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Editor:
Assoc Prof Robert N Gibson
University of Melbourne

Co-Editor:
Keith Henderson
ASUM Education Officer

Assistant Editor:
Margo Harkness
Queensland University of Technology

Production:
Merilyn Denning

Contributions
Original research, case reports, quiz cases, short articles, meeting reports and calendar information are invited. Please send via **Mail:** ASUM, 2/181 High Street, Willoughby 2068 Australia.
Tel: 61 2 9958 6200 **fax:** 61 2 9958 8002.
email: khenderson@asum.com.au
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Membership and General Enquiries
email: asum@asum.com.au
tel: 61 2 9958 7655 **fax:** 61 2 9958 8002
mail: ASUM, 2/181 High Street, Willoughby 2068 Australia
website: http://www.asum.com.au

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Greetings from the editor's desk in the year 2000 and, for all but the pedants, the new milllenium!

Two articles in this February issue of the ASUM Bulletin demonstrate superbly the capabilities of modern ultrasound scanning of superficial structures. The pictorial essay by Peter Graham on scrotal ultrasound is a beautifully illustrated correlation with surgical findings and shows the ever narrowing gap between macroscopic pathology and its ultrasound grey scale representation. The article by Mike Heath on ultrasound of foreign bodies is a good example of how high resolution ultrasound is extending its clinical utility into more superficial structures which have always been accessible to ultrasound but not always usefully imaged by it. In contrast, Christopher Bladin's article on transcranial Doppler summarises some clinical applications in an area of anatomy that remains relatively inaccessible even to low resolution ultrasound. In the article "Slice thickness artifacts" Roger Gent continues to reveal to us how ultrasound, more than any modality, can produce misleading images, and why a solid understanding of the physics of ultrasound image generation is essential for all who use it.

Cheryl Bass, as Chair of the Standards of Practice Committee, commences a series which will see the current Policies and Guidelines of the Society published in upcoming issues of the *Bulletin*.

Robert N Gibson
Editor

Contents

Sonography: Our Profession, Our Future

ASUM came into being thirty years ago, as a group of scientists, medicos of different specialties, and fledgling sonographers. All were considered colleagues, and all had the same aim, to harness this new technology of ultrasound imaging to provide a tool to aid diagnosis of disease. These founding members, perhaps idealistically, felt that this new Society should be apolitical, that the specialist medical colleges should be responsible for political lobbying and appropriate remuneration. Remember, these were the early days of Medibank prior to Medicare!

As the new technology developed, and new applications for ultrasound imaging became available, smaller craft groups emerged. Some stayed within the Society, such as the obstetricians under the umbrella of COGUS. Others, such as the cardiologists, formed their own sub specialist groups. Sonographers tended to either remain part of ASUM, or became members of much smaller craft groups such as ACTIV.

A Search for Sonographer Identity
As the practice of medical ultrasound matured, a distinct role for sonographers evolved and a search for sonographer identity emerged. Until 1995, sonographer members of ASUM elected voting members to the Council, but did not have the potential to become full members of the Society; they were all associate members of ASUM, a membership category open to any interested person. By the end of the 1980's sonographers, seeking recognition of their qualification by the Society, proposed that qualified sonographers be granted full membership. This proposal was defeated, and some sonographers formed a separate association, the Australian Sonographers Association (ASA), an association for qualified sonographers only. ASUM granted full membership to qualified sonographers in 1995.

From 1992, an *ad hoc* ASUM committee (UQAC) was investigating sonographer accreditation, a necessary step in defining sonographers as a distinct professional group. In 1994 ASUM invited ASA, AIR and some universities to join it in establishing a sonographer accreditation body, the progenitor of Australian Sonographer Accreditation Registry (ASAR). ASAR is now well established, with over 700 accredited medical sonographers.

In 1996 ASUM published the document "The Role of the Sonographer" which defines "sonographer" as "a term to define a qualified and accredited professional" and described the education and responsibilities of sonographers. Although this document can be criticised as an incomplete definition of the role of the sonographer, its publication was another important step in the definition of sonographers as a professional group. It has been extensively revised and is currently being reviewed by the Sonographer Affairs Committee.

Who is a sonographer?
While anyone who produces ultrasound images, can call him or herself a sonographer, an accredited medical sonographer (AMS) holds a qualification and accreditation that shows that the sonographer is maintaining her or his professional education and development, knows how to perform an ultrasound examination, take a relevant patient history and extend the examination when necessary, present the findings of the examination to the reporting doctor to make a diagnosis, and write a final report. An AMS has the responsibility to alert the reporting doctor to abnormalities or inconsistencies, to allow that doctor to liaise with the referring clinician to direct further investigations and appropriate patient management and care.

Recognition of the status of the qualified sonographer has been frustratingly slow, but as a result of consistent promotion and lobbying, sonographers can take pride in their emerging professional status.

What is happening in our industry today?
The Health Insurance Commission (HIC) has reviewed the imaging budget, and has identified ultrasound as the imaging tool with the highest increase in examination numbers. There is also pressure on the HIC to award Medicare rebates to the newest (and most expensive) imaging tool, MRI. This has led to a review of Medicare rebate fees, and debate between the medical Colleges and the HIC to find ways to reduce the imaging budgets. At the same time, other medical specialties such as general practitioners, emergency department specialists and non-imaging specialist obstetricians have been lobbying to increase the ultrasound rebates for non-referred patients.

A proposal for professional supervision has been drafted by government with the intent of ensuring that the reporting doctor is available for consultation, if required, before the patient leaves the practice. Sonographers have objected strongly to this proposal which appears to denigrate their role. A most concerning element is the proposed exemption of non-specialist and non-ultrasound trained medical practitioners to comply with these regulations. It seems that qualifications will actually reduce expertise, and require supervision! Understandably, this has caused widespread consternation within ASUM's membership who perceive an increase in medico-legal problems resulting from misdiagnosis both and a consequential decline in the public perception of the usefulness and high standards of ultrasound examination.

As an organisation, we must not allow the denigration of the high technical and education standards that ASUM members have developed and maintained over thirty years. Education has always been the highest priority, and members have all given freely of their time and expertise to pass this hard-won knowledge on to students who have followed. Has the time come for ASUM as an organisation to reassess the Founding Members' apolitical stance and enter the political arena as its own representative, with ultrasound interests as the highest priority?

All professional groups must be vigilant and proactive to protect the status of their profession, and advance the knowledge and standards of practice within their profession. We achieve this through active involvement in ASUM's activities that give us the opportunity to fulfill our responsibility to act in unison to maintain and develop the highest standards of medical ultrasound practice in Australia. In doing so we take our next step in the development of our professional recognition.

Mary Young
Honorary Secretary

Testicular Ultrasound: Ultrasound and Surgical Correlation

Peter Graham FRACP DDU, Don Moss FRACS, Peter Kyatt DMU
St John of God Hospital Ballarat Vic

In our department we strongly believe that correlation of our ultrasound findings with other modalities and also with surgical specimens improves our own understanding of various disease processes. We have endeavoured over the last few years to collect surgical specimens of both testicular and extra-testicular lesions.

Appendages and Variants

The commonest two appendages that we demonstrate are the appendix of the epididymis which is a remnant of a persistent mesonephric tubule and also the appendix of the testis which is a Mullerian duct remnant.

Figure 1. Appendix of the epididymis (arrow) and the appendix of the testis (forceps). Visualisation is always easier when there is a hydrocele.

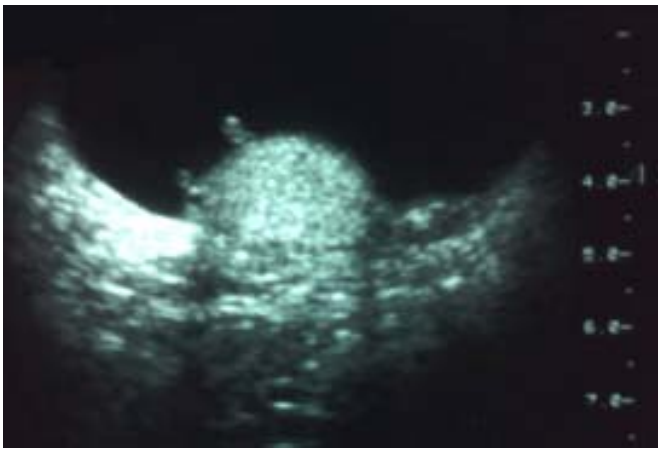

Figure 1a

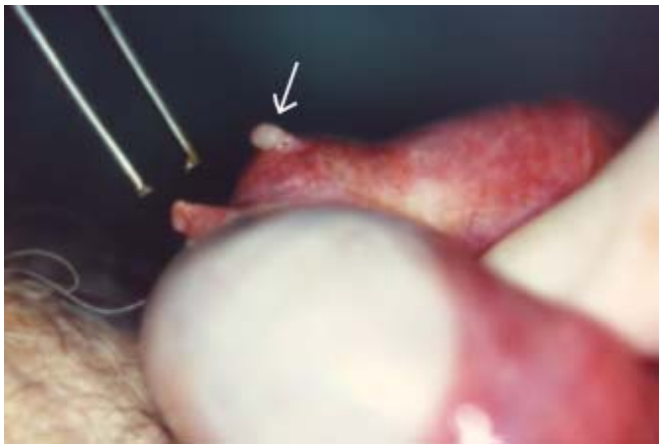

Figure 1b

Figure 2. Cysts of the appendages are common and can be essentially regarded as normal findings. In this case the cyst appears to be originating from the appendix of the epididymis (arrow).

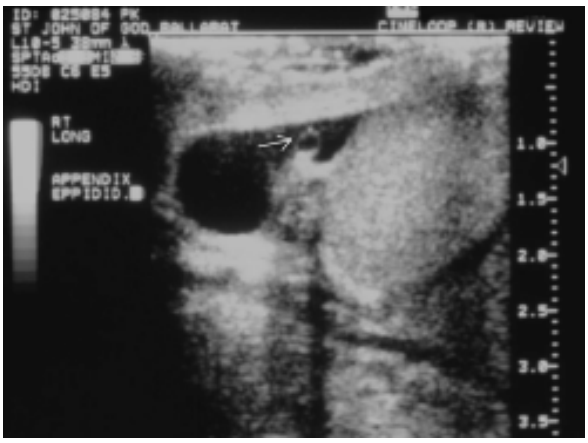

Figure 2a

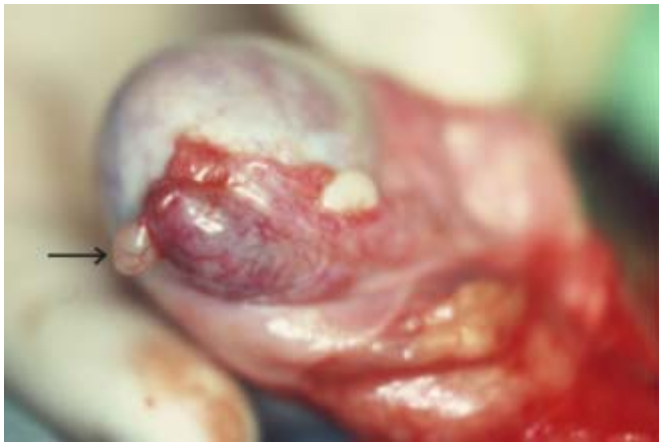

Figure 2b

Figure 3. Cyst of the appendix of the testis (arrow).

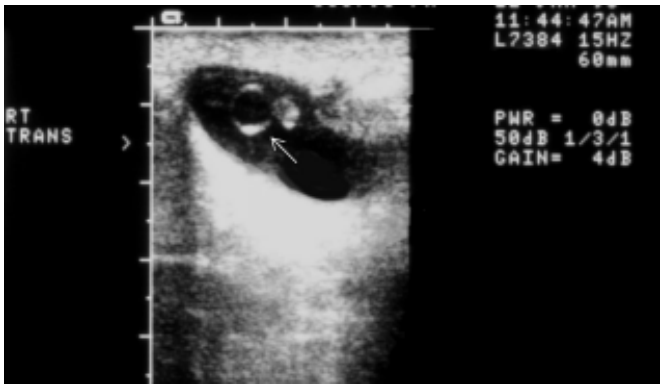

Figure 3a

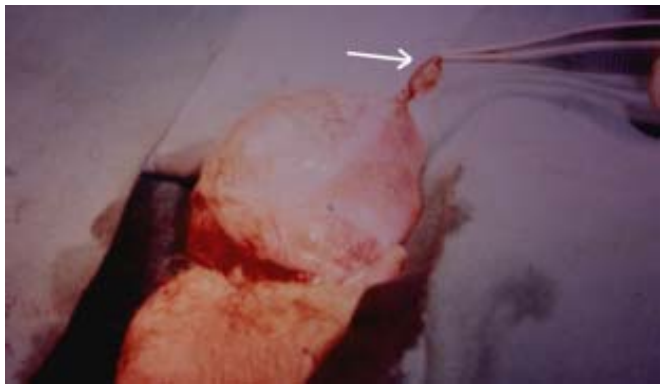

Figure 3b

Figure 4. Fibrosis of the appendages is a common finding, particularly in older patients (arrow).

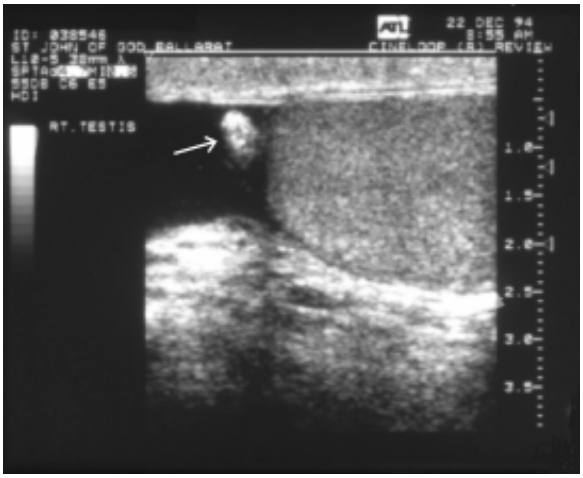

Figure 4a

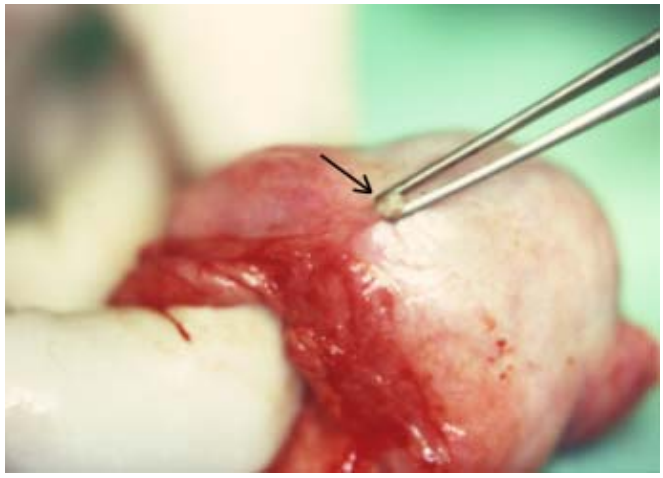

Figure 4b

Torsion of the Appendix Testis

Figure 5. Torsion of the appendix testis with an intraoperative ultrasound (arrow).

