non-traumatic bone lesions must not be misdiagnosed as non-accidental as homicide convictions depend on correct diagnoses. MRI of the neck assists in evaluating any injuries that would be difficult to observe during autopsy.

Scuba deaths undergo urgent CT scans prior to autopsy and before decomposition gases mask the signs of decompression illness.

Gunshot wounds require radiographic evaluation in order to visualise the projectiles and their pathway. Migrating bullets can be rapidly located. Extensively burnt bodies will undergo radiography to exclude gunshot wounds prior to concealment of a homicide.

Identification is based on the comparison of antemortem and postmortem dental images. Sinus patterns and photo imposition of the skull X-rays as well as diseases that leave their mark on bones provide other modalities for identification. Visual identification of victims in mass disasters may be impossible due to the severity of the injuries. Radiology assists with disaster victim identification (DVI) and is used as a means of determining the presence of foreign material and missile fragments. Hidden homicides and animal remains have to be excluded as mass casualty victims. Despite the difficulties in working at mass casualty scenes with limited resources, unsuitable equipment and unskilled staff, the radiographic evaluation is an integral part of a multi-disciplinary team. Media coverage and interdepartmental agency investigation may hamper DVI teams during the processing.

Partially skeletonised remains can be confused with large animals. The bones may require identification for internment.

Radiological techniques are used in the non-medical field to prevent smuggling, and for the checking of forgeries.

All medical radiological procedures are undertaken with the permission of the Coroner. Most of the X-rays are taken after death, often by semi-trained mortuary staff and may be sub-optimal. CT scans and MRIs are performed by professional radiology staff.

Ultrasound in stress urinary incontinence

Dr Michelle Atherton, King Edward Memorial Hospital, Western Australia

Stress incontinence (urine leak associated with raised intraabdominal pressure) is usually but not invariably caused by a weak urethral/ bladder neck sphincter mechanism, ie. genuine stress incontinence (GSI). Imaging of the lower urinary tract and surrounding tissues is an important adjunct to urodynamic diagnosis and management.

The most common imaging modalities in SI are dynamic fluoroscopy during urodynamics (video-cystourethrography) and ultrasound. Ultrasound is replacing fluoroscopy amongst gynaecologists due to wide availability, ease, less invasiveness, and lack of radiation. Ultrasound provides good anatomical visualisation of the bladder base, bladder neck, urethra and surrounding pelvic floor structures. Fluoroscopy may provide better anatomical definition of the bladder neck (particularly during voiding), urethral and vesical diverticulae, and ureteric reflux. The Medicare Benefits Schedule has recently included an item number for urodynamics with ultrasound imaging.

Ultrasound is mainly used to detect the anatomical changes associated with GSI i.e urethral/bladder neck mobility (bladder neck caudal-dorsal displacement on valsalva) and levator function (bladder neck cephalo-ventral displacement on pelvic floor contraction. This aids in selection of the most appropriate surgery, assessment of surgical results and post-operative complications, teaching pelvic floor exercises, research in assessing antenatal hypermobility as a risk factor for postpartum SI and research in assessing changes in mobility and levator function after parturition, physiotherapy or surgery.

The transperineal route has advantages over the transrectal, transvaginal or transabdominal routes. Ultrasonographic detection of stress incontinence is possible but has not been taken up in routine clinical practice. Three-dimensional and 360° degree intraurethral ultrasound of the urethral sphincter are exciting future possibilities.

3D volume ultrasound of suburethral slings

Dr Hans Peter Dietz, Royal Prince Alfred Hospital, New South Wales

Objective

Synthetic slings have recently enjoyed a renaissance in the surgical treatment of female stress urinary incontinence. In this study translabial 3D volume ultrasound was assessed for its usefulness in imaging these implants.

Methods

In the context of audit activities in urogynaecology units in Dunedin, New Zealand and Canberra, Australia 83 women after tension-free vaginal tape (TVT) and 44 after suprapubic arc sling procedure (SPARC) were seen for 2D and 3D volume ultrasound using a Philips ATL HDI 4000 system. Measurements were obtained for tape location relative to the symphysis pubis, at rest and on maximum Valsalva. 3D volumes were obtained at rest, on levator contraction and on Valsalva. As follow up time between the groups varied, 2D data was compared after matching SPARC patients with previously obtained TVT data.

