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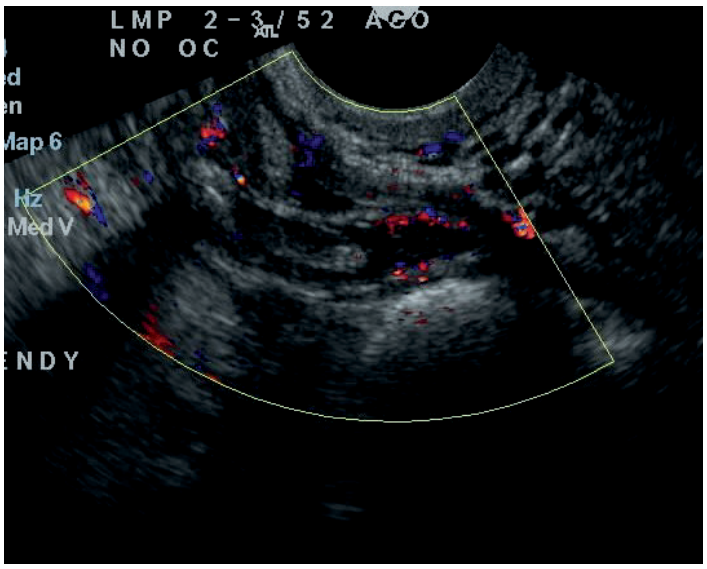
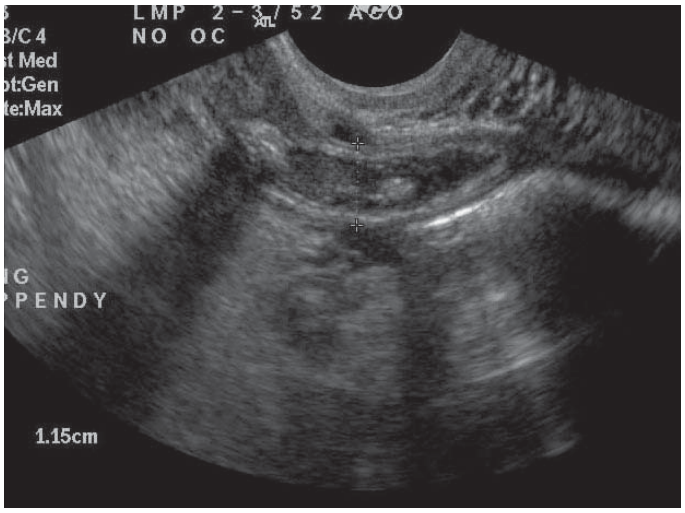
Australasian Society for Ultrasound in Medicine

ULTRASOUND BULLETIN

ASUM Multidisciplinary Workshop
Melbourne 16–20 March 2005
DMU Preparation Courses 16–20 March
DDU Preparation Course 16–17 March
O&G Workshop 17–20 March
Vascular Workshop 18–19 March
Musculoskeletal Workshop 19 March
Cardiac Workshop 19 March
Breast and Paediatric Sessions 19 March
Registration brochures included with
with this issue





- Acute appendicitis and concurrent appendicoliths
- Chronic Venous Insufficiency
- Assessment of head engagement
- Cornual ectopics
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Original research, case reports, quiz cases, short articles, meeting reports and calendar information are invited and should be addressed to The Editor and sent to ASUM at the address below

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Notes from the Editor

Another year is rapidly coming to a close. Thoughts will soon turn to the Festive Season, and away from occupation or education. Before relaxing over the summer holiday, peruse this edition of the *Ultrasound Bulletin*, which is replete with articles and items of uniformly high standard.

First, there is a part one of a superb summary from the multidisciplinary workshop on chronic venous insufficiency by D Coghlan. After studying this, readers will be encouraged to attend the upcoming workshops in 2005.

A comprehensive review of acute appendicitis has been contributed by J Spurway and B Simmons – their contributions are always valuable. The remaining articles: on two methods of assesssing head engagement by P Dietz and V Lanzarone and two case studies on corunal ectopics by D Moir and K McMahon are equally valuable; all are commended to readers.

Abstracts from the highly successful ASUM 2004 scientific meeting are worth detailed study. Many new ideas are first presented at meetings such as ASUM 2004, sometimes two years ahead of formal publication.

Readers will appreciate the wealth of information and education available through ASUM and are encouraged to consider attending a scientific meeting at least every two or three years. Feedback, good and otherwise, regarding the 2004 meeting is also sought, through letters to the Editor.

Many readers contributed to The ASUM Professional Survey on the use of worksheets as well as the interaction between sonographer and physician in daily ultrasound practice. The responses were sometimes unexpected and always interesting. A preliminary analysis is presented in this issue.

ASUM editorial staff wish all readers and members of ASUM a happy and safe Festive Season, and a great start to 2005.

Roger Davies
Editor

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ASUM multidisciplinary workshop 16–20 March 2005

WEDNESDAY 16 March 2005

	DMU and DDU Preparation Courses: Physical Principles
Session 1	Ultrasound Propagation and Basic Transducers Transducer Arrays and Advanced Techniques
Session 2	Standards and Ultrasonic Output Bioeffects and Safety
Session 3	Imaging Artifacts
Session 4	Imaging Technology Q&A

THURSDAY 17 March 2005

	O&G	Point of Care	DMU and DDU Preparation Courses: Physical Principles
	NUCHAL TRANSLUCENCY COURSE	FAST SCANNING Point of Care Limited Ultrasound Study	Doppler Principles Doppler Instrumentation
			DDU Tutorial DMU Gen & Obs: Tutorial DMU Vascular: Vascular Artifacts DMU Cardiac: Film Analysis
			Measurements Phantoms Tissue Harmonic Imaging Contrast Agents
			DDU Tutorial DMU Vas, Gen &Obs: Film Analysis DMU Cardiac: Cardiac Artifacts

FRIDAY 18 March 2005

	O&G	Vascular	General	DMU Preparation Courses
Session 1	Twin Pregnancy	The Lower Limb Arterial Duplex Examination: - Ultrasound Pathology - What Criteria should be used? - What the Sonographer is trying to achieve. - Graft Surveillance - Stents, Angioplasty & Interventional Procedures of the Lower Limb Arteries. - Ultrasound follow-up of Interventional Procedures.	**Breast** Normal Breast Ultrasound Benign & Malignant Ultrasound Features Interventional Ultrasound Techniques **Live Scanning** Workshop Session	Gen & Obs: (1) Breast, Thyroid & Scrotum (2) DVT and Carotids Vascular: (1) Learning Methods (2) Standard scanning Protocols and Practices Cardiac: (1) Learning Methods (2) Cardiac Physiology
Session 2	Fetal Abnormalities	Live Scanning Workshop Session	**Paediatric** Paediatric Hip Acute Abdomen	Gen & Obs: Peritoneum, Liver & Biliary Tree Vascular Vascular Diseases Cardiac: TOE vs. TTE & Interesting Cases
Session 3	Live Scanning Workshop Session - Fetal Abnormalities - Nasal Bone Measurement	Endoluminal Grafts and AAA AAA Assessment pre stenting Information required for the Interventionalist Endoluminal Grafts V's Open AAA procedure Scanning graft in gel AAA Post Assessment	**Paediatric** Living Scanning Workshop Session	Gen & Obs: Renal, Adrenal, Bladder & Prostate Vascular: Scanning Protocols & Critical Thinking Cardiac: Diseases of the Aorta
Session 4	Infertility/Ectopic Pregnancy	Live Scanning Workshop Session	**Paediatric** Neonatal Head Intussusception	Gen & Obs: (1) Neonatal Head (2) Paediatric Scanning Vascular: TBA Cardiac: Prosthetic Valves

Changes to this Program will be notified at the Meeting.

ASUM reserves the right to cancel this Program if there are insufficient Registrations on **1 February 2005.**

www.asum.com.au/open/meet_mdw05_home.htm

SATURDAY 19 March 2005

	O&G	Vascular	Musculoskeletal	Cardiac	DMU Preparation Courses
Session 1	Abnormal Uterine Bleeding	The Lower Venous Duplex: - What is the Duplex trying to achieve? - Ultrasound Pathology - What the Surgeon wants to know. - What Criteria should be used? - Recurrent VV's - Pelvic Veins	Post-op Shoulder Finger Pulleys/ Ligaments	Quantative Assessment of Valvular Heart Disease	Practical Scanning Sessions Gen & Obs: Gynaecology and Infertility Vascular: Venous disorders Cardiac: Valvular Heart Disease
Session 2	Fetal Heart	Live Scanning Workshop Session	Live Scanning Workshop Session	Overview of Quantitative LV Systolic Function Assessment	Gen & Obs: Late Pregnancy -Fetal Abnormalities Vascular: Transcranial Doppler. AV Fistulas Cardiac: Echo & Systemic Diseases
Session 3	Live Scanning Workshops: Fetal Heart	Planning for Carotid Stents Ophthalmic Signs of Carotid Disease Transcranial Doppler The Aortic Arch and Vessels at the root of the Neck	Hamstring and Muscle Tears Osteitis Pubis	Congenital Heart Lesions	Gen & Obs: Mid Trimester Scan and Fetal Measurements Vascular & Cardiac: Haemodynamics
Session 4	Early Pregnancy	Advances in Ultra-sound - Tools or Toys? Reporting a Scan - Eh! What is it Saying? A-V Fistulae Assessment for Dialysis Access. Q.A. - How Good is Vascular Ultrasound?	Live Scanning Workshop Session	Echo Assessment of Diastolic Function	Gen & Obs: Early Pregnancy - Implantation, Fetal Growth & Development Vascular: Vascular Artifacts Cardiac: (1) Echo & Common Congenital Heart Lesions (2) Cardiac Masses

SUNDAY 20 March 2005

	O&G: Point of Care Limited Ultrasound Study	O&G: Pelvic Floor Ultrasound 2D-3D-4D	DMU and DDU Preparation Courses
Session 1	First Trimester: Normal and Abnormal Presentations	An Interactive Educational Session involving Virtual and Live Scanning	Mock OSCE Exam
Session 2	Ectopic Pregnancy		Legal and Ethical Issues
Session 3	Normal Pelvis, Endometrial Assessment		Quality Assurance

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Greg Brand is a 25 year senior management veteran of the ultrasound industry and is the managing director of SonoSite Australasia.

Shelley Thomson is SonoSite's clinical marketing manager for Australasia. She has over 14 years experience in the ultrasound industry and, similarly to Greg, is widely-known through past positions with ATL and with Philips.

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President's message

Dr David Rogers

Greetings.

This is my first *Ultrasound Bulletin* message since I began my role as ASUM President during the ASM in Sydney in September; and what a fantastic meeting it was. The speakers were of a very high standard and introduced us to many new advances. The venue was superb and made great use of the excellent weather Sydney turned on for the event. Special mention must be made of the supreme effort of the Organising Committee to produce a top class event, especially the convenors, Glenn McNally and Jenny Kidd. Our thanks to all.

Glenn McNally's presidency

I take over the role of president from Glenn McNally who leaves large boots to fill. Glenn has worked tirelessly for ASUM during his term and has placed the Society in a top position.

During Glenn's presidency, ASUM won its bid to host the WFUMB 2009 Conference. This is a great honour, giving the Society a truly international position. ASUM can now be proud to have two councillors to WFUMB, Glenn McNally and Stan Barnett as Secretary.

During Glenn's presidency ASUM expanded its work and reputation in Asia, with further development of the Asia Link program. Highlights of this include the development of the DMU (Asia) course at the Vision College in Kuala Lumpur and the recent ASUM meeting held in Kuala Lumpur. This was an excellent meeting with a high quality academic program which will enhance our Society's reputation in Malaysia.

Special thanks to speakers who generously donated their time, especially Roger Gent, Andrew Ngu, Simon Meagher, Stan Barnett, Glenn McNally and from Kuala Lumpur, Raman Subramanian, Patrick Chia, TP Baskaran, Teresa Chow and Sulaiman Tamanang. Further Asian meetings are planned in Bangkok in 12 months time and liaison with China is planned next year.

As President, Glenn had oversight of the sale of the Willoughby office. which has placed ASUM in a good position to purchase a new, more suitable premises sometime within the next two years. With an expanding role for the Secretariat and the promotion of WFUMB 2009, more appropriate space is required.

Finally, under Glenn's direction the Society is in a strong financial position. Although this is not the core aim of ASUM, it enables us to offer greater service to members. Many other ultrasound societies do not employ a secretariat and their activities are minimal.

Secretariat

ASUM's great strength is its secretariat. Under the very capable direction of Caroline Hong as CEO and Keith Henderson as Education Manager, the Society is able to be very active. These days, few people have spare time to organise activities. The Secretariat is able to put in all the groundwork, leaving ASUM volunteers to do the work of education. The recent meeting in Kuala Lumpur was a shining example of this, where the speakers had all the organisation done for them and only had to turn up and give their lectures.

Additionally, financial strength has enabled us to seed the Research Fund, which will be an important self-sustaining asset. Members' attention is drawn to this fund. It would be ideal if the fund were to be used to sponsor original research to be presented at the WFUMB 2009 Conference.

New Council

At the AGM, two new Councillors had their nomination ratified. We welcome Prof Ron Benzie and Dr David Davis Payne to Council. Ron is Professor of Obstetrics at Nepean Hospital in Sydney and David is a paediatric radiologist in my home town of Auckland. Ron will chair the Standards of Practise Committee and David will chair the Education Committee.

Future plans

During my term as President, there are some objectives that I wish the Society to achieve. Clearly, we will need to source and purchase a new office, a process we have already begun. The DMU has gained certification for the next five years; to improve the DMU, I believe we need to develop an online course for DMU candidates to assist in education and preparation for the exam. This would also satisfy the requirements of our candidates outside of main centres. We also need to complete the Online Handbook to fulfil its potential as an outstanding resource.

Branch activities

Branch activities will also be a focus. These seem to be at an all time low and need attention. ASUM struggles a little in this area as it has a diverse membership and finds it difficult to be all things to everyone. ASUM centrally can only provide support to branches to facilitate activities. The activities themselves need to be driven by the branches. I hope to be able to visit each Branch over the next year to establish more effective communication and to stimulate activity. There is a need for regular educational meetings in most areas.

I hope the Christmas season treats everyone well and Santa brings you all you wish for.

Merry Christmas and Happy New Year

David Rogers
President ASUM

CEO's message

Dr Caroline Hong

ASUM 2004 Annual Scientific Meeting

Another showcase meeting of ASUM over four glorious days at Star City Hotel in Sydney from 23rd to 26th September 2004 finished with overwhelming success. The event attracted over 600 delegates from Australia, New Zealand and overseas. The Skills Day and Nuchal Translucency Day workshops both were fully subscribed on the pre-congress day – in the midst of all the flurry of activities happening in exciting Sydney.

The Annual Scientific Meeting provided a valuable forum for professionals in ultrasound in medicine from all over the world to meet and discuss topics relevant to the various practice fields.

We were extremely fortunate to have great keynote speakers and delegates from all parts of Australia, New Zealand and overseas. The exhibition halls were packed on most days with interested delegates enjoying the new products, reestablishing old contacts, making new contacts and networking relevant to the advancement of the ultrasound profession. The quality of the speakers was superb.

As expected, the ASUM social event, the Gala Dinner at the Sheraton on the Park, was sensational, with dancing until the early hours of the morning to the rhythm of the funkiest music from Almondo Hurley and his 10-piece band.

Special thanks again go to all the speakers, exhibitors and sponsors and to the team behind the scenes, including the Organising Committee, ASUM secretariat staff and ICMS staff.

DMU Examiners accreditation

A Practical Examiners Accreditation Training Day was conducted on Thursday 23rd September 2004 at Star City. Twenty-three people achieved accreditation as Practical Examiners for the ASUM DMU following the training day. This is consistent with ASUM's commitment to maintain a high standard in the DMU examination process, requiring the DMU practical examiners be re-accredited once every three years More information can be obtained from James Hamilton at dmu@asum.com.au.

ASUM awards Life Member and Honorary Fellows

The Annual General meeting of ASUM was held on Saturday 25th September 2004. At this meeting, it was approved that Dr Jack Jellins be awarded Life Membership for outstanding contribution to the Society and to the profession. It was also announced that Assoc Prof Albert Lam and Mrs Jane Fonda were approved by Council to be awarded Honorary Fellows of the Society *(see pages 40, 41)*.

ASUM Secretariat

Council has commissioned a report to advise the Society on the purchase of new ASUM Head office premises following from the sale in May this year. The search will continue and ASUM has a leaseback option up to May 2007.

Two new staff, Nancy Leung and Matthew Byron have joined ASUM recently as administrative assistants. This will provide the necessary support required to deliver the increasing DMU, educational and administrative services. Funding for the new staff members are generated from within the revenue collected from the new and increased ASUM projects and services.

ASUM Branches

A luncheon meeting of Council with Branch Chairs was held on Saturday 25th September immediately following the Incoming Council meeting. It was pleasing for the new President and Council members to meet with Branches informally to discuss branch matters. Dr Dave Rogers, in his role as the new President, intends to visit branches to continue to enhance communication with the Council.

Past Presidents' Meeting

Past Presidents of ASUM and the previous Ultrasonographers Group met on 24th September 2004 at a luncheon held at Star City. It was a great occasion for the current Council members as well as the CEO of ASUM to hear the views and stories of many of the past presidents, who contributed to beginnings of the Society that have led to where it is today globally.

ASUM – Denmark link

A proposal and presentation was made to Council by Assoc Prof Christian Nolsoe of the Danish Society for Diagnostic Ultrasound (DSDU). He proposed the development of an ASUM–DSDU link, with the Danish Royal family as the patrons of an Australian–Danish scientific and educational foundation for the promotion of medical ultrasound in the two countries.

Assoc Prof Nolsoe was also a speaker at ASUM 2004. Council agreed to pursue the linkage. Certainly, the recent wedding of His Royal Highness Crown Prince Frederic of Denmark and Australian Mary Donaldson has generated a lot of mutual interest in both countries.

WFUMB 2009

Promotional and exploratory efforts continue in this area. Council approved for the WFUMB promotion team to consist of Dr Stan Barnett (WFUMB 2009 Convenor), Dr Glenn McNally (WFUMB 2009 Treasurer), Dr Dave Rogers (ASUM President) and Dr Caroline Hong (ASUM CEO).

At the Annual Scientific Meeting, two WFUMB Councillors, Professor Michel Claudon from France and Professor Giovanni Cerri from Brazil were among the keynote speakers. It was most interesting to talk with them and learn about the activities of WFUMB internationally.

Professor Cerri will be the President of WFUMB when the World Congress comes to Sydney in 2009.

Future meeting dates

It is never too early to plan your calendar to attend the next ASUM meeting.

Register your interest early and email asum@asum.com.au if you need any additional information. Also go to the website: www.asum.com.au for regular updates on meetings and how to make contact with the organisers.

For your diary

- ASUM 2005 Multidisciplinary Workshop 18–19th March 2005 Melbourne.
- ASUM 2005 NZ Branch joint RANZCR NZ meeting 29–31st July 2005 Wellington
- ASUM 2005 Annual Scientific Meeting 29 September to 2nd October 2005 Adelaide
- ASUM Asia Link Meeting November 2005 Bangkok

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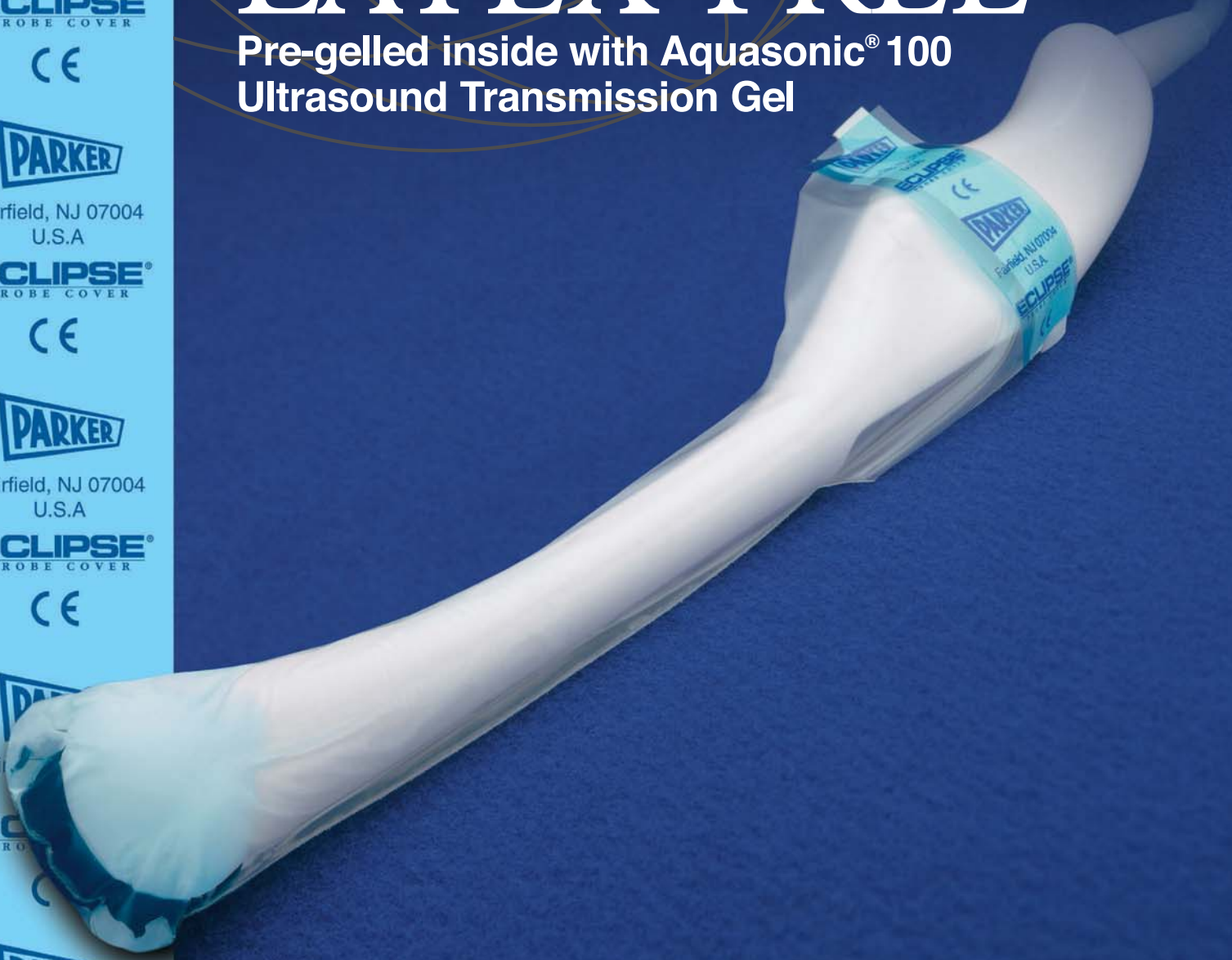

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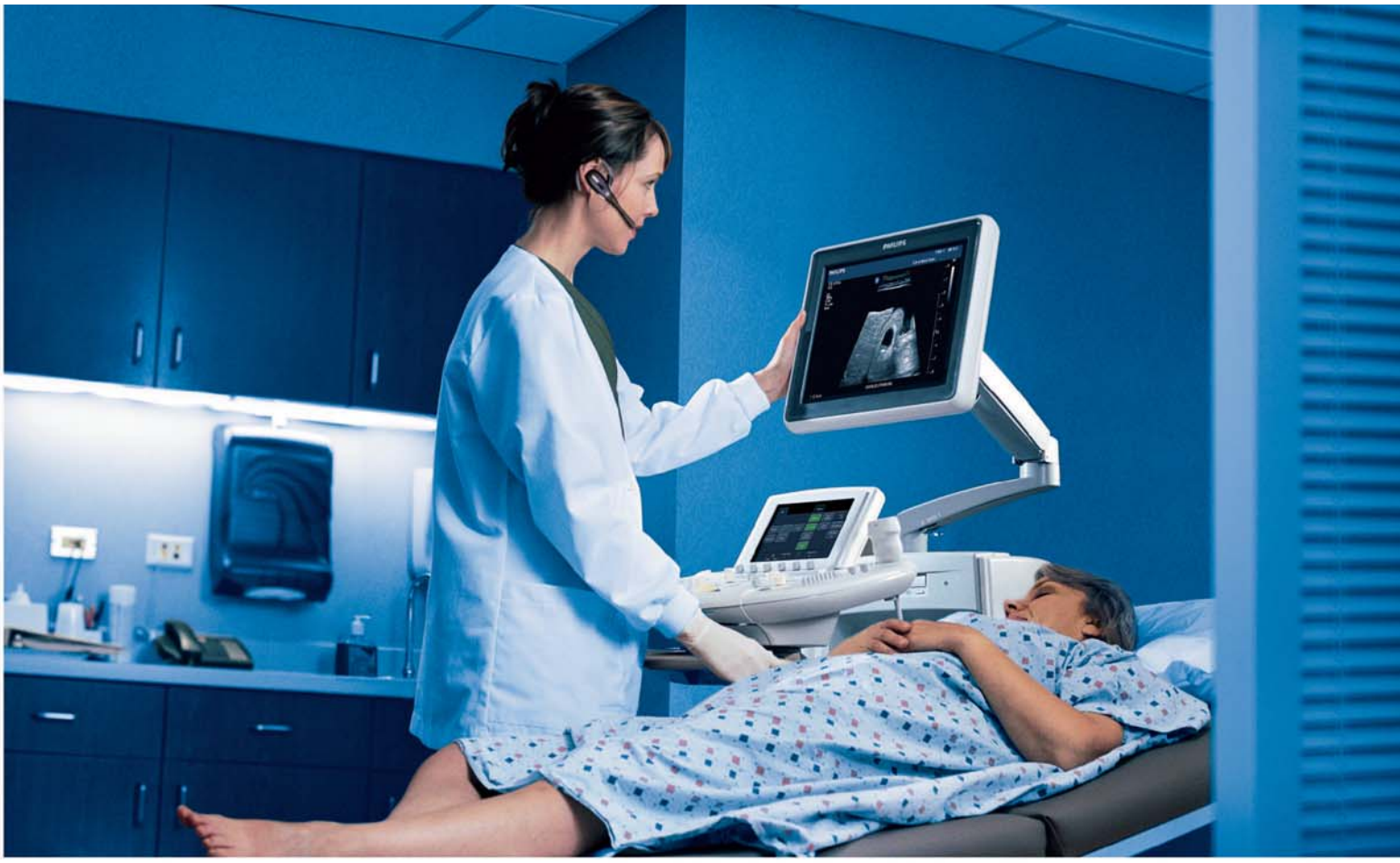

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A review of acute appendicitis and concurrent appendicoliths

Jacqueline Spurway and Bradley Simmons

Introduction

Diseases of the appendix are among the most common surgical emergencies in the western world, yet the appendix is the smallest and functionally most irrelevant segment of the gastrointestinal tract[1].

The peak incidence of acute appendicitis is in late childhood and adolescence, when there is a 3:2 male-to-female ratio. This ratio tends to equalise by the fourth decade of life. In 2001 the mortality rate in Australia from acute appendicitis was 0.70 deaths per million people and in New Zealand in 2000 it was 1.77 deaths per million. This is in contrast to The Bahamas, which had a mortality rate of 6.72 per million in 2000[2].-

The clinical presentation of acute appendicitis includes generalised abdominal pain that begins in the epigastrium and later localises to the right lower quadrant, fever, loss of appetite, nausea, vomiting and diarrhoea.

Physical examination may demonstrate rectal tenderness, abdominal guarding or a mass or tenderness in the right iliac fossa. Laboratory findings frequently include leukocytosis, bandemia and an abnormal urinalysis[1].

CT findings may include an enlarged appendix (> 7 mm diameter), an appendicolith, a thick, enhancing appendiceal wall, deformity or thickening of the apex of the caecum and stranding in the adjacent mesenteric fat. Peritoneal fluid may also be seen[3].

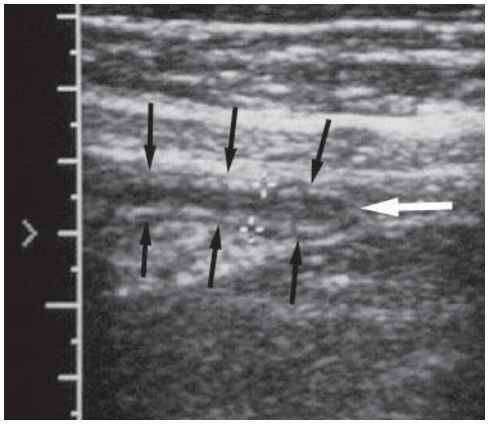

Figure 1 Mildly dilated appendix (black arrows) with preservation of the expected multilayered appearance of bowel. Note blind end (white arrow)

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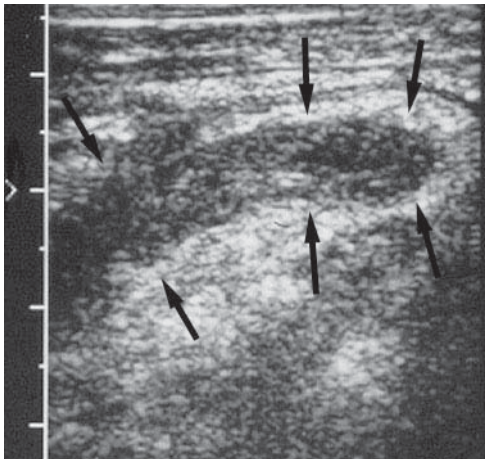

Figure 2 A non-compressible, enlarged appendix (arrows) with loss of definition of the bowel wall layers, particularly the echogenic submucosa. At surgery a perforated appendix was found

The sonographic detection or exclusion of other diseases facilitates the clinical differential diagnosis of right lower abdominal pain[4]. The reported sensitivity in the ultrasound diagnosis of acute appendicitis is approximately 75–90%, while specificity and accuracy are greater than 90%[1].