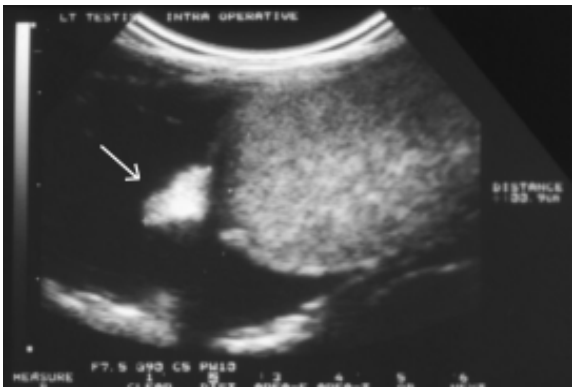

Figure 5a

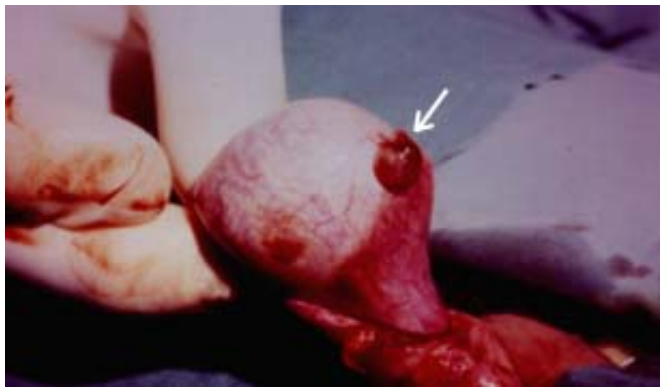

Figure 5b

Figure 6. Torsion of the appendix testis - small complex nodule at the junction of the head of the epididymis and upper pole of the testis (arrow) with the subsequent surgical specimen.

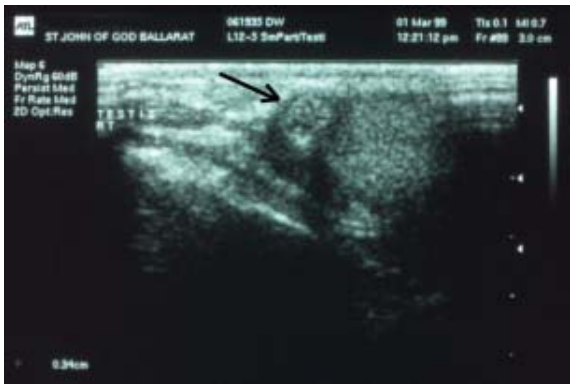

Figure 6a

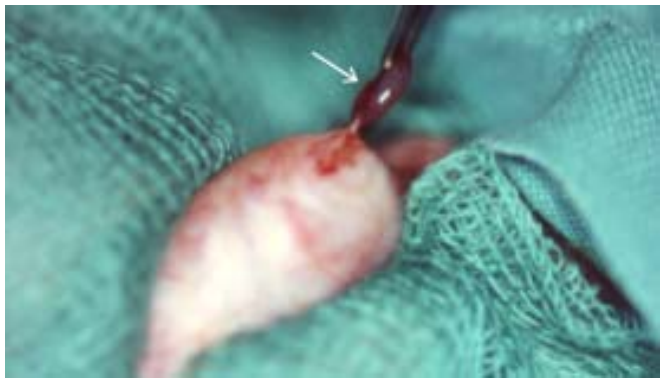

Figure 6b

Intrascrotal Calcification

Calcification in the scrotum is common. Figure 7a demonstrates a typical calcific lesion adherent to the tunica. These are quite fleshy in appearance and it is easy to imagine that they can become detached and end up within the tunical layers as a "scrotal pearl" (figure 7b).

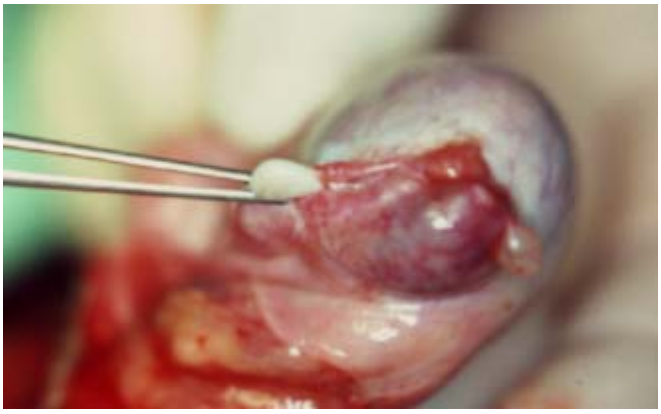

Figure 7a

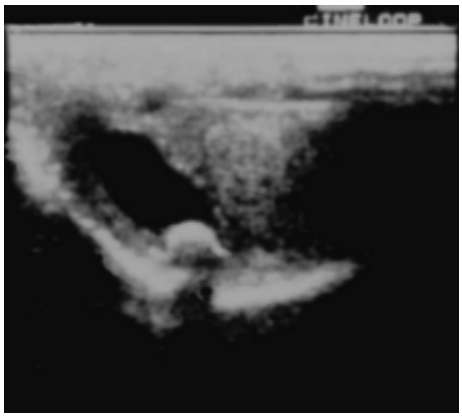

Figure 7b

Not all calcification within the scrotum is innocent. Figure 8 demonstrates a choriocarcinoma (arrow), and there is calcium in relation to the tumour. It is also interesting to note the microcalcification scattered throughout the testis.

Microlithiasis within testes, whilst uncommon, is a significant important potential marker for the development of germ cell tumours.

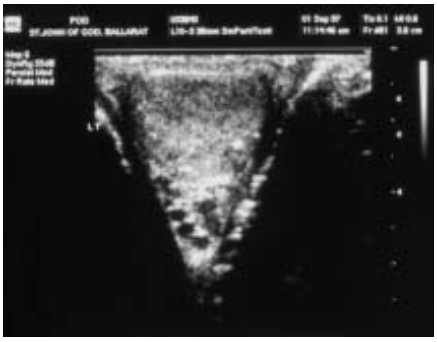

Figure 8a

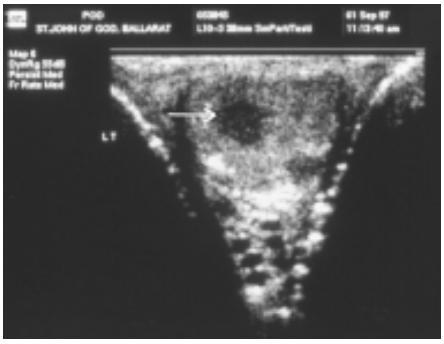

Figure 8b

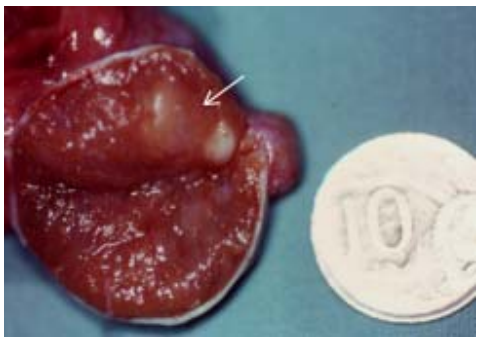

Figure 8c

Epidermoid Tumours

Not all solid lesions in the testis are malignant. Figure 9 shows a very typical ultrasound appearance of an epidermoid tumour with its onion ring appearance.

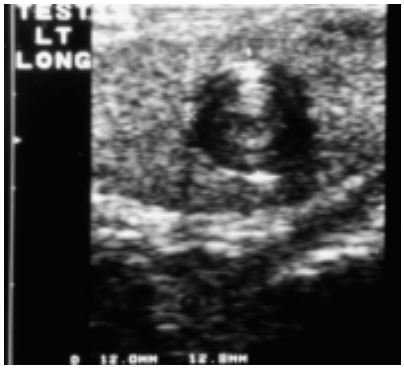

Figure 9

Figure 10. Another epidermoid tumour with surgical specimen. The findings are sufficiently characteristic that a diagnosis is often made on the ultrasound findings. The surgical specimen demonstrates the typical sebaceous material that is contained within the lesion (arrow).

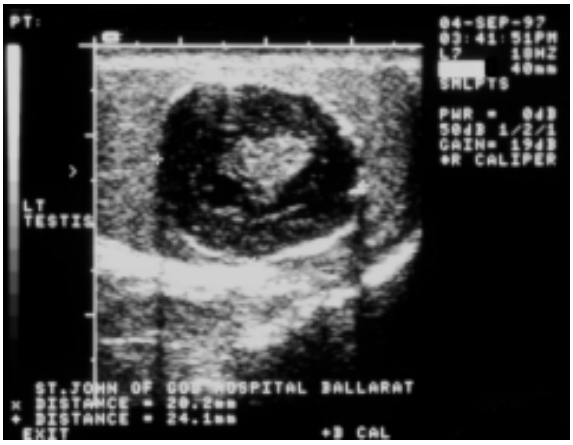

Figure 10a

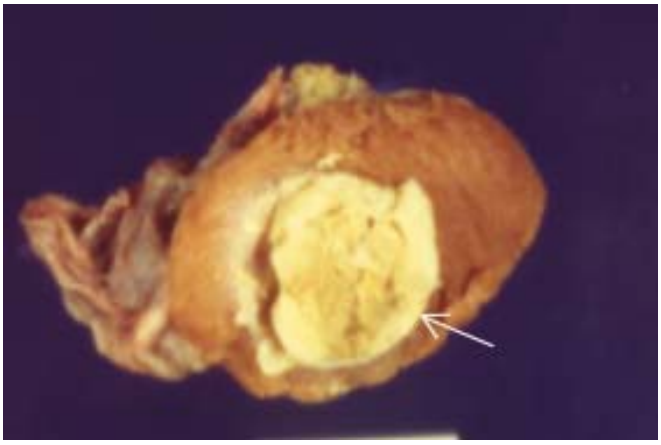

Figure 10b

Intrascrotal Cystic Structures

Intrascrotal cysts are extremely common findings on ultrasound. Tunical and epididymal cysts (figure 11a) are common. The surgical specimen shows a typical epididymal cyst (figure11b).

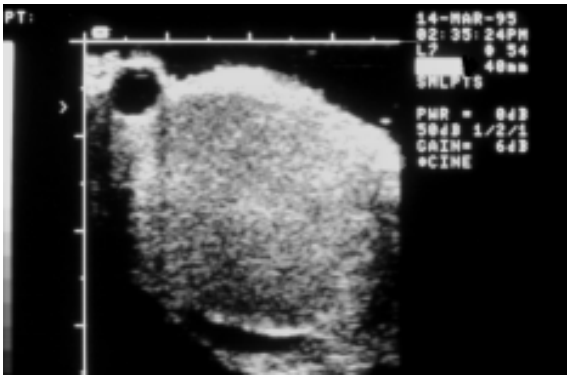

Figure 11a

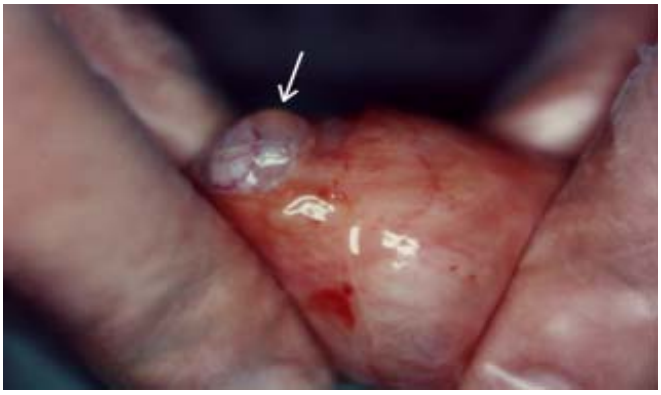

Figure 11b

Most of the cysts that we see within the substance of the testis have a relationship to the mediastinum. A haemorrhagic cyst is demonstrated in figure 12. The ultrasound demonstrates evidence of echogenic material within the cyst with the gain turned up. This type of cyst has no particular sinister significance.

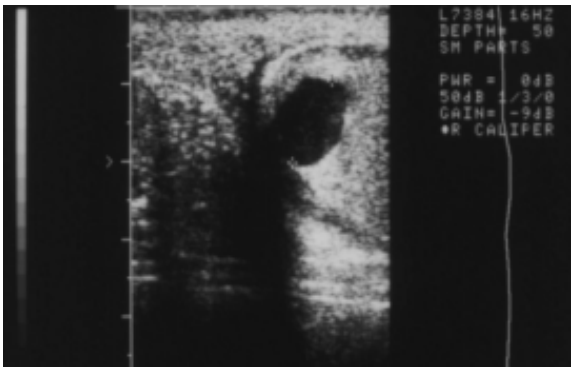

Figure 12a

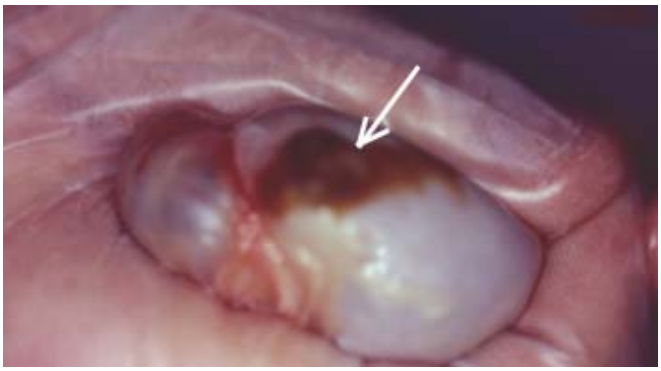

Figure 12b

Ultrasound technique is still important as emphasised by the following studies. Figure 13a shows a simple intratesticular cyst. The case demonstrated in figures 13b and 13c however is not a simple cyst. There is no posterior enhancement. Colour flow assessment demonstrated in figure 13c shows significant vascularity. This was a Leydig cell tumour. These types of lesions are readily localised with intraoperative ultrasound. This may avoid the need for orchidectomy.

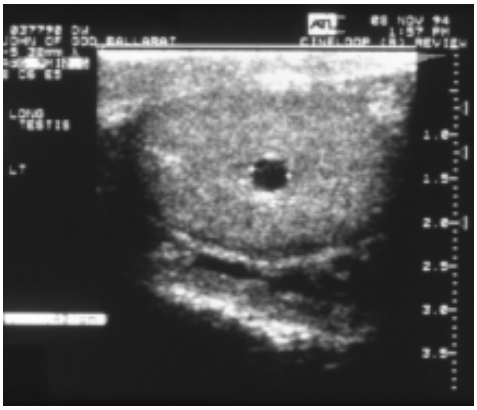

Figure 13a

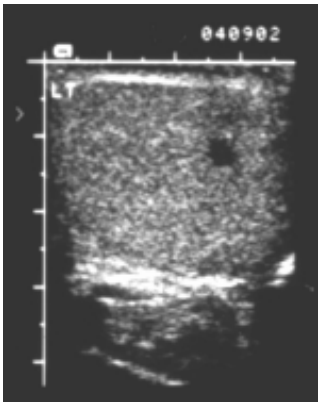

Figure 13b

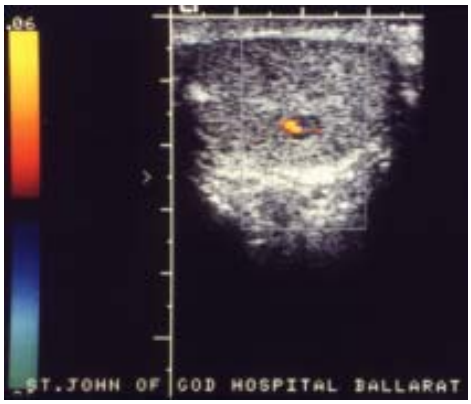

Figure 13c

A number of germ cell tumours may have cystic components. Figure 14 demonstrates an unusual case. This is cystic change within a seminoma (white arrows). Tumour mass displaces the normal testicular tissue (red arrows).