Results

Volumes were obtained in all cases and evaluated at a later date with 3D View 2000™ and Sonoview™ software. Variations such as tapes divided postoperatively, twisted tapes, asymmetrical insertions and patients with two tapes were demonstrated. There were marked variations in tape location and mobility. The SPARC is situated more cranially at rest ($p \leq 0.001$) and further from the symphysis pubis on Valsalva ($p \leq 0.001$), and it is more mobile ($p \leq 0.001$). On 3D rendered images this results in characteristic spatial relationships between bony pelvis, urethra and implant.

Conclusion

Translabial ultrasound is the method of choice for visualising synthetic suburethral slings. While B-mode imaging alone is sufficient to determine implant position and mobility, 3D ultrasound can demonstrate the whole sling, from above the pubic rami to the urethra. Variations in placement are easily visualised which should enhance our understanding of mechanisms of action, complications and failures.

The value of resistive index measurement in the prediction of clinical outcome following stenting for renal artery stenosis

Ms T Mares, G Geary, Westmead Hospital, Sydney, P Vladica and S Gruenewald, Westmead Hospital and University of Sydney, Sydney, New South Wales

Various measurements have been used in an attempt to predict which patients with atherosclerotic renal artery stenosis (RAS) are likely to benefit from stenting. Recently, in patients with moderate to severe renal dysfunction, it has been suggested that a resistive index (RI) of greater than 0.8 identifies patients who will not improve following angioplasty while an RI less than 0.8 predicts a good response. The aim of this study was to investigate whether RI is predictive of clinical success following renal artery stenting in patients with RAS and normal to mildly reduced renal function.

Method

Colour Doppler examination of both kidneys with measurement of RI from the interlobar arteries was performed prior to intervention and the results were correlated with clinical follow up at 6 months. Clinical success was defined as a requirement for less anti-hypertensive medication. Renal function was measured before stent and at 6 months.

Results

Twenty patients with mean serum creatinine of 117 μmol/l (range 63–220) and at least 60% angiographic stenosis (range 60–95%) had technically successful revascularisation. Stents were deployed in 19/20 patients. Seventeen of the 20 patients had RI measurements of ≤ 0.8 (7 successes and 10 failures. Mean creatinine before and 6 months after treatment was 117 and 118 μmol/l respectively (non-significant (ns)). Three patients had RI measurements of ≥ 0.8 (1 success and 2 failures). Mean creatinine before and 6 months after stenting was 114 and 122 μmol/l respectively (ns).

Conclusion

In patients with RAS and normal or mild renal dysfunction:
1 An RI ≥ 0.8 was uncommon.
2 RI did not predict clinical outcome following renal artery stenting.
3 Irrespective of the RI, approximately one-third of patients benefited from the intervention.

Sonography of the finger

Dr Bill Breidahl, Royal Perth Hospital, Western Australia

At the level of the wrist, the flexor digitorum superficialis (FDS) and flexor digitorum profundus (FDP) tendons are contained within a common synovial sheath. This ends at the level of the mid metacarpals except for the little finger, where it is usually continuous with its digital sheath. An effusion around the little finger flexor tendons within the digit may reflect more proximal pathology.

The digital flexor tendons are held in osseo-aponeurotic canals by fibrous sheaths from the metacarpal heads to the base of the terminal phalanx. Thickened zones of the sheath are termed pulleys, which may be annular or cruciate. The most clinically important of these are the A1 and A2 pulley. The A2 pulley has recently been described in cadaver study as hyperechoic, but in-vivo is hypoechoic. Disruption of the A2 pulley results in 'bowstringing' of the flexor tendons. Thickening of the A1 pulley is one of the many aetiologies of trigger finger.

The volar plate is a fibrocartiliginous plate that forms the floor of the metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints. At the PIP joint it provides significant stability and disruption, usually at its distal attachment, predisposes to recurrent dislocation.

There is a fibrous expansion on the dorsum of each digit, which extends distally from the metacarpal head and blends with the extensor digitorum tendon. The tendon is stabilised on the metacarpal head by components of the extensor hood, including sagittal bands which extend anteriorly to the volar plate. Dorsal hood injuries usually involve the radial sagittal band, resulting in ulnar subluxation of the common extensor and ulnar deviation of the proximal phalanx.