The appendix

The normal appendix

Ultrasonically the appendix appears as five distinct alternating echogenic and hypoechoic concentric layers, corresponding to the layers of bowel wall[5] (Figure 1). The average adult appendix is 8 to 10 cm long[1] with a range of 4 to 25 cm. Compare this to the koala which has an enlarged caecum, the equivalent of the human appendix, which is 2 metres long and 10 cm in diameter[6,7].

Acute appendicitis

Appendicitis is caused by obstruction of the appendiceal lumen followed by infection[1]. Ultrasound identification of acute appendicitis is based on the visualisation of a "tubular, noncompressible, aperistaltic bowel loop that demonstrates a connection with the caecum and a distal blind end, with a diameter greater than 6 mm"[5] (Figure 2). A calcified appendicolith may be present, which assists in differentiating a dilated appendix from adjacent bowel loops. Pericaecal fluid may be present and the pericaecal fat can be prominent. Mesenteric adenitis in the right lower quadrant is identifiable by ultrasound in 40% of appendicitis[5]. Scanning should be initiated in the region of maximal pain indicated by the patient to expedite the sonographic evaluation. Graded compression may assist in the localisation of the appendix.

Colour Doppler appearance of appendicitis represents a

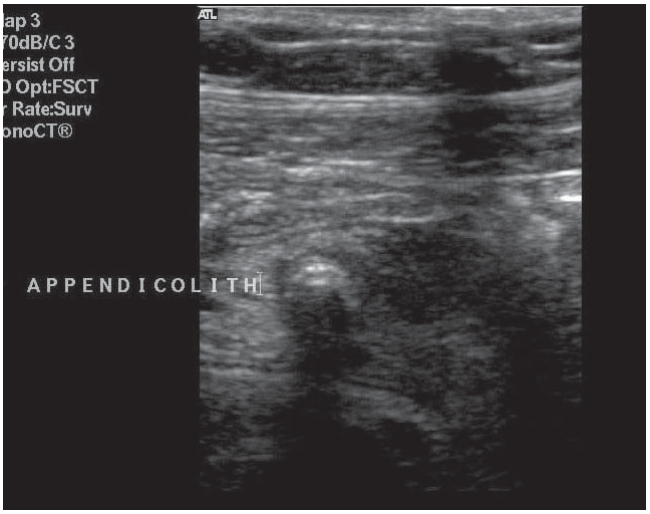

Figure 3 Appendicolith with posterior shadowing

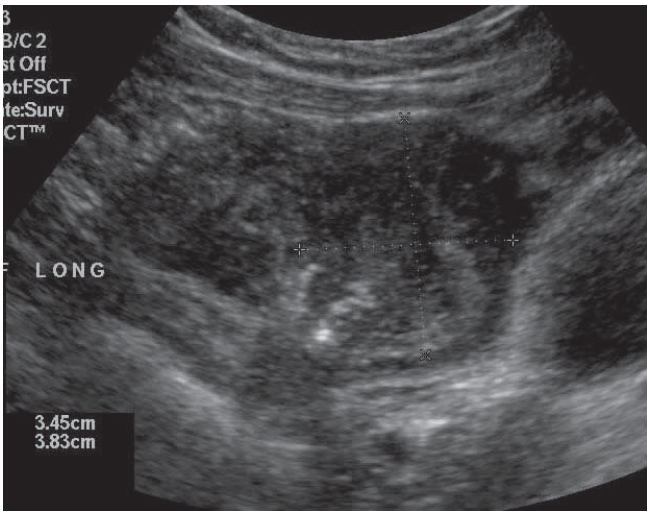

Figure 4 Trans-abdominal image of RIF showing heterogeneous mass

time continuum that varies with the severity of disease. Initially there may be no detectable increase in colour Doppler flow signal making the absence of colour Doppler flow signal non-diagnostic, as it can be seen in both normal and abnormal appendices. Visualisation of increased colour Doppler flow in the appendiceal wall or a right iliac fossa mass is supportive of appendicitis. This reflects increasing hyperperfusion of the appendiceal wall[5]. The addition of colour Doppler to B-mode imaging results in a sensitivity of 87%, specificity of 97%, and accuracy of 93% in the diagnosis of acute appendicitis in children[5].

Differentiating non-perforated appendicitis from perforated appendicitis is important for operative planning. Ultrasound appearances in cases of perforation include thickening of adjacent bowel wall, atonic bowel loops, interloop fluid pockets, no tenderness on transducer pressure, asymmetrical appendiceal wall thickening, hypoechoic rim around the appendix and free fluid containing debris.

Non-visualisation of a perforated appendix may be due to failure to recognise a decompressed, but thickened, appendix because of surrounding thickened, matted loops of bowel or failure to recognise the decompressed and excessively necrosed remnants of the perforated appendix. Other factors contributing to non-visualisation of an abnormal appendix are prevention of adequate compression owing to reflex abdominal rigidity caused by perforation and atonic dilation of bowel loops caused by peritonitis[5].

Sonographic false positive diagnoses are uncommon, but may include hydrosalpinx, periappendicitis resulting from tubo-ovarian abscess, Crohn's disease, psoas muscle fibres, inspissated stool mimicking an appendicolith or resolving appendicitis[5].

Sonographic false negative diagnoses may occur in patients with a retrocaecal appendicitis, ascites, ileus, and small bowel obstruction or with a markedly enlarged or gas-filled appendix[5].

The ultrasound diagnosis of acute appendicitis can be limited by operator experience, the presence of overlying bowel gas, and patient obesity.

Appendicoliths

A calcified appendicolith appears sonographically as a curved, echogenic structure with posterior shadowing (Figure 3). Air or inspissated faeces within the bowel lumen may produce posterior acoustic shadowing mimicking a calcified appendicolith[5,8].

The appendicolith or faecolith is a calcified deposit within the appendix. It is present in approximately 30% of children with acute appendicitis[8].

An appendicolith is a mass of inspissated faecal material that forms around a foreign body in the appendix, growing slowly with the deposition of successive laminae, sometimes with calcification[9]. The radiopacity of appendicoliths depends on their mineral content with only 7 to 12% being visualised radiographically in adults with acute appendicitis[10].

The first documented report of the detection of appendicolith by ultrasound was in 1983,[11] prior to this a radiographically demonstrated fecalith was widely considered a virtually pathognomonic sign of acute appendicitis[12].

Case study

A thirty-five year-old female presented to the Emergency Department complaining of right-sided pelvic pain, which had been intermittently present for two days, but had increased in intensity recently. On physical examination she had rebound tenderness on the right side. Abdominal tenderness was worse with movement and coughing and the pain radiated across her abdomen. The patient had a slightly elevated temperature at 37.4°C and resting pulse rate of 103 beats per minute.

The patient was suffering from nausea, hot and cold sweats and depressed appetite. Her last menstrual period was three weeks previously and she believed she was not pregnant. The patient was alert but in obvious distress.

Investigative procedures showed a negative beta-hCG and an elevated white cell count.

The patient was referred to the Medical Imaging Department for a pelvic ultrasound to investigate the presence of appendiceal or ovarian pathology. As the patient was nil by mouth her bladder was filled by increasing IV fluid input.

The patient revealed that she had been pregnant three times resulting in two live births and an uneventful hydatidiform mole treated by a dilatation and curettage. She had previously had a left ovarian cyst drained and was currently not on hormonal contraception. On transabdominal imaging the bladder was very poorly distended. The right ovary and kidneys appeared to be essentially normal. A 35 x 38 x 32 mm heterogenous mass was identified in the right iliac fossa (Figure 4).

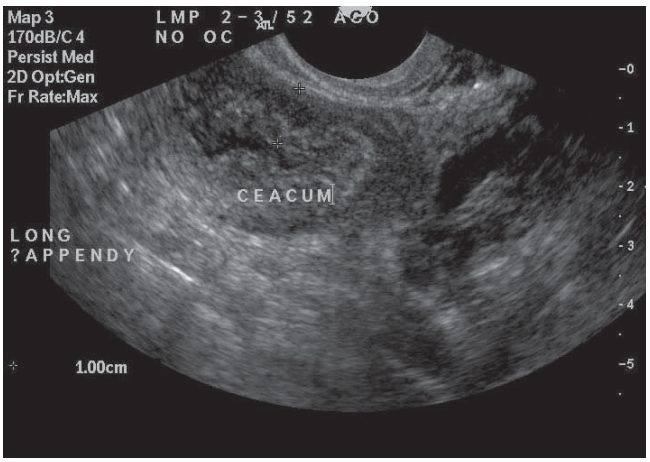

Figure 5 Thickened caecum

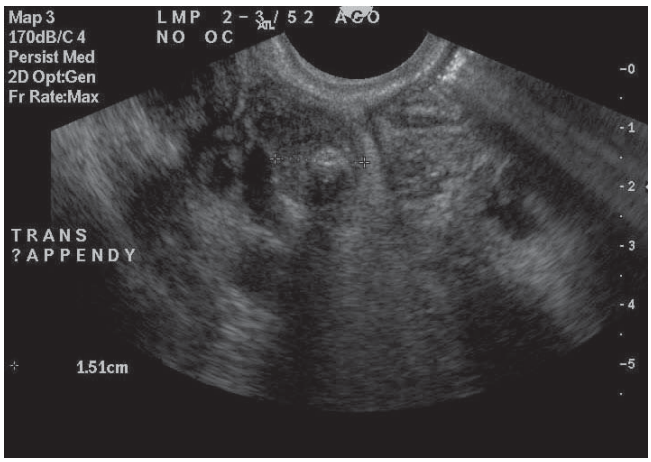

Figure 6 Enlarged appendix with transverse diameter of 15 mm

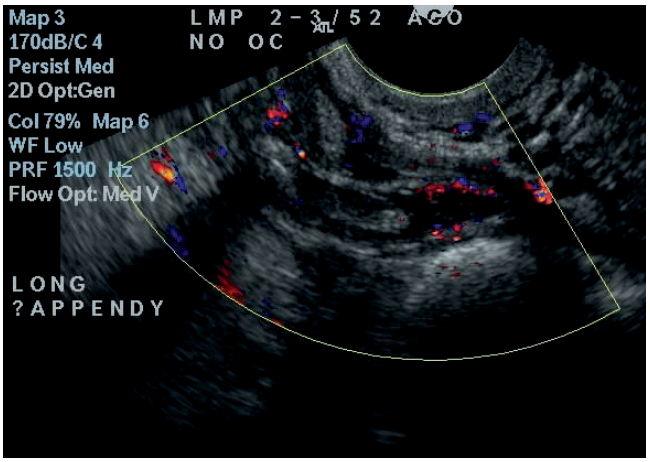

Figure 7 Hyperaemic response in appendiceal wall

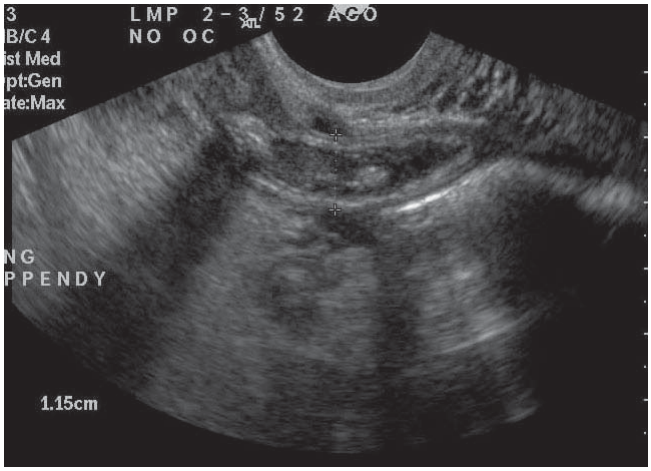

Figure 8 Appendicoliths with posterior shadowing

Transvaginal ultrasound showed Nabothian cysts in the cervix, normal myometrial echotexture, a normal endometrial appearance and thickness (9 mm). The left ovary was unremarkable with a volume of 5.4 cc. The right ovary was enlarged with a volume 16.5 cc and contained a ruptured follicle consistent with a recent ovulation.

Superolateral to the right ovary abnormal caecum was identified with thickened, oedematous, hyperaemic walls (Figure 5).

No peristalsis was noted in real time. An abnormal appendix was identified with a transverse diameter of 15mm. (Figure 6). The walls of the appendix were thickened, hyperaemic (Figure 7) and tender on direct transducer pressure. Within the appendix at least three hyperechoic, shadowing foci were identified (Figure 8) consistent with appendicoliths. Some free fluid was noted around the right ovary, appendix and within the Pouch of Douglas.

Later the same day the patient underwent a laparoscopic appendicectomy. Pathological review of the surgical specimen showed acute suppurative appendicitis with rupture and local peritonitis.

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Chronic venous insufficiency

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The aim of this article is to give students a solid understanding of:

1 Pathophysiology and venous haemodynamics behind chronic venous insufficiency (CVI).
2 Detailed anatomic overview of the deep and superficial veins of the leg.
3 A practical and useful protocol that has been implemented at the Camperdown Vascular Laboratory.

Pathophysiology of chronic venous insufficiency

Chronic venous insufficiency is an advanced stage of venous disease caused either by superficial or deep venous pathology, in which venous return is impaired, usually over a number of years, by reflux, obstruction or calf muscle pump failure. This leads to sustained venous hypertension and ultimately to clinical complications including oedema, eczema, lipodermatosclerosis1 and ulceration.

CVI results from dysfunctional valves that reduce venous return, which thus increases venous pressure. Because existing valves are destroyed, venous blood flow is bi-directional, resulting in inefficient venous outflow. The net effect of this change is that the weight of the venous blood column from the right atrium is transmitted along the full length of the veins. Very high venous pressure is exerted at the ankle and the venules become the final pathway for the highest venous pressure.

Aetiology

Chronic venous insufficiency can be divided into primary and secondary varicose veins. Both lead to venous hypertension, which produce associated signs and symptoms (explained later).

Primary varicose veins are those which only involve the superficial system. Secondary varicose veins are usually attributable to previous DVT, which have caused damage to the valves of the deep veins and perforators.

Primary varicose veins

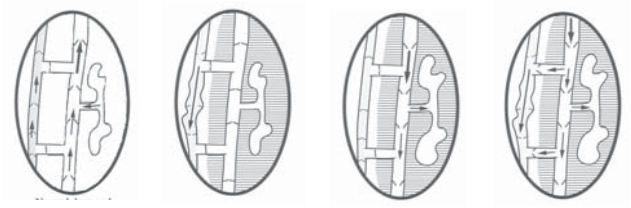
One popular explanation for the production of incompetent venous valves is an inherent structural weakness of the veins themselves. The most striking feature of this problem is the positive family history usually obtained.

The haemodynamic factors play a significant role in producing primary varicosities. The most important of these is the high hydrostatic pressure to which the veins to the lower extremities are subjected as a result of the patient standing. Other factors include heavy muscular work such as lifting, repeated straining at stool, pregnancy, and pelvic tumours, all of which increase intraabdominal tension.

Secondary varicose veins

The most serious of all venous disorders occur when the deep venous system is obstructed and the valvular mechanisms are destroyed or rendered incompetent. This is thought to occur when there has been an episode of deep venous thrombosis that leads to two problems – obstruction of the deep veins and subsequent destruction of the venous valves.

When venous obstruction occurs, the venous blood is forced to follow alternate pathways to reach the heart. One way is to force the opening of new pathways (co-laterals), or to use the superficial system as the alternate pathway. However, the flow in the communicating (perforating) veins is now reversed, becoming deep to superficial.



Normal deep superficial veins | Superficial vein incompetence | Deep vein incompetence | Combined deep and superficial vein incompetence

Lipodermatosclerosis

Venous eczema and ulceration

Venous hypertension

High pressure results in the formation of oedema fluid, as well as extravasation of red blood cells and large protein molecules that leak out from capillaries. Initially, soft pitting oedema is present at the ankle, but over a period of time the skin becomes thickened and acquires a woody feeling.

The haemoglobin from these cells is broken down to haem pigment, which is taken up by tissue macrophages, hence the brown skin pigment associated with chronic insufficiency.

Venous hypertension also produces a fibrin cuff around capillaries. This inhibits oxygen diffusion to adjacent tissues, thereby causing local tissue atrophy and skin ulceration. These signs are often referred to as lipodermatosclerosis or post thrombotic syndrome.

Various types of dermatitis, including erythema and scaling, are also associated with this condition. Trivial trauma may cause skin breakdown and ulceration. The ulcers are usually shallow but may penetrate to the level of the deep fascia.

When the valves in the veins of the lower extremities become incompetent, there is regurgitation of blood in the superficial venous system, producing varicosities. Depending upon the site of involvement, this reflux takes place either through the saphenofemoral junction or through communicating of perforator vessels. As a result of the marked dissention of the superficial veins and the poor support they possess, these vessels enlarge and become tortuous, in the process of which the valves locally also become incompetent.

If the perforating veins valves are incompetent as well, increased pressure is transmitted through perforating veins to the capillary bed; this in turn results in exudation of protein-rich fluid and red blood cells into the subcutaneous tissues. Degenerated red blood cells and organised protein-rich exudate produce induration and hyperpigmentation.

Work, by Browse, suggests that fibrin is deposited around capillaries as a result of increased capillary permeability. These deposits prevent diffusion of oxygen to adjacent cells, causing limitation in healing capability and or cutaneous atrophy so that ulceration may result from even minor injuries.

Clinical consequences of chronic venous insufficiency

- ➢ Oedema
- ➢ Varicose eczema (scaly brown skin, especially medial lower leg and ankle region)
- ➢ Lipodermatosclerosis
- ➢ Venous ulceration

Signs of chronic venous insufficiency

- Pigmentation
- Lipodermatosclerosis
- Eczema
- Ulceration
- Varicose veins
- Oedema
- Dermatitis (especially eczema)
- Atrophic blanche (white areas on skin)
- Fibrosis (hard contracted skin of the lower leg, known as ‘bottle neck appearance’)

Presentation

- Pain
- Itch
- Swelling (oedema)
- Superficial signs of CVI (discussed above)
- Primary varicose veins
- Secondary varicose veins
- Recurrent varicose veins
- Recurrent cellulitis
- Cosmetic
- Pre sclerotherapy
- Restless leg syndrome
- Aching limb
- Recurrent cellulitis
- Klippel-Trenaunay syndrome

Venous haemodynamics

At any given time, about 75% of circulating blood in your body is moving through the venous system. So, understanding the mechanisms by which venous return to the heart is accomplished, is crucial to understanding the physiology of the vascular system.

Phasicity

Phasicity, in the venous system, refers to the ebb and flow that occurs in normal veins in response to respiration. All deep veins normally exhibit phasicity,

The two phases of respiration are inspiration and expiration.

The way in which the blood moves in phase with respiration differs according to the part of the body affected and the position in which the body is placed.

The effects of respiration

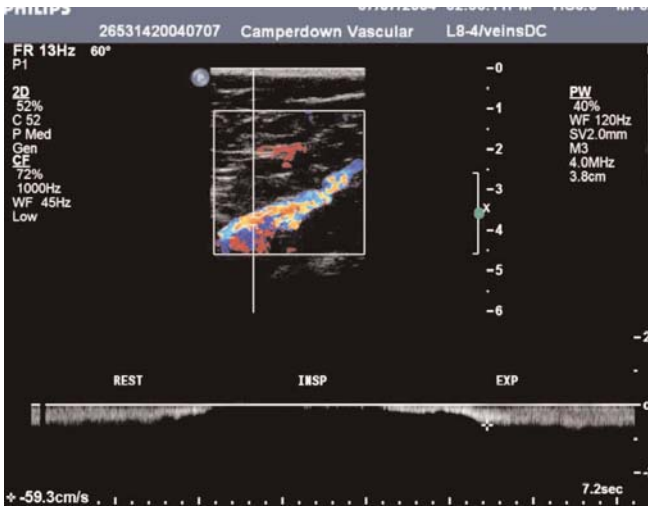
Respiration has profound effects on venous pressure and flow.

Inspiration

The thoracic cavity expands, the diaphragm lowers and the abdomen becomes smaller.

The volume of the veins of the thorax increases and the pressure decreases in response to the reduced intrathoracic pressure.

In the abdomen, because of the descent of the diaphragm, the pressure increases. Increased abdominal pressure decreases pressure gradients between peripheral veins in the lower extremities and the abdomen, thus reducing flow in the vessels.



Expiration

The thoracic cavity decreases, the diaphragm elevates and the abdomen becomes larger. The volume of the veins of the thorax decreases and the pressure increases.

In the abdomen, because of the elevation of the diaphragm, the pressure decreases. Decreased abdominal pressure increases pressure gradients between the peripheral veins in the lower extremities and the abdomen, thus increasing flow to the vessels.

In a nutshell, when you breathe in, flow out of the legs slows or stops. When you breathe out, flow resumes.

Valsalva manoeuvre

Valsalva, forced expirations or coughing, causes compression both the intra-thoracic and intra-abdominal veins. Flow in the vena cava can be markedly reduced as a result.

Hydrostatic pressure

Hydrostatic pressure is the pressure exerted by fluid within a closed system. Hydrostatic pressure varies with position. When supine, there is virtually no hydrostatic pressure in the legs, as they are at the same level as the right atrium, which has a pressure of zero.

Gravity exerts significant effects on venous return because of our upright posture. As body posture is changed from supine to standing, gravity acts upon the vascular volume, so that blood accumulates in the lower extremities. Because venous compliance is high, most of the blood volume shift occurs in the veins. Therefore, when standing, venous volume and pressure becomes very high in the feet and lower limbs.

When venous valves are working correctly, every movement of the leg causes blood to be pumped inward and upward past a series of valves. During walking, the normal pressure in the venous system of the lower leg is low. Immediately after walking, the early standing pressure in the normal leg remains low. Arterial inflow fills the leg veins slowly and the only source of venous pressure is the hydrostatic pressure of a column of blood as high as the nearest competent valve.

After prolonged standing, the veins are completely filled and all the venous valves float open. At this time, high hydrostatic venous pressure results from the unbroken column of fluid that extends from the head to the foot.

Failed valves cause the column of standing blood in the vein to remain high even when during walking. The hydrostatic pressure increased during and immediately after ambulation.

High venous pressure is directly responsible for many aspects of venous insufficiency syndrome, including edema, tissue protein deposition, perivascular fibrin cuffing, red cell extravasation, impaired arterial inflow, and other locally mediated disturbances.

Not all of the sequelae of venous insufficiency are related to venous hypertension, and not all patients with venous hypertension develop ulceration. Some patients with venous ulceration do not have marked venous hypertension.

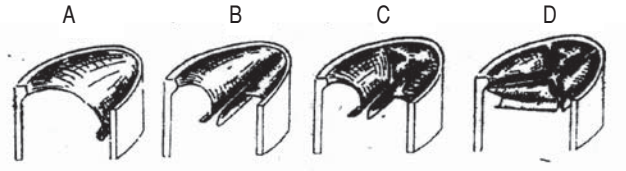
The venous valves and the muscle pump

Venous valves play a very important role in the function of venous return, especially in the lower extremities. They are irregularly located along the veins, but are always found at the junctions of tributaries with main venous channels or where two large veins join. Venous valves are usually bicuspid and occasionally tricuspid.

In the leg, some veins have fewer valves than others. The deep system has more valves than the superficial.

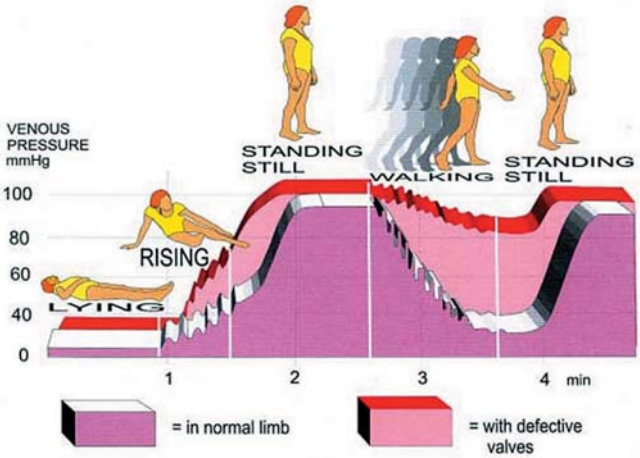
Venous valves direct flow, they keep the blood moving back toward the heart in both the deep and the superficial veins. In the perforating veins, the valves direct the flow from the superficial to the deep veins, if the venous valves are functioning normally, they prevent reflux.

Venous valves open and close in conjunction with the action of the muscles.

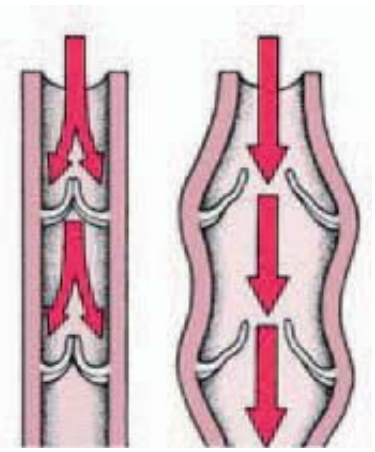


Types of valves: A unicuspid B bicuspid C tricuspid D quaricuspid

VEIN	NUMBER OF VALVES
Posterior tibial	9–19 valves
Anterior tibial	9–11 valves
Peroneal	7 valves
Popliteal	4 valves
Superficial femoral	4 or 5 valves
Common femoral	extremely rare to have any valves
External iliac	1 and sometimes 2
Common iliac	extremely rare
Long and short saphenous	7–9 between them



The effect of posture and exercise on venous pressure at ankle



Normal vein Varicose vein

Incompetent venous valves

When the deep valves are incompetent, blood that is squeezed upward by muscle contraction simply flows back down during muscle relaxation. Additionally, blood is often forced back down the veins toward the foot by muscle contraction, this dramatically increases distal venous pressure and venous hypertension and other symptoms may occur. The condition is exacerbated if the perforator valves are insufficient as well.

The muscle pump

In the extremities, the deep veins are surrounded by muscles. As these muscles contract, they squeeze the veins within them. Muscles do not remain permanently contracted, to function, they must alternately contract and relax, thus propelling the blood up the leg.

In the venous system, it is the interaction of the venous valves and the muscle pump that keep venous blood moving, and moving in the right direction. When these two elements are working properly, the veins in the lower extremities can empty so effectively that emptying is actually complete.

If a person is standing still, they have an ankle venous pressure of about 90 mm Hg. When that person begins to exercise the leg muscles, they activate the calf pump. If the valves and the pump are functioning properly, the ankle venous pressure will fall to 30 mm Hg or even lower – possibly even 1 mm Hg.

During muscle contraction

1 The large blood volume residing in the deep calf veins and soleal sinuses is literally squeezed up and out of the calf.
2 The proximal deep valves are forced open.
3 The distal valves close to prevent caudal flow.
4 The perforator valves close to prevent flow into the superficial venous system.

During muscle relaxation:

1 The proximal valves close due to the reflux of blood back down the veins.
2 The distal deep and perforator valves open, and blood flows into the calf deep and muscular veins.
3 The hydrostatic pressure column has been interrupt ed and distal intraluminal pressure is reduced.

Lipodermatosclerosis1 (LDS) is scleroderma-like hardening of the legs in patients with venous insufficiency. It is characterised by induration, hyperpigmentation and depression of the skin. LDS may be either acute or chronic. Most patients are middle-aged or older women, often with a history of venous insufficiency. The acute phase of LDS is characterised by leg pain above the medial malleolus and a poorly defined area of erythematous, tender, warm skin with minimal induration. The better recognised chronic phase of LDS is characterised by a more sharply demarcated induration and depression of the skin, often with hyperpigmentation or areas of atrophie blanche. The subcutaneous fibrosis and scarring may lead to constriction of the mid portion of the leg, resulting in a 'bowling pin' appearance.

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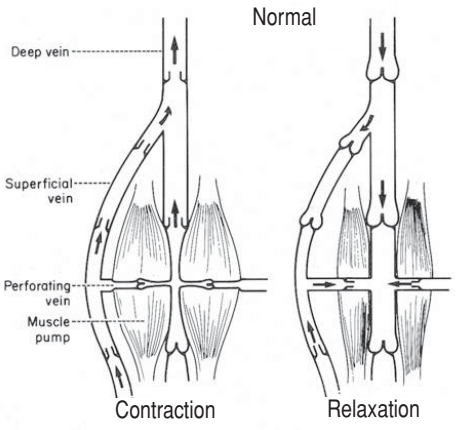
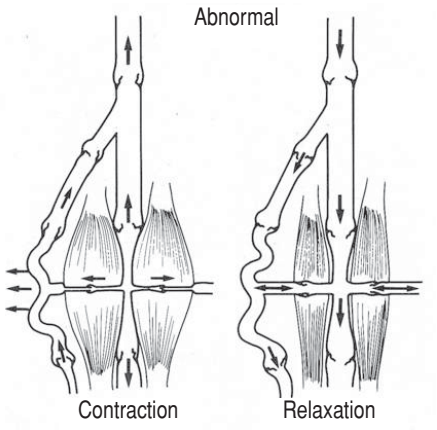


Normally, competent valves allow for efficient function of the pumping effect of the calf muscle pump. That is, muscle contraction results only in cephalic flow as competent valves close to prevent reflux.



When the valves of the deep venous system become incompetent blood will flow both up and down as the muscle pump contracts and relaxes, producing distension and increased volume of the deep veins of the lower extremity. If the perforating vein valves are incompetent as well, increased pressure is transmitted through perforating veins to the capillary bed. This, in turn leads to venous hypertension.

Scanning protocol for chronic venous insufficiency:

1 Purpose
- a) To provide anatomical and functional information of the deep and superficial venous system.
- b) To provide a 'map' of the lower limb venous system and to demonstrate valve function and location of tributaries and perforating veins.