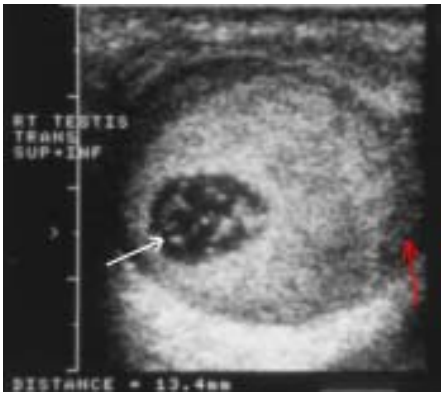

Figure 14a

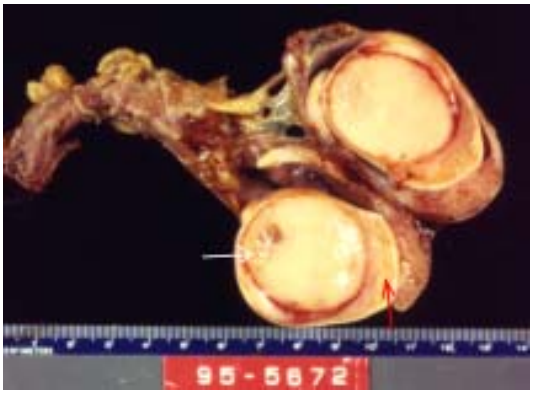

Figure 14b

Things that appear cystic in the testis are not necessarily tumours or cysts. Figure 15 is an example of an intratesticular varicocele which is uncommon but easily identified with colour flow assessment.

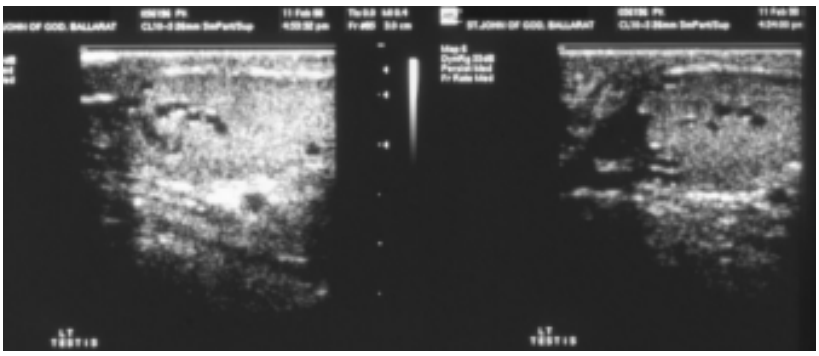

Figure 15a

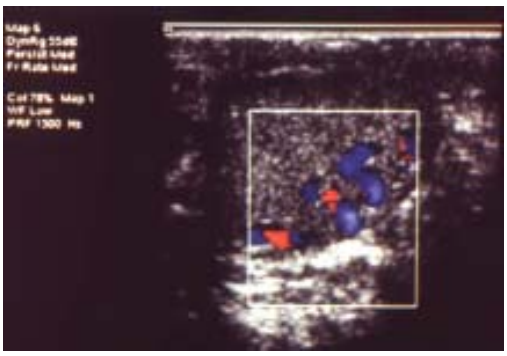

Figure 15b

Tubular Ectasia

Tubular ectasia of the rete testes is a common and quite benign entity. It results in multiple cystic spaces in the region of the mediastinum of the testis but with no associated soft tissue abnormality and no evidence of abnormal Doppler flow.

Figure 16a demonstrates that there are a number of small cystic areas in the region of the mediastinum (arrows). The changes are often more striking on ultrasound than in the surgical specimen. Ultrasound changes of tubular ectasia are quite variable but the characteristic soap bubble appearance is noted here (figure 16b).

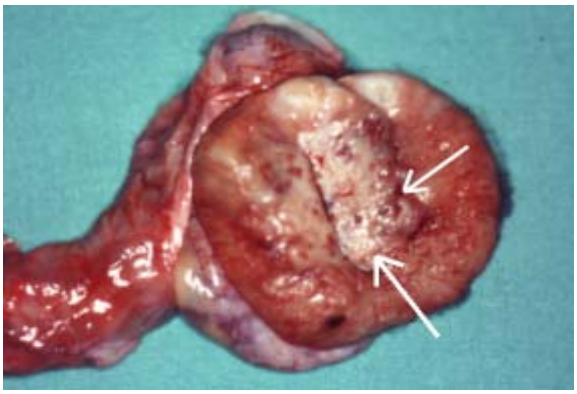

Figure 16a

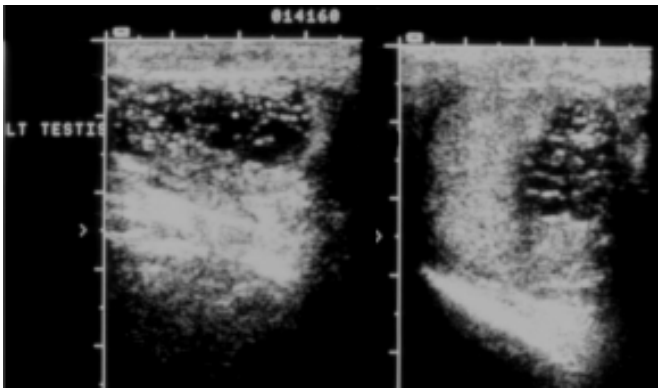

Figure 16b

Figure 17 shows a further example of tubular ectasia. The mediastinum of the testis can be identified and adjacent to this there are a number of varying size cystic areas.

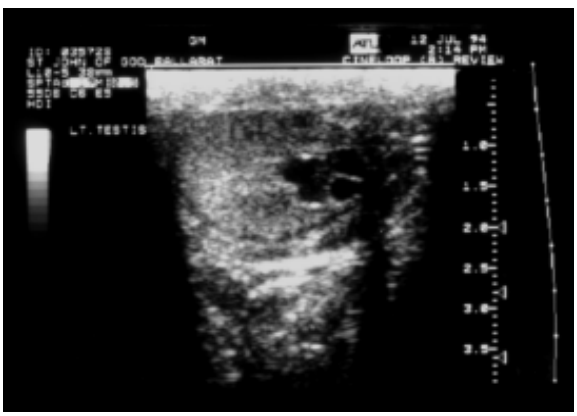

Figure 17a

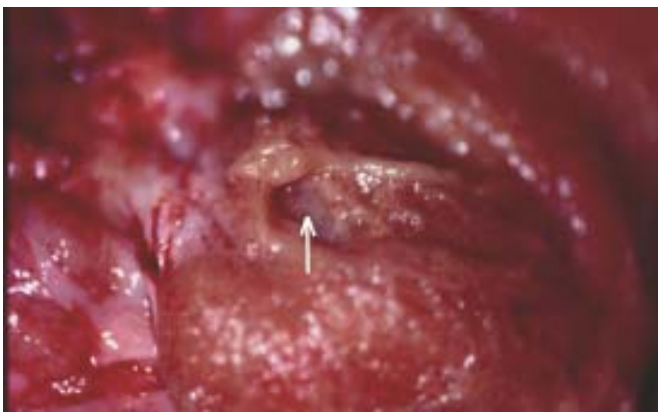

Figure 17b

Epididymal Pathology

Epididymal pathology is common. The generalisation that findings are mostly benign is true but there are significant exceptions.

The following two cases demonstrate sperm granulomata. Interestingly neither of the patients had been vasectomised.

Figure 18a illustrates a transverse section of a sperm granuloma in the head of the epididymis (arrow) and 18b the corresponding surgical specimen.

Figure 19 shows the preoperative and intraoperative ultrasound images and surgical specimen of a sperm granuloma in the tail of the epididymis in an elderly patient.

Both are complex masses which demonstrate minor accoustic enhancement.

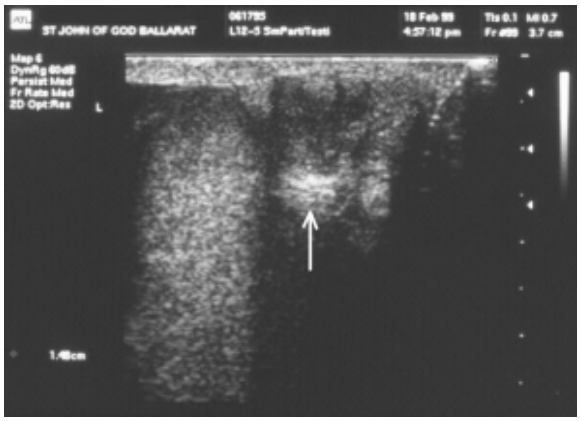

Figure 18a

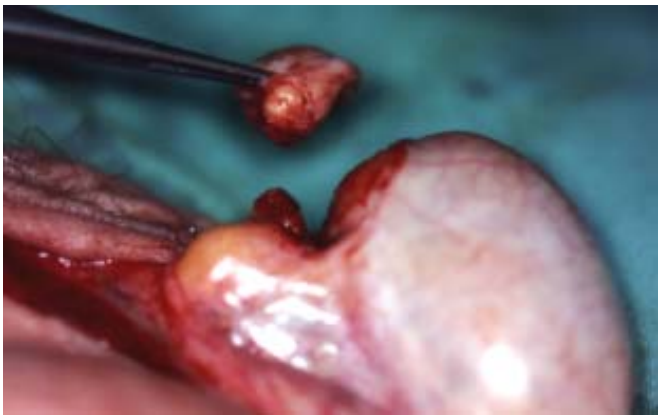

Figure 18b

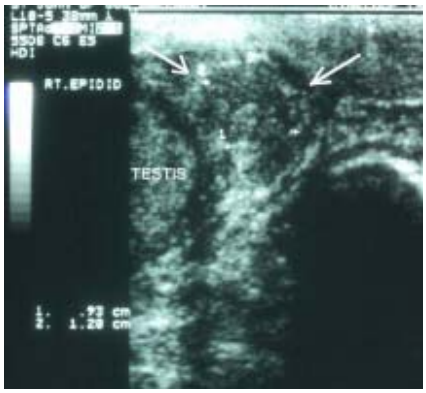

Figure 19a

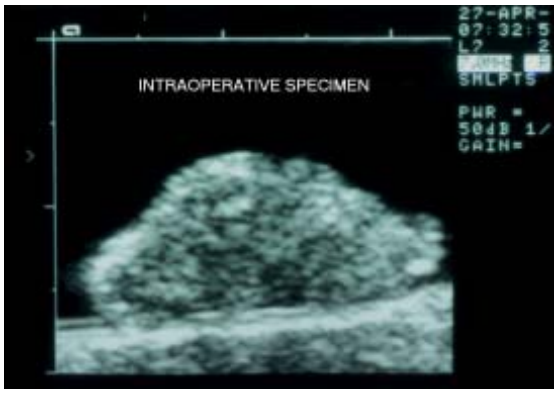

Figure 19b

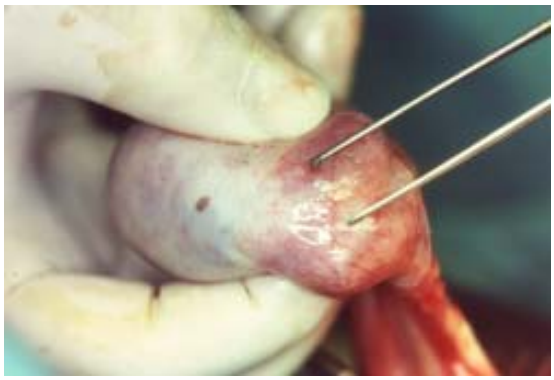

Figure 19c

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Figure 20. An elderly patient who presented with a firm nodule in the tail of the epididymis. Figure 20a illustrates the ultrasound features. This was an adenomatoid tumour of the epididymis with direct invasion of the testis (figure 20b).These make up approximately 30% of para testicular tumours. They do not metastasise but can be locally invasive.

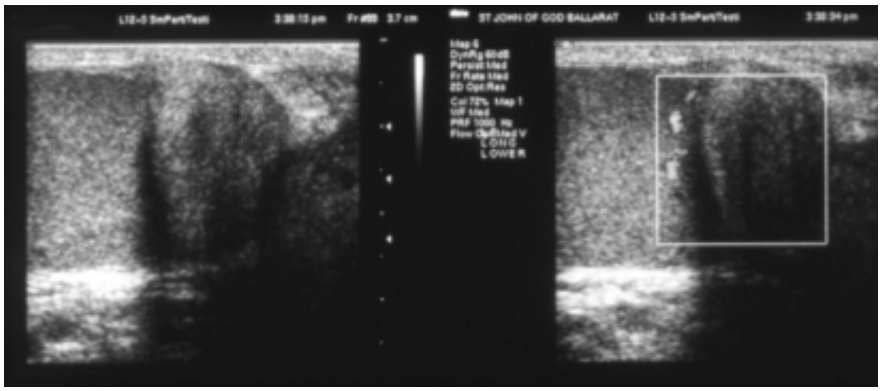

Figure 20a

Figure 20b

Malignant tumours can occur in the epididymis. Figure 21 demonstrates a large epididymal tumour (arrow) which subsequently proved to be an embryomal rhabdomyosarcoma in a 15 year old. This is probably the most common malignant tumour of the paratesticular structures.

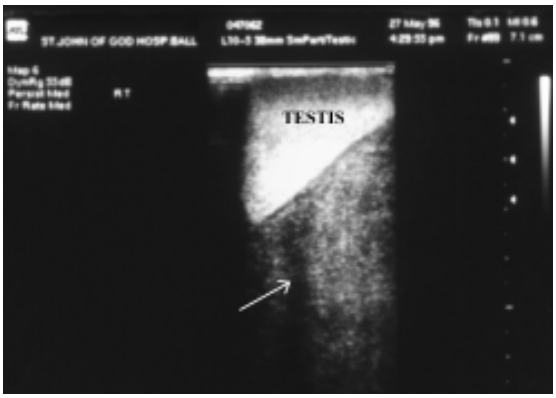

Figure 21a

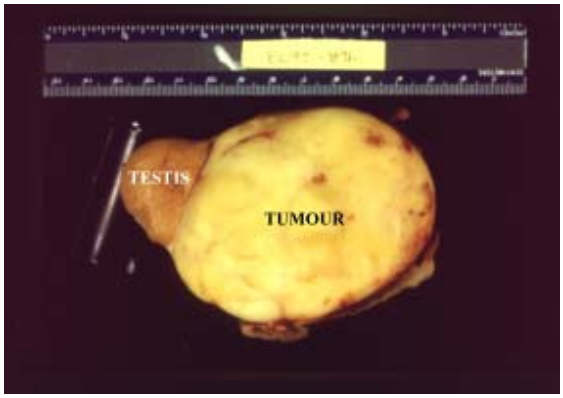

Figure 21b

Other malignant tumours of the epididymis may occur. Figure 22a shows lymphomatous infiltration of the epididymis. Figure 22b demonstrates a leiomyosarcoma.