As the extensor digitorum tendon approaches the PIP joint, it divides into an axial part, which inserts into the base of the middle phalanx and two collateral slips. Disruption of the axial portion results in a Boutonniere deformity. The collateral slips of the extensor tendon then unite to be attached to the dorsal aspect of the base of the distal phalanx. Disruption of this attachment results in mallet finger.

Sonography is useful in the assessment of the tendon repairs. Loss of function of a tendon following surgery may be the result of dehiscence of the repair or excessive scar tissue (tenodesis).

The MCP joint collateral ligaments may be visualised with sonography. Injury usually affects the radial side of the digit following ulnar extension force. The abnormal ligament is enlarged, hypoechoic and tender to direct compression.

Most soft tissue masses in the digits can be confidently diagnosed with sonogaphy. Ganglia are commonest. They commonly occur at the level of the A2 pulley. Ganglia are typically anechoic with an anterior echogenic margin and

may be multiocular. Occasionally they may appear complex/ solid, reflecting haemorrage. Digital mucous cysts lie between the distal interphalangeal (DIP) joint and the proximal nail fold. They are anechoic also, but have a neck which extends to the DIP joint where there is usually an adjacent osteophyte. Dupytrens contracture is usually clinically obvious, but atypical distributions may cause diagnostic dilema. On sonography it appears as an irregular lypoechoic area of subcutaneous thickening – the tendon sheath initially is not involved.

The commonest solid mass in the digit is the entity of giant cell tumour of tendon sheath. It has a lobulated or multi-lobulated contour, contains relatively uniform low level echoes and may demonstrate flow on colour Doppler. Glomus tumours typically occur in the region of the nail bed. They are hypoechoic. They usually (but not always) are hyperemic on colour Doppler.

Ultrasound imaging of the upper extremity

Mr Jeff Ecker, hand, wrist, elbow, shoulder surgeon, Western Australia

Ultrasound imaging of the upper extremity can be an invaluable investigation when assessing soft tissue swellings, tendon disruptions either partial or complete, tendon instabilities, joint instabilities, ligament damage, entrapment of tendons and nerves, pathology within nerves and nerve instability, dynamic evaluation of the shoulder for subacromial impingement and to assess the blood supply of the upper extremity. Pathology can be followed up to determine interval deterioration or improvement which may influence treatment. As with all tests, ultrasound studies provide a piece of information that needs to be taken in the context of the history, clinical examination and other investigations that are performed.

Power Doppler signal reduction after the application of transducer pressure to the metacarpophalngeal joints of rheumatoid arthritis patients

Dr Fredrick Joshua, Dr Rohan de Carle, Mr Michael Rayment, Dr Carl Bryant, Dr John Edmonds and Dr Marissa Lassere, St George Hospital, Sydney, New South Wales

Background

Rheumatoid arthritis synovium is abnormally enlarged and vascular. It has been postulated that the vascularity may be a measure of rheumatoid arthritis disease activity. Recently power Doppler imaging of synovium has been used to try and quantify this vascularity. This is the first report exploring the possibility of transducer pressure changes causing reliability issues for power Doppler imaging of rheumatoid arthritis synovium.

Aim

To determine if transducer pressure changes can cause differences in power Doppler assessments of rheumatoid arthritis synovium at the metacarpophalangeal joints.

Methods

Five rheumatoid arthritis patients of varying degrees of disease activity and damage were assessed with power Doppler ultrasound scanning of the dominant hand 2nd to 5th metacarpophalangeal joints. Ultrasonography was performed with a high frequency transducer (14 MHz) with a colour mode frequency of 10 Mhz and a standard colour box and gain. In the joint that showed the highest flow an image was made. A further image was taken after transducer pressure was applied.

Results

In all patients there was increased flow to at least one joint. After pressure was applied power Doppler signal intensity was reduced in all images and could be applied to a level where there was no documentable power Doppler signal.

Conclusion

Power Doppler signal can be reduced in the metacapophalangeal joints of rheumatoid arthritis patients with the application of transducer pressure. This has important implications for reproducibility and also in the quantification of power Doppler images as a measure of rheumatoid arthritis disease activity.

How helpful is ultrasound guided carpal tunnel injection?