2 Risk factors

Consistent evidence
- a) Age
- b) Pregnancy

Inconsistent but strong evidence
- a) Family history
- b) Female gender
- c) Obesity
- d) Industrialised populations
- e) Standing vocation

3 Indications
- a) Primary varicose veins
- b) Recurrent varicose veins
- c) Previous DVT
- d) Pain and tenderness
- e) Leg swelling
- f) Aching 'tired' limbs
- g) Chronic skin changes
- h) Ulceration
- i) Clinical venous statis
- j) Pre-sclerotherapy assessment
- k) Pr-operative leg markings
- l) Klippel-Trenaunay syndrome

4 Contraindications and limitations
- a) Bandages that cannot be removed
- b) Extensive exudate
- c) Excessive leg tenderness
- d) Obese patients

5 Equipment and supplies
- a) High resolution duplex system with colour flow imaging.
- b) For the deep veins a 7-4 MHz transducer, for larger l egs a 3-5Mhz curved linear array may be needed.
- c) For the superficial veins a 10-12Mhz is best.
- d) Examination gowns, acoustic coupling gel, wiping towels, blankets and pillows, op-site transducer covers/Gladwrap.
- e) Hardcopy capabilities (thermal paper, colour printer, video tape).

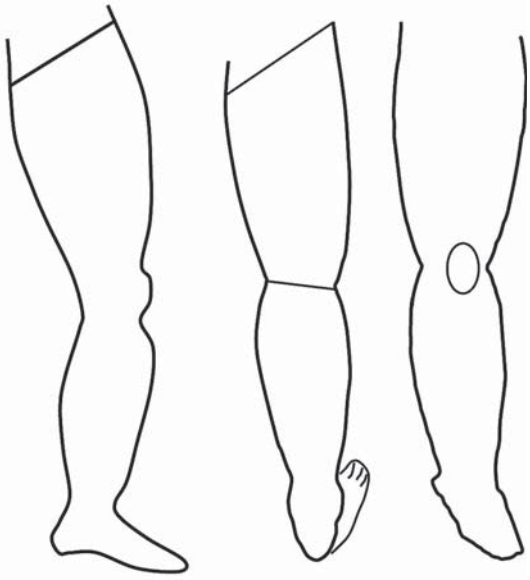
6 Patient preparation
- a) The patient should be booked for an afternoon appointment and asked not to wear compression stockings for at least 12 hours before.
- b) If possible, during the morning of the examination, have the patient walk or stand to produce symptoms; about 30 minutes prior to the examination, the patient should be rested to prevent exercise-induced hyperaemic venous flow (ie. Continuous venous flow).
- c) Reassure the patient by explaining the procedure and allow time for questions.
- d) A short history is taken to document symptoms. It is necessary to assess the leg in good light before the scan is commenced, to visualise the distribution of any varicose veins and to document problem areas such as signs of venous stasis,
- e) Below is an example of a table you can use. The leg diagrams are used to mark any significant clinical areas.
- f) The patient is asked to undress from the waist down. Underpants are permitted, but tight undergarments may have to be removed.
- g) A gown is provided for patient modesty.

7 Procedure

1 Deep veins of the lower limb

A) General considerations
- ➢ **Assess with B-Mode, colour and duplex.**
- ➢ **B-Mode**
  - Exclude any acute or chronic thrombus.
  - Examine the vessel wall to look for signs of residual thrombus such as thickening, recanalisation etc.
  - Look for anatomical anomalies such as duplication, or single calf vessel.

HISTORY	
Previous surgery	
P/H DVT	
No. of children	
Family history	
Other investigations	
INDICATIONS	
Leg swelling	
Oedema	
Spider veins	
Varicose veins	
Aching legs	
Chronic venous changes	
Ulcers	



- Be aware of chronic conditions such as cellulitis, lymphoedema, oedema, large popliteal (Baker's) cyst or large muscle tears, haematoma etc.

➢ **Colour and duplex**

- Inspect the entire length not just junctions. This can be done with colour flow, however, duplex will need to be performed in order to measure the time of the reversed flow.
- Competent valves:
  - ❍ Usually hear a 'thump' as the valve closes.
  - ❍ Normal physiological reflux/retro grade flow can occur, however, this is usually less than 1 second.
  - ❍ May see some retrograde flow between competent valves.
- Incompetent valves:
  - ❍ Reflux is usually continuous, but must be >1 second and >10cm/sec.
  - ❍ Will sometimes see 'leaking valves'. The valves appear to close, however, some leaking occurs when the tips of the cusps don't meet. Reflux will often be >1 second, however <10 cm/sec.

B) Test procedure

➢ The examination will start with the patient in the upright position.
  - ❍ This can be done either with the patient standing on a stool with side supports, or on a standard footstool, resting his/her buttocks against the examination couch.
  - ❍ The leg to be examined should be non-weight bearing.
  - ❍ The leg being examined should be slightly flexed at the knee and the hip externally rotated (Figure 1).

➢ Starting with B-Mode examine the CFV, SFV and popliteal veins. (I find trans verse best).

➢ Return to the CFV and examine longitu dinally using colour and duplex.
  - To assess competency, either valsalva or calf augmentation are used.
    - ❍ Valsalva – the patient should valsalva for at least 2 secs.
    - ❍ Calf augmentation – this may be done by squeezing the calf with either your hand, or a calf pump. Good distal augmentation is achieved by placing the foot over the edge of the stool and the patient then flexes the toes cephalically. This activates the calf pump and provides good augmentation (Figure 2 a and b).
  - ❍ If the SFJ is grossly incompetent, then reflux will occur in the CFV – sample distal to the SFJ for a true reading.
  - ❍ Take sample readings throughout the SFV using the same technique described above. (Don't forget if vessel is duplicated, examine both vessels).
  - ❍ At the adductor you need to change position and now move the transducer behind the knee, being sure to meet up with the vessel from the medial position.
  - ❍ At the popliteal vein take samples proximal and distal and at the tibio-peroneal level.
  - ❍ To assess the calf vessels, the patient may sit down on the bed (Figure 3).
  - ❍ Assess colour flow to determine patency and/or any evidence of reflux, a single Doppler recording will be sufficient, in the PTV, and peroneal veins.

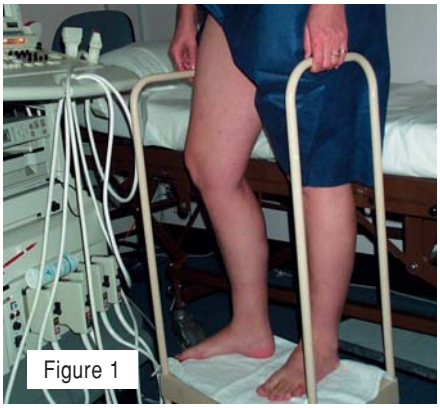


Figure 1

2 Superficial and perforating veins of the lower limb

A) General considerations

➢ It is necessary to become familiar with the many varied anatomical variations and anomalies (see anatomy section).

➢ Look and document areas of acute or chronic thrombophlebitis.

➢ For reflux in the superficial system use the same criteria as the deep.

Figure 2a

Figure 2b

Figure 3

- ➢ Perforator flow goes from superficial to deep. Incompetence flow will travel from deep to superficial. Bi-directional flow is considered incompetent.
- ➢ Perforators > 4 mm are documented even if competent.
- ➢ Incompetent perforators may cause incompe tence of the associated deep vein between valve segments.
- ➢ All perforators and large tributaries are measured in the thigh from the groin down or knee crease up. In the calf measure from the knee crease down or sole of foot up. (some measure from the medial malleolus, however this can be difficult with ankle swelling).

B) Test procedure

- ➢ Return the patient to the standing position and use a higher resolution probe (for most patients 10+Mhz, however a lower resolution probe may be necessary in some patients).
- ➢ At the groin examine the SFJ in transverse and B-mode measuring the SFJ at the origin (Figure 4).
- ➢ Assess this area with colour and duplex testing for reflux. Take particular note of the anatomical tributaries in this region.
- ➢ Tributaries may course from the pelvis via the SEPV and render the SFJ incompetent.
- ➢ Valves vary in this area and may be at the junction or distal to this. The first valve is often referred to as the terminal valve and the second the subterminal valve (See Figures 5a & b). There may be no valve for several centimetres.
- ➢ Follow the LSV the whole length of the thigh. Note where the tributary junctions are and follow any varicose tributaries to their termina tion point. (This will often be in an incompetent perforator).
- ➢ Numerous non described tributaries may be present.

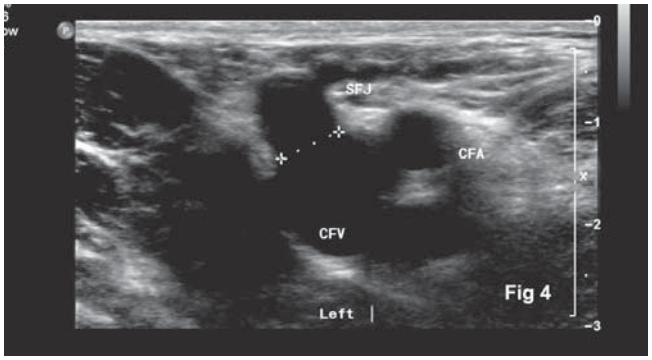


Figure 4

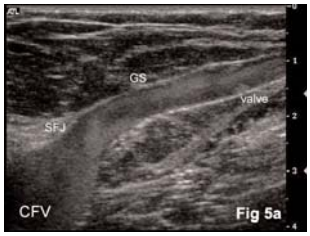


Figure 5a

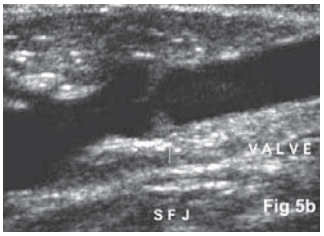


Figure 5b

- ➢ Look for perforators coursing from the LSV or tributaries to the deep system and measure these at the subcutaneous facia.
- ➢ At this point check for competency. You may have to augment both proximal and distal to the perforator.
- ➢ Sit the patient on the bed and examine the calf as you did with the deep system.
- ➢ As with the thigh superficial veins, check for all tributaries and perforators.
- ➢ Perforators in the calf are more numerous than the thigh and more likely to be incompetent.
- ➢ Take special note of the tributaries around the clinical areas.
- ➢ The SPJ is varied and may continue into the thigh.
- ➢ The SSV is examined in a similar fashion to the LSV, taking note of varicose tributaries and perforating veins.
- ➢ Recurrent veins – carefully assess the groin region for neovascularisation joining with a stump of the LSV.
- ➢ The popliteal fossa is carefully assessed as it may develop a recurrent SPJ.

8 Interpretation

Reflux

Reverse flow in a vein lasting ≥ 1 sec with a velocity of ≥ 10 cm/sec.

Minior/mild reflux

- o Reverse flow in a vein lasting ≥ 1 sec but < 10 cm/sec
- o Reverse flow in a vein lasting < 1 sec but with a prolonged valve closure signal

Perforator incompetence

Deep to superficial flow upon augmentation or bi-directional flow

9 Documentation

B-mode and/or colour pictures are taken and kept with the patients records. Below is an example of the worksheet we use at the Camperdown Vascular Laboratory. We include the following on this worksheet.

a) Indicate the competent and incompetent veins.
b) Size of the SFJ.
c) Size and location of the SPJ.
d) Distribution of varicosities.
e) Areas of previous surgery or ligation.
f) Incompetent perforators measured from an appropriate anatomical landmark, with diameter measurements.
g) Areas of acute/chronic thrombus.
h) Incidental findings.

10 Reporting

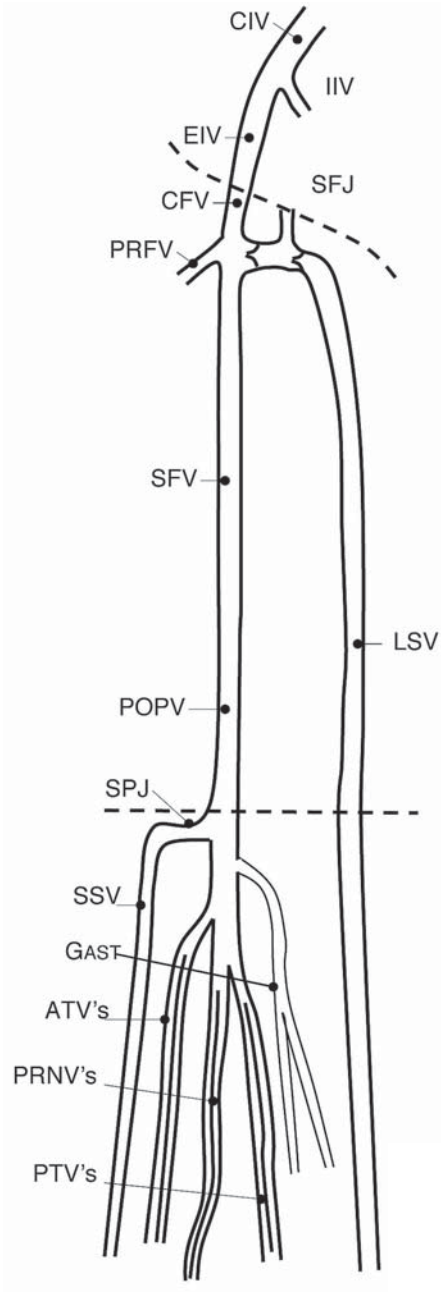
a) In urgent cases, a preliminary report is telephoned or faxed to the referring doctor.
b) A detailed worksheet is kept with the patient's records and a copy sent to the referring doctor.
c) A final report is signed by one of the medical directors within 24 hours and sent to the referring physicians.

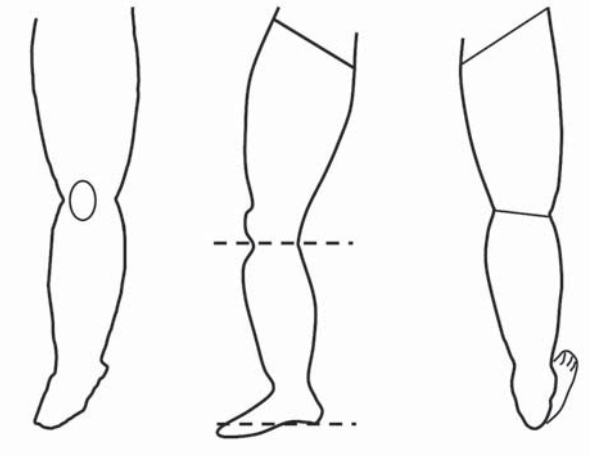
Camperdown Vascular Laboratory

VENOUS WORKSHEET RIGHT LEG

Name: Date:

SFJ (Terminal value)	LSV				
	Thigh				mm
mm	Calf				mm
	SPJ				
	Knee crease		cm		mm
	SSV				
					mm





COMMENTS

REFLUX – INCOMPETENT		PERFORATORS – INCOMPETENT	X
COMPETENT			
THROMBUS		LIGATION	
PERFORATORS – COMPETENT	X	VENOCUFF	xxxxxx

CIV = Common Iliac V	SFJ = Saphenofemoral Junction	ALTV = Anterio-lateral Thigh V
IIV = Internal Iliac V	LSV = Long Saphenous V	PAV = posterior Arch V
EIV = External Iliac V	SEV = Superficial Epiogastric vein	SPJ = Saphenopopliteal Junction
CFN = Common Femoral V	SCIV = Superficial Circumflex Iliac V	SS = Short Saphenous
SFV = Superficial Femoral V	SEPV = Superficial External Pudendal V	
POPV = Popliteal V	PMTV = Postero-Medial Thigh V	

ASUM Ultrasound Bulletin 2004 August 7:4: 22

Intra- and interobserver variability of two ultrasound methods for the assessment of head engagement

Hans Peter Dietz and Valeria Lanzarone

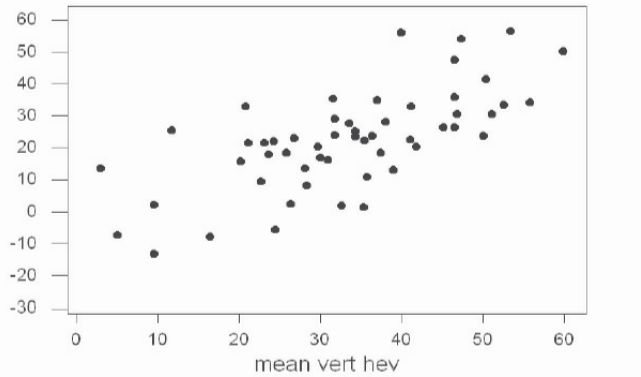


Figure 1 Dotplot illustrating interobserver variability of method A of measuring engagement of the fetal head relative to the symphysis pubis; r = 0.77, p < 0.001

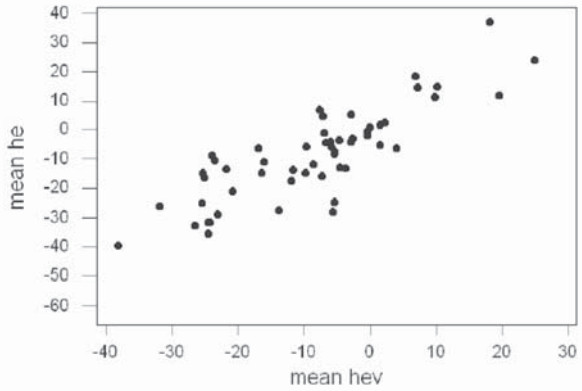


Figure 2 Dotplot illustrating interobserver variability of method B of measuring engagement of the fetal head relative to the symphysis pubis; r = 0.86, p < 0.001

Introduction

Head engagement in late pregnancy can be assessed by translabial ultrasound and has recently been shown to be predictive of delivery mode[1]. The originally described method (method A) relied on the inferoposterior margin of the symphysis pubis and a line parallel to the main transducer axis as a reference, introducing the possibility of angle error due to variations in transducer position. In this study we tested this and an alternative method (method B) for repeatability.

Methods

In a prospective clinical study, 30 nulliparous women between 36 and 40 weeks' gestation were assessed by translabial ultrasound, supine and after bladder emptying, using the midsagittal plane. The two assessors (VL and HPD) were blinded against each other's findings. Both investigators obtained three measurements for both methods. For method A, the line of reference was taken at the inferoposterior symphyseal margin and extended parallel to the incident beam, similar to techniques used in pelvic floor imaging[2]. For method B we used as reference a line at right angles to the central axis of the symphysis pubis, placed through the inferoposterior symphyseal margin. The central axis of the symphysis pubis is generally more easily identifiable in young women as the interpubic disc is echolucent. Later in life increasing calcification renders this structure more echodense.

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Results

Full datasets were obtained for all 30 patients. Intraobserver variability was low (Pearson's r = 0.94, ICC 0.93 for method A and r = 0.91, ICC = 0.93 for method B). Interobserver variability was higher, with method B showing superior agreement (r = 0.86, p < 0.001) over method A (r = 0.77, p < 0.001). Intraclass correlations were determined as 0.62 (good) for method A and 0.80 (excellent) for method B. Figures 1 and 2 show dotplots correlating measurements obtained by the two investigators.

Conclusions

The assessment of fetal head engagement by translabial ultrasound is best performed by using the central axis of the symphysis pubis as a reference. This is feasible due to the echolucency of the interpubic disc in young women.

The method has excellent test-retest reliability and seems superior to a previously described method utilising the inferoposterior margin of the symphysis pubis as a point of reference.

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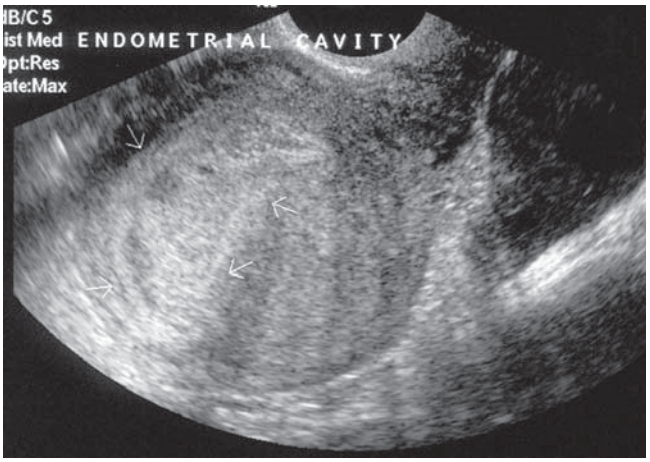
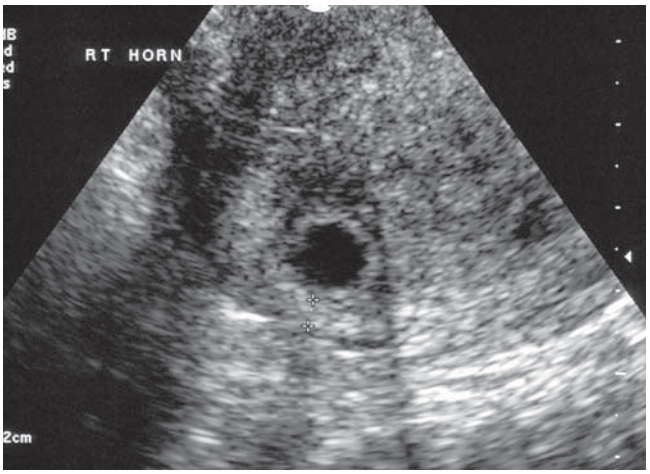
Cornual ectopics – two case studies

Deborah Moir and Kerry McMahon



Case 1 Figure 1 Thickened, irregular endometrium suggesting a decidual reaction, however no intrauterine pregnancy is identified



Case 1 Figure 3 Thinning of the myometrial mantle surrounding the interstitial gestation

Introduction

Cornual or interstitial ectopic pregnancies are extremely rare, accounting for 1.8 % of all ectopias, and < 0.01% of pregnancies. If not diagnosed, the condition can be fatal – causing uterine rupture. The mortality rate is more than twice that of other tubal pregnancies. The diagnosis of interstitial ectopic pregnancy can be difficult. However, there are specific sonographic features enabling the diagnosis of this rare condition. We present two cases presenting to our institution over the last six months.

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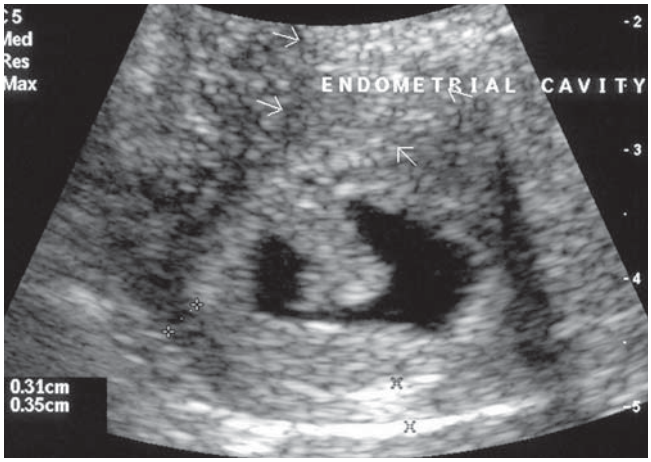


Case 1 Figure 2 The interstitial line sign

Case 1

A 35-year-old G2P1 woman was referred from her obstetrician following confirmed pregnancy secondary to IVF treatment. Two fertilised ova had been transferred into the endometrial cavity. By dates the patient should have been 6 weeks pregnant, however scanning performed by her obstetrician showed only blood products within the endometrial cavity. The patient was referred for clarification of site of gestation and viability. Although having had a child many years prior she had suffered infertility for the last 5 years. Previous assessments showed bilateral hydrosalpinx and for this reason bilateral salpingectomy had been performed.

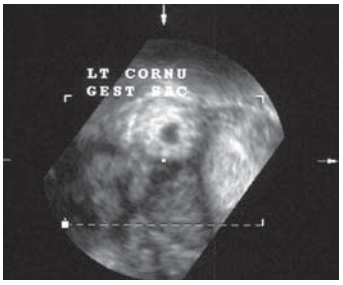
Scanning was performed on an ATL 5000 ultrasound machine (Philips Medical Systems, Eindhoven, The Netherlands) with both transabdominal and endovaginal scanning.

On endovaginal scanning, there appeared to be 2 cystic areas in the myometrium within the right cornual section of the uterus. These areas were felt to most likely represent early, ectopic gestational sacs. Pregnancy however, at this stage, appeared to be just < 6 weeks and this information was discussed with the referring obstetrician. Given this was an extremely wanted pregnancy early follow-up was recommended.

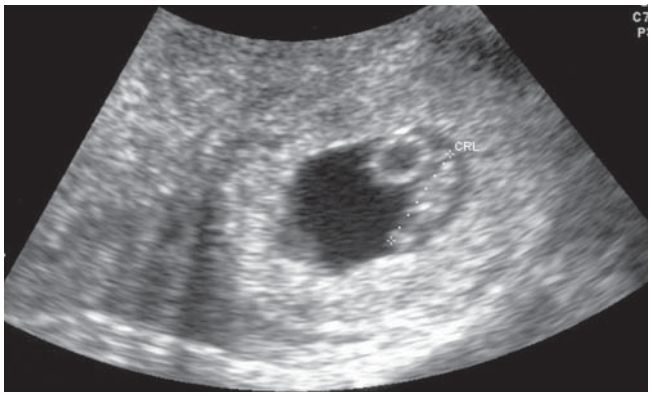
Repeat examination 3 days later showed that one of the presumed gestational sacs now contained a small, viable fetal pole, whilst the other sac was now difficult to discern. The gestation was in the right horn of the uterus and considered to be a right cornual ectopic pregnancy. There was approximately 4 mm of myometrium surrounding the sac.

At this stage, termination of pregnancy was not an option for the patient, particularly psychologically, and given she desperately wanted to keep the pregnancy, she returned on two further occasions for ultrasound follow-up. On the final occasion, the myometrium surrounding the gestational sac had thinned significantly, and the decidual vessels almost reached the serosa. The patient was by now 9

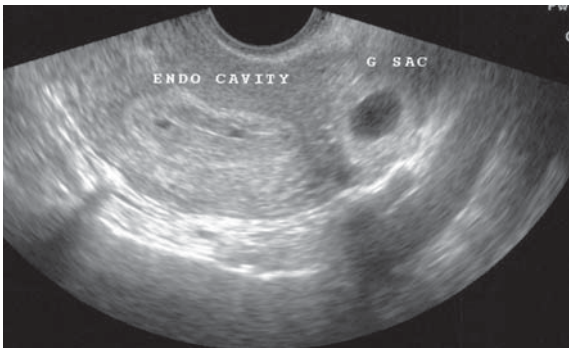
Case 2 Figure 1 Right hydrosalpinx.



Case 2 Figure 2 A 3D image reconstructed in the coronal plane demonstrating the gestation sac in the left cornua. The endometrial cavity is seen to the right of the gestational sac



Case 2 Figure 3 Crown rump length measurement of the viable fetal pole in the left cornua



Case 2 Figure 4 Gestational sac ectopically sited in the left cornua. The thickened endometrium is visible to the right of the gestation sac

weeks gestation. After extensive counselling the pregnancy was terminated. The patient was admitted to hospital and intrasac/intraplacental methotrexate mixed with adrenalin was administered with no response. Five days following her BhCG was 106,000. For this reason she was further treated with 100 mg intravenous methotrexate stat, followed by 200 mg of intravenous infusion over 12 hours. The fetal heart motion was observed to have ceased and progressive BhCG levels returned to normal.

Case 2

A G1P0, 26-year-old patient presented for a routine early pregnancy examination. This was her first pregnancy after several years of infertility. She had a history of bilateral hydrosalpinx. Examination was performed on a Voluson 750 Expert (GE Medical Systems, Milwaukee, Wisconsin, USA.) with initial transabdominal scan followed by endovaginal scanning. On transvaginal scanning it was evident that a viable pregnancy was present, however, implanted in the in the left cornua of the uterus. The patient was counselled about the findings and was sent back to her general practitioner. From here she was referred to the local maternity hospital where medical termination was recommended. An initial dose of methotrexate was administered. She elected to stay in hospital overnight, and began to experience pain and haemorrhaging. She was taken to theatre and was found to have a ruptured cornual ectopic pregnancy. She had an emergency cornual excision.

Discussion

The diagnosis of interstitial ectopic pregnancy can be difficult. Eccentric positioning of the gestational sac and thinning of the myometrial mantle have been described as sonographic features[1] and more recently the interstitial line sign[2]. Ectopic pregnancy is increased in patients with hydrosalpinx and, interestingly, both of these patients had a history of bilateral hydrosalpinx. The first patient had already had bilateral salpingectomy performed and was an IVF patient. The second patient, although she had already had a hysterosalpgogram (HSG) showing hydrosalpinx, but had not sought further medical intervention prior to pregnancy or was unaware of the possible complications to pregnancy.

It has been established that hydrosalpinx has a deleterious effect on the implantation of transferred embryos, for a number of reasons. Distension of the uterine cavity is usually present, disturbing the contact between the embryo and endometrial surface[3]. There is also disturbance of the intrauterine secretory products and the endometrial glands may be dilated. The tubes are often inflamed which may result in the release of cytokines into the tubal fluid and these are believed to inhibit embryo implantation. Finally, the hydrosalpinx fluid may cause a mechanical flushing of embryos transcervically[4].

It has been suggested that the treatment of patients with hydrosalpinx should be unilateral or bilateral salpingectomy prior to IVF[4]. Concerns, however, have been raised that salpingectomy in itself may lead to an increase in the rate of ectopic pregnancies and may even have a detrimental affect on ovarian function by affecting the ovarian blood supply[4]. A study by Strandell et al[5] concluded that salpingectomy is the method of choice for treatment of infertility in patients with hydrosalpinx. Although these trials showed no increase in the rate of ectopias, it has been shown that those patients undergoing salpingectomies are at a higher risk of cornual ectopic pregnancies[6], which is a more serious condition. In 20% of cases that progress beyond 12 weeks of amenorrhoea, potentially life-threatening rupture occurs, with a maternal

mortality rate of 2.5%[5].

In patients with IVF assisted pregnancy, an increase in cornual ectopic pregnancies may be for a number of reasons. Infertility patients having undergone prior salpingectomy or having some form of tubal dysfunction are considered to be at a higher risk. Misplacement of the embryos in the cornua either by catheter misplacement or indirectly secondary to retrograde reflux of the embryo have also been found to be causes. Finally, the number of transferred embryos can be a predisposing factor[6].