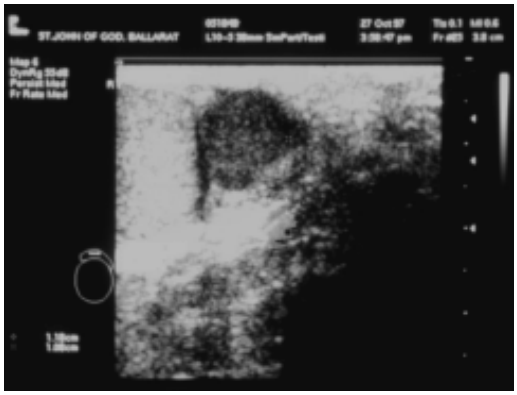

Figure 22a

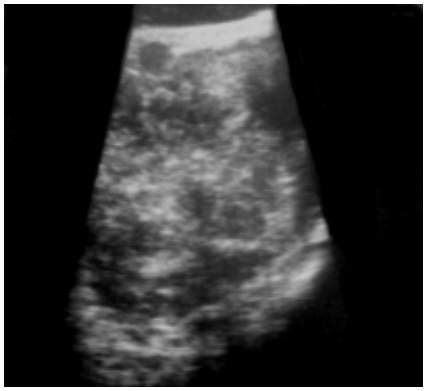

Figure 22b

Testicular Torsion

In our institution testicular torsion is primarily a surgical diagnosis and typically is not imaged. There are however circumstances where it can be an extremely helpful examination.

Figure 23. A 15 year old male who had a history of lower abdominal discomfort for twenty-four hours. At orchidopexy it was felt that the testis was probably viable however his pain continued and at a subsequent ultrasound there was evidence of infarction of the middle third of the testis with persistent flow to both the upper and lower poles.

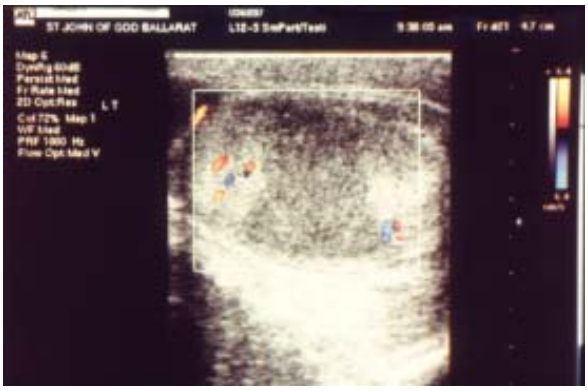

Figure 23a

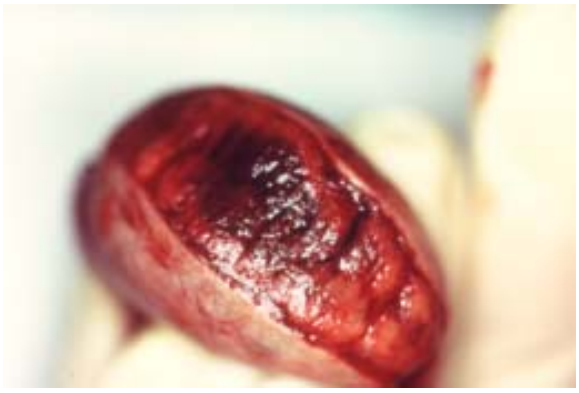

Figure 23b

Figure 24. Elderly man who presented with bilateral acute epididymo-orchitis. His initial ultrasound had shown marked increase in vascularity throughout the parenchyma of the testis however a scan one week later demonstrated circumferential hyperaemia with almost absent perfusion to the parenchyma of the testis.

The ultrasound assessment of infarction of both testes was confirmed with a radionuclide scan which demonstrated changes typical of chronic infarction secondary to severe infection.

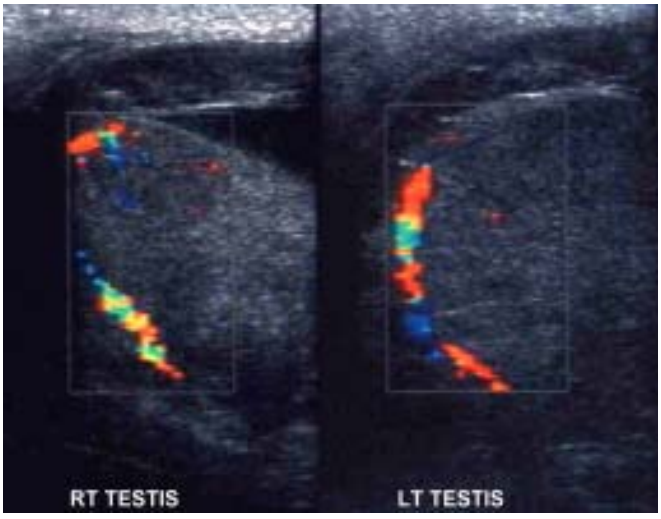

Figure 24a

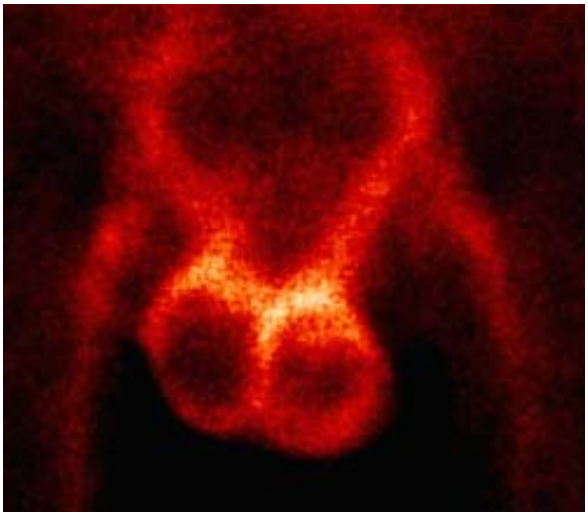

Figure 24b

Ultrasound of Foreign Bodies

Mike Heath DMU, Auckland Radiology Group, Auckland, NZ

Introduction

In recent years ultrasound has established itself as an excellent modality for the detection of superficial non-radiopaque foreign bodies (FB) with reported sensitivities and specificities in the order of 90% (1,2). This review will briefly discuss imaging modalities for various types of superficial FB and then the ultrasound features of FB diagnosis. An emphasis will be placed on scan technique highlighting potential pitfalls with suggestions on how to minimise false positive and negatives. Consideration will also be given to findings which can help the referring physician.

FB types and imaging modalities

Metal, glass and wood are the most common retained FB (3). Ultrasound is the modality of choice for the evaluation of wooden FB and other non-radiopaque substances such as plastic. Most wood FB are water density at cellular level and are therefore non-radiopaque (4). Plastic is also non-radiopaque (5) having a density of 1.2. (water 1.0, soft tissue 1.02, glass 2.22 – 2.87). Plastic does not tend to shatter (5) therefore it is unusual for fragments to remain following penetrating injuries. Ultrasound is the modality of choice to visualise plastic FB (6).

Metallic FB have a 100% likelihood of detection on plain X-ray (7) and are therefore not normally candidates for ultrasound examination. All glass types can be detected on plain radiographs with correct exposure and positioning (5) and plain radiography is the examination of choice.

CT is the modality of choice for detecting a radiopaque, i.e. high density FB, when it is thought to be obscured by overlying bone on plain X-ray or when localising in complex anatomical areas, eg hand and foot. Ultrasound is a cheaper and readily available test and can have a role in the same context. Localisation after visualisation on X-ray may be useful: eg to see if a fragment is extrinsic or intrinsic to a tendon.

MR is sensitive in demonstrating nonopaque FB such as vegetation, plastic, leather or rubber, however is not normally a primary imaging modality largely due to cost. Our practice has been to suggest MR when the ultrasound is negative in the context of strong clinical suspicion and also if there are ultrasound indicators of an unseen FB, such as a joint effusion.

Scan considerations

Infection control

Often there is a wound and there needs to be consideration of infection control. Sterile gel on the puncture site with gladwrap works as an adequate barrier. The advantage of this is it is easy to keep the probe clean and a standoff can easily be applied. In the case of wounds on fingers, a latex examination glove works as a satisfactory barrier. Gel is placed into the affected finger of the glove. The patient then wears the glove. With this technique the tip of the glove finger may need to be punctured to allow trapped air to escape and any air bubbles worked away from the scan site.

Technique

The successful search for a FB requires the optimisation of the probe's resolution capability coupled with a careful survey in real time. A high frequency linear array probe is ideal. As well as setting the electronic focus at the depth of interest, consideration needs to be given to using a stand-off to bring the elevation plane focus into the depth of interest when a FB is suspected close to the skin surface.

Real time survey technique for FB is different from that used to scan other superficial lesions. For many FB, surveying the area in two perpendicular planes is inadequate. When a FB is long and thin it may not be recognised unless the probe is aligned with the long axis of the FB. Therefore orthogonal scanning needs to be initiated, searching for the long axis in varying planes. Tilting of the probe may also be required to bring the FB long axis parallel to the probe face.

Comparative study with the contralateral side looking for asymmetry should also be used especially if the FB is small or subtle.

Ultrasound is a dynamic study and this can be used to advantage when tendons and muscle planes are involved or are in close proximity. Flexing tendons while observing the FB will help discriminate whether there is an intrinsic or extrinsic relationship.

Ultrasound diagnosis: what to look for

Primary diagnostic feature:

Hyperechoic linear focus: The primary diagnostic feature of a FB is a hyperechoic linear focus within the superficial tissues (1,2,6,7). Most FB are linear specular reflectors and therefore declare themselves as hyperechoic structures irrespective of the FB type: metal, glass, wood, plastic, fish bone or pencil lead (2) (Figure 1).

Secondary diagnostic features of FB include:

Hypoechoic zone: William *et al* in their series of 21 FB reported a surrounding halo or hypoechoic zone in 9 cases (2). Anecdotal evidence suggests this to be more common. This zone bears no relationship to time and may be present in the acute through to a chronic setting. It can be representative of haematoma (8), oedema (2), inflammatory debris (1), abscess (2) or granulation tissue (2) (Figure 2).

Posterior shadow: Gilbert *et al* report the presence of a shadow in 11 cases of the 21 FB found in their series (1). Shadowing may be attenuative or refractive in nature. Shadowing may also be highly angle dependent.

Comet tail reverb artefacts: These are frequently seen with glass (1) and metallic FB (9) (Figure 1). It is unusual for wood to exhibit comet tail artefacts.

Localisation

Once a FB has been depicted its length is measured and a depth perpendicular from the skin surface measured to assist surgical removal. It can also be helpful to have a measurement from the FB to a reference point such as the puncture site or an easily established landmark. Where possible, I like to indicate the length and orientation on the skin over the FB with an indelible marker. A spirit based felt-tip or a correction pen works well.

Pitfalls and the false negative diagnosis

Anisotropy

Anisotropy can render a FB invisible. Awareness of the following situations helps to increase FB conspicuity.

Virtually all FB are specular reflectors no matter what material they consist of. They will therefore return a high intensity reflection to the transducer when the incident sound interrogates its surface at 90 degrees, *ie* when the probe face is parallel to the long axis of the FB. Like a mirror, the angle of reflection equals the angle of incidence (10) (Figure 3). A FB oblique or perpendicular to the skin surface will often reflect most sound away from the transducer. The intensity of echoes returning to the transducer can quickly reach that of surrounding tissues, *ie* the FB becomes isoechoic. Tilting the transducer to varying angles during the search may facilitate a 90 degree interrogation (Figure 4). Tilting of the probe may be aided by the use of a stand-off or heavily applied gel. A small footprint linear array or a high frequency sector probe may help with this manoeuvre.

Greater than 50% of FB will be surrounded by a hypoechoic zone. Therefore, location of such a zone demands a careful search for the offending FB (Figure 5). Use the above manoeuvres in search of an echogenic focus.

A shadow is often generated by a FB. This may be refractive in nature and the source invisible. This is in accordance with Snell's law where the angle of incidence reaches a critical angle and there is total internal reflection (10). Look for such a shadow in the distal field of view. When such a shadow exists, observe its origin. This will direct you to the FB. The probe then needs to be aligned with the FB long axis and tilted to bring the probe face parallel to the FB.

FB are invariably straight. Any faint linear reflector which is not clearly normal anatomy should draw attention (Figure 4). Our experience has been the observation of a straight line that transects a tissue plane may well be a FB. Once observed, tilt the probe face to bring it parallel to the faint line. With this manoeuvre a true FB declares itself as an echogenic focus.

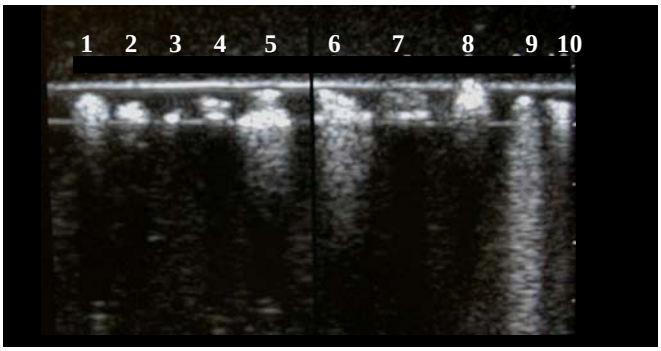

Figure 1 FB types within a phantom. Most FB will generate a hyperechoic reflection. 1 pencil lead, 2 dry wood, 3 rose thorn, 4 plastic slither, 5 plastic from car reflector, 6 windscreen glass, 7 rubber, 8 stone, 9 lead shot, 10 metal pin.

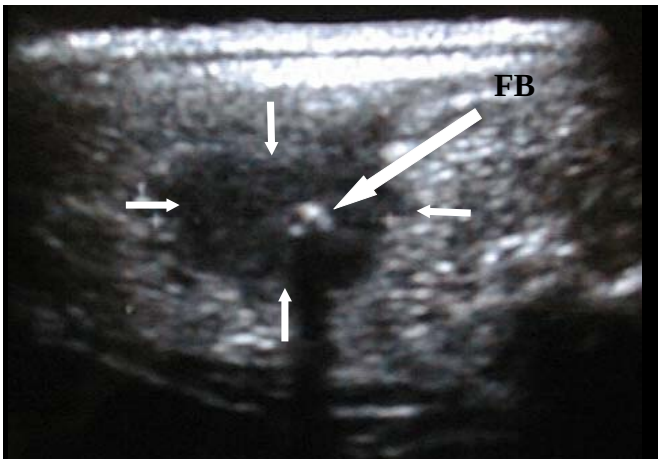

Figure 2 An 8 year-old male with a hedge spike lodged within the left erector spinae muscle group. A 2.2 x 2 x 7 cm collection (small arrows) surrounds the FB (large arrow).

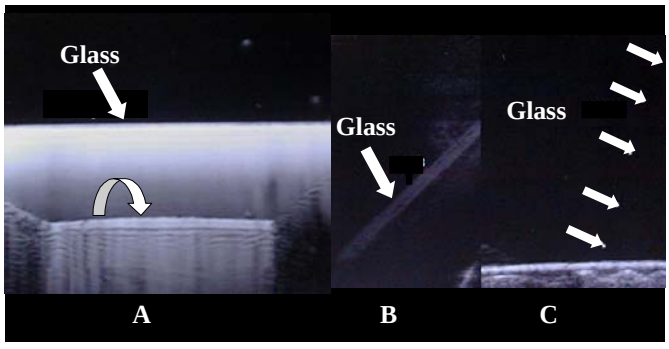

Figure 3 The glass is a pathology slide immersed in water and insonated at different angles. (A) 90 degree incident sound returns a high intensity echo to the transducer. Marked reverberation is observed posterior to the glass and plastic container base (curved arrow). (B)The angle of reflection is away from the transducer so little sound returns to the transducer. Note the intensity similar to soft tissue, *ie* isoechoic. (C) At the point of critical angle all sound is internally reflected. No sound returns to the transducer.