Dr Iain Duncan, Canberra Imaging Group, Australian Capital Territory

Aims

Carpal tunnel syndrome is the commonest form of peripheral nerve entrapment. It is thought to result from compression of the median nerve within the carpal tunnel. Surgical treatment is accepted as the most likely to give permanent relief but a number of non-surgical treatments are also used. Studies of Carpal Tunnel injection have suggested some benefit up to 3 months but only a few of these have used ultrasound to locate the target. I receive a large number of referrals for carpal tunnel diagnosis and injection and this study retrospectively evaluated a random selection of these of these over a 12-month period.

Methods

100 injection procedures were randomly selected from 245 registered in the practice database between January 2001 and December of 2002. The patients were then contacted for a structured telephone interview. Sufficient data was obtained from 72 of these injections (60 patients – 12 bilateral procedures). All patients had a clinical diagnosis of carpal tunnel syndrome based on both ultrasound and clinical criteria. All referrals were from local practitioners, neurologists, or surgeons experienced in carpal tunnel syndrome. A standardised questionnaire was administered and results tabulated for analysis.

Results

38 (53%) patients were female and 44 (61%) of the procedures were to the right wrist. The average follow-up time post injection was 11.7 months. 82% had a favourable initial response. The response declined with time: 58% at 2 months, 31% at 6 months, and 25% of patients remaining well at last follow-up. 13 procedures had follow-up times greater than one year and 6 of these had no recurrence.

There were no complications and 82% of procedures were considered relatively painless (pain scores 0–2 out of 10). 24% patients proceeded to surgical treatment, 11% were awaiting surgery, 36% were able to avoid surgical treatment, and 29% remained undecided whether further treatment was needed.

Conclusions

This series demonstrates ultrasound guided carpal tunnel injection is a safe well tolerated procedure with a reasonable long-term response rate. The need for surgery in patients treated this way may be significantly reduced.

Imaging of orthopaedic problems

Mr Keith Holt, Western Australia

This review looks at imaging modalities in orthopaedics and particularly in the shoulder area. Of particular focus will be the relevance of ultrasound, X-ray and magnetic resonance imaging (MRI) scan in the diagnosis of disorders around the shoulder. Emphasis will be placed on the relevance of the information concerned, both to the clinician and to the patient and it will be shown, particularly in the case of impingement, that ultrasonographic and MRI studies are predominantly for the benefit of patient information and planning a postoperative course, rather than for the purposes of specific management. Particularly in the shoulder it is noted that plain radiographic examination is still the primary investigation of choice and other modalities merely enhance the clinical findings. On the other hand there are diagnoses within the shoulder for which these modalities are primarily intended and these include SLAP tears and ganglia of the shoulder region.

A review of the above will be undertaken and mention will be made of other joints and the relevance of these investigations pertaining to those joints.

Sonographic evaluation of solid breast nodules

Dr Tom Stavros, Radiology Imaging Associates, United States

Because of the heterogeneity of breast cancer from nodule to nodule, single findings cannot achieve the sensitivity or the negative predictive value necessary to identify a low risk group that can be offered the option of follow-up (BIRADS 3 group). However, by using multiple findings in a strict algorithm, such a group can be identified. It is also important to keep in mind that breast cancer can be heterogeneous within an individual nodule. Part of the nodule may have circumscribed features that simulate a benign lesion, while another part may be spiculated and obviously malignant. Only by scanning the whole surface and substance of the nodule in two orthogonal planes (radial and anti-radial) can the presence of suspicious findings be excluded and if there is a mixture of benign and suspicious findings, the benign findings should be ignored.

These studies show that sonography is useful in the characterisation of solid breast masses. Characterising solid breast nodules into BIRADS categories defines carcinomas that might have been missed clinically or mammographically. It identifies a BIRADS 3 group that has far less than 2% risk of being malignant and can offer the patient the option of follow-up rather than biopsy. Currently approximately 80% of patients with BIRADS 3 solid nodules are electing to be followed rather than to undergo biopsy. It improves the accuracy of the diagnosis of malignant breast lesions. Importantly, it also accurately defines a population of benign solid breast lesions that do not require biopsy when strict sonographic criteria of benignity are present.

To achieve the desired sensitivity and negative predictive values of 98% or greater the algorithm must be strictly adhered to. When the patient elects to be followed rather than undergo biopsy, follow-up should be performed in 6 months, not one year. The malignant lesions at most risk to be mischaracterised as BIRADS 3 are higher grade invasive ductal carcinomas that grow rapidly enough for change to be readily detected at 6 months.