Ultrasound features of interstitial pregnancies

The usual indicators of an ectopic pregnancy obviously play a role, these are:

- A beta-hCG level of 500–1000 mUI/ml and no gestation sac seen transvaginally.
- A decidual cast or pseudo gestational sac in the endometrial cavity, which is a fluid collection in the cavity surrounded by a single decidual layer.
- A mass outside of the endometrial cavity, which demonstrates either a live foetus, or a high velocity (21cm/sec) and a low resistive pattern that is indicative of peri trophoblastic flow.

Interstitial ectopic pregnancies also have distinct appearances to suggest their location, which are:

- The 'interstitial line' sign, which is an echogenic, line extending from the endometrial canal up to the cornual sac or haemorrhagic mass[2,8].
- Thinning of the surrounding myometrial mantle surrounding the gestation to less than 5 mm[8].

The treatment for this condition is often surgery, with conservative cornual resection replacing hysterectomy. Methotrexate is another form of treatment administered systemically via intramuscular injection, or locally into the gestational sac under laparoscopic control. Methotrexate is usually the method of choice if the patient cannot have anaesthesia, or has multiple adhesions, if the beta-hCG is low (5–10,000 mUI/mL), the gestation is less than 4 cm in diameter, the patient is not in pain or the pregnancy is not visible on ultrasound. Surgery will be the method of choice if the patient is haemo-dynamically unstable, the BhCG is over 10,000 mUI/mL or the pregnancy is greater than 4 cm in diameter[9]. Even ruptured cornual ectopias have been treated with cornual excision successfully.

Conclusion

Cornual or interstitial ectopic pregnancies are quite rare, accounting for 3% of all ectopias. It is defined as implantation of the trophoblast in the interstitial part of the tube. By appropriate imaging techniques the diagnosis can be made accurately with avoidance of catastrophic outcomes. Any patient presenting to the Department with a history of hydrosalpinx, unilateral or bilateral salpingectomies, or IVF treatment with embryo transfer should be considered at an increased risk for this condition and should be examined very carefully for any signs of an interstitial pregnancy.

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ASUM Ultrasound Bulletin 2004 August 7: 4: 26–28

Ultrasound education in Bangladesh

Kanu Gopal Bala

Abstract

Bangladesh, a developing country, is the eighth biggest country in the world. The present population is 140 million, which is 2% of the world's population. In 1980 ultrasonography was first introduced in Bangladesh for diagnostic purposes. Since then, the technique has been used increasingly. The educational aspect has become very important. In 1990 the Bangladesh Society of Ultrasonography, the national organisation of sonographers in Bangladesh, formulated a two step education program.

Step I of this program is for doctors who have little or no experience of ultrasonography but are interested in the field. It is a compact 12-week program, after completing this course physicians are able to deliver basic abdominal and pelvic ultrasound services efficiently and accurately.

Step II is aimed at doctors who have been in active practice in the field of ultrasound for a period of at least two years. This is an advanced course and is run by the Bangladesh Institute of Ultrasound in Medicine and Research under the University of Science and Technology, Chittagong. This longer course leads to the Diploma in Medical Ultrasound Diagnosis. In future, Masters and Doctoral courses may be introduced.

Introduction

Bangladesh, a developing country, is the 8th biggest country in the world with a present population of 140 million, 2% of the total world population. Population density of is 1850 per square mile. Twenty per cent of the population is urban while 80% is rural. Thirty-three percent of the population is literate[1].

There are 30,000 qualified doctors in Bangladesh and the doctor/patient ratio is 1: 5000.[1] This ratio, however, is not maintained throughout the whole country and in some remote areas the doctor/patient ratio stands at 1:20,000. Naturally people depend on easily available non-qualified doctors and traditional healers. Because of these factors the health delivery problem and its solution are different from those in developed countries.

Ultrasonography was first introduced in Bangladesh in 1980 as a diagnostic tool. Since then, the technique has seen increased use[2]. At present more than 1200 units are in use throughout the country. Such increased use represents a challenge for the people concerned and the educational aspect has become very important.

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Training session in progress

Diagnostic ultrasound is a rapidly developing imaging technology, which is widely used in both industrialised and developing countries. Since its introduction in 1960s, ultrasound has found widespread applications in anatomical imaging, blood flow measurement and evaluation of physiology in almost all aspects of medicine[3].

Ultrasound is considered the primary imaging modality for the detection of most gynaecological, hepatic, biliary, pancreatic, splenic and renal diseases[4]. Ultrasound has established an enviable safety record. There has not yet been any published report of harmful biological effects due to[5, 6,7,8] diagnostic ultrasound, in either patients or operators.

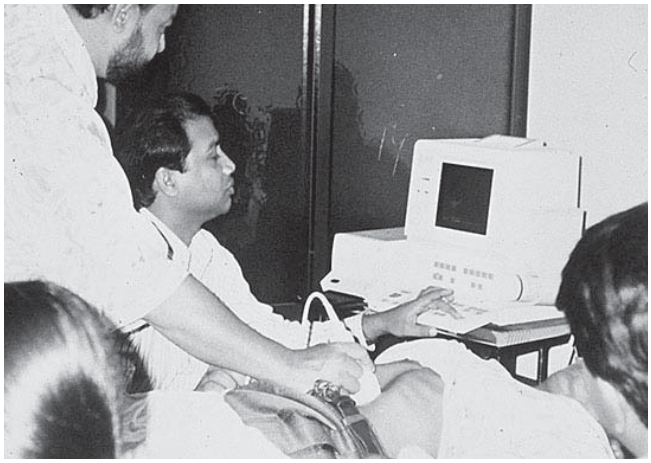
Ultrasound education

The use of diagnostic ultrasound by individuals without proper training and experience adds to the likelihood of unnecessary examinations and misdiagnosis. The need for adequate education and training in ultrasonography exists both in developed countries and in developing countries like Bangladesh. The challenge of providing adequate training in ultrasonography is made more difficult by the diversity of Bangladesh's population since no single specialty has monopoly on its use[4]. The effective use of an ultrasound scanner, although less expensive than other imaging equipment is very dependent on the physicians[9].

In developed countries the greater need is for training to maintain and increase levels of competency, whereas in developing countries both entry-level training and continuing education are hugely important[10,11,12]. In Bangladesh, doctors from three different types of background use ultrasound.

A) Informal training and self educated Interested doctors get training from any individual or from any institution. No formal pattern of course guides the trainee, rather they train themselves by maintaining a day-to-day practice schedule. Mainly they are self-educated. All the senior sonographers belong to this group. In fact they are the foundation of ultrasonography in Bangladesh and continue to

The society maintains international contact and input



Hands on training is at a premium

provide the majority of services in both the clinical and educational sector.

B) Along with other courses Ultrasonography is incorporated partly in the course and curriculums of Radiology, Nuclear Medicine, Internal Medicine, Gynaecology and Obstetrics etc[12]. In Bangladesh, none of the courses cover ultrasonography elaborately. Even Postgraduate courses in Radiology include only two months attachment and few lectures in ultrasonography. This does not fulfil the necessary training and lecture requirements. There are many doctors who, after qualifying in any other specialty other than ultrasonography, are developing competency in ultrasonography at a personal level. In other words they are also a kind of self educated sonologist.

C) BSU Programs The Bangladesh Society of Ultrasonography has formulated a two step education program.

Step 1 education in ultrasonography

This program is for doctors who have little or no exposure to ultrasonography, but have an interest in the field. It is a 12-week-long, compact education program comprising of lectures, supervised practical, video sessions and slide sessions. A mid-term evaluation and final evaluation assess the progress of students. Final evaluation comprises written, oral, spotting and log book[14]. Thirteen such programs with an output of about 400 trained doctors have been completed. From the eighth course onwards, the program has been affiliated with Jefferson Ultrasound Education and Research Institute [JUREII, Philadelphia, USA]. These programs are meeting the needs for trained doctors in the field of ultrasound who will deliver basic services to the people with a minimal outlay.

The objectives of this course are to help a qualified doctor to start the ultrasound practice and to provide minimum basic abdominal and pelvic ultrasound services to Bangladeshis in remote areas.

In addition to the Society's own evaluation process by the, the students sit for the J-UREI competency examination. The examination consists of 100 blind-ended questions, 30 of which are on ultrasound images drawn from 70 different aspects of ultrasound, which are taught during the courses. The answer sheets are sent to JUREI for evaluation. Any student securing 70% will receive a certificate from JUREI. This is a very effective system for a country like Bangladesh. The students and the country feel that their level of education has acquired a minimum level of quality.

Step 2 education ultrasonography

In 1996, the Bangladesh Society of Ultrasonography established its educational enterprise Bangladesh Institute of Ultrasound in Medicine and Research (BIUMR). The Institute was incorporated into the University of Science and Technology in 1999. A reputable national and international faculty is committed to developing the next generation of specialists in ultrasonography and imaging.

The Institute runs a 12-month course, which leads to a Diploma in Medical Ultrasound Diagnosis (DMUD). Doctors with at least two years experience in diagnostic ultrasound are eligible to be admitted into the course. During the course the students are required to attend:

a) Part 1: Lecture series on basics of ultrasound and alternate imaging modalities.

b) Part H: Lecture Series on Diagnostic Ultrasound.

c) Part III: Clinical sessions in latrasonography and in other diagnostic imaging modalities.

The candidates must complete 10 examinations: Written Papers I & II, Case reporting, Oral and practical – Board I & II, and Dissertation.

The World Federation for Ultrasound in Medicine & Biology (WFUMB) has declared the Institute a WFUMB Center of Excellence. This is the only such centre in Asia. Jefferson Ultrasound Research and Education Institute (JUREI), Thomas Jefferson University has approved the DMUD program and affiliated the Institute.

Conclusion

The Bangladesh Society of Ulatrasonography believes:

A) A minimum basic service of diagnostic medical ultrasonography should be available to the common people irrespective of their purchasing ability.

B) Medical ultrasonography should develop as an independent subject.

References

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7 Bio-Effects and safety of diagnostic ultrasound. American Institute of Ultrasound in Medicine, Laurel, MD 1993.
8 Medical ultrasound safety. Part I: Bio-effects and biophysics. Part 11 : Prudent use. Part III: Implementing ALARA. American Institute of Ultrasound in Medicine, Laurel, MD, 1994.
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12 Manual vol. III: Institute of Postgraduate Medicine & Research, Dhaka 1994.
13 Certificate in Clinical Ultrasonography: Prospectus, Course & Curriculum. The Bangladesh Society of LJltrasonography, Dhaka 1999.
14 Course & Curriculum: Diploma in Medical Ultrasound Diagnosis. The Bangladesh Institute of Ultrasound in Medicine & Research, Dhaka 1996.
15 Prospectus: Diploma in Medical Ultrasound Diagnosis, The Bangladesh Institute of Ultrasound in Medicine & Research, Dhaka 1996.

Sonographer's observations: Renal artery duplex

Proforma

NAME

Image Quality *Poor*
Good
Excellent

MRN

Clinical Indications

DMI

Date

DIRECT ASSESSMENT

RIGHT RENAL ARTERY			**LEFT RENAL ARTERY**		
	PSV (cms^{-1})	**EDV (cms^{-1})**		**PSV (cms^{-1})**	**EDV (cms^{-1})**
Aorta					
Origin			Origin		
Prox			Prox		
Mid			Mid		
Distal			Distal		
PSV < 180 cms^{-1} NORMAL			**PSC < 180 cms^{-1} NORMAL**		

RAR = PSV Renal Artery / PSV Aorta at SMA origin = _____ = _____ **RAR < 3.5 NORMAL**

INDIRECT ASSESSMENT

RIGHT KIDNEY ARCUATE ARTERIES				**LEFT KIDNEY ARCUATE ARTERIES**			
	Acceleration Time (msec)	Acceleration Index (cms^{-2})	Resistive Index		Acceleration Time (msec)	Acceleration Index (cms^{-2})	Resistive Index
UPPER POLE				UPPER POLE			
MID				MID			
LOWER POLE				LOWER POLE			
NORMAL VALUES	**AT < 70 msec NORMAL**	**AI > 300 cms^{-2} NORMAL**	**RI < 0.7 NORMAL**	*NORMAL VALUES*	**AT < 70 msec NORMAL**	**AI > 300 cms^{-2} NORMAL**	**RI < 0.7 NORMAL**

Rt Kidney ..... cm
Lt Kidney ..... cm

Aorta .....

Bladder volume ..... cc Post micturition bladder volume cc

Prostate volume cc

Sonographer ..... Date .....

ASUM Ultrasound Bulletin 2004 August 7: 4: 30–31

Fetal measurements requirements

Lynette Hassall

The measurements required for a fetus may seem to be a very basic skill, and common knowledge, but it must be reinforced to all students attempting DMU Practical exams.

It is vital that all ultrasound fetal measurements must be performed precisely and meticulously every time they are done. It is only in this manner that dating errors can be minimised. An over-measurement of fetal abdominal circumference and head circumference may be the difference between the measurements crossing a centile line in a later scan or fetal growth remaining within their centile line.

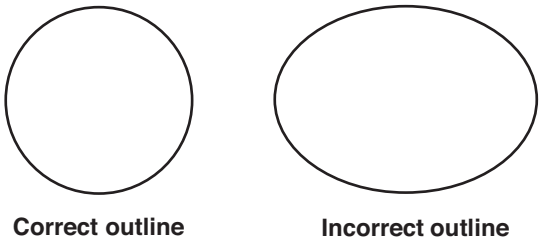
All images must be optimised with close attention to depth, focus and TGC, sector width, and zoom functions.

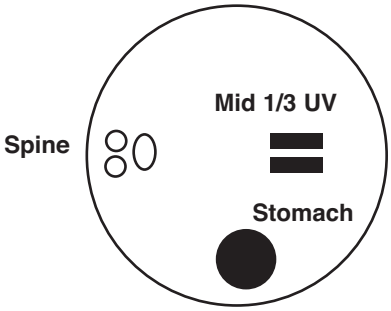
All measurements should be done at least twice.

Abdominal circumference

First, the abdominal circumference must be ROUND. If it is oval the measurement is greater than it should be. If the image is oval then unfreeze the image and try again.

Kidneys must not be included in the image. If you can see the kidneys then you are too low in the abdomen. Stomach must be visualised, along with the middle third of the umbilical vein. The measurement is made at the outside of the skin edge.





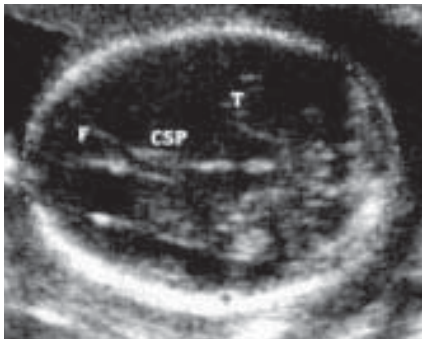
Graphic representation of correct abdominal circumference measurement

Biparietal diameter and head circumference

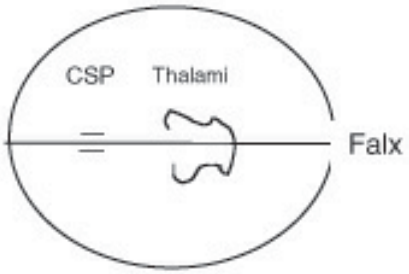
Biparietal diameter and head circumference are measured at the same level.

You must see cavum septum pellucidum, thalami and falx cerebri in the image. The falx of the brain must be equidistant from the upper and lower skull, with one side of the brain a mirror image of the other. The measurement is taken above the level of the roof of the orbits, and must not include any posterior fossa. If the posterior fossa is showing in the image the head circumference is over estimated.

The measurement is performed at the widest part of the head, from outer table to inner table.(The cavum septum pellucidum appears as an empty box, the thalami resemble a butterfly and the falx is a straight white line).



Ultrasound image of correct head image for BPD and HC measurement



Correct head placement for BPD and HC measurement

Femur length

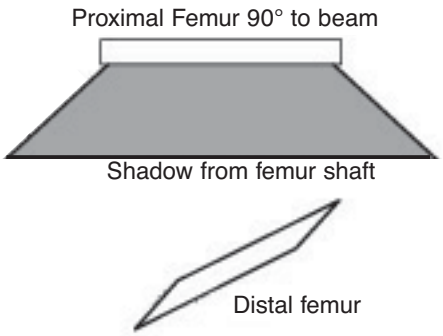
The femur must be at 90º to the ultrasound beam, any other angle can lead to inconsistencies in the measurement.

The proximal femur must be measured; this means the femur closest to the transducer.

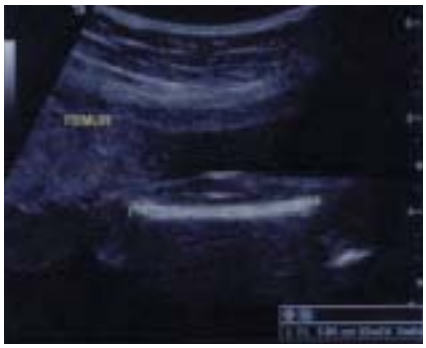
Do not measure the distal femur (the one furthest from the beam), this is incorrect. The shaft of the femur must cast a shadow to prove you are measuring the full length of the bone.

Do not measure the epiphysis.

Do not measure the small side lobe artifact from the end of the shaft, you can visualise where the bone ends using the shadowing from the shaft, an artifact will not cause this shadow.



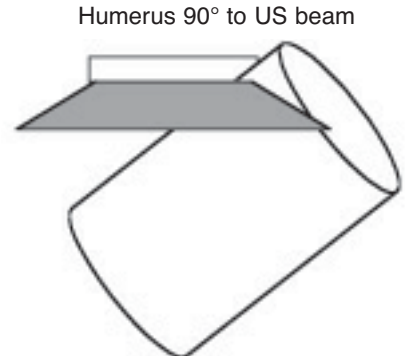
Graphic representation of correct femur visualisation for measurement



Ultrasound image of correct femur length measurement

Humerus length

The same principles of measurement of the femur apply to measurements of the Humerus. Again, the humerus must be at 90º to the beam. The measurement must be of the proximal humerus, the one closest to the transducer.



Graphic representation of humerus length measurement

Ultrasound image of correct humeral length measurement

It is only by adhering very strictly to the measurement criteria that accurate and reproducible measurements of the fetus may be obtained. You cannot use a 'near enough is good enough' technique.

All ultrasound departments must produce comparable and accurate results. This can only be achieved by each sonographer maintaining the highest standards. Tutor sonographers must insist that all students maintain the same high standards at all times, and a quality assurance program may be helpful.

ASUM Policies and Statements; D7 Statement on Normal Ultrasound Fetal Measurements

Examination dates and fees for 2005

DMU dates 2005

DMU Application closing dates

- Student Status Applications
  Monday 31st January.
- Exemption Applications Part I and Part II
  Monday 31st January
- Examination Applications Part I and Part II
  Thursday 31st March

DMU Prep Course

- Melbourne
  Wednesday 16th March – Sunday 20th March 2005

DMU Examinations:

- Written
  Part I and II Written Examinations
  Saturday 30th July 2005
- Oral Examination and OSCE*
  (Venues to be decided)
- Cardiac
  Saturday 8th October 2005
- General
  Saturday 15th October 2005
- Obstetric
  Saturday 15th October 2005
- Vascular
  Saturday 8th October 2005
- Part I Written Examination Re-sit
  (on application)
  Saturday 5th November 2005

*The DMU Board of Examiners determined the final locations for the OSCEs after final candidate numbers, venue availability and Examiner requirements were known. Candidates are again reminded that while the dates for OSCEs are fixed, all modalities are not necessarily examined at every centre.

Practical Examinations

Practical Examination are conducted at the candidate's clinical practice, where possible, by arrangement between the ASUM DMU Board of Examiners, the candidate and the practice managers between April and November.

DMU Practical Examiner Accreditation and Training Days

- Melbourne
  Thursday 17th March (Multidisciplinary Workshop)
- Wellington, New Zealand
  Friday 29th July (NZ Branch Meeting and RANZCR meeting)
- Adelaide
  Thursday 29th September (Annual Scientific Meeting)

ULTRASOUND EDUCATION

Visit the ASUM website: www.asum.com.au for up-to-the minute information

DMU fees Part I 2005

Exemption Application Fees – Part I and Part II

- $A150.00+GST = $AU165.00 (Australia)
- $A150.00 (New Zealand and elsewhere)

Deferment Application Fees

- $A150.00+GST = $AU165.00 (Australia).
- $A150.00 (New Zealand and elsewhere).

ASUM Member

Anatomy, Physiology and Pathology (APP) only

(Having previously been granted an Exemption to PHY)

- $A600.00 + GST* = $AU660.00 (Australia)
- $A600.00 (New Zealand and elsewhere)

Physical Principles of Ultrasound and Instrumentation (PHY) only

(Having previously been granted an Exemption to APP)

- $A600.00 + GST* = $AU660.00 (Australia)
- $A600.00 (New Zealand and elsewhere)

APP and PHY

- $A900.00 + GST* = $AU990.00 (Australia)
- $A900.00 (New Zealand and elsewhere)

Non-Member

APP only

(Having previously been granted an Exemption to PHY)

- $A1200.00 + GST* = $A1320.00 Australia)
- $A1200.00 (New Zealand and elsewhere)

PHY only

(Having previously been granted an Exemption to APP)

- $A1200.00 + GST* = $AU1320.00 (Australia)
- $A1200.00 (New Zealand and elsewhere)

APP and PHY

- $A1500.00 + GST* = $AU1650.00 (Australia)
- $A1500.00 (New Zealand and elsewhere)

***GST applies to Australian Residents only**

DMU fees Part II 2005

Exemption Application Fees – Part I and Part II

- $A150.00 + GST = $AU165.00 (Australia).
- $A150.00 (New Zealand and elsewhere).

Deferment Application Fees – Part I and II

- $A150.00 + GST = $AU165.00 (Australia)
- $A150.00 (New Zealand and elsewhere)

Written, Practical and OSCE

ASUM Member

- $A1600.00 + GST* = $AU1760.00 (Australia)
- $A1600.00 (New Zealand and elsewhere)

Non-Member

- $A2100.00 + GST* = $AU2310.00 (Australia)
- $A2100.00 (New Zealand and elsewhere)

Written only

ASUM Member

- $A900.00 + GST* = $A990.00 (Australia)
- $A900.00 (New Zealand and elsewhere)

Non-Member

- $A1400.00 + GST* = $A1540.00 (Australia)
- $A1400.00 (New Zealand and elsewhere)

Written and Practical

ASUM Member

- $A1500.00 + GST* = $A1650.00 (Australia)
- $A1500.00 (New Zealand and elsewhere)

Non-Member

- $A2000.00 + GST* = $A2200.00 (Australia)
- $A2000.00 (New Zealand and elsewhere)

Written and OSCE

ASUM Member

- $A1100.00 + GST* = $A1210.00 (Australia)
- $A1100.00 (New Zealand and elsewhere)

Non-Member

- $A1600.00 + GST* = $A1760.00 (Australia)
- $A1600.00 (New Zealand and elsewhere)

Practical and OSCE

ASUM Member

- $1300.00 + GST* = $A1430.00 (Australia)
- $A1300.00 (New Zealand and elsewhere)

Non-Member

- $A1800.00 + GST* = $A1980.00 (Australia)
- $A1800.00 (New Zealand and elsewhere)

Practical only

ASUM Member

- $A1100.00 + GST* = $A1210.00 (Australia)
- $A1100.00 (New Zealand and elsewhere)

Non-Member

- $A1600.00 + GST* = $A1760.00 (Australia)
- $A1600.00 (New Zealand and elsewhere)

OSCE only

ASUM Member

- $A700.00 + GST* = $A770.00 (Australia)
- $A700.00 (New Zealand and elsewhere)

Non-Member

- $A1200.00 + GST* = $A1320.00 (Australia)
- $A1200.00 (New Zealand & elsewhere)

***GST applies to Australian Residents only**

DMU EXAMINATIONS

James Hamilton
email dmu@asum.com.au tel +61 2 9958 7655
will answer your questions about the DMU

DDU dates and fees 2005

Examination Fee Part I

ASUM Member

- $A900.00 + GST* = $A990.00 (Australia)
- $A900.00 (New Zealand and elsewhere)

Non-Member

- $A1140.00 + GST* = $A1254.00 (Australia)
- $A1140.00 (New Zealand and elsewhere)

Examination Fee Part II

ASUM Member

$A1600.00 + GST* = $A1760.00 (Australia)
$A1600.00 (New Zealand and elsewhere)

Non-Member

- $A1840 + GST* = $A2024.00 (Australia)
- $A1840.00 (New Zealand and elsewhere)

Part II Casebook Fee

- $A300 + GST* = $A330.00 (Australia)
- $A300.00 (New Zealand and elsewhere)

Fees quoted above are from July 1st 2002 and may be subject to change.

Information pertaining to the next examinations

2005 Part I

The Part I Examinations for 2005 will be held on Monday 16th May 2005 with applications closing on Monday 21st March 2005.

2005 Part II

Casebooks for 2005 Part II DDU Examination must be submitted by Monday 17th January 2005 and accompanied by the prescribed fee of $A330.00 for all participants.

The Written Examination for Part II will be held on Monday 16th May 2005 with the closing date being Monday 21st March 2005.

The Oral Examination for Part II will be held on Saturday 18th June 2005 in Sydney. The Oral Exam for Cardiology candidates will be in Melbourne on Thursday 16th June 2005.

Results

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

The ASUM *Ultrasound 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.

***GST applies to Australian Residents only**

DDU EXAMINATIONS

Marie Cawood
email ddu@asum.com.au tel +61 2 9958 7655
will answer your questions about the DMU

ASUM Professional Survey

The use of worksheets in ultrasound examinations is a somewhat controversial area. While worksheets may be an invaluable part of the imaging process as a communication tool between the sonographer and the reporting doctor, the status of the worksheet as regards any interim or final report remains uncertain. There are varying opinions as to the necessity to file and retain the worksheet as part of the patient's record.

To investigate this issue, ASUM has been conducting research into the use of sonographer worksheets in clinical practice. A survey relating to sonographer worksheets was circulated to ASUM members. The response was substantial, with 331 replies received in a format allowing inclusion in these preliminary results. Further results will be published in the next issue of the *Ultrasound Bulletin*.

Please consider the responses summarised so far and submit any commentary to the *Ultrasound Bulletin* Editor. These responses will be reviewed when preparing an ASUM position statement on the use of sonographer observations or worksheets.

Commentary

The survey resulted in a broad cross section of respondents from both sonographer and physician streams, from city and country practice and from private and public workplaces. A very large percentage of practices reported immediate availability of physician support during normal hours, at least part of the time. There were more concerns regarding physician support in non-private city practices expressed by sonographers. There was a very diverse range of views expressed regarding support, ranging from:

'Is always available for consultation with patient if needed. Mutual respect [between] sonographer and sonologists essential' and:

'Majority of places I work have onsite radiologist'

to:

'Many radiologists with differing attitudes and approaches to supporting sonographic staff. Some [are] fabulous, others just want you to tell them what to say in the report'.

Geographic issues were more common in non-city

Respondent's position or occupational classification

Radiologist	Obstetrician	Nuclear physician	Vascular Surgeon	Cardiologist	Sonographer	Other Physician
59	18	5	4	2	237	6

Comment while the numbers of physicians in various subgroups is small, overall there is a broad representation of imaging and clinical specialists. There was a very significant response from sonographers on the issues canvassed. Sonographers' qualifications included AMS in 19 (of whom 13 also held a DMU), DMU in 102, BappSc in 18, Other qualification in 35 and 78 with no qualification stated.

Practice details

Private practice was the principal place of work in a city-based practice in 168 respondents. A further 52 were in non-private city based practice giving a total of 220 city-based respondents. 80 respondents were in a non-city private practice, while 31 respondents were non-city based non-private practice.

A total of 111 sonographers were private practice city based, while 71 were non-city private practice based and 34 were city based non-private practice sonographers with 21 other sonographer respondents. A wide mix of practitioners responded to the survey.

With the exception of one sonographer-based practice, all city private practice sites reported part time or full time radiologist or sonologist availability during normal hours. Some non-private city sites reported limited availability due to recruitment, holiday cover and related issues. 15 of 92 non-city-based sonographers reported little or no availability of on site radiologist or sonologist, mainly due to geographic considerations.

21 (23%) of radiologists and physicians, regarded immediately available physician support of sonographers as desirable while the remaining 72 (77%) deemed physician support of sonographers as essential. 106 (44%) of sonographers, rated physician support as desirable, with 123 (52%) rating support as essential and 8 (3%) sonographers rating physician support as irrelevant or did not respond.

229 (69%) of 331 respondents thought worksheets useful for medico-legal reasons. An overwhelming 315 (95%) thought the worksheets useful for clinical reasons, with 4 of the remaining 18 deeming worksheets useful only for medico-legal reasons.
296 (89%) respondents, including all but one physician, regarded the sonographer worksheets as unacceptable as a substitute for a formal radiologist/sonologist report to be sent to the referring clinician. One radiologist and 34 sonographers disagreed. 12 of these 34 sonographers were not city based.

Respondents were asked whether they would like to see the role of sonographer extended to include the provision of written reports to referring clinicians. 30 respondents including 2 radiologists agreed with this proposition. 133 respondents including 59 physicians and 75 sonographers disagreed. 28 physicians and 139 sonographers agreed that provision of a written sonographer's report would sometimes be appropriate.

practices, with comments ranging from:

'Sonologist available 5 days per week' to:

'Sole sonographer in town, radiologist 250 km away'.

Around 77%of physicians thought direct support of sonographers was essential, and just over half of sonographers agreed. Only a very small minority (3%) of sonographers believed physician support was irrelevant. A number of comments suggested that, if anything, improved support would be preferred.

Comments included:

'Fantastic, interested radiologist support in our small group' to:

'Radiologist present but normally to[o] busy'.