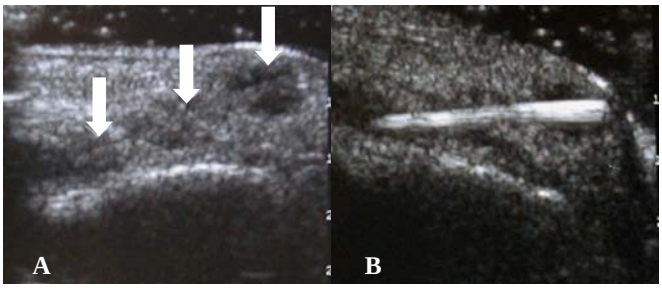

Figure 4 A 49 year-old female with a phoenix palm embedded over the dorsal aspect of the 5th metatarsal. (A) An isoechoic straight line was noted crossing tissue planes. (B) Tilting the transducer to 90 degree isonation confirms the presence of a FB.

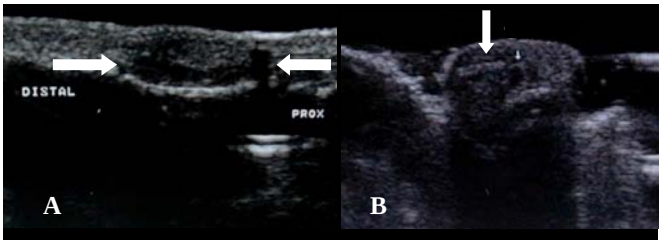

Figure 5 Wooden splinter left ring finger. (A) The hypoechoic zone, palmar aspect of the mid phalanx, demands a careful search. (B) Orthogonal scanning reveals the FB.

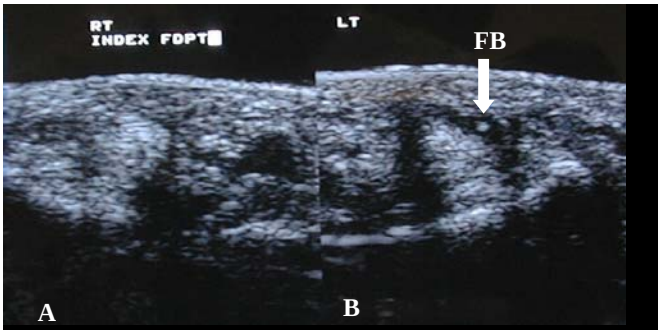

Figure 6 A 41 year-old male with a thorn embedded in the tendon sheath of the flexor digitorum profunda tendon (FDPT). (A) Normal right (B) Asymmetry of the left tendon sheath draws attention to the FB.

The Tiny FB

Care needs to be given to maximising focussing capabilities of the transducer. This entails shifting the frequency as high as possible and ensuring the elevation plane focus is at the likely FB depth. If, for example, a rose thorn is just beneath the skin surface, there is potential for partial volume of echoes in the elevation plane therefore reducing contrast resolution and ready detection.

Scanning the contralateral side helps identify an area of asymmetry otherwise not appreciated (Figure 6). An interrogation of this area will often reveal an echogenic focus. Our department adopts this protocol as routine unless the lesion is obvious. Scanning the contralateral side becomes imperative when reviewing unfamiliar anatomy and can lead to a very satisfying result.

Challenging Geography

Difficulty in detection can be encountered due to distance from the puncture site, an unexpected location or poor access.

Distance: Sometimes the FB can be astonishingly remote from the puncture site. This was the case in which a 10 year-old girl had a penetrating injury to the sole of the foot. The initial ultrasound was negative but she proceeded to MR due to compelling clinical suspicion. The FB was identified on the dorsal aspect of the foot and subsequently readily seen on review ultrasound (Figure 7). The teaching point is to always survey an extensive area, especially in the context of a negative study.

In the acute setting, a tract from the puncture site may be visualised and lead to the location of the FB (8).

Unexpected location: A FB may be within a joint, or embedded within a tendon. Soft signs such as a joint effusion or synovial thickening may indicate its presence. A careful search may reveal a FB (Figure 8). Failing this MR is recommended.

Poor access: Ultrasound detection is a challenge if the FB is "end on". This compromises orthogonal scanning when looking for a long axis or endeavouring to overcome anisotropy. FB between bones of the hand or foot can present access difficulties (Figure 9).

Pitfalls and the false positive diagnosis

There are echogenic foci generated by reflectors that can masquerade as a FB. Ossified cartilage (2), and bony anatomy (1) have been reported. Keratin plugs (11), gas (1) and old scarring (1) have also been implicated as a potential source for a false positive diagnosis. Bony spurs or sesamoid bones can also be misleading. Scanning of the contralateral side and plain X-ray should help identify the presence of variation in bony anatomy. Surgical exploration within two days prior should raise suspicion of gas trapped in the tissues. A rescan of the area after 48 hours should resolve the issue, as gas should reabsorb within this time (1).

Anisotropic tendons should not be misdiagnosed as a hypoechoic zone(1).

Helping the clinician

The obvious assistance to the referring physician is to find the FB, measure its length, mark its orientation on the skin surface and indicate its depth. The use of ultrasound can be extended by consideration of the following questions which may lead to information pivotal to management.

Is the FB fractured or fragmented?

Is there one or multiple FB?

Is there an inflammatory reaction, abscess, fluid collection or joint effusion?

Are fascial planes traversed, ie what compartment is involved: anterior, posterior, deep or superficial?

What is the relationship to other anatomy, ie muscle, bone, tendons, arteries or major nerve trunks?

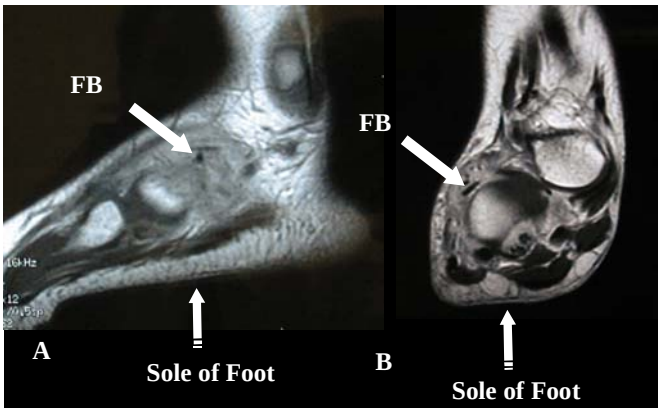

Figure 7 (A) Sagittal and (B) Coronal T 1 of the foot on a 10 year old female with a FB. Ultrasound over the puncture site on the sole of the foot was negative. (Puncture site not seen on these images). MR demonstrates a remarkably distant FB, easily seen on a subsequent ultrasound.

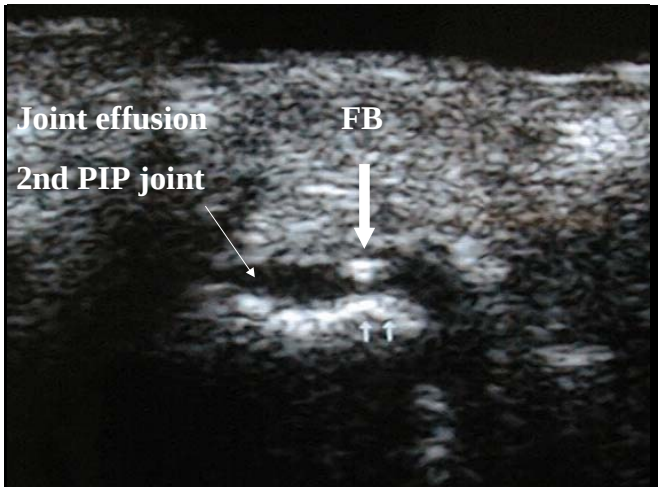

Figure 8 A 38 year old female, right toe, PIP joint. Search of this joint effusion localised a 1 mm bougainvillaea thorn. The puncture site was on the opposite side of the toe.

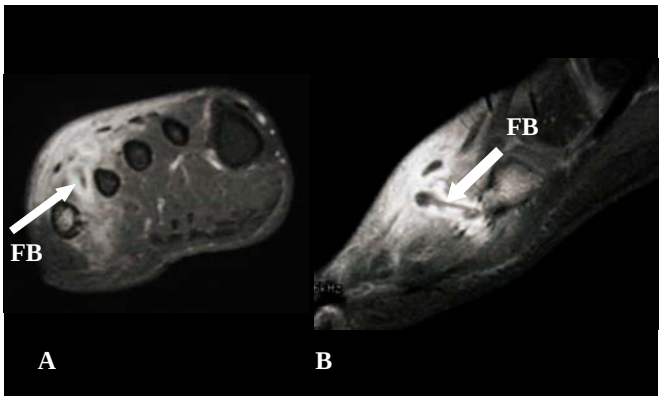

Figure 9 Teenage boy with retained phoenix palm. The negative ultrasound 1 year prior was probably due to poor access and the FB being end on. (A) coronal and (B) sagittal T1 MR of forefoot demonstrates the FB.

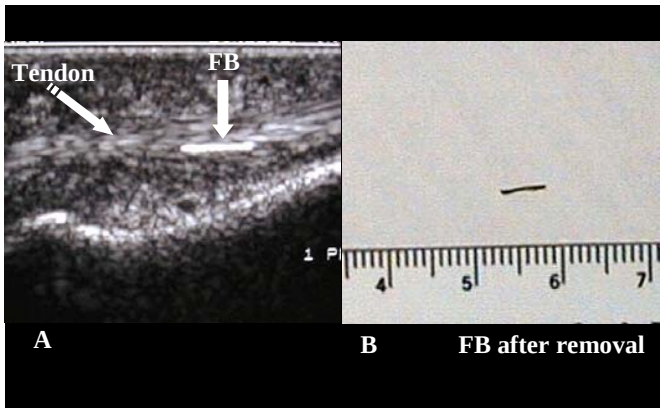

Figure 10 54 year old male. (A) A pineapple frond fragment is located within the flexor pollicis longus tendon over the proximal phalanx. (B) Removed FB.

For example, a FB within a tendon should prompt orthopaedic referral (Figure 10). A FB in contact with bone would alert the physician to an antibiotic strategy to reduce the risk of osteomyelitis. A case we imaged demonstrated a splinter involving the tibialis anterior tendon. An ankle joint effusion was also noted and prompted an MR which confirmed a second splinter within the joint.

Conclusion

Ultrasound is a sensitive test for the investigation of suspected superficial FB. It is the examination of choice for the non-radiopaque FB such as wood and plastic. Virtually all FB types can be detected by ultrasound and the modality may be of use for specific localisation. Plain X-ray should reveal 100% of metal FB and is overall more sensitive for the detection of glass, fish bones, pencil lead and other high density materials.

Localisation of a detected FB for the clinician can be assisted by marking its length and orientation on the skin surface with an indelible marker and a depth from the skin surface indicated. Ultrasound can be of further assistance in searching for information that will influence management.

A negative ultrasound review does not exclude the presence of a FB and meticulous care has to be given to scan technique in order to overcome potential pitfalls. Further evaluation should be considered in the context of a negative ultrasound and strong clinical suspicion. Suspicious but inconclusive ultrasound findings coupled with a good clinical history should also prompt MR or CT evaluation contingent on expected FB type.

Acknowledgements:

Thanks for assistance received from Drs Vicki Morganti, David Rogers and Neal Stewart.

References - continued on page 31

Transcranial Doppler Ultrasound

Assoc Professor Christopher F Bladin, Director, Department of Neurosciences, Box Hill Hospital Vic
Dr Christopher Levi, Department of Neurology, John Hunter Hospital, Newcastle NSW

Introduction

Transcranial Doppler (TCD) was developed in the late 1970s by Rune Aaslid and was first introduced clinically in 1982. TCD enables a non-invasive investigation of intracranial cerebral haemodynamics in a variety of conditions including subarachnoid haemorrhage, acute stroke, and intracranial and extracranial vascular stenosis. TCD has also been used for monitoring cerebral haemodynamics during carotid and cardiopulmonary bypass procedures, and also for the assessment of brain death. More recently TCD has been used for the detection and monitoring of cerebral emboli in acute stroke and TIA (particularly in patients with a potential cardiac source of emboli eg. atrial fibrillation), and post-operatively after carotid endarterectomy.

Technique

The technique is based on the use of low frequency ultrasound of approximately 2 MHz to insonate the basal cerebral arteries. This is done through a number of skull bone "acoustic windows", usually the temporal bone (transtemporal), the foramen magnum (suboccipital) and the orbits (transorbital) so as to insonate the middle and anterior cerebral arteries, and the vertebral, basilar and posterior cerebral arteries. Because of the attenuation by bone of the ultrasound beam, insonation at other skull sites is not possible.

Once a particular cerebral vessel is located, successive measurements are made of blood flow velocity at various distances along the artery. Blood flow parameters measured by TCD include:

- systolic flow (SV)
- end-diastolic flow (EDV)
- mean flow velocity (MFV = [SV + 2EDV]/3)
- pulsatility index (PI = SV - EDV/MFV)

General Applications of TCD

The clinical usefulness and role of TCD is yet to be fully defined. Generally established indications for TCD are listed in Table 1.

Table 1

- Detection of stenosis of the basal cerebral arteries
- Assessment of the pattern and extent of collateral cerebral circulation in vessel stenosis or occlusion
- Evaluation and follow-up of vasoconstriction in subarachnoid haemorrhage
- Assessment of arteriovenous malformation (AVM)
- Assessing brain death

1. Intracranial arterial stenosis

TCD has proven very useful in detecting, and following, intracranial vessel stenoses. This is mostly done for arteries such as the M1 segment of the middle cerebral artery (MCA) where the sensitivity and specificity in comparison to X-ray angiography is over 90%. The accuracy in more difficult to insonate regions such as the intracranial vertebral and basilar arteries is acceptable but not as high as the MCA. Areas of greater insonation difficulty are the carotid siphon, the M2 segment of the MCA, A2 segment of the anterior cerebral artery and the P2 segment of the posterior cerebral artery. As with most ultrasound techniques the skill of the operator is paramount in ensuring a high sensitivity and specificity for detection of a vessel stenosis.

Stenosis of a particular intracerebral vessel leads to an increase of blood flow velocity (usually greater than mean flow velocity of 80-100 cm per second or a peak systolic velocity of 180 cm per second in the MCA) associated with a step up and step down in flow velocity at each side of the stenotic lesion. Other suggestive features are side to side asymmetry in left and right MCA blood flow velocity >30 cm per second, turbulence of the blood flow of the site of stenosis, "musical" murmurs and evidence of altered flow dynamics with collateral flow.

2. Collateral cerebral blood flow and extracranial vascular stenosis

Transcranial Doppler is sensitive to collateral blood flow in patients with carotid artery occlusive disease by determining the pattern of blood flow through the three major collateral arteries, namely the anterior communicating artery, the posterior communicating artery and the occipital artery.

The patterns of collateral flow in extracranial carotid occlusion are demonstrated in Figure 1. The anterior communicating artery may be identified when there is increased flow from one hemisphere to the other via the anterior communicating artery, resulting in increased flow through the contralateral anterior cerebral artery, and reversed flow through the ipsilateral anterior cerebral artery, eg. as a consequence of ipsilateral carotid artery stenosis. Similarly, reversed flow through the posterior communicating artery indicates posterior to anterior circulation collateralisation. This is often accompanied by a compensatory increase in flow in the vertebrobasilar system. Reversal of flow in the ophthalmic artery indicates extra-to intracranial collateral flow.