The National Breast Cancer Centre Breast Imaging Guidelines and Overview

Dr Roslyn Adamson, Royal Perth Hospital, Perth, Western Australia

The NBCC publication *Breast Imaging: a Guide for Practice* which was released earlier this year and which has the endorsement of the Royal Australian and New Zealand College of Radiologists devotes a chapter to reporting breast imaging.

Synoptic and standardised reporting systems have been introduced in radiology and other disciplines with the aim of standardising the information contained in reports and improving communication among clinicians and other health care professionals. The use of checklists is the most efficient method of improving the content and completeness of reports.

The minimum data recommended for inclusion in a breast imaging report and a sample report will be presented.

Breast ultrasound of radial scars

Dr Liz Wylie, BreastScreen WA, Perth, Dr Emmeline Lee and Dr Cecily Metc.alf, Royal Perth Hospital, Perth, Western Australia

Radial scars (complex sclerosing lesion) are benign mammographic screen detected screen abnormalities that have radiographic appearances that mimic breast carcinoma. Radial scars may be associated with malignant lesions and excisional biopsy is recommended.

It has been our experience that radial scars are often visible on ultrasound. At the Royal Perth Breast Assessment Clinic from January 1995 to December 2002, 44 radial scars were identified in 43 women.

Of these 44 radial scars, 39 ultrasound examinations were available for retrospective assessment, and comparison was available with concurrent mammography.

In our series, the predominant mammographic abnormality was that of a stellate mass lesion present in 38 women. The most common ultrasound finding was that of a hypoechoic mass with posterior acoustic shadowing, the second most common abnormality was of stromal distortion. These two findings were present in more than 50% of all radial scars in our series.

Conclusion

Ultrasound is an important adjunct to mammography in the assessment of stellate mammographic screen detected

lesions. Stellate 'Black Star' lesions are often difficult on mammography to visualise in two planes, making preoperative tissue biopsy difficult as well as leading to difficulties with preoperative hookwire localisation prior to open diagnostic biopsy. Radial scars that can be detected on ultrasound should be submitted to preoperative core biopsy, and hookwire localisation under ultrasound control leading to a more accurate localisation and a less time consuming procedure for both patient and practitioner.

The role of ultrasound in the dense breast

Dr Fiona Bettenay, King Edward Memorial Hospital, Perth, Western Australia

Radial scars (complex sclerosing lesion) are benign mammographic screen detected screen abnormalities that have radiographic appearances that mimic breast carcinoma. Radial scars may be associated with malignant lesions and excisional biopsy is recommended.

It has been our experience that radial scars are often visible on ultrasound.

At the Royal Perth Breast Assessment Clinic from January 1995 to December 2002, 44 radial scars were identified in 43 women. Of these 44 radial scars, 39 ultrasound examinations were available for retrospective assessment, and comparison was available with concurrent mammography.

In our series the predominant mammographic abnormality was that of a stellate mass lesion present in 38 women. The most common ultrasound finding was that of a hypoechoic mass with posterior acoustic shadowing, the second most common abnormality was of stromal distortion. These two findings were present in more than 50% of all radial scars in our series.

Conclusion

Ultrasound is an important adjunct to mammography in the assessment of stellate mammographic screen detected lesions. Stellate 'Black Star' lesions are often difficult on mammography to visualise in two planes, making preoperative tissue biopsy difficult as well as leading to difficulties with preoperative hookwire localisation prior to open diagnostic biopsy.

Radial scars that can be detected on ultrasound should be submitted to preoperative core biopsy, and hookwire localisation under ultrasound control leading to a more accurate localisation and a less time consuming procedure for both patient and practitioner.

Ultrasound in the assessment of fistula in ano

Dr Jim Anderson, Royal Perth Hospital, Western Australia

Introduction

Fistula in ano represents a common condition, which is relatively easily treated. In 5% of patients initial surgical treatment is unsuccessful and the recurrence of the symptoms indicates that the condition is more complex and surgical management is more difficult. It is in this group of patients that ultrasound can be used to assess accurately the full extent of the fistula.

Methods

The anal canal can be assessed by a variety of ultrasound transducers (convex, linear array) and mechanical endorectal equipment. Imaging via the transperinel route also has its advocates. All of the above techniques will allow assessment of the fistula but to confirm actual patency of the fistula, it is necessary to perform fistulography. This can be performed using peroxide as a contrast agent.