Worksheets were used in at least some types of study almost universally.

Comments included:

'Displaying info[rmation] in a concise systematic manner. Comprehensively displaying data from films – no omission[s]' to:

'An essential discipline to focus the sonographer on protocol and come to a clinical conclusion'.

There was little support (around 10%) for the sonographer's worksheet or report being the sole means of advising referring clinicians about the results of the examination.

Typical comments ranged from:

'Final report generated [is] by sonologist – their responsibility to ensure report is accurate representation of examination' to:

'Some radiologists report directly from worksheet therefore is some responsibility. Very frustrating as songraphers do all the work but the radiologists take the credit'.

Further results to be reported in the next issue will concentrate on how the worksheet is utilised in clinical practice

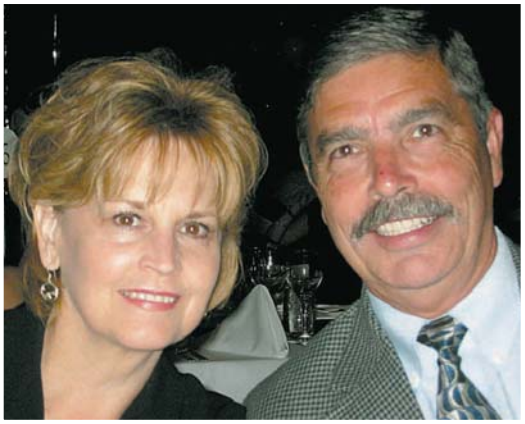
Roger Davies
Chairman
ASUM Research and Grants Committee

Registrations top 600 at ASUM 2004 Sydney

The ASUM 2004 Annual Scientific Meeting, held over four days from 23–26th September, at Star City in Sydney, was an outstanding success. The meeting attracted over 600 delegates from Australia, New Zealand and overseas. The well-balanced program combined presentations by local and overseas keynote speakers with opportunities to network and to enjoy social gatherings.









TOSHIBA
ultrasound


PHILIPS
PHILIPS


16


SonoSite
EXIT

MSK Ultrasound 2005

"The Master Class"

You are invited to participate in 'MSK Ultrasound 2005' being held at Australia's only 6 star Hotel, Palazzo Versace on the Gold Coast, from 5-6 March 2005. This exclusive setting has been specially chosen to create an intimate and constructive learning environment. The intensive program will be delivered by specialists and sonographers who are recognised for their extensive knowledge and teaching skills. **Interactive workshops and open teaching forums will be presented by the National Faculty, and are included in the registration fee.** The course is limited to 250 delegates to ensure detailed tutelage.

Invited International Guest Speaker

Jon Jacobson

Clinical Associate Professor, Michigan University

National Faculty

Frank Burke	David Lisle	John Read	Mark Bryant
Greg Cowderoy	Jenny Noakes	Neil Simmons	Barry Lennon
James Linklater	Ronnie Ptasznik	Amanda Woodward	Peter Murphy

PROVISIONAL PROGRAM

	SATURDAY 5th MARCH		SUNDAY 6th MARCH
08:30-09:00	U/S of the Rotator Cuff - Jon Jacobson	08:50-09:20	Ankle & Foot Sonography Pt. 1 - Jon Jacobson
09:00-09:15	Shoulder Injections- Frank Burke	09:20-09:40	Ankle & Foot Sonography Pt. 2 - Jon Jacobson
09:15-09:45	U/S of the Shoulder:Beyond the Rotator Cuff - Jon Jacobson	09:40-10:10	Achilles Tendinosis- Ronnie Ptasznik
09:45-10:05	What the Surgeon wants from MSUS of the upper limb	10:10-10:25	The Role of Power Doppler in MSK U/S - James Linklater
	MORNING TEA		MORNING TEA
10:30-11:00	Elbow U/S with MRI Correlation - Jon Jacobson	11:00-11:20	What the Surgeon wants from MSUS of the lower limb
11:00-11:15	Biceps Tendon - Dave Lisle	11:20-11:50	Hip & Thigh U/S with MRI Correlation- Jon Jacobson
11:15-11:45	Wrist and Hand U/S with MRI Correlation - Jon Jacobson	11:50-12:05	Ultrasound of the Buttocks Neil Simmons
11:45-12:00	Skiers Thumb and the Stener's Lesion- Greg Cowderoy	12:05-12:20	Ultrasound of the Groin - John Read
12:00-13:10	LUNCH		END
13:10-14:40	Workshops / Open Teaching Forums		
14:40-15:00	TEA		
15:00-16:50	Workshops / Open Teaching Forums		

For further information, or to receive a registration brochure, contact **Event Solutions**
Ph 07 3855 3711 • Fax 07 3855 2811 • Email: shan@eventsolutions.com.au
Visit the Phoenix Conferencing website for workshop details, program updates and registration information

www.phoenixconf.com

New Zealand news

This year's Annual Conference was held in Christchurch at Rydges Hotel, which is located in the heart of the city and overlooks the Avon River.

The Conference Committee, led by Rex de Ryke, organised a wonderful meeting from beginning to end. Well done team.

The Friday night social event was a cocktail party sponsored by Toshiba. Siemens sponsored the Saturday night dinner at the Antarctic Centre. Everyone seemed to have a great time and enjoyed the entertainment so much it was hard to get them out and onto the bus for the return trip to the Hotel. Ten points for the patient bus driver who even dropped some off at strategic points along the way home.

Thanks also to Philips (Platinum sponsor) and Kodak. It is through the generous support and sponsorship of business that we were able to provide delegates with a valued packed conference.

The scientific program covered a wide range of topics. In fact, looking back over the program there was a little bit of everything.

The speakers were from New Zealand and Australia and I enjoyed them all. We had one paper and two posters by students. I was very impressed by all three. Well done Alex, Sumi and Lucy. Good luck for your exams.

For the students, there was a mock OSCE Exam on the Thursday prior to the Conference.

Prizes for this year's conference went to:

- Gerald Duff and Alison Sommerville Award $400.00: awarded to Dr David Kerr for his talk on groin and hip ultrasound.
- Best Sonographer Paper $300.00: awarded to Dr Isabel Wright, a vascular sonograph-er in Christchurch, for her talk on varicose vein ultrasound.
- Best Student Paper – $300.00: awarded to Alex Jarkov, for his talk on neonatal adrenal haemorrhage.
- Best Poster Prize – $300.00: awarded to Lucy Berwick, for her poster. 'What's that in that spleen?'

The Best Registrar Paper Award had no candidate to award it to. Maybe next year?

The ASUM Council also attended the Conference and used some of the time to hold ta Coouncil Meeting. It was great to have them here and I hope they had a chance to enjoy some of the sights Christchurch and the South Island had to offer.

Next year's conference will be in Wellington as a combined meeting between NZ ASUM and the RANZCR, from July 29–31st 2005. The focus will be on abdominal imaging. For more information visit www.mianz.co.nz/conference.html

Yvonne Taylor
ASUM New Zealand

ASUM honours ultrasound leaders

Jane Fonda receives her award from Immediate Past President Glen McNally

Jane Fonda BSc (Applied Science) Med DMU AMS
Honorary Fellow

Jane Fonda was introduced to sonography in 1976, when she was seconded by Sr Anne Byrne, Matron of St Margaret's Children's Hospital, to establish the Ultrasound Department.

She operated one of the first commercial UI Octosons, trained with William Garrett at the Royal Hospital for Women, Paddington, and joined in the Ultrasonics Institute's weekly reporting sessions, where her acumen in obstetrics sonography was recognised.

Throughout these 29 years, Jane has greatly assisted the development of sonography, via a wide-ranging clinical practice, professional development and teaching. She was awarded the Diploma of Medical Ultrasonography in 1980.

As a lecturer, since 1993 at the University of Sydney, Faculty of Health Sciences, School of Medical Radiation Sciences, Jane lectures and coordinates for the Graduate Programs in Medical Sonography, including development of work materials, film libraries for continuing research and distant learning, and coordination of over 300 supervisors for students in their clinical practices. She continues to work part-time in clinical practice to maintain her skills. She was Assistant Course Coordinator of the UI RHW Course from 1982–1990.

Jane has presented some 20 papers at scientific meetings both in Australia and internationally and has three scientific publications, with some in progress.

Her contributions to the Society, throughout her career, are substantial and include: lecturing at the Sydney Technical College Diagnostic Ultrasound Course, 1982–87, developed and organised by ASUM; serving as Secretary of the DMU Board of Examiners from 1982–87; lecturing for the NSW Branch courses and participating in my Committee organising the First World Congress of Sonographers' meeting (1985).

In the 1990s, she was a panel member of the Competency-based Professional Accreditation Board (1993–95), which developed guidelines for sonography practice; elected to the ASUM Council (1997–2001) and has been Secretary of the NSW Branch from 1997. Jane has also been a member of the Annual Scientific Committee (1989–2001), and has been a member of the Organising Committee and lecturer for the DMU Preparation Course, since 1998.

The Society is enriched by such members as Jane Fonda, who gives so much. She is a deserved recipient of Honorary Fellowship of ASUM.

Kaye Griffiths

Albert Lam MB BS (HK) MD (Syd) FRANZCR DDU
Honorary Fellow

Albert Lam

After qualifying as a Radiologist, Albert subspecialised in paediatric radiology and trained in ultrasound with Drs Gary Gates, Fred Sample and George Leopold in California in the mid-1970s.

He returned to Australia to establish the first paediatric ultrasound unit in NSW in 1979. He has remained as the head of this pioneering ultrasound unit at the, then, Royal Alexandra Hospital for Children, ever since.

Albert was appointed Clinical Associate Professor in both the Departments of Paediatrics and Radiology at the University of Sydney in 1994 and is also concurrently the Deputy Head of Department of Radiology at the University.

With over quarter of a century of association with the Children's Hospital, numerous Australasian registrars within Australasia in the field of radiology and paediatrics were trained locally in his unit.

In addition, over 30 overseas postgraduate Fellows from 13 countries took up training and returned home to practice paediatric ultrasound. This enormously improves the health care in children from almost all countries of Asia and as far away as Turkey and Ukraine.

Albert became an ASUM member in 1979 and, since, has worked closely with the Society. He convened and lectured in numerous educational and scientific meetings including: the NSW Branch from 1985 to the mid 1990s and the DMU Preparation Courses through its evolution. He was ASUM's NSW Branch Chairman from 1991 to 1994, as well as being the DDU Examiner for paediatrics.

Albert's research, education and examiner links throughout Australasia and also for the Society saw him deservedly appointed as the inaugural presenter of the UI/UL Plenary Lecture at the ASUM Goldcoast Meeting in 2002.

Albert is also the Associate Editor of the Journal of Ultrasound International since its inauguration and serves as a reviewer for *Australasian Radiology*, *Journal of Paediatric and Child Health*, the ASUM *Ultrasound Bulletin* and Australian and New Zealand Journal of Phlebology.

He has 71 publications in peer review medical journals, five chapters in books and 90 conference abstracts to date. He has been an invited lecturer in no less than 32 international meetings and 29 Australasian meetings.

Albert's elevation by Council is certainly deserved.

Kaye Griffiths

Jack Jellins

Jack Jellins BSc BE PhD Hon MD FAIUM FACPSEM

Life Member

Jack Jellins graduated in Science (BSc) and Engineering (BE) from the University of Sydney and, in 1965, commenced his scientific research into ultrasonic imaging of the breast at the Commonwealth Acoustic Laboratories (CAL), later known as the Ultrasonics Institute (UI).

Over the next 25 years, Jack, collaborating with George Kossoff (CAL-UI) and Professor Thomas Reeve at the Royal North Shore Hospital, made a significant contribution to breast ultrasound – including the identification of bistable ultrasound anatomy of the breast in the late 1960s; the introduction of grey scale breast sonography in 1969; the development of ultrasonic diagnostic criteria for breast pathology in the early 1970s; and the implementation of Doppler techniques in a water bath imaging system in 1982.

He retired from the Ultrasonics Institute in 1991 but continued teaching and providing educational seminars on breast ultrasound through the International Breast Ultrasound School (IBUS).

Dedicated to research in and advancing the field of breast ultrasound, Jack has published more than 75 scientific articles and book chapters, and has co-edited two books. He has been invited to numerous national and international meetings, and has a strong commitment to the teaching of high-resolution ultrasound physics and related topics in breast disease evaluation with ultrasonic imaging and Doppler techniques.

He was elected to fellowships of the American Institute of Ultrasound in Medicine (AIUM) in 1985 and the Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM) in 1986.

At the 1988 meeting of the World Federation of Ultrasound in Medicine and Biology (WFUMB), Jack was presented with a Pioneer Award in recognition of his many contributions to the development of breast ultrasound. In the same year, he obtained a PhD from the University of New South Wales for his thesis 'Ultrasonic examination of the breast – imaging and vascularity assessment'. He joined the Editorial Board of *Ultrasound in Medicine and Biology* in 1998,

Jack is committed to promoting international cooperation between societies and organisations devoted to breast disease assessment. Following the First International Congress on the Ultrasonic Examination of the Breast, held in Philadelphia in 1979, the International Association for Breast Ultrasound (IABU) was formed for the purpose of disseminating research and clinical results through scientific meetings. Jack was its first President and remains on its Executive Committee as Honorary Secretary.

As its founding President, Jack directs its international educational activity involving a highly dedicated faculty of international breast disease experts, and co-authored the 'IBUS Guidelines for the Ultrasonic Examination of the Breast' which was published in the *European Journal of Ultrasound*.

He is a member of the Senological International Society (SIS) Executive and, in 1995, was instrumental in establishing the steering committee that resulted in the establishment of the Australasian Society for Breast Disease (ASBD) of which he became Honorary Secretary. In recognition of his international contributions to breast ultrasound, Jack was awarded a Doctorate in Medicine and Surgery, *Honoris Causa* (Hon MD) from the University of Ferrara in Italy in 2001.

Jack Jellins was a founding member to ASUM in 1970. He was an ASUM Councillor from 1979 to 1989, Honorary Secretary from 1979 until 1986 and Vice-President from 1989 to1991. During this tenure, Jack was Secretary-General for ASUM's first world meeting, WFUMB '85, held in Sydney.

Jack was instrumental in developing the physical principles curriculum for the Diploma of Diagnostic Ultrasound (DDU) and Diploma of Medical Ultrasonography (DMU). He has served on the DDU Board of Examiners (1987 to the present) and the DMU Board of Examiners (1990–2002).

Kaye Griffiths

34 years of service to sonography

The Presidents of ASUM from 1970 to 2004 and the Presidents of the Ultrasonographers Group from 1978 to 1995 got together for this historic photograph during the 2004 ASM.
Back row: David Rogers, Mike Dadd, Peter Warren, Kaye Griffiths, Dave Carpenter and Roy Manning. Mid row: Glenn McNally, Susie Woodward, Sue Davies, Maureen Varga. Front row: Beverley Barraclough, David Robinson, William Garrett, George Kossoff and Thomas Reeve.
(Photo Caroline Hong)

Toshiba Giulia Franco Teaching Fellowship: planes, trains and automobiles

Marilyn Zelesco

Evening function in Kalgoorlie L–R Margaret Christie, Julia Mayes, Shaun O'Regan, Vicki Hooper and Marilyn Zelesco

In early 2004, the WA Branch was notified that it was the recipient of the Giulia Franco Teaching Fellowship. Toshiba has generously funded this Fellowship in honour of Giulia Franco, a well-known and respected colleague and past employee.

The WA Branch sought to nominate a Teaching Fellow who would be deserving of this tribute and would suit its local needs. Our first choice was Shaun O'Regan of I-Med, Tasmania. We were delighted when he was able to include us in his busy schedule. Once we had secured his time, we put together a gruelling program that covered four different locations in the State.

Shaun O'Regan started his lecture tour when he arrived in Perth on Saturday, August 14th 2004.

From Perth he travelled by train to Bunbury, a coastal community 200 km south of the capital. Bunbury is a fast growing city that serves as the regional centre for many rural towns in the district.

A full day seminar, convened by senior sonographer, Kevin Jones, was held on Sunday. It was attended by 10 sonographers and two radiologists – all were employees of the private practice Imaging The South. This practice provides ultrasound and medical imaging services to various locations within the State's southern region.

Shaun delivered nine lectures to this group. Light refreshments, provided by senior sonographers Kevin Jones and Ian Went, followed the seminar.

The seminar was an excellent opportunity for the sonographers and radiologists who attended to gain CPD in their home town.

Shaun travelled back to Perth on Monday 16th August on the Australind train, arriving in the early evening.

On Tuesday August 17th he travelled to Kalgoorlie with WA Branch representative Marilyn Zelesco.

Kalgoorlie Chief MIT Margaret Christie had organised a personalised tour, conducted by two guides from the Goldfields Tourism Bureau, for him. The four-hour tour gave Shaun an insight into the old and modern history of this colourful city, as well as an opportunity to gain a feel for the broad cross section of clientele that requires ultrasound investigations in this region.

Shaun conducted a seminar at the Regional Hospital in the afternoon. it was convened by Margaret Christie and attended by five sonographers and a radiologist. One sonographer, Vicki Hooper, travelled from Merredin approximately 300 km west of Kalgoorlie to attend.

In addition to the topics covered during the day, a practical scanning session demonstrating sonography of the rotator cuff was conducted.

After the seminar, the participants moved on to a local restaurant for refreshments and a meal. The meal was an excellent opportunity for professional networking and informal discussions with the teaching fellow.

Shaun O'Regan returned to Perth on Wednesday 18th August to conduct an evening Branch meeting. The topic was 'Clinical prediction of acute DVT' and was delivered to an audience of approximately 25. This presentation outlined the results of ongoing clinical research being funded by the Commonwealth Department of Health and Ageing.

WA Branch Education Coordinator Elvie Haluszkiewicz convened the meeting.

On Thursday 19th August Shaun O'Regan conducted a half-day seminar at Royal Perth Hospital for Part 2 DMU candidates. This four-hour session was formatted to encourage discussion in an informal setting. The well received seminar including the following topics: abdominal and pelvic ultrasound, second trimester morphology scan and a DMU practical exam tuition on 'Do's and don'ts'. Later in the evening, WA Branch representatives Elvie Haluszkiewicz and Jacqualine Sanford escorted Shaun to a meal generously sponsored by Toshiba and hosted by Paul Philips.

On Friday 20th August Shaun travelled to Broome to conduct the final lecture series of his tour. WA Federal Councillor Janine Horton escorted Shaun on this stage of his journey.

Senior Broome MIT Debbie Foster convened the seminar. Sonographers from Broome, Derby, Port Hedland and Karratha attended the one-day seminar on Saturday. As these towns are all a minimum of two hours travel from Broome (Port Hedland and Karratha being between six and eight hours by road), attending was a commendable effort by these rural sonographers – who were delighted to be able to attend a seminar in their region. These trainees are amongst the most isolated in Australia and worthy recipients of educational grants. The topics covered at this seminar were:

In the evening, these north west sonographers were able to show Shaun some traditional hospitality and used the forum as a relaxed opportunity for networking and camaraderie amongst colleagues working in similar settings.

In summary, Shaun delivered a total of 28 talks to more than 50 sonographers, trainees and radiologists. All of the presentations were left on CD in Broome so that copies may be distributed to interested attendees.

The feedback from this tour was overwhelmingly positive, with lectures that appealed to a broad cross section of skills and interests. Shaun's commitment and professionalism in conducting the tour impressed the WA Branch.

Because of the geographical spread of Western Australia, the tour itinerary was arduous and admittedly one that the WA Branch was reluctant to pursue. However, thanks to the tremendous enthusiasm of all of the individual convenors and Shaun's dedication to the provision of education, we couldn't refuse any delegates that expressed interest. As a result, I feel that the WA Branch and Shaun O'Regan truly fulfilled Toshiba and ASUM's charter for the Giulia Franco Teaching Fellowship.

In conclusion, the following need to be acknowledged for their assistance in the tour: Shaun O'Regan, Kevin Jones, Margaret Christie, Elvie Haluszkiewicz, Jacqualine Sanford, Janine Horton, Debbie Foster and Judy Vickress.

Shaun O'Regan and Julia Mayes at the Mt Charlotte lookout in Kalgoorlie

Attendees from 'Imaging the South' at the South West Seminar in Bunbury

Broome sonographer says 'thanks ASUM'

Caroline Hong
Chief Executive Officer
Asum

Dear Caroline,
I would like to write on behalf of the sonographers and trainees who attended the Guilia Franco Travelling Fellowship Didactic Professional Update Day recently in Broome.

The day was very rewarding for all who participated. I have lived in Broome for 10 years. This is the first occasion that we have had any Professional Development come to us.

The other sonographers gladly travelled up to nine hours by vehicle to attend this day and we would all like to extend our gratitude to ASUM for organising the event.

I would also like to thank Toshiba for their sponsorship and Shaun O'Regan for making the day so easy to understand and professionally rewarding.

Thanks again

Debbie Foster
Broome Health Services

Toshiba Giulia Franco Teaching Fellowship: Western Australia seminars

Shaun O'Regan

I would like to thank ASUM for giving me the opportunity to undertake the 2004 Giulia Franco Teaching Fellowship. This involved an eight-day lecture tour throughout Western Australia, including seminars in Bunbury, Kalgoorlie, Perth and Broome as outlined in the following program.

Sunday 15th August: Bunbury

An all day seminar was convened by Kevin Jones and attended by 10 sonographers and two radiologists. Presentations covered the following range of topics:

- Duplex Doppler of lower limb arteries
- Peripheral arterial waveforms: what they can tell us
- Ultrasound of the rotator cuff
- Polycystic ovary syndrome
- Ultrasound of the female pelvis
- Clinical prediction of acute lower limb DVT
- Sonographic appearances of recurrent DVT
- Ultrasound of the eye
- Scrotal ultrasound

Tuesday 17th August: Kalgoorlie

An evening seminar was convened by Margaret Christie and attended by four sonographers and a radiologist. Requested topics included the following lectures:

- Clinical prediction of acute DVT
- Sonographic appearances of recurrent DVT
- Ultrasound of the pelvis
- Duplex Doppler of lower limb arteries
- Ultrasound of the rotator cuff

In addition to the lectures a practical workshop on shoulder ultrasound was undertaken.

Wednesday 18th August: presentation at Branch Meeting in Perth

At the request of the WA State Branch, a talk on the clinical prediction of acute lower limb DVT was delivered to an audience of 25 sonographers, trainees and doctors at an evening meeting held at Royal Perth Hospital. This presentation outlined the results of ongoing clinical research being funded by the Commonwealth Department of Health and Aging.

Thursday 19th August: DMU tutorials at Royal Perth Hospital

Three DMU candidates, two trainees based at Royal Perth Hospital and a student sonographer from Karratha, attended a session from 9.30 am until 1.30 pm. Topics covered included abdominal and pelvic ultrasound, second trimester morphology scan and 'Do and don'ts' for the DMU practical exam.

Saturday 21st August: Broome

An all-day seminar was organised by Debbie Foster and attended by six trainees and sonographers, including WA ASUM Councillor, Janine Horton, who flew up from Perth to participate. Others travelled from Port Headland, Karratha and Derby. The following topics were covered:

- Upper abdominal ultrasound
- Ultrasound of the eye
- Female pelvic ultrasound
- Polycystic ovary syndrome
- Sonographic appearances of recurrent DVT
- Ultrasound of the rotator cuff
- Foetal echocardiography
- Markers for aneuploidy
- Ultrasound of the paediatric hip (DDH)

Summary

In all, a total of 28 talks were presented to over 50 sonographers, doctors and students. All presentations were recorded on CD and left with Debbie Foster in Broome to distribute to participants throughout the State.

From my perspective, the seminars were very productive and, I believe, well received and appreciated by the participants.

I particularly enjoyed the lively discussion that typified these sessions and I gained a lot of satisfaction from this direct interaction with my colleagues in WA.

I was truly impressed with the enthusiasm and desire to learn demonstrated by the participants, some of who travelled for many hours from remote areas of the State to attend my talks. Such enthusiasm and professional commitment augurs well for the future of sonography in this country.

I would like to thank the WA State Branch and the Education Committee of ASUM for the opportunity to serve as this years Giulia Franco Teaching Fellow.

I also thank Toshiba for their generous sponsorship of this Fellowship, which enabled me to travel as extensively as I did. Without this financial assistance, many of the sonographers and trainees working in remote areas of WA would have missed this all too rare professional development opportunity.

I would also like to thank Judy Vickress for coordinating my travel arrangements and Marilyn Zelesco, Elvie Haluszkiewicz, Kevin Jones, Margaret Christie and Debbie Foster for organising the various seminars and for the tremendous hospitality extended to me during my time in Western Australia.

Shaun O'Regan
Giulia Franco
Teaching Fellow 2004

ASUM Council appointments for 2004–2005

Council is made up of seven medical/ scientific councillors and five sonographer councillors.

Medical/Scientific Councillors
Dr David Rogers President
Dr Glenn McNally Immediate Past President
Dr Matthew Andrews
Prof Ron Benzie
Dr Dave Carpenter
Dr Roger Davies
Dr David Davies-Payne

Sonographer Councillors
Mr Stephen Bird
Mrs Margaret Condon
Ms Kaye Griffiths AM
Ms Janine Horton
Mrs Roslyn Savage

President
Dr David Rogers

Immediate Past President
Dr Glenn McNally

Honorary Secretary
Mrs Roslyn Savage

Honorary Treasurer
Dr Dave Carpenter

DDU Board of Examiners 2004–2005

Chair
Dr Chris Wriedt

President
Dr David Rogers

Honorary Secretary
Mrs Roslyn Savage

Committee Secretary
Dr Barry Chatterton

Committee Members
Dr Dave Carpenter
Dr John Crozier
Dr Jack Federman
Dr Jack Jellins
Dr Simon Meagher
Dr Rob Robertson
Dr Susie Woodward

DMU Board of Examiners 2004–2005

Chair and Honorary Secretary
Mrs Roslyn Savage

President
Dr David Rogers

Committee Secretary
Dr Lucia Pemble

Committee Members
Mr Mike Dadd
Mr Roger Gent
Dr Denise Ladwig
Mrs Louise Morris
Mr Martin Necas
Mrs Rebecca Neish
Mrs Naomi Rasmussen
Mr Christopher Sykes
Mrs Catherine West

DDU Development and Medical Affairs Committee 2004–2005

Chair
Matthew Andrews

Committee Members
Prof Ron Benzie
Dr Roger Davies
Dr Glenn McNally
Dr David Davies-Payne
Dr David Rogers

DMU Advisory and Sonographer Affairs Committee 2004–2005

Chair
Ms Janine Horton

Committee Members
Mr Stephen Bird
Mrs Ros Savage
Ms Kaye Griffiths
Mrs Margaret Condon

Education and ASM Committee 2004–2005

Chair
Dr David Davies-Payne

Committee Members
Prof Ron Benzie

Research and Grants Committee 2004–2005

Chair
Dr Roger Davies

Committee Members
Dr Dave Carpenter
Ms Janine Horton

Safety and Standards Committee 2004–2005

Chair
Dr Stan Barnett

Committee Members
Mr Stephen Bird
Dr Dave Carpenter
Dr Roger Davies
Marsh Edwards
George Kossoff

Standards of Practice Committee 2004–2005
Chair
Prof Ron Benzie

Committee Members
Dr Glenn McNally

Asia Link Committee 2004–2005

Chair
Dr Glenn McNally (Immediate Past President)
Dr Caroline Hong ASUM CEO

WFUMB Promotion Team

WFUMB 2009 Convenor
Dr Stan Barnett

WFUMB 2009 Treasurer
Dr Glenn McNally

ASUM President
Dr Dave Rogers

ASUM CEO
Dr Caroline Hong

Liaison Experts 2004–2005

Cardiac liaison	Dr Gary Sholler
Vascular liaison	Dr John Crozier

Awards announced at the Annual Scientific Meeting, 25 September 2004

C O N G R A T U L A T I O N S

Tania Griffiths 2004 Sonographers Research Presentation Award
(sponsored by Philips Medical)
Sofie Piessens 2004 Best Research Presentation Award
(sponsored by Siemens Ultrasound)
Kathryn Busche 2004 Best Clinical Presentation Award
(sponsored by Siemens Ultrasound)
Vanessa Pincham Frances Miceli 2004 Best Poster Award
(sponsored by ASUM)

New members June – September 2004

June 2004

Full members
Emma Alexander Qld
Jill Bryant NSW
Michael Carr NSW
Thomas Daly NSW
David Davies-Payne NZ
Anthony Daynes Qld
David Fauchon NSW
Bernadette Gourley NZ
Gael Harrison NZ
Leah Kallos SA
Murty Mantha Qld
Glenda McLean Vic
Raj Nagarajan Vic
Kerri Owen SA
Averlea Robertson NZ
Trevor Stewart NSW

Associate members
Daniel Colombini WA
Imo Inyang Vic
Josie Macfarlane NZ
Kimberly McConchie Vic
Direshni Naidu WA
Hien Quach Vic
Shameen Ramlall NZ
Dail Redwood SA

Trainee members
Honey Lai Vic

Corresponding members
Gregory Antonio HK
Wanda Taylor USA

July 2004

Full members
Kim Bailey Vic
Julie Beaumont NZ
Claire Brindley NZ
Tony Calder-Mason NSW
Ben Castle NZ
Carolyn Challenger NZ
Cornelia Deakins NZ
Catherine Duncan NSW
Jill Ellis NZ
Amanda Evans NT
Donna Ferry NZ
Ginny Frame NZ
Sue Goldsmith NZ
Joanne Hall NZ
Sandra Hellewell NZ
Peter Henderson NZ
Azile Hooper NZ
Michelle JohnstoneNZ
Maree Loye NZ
Philippa Maurer NZ
Tanya McCahon Tas
Beverley McFarlane Vic
Betty McLeod NZ
Aynsley Moore NZ
Julian Nguyen Vic
Diane Oppawsky Vic
Elizabeth Ouzas NSW
Galina Palachevskaia NSW
Julia Parij NSW
Anthony Parmiter SA
Rita Richter NSW
Pamela Spence NZ
Lisa Stenberg NSW
Kaye Thompson NZ
Susan Toppin NZ
Timothy Valley NSW
Margaret Van Der Linde SA
Tracey Ward NZ
Karen Wark NSW
Jeanne White WA

Associate members
Jodie Bamford Vic
Jody Bartsch NSW
Relda Beere NZ
Deidre Coppen WA
Gillian Evans SA
Omaya Hammad NSW
James Harley Vic
Shaista Hussaini NSW
Farhana Jaikaran NZ
Mary-Leigh Neale NSW
Da Thao Tran NSW

Trainee members
Sanjay Patel NSW

Corresponding members
Tatiana Perova Russia

August 2004

Full members
Bonita Anderson Qld
Michael Gray NSW
Lisa Hicks ACT
Vicki Hooper WA
Cara Kirsten SA
Carol Schultze NSW

Associate members
Mark Jackson Vic

Trainee members
Chandima Perera ACT

September 2004

Full members
Lynda Brooks NZ
Maria Busu NSW
Linda Hamilton NZ
Gail Paskin NZ
Rida Saleeb NSW

Associate members
Susan Gibb Qld
Priscilla Serratore NSW

2005 DMU and DDU Preparation Courses

The DMU and DDU preparation courses will be run in conjunction with the Multidisciplinary workshop in Melbourne

DDU course dates: 16–17th March 2005
DMU course dates: 16–20th March 2005

www.asum.com.au/open/meet_mdw05_home.htm

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Greg Brand 1300 663 516
greg.brand@sonosite.com

Toshiba (Aust) Pty Ltd Medical Division
David Rigby
tel +61 2 9887 8026
email drigby@toshiba-tap.com

Book reviews

Ultrasound Diagnosis of Fetal Anomalies

Author/Editor M Entezami, M Albig et al.
Publisher Thieme
Year 2004
Approx Cost $A 302.50
ISBN 3-13-1318619

This 371-page textbook describing the ultrasound diagnosis of fetal abnormalities is very well written and presented and contains 488 illustrations. The illustrations are beautiful, colourful and appropriate. Between them the co-authors have had a wealth of experience in the subject matter. The book is divided into five sections consisting of 18 chapters. The layout of each of the chapters makes it very easy to read and, with the illustrations, it is an ideal textbook for reference in the diagnosis of fetal abnormality.