It is important, however, to remember that many of these findings are dependent on a complete circle of Willis, (ie the anterior, and posterior communicating arteries) and the

presence and patency of occipital arteries on both sides of the brain. Unfortunately this complete anatomic arrangement is only present and symmetrical in a minority of people, and the more typical situation is that one or more of these communicating arteries will be either small or absent. At times this can make interpretation of findings on TCD difficult.

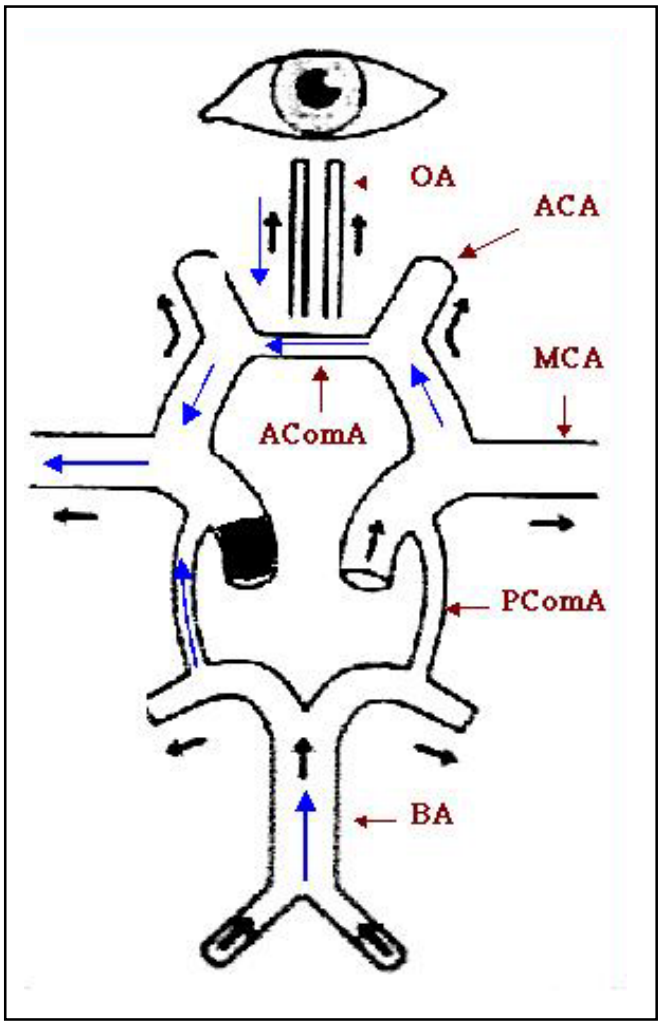

Figure 1 Patterns of collateral blood flow in carotid occlusion. Black arrows indicate normal direction of flow; blue arrows indicate direction of collateral flow in carotid occlusion
Legend:
OA - ophthalmic artery
MCA - middle cerebral artery
PComA - posterior communicating artery
AComA- anterior communicating artery
BA- basilar artery

3. Subarachnoid haemorrhage

Transcranial Doppler has been shown to be very useful in identifying cerebral vasospasm in patients with subarachnoid haemorrhage. Vasospasm occurs between day 3 and day 10 following the rupture of blood into the subarachnoid space. Blood flow velocities may increase diffusely but typically more so on the side of the ruptured aneurysm. Transcranial Doppler indicators of arterial vasospasm include:

1. a rapid rise in middle cerebral artery mean blood flow velocity >50 cm/sec per day, and
2. intracranial to extracranial mean blood flow velocity ratios ≥3 (known as the Lindegaard ratio).

Comparison of TCD readings with cerebral angiography has been undertaken. Vasospasm proven on angiography correlates with TCD mean blood flow velocities greater than 140 cm per second. Velocity readings >200 cm/sec indicate severe vasospasm and predict delayed cerebral ischaemia and stroke. The specificity of transcranial Doppler for the detection of vasospasm in the middle cerebral artery in subarachnoid haemorrhage is reported in various studies as 85-100%, and the sensitivity 59-94%.

4. Arteriovenous malformations

Arteriovenous malformations (AVM) consist of an abnormal cluster of arteries and veins in the brain parenchyma. The size of the lesions range from very small to very large but typically they have one or more large feeding vessels. Increased blood flow velocities in the feeding vessels are characteristic findings on TCD, particularly in medium and large AVM. TCD may be of benefit in identifying feeding arteries by insonation of multiple vessels in the vicinity of the AVM. The flow patterns on TCD can then be compared before and after surgical intervention.

Other evolving applications for TCD include:

5. Detection of Microemboli

Prior to the advent of TCD, it was recognised that Doppler ultrasound could be used to detect emboli-in-transit firstly through laboratory flow circuits and later, through the arterial system. A difference in the density or acoustic impedance between blood and the embolic material results in scattering and/or reflection of the incident ultrasound when an embolus passes through the Doppler beam. This often results in a high intensity transient signal (HITS) (Figure 2). Gaseous emboli, which are of much lower density in comparison to blood, produce the highest intensity embolic signals. Experimental studies suggest that gaseous emboli down to a 5-10nm diameter can be detected with Doppler. Particulate emboli of various compositions are usually of a similar density to blood and typically produce less intense embolic signals.

With the development of TCD instruments using low frequency it was recognised that the sensitivity to detect emboli was enhanced. From the early 1990's a number of potential clinical applications of TCD embolus detection were investigated. These include:

- Microembolus monitoring of the MCA during and following carotid endarterectomy. In this setting a number of investigators have reported that frequent embolic signals during the early postoperative period are associated with an increased risk of carotid thrombosis and incipient cerebral ischaemia.
- Microembolus monitoring during cardiac surgery. In this setting frequent microemboli are associated with an increased risk of neuropsychological impairment.

- Microembolus monitoring in asymptomatic carotid stenosis. The presence of microemboli is associated with an increased risk of cerebral ischaemia in a single small study. Larger cohort studies are underway in Australia and the UK to confirm this finding.
- Microembolus monitoring in acute ischaemic stroke. Frequent microemboli may be associated with an increased risk of early stroke recurrence.

Another application of TCD embolus detection is in the detection of intracardiac right to left shunts. This technique involves MCA embolus detection monitoring during intravenous administration of agitated saline containing microbubbles, or echo contrast agents such as "Levovist" (Schering). The detection of intracranial embolic signals support the existence of a right to left shunt and has been demonstrated to have a high degree of accuracy in comparison to contrast transoesophageal echocardiography.

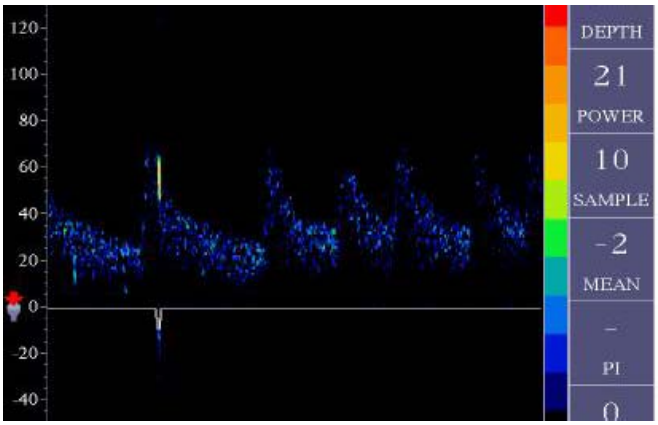

Figure 2 An embolic, or high intensity transient signal (HITS)

6. Acute Stroke

TCD may have a significant role in the assessment of acute stroke, in particular in patients with ischaemic cerebrovascular disease. This may be particularly relevant with the advent of thrombolysis for treatment of acute ischaemic stroke, and the need to identify patients with embolic occlusion of the middle cerebral artery. Figure 3 demonstrates such a situation in which an occluded M2 segment of the MCA in acute stroke was observed to re-open whist undergoing TCD insonation (with thanks to Andrei Alexandrov, MD).

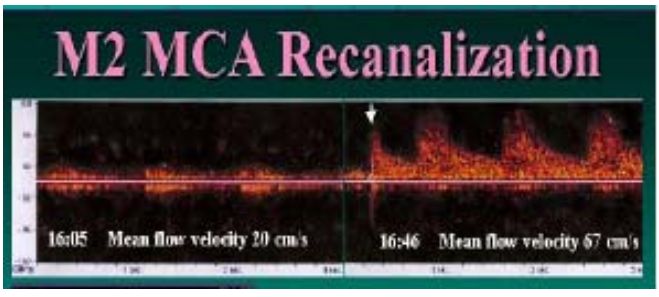

Figure 3 Recanalisation of middle cerebral artery (MCA) occlusion in acute stroke

Future Advances

A significant recent advance for TCD (and vascular ultrasound in general) has been the development of vascular echo contrast agents (*eg* Levovist). These agents allow greater demonstration of the blood flow waveforms particularly in situations where there is difficult insonation such as a thickened skull with poor acoustic windows. Coupled with this has been the advent of transcranial colour duplex sonography (TCCD) with direct visualisation of the circle of Willis.

Conclusion

Transcranial Doppler is an important noninvasive adjunct in the evaluation and management of patients with cerebrovascular disease. It allows noninvasive assessment of the anatomy and haemodynamic status of the cerebral circulation in a variety of neurological conditions as well as allowing assessment of the potential risk for embolic stroke.

The inability to directly visualize blood vessels has, at least partially, limited its use, however, the use of echo contrast agents and the advent of transcranial colour duplex sonography has significantly enhanced the utility of this noninvasive technique.

Recommended Reading:

1. Newell DN, Aaslid, R (eds). Transcranial Doppler. Raven Press, New York 1992

2. Alexandrov AV, Bladin CF, Norris JW. Intracranial blood flow velocities in acute ischemic stroke. Stroke 1994; 25: 1378-1383

3. Grossett DG, Straitin J, duTrevou M, Bullock R. Prediction of symptomatic vasospasm after subarachnoid hemorrhage by rapidly increasing transcranial Doppler velocity and cerebral blood flow changes. Stroke 1992; 23:674-679

4. Levi CR, Donnan GA, Bladin CF, Chambers BR. Transcranial Doppler detected cerebral microembolism following carotid endarterectomy. Brain 1998; 121:103

5. Alexandrov AV, DemchukAM, Wein TH, Grotta JC, Yield of transcranial Doppler in acute cerebral ischemia. Stroke 1999; 30: 1604-1609

6. Demchuk AM, Felburg RA, Alexandrov AV. Clinical recovery from acute ischemic stroke after reperfusion of the brain with intravenous thrombolysis (letter). N Eng J Med 1999; 340:894-895

Slice Thickness Artifacts

Roger Gent DMU, Paediatric Ultrasound, Women's and Children's Hospital, North Adelaide SA

One of the inherent limitations of ultrasound imaging is the inability to produce ultrasound beams that are very narrow throughout the depth of imaging (a limitation dictated by diffraction effects).

Various techniques are used to minimise beam dimension (width) and side lobes in the scan plane (eg. electronic focussing on transmit and receive, use of multiple focal zones, apodisation, dynamic aperture). These techniques are not generally available to control thickness of the beam in the elevation plane, perpendicular to the scan plane. Significant improvement in ultrasound imaging (particularly contrast resolution) could be achieved if these techniques were available to control slice thickness.

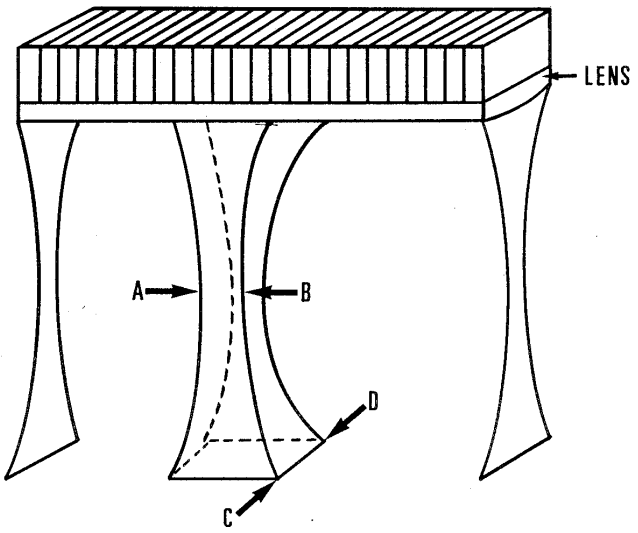

Figure 1 Diagrammatic representation of the difference between beam width (A-B) and slice thickness (C-D) for a linear array transducer. In each case, the value varies with depth from the transducer.

For most array transducers (except annular arrays), beam dimension in the elevation plane is minimised using a plano-convex acoustic lens, extending over the length of the array. This is a much less effective means of narrowing the beam however, and has the additional disadvantage of producing a focal zone of fixed depth, determined by the lens characteristics. This also means that for linear, phased and curved array transducers, slice thickness is considerably larger than beam width for most of the depth of the beam. Depending on transducer frequency, the slice thickness just below the surface of a diagnostic transducer may be as great as 15 mm (or more for low frequency transducers).

The echoes in a B-mode image are therefore acquired from a slice of tissue of finite thickness, determined by the beam dimensions in the elevation plane, but are compressed into a 2-dimensional display, *ie* they are assumed to have come from an infinitely thin plane through which the centre of the beam has swept (referred to as the scan plane).

Unlike beam width in the scan plane, which mainly affects spatial resolution, beam dimension in the elevation plane (slice thickness) affects contrast resolution, which is the ability to distinguish different tissues by variations in their echogenicity. Artifactual appearances resulting from the compression of 3-dimensional information into a 2-dimensional display are known as slice thickness artifacts and are the equivalent of "partial volume" effects seen in CT imaging.

Side lobes in the elevation plane will contribute to this effect. The angled arrangement of these lobes to the main lobe means that echoes from well outside (in front of or behind) the assumed plane of origin may appear in the display. No distinction is made between slice thickness artifact caused by the finite thickness of the main lobe and that caused by side lobes in the elevation plane; in either case, the effect is a reduction in contrast resolution.

The effect of slice thickness on contrast resolution is shown in Figure 2. Figure 2a is a coronal view of a neonatal kidney, taken with a 7 MHz transducer. Figure 2b is a coronal view of the same kidney, taken with a 10 MHz transducer. Although the renal pelvis is apparent in both images, it is much more clearly seen in the 10 MHz image. The larger slice thickness of the lower-frequency transducer has resulted in slice thickness artifact being displayed within the renal pelvis, significantly reducing the contrast resolution. The artifact is largely eliminated in the 10 MHz image because of the reduced slice thickness associated with the higher frequency sound. An indication of relative slice thickness values for the two transducers can be deduced from a para-sagittal view of the kidney (Figure 2c), which shows the antero-posterior measurement of the renal pelvis to be approximately 2 mm. This indicates that the slice thickness (at the depth of the renal pelvis) of the 7 MHz transducer must be greater than 2 mm, while that of the 10 MHz transducer must be less than this. The loss of contrast resolution because of slice thickness is commonly encountered in neonatal cranial scans; a normal third ventricle is frequently poorly seen in mid-sagittal views because its width is typically less than the slice thickness. This is not the case when ventricular dilatation is present.

Figure 2 shows the effect of slice thickness on contrast resolution.