Results

Since offering the service, numerous patients have been and continue to be referred for ultrasound assessment of fistulas (principally by colo-rectal surgeons). Fistulas can be classified as simple if the internal opening penetrates into anal canal no higher than the junction of the upper 2/3 and the lower 1/3 of the anal canal.

Many patients have `complex ` fistulas with an internal opening higher than the lower 1/3 of the anal canal or extension of the track across the midline. Ultrasound can show extension of the fistula above the pelvic floor. Magnetic Resonance Imaging should be suggested for further imaging if the full extent of the supra-levator component of the fistula is not visualised.

Conscious sedation should be considered if the ultrasound examination follows soon after surgery or if there is any reason to suggest that the patient may find the procedure painful.

Fistulography should be attempted if there is reason to suspect the fistula is complex and an external opening is available for possible canulation.

In one case no open external fistula was visible attempted and percutaneous injection of peroxide was unsuccessful in opacifying the presumed dormant fistulous track.

In 2 patients referred for assessment of presumed fistulous disease no fistula was discovered.

Conclusion

The linear array endoluminal transducer is highly effective in delineating fistulous tracks.

Peroxide fistulography successfully confirms fistula in nearly all cases.

Endoscopic ultrasound

Dr Duncan Ramsay, Royal Perth Hospital, Perth, Western Australia

Although endoscopic ultrasound has been performed within Australia for over 10 years it has always been of very limited availability with only a handful of institutions offering this procedure. However, recently the demand for this test has been increasing and it is now routinely being used for imaging of the pancreas, biliary tree, bowel wall mucosal lesions and biopsy of mediastinal and retroperitoneal masses or lymph nodes.

The examination is usually performed with a mechanical radial array echoendoscope which is passed perorally through the oesophagus and stomach to the duodenum while the patient is sedated. Using a high frequency transducer a thorough examination of the 5 layers of the bowel wall can be made and therefore allow interrogation of lesions either to determine their nature or, if malignant, to asses their depth of spread. At a lower frequency viscera outside the bowel can be visualised and again the nature of lesions, whether pancreatic, biliary or retroperitoneal can be

assessed. Furthermore spread of malignancy, particularly of the pancreas can be visualised, particularly with respect to vascular invasion. The resolution that can be obtained frequently far outweighs any other form of imaging and unlike transabdominal ultrasound is not usually hampered by excess bowel gas.

A recent innovation has been the introduction of biopsy capable linear echoendoscopes and this, along with improvements in both endoscopes and ultrasound transducers, means that endoscopic ultrasound will increasingly be requested by clinicians to help in management of their patients.

Ultrasound of the vermiform appendix

Dr Conor Murray, Royal Perth Hospital, Perth, Western Australia

The vermiform appendix may be retrocaecal, pelvic, subcaecal, and pre- or post ileal in location. The most common disease of the appendix is acute appendicitis. Ultrasound is an established imaging modality to diagnose acute appendicitis. The advantages of US over x-ray techniques are its lower cost, lack of ionising radiation, ability to assess vascularity through colour Doppler techniques and ability to provide dynamic information through graded compression. The ability to accurately diagnose appendicitis can be affected by several factors including operator experience, appendiceal size and location, and the patient's physique. The use of advanced equipment combined with accumulated operator's experience will yield more frequent detection of the vermiform appendix and more accurate results.

A wide range of other diseases can involve the appendix. Primary appendiceal neoplasms may masquerade as appendicitis or be discovered incidentally. Mucoceles from either benign or malignant mucinous neoplasms represent the majority of appendiceal tumours detected at imaging but are the least likely to manifest as appendicitis. Pseudomyxoma peritonei is a common manifestation of mucinous adenocarcinoma. Colonic-type (nonmucinous) adenocarcinoma of the appendix is much less common than mucinous tumours and typically manifests as a focal mass without mucocele formation. Carcinoid tumour is the most common appendiceal neoplasm but is less often detected on ultrasound because it is typically small and relatively asymptomatic. Other pathologies, including non-Hodgkin lymphoma, are rare and usually infiltrate the entire appendix.