The first chapter on ultrasound screening details what to look for in the first, second and third trimester of pregnancy during routine ultrasound screening.

The second section on 'Systematic Scanning of Fetal Abnormalities' describes the anomalies seen in different parts of the fetus accompanied by beautiful illustrations. The chapters include anomalies of the central nervous system, face and neck, thorax, the heart, the abdomen, urinary tract and skeletal anomalies.

The third section on 'Chromosomal Disorders and their Soft Markers', consists of two chapters. The first, entitled 'Chromosomal Disorders' describes the features of common Trisomys. The second chapter titled 'Soft Markers of Chromosome' describes the various soft markers and their clinical relevance.

The fourth section of the book titled 'Selected Syndromes and Association' gives detailed abnormal findings in 45 clinical syndromes. The syndromes described are well illustrated with post mortem pictures to match the ultrasound findings.

The last section of the book, titled 'Other causes of Fetal Diseases Anomalies' consists of seven chapters describing various clinical conditions, which could affect fetal outcome. These includes fetal hydrops, intrauterine infection, diseases of placenta, cord and amniotic fluid, multiple pregnancy, growth disturbance, diabetes and drugs.

This is a very well written and illustrated textbook. It is an invaluable reference for clinicians involved in prenatal diagnosis, counselling and management of patients in the diagnosis of fetal abnormalities and trying to group together abnormalities into syndromes.

Dr Andrew Ngu

Breast Ultrasound

Author/Ed A Thomas Stavros
Publisher Lippincott, Williams & Wilkins
Year 2004
Pages 1013
Approx cost $A203.00
ISBN 0-397-51624-X

Thomas Stavros is Assistant Clinical Professor of the University of Colorado School of Medicine in Denver and a well recognised and much published author on breast imaging.

In view of the rapidly advancing technological changes in ultrasound this beautifully bound, superb book, has taken close to ten years to complete. Tom Stavros has written and re-edited the book on numerous occasions and the single author approach ensures uniform organisation of the text. The chapter on ultrasound-guided interventional procedures has been written by his partner and 'co-conspirator' Steve Parker.

The first few chapters of the book deal with equipment, technique and anatomy and then much of the book describes the pathological and sonographic appearances of various breast conditions.

The book has been written with a strong emphasis on how gross histopathologic morphology of both benign and malignant processes alters the sonographic anatomy. This enables the reader to gain a greater understanding of the reasons behind the sonographic image and, hence, to better characterise solid breast nodules. Throughout the text the author also refers to mammographic findings and suggests various sonographic and mammographic algorithms with management rules to aid with problem solving.

Chapters on the male breast, the iatrogenically altered breast and Doppler evaluation of the breast are also included. At the end of each chapter a useful and thorough reference list is provided.

The book is designed to be a reference text. Thus, each chapter is designed to stand alone which can lead to some information being presented more than once, but this organisation, along with thorough cross-referencing aids to the readability of the text.

This large and comprehensive text on breast sonography is fully illustrated with the most up to date images and provides an excellent reference for radiologists, breast surgeons and sonographers performing breast ultrasound, an excellent addition to any radiological library.

Dr Prue Neerhut

Calendar of ultrasound events

2005

Mon 31 Jan 2005
Applications due for ASAR Student Status
Contact: James Hamilton DMU Coordinator
Ph: +61 2 9958 0317
Fax: +61 2 9958 8002
Email: dmu@asum.com.au

Mon 31 Jan 2005
DMU Exemption Applications due.
Contact: James Hamilton DMU Coordinator
Ph: +61 2 9958 0317
Fax: +61 2 9958 8002
Email: dmu@asum.com.au

Wed 2 Feb – 3 Aug
2005 ASUM Victoria Branch Meeting
Ultrasound Lecture Series
Venue: Radiology Lecture Theatre
2nd Floor, The Royal Melbourne Hospital
Time: Every Wednesday Evening
6.00 – 7.30 pm
Contact: Merilyn Denning
Ph: (03) 9342 8786
Fax: (03) 9342 8369

Wed 16 Mar 2005
5 days DMU Prep Course
Contact: James Hamilton DMU Coordinator
Ph: +61 2 9958 0317
Fax: +61 2 9958 8002
Email: dmu@asum.com.au

Wed 16 Mar 2005
2 days DDU Technical Seminar
Contact: DDU Coordinator
Ph: +61 2 9958 7655
Fax: +61 2 9958 8002
Email: ddu@asum.com.au

Thu 17 Mar 2005
Nuchal Translucency Course
Contact: ASUM
2/181 High Street, Willoughby, NSW, 2068
Ph: +61 2 9958 7655
Fax: +61 2 9958 8002
Email: education@asum.com.au

Fri 18 Mar 2005
2 days ASUM Multidisciplinary Workshop involving interactive programs in Obstetric, Gynaecological, Musculoskeletal, Vascular, Cardiac, Small Parts and Breast Ultrasound
Contact: ASUM
2/181 High Street, Willoughby, NSW, 2068
Ph: +61 2 9958 7655
Fax: +61 2 9958 8002
Email: education@asum.com.au

Fri 18 Mar 2005
3 days ASUM Obstetric and Gynaecological Ultrasound Symposium held in conjunction with the ASUM Multidisciplinary Workshop
Contact: ASUM
2/181 High Street, Willoughby, NSW, 2068
Ph: +61 2 9958 7655
Fax: +61 2 9958 8002
Email: education@asum.com.au

Fri 18 Mar 2005
2 days ASUM Vascular Symposium held in conjunction with the ASUM Multidisciplinary Workshop
Contact: ASUM
2/181 High Street, Willoughby, NSW, 2068.
Ph: +61 2 9958 7655
Fax: +61 2 9958 8002
Email: education@asum.com.au

Thu 31 Mar 2005 DMU Examination Applications
Contact: James Hamilton, DMU Coordinator
Ph: +61 2 9958 0317
Fax: +61 2 9958 8002
Email: dmu@asum.com.au

Sun 19 Jun 2005
3 days 2005 AIUM Annual Convention
Venue: Walt Disney World Swan and Dolphin, Orlando, FL USA
Contact: Brenda Kinney
AIUM
Ph: 1-301-498-4100
Email: bkinney@aium.org
Website: www.aium.org

Fri 29 Jul 2005
3 days ASUM NZ Joint Meeting with RANZCR
Location: Wellington NZ

Sat 30 Jul 2005
DMU Part I and Part II Written Examinations
Contact: James Hamilton, DMU Coordinator
Ph: +61 2 9958 0317
Fax: +61 2 9958 8002
Email: dmu@asum.com.au

Aug – Nov DMU Part II Practical Examinations
Contact: James Hamilton, DMU Coordinator
Ph: +61 2 9958 0317
Fax: +61 2 9958 8002,
Email: dmu@asum.com.au

Thu 29 Sep 2005
4 days ASUM 2005 35th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine
Venue: Adelaide Convention Centre, Adelaide.
Contact: ASUM
2/181 High Street, Willoughby, NSW, 2068
Ph: +61 2 9958 7655
Fax: +61 2 9958 8002
Email: asum@asum.com.au

Sat 8 Oct 2005
DMU OSCE Cardiac and Vascular Examinations
Contact: James Hamilton, DMU Coordinator
Ph: +61 2 9958 0317
Fax: +61 2 9958 8002
Email: dmu@asum.com.au

Sat 15 Oct 2005
DMU OSCE General + Obstetrics Examinations
Contact: James Hamilton, DMU Coordinator
Ph: +61 2 9958 0317
Fax: +61 2 9958 8002
Email: dmu@asum.com.au

Thu 10 Nov 2005
2 Days ASUM Thailand
Location: Bangkok
Contact: ASUM
2/181 High Street, Willoughby, NSW, 2068
Ph: +61 2 9958 7655;
Fax: +61 2 9958 8002
Email: asum@asum.com.au

2006

Sat 29 Jul 2006
DMU Part I and Part II Written Examinations – Provisional

Thu 14 Sep 2006
ASUM 2006 Melbourne

2007

Sat 28 Jul 2007
DMU Part I and Part II Written Examinations – Provisional

2008

Sat 26 Jul 2008
DMU Part I and Part II Written Examinations – Provisional

2009

Thu 5th Sep 2009
4 days ASUM hosts: WFUMB 2009 World Congress in Sydney, Australia.

ASUM relies on information supplied by organisers for non-ASUM events included in the calendar. No responsibility is taken for incorrect information and Members are advised to contact event organisers' direct.

ASUM Ulrasound Bulletin November 7: 4: 50–63

Abstracts 34th Annual Scientific Meeting 2004 Sydney, New South Wales

First trimester fetal malformation

Simon Meagher, University of Melbourne, Vic

First trimester ultrasound is a valuable tool in early pregnancy dating. More recently high resolution transvaginal ultrasound has been employed to assess the nuchal translucency risk estimation of many aneuploidies between 11–14 weeks of gestation. Transvaginal ultrasound provides the opportunity to asses embryonic and early fetal structure and has proven to be a valuable tool in the detection of many structural abnormalities. Many abnormalities previously detected as late as 18–20 weeks may now be visualised at transvaginal ultrasound at early as 9–10 weeks gestation ie. 7–8 weeks following conception. While many first anomalies have sonographic features similar to those described in the second and third trimester of pregnancy others have characteristic sonographic features confined to the first trimester. There are many practical and psychological benefits to the early diagnosis of fetal malformation. Earlier prenatal diagnosis may provide the opportunity for early prenatal medical and interventional therapies which may in the future lead to improved fetal outcome. The appropriate interpretation of first trimester ultrasound however requires an in depth knowledge of sonoembryology and the pathophysiology of fetal malformation. In contrast to the mid trimester examination the diagnosis in the first trimester frequently requires more than one examination. For example the diagnosis of a small omphalocele may be suspected at 9–10 weeks gestation but may only be confirmed at a repeat examination after 12 weeks gestation when the physiological return of bowel to the abdominal cavity should have occurred. Thus in the first trimester there is a learning curve in the sonographic screening for selected fetal structural abnormalities. Several publications have assessed the sensitivity of transvaginal ultrasound in the first trimester in detecting a variety of structural anomalies. From this data it is evident that the accuracy of fetal diagnosis increases over time and that on average the learning curve is 2–3 years. This lecture will present 100 video clips of fetal malformation in an effort reduce the learning curve associated with first trimester fetal malformation diagnosis.

Variations in the quality of ultrasoundexaminations in an unregulated market

Paula S Woletz, American Institute of Ultrasound in Medicine, United States

In the early 1990s, the US National Institutes of Health initiated a multi-center clinical trial to determine whether routine ultrasound examinations during pregnancy would lead to improved obstetric/neonatal outcomes. Not only did the findings dispute the assumption that routine antepartum ultrasound would result in improved outcomes, they uncovered vastly discrepant qualities in the performance and interpretation of these sonograms. Voluntary accreditation of ultrasound practices was developed as a way of "raising the bar" and promoting quality assurance in an unregulated medical arena. The components of an adequate ultrasound examination and examples of deficiencies will be presented.

Recent technical advances in ultrasound

Michel Claudon, Hôpital d'Enfants – CHU Nancy, France

Significant advances have been recently introduced into various fields of technology, taking advantage from the use of new piezoelectric materials and the large diffusion of broadband transducers. Various types of modulation may be applied to the pulse characteristics, using single pulse, multipulse or multiline techniques, resulting in improved spatial resolution and better penetration. Non-linear imaging uses the harmonics component, which is generated by tissues or by contrast agents. Different modalities can be used to separate harmonics from fundamental bands from the received signal. New Doppler modes have been developed, including large band modes, while greyscale flow imaging allows the simultaneous imaging of blood flow and tissues. Compounding techniques improve the contrast resolution of tissues and reduce artefacts. 3D techniques are now currently available, real-time 4D imaging has been recently introduced. Elastographic imaging is still under evaluation, but promising clinical results have been shown. Portable units have been introduced, giving compromise between good technical performances and reasonable cost and allowing ultrasound to be used in ICU, bedside situation and outpatients. Recent release of the DICOM specification has made the full integration of ultrasound to the PACS systems easier. All these advances make the contribution and the potential of ultrasound in patient management still growing.

Aneuploidy detection: an evidence based approach

Harris J Finberg, Phoenix Perinatal Associates, United States

Screening for aneuploidy has evolved from recognising risk based on maternal age, to identifying added risk based on serum analytes and/or sonographic marker findings, and then to using favourable maternal serum screening and normalcy on sonograms to reduce a pregnant woman's *a priori* high risk status.

Current research supports a further evolution toward universal screening of all pregnant women. Each woman, regardless of age, can get her own unique risk assessment for trisomies 21 and 18 and spina bifida in her current pregnancy. This is based on a combination of sonographic observations used to mathematically adjust the woman's individualised risk based on an evaluation of serum analytes in second and progressively more so in first trimester.

A normal second trimester detailed genetic sonogram may reduce the serum screen Down syndrome risk by 60–70% and the risk of Trisomy 18 by a factor of at least ten times lower. Combined second trimester screening may detect 80% or more Trisomy 21 cases at 5% false positive.

Recent emphasis has been on first trimester sonographic screening by the Dorsal Nuchal Translucency (DNT) together with blood analytes, free beta-hCG and pregnancy-associated plasma protein A (PAPP-A). This screening strategy may have similar sensitivity and specificity weeks earlier.

Combining first and second trimester screening may potentially exceed 90% sensitivity but with a 3–4 week delay between initiation of the screening and the report of the risk level.

Clinical value of 3-D and 4-D ultrasound in prenatal diagnosis

Ronald J Benzie, Nepean Hospital, University of Sydney, NSW

This presentation will focus on the question 'Do we need to invest in 3-D/4-D ultrasound – is it a luxury or a necessity for prenatal diagnosis?'. The advantages of this technique will be discussed as well as the disadvantages including the use of 3-D ultrasound for entertainment.

A literature review will be presented of the fetal anomalies in which 3D/4D ultrasound has been shown to be of value. Experience in our own centre with volume acquisition in pathology of the lungs, adrenals, kidneys and spine will be discussed.

Emphasis will be placed on the use of 3D and 4D ultrasound in counselling of patients and preoperative usefulness for paediatric surgeons. Finally its potential as a research tool will be demonstrated.

Prenatal imagining and postnatal imaging

Rita L Teele, National Women's Hospital and Starship Children's Hospital, New Zealand

This case-based presentation emphasises the linkage between prenatal diagnosis of an abnormality and postnatal imaging.

Although exquisite anatomic detail may be revealed on prenatal ultrasonography of the fetus, the specific diagnosis of an abnormality may be elusive. Considerations concerning prenatal diagnosis include the following:

1 One scan represents a snapshot in time. A sequence of scans may provide a more complete picture of a prolem.
2 Normal development may masquerade as abnormality, particularly in the first trimester.
3 There is an overlap between 'normal' and 'abnormal'. For example, echogenic bowel as a solitary finding may or may not be important.
4 Anatomy does not equal physiology. For example, a measurement of the renal pelvis does not predict renal function.
5 Size of an abnormality does not always correlate with outcome. For example, a large ovarian cyst may pro-- duce fewer symptoms in the neonate compared to a small duplication cyst of bowel.
6 Fetal circulation is different from the neonatal. Certain cardiac abnormalities may be undiagnosed in utero.
7 A label tends to stick. Beware of using diagnostic labels when there are uncertainties.
8 Abnormalities may be acquired after scans have been normal; specifically, infection and ischaemia may affect the fetus in the third trimester.
9 A Fetal Medicine Panel is a forum both for discussion of abnormalities identified on prenatal scanning and for rec-- ommendations concerning obstetric and/or paediatric follow up.
10 Abnormalities identified prenatally must be followed up postnatally.

The changing role of non-invasive vascular studies and how they impact on decision making

Philip J Walker, University of Queensland, Qld

The investigation and management of vascular diseases underwent a revolution when duplex ultrasound (DUS) became widely available. This signalled the end of the era of routine angiographic assessment. Duplex ultrasound could be used to evaluate and plan intervention in many arterial beds. Up to 90% of carotid surgery could be planned after DUS alone. With DUS, PAD could be evaluated and management planned for many, with angiography used only selectively. AAA was diagnosed with DUS and in most cases surgery was undertaken after axial CT. Duplex ultrasound usurped venography as the first line imaging modality for diagnosis of both venous thrombosis and incompetence. As a process however, DUS has been hindered by its operator dependence and the time consuming nature of many of the studies.

The advent of non-invasive helical CT and MR angiography has provided a competitive option to DUS and catheter angiography for the evaluation of vascular diseases in many instances. These imaging modalities are not encumbered with the potential morbidity and cost of angiography. Compared to DUS they are more expensive modalities but can often be performed in a shorter time and they are not as operator dependent. In some areas that are difficult to study with DUS (eg. pelvis, abdomen, renal arteries, chest, intracranial circulation) the advantages of these modalities are obvious.

The maturation of these new imaging modalities for vascular applications has occurred at a time when there is a growing trend towards endovascular therapeutic techniques (eg. aortic stent-grafting) where additional information is required for planning and follow-up, than is required for conventional open surgical procedures. Such information is not always available from DUS. There is a need for comparative studies of the accuracy, advantages and disadvantages, and costs, of the various imaging modalities for different indications. Despite the challenge from the newer imaging modalities, properly performed DUS will remain an important, cost effective modality for the evaluation of patients with vascular diseases.

This presentation will discuss the current trends in vascular imaging, and the strengths and weaknesses of the various imaging modalities for individual vascular applications.

Imaging the carotid artery after open and endovascular procedures

Kathleen A Carter, Vascular & Transplant Specialists & Eastern Virginia Medical School, United States

Duplex ultrasound has been shown to be a very accurate way of identifying and following disease in the carotid arteries. It is also useful in following patients after both open and endovascular interventions. Following standard surgical endarterectomy, it may be used to identify restenosis from intimal hyperplasia, recurrent atherosclerotic disease, identify technical defects at the time of surgical repair or later and identify proximal or distal clamp injuries.

The use of carotid stents has been growing in popularity, particularly since the introduction of protection devices. The use of a stent is designed to restore the lumen by compressing the plaque and pushing out the wall of the ICA. The stent is often placed across the orifice of the external carotid artery and may involve the common carotid artery as well. Standard velocity criteria validated with angiography for native diseased arteries may overestimate disease in stented arteries. The vessel compliance is decreased and higher velocities are often seen in stented segments. Early results of the CREST trial shows that PSV < 150 cm/sec correlates with normal lumen (0–19%stenosis) with a sensitivity of 75% and a specificity of 91%.

Carotid stenting is a still evolving endovascular procedure and because its efficacy is yet to be determined, long term follow-up will be necessary to evaluate its results. Duplex Ultrasound is an ideal modality for monitoring patients following stent placement and may also have a role in pre-procedure planning and patient/lesion selection.

The importance of graft surveillance in lower extremity bypass

Bernard M Bourke, Gosford District Hospital, NSW

In a landmark study Szilagyi[1], using angiography, has demonstrated that significant structural defects will occur in almost one third of intrainguinal vein bypasses (IVB) at a mean follow-up of 5 years (the majority within 6–9 months). Stenoses in vein grafts are associated with a spectrum of morphologic changes and the natural history of the lesion appears to be linked to a hyperplastic process occurring in the vein wall as well as thrombotic events on the lumen surface.

Typically these lesions develop without symptoms and, when haemodynamically significant, graft failure will occur unless a lesion is repaired. Up to 15% of grafts could fail during a surveillance interval on the basis of simple ankle brachial indices (ABI) measurements and a positive ABI result will indicate a graft in jeopardy less than one third of the time.

Duplex scanning is a valuable tool for post-operative sur-

veillance both to identify the "failing bypass" and to characterise the natural history of stenosis in vein grafts. Routine surveillance has demonstrated that 12–37% of IVB develop a progressive stenotic lesion that warrants correction.

Angiographic stenosis of greater than 70% is the best predictor of subsequent graft failure and such angiographic stenosis correlates with a PSV ratio of 3.0 (sensitivity 80%, specificity 84%). Duplex surveillance has also indicated that sites of flow disturbance can resolve with time. Approximately one half progress and require correction, one third regress and the remainder can remain dormant.

Controversy exists as to the criteria used to indicate a graft is failing, the frequency of surveillance, the additional value of ABI, the use of angiography and the method of correction of identified abnormalities[2].

1 Biologic Fate of Autogenous Vein Implants as Arterial Substitutes. Szilagyi DE et al. *Ann Surg*. 1973: 178: 232–244.

2 Duplex Scan Surveillance of Infra-Inguinal Bypass Grafts. Bourke BM. Editorial *Aust N.Z. J. Surg* (1998) 68, 249–250.

The fast scan – where has it been? Where is it going?

John P McGahan, University of California, Davis Medical Center, United States

Objectives

- Review ultrasound findings of traumatic injuries to the abdomen
- Familiarise audience with limitations of the trauma ultra sound
- Demonstrate methods of performance of the trauma ultra sound

Ultrasound technique

The focus of the ultrasound examination in patients with blunt abdominal trauma is detection of free intraperitoneal fluid. As such a comprehensive examination includes real-time imaging of the RUQ, LUQ, the paracolic gutters, and the mid-epigastrium. The seventh view is a subxiphoid view of the theart to check for pericardial effusions.

Ultrasound findings

Free fluid is usually hypoechoic in appearance. However, with more active hemorrhage, it may become more echogenic with swirling debris noted within the fluid.

Ultrasound findings – organ injury

Injuries to the liver, spleen, and kidney area are difficult to identify with sonography. Liver lesions are often isoechoic with the rest of the liver. In one series, minor liver lesions were echogenic and became isoechoic or cystic appearing with healing.

Often, renal injuries are best detected as a disorganised appearance to the particular portion of the kidney that is injured.

Future

In the future ultrasound contrast agents may be useful to detect solid organ injuries. This use of contrast agents will be reviewed.

References:

1 McGahan JP, Rose J, Coates TL, Wisner DH, Newberry P. Use of ultrasonography in the patient with acute abdominal trauma. *J Ultrasound Med* 1997; 16: 653–662.

2 Richards JR, Schleper NH, Woo BD, Bohnen PA, McGahan JP. Sonographic assessment of blunt abdomi nal trauma: a 4-year prospective study. *J Clin Ultrasound* 2002; 30: 59–67.

Ultrasound evaluation of acute right lower quadrant abdominal pain

Giovanni G Cerri, Hospital das Clinicas – University of Sao Paulo, Brazil

The great number of possible pathologies bringing a patient with acute right lower quadrant (RLQ) abdominal pain to an emergency department can make this a challenging clinical scenario. Acute appendicitis leads the list of common causes to be considered, but numerous other entities, both surgical and non-surgical, may present in such a manner. In typical settings, such as in young males presenting with classic appendicitis, it is generally accepted that further diagnostic procedures are unnecessary. However, daily experience has shown that these account for a minority of cases, and that imaging studies have had much to contribute, by improving diagnostic accuracy and lowering the number of unnecessary surgical operations. Sonography has advantages that make it a uniquely fit imaging tool for the evaluation of these patients in the emergency department, being innocuous, readily available, fast and low-cost. The innate ability of US to address gynaecological and obstetric pathologies combined with its advances in the assessment of gastrointestinal abnormalities enables it to screen efficiently most pathologic conditions that will bring these patients to the emergency room. Unusual causes of RLQ pain such as urinary and vascular disorders can be also efficiently diagnosed. Physicians need to be familiarised with the correct examining technique and US appearances of these disease processes, in order to modify positively the outcome of these acutely ill patients.

Ultrasound contrast agents in routine clinical practice

Jane A Bates, BMUS, United Kingdom

During the last decade, microbubble contrast agents have predominantly been the preserve of research projects, tending to be confined to specialist and research centres.

Can, and should, contrast agent scanning now be translated into routine practice, to be utilised by busy sonographers during busy sessions? The answer is undoubtedly in the affirmative.

Contrast agents can be a quick, well-tolerated and accurate adjunct to many areas of ultrasound diagnosis, providing increased diagnostic confidence, obviating the need for further (often invasive) imaging and offering much-needed and immediate reassurance to patients.

Lesion characterisation, especially in the liver, is particularly successful using contrast agents, and requires little overall training for the experienced sonographer. Other areas include renal lesions, vascular leaks and follow-up of disease following surgical treatment.

Several case studies will be presented to illustrate the advantages of using contrast in routine practice.

Echocardiography; who, why and what. An overview of echo practice

Rob A Phillips, University of Queensland, Qld

Since the first clinical use of echocardiography, nearly 30 years ago, it has become a ubiquitous and accepted tool for evaluation of many cardiovascular diseases. Over this time the usefulness and applications of echocardiography have been proven by research and academic publications from specialised centres of excellence. However, these centres of excellence may have specific experience and expertise in the clinical area of publication, which is not reproduced in the echo community at large. Clearly the benefits to the community of echocardiography depend on high practice standards across a broad range of applications in a variety of clinical settings by a number of practitioners. While echocardiography is recognised as a user dependent modality, the use of universal standards of practice and protocols as to who should perform an examination, why they should perform an

examination, and what examination should be performed, may contribute significantly to improved practice.

There are currently pressures for echocardiography to be practiced more widely in multiple clinical environments. However attaining the operator skills to deliver effective and reliable diagnostic results in multiple clinical disciplines may take time and considerable training before the results in published literature are achievable. Additionally the concept of the limited examination by operators of limited experience has also achieved some clinical acceptance. However, it is important that the results associated with published best practice be achieved to fulfil our statutory responsibilities to patients and justify community economic support.

This presentation reviews the indications and applications of echocardiography and presents supporting evidence, and discusses the potential for greater standardisation of echo practice goaled toward delivery of proven, equitable and cost-effective care.

Quality issues in ultrasound

Matthew W Andrews, RANZCR, Vic

In addressing quality issues in the provision of a diagnostic and interventional ultrasound service, each component of the examination must be addressed, as the overall quality of the study will only be as high as the weakest component.

An ultrasound examination can be seen as the sum of the following components:

- Patient
- Referral
- Equipment: Machine
- Sonographer
- Sonologist
- Report
- Payer

This presentation will address each of these factors, identifying, with perspective, the major issues, which determine the quality of each step.

Role extension for sonographers

Robyn Tantau, Advanced Medical Imaging, NSW

Sonographers are currently forced to move into applications, sales, education or management to have a career path within the profession.

The Australian Sonographers' Association (ASA), in response to lobbying from its membership is looking into ways by which an extension of the sonographer's current role could be instituted.

There are already other professions in the medical field where this has happened. Nurse practitioners are the most well known.

Research is being commissioned to look at the viability of such an extension of role for sonographers and to propose a model for this if it is thought to be viable.

There are many potential benefits to the business of ultrasound with the creation of a sonographer practitioner role. An attractive career path will be in place that will help retain sonographers in the field and help address the current shortage of suitably qualified sonographers.

Not all sonographers will chose to follow this path and only those sonographers who are suitably trained would be able to extend to this role. Sonographer practitioner is the next logical step for the development of the profession and all stakeholders will benefit from its instigation.

My presentation will look at some of the issues facing the profession, how role extension may come about and some of the potential problems that need to be resolved.

Results/recommendations from AIUM's compact/hand-held ultrasound forum

Paula S Woletz, American Institute of Ultrasound in Medicine, United States

In April 2004, the American Institute of Ultrasound in Medicine held a multispecialty forum to study the impact of low-cost, high-resolution lightweight ultrasound machine technology, which has created new opportunities, applications, and challenges in diagnostic medical sonography. Key figures in the medical field addressed issues central to the use of compact ultrasound devices, including education, research, quality assurance, reimbursement, point-of-care ultrasound versus referred ultrasound procedures, and the utilisation of these devices in the future. Forum participants predicted increasing use in emergency medicine, focused subspecialty applications, screening examinations, more comprehensive diagnostic studies, procedure guidance, and ultimately as an adjunct to routine physical exams. These topics and related issues in medical education, reimbursement, and evolving technology will be discussed.