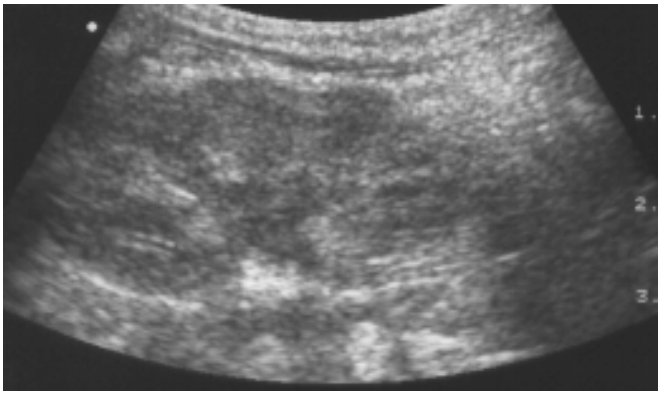

Figure 2a Coronal view of a kidney taken with a 7 MHz transducer, showing echoes within the renal pelvis.

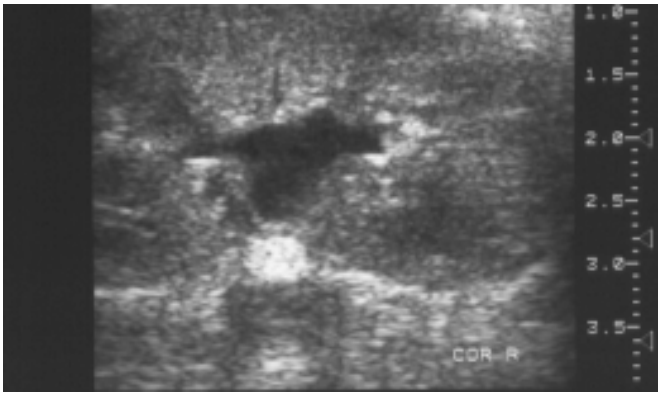

Figure 2b The renal pelvis is almost echo-free when imaged with a 10 MHz transducer because of the reduced slice thickness.

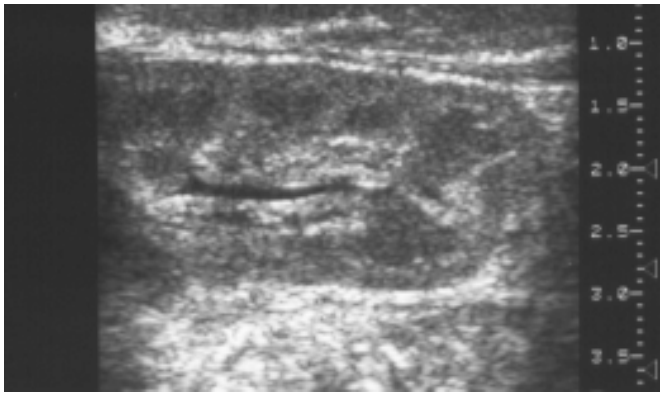

Figure 2c The actual width of the renal pelvis is shown in the para-sagittal view.

Visualisation of anechoic tubular structures (eg. blood vessels, ureters) in their longitudinal axis is very much influenced by slice thickness. The depth of the structure from the transducer is relevant because of focusing in the elevation plane. This is demonstrated in Figure 3, using images of anechoic cylinders in a tissue-equivalent phantom. In a short axis view (Figure 3a), the top three cylinders are visible (arrows) and appear echo-free. When the transducer is rotated to show a longitudinal view (Figure 3b), the superficial cylinder is much less apparent, being filled with slice thickness artifact. The second and third cylinders are still clearly seen however, because they lie within the elevation focal zone. The importance of the focusing is apparent when the long axis view is obtained with the aid of a stand-off pad (Figure 3 c). With much of the focusing effect occurring within the stand-off, the superficial cylinder now lies within the elevation focal zone and is more clearly seen. The situation is shown diagrammatically in Figure 4, indicating the change in slice thickness at the level of the first cylinder, with and without the stand-off.

Figure 3 shows the effect of slice thickness on visualisation of anechoic cylinders in a tissue equivalent phantom.

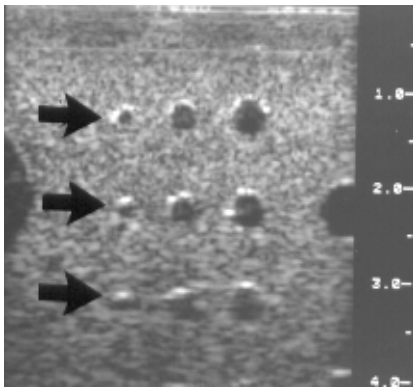

Figure 3a In a short axis view the top three cylinders are clearly seen (arrows).

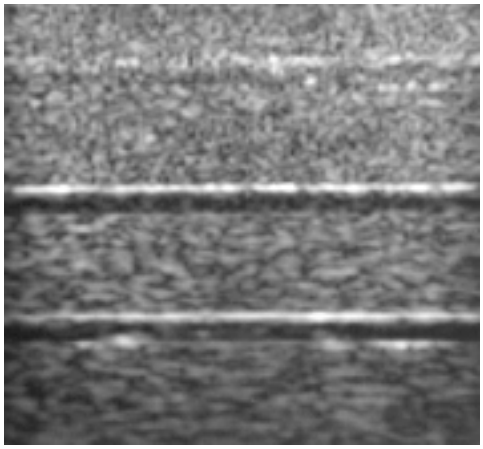

Figure 3b With the transducer rotated into the longitudinal axis the superficial cylinder is now filled with echoes (slice thickness artifact).

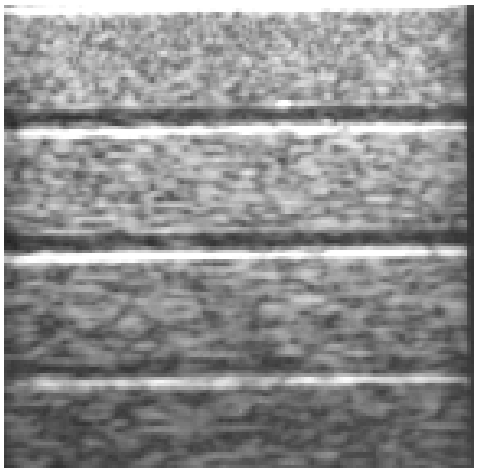

Figure 3c When a stand-off is used the superficial cylinder appears echo-free and is more clearly seen.

From the above examples, it is apparent that slice thickness artifact is likely to appear in any structure with a slice thickness dimension less than that of the beam at the same depth. This is of practical importance when scanning very superficial tubular structures, which are likely to be better visualised in their longitudinal axis using a stand-off pad, or by using a transducer designed for intraoperative work (these typically have small elevation dimensions, with minimal slice thickness). This also applies to small superficial cysts, which are more likely to appear echo-free if scanned with a stand-off pad or with an intraoperative transducer.

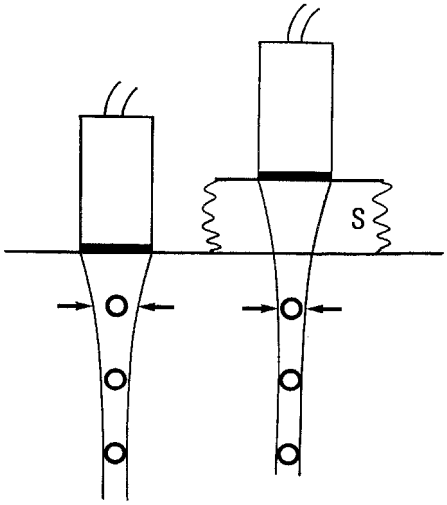

Figure 4 Diagrammatic representation of the situation seen in Figure 3, showing the slice thickness at the depth of the superficial cylinder, with (right) and without (left) a stand-off. Using a stand-off reduces the slice thickness at the depth of the first cylinder, avoiding the appearance of slice thickness artifact.

The greater control of beam shape in the scan plane means that any small anechoic tubular structure is likely to be better seen in a transverse view rather than longitudinal. This is particularly true when the structure is not within the relatively limited elevation focal zone. In a transverse view, irrespective of depth from the transducer, the tube is likely to extend through the full thickness of the beam, thereby precluding the generation of slice thickness artifact in that region. In the longitudinal view, however, slice thickness artifact is likely to appear within the tube. A clinical example is seen in Figure 5, showing views of a dilated distal ureter. Considerable artifact is present in the longitudinal view (a), but is not apparent in the transverse view (b).

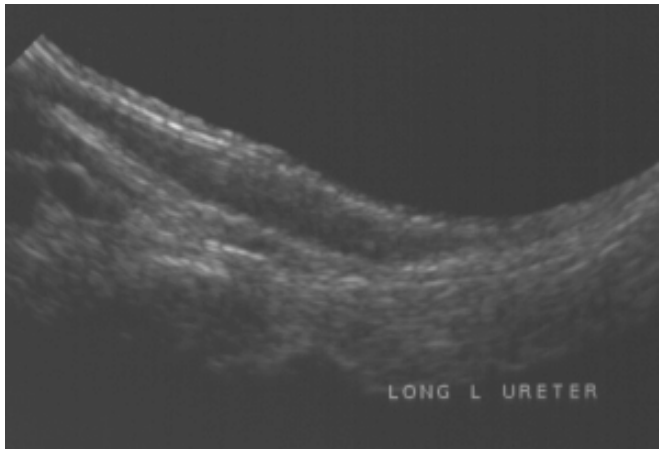

Figure 5a In the longitudinal view the ureter is filled with slice thickness artifact.

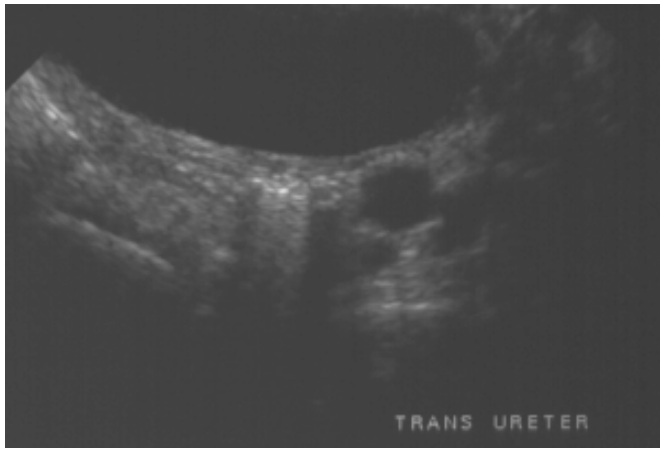

Figure 5b In the transverse view the ureter appears echo free.

As mentioned earlier, elevation plane side lobes can be responsible for slice thickness artifact. This commonly occurs in transverse views of the urinary bladder, when bowel gas lying superior to the bladder acts as a very strong reflector, even for the relatively low-amplitude side lobes. These side lobe echoes are all the more apparent because they are displayed within the lumen of the bladder, expected to be echo-free. The depth of the gas from the transducer, in combination with the angle of the bladder wall to the scan plane, will determine where the artifact appears in the bladder. In some cases (as shown in Figure 6) the echoes are displayed away from the posterior bladder wall and can easily be recognised as artifact. In other cases however (Figure 7), the artifact appears adjacent to the posterior wall

and can simulate a layer of debris. For reliable differentiation between artifact and debris, the patient should be rolled onto one side, in which case debris will move to the dependent part of the bladder, whereas artifact echoes are unlikely to move.

Changing transducer position or orientation, without rolling the patient, is unlikely to allow reliable differentiation between debris and artifact.

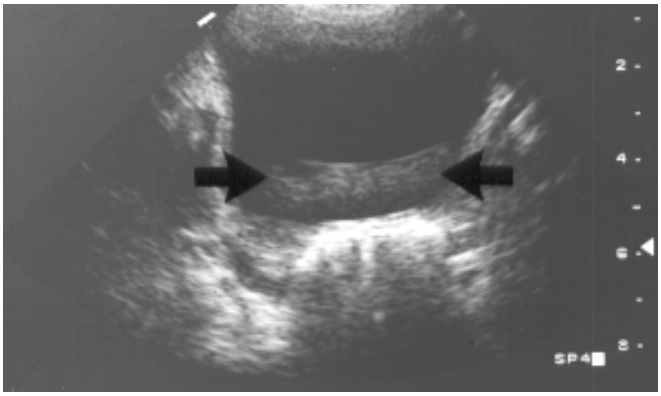

Figure 6 Transverse view of a urinary bladder, showing slice thickness artifact, from bowel gas lying superior to the bladder, appearing within the bladder lumen.

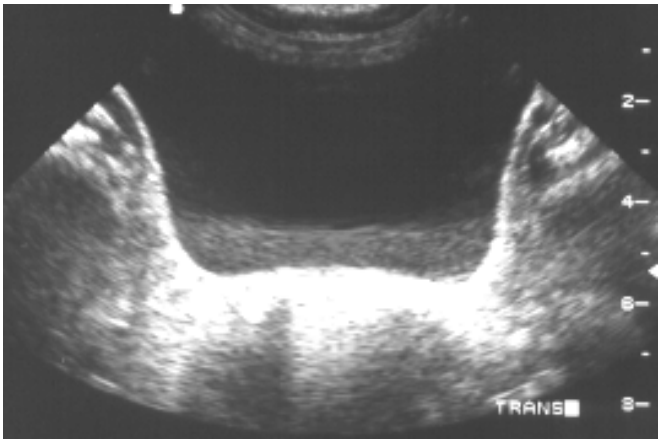

Figure 7 Transverse view of a urinary bladder, showing slice thickness artifact mimicking particulate matter dependent in the bladder.

Another effect of the finite slice thickness is marked exaggeration of the thickness of thin membranes when they are angled relative to the scan plane. This can be readily shown by scanning a thin membrane, (eg. a steridrape), within a water bath (Figure 8). At a 90º approach (Figure 8a) the membrane is displayed as a thin echo. Angling the transducer relative to the plane of the membrane (Figure 8b) causes it to appear as a much thicker echo because of the range of axial depths (from the transducer) over which the membrane is detected by different parts of the beam throughout its slice thickness.

Figure 8 shows an echo from a steridrape suspended in water bath.

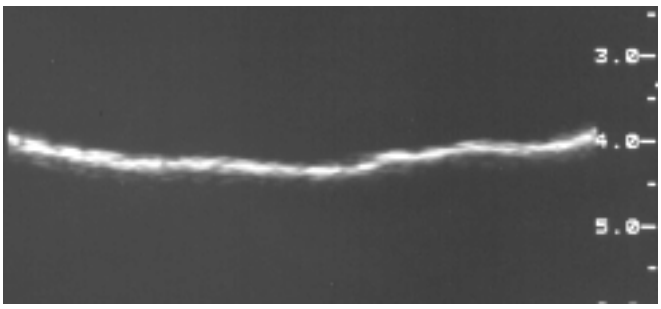

Figure 8a With a perpendicular angle of approach in the elevation plane the echo appears very thin.

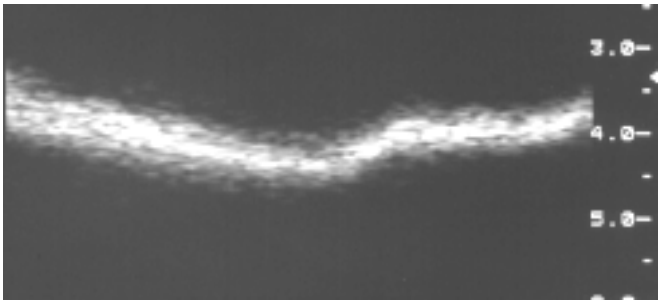

Figure 8b When the steridrape is angled in the elevation plane the echo appears much thicker.

An estimation of the slice thickness of diagnostic transducers can be made using the technique described above. If the membrane is angled at 45º to the scan plane, the thickness of the echo is equivalent to the slice thickness at that depth.