The presentation will focus on the role of ultrasound in the diagnosis of acute appendicitis in adults and children with emphasis on optimising sonographic technique and avoiding common pitfalls. The relative role of other imaging modalities will be discussed briefly. A range of other appendiceal pathologies will be illustrated.

The effect of secondary maternal hypertension on the fetal rabbit: ultrasound assessment of growth trajectory

Mr Peter Coombs, Dr Devaki Maduweg.edera, Dr Rebecca Flower, and Dr Kate Denton, Monash University, Melbourne, Victoria

Purpose

Chronic hypertension affects around 5% of pregnancies. Little is understood about the way this affects the growing fetus and the implications in adulthood. Studying this in humans is difficult because of length of gestation and human life. Genetic, environmental and societal influences further complicate data. Rabbits are used in biomedical research in developmental health to investigate the origins of adult disease. Insight into fetal life is limited as there has been no reproducible non-invasive method of monitoring the fetus.

This paper will report on ultrasound data derived as part of project investigating the effects of maternal hypertension in rabbit fetal life and then consequently in adult life. Biometrical planes which correlate remarkably with human fetal biometry will be presented.

Methods

Biophysical parameters in 2 groups of pregnant rabbits were measured at 18 and 28 days of pregnancy. Group 2K-1W (n = 6) had their left kidney wrapped in cellophane, inducing hypertension. Group Sham (n = 6) were normotensive having undergone a sham operation. Biometry and morphological assessment using Philips ATL5000 using the L12-5 MHz transducer was performed at 16, 20, 26 days gestation (Gestation=32days) in three mothers in each group. Fetal growth was assessed in 20 rabbit fetuses by:

- Crown Rump Length (CRL) – D16
- Coronal Biparietal Diameter (CPBD) – D16, 20, 26
- Abdominal circumference (AC) – D16, 20, 26
- Femur Length (FL) – D20, 26
- Renal length and volume (RL, RV) D20, 26

In addition, fetal morphology was assessed at all stages.

Results

Birth weight in the 2K-1W fetuses was 58 ± 5g compared with sham fetuses 43 ± 3g. Ultrasound biometry showed that the increase in fetal size of 2K-1W was evident at D16, becoming more significant at 20 and 26 days. Renal size was also larger in 2K-1W fetuses.

Conclusions

This is first report in the literature of biometry and morphologic assessment of the fetal rabbit with high-resolution ultrasound. Fetal number and lie can be a limiting factor. This data and experience suggests that ultrasound can have an important role in the expanding research area of developmental health as a factor in the origins of adult disease.

An evaluation of colour to capsule distance in the detection of chronic allograft nephropathy

Mrs Louise Hollier, Brian Nankivell and Simon Gruenewald, Westmead Hospital, Sydney, New South Wales

Chronic allograft nephropathy (CAN) is the end result of a variety of pathologies which lead to the progressive loss of kidney transplant vascularity and function. Early diagnosis and therapy may prevent irreversible changes but Doppler ultrasound and arcuate resistive indices (RI) measurements have proven unreliable in demonstrating the vascular pruning typically seen on angiography.

Aim

To determine whether peripheral colour Doppler vascularity as quanitified by the colour to capsule distance correlated with biopsy findings.

Method

In a pilot study of 13 stable kidney transplants with normal function (GFR ≥ 50 mls/min) and absence of nephropathy

on biopsy, the 95% confidence level for distance from the most peripheral colour pixel to the kidney capsule was 5 mm. The accuracy of this cutoff level in the diagnosis of CAN was then tested in a prospective study of 118 transplants (mean duration of transplants 22 months, range 1 week to 288 months) all of whom also had RI and peak main renal artery velocity (MRA) measurements as well as contemporaneous biopsies scored using the Banff schema.

Results

No statistical relationship was shown between the RI or peak MRA velocities and histological grades of CAN. Transplants with normal biopsies (n = 74) had colour to capsule distances of 3.7 ± 1.9 mm. In mild (n = 30) and moderate to severe (n =1 4) CAN, the colour to capsule distances were 4.7 ± 4 mm and 6.6 ± 3.7 mm respectively. These colour to capsule distances were highly significant between normal and moderate to severe CAN ($p \leq 0.001$), but were unable to differentiate between normals and mild CAN ($p = 0.4$).

Conclusion

This simple technique has promise in the non-invasive detection of moderate to severe CAN, thus facilitating patient selection for biopsy.