Quality issues in the UK

Jane A Bates, BMUS, United Kingdom

A shortage of radiologists during the last two decades has driven role extension for sonographer practitioners. This has resulted not only in a high level of sonographer expertise and development, but also in the sonographer practitioner as a specialist member of the multidisciplinary team.

Demand for ultrasound has, however, outstripped capacity. There is now a sonographer shortage, and more clinicians are demanding ultrasound 'on tap' in the setting of a one-stop clinic or surgery.

This has generated quality issues. Training more sonographers is not possible due to the already compromised staffing levels in over-pressed departments. Some clinicians are choosing to provide ultrasound themselves, without proper training or audit.

Ultrasound outside the setting of the conventional hospital radiology department has huge implications for the patient. Reluctant practitioners must now explore how to provide training for a first line ultrasound scan which can achieve an acceptable contribution to patient management while meeting proper standards for accuracy, audit and patient care.

Education and QI: members' perspective of the value of CPD in improving their practices

Keith Henderson, Australasian Society for Ultrasound in Medicine, NSW

ASUM members have used ASUM's MOSIPP program as a means to record their CPD since the program's inception in 1997. In this time a considerable body of data has developed. This presentation will draw on these data to demonstrate trends in members' continuing professional development CPD practices and reveal indicators of the relative values that they place on their learning experiences.

Individual and group learning curves for ultrasound fetal biometry measurements

Sarath L Weerasinghe, FMHS, Anthony D Revel, FMHS, Hisham Mirghani, FMHS, Fikri Abu-Zidan, FMHS, UAE University, United Arab Emirates

Objectives

To use cumulative sum analysis (CUSUM) in the estimation of the number of examinations a trainee primary health care doctor requires to achieve an acceptable level of accuracy in fetal measurements.

Design
A prospective observational study.

Methods
Three primary health care doctors, who had had no formal training in ultrasound attended a two week course in ultrasound measurements of fetal biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC) and femur length (FL). Following this each trainee measured the fetal BPD, HC, AC, FL according to established criteria on 100 consecutive antenatal patients, (300 patients / 1200 measurements). The supervisor repeated the measurements. If the trainee measurement was within ±5% or 10% of that of the supervisor, the measurement was considered a success and if in excess a failure. The CUSUM for each of the trainee measurements were calculated at set failure rates of 5% and 10% as: (Sn) = (Xi–X0), where Xi = 0 for success and Xi = 1 for failure, and X0 = a predetermined acceptable failure rate. The CUSUM values were plotted against the number of examinations to produce CUSUM graphs. The point at which the curve either plateaus or acquires a consistent negative slope indicates the number of examinations required to achieve competency in performing a particular measurement.

Results
For the whole group the minimum number of examinations required to achieve competency at 5%/10% were; BPD 65/10, HC 65/15, AC 80/45, FL 85/85. Individual learning curves will be presented.

Conclusions
To achieve competency, fewer examinations are required for BPD/HC compared to AC/FL. CUSUM curves identify the point of competency and quantifies the duration of training for each trainee and for each measurement, which helps to individualise a training program.

Imaging the Bush – ACRRM's innovative educational resources for rural and remote doctors in obstetric ultrasound

Dan L Manahan, Australian College of Rural and Remote Medicine and Queensland Health, Qld, Roz M Glazebrook, Australian College of Rural and Remote Medicine, Qld, Alan B Chater, Australian College of Rural and Remote Medicine and Private General Practitioner, Qld, Sue Davies, Australian Institute of Ultrasound, Qld, Gary Pritchard, Brisbane Ultrasound for Women, Qld, Rae Roberts, King Edward Memorial Hospital, WA, Brendan Steele, Private Rural Obstetrician and Gynaecologist, Qld

Over the last two years the Australian College of Rural and Remote Medicine (ACRRM) developed an obstetric ultrasound professional development program for rural and remote Australian doctors with funding provided by the Commonwealth Department of Health and Ageing. The program was based on the results of research on the educational needs of the target group. The College ran nine basic obstetric ultrasound two-day workshops which involved 141 rural and remote doctors having 'hands on' scanning of pregnant models using lower end ultrasound machines. As part of the program a number of enduring obstetric ultrasound educational resources were developed including a basic obstetric ultrasound manual, two videos of national obstetric ultrasound satellite broadcasts, a DVD and a CD ROM.

This paper will describe the development of these resources and demonstrate them. The CD ROM contains an ultrasound simulation section where doctors can manipulate the controls on an ultrasound machine to improve the image of the scan. They can also mouse over the controls to learn what each knob does (knobology). The CD ROM contains video clips of types of transducers, finding the cervix and vagina on ultrasound, first trimester scanning, biometry in second trimester, looking for the placenta, artefacts, measuring the amniotic fluid index, the abnormal obstetric ultrasound and an amniotic band. There are also 17 obstetric cases presented, including presenting history, scans with hotspots, true and false and short question and answer sections

Ultrasound weight estimation and diagnosis of macrosomia: a mathematical model

Max Mongelli, Nepean Hospital Penrith NSW, Australia and Ron Benzie, Nepean Hospital, University of Sydney, Australia

Objective
To assess the frequency of the diagnosis of macrosomia in relation to differing weight estimation formulas in unselected pregnancies.

Methods
Computer modeling techniques were employed. Computer software generated fetal biometry measurements according to published UK standards, from 37 to 40 weeks. For each set of measurements, an estimated fetal weight was obtained by 11 ultrasound weight formulas. The diagnosis of macrosomia was made if the weight estimate was greater than 4500g. Cohorts of 5000 pregnancies for each week of gestation were studied.

Results
The frequency of diagnosis of macrosomia increased progressively with advancing gestational age. The type of weight estimation formula had a large influence on the frequency of diagnosis of macrosomia. It ranged from 0 with Campbell's formula, to 10–15% with Shepard's or Birnholz's formula. The Hadlock group of formulae yielded frequencies of 0.7% to 1%.

Conclusions
Intervention rates for suspected fetal macrosomia may be related to timing and the type of weight estimation formula in use.

Ultrasound detection of non-palpable Implanon

Sofie G Piessens and Amanda Sampson, Royal Women's Hospital, Melbourne, Vic

Objective
Two studies have suggested that ultrasound and MRI can be used to localise non-palpable Implanon in phantoms but so far only case reports have been published about the management of actual patients with non-palpable Implanon. The aim of our study was to determine whether ultrasound is a reliable method to localise a non-palpable Implanon in vivo and to observe whether ultrasound localisation helps to reduce unsuccessful attempts to remove the implant.

Methods
We prospectively studied all patients referred to the ultrasound department of the Royal Women's Hospital in Melbourne for localisation of their non-palpable Implanon between December 2001 and April 2004. All patients were followed up to ascertain the accuracy of the ultrasound findings. If the rod was located, follow-up continued until the Implanon was surgically removed. If the rod could not be located, an etonogestrel determination was performed which, if negative, confirmed the absence of the rod.

Results
Thirty-four patients were referred for ultrasound localisation of non-palpable Implanon. Twenty-five Implanons were seen and nine could not be seen with ultrasound. So far we have confirmed follow up in 30/34 patients. Where the Implanon was localised, it was proven present in 21/22 cases. Where the Implanon was not seen, the implant was proven absent in 6/7 cases. Eleven of the 34 patients underwent one or more unsuccessful attempts to remove the implant before referral to the ultrasound department. Only one patient had an unsuccessful attempt after ultrasound marking.

Conclusion
In experienced hands, ultrasound is an effective tool to localise non-palpable implanon and to assist the surgeon in successfully removing the implant. The positive predictive value is excellent at 96%. With a negative predictive value of 85%, MRI and etonogestrel determination is required in those cases where ultrasound does not detect the implant to confirm or refute the absence of the rod.

The work practice of sonographers performing nuchal translucency measurements
Tania L Griffiths, Monash University, Vic and Euan M Wallace, Monash University, Vic

Background
Nuchal translucency (NT) has become a widely used marker for fetal aneuploidy screening. The method of NT measurement is critical to optimum performance of NT as a marker. While it might be assumed by the profession and referring physicians that sonographers will perform the NT measurement in a consistent and uniform manner that reflects best practice, for a variety of reasons, this may not always be so. The aim of this study was to survey current NT measurement practice in Australian sonographers.

Methods
An on-line survey was developed and posted on the ASA website. Registrants for the ASA 2004 meeting were specifically directed to the survey. The survey explored various aspects of current practice.

Results
Two hundred and five sonographers have completed the survey. A full analysis of the data has not been completed at the time of abstract submission. However, of the respondents to date, 86% regularly undertake NT measurements as part of their work. It is clear that, for these respondents, there are differences in various technical aspects of NT measurement. 64% of respondents measured NT using an image size of 100% of fetal CRL, 30% using 200% of CRL. Image enhancement (compound imaging, harmonics, X-res or similar) is not used by 38%, sometimes used by 43% and always used by 18% of sonographers in the acquisition of NT measurement. Also, approximately 57% of sonographers regularly undertaking NT measurements have completed a formal NT course.

Conclusions
There are widespread differences in the approach to NT measurement. It is likely that these differences will have an impact upon NT-derived Down syndrome risks and therefore upon clinical decisions arising from the examination. Validation of the techniques for NT measurement is required along with the introduction of uniform, evidence based guidelines and standardised technique. The ASUM should consider the adoption of a standard technique for the measurement of NT.

Accurate ultrasound estimation of gestational age in late pregnancy
Max Mongelli, Nepean Hospital Penrith, NSW, Yuxin Ng, National University of Singapore, Singapore and Stephen Chew, National University of Singapore, Singapore

Objective
To derive an accurate formula for ultrasound estimation of gestational age in late pregnancy.

Methods
A database of 149 singleton pregnancies conceived by artificial reproductive techniques was studied. A total of 210 third trimester ultrasound fetal biometry measurements were available. Biometry variables included the HC, FAC and the FL. The dataset was equally divided into a derivation sample and a target sample. To derive the equations of best fit, regression analysis was used, with true gestational age as dependent variable and fetal biometry measurements as independent variables. The formulas were tested on the target set and the gestational age estimates were compared with the actual gestational age. Clinical performance was estimated in terms of absolute errors and the 95% CI.

Results
The gestational ages ranged from 25 to 40 weeks, with a mean of 33 weeks. The best performing derived formula was a combination of HC and FL. This had a mean absolute error of 5.6 days, and a 95% confidence limit of -14 to +15 days. In contrast, using the HC only gave a mean absolute error of 7.8 days and a 95% confidence limit of -22 to +18 days.

Conclusions
Ultrasound estimation of gestational age in late pregnancy is better than indicated by older publications. It is more accurately estimated by combining the HC with the FL than by just using single measurements only.

Ultrasonography in the neonatal nursery
Rita L Teele, National Women's Hospital & Starship Children's Hospital, New Zealand

With the introduction of portable ultrasound equipment 25 years ago, the clinical practice of neonatology changed forever. Within the secure confines of the neonatal nursery, the neonate can be scanned – literally and figuratively – from top to toe.

This presentation will highlight some of the more unusual applications of neonatal ultrasonography, in addition to noting the ongoing role of neurosonography, particularly of the premature infant.

Considerations for neonatal scanning are as follows:

- Appropriate equipment with high frequency transducers, including linear
- Appropriate handling of neonates
- Clinically targeted examination; frequent consultation; routine conferences

Integration of ultrasonography with other imaging indications for neonatal scanning include the following:

- Postnatal scanning of abnormality discovered on prenatal scans
- Suspected intracranial abnormality
- Neck mass
- Echocardiography for suspected congenital heart disease or patent ductus arteriosus of prematurity
- Chest mass
- Intra-abdominal mass
- Some cases of gastro-enteric abnormality
- Position/complications related to catheters
- Suspected renal disease
- Ambiguous genitalia
- Suspected spinal abnormality
- Abnormality of hips and/or other joints
- Soft tissue mass
- Scrotal mass

Paediatric ocular ultrasound
Amanda J Crow, The Children's Hospital at Westmead, NSW

Ultrasound of the paediatric eye is useful to aid diagnosis in both congenital and acquired conditions. High resolution equipment is readily available, with no special equipment required for the adequate visualisation of the eye. Knowledge of technique of ocular ultrasound and the various pathological states encountered may help avoid imaging which either requires anaesthetic and/or ionizing radiation.

The shallow depth of the eye and low attenuation of the aqueous humor allow for the use of a very high frequency transducer. A linear array of at least 10MHz is required.

Normal warmed gel may be used except in the case of a recent penetrating eye injury. Patients are scanned in the supine position with their head cradled by a pillow to discourage movement. Scanning is performed through the closed lid.

In general no sedation or anaesthetic is required for ocular ultrasounds. Congenital anomalies are usually detected in young infants, feeding the baby prior to the examination will encourage a more settled state.

Imaging of the eye is required when there is obstruction of the view obtained with an ophthalmoscope, either by lens opacity or by solid matter within the aqueous humor.

Pathology falls into two categories, congenital and acquired.

Congenital anomalies include:

- Congenital cataracts
- Microphthalmia
- PHPV (persistent hyperplastic primary vitreous)
- Coats' disease

Acquired conditions include:

- Infection
- Trauma
- Tumour

Progression of haemorrhage leading to contraction and traction retinal detachment can be monitored by serial ultrasounds.

An awake patient will mean there is movement of the eye, this can be of diagnostic value to visualise movement of fibrinous bands and to allow complete visualisation of different areas of the eye.

The judicious use of colour and spectral Doppler is essential to confidently diagnose PHPV, retinal detachment and to differentiate between a mass and vitreous haemorrhage.

Contrast study for hepatic sonography

Michel Claudon, Hôpital d'Enfants – CHU Nancy, France

The development of ultrasound contrast agents (UCA), which perform as blood pool tracers, have overcome the limitations of conventional B-Mode and colour or power Doppler US and enable the display of parenchymal microvasculature. The assessment of microbubbles usually requires contrast specific imaging modes. Contrast specific US modes are generally based on the cancellation and/or separation of linear US signals from tissue and utilisation of the nonlinear response from microbubbles.

Dependent on contrast agent and US-mode, the dynamic lesion enhancement pattern is visualised during intermittent or continuous insonation.

An inherent advantage of second generation UCA is the possibility to assess the contrast enhancement patterns in real time. Enhancement patterns are described during subsequent vascular phases (eg. arterial, portal-venous and late phase for liver lesions), similar to contrast enhanced computer tomography (CECT) and/or contrast enhanced magnetic resonance imaging (CEMRI).

In adults, based on characteristic enhancement patterns throughout the vascular phases, contrast-enhanced ultrasound (CEUS) of the liver permits clear improvements in the characterisation and detection of FLL when compared to un-enhanced US, with close diagnostic agreement with other well established radiological imaging methods such as CECT or CEMRI.

In Europe UCA have not been approved in children, except for the diagnosis of vesico-ureteric reflux. We report our initial experience on the use of a second generation UCA in the evaluation of focal liver lesions in children, including benign lesions such as adenomas and focal nodular hyperplasia, malignant lesions and the follow-up of chronic hepatopathies.

The RANZCR/NATA accreditation program

Lawrence Lau, The Royal Australian and New Zealand College of Radiologists, NSW

In the mid 1990s, The Royal Australian and New Zealand College of Radiologists considered the implications and development of practice accreditation.

The Accreditation Guidelines and Quality Committee was formed in 1997 to lead the development of an accreditation program. It was agreed that the program would be implemented in stages, with Stage 1 (Registration stage) introduced in 1999 and Stage 2 (Registration stage) available in 2001. Stage 3 (Accreditation stage) was launched in 2003 and is known as the RANZCR/NATA Accreditation Program.

This paper will cover the features related to the different stages of the program development, including the setting and updating of accreditation standards and assessment processes. The collaboration with the stakeholders will be highlighted. The role of the Medical Imaging Accreditation Advisory Committee (MIAAC) will be discussed. The range of issues relating to accreditation, ie. accreditation requirements, assessment and application processes and the role of assessors will be presented. The paper will conclude with the benefits of accreditation, the challenges ahead and the supports available.

AIUM accreditation and quality improvement findings from a case control study

Alfred Abuhamad, Eastern Virginia Medical School, United States, Beryl Benacerraf, Harvard Medical School, United States, Paula S Woletz, American Institute of Ultrasound in Medicine, United States and Bonnie Burke, Eastern Virginia Medical School, United States

The most critical element of the AIUM ultrasound practice accreditation is the submission of actual case studies. The AIUM and other organisations have developed collaborative ultrasound examination performance guidelines that serve as the standards by which case study submissions are graded. Once accredited, practices must apply for re-accreditation every three years.

Case study scores from a random sample of re-accreditation applications were compared to each practice's scores from its initial application. The re-accreditation case study scores were also compared to scores earned by initial applications that were received in the same time period as the re-accreditation applications. The re-accreditation scores were significantly higher than the scores earned by the same practices on their initial application. Re-accreditation scores were also significantly higher than the scores of initial applications that were submitted at the same time as the re-accreditation applications.

Conclusion

Practices that seek and receive AIUM ultrasound accreditation were able to improve the scores of case studies and compliance with published minimum standards and guidelines when re-evaluated three years after the initial application scores. This improvement should translate into an enhancement of the quality of ultrasound practice. (Abuhamad A, Benacerraf B, Woletz P, Burke B. The accreditation of ultrasound practices: impact on compliance with minimum performance guidelines Journal of Ultrasound in Medicine 2004; in press)

ICAVL – the effect of an accreditation body in improving practice standards

Kathleen A Carter, Vascular and Transplant Specialists, United States

Committed to balancing the changing needs of both the vascular community and the general public, the ICAVL was created in 1990 by uniting physicians, technologists and sonographers from 10 sponsoring organisations. Collaborating together, those physicians, technologists and sonographers composed the body of work known as The Standards, an extensive docu-

ment defining the minimal requirements for vascular laboratories to provide high quality care. Laboratories use The Standards as both a guideline and the foundation to create and achieve realistic quality care goals.

The purpose of the Intersocietal Commission for the Accreditation of Vascular Laboratories (ICAVL) is to provide a mechanism for accreditation of facilities that perform comprehensive testing for vascular disease with non-invasive testing modalities. Through the accreditation process, laboratories assess every aspect of daily operation and its impact on the quality of health care provided to patients. While completing the accreditation application, laboratories often identify and correct potential problems, revising protocols and validating quality assurance programs. Because accreditation is renewed every three years, a long-term commitment to quality and self-assessment is developed and maintained. Laboratories may use ICAVL accreditation as the foundation to create and achieve realistic quality care goals. The ICAVL has accredited more than 1600 vascular laboratories through a well-established intersocietal accreditation program. In the majority of states within the US, Medicare reimbursement for vascular laboratories hinges on either ICAVL laboratory accreditation or technologist certification.

ICAVL Mission Statement

The ICAVL is dedicated to promoting high quality non-invasive vascular diagnostic testing in the delivery of health care by providing a peer review process of laboratory accreditation. www.icavl.org

Ultrasound and haematological assessment of devices for deep vein thrombosis prophylaxis

John P Woodcock, Rhys J Morris, John C Giddings, Heather M Ralis, Gwyneth M Jennings and Delyth A Davies, Cardiff University, United Kingdom

Purpose

Intermittent pneumatic compression is an accepted physical method of DVT (deep vein thrombosis) prophylaxis, and is thought to act by prevention of venous stasis and by effecting fibrinolysis.

Some systems inflate rapidly to produce high venous blood flow velocities, though this has not been shown to be beneficial in prevention of DVT. The objective of this research was to determine whether there was a positive link between more rapid velocities, and changes in fibrinolysis.

Methods

A rapidly inflating intermittent calf compression system, and a more gently inflating equivalent were applied to 20 healthy male volunteers for two hours each. Blood flow velocity was measured in the femoral vein with Doppler ultrasound. Venous blood samples were taken for analysis of blood coagulation and fibrinolytic potential.

Results

The rapid system produced significantly higher venous peak velocities and augmentations at the beginning, middle and end of the two hours, as was expected. TFPI (tissue factor pathway inhibitor) and tPA (tissue plasminogen activator) levels were significantly increased after the compression period for both pumps, and PAI-1 (plasminogen activator inhibitor 1) reduced, though the tPA change was probably caused by the period of rest. A D-Dimer test for global fibrinolysis showed significant increases for the gentler system, but not for the rapid system.

Conclusions

Differences in the inflation rates of intermittent compression systems clearly affect venous blood flow velocities, but while this data confirms that both types suppress procoagulant activation, rapid inflation clearly produces no extra benefit in increasing global fibrinolysis, and may be less effective. Rapid flow in veins during compression is not necessarily beneficial therefore, and simple prevention of stasis may be all that is needed.

Ultrasound detection of arterial neovascularisation in recanalising venous thrombus: a new diagnostic sign

Kathryn J Busch, Camperdown Vascular Laboratory, NSW, Geoffrey I White, Royal Prince Alfred Hospital, NSW, Alison E Burnett, Vascular Laboratory, Royal Prince Alfred Hospital, NSW, Debbie A Coghlan, Camperdown Vascular Laboratory, NSW and John P Harris, University of Sydney, NSW

It is known that recanalisation of venous thrombus can be readily observed using colour duplex ultrasound (CDU). As ultrasound capabilities advance however, it is now possible to readily image a phase of the recanalisation process that has rarely been described in humans. We recently detected arterial neovascularisation (ANV) in 85% of 20 consecutive patients presenting with lower extremity venous thrombosis.

The purpose of this presentation is to describe the ultrasound features of ANV and to demonstrate images documenting the phenomenon.

Using a Philips HDI 5000 ultrasound system, a standard venous CDU imaging protocol was implemented with particular attention to flow in and around the thrombus. Arterial neovascularisation was observed as small vessels that occur in the tissue surrounding a thombosed vein or predominantly on the vessel wall with small 'buds' entering the thrombus which:

- In more prominent cases appear as serpiginous small arterial channels within the thrombus
- Occur when thrombus is predominately homogenous and occlusive or virtually occlusive
- Exhibit a low resistive signature similar to a renal artery
- May arise from main the arterial tree eg. geniculate artery
- May be paired with a vein
- Range in diameter from 0.3 mm–3.0 mm (average diameter approx 1.0 mm)
- Are not detected when thrombus is retracted and organised in appearance

The presence of ANV can be identified with duplex ultrasound and may be more common than previously realised. There may be a new role for CDU in documenting this phenomenon although the clinical significance has yet to be determined.

The determination of fetal head engagement by clinical examination and translabial ultrasound

Valeria Lanzarone and Hans Peter Dietz, RPAH Sydney, NSW

Objective

While engagement of the fetal head is universally used in clinical obstetric practice, to date no attempts have been made to define engagement with modern imaging techniques. A recent pilot study suggested that head engagement can be determined by translabial ultrasound and is associated with delivery mode. In this paper the authors tested parameters of head engagement for their predictive value.

Methods

Two hundred and two nulliparous women in their first ongoing pregnancy were seen between 36 and 40 weeks' gestation in a prospective observational study. The assessment included an interview, abdominal palpation and (in a subset of 154 women) vaginal examination for a Bishop Score, as well as translabial ultrasound. Antenatal and delivery information was obtained from patient notes and the institutional obstetric database. Head engagement was determined in the midsagittal translabial plane, supine and after voiding, with a line vertical to the central axis of the symphysis pubis used as plane of reference.

Results
Of 202 women, one was excluded from analysis as she was found to have a previously undiagnosed breech presentation. The average age was 30, the average gestational age was 38 weeks. Head engagement was determined abdominally in 200 women, vaginally in 154 and sonographically in 201 women.
The three methods were strongly intercorrelated (all $p < 0.001$). All methods were associated with delivery mode, with the sonographic method showing by far the strongest association ($p < 0.001$ with both normal vaginal delivery and vaginal delivery.

Conclusions
Head engagement in the late third trimester is a predictor of vaginal delivery in nulliparous women. It can be assessed by translabial ultrasound, and the imaging assessment clearly is more predictive than abdominal or vaginal palpation of the fetal head. Used in conjunction with other parameters, it may allow construction of a predictive model for use in a clinical intervention trial.

Posterior compartment descent on 2-D and 3-D pelvic floor ultrasound
Hans Peter Dietz, NSW, Anneke Steensma, RPAH Sydney, NSW.

Objectives
Rectocele is regarded as the archetypal traumatic pelvic floor lesion, due to trauma sustained during crowning of the fetal head. There is little information on prevalence and aetiology of posterior compartment descent which may encompass perineal hypermobility, isolated enterocele or a 'true' rectocele due to a defect of the rectovaginal septum. Our objective was to determine the prevalence of true rectocele in a urogynaecological population.

Methods
Two hundred and seven women were clinically evaluated for prolapse and examined by translabial ultrasound, supine and after voiding, using 3D capable equipment (Kretz Voluson 730 and Medison SA 8000) with 7–4 MHz volume transducer.
Downwards displacement of rectocele or rectal ampulla was used to quantify posterior compartment prolapse. A rectovaginal septal defect was seen as a sharp discontinuity in the ventral anorectal muscularis.

Results
Clinically, a rectocele was diagnosed in 112 cases. Rectovaginal septal defects were observed sonographically in 78 (39%) women. There was a highly significant relationship between ultrasound and clinical grading ($P < 0.001$). Of 112 clinical rectoceles, 63 (56%) showed a fascial defect, in eight (7%) there was perineal hypermobility without fascial defect, and in three (3%) an isolated enterocele. In 38 (34%), no sonographic abnormality was detected. Neither position of the ampulla nor presence, width or depth of defects correlated with vaginal parity. In contrast, age showed a weak association with rectal descent ($r = -0.212$, $P = 0.003$), the presence of fascial defects ($P = 0.002$) and their depth ($P = 0.02$).

Conclusions
Rectovaginal septal defects are readily identified on translabial ultrasound as a herniation of rectal wall and contents into the vagina. Such defects are common and associated with age, not parity. The aetiology of defects of the rectovaginal septum may have to be re-examined.

Volume contrast imaging (VCI): clinical applications in obstetrics and gynecology
Teresa M Clapham and Gary R Pritchard, Brisbane Ultrasound for Women, Qld

Volume Contrast Imaging (VCI) is a relatively new technique in B-mode imaging obtained by acquiring a small, real time 3D volume acquisition. It promotes contrast enhancement and effectively reduces the signal to noise ratio within an image.

In our clinical department, we have discovered the vast benefits of this technology during the day to day scanning of obstetrics and gynaecological cases.

It is a useful tool in imaging and often optimises B-mode images in situations where images are compromised by increased signal to noise ratio and/or speckle artefact, such as maternal body habitus and fetal soft tissue structures such as kidneys, diaphragm and brain etc. This presentation aims to describe the VCI technology and give various pictorial and 2D comparative representations.

The 'why' factor in sonographic evaluation of the fetal brain and face
Jane S Fonda, University of Sydney, NSW

Sonographic evaluation of the fetal brain and face is part of the 18–20 week morphology scan. The studying of fetal anatomy is an important component along with the monitoring of growth. Normal brain patterns need to be thoroughly understood and observed during real time evaluation. Sonographic evaluation is operator dependent and limitations may occur due to maternal obesity or fetal position. Transvaginal evaluation may be helpful, however with the limitations of depth or even patient compliance, reevaluation of the fetus at 22 weeks may be necessary.

There are no guarantees, with all the antenatal diagnostic procedures, that a fetus will be normal in every aspect. When a fetus has a structural abnormality the clinical detection may depend on its size. Discrimination between normal and abnormal may not be as difficult as differential diagnostic features that distinguish one abnormality from another.

The person who examines the patient sonographically can impact management decisions. Education combined with continuing quality assurance is the most practical means of reducing the variability among sonographers.

An embryologic approach to spinal ultrasonography
Rita L Teele, National Women's Hospital & Starship Children's Hospital, New Zealand

Defects in gastrulation/notochord development (7–17 days post ovulation):
- Split cord malformations: diastematomyelia/ diplomyelia
- Segmentation anomalies of vertebral bodies

Defects in primary neurulation (18–27 days post ovulation):
- Rachischisis
- Anencephaly
- Encephalocele
- Spina bifida aperta (open defect)
- Meningomyelocele (closed defect)

Defects in ectodermal dysjunction (27–28 days post ovulation):
- Dermal sinus

Defects in secondary neurulation and rretrogressive differentiation (28–56 days post ovulation):
- Lipomyelomeningocele
- Tethered cord
- Rudimentary tail
- Caudal agenesis
- Myelocystocele associated with cloacal malformations
- Sacrococcygeal teratoma

Spina bifida and Arnold Chiari II malformation:
Arnold Chiari II malformation likely is secondary to decompression of the rhombencephalic vesicle when CSF leaks from a distal defect. Decompression results in inadequate stimulation of mesenchyme of posterior fossa. The developing infratentorial brain is compressed and displaced. The normal

flow of CSF is interrupted and ventriculomegaly results. (McLone and Knepper, 1989)

Diastematomyelia

Diastematomyelia may be related to duplication of the notochord and subsequent induction of two neural tubes. Vertebral anomalies are common. Combination of diastematomyelia with other neural anomalies, eg. lipomyelomeningocele or myelomeningocele is common.

Sacrococcygeal teratoma

The pluripotential cells in the caudal cell mass fail to complete their retrogressive differentiation and develop into a teratoma related to the coccyx.

Indications for spinal ultrasonography of the neonate are as follows:

- Sacral agenesis (shallow intergluteal cleft and flat glutei)
- Vertebral anomalies, especially sacral
- Sacrococcygeal cleft or dimple that is deep and/or atyp ical
- A mass, dermal abnormality or hairy patch over spine
- Abnormal neurologic examination of legs
- Abnormal rectum/anus
- Sacrococcygeal teratoma
- Paraspinal mass in chest or abdomen

Doppler and the paediatric kidney

Michel Claudon, Hôpital d'Enfants – CHU Nancy, France

Renal Doppler imaging has been successfully performed, as the blood flow in a normal kidney is important, resulting in a high Doppler signal level.

Several Doppler techniques can be used, including color, amplitude and duplex modes. A precise knowledge of their respective benefits and limitations allow for the appropriate choice, a better optimisation of technical settings in a given patient, and understanding of normal vascular anatomy and hemodynamics.

From a practical point of view, the wish of a good sensisitivity to low blood flow is often compromised by motion artefacts. Other modalities, such as Dynaflow and non-Doppler techniques, have been recently introduced, leading to a better spatial resolution.

The actual trend to use higher transmission frequencies further improves the spatial resolution, and increases the sensitivity to flow. New software packages been introduced in the attempt to reduce motion artifacts.

Clinical applications of Doppler include the detection and follow-up of renal vein or artery thrombosis, the diagnosis of acute pyelonephritis, the evaluation of vascularity of renal tumors and pseudotumors, the detection of crossing vessels in UPJ syndromes, the follow-up of patients after renal transplantation.

Ureteral jets may be an adjunct for the diagnosis of obstruction of the upper urinary tract in some cases. Doppler has been used for the detection of vesico-ureteral reflux, but now contrast-enhanced US appears more sensitive and reliable.

Intussusception with a leadpoint in children

Albert H Lam, University of Sydney, Children's Hospital at Westmead, NSW

Objective

To review and correlate the diagnostic sonographic features of small bowel, ileo-colic intussusception secondary to a leadpoint with surgical and pathological findings.

Materials and methods: Review of surgical and pathological findings with sonographic studies of proven cases of intussusception secondary to a leadpoint in the Royal Alexandra Hospital for Children, Sydney from 1983 to 2003 were undertaken retrospectively.

Seventeen cases were collected which includes six cases of inverted Meckel's diverticulum, four cases of lymphosarcoma, three cases of duplication cyst and four cases of small bowel polyps, two associated with Peutz-Jeghers syndrome, and two with inflammatory myofibroblastic tumour.

Four cases of Henoch-Scholein purpura and four cases of cystic fibrosis were excluded, as there were no definite lead points identified and these were treated conservatively.

Results

The common leadpoint points are inverted Meckel's diverticulum, intestinal duplication cyst, lymphosarcoma, and small bowel polyps. Preoperatively sonography correctly diagnose all cases and the imaging features correlate well with the surgical and pathological findings. In our series, barium or air enema reduction was only performed in cases with early ileocolic intussusception as to partly reduce the intussusception before surgery.

Conclusion

Sonography correctly depicts the lead points of secondary intussusception pre-operatively and guides subsequent management. A high index of suspicion and careful search for a leadpoint is indicated in cases of atypical age of presentation, recurrent intussusceptions, cystic fibrosis and clinical signs of Peutz-Jegher syndrome.

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An approach to the diagnosis of skeletal dysplasia in the fetus

Rita L Teele, National Women's Hospital & Starship Children's Hospital, New Zealand

The identification and specific diagnosis of skeletal dysplasia in the fetus is one of the most difficult tasks for the sonographer and sonologist. The rarity of skeletal dysplasia is such that an obstetric sonographer, working full time, might encounter one case every two years. Many dysplasias do not become manifest until the third trimester; therefore, an 18–20 week scan is often unrevealing.

Although a family history of skeletal dysplasia guides prenatal investigation, most fetuses with skeletal dysplasia are the result of spontaneous chromosomal mutation.

When skeletal dysplasia is suspected, by virtue of short or abnormally shaped limbs, the following protocol is offered as a guide:

- Length of all long bones: femur, humerus, ulna, radius, tibia and fibula
- Sagittal and coronal views of femora and humeri
- Transverse view of the clavicles
- Sagittal views of the scalpulae
- Ribs: length and shape
- Thoracic circumference/abdominal circumference
- Axial view of the feet with measurement of foot lengths
- Number of digits of hands and feet, if possible
- Sagittal, transverse, and coronal views of the spine
- Profile and coronal views of the face with 3D view if available
- Skull: shape, softness, sutures

After skeletal dysplasia is diagnosed:

- In lethal skeletal dysplasia, (skeletal anomalies in association with pulmonary hypoplasia) thoracic cir cumference is usually equal to, or less than one half the

abdominal circumference
- Severe intrauterine growth retardation may mimic skeletal dysplasia
- Aneuploidy is frequently associated with skeletal dysplsia
- Some teratogens, and diabetes mellitus, are associated with skeletal dysplasia
- Discussion of findings with parents should follow directly after the scans, but avoid specific diagnostic labels unless certain
- Consultation with other services, specifically obstetrics, paediatrics, genetics should be scheduled. Consider other imaging such as radiography, MRI
- 'Common' diseases happen commonly. Most skeletal dysplasias diagnosed prenatally fall in to the four groups of thanatophoric dysplasia, osteogenesis imper fecta, achondroplasia and achondrogenesis

Simple obstetric measurements
John P McGahan, University of California, Davis Medical Center, United States

Objectives:
- To familiarise the audience with different measurements used throughout pregnancy
- To present a simple approach to common obstetrical measurements
- To understand the basis of obstetric ultrasound measure ments

Several measurements are utilised in the first trimester of pregnancy.

1 mm
These values can include the following:
Mean sac diameter and gestational sac approximately 1 mm/day.

4 mm
With a 4 mm embryo, embryonic cardiac activity can almost always be identified using endovaginal technique with modern probes. It is rare with a 4 mm embryo that there will be a lack of cardiac activity. If there is any doubt a follow up scan should be obtained in a few days.

8 mm
When the mean sac diameter is 8 mm using endovaginal scanning, a yolk sac is almost always identified. The yolk sac is always identified before the embryo.

16 mm
A mean sac diameter of 16 mm is the discriminatory level for reliably identifying an embryo. Certainly, it is imperative that whenever there is a doubt that a repeat ultrasound is obtained in 2–3 days.

Several measurements are used for the second trimester of pregnancy.

10 mm – atrial width
In examining the atria width, the original study and a follow up study have determined that an upper limit of normal of the atrial width is 10 mm.

10 mm – cisterna magna
The anterior-posterior measurement for a cisterna magna is between 1 mm and 10 mm.

Double jeopardy: troubles with twins – part 1: decision cascade: what form of twinning event has occurred?
Harris J Finberg, Phoenix Perinatal Associates, United States

All twin pregnancies are high risk relative to singleton gestations. There is substantially greater risk of morbidity and mortality in monochorionic as compared to dichorionic twinning, and even greater risk in monochorionic-monoamniotic twins. It is, therefore, indicated that the form of twinning should be determined on the initial sonogram during which twins are recognised. This permits appropriate levels of frequency and intensity of monitoring the growth and well being of the twins.

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Monoamniotic twins have all the risks of a shared placental circulation, and the additional significant risks of cord entanglement and knotting, as well. Conjoined twins, with only rare survivors, are always monoamniotic.

Part 1: Decision cascade: what form of twinning event has occurred?

Part 2: Monochorionic twins: diagnosis, problems, and pathophysiology.

Sonography of the foot and ankle
Neil Simmons, WA

Rather than give an exhaustive (and exhausting) overview of the entire foot and ankle region, I should like to focus on several areas on which sonography has a part to play in the clinical management of the patient.

These include:

1 Assessment of the painful forefoot
2 Staging of tibialis posterior tendon abnormalities
3 Neural entrapments on the dorsal aspect of the foot
4 The role of sonography in assisting orthopaedic surgeons in patient management

Reference will be made to particular cases demonstrating the relevant points. The dynamics of the tibialis posterior tendon and the consequences of its failure will be discussed.

Ultrasound of the foot and ankle
Rob McGregor, ACT

Examination of the foot and ankle with ultrasound is a well-established diagnostic technique but in common with some other musculoskeletal studies the role of ultrasound may need redefining as new techniques such as MRI are developed and implemented.

This paper will outline the common current role of ultrasound examination of the foot and ankle along with suggested mechanisms to enhance the training of new practitioners. In addition I will discuss potential applications to expand the use of ultrasound in this area.

Emerging issues in venous disease
Philip J Walker, University of Queensland, Qld

Venous duplex ultrasound (DUS) is the mainstay of investigation for venous thrombosis (VT) and venous insufficiency.

For VT, DUS is used for screening, for diagnosis, and for follow-up to document extent of residual VT and incompetence, and to stratify individuals for their risk of DVT recurrence. Use of clinical probability scores and D-dimer may limit unnecessary DUS in some patient groups. The extent of the

DUS for DVT is debated. Should both deep and superficial veins be studied? Should only the symptomatic limb be studied (ie. unilateral or bilateral)? Should the calf veins and iliocaval segment be studied? Should DUS be confined to the thigh, or involve sampling of the femoral and popliteal vein segments only? Ageing of VT and differentiation between recurrent VT or post phlebitic symptoms remains problematic, hence it is mandatory to carefully document the anatomic extent of VT at all times.

For venous insufficiency, DUS can accurately document the anatomy and sites of incompetence. There is argument as to whether it is required for all primary LSV varicose veins, but most clinicians would deem it compulsory for suspected SSV incompetence and for congenital, complicated, secondary and recurrent venous disease.

Ovarian and pelvic vein incompetence can be evaluated with DUS. The role of functional tests (such as the various plethysmographic tests) to grade 'severity' of venous disease is controversial. Guidelines are emerging for the assessment of veins and valves that may predict the success of restorative procedures (valve repair or replacement), as opposed to the need for ablative (vein stripping) procedures. Duplex ultrasound (DUS) can be helpful in diagnosing venous compression syndromes (thoracic outlet compression, iliac vein compression, popliteal vein entrapment) although additional imaging is usually required. Duplex ultrasound is increasingly used for intraprocedural guidance during valve repair or replacement procedures and some of the newer 'minimally invasive' venous closure techniques (echosclerotherapy, endovenous radiofrequency or laser closure) and can be valuable in determining success post-intervention. This presentation will discuss the expanding role of venous duplex in the management of venous diseases.

Impact of new technology on vascular imaging

Andrew Csillag, NSW

Computer tomography angiography (CTA) and magnetic resonance angiography (MRA) have had a profound effect on vascular imaging. There seems little doubt that all purely diagnostic angiography will be done with CTA and MRA in the not too distant future.

Catheter angiography (DSA) is already declining and will continue to do so, but is still required for vascular interventional procedures and assessment of small vessel disease. There will be a decline in some Doppler ultrasound studies, especially renal, mesenteric and peripheral arterial studies.

However the new technology is not without its problems. Cost, availability, potential for over investigation, clinical validation and the decline in numbers of trained angiographers and angiography units still required for vascular intervention will all have to be addressed.

While vascular imaging with the new technologies is already excellent, the next five years will see enormous advances.

Color Doppler evaluation of vascular emergencies

Giovanni G Cerri, Hospital das Clinicas University of Sao Paulo, Brazil

Vascular processes account for a great amount of consultations in a radiology emergency department. They may be divided, according to etiology, into traumatic and non-traumatic urgencies. Main pathologies in the first group are arterial rupture and dissection, pseudoaneurysms, and arteriovenous fistulas. The latter comprises thrombophlebitis, deep venous thrombosis, embolism, arterial dissections and aneurysm-related complications, mainly rupture. Despite the importance and high accuracy of a well-performed, thorough physical examination, imaging studies are strong adjuncts in the confirmation of suspected entities as well as in the exclusion of potential differentials, when such a gamut of pathologies is considered. The vital role of real time B-mode and Doppler sonography can not be overemphasised in the management of these patients, contributing to diagnosis and therapeutic planning, be it clinical or surgical. Arteriography and venography are still considered gold standard examinations, but their invasive character, high cost and restricted availability are serious limitations to place them as first-line diagnostic studies. Vascular insults are potentially serious, life-threatening conditions that are quite often presented to the imaging professional. Meticulous technique and deep comprehension of vascular anatomy as well as of flow dynamics are essential requisites for the performance of high yield, accurate sonographic examinations.

Renal artery duplex ultrasound

Kathleen A Carter, Vascular & Transplant Specialists and Eastern Virginia Medical School, United States

Overview Information

Advances in ultrasound technology including the availability of improved image processing and improvement in Doppler colour flow imaging have increased the application and use of duplex ultrasound for the evaluation of the renal arteries. This application still requires a considerable amount of skill and experience on the part of the examiner and the interpreter.

Renal arteries are difficult to evaluate in their entirety due to their depth, overlying bowel gas, movement with respiration, vessel size and the incidence of multiple renal arteries. Despite these limitations, the technique has proven to be accurate and reliable in experienced hands. The overall accuracy in identifying haemodynamically significant renal artery disease has been reported to be 80% to 96%. A known limitation of this technique is the inability to consistently identify multiple renal arteries, which occur in approximately 20% of the population.

The renovascular duplex evaluation can be very technically demanding. The learning curve for the examination is longer than for many other vascular duplex studies. Success will rely on the skill and experience of the examiner. There are, however, some key points that will assist in insuring the best possible study is obtained. These will be addressed in regard to: patient preparation, equipment, examination time, knowledge (anatomic landmarks and variations as well as normal and abnormal haemodynamics in the aorta and kidneys; understanding of renal pathophysiology), technique and criteria.

What you should know when examining the fetal heart

John P McGahan, University of California, Davis Medical Center, United States

Objectives:

- Understand the sonographic anatomical features of the four-chamber view of the heart
- To recognise major fetal cardiac malformation
- Understand how to perform a four-chamber view of the heart and views of the outflow tracts

When performing a routine four-chamber view of the heart, various questions should be asked. These include:

1 Is the heart in its normal position?
2 Is the heart normal in size in comparison to the fetal thorax?
3 Is the axis of the interventricular septum normal?
4 Are the ventricular chambers approximately equal in size?
5 Is there a septal defect?
6 Is there any abnormality of the endocardium, myocardium, or pericardium?

Anomalies missed by the four-chamber view

Several anomalies may be difficult to diagnose with a four-chamber view of the heart. These include tetralogy of Fallot, transposition of the great arteries, truncus arteriosus and VSDs. Therefore, in addition to the four-chamber view of the heart it may be important to assess the relationship of the aorta and the

pulmonary arteries to the ventricular cavity. This may be performed easily by obtaining views of the outflow tracts.

Outflow tracts

To help better identify the relationship of the aorta to the left ventricle, a more sophisticated examination of the fetal heart can include aortic or pulmonary or artery outflow tracts. These views will be reviewed.

Double jeopardy: troubles with twins – part 2: monochorionic twins: diagnosis, problems and pathophysiology

Harris Finberg, Phoenix Perinatal Associates, United States

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Ouch! Now what do I do?

Val Gregory, Royal Prince Alfred Hospital, Sydney, NSW

Ouch! Now what do I do? This is an all to familiar phrase heard by those who provide education on safer scanning for sonographers.

Under Occupational Health, Safety and Rehabilitation legislation employers have a legal obligation to ensure a safe workplace without risk to the employee's health, safety and welfare. The employee has a legal obligation to report all work-related injuries to their employer. The professional bodies the Australasian Society of Ultrasound in Medicine and the Australian Sonographers Association have published a policy document titled 'Guidelines for Reducing Injuries to Sonographer/Sonologist'. But how do we make the Sonographer work safely?

Published literature reports the high incidence of work related injuries in our profession, their causes and prevention. However, sonographers still scan unsafely, with poor posture, lack of work breaks, poorly adjusted equipment and unreasonable workloads.

Why do sonographers so often think that they will not succumb to the problems that have occurred in over 80% of their colleagues?

Why don't sonographers take time to adjust the work processes and environment to suit them?

Why do sonographers continue to work while injured?

Why are they reluctant to report their work-related injuries?

In this presentation I will discuss these points as well as how to encourage Sonographers to look after themselves and prevent serious injuries occurring in the first place.

Detecting fetal Down syndrome in a general pregnant population using mid-trimester sonographic markers

Philip J Schluter, University of Queensland, Qld and Gary Pritchard, Brisbane Ultrasound for Women, Qld

Objective

To report adjusted effect sizes of mid-trimester sonographic markers associated with Down's syndrome in a general pregnant population.

Study design

A large prospective cohort study, conducted between March 1993 and December 2002 in south-east Queensland, on women first scanned between 15 to 22 weeks gestation and having nuchal skinfold, echogenic intracardiac focus, renal pelvic dilation, echogenic bowel, biparietal diameter, short femur, short humerus, and aneuploid anomaly prospectively recorded.

Results

Data was available for 73 Down's affected and 16,891 unaffected pregnancies. Strong colinearity existed between short humerus and femur lengths, necessitating the removal of femur length in pursuant multivariate models. In the final most parsimonious statistical model, all included sonographic variables were statistically significant, as were the interactions between gestational age and nuchal skinfold, and short humerus length and aneuploid anomaly. Compared to a reference women aged 20 years at 16 weeks gestation who has no sonographic indications, adjusted relative risk estimate (and 95% confidence intervals) were: 1.1 (95% CI: 1.1, 1.2) for each increasing year of age, 0.6 (95% CIL 0.5, 0.8) for each increasing week of gestation, 8.2 (95% CI: 2.8, 23.8) for nuchal skinfold indication, 10.0 (95% CI: 5.4, 18.5) for short humerus indication, 5.0 (95% CI: 2.2, 11.1) for echogenic bowel indication, 7.2 (95% CI: 3.9, 13.2) for echogenic intracardiac focus indication, 3.6 (95% CI: 1.6, 8.2) for renal pelvic dilation indication, 87.6 (95% CI: 30.7, 250.1) for aneuploid anomaly indication, 1.6 (95% CI: 1.1, 2.4) for the gestational age and nuchal skinfold interaction, and 0.2 (95% CI: 0.0, 0.9) for the short humerus length and aneuploid anomaly interaction. Adjusted relative risk estimates were substantially different from their crude estimates.

Conclusions

Due to dependencies between ultrasonic markers, the use of multivariate models is fundamentally important in accurately quantifying prenatal Down's syndrome risk.

Defining the risk of unplanned operative delivery

Hans Peter Dietz, RPAH Sydney, NSW and Valeria Lanzarone, RPAH Sydney, NSW

Objective

Emergency operative delivery is often a traumatic experience for the mother and associated with excess morbidity, resource use and medicolegal risk. Prediction would therefore hold considerable promise. In this study we created a predictive model from known and newly described predictors of vaginal delivery and tested this model for its predictive value.

Methods

Two hundred and two nulliparous women were seen between

36 and 40 weeks gestation in a prospective observational study. A subset of 126 women had an assessment including an interview, vaginal examination for a Bishop Score, as well as translabial ultrasound. The latter was performed supine and after voiding to determine cervical length, pelvic organ descent on Valsalva and head engagement.

Results

Maternal age, current body mass index, Bishop score and a history of C/S in mother or sisters were predictive of vaginal delivery on univariate analysis, as were the following measurements obtained on translabial ultrasound: position of the bladder neck on Valsalva, cervical length and head engagement relative to the symphysis pubis. Head engagement and age were the strongest single predictors. The best regression model for predicting vaginal delivery contained all of the above except cervical length on US and yielded a corrected Nagelkerke's R2 of 26.8%. The likelihood of caesarean section in the deciles of predictive scoring was as follows (from the lowest decile to the highest): 8%, 0%, 0%, 8%, 0%, 16%, 42%, 33%, 42%, 85%.

Conclusions

Prediction of delivery mode in nulliparous women is feasible and moderately powerful. A combination of clinical and ultrasound parameters yielded a predictive model that may become useful as an entry criterion for intervention trials. Intervention may become possible both at the low-risk (eg. selecting women for low-tech birthing units) and the high-risk end of the spectrum – eg. offering elective caesarean section to women with a high likelihood of emergency operative delivery.

The placenta is more than an edge! – confined placental mosaicism

Teresa M Clapham, Brisbane Ultrasound for Women, Qld and Gary R Pritchard, Brisbane Ultrasound for Women, Qld

An individual has mosaicism if they are composed of two or more cell lines of different chromosomal constitution, but essentially derived from the same zygote. (King, RC and Stansfield, W, 1990)

Placental mosaicism denotes tissue-specific chromosomal mosaicism affecting the placenta. When this is confined to the placenta, it is known as 'Confined Placental Mosaicism' (CPM)

Many cases have been reported (in the literature) of confinement of trisomies within the placenta, with a phenotypically normal fetus. Association between 'unexplained' intrauterine growth restriction (IUGR) with CPM has also been reported.

Placental mosaicism would be suspected if there were evidence of placental cysts, increased thickness and echogenicity of the placenta and the presence of gender discrepancies between CVS sampling and ultrasonic evaluation.

Careful assessment of the placenta is required sonographically and cytologically. The diagnosis of CPM is most commonly made when (after the diagnosis of chromosomal mosaicism in a CVS sample), the second prenatal testing (either by amniocentesis or fetal blood analysis) shows a normal diploid karyotype. (Kalousek, D.K., and Vekemans M., 1996)

Extensive sonographic evaluation of the fetus is also required to ensure no associated anomalies and/or IUGR is evident. After the birth, the placenta should be sent for cytogenic analysis to confirm the placental mosaicism.

Our department has had several cases, where placental mosaicism has been detected. This has effectively altered the management for Trisomy 21 and Nuchal Translucency risks assessments and the final outcome for the parents.

This presentation will discuss placental mosaicism, and five associated cases studies.

References

1 Kalousek, D and Vekemans, M. Confined Placental Mosaicism. *J Med Genetics* 1996; 33: 529–533.

2 King R and Stansfield W. *Dictionary of Genetics. (3rd Ed.)* New York: Oxford University Press, 1990: p252.

Agenesis of the corpus callosum in the fetus

Elizabeth V Graham, Monash Medical Center, Clayton Campus, Vic

Ultrasound findings of Agenesis of the Corpus Callosum (ACC) include a number of intracranial abnormalities. These will be highlighted in this presentation.

A routine obstetric ultrasound should include three standard planes of intracranial views that will help exclude the presence of ACC.

Discussion points include:

- The gestation at which the Corpus Callosum is seen
- The appearance of the "true" Cavum Septum Pellucidum
- The lateral ventricular configuration
- The significance of ventriculomegaly
- Identification of the pericallosal artery
- Other intracranial and extracranial abnormalities that may be associated with ACC.

I will present a case series of eight fetuses with ACC identified antenatally that were confirmed with postnatal ultrasound or at post mortem. Our experience with ACC has allowed us to develop a Diagnostic Pathway to identify ACC in obstetric ultrasound examination.

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 suppled separtely and not embedded. Powerpoint presentations are not accepted.

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

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

- Title page should include the:

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

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

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

1 In-text citation Superscript. If at the end of 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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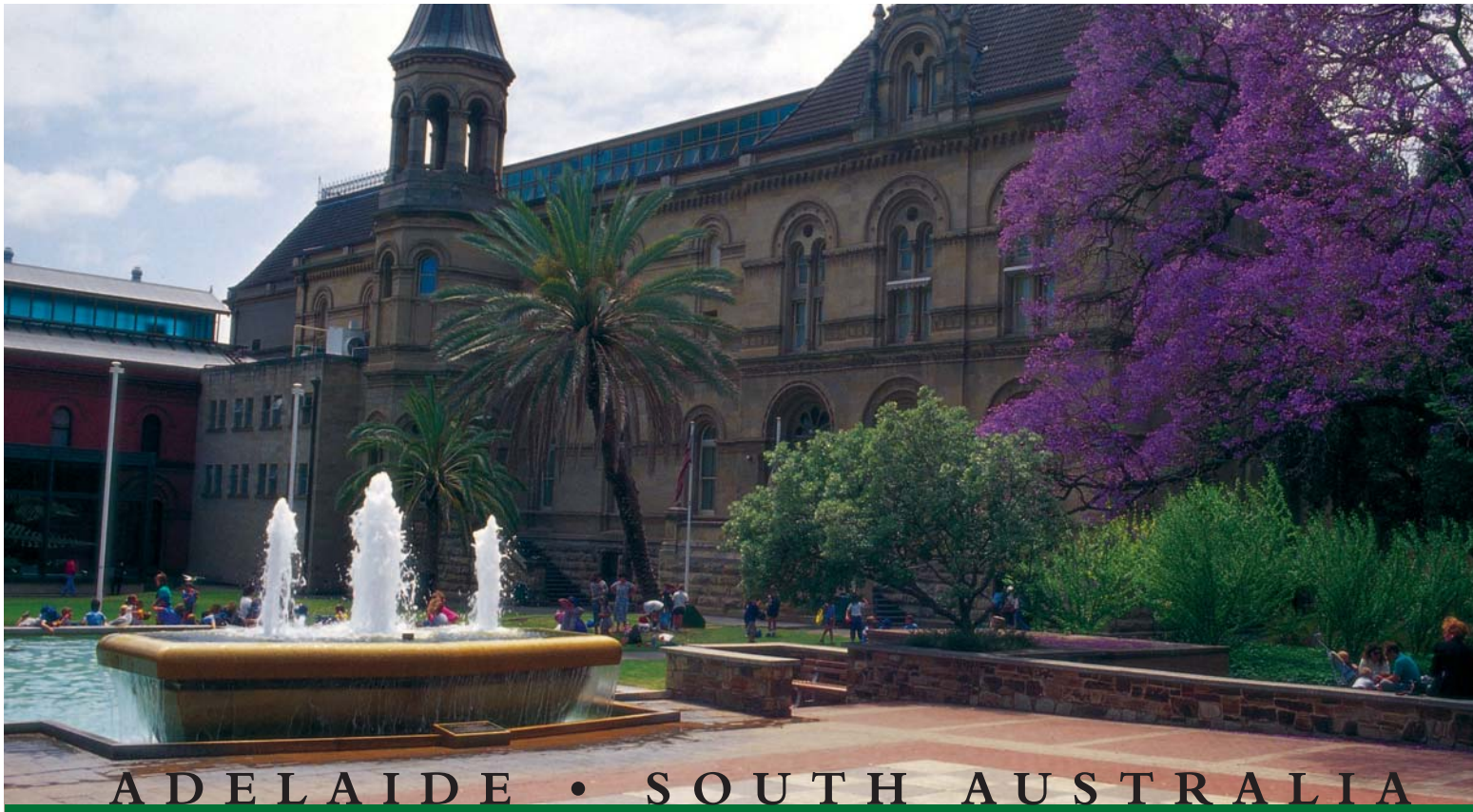

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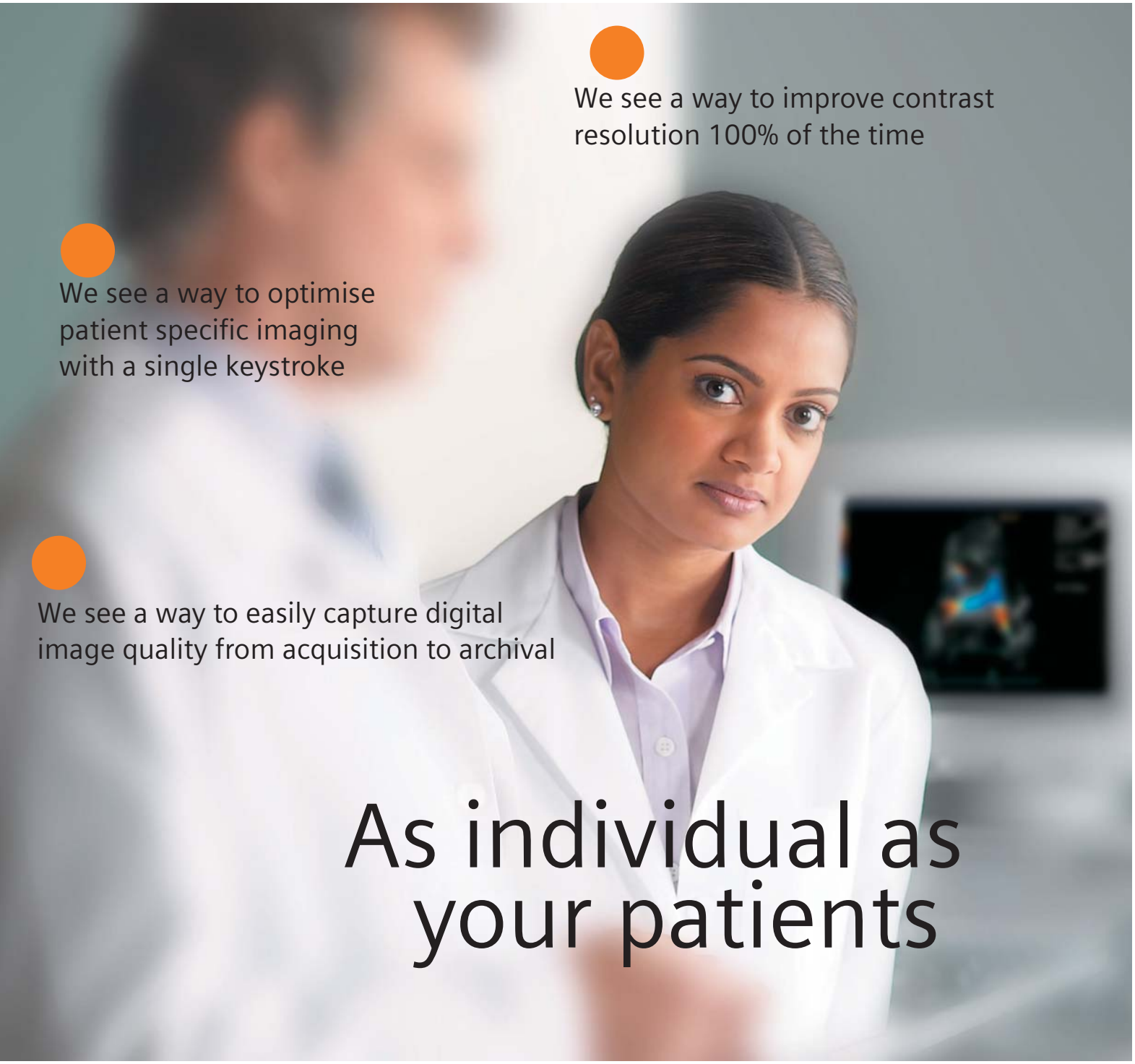

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