Artifactual thickening of a membrane is commonly seen in cranial images acquired through the anterior fontanelle, in which the tentorium appears several mm greater than its true thickness (Figure 9). Note that the increased thickness is partly a beam width artifact as well, because the tentorium is angled to the axis of the beam not only in the elevation plane, but also in the scan plane. Use of a more perpendicular approach to any membrane will reduce the effect.

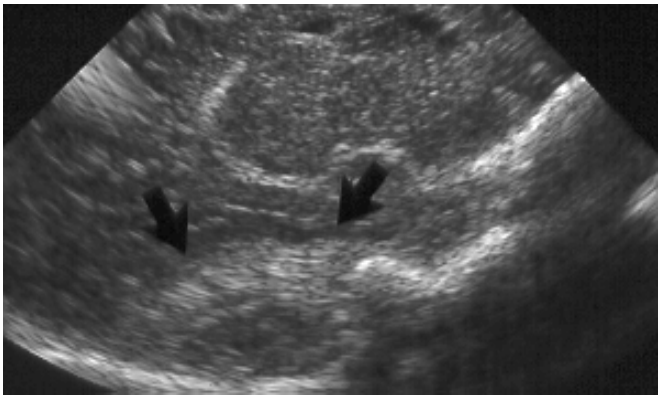

Figure 9 Para-sagittal view of a neonatal brain. The tentorium (arrows) appears much thicker than its true thickness, because of its angulation to the ultrasound beam.

Revisiting and reviewing the Ultrasound Policies and Guidelines

Cheryl Bass,
Chair, Standards of Practice Committee

Over a decade ago the Society introduced standards and guidelines for performing various ultrasound examinations. As a member and now Chair of the Standards of Practice Committee I have been involved in actively reviewing the standards with the aim of bringing them up to date. Standards need to reflect current best practice and encourage uniformity without excluding intelligent adjustment of protocol to suit the individual situation.

One of the problems with writing these standards is the wide range of geographical locations, types of equipment and level of expertise available. In Australia we have a particular responsibility not to disenfranchise people in remote areas. Whilst in the ideal world all examinations would be done on "top of the range" equipment by an experienced sonographer and supervised by a sonologist specialising in that type of scan only, we know this is unrealistic, but equally it is important not to condone shoddy practice.

When reviewing the standards it was felt that they should represent an outline of what should be done. I hesitate to use the words "minimum requirement" as I realise that in some situations, for example in a sick patient or in the follow up situation, a one line response may be all that is required and not a full evaluation. It was also felt that the standards should be just that and not a teaching manual and therefore many of the references to how or why you do it have been removed. The exception is in the newer and/or controversial areas where more detail has been supplied. Nuchal Translucency scanning in the obstetric section is a good example of this.

Some of the sections have undergone little more than a "tidy up." For example, the reorganised abdominal ultrasound section provides a more logical approach to the scan and brings it into line with current practice. The requirement to evaluate the intraabdominal vasculature has also been demoted as it is felt this should be requested and performed as a separate Doppler ultrasound examination.

By contrast significant changes have been made in the sections on breast, obstetrics and gynaecology. Of course none of this was without controversy with an interesting range of opinions being collated and discussed from around Australia and New Zealand. We have arrived at the best available model but always welcome your comments.

The updated standards have already been circulated, enclosed in a plastic wrapper inside the last edition of the *Bulletin*. I suspect that many of these packages are still firmly sealed! Therefore to make them more accessible some of the standards will be printed in the main body of future editions of the *Bulletin*.

Episode 1: The Breast

The breast is always a good starting point. The latest standard has been altered to remove the emphasis from a routine survey and replace it by the targeted approach. It is realised that there may be a place for ultrasound screening of young women with dense breasts and a strong family history but

a) we are talking about diagnostic ultrasound not mass screening and

b) the jury is still out on this subject and therefore it was not felt it merited inclusion at this time.

This standard reflects the need to target the ultrasound on a palpable or mammographic abnormality and strongly endorses the Stavros criteria for distinguishing between benign and malignant lesions.

Physical Fundamentals (cont'd)

Recent developments in array technology have resulted in the introduction of transducers that have a matrix of elements (across the array as well as along it). These transducers are designated as 1½-dimensional arrays, because the number of elements in the elevation plane is small (less than 9 currently), to avoid an unwieldy cable connection to the ultrasound system. This allows electronic focusing methods to be used in the elevation plane. The small number of elements means that the degree of elevation focusing is limited, but this is nevertheless an improvement over the fixed lens focusing used to date. It is likely that transducers using a larger number of elements in the elevation plane will be produced in the foreseeable future, resulting in greater control of focusing in this plane. This will allow further improvement in the contrast resolution achievable with ultrasound images.

References

Goldstein A,Madrazo B: Slice-Thickness Artifacts in Gray-Scale Ultrasound J Clin Ultrasound 9:365-375, 1981

Breast Examination and reporting

Reaffirmed MAY 1997
Revised SEPTEMBER 1999

Breast ultrasound should be a targeted procedure directed at a clinical or mammographic abnormality.

Other indications for breast ultrasound such as screening for breast cancer in high risk women with mammographically dense breasts are still under evaluation and are not currently routine practice.

It is of the utmost importance to be aware of the position and characteristics of the palpable or mammographic abnormality and to correlate this information with the ultrasound findings. It is anticipated that in order to do this some knowledge of mammography and in particular mammographic position will be necessary.

The Examination

A high frequency transducer usually 7.5 MHz or above is desirable.

The patient should be examined in the supine or semi oblique position so that the breast tissue is spread more evenly over the chest wall. This may be further assisted by placing the patient's arm over her head.

All areas of concern should be scanned in several planes. Note should be made as to whether the ultrasonically visible lesion is palpable and if it corresponds to the indication for referral.

The Report

Uniformity of reporting is essential so that a lesion can be found by other individuals, and can be accurately localised to enable comparison with palpation and mammographic findings.

The breast should be visualised as a clock face. The films should be annotated according to the position of the transducer on the clock face. The distance of the lesion from the nipple in centimetres and the orientation of the transducer (longitudinal or transverse) should be indicated on the film.

The Assessment

Assess the lesion with respect to the Stavros benign and malignant criteria and describe those that are present.

Assess:
Size

Shape:
a) Ellipsoid
b) Taller than wide

Margins:
a) Spiculated
b) Angular
c) Branch extension
d) Duct extension

Lobulations:
a) Number
b) Characteristics, gentle or microlobulations

Shadowing

Echogenicity:
a) Markedly hypoechoic
b) Hyperechoic Calcification

Capsular thickness

Reference: Stavros AT *et al*. Solid Breast Nodules; Use of sonography to distinguish between benign and malignant lesions. Radiology 1995,196:123-134

Guidelines for abdominal scanning

Reaffirmed MAY 1997
Revised SEPTEMBER 1999

The following comments apply to ultrasound in adults. They generally hold for children and infants, although are directed towards the range of pathology expected in adults.

Equipment for abdominal scanning should be high quality real-time apparatus. Curved linear and sector transducers with variable focal zones are preferred. The frequency should be in the 3.5-5.0 MHz range.

Ultrasonic investigation of the abdomen is usually directed to a specific clinical problem and the examination should be tailored to answer the clinical question, for example: Are there gallstones? Is the prominent aortic pulsation due to aneurysm?

Although the study should be directed to answering the clinical question, a general examination of the abdomen should follow to detect alternate causes for the symptoms and signs and to exclude other pathology. This survey of the abdomen can usually be restricted to the upper abdominal organs. Transabdominal scanning of the lower abdomen should be obtained if appropriate.

When assessing a particular organ in the abdomen with

ultrasound, the organ should be completely scanned from one margin to the other in two orthogonal planes as a minimum. Hard copy images are taken in standard planes to document a normal study and specific views are taken to illustrate detected pathology.

The following is a guide to the abdominal ultrasound survey.

1. Pancreas

Transverse and longitudinal scanning required, particularly in the head.

Comment on:

- The degree of visualisation particularly if suboptimal
- Size of the head, body and tail
- Parenchymal texture
- Focal lesions: including soft tissue masses, cysts, and calcification
- Pancreatic duct; calibre, contour and stones
- Peripancreatic lesions; solid masses, lymphadenopathy and cysts

2. Gall bladder

Demonstrate in at least two planes and with patient in more than one position (ie oblique and erect)

Comment on:

- Intraluminal lesions; number, size, posterior shadowing and mobility
- Wall thickness (versus degree of distension)
- Presence of mural gas or calcification
- Distension - physiological, pathological
- Point tenderness
- Pericholic collections

3. Extrahepatic Bile Duct

Attempt to demonstrate the full length of the common bile duct and common hepatic duct.

Comment on:

- Duct diameter - measured inside to inside, at level of portal vein bifurcation and more distally, if the proximal measurement is at or above the upper limit of normal
- Duct dilatation - degree and extent of dilatation, level of obstruction, regularity of calibre
- Intraluminal lesions - number, size, echogenicity, posterior shadowing, and mobility within duct

4. Liver

Longitudinal and transverse views usually sufficient.

Comment on:

- Adequacy of visualisation of the whole of the liver
- Overall size, caudate lobe size
- Borders - smooth, irregular
- Parenchymal echogenicity, texture and attenuation
- Focal lesions; number, size, location echo characteristics
- Intrahepatic bile ducts
- Hepatic veins, portal veins
- Perihepatic collections
- Right pleural space

5. Spleen

Size
Parenchyma - texture and echogenicity
Focal lesions - number, size, location, echo characteristics
Perisplenic collections, collateral veins
Left pleural space

6. Kidneys

Size - measure bipolar distance
Outlines
Parenchyma - echogenicity cortex and medulla
Focal masses - number, size, location, cystic or solid
Collecting systems - hydronephrosis, prominent extrarenal pelvis, dilated ureter, intraluminal lesions
Peri-renal and para-renal collections and masses

7. Adrenals

Visualisation should be attempted
Size and texture if enlarged
Focal masses: cystic, solid, bilateral, unilateral

8. Upper Abdominal Vasculature

Demonstration of the upper abdominal vasculature is the key to upper abdominal anatomy. The level of ultrasonic evaluation of the vasculature will depend on the clinical indication for the scan. The following vessels should be identified.

Aorta
Coeliac axis
Superior mesenteric artery
Left renal vein
Inferior vena cava
Splenic vein
Superior mesenteric vein
Main portal vein and its branching pattern in liver
Splenic artery
Hepatic artery
Replaced right hepatic artery (common variant)
Hepatic veins

9. Aorta

Size: measure the outer AP diameter of the aorta.

Comment on:

- Aneurysmal dilatation
- Calcification, plaques and thrombus
- Para-aortic masses; size number location

10. Peritoneal Cavity

Ascites
Loculated collections; size, site, echo characteristics
Peritoneal masses; size and site
Bowel: wall thickness, dilatation, peristalsis
Assess appendix

Vein of Galen aneurysm- A Case Study

Oriana Pellegrini, Grad Dip U/S, BApp Sci
Melbourne Diagnostic Imaging Group, Epworth Hospital, Richmond Vic

A Vein of Galen aneurysm is an arteriovenous malformation where there is failure of the embryonic shunts to be replaced by capillaries (1). Blood flows directly from arteries to deep veins. They are found in the quadrigeminal plate cistern and can compress the cerebral aqueduct causing secondary obstructive hydrocephalus.

Jack* was born on the 29/6/97 and transferred to The Royal Children's Hospital the day after with hydrocephalus and high output cardiac failure. He had a cranial ultrasound with coronal and sagittal images obtained from the anterior fontanelle (Figs 1, 2).

There were several feeding arteries, the largest a branch of the left pericallosal artery. His MRI showed other feeding arteries from his anterior and posterior cerebral arteries. Also, there was widening of the internal jugular vein, the transverse, sigmoid and straight sinuses. On the 1/7/97, Jack underwent embolisation of the malformation. Multiple coils were inserted via the left femoral vein to slow the blood flow within the malformation (Fig 3). However, with colour Doppler, significant flow was still seen within the malformation and the feeding arteries (Fig 4).Drainage of the malformation was via the straight sinus. A spectral trace of the straight sinus (Fig 5) from the posterior fontanelle showed that peak systolic velocity within the straight sinus was 80 cms^{-1}.

Unfortunately, the malformation remained patent and Jack's condition did not improve. On the 5/7/97, Jack underwent a second embolisation. Entry was via the torcula and a further twenty-six coils were inserted (Fig 6). With colour Doppler, flow was still seen within the malformation and the feeding vessels (Fig 7) indicating persisting patency.

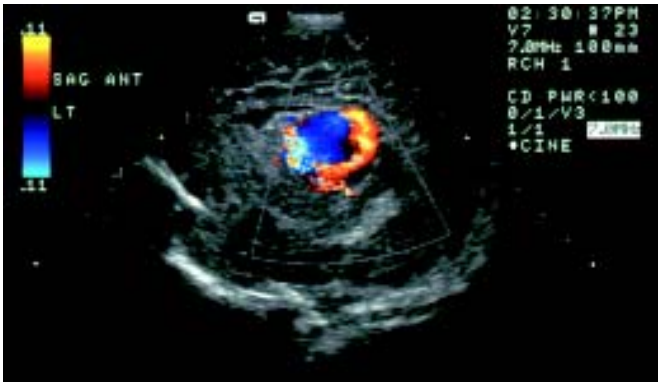

Figure 2 Corresponding colour image showing turbulent flow within a Vein of Galen malformation.

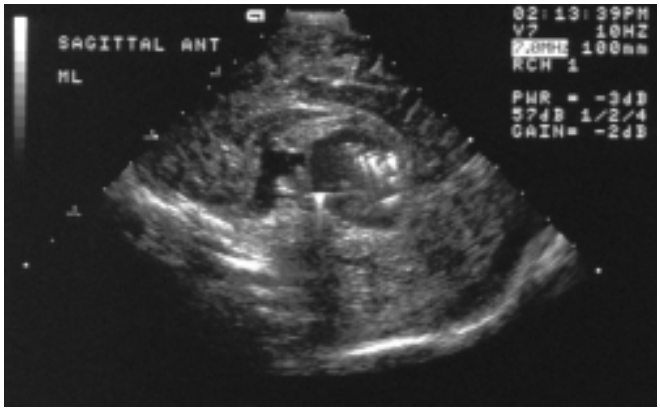

Figure 3 Sagittal image of malformation with coils in situ.

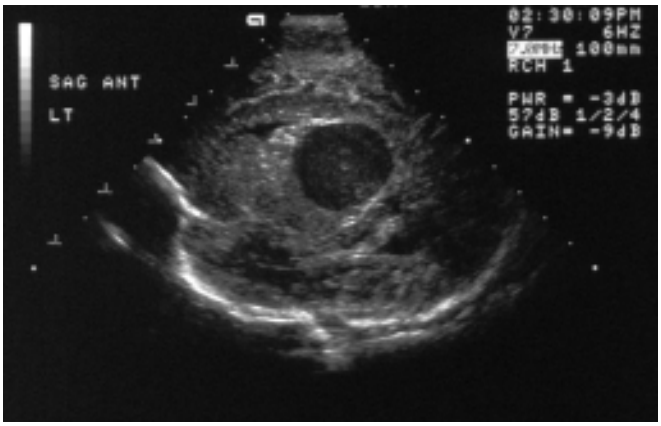

Figure 1 Sagittal image just to the left of midline. The body of the ventricle is compressed by a large, hypoechoic rounded structure, measuring about 3 x 3 x 3 cm in dimension posterior to the third ventricle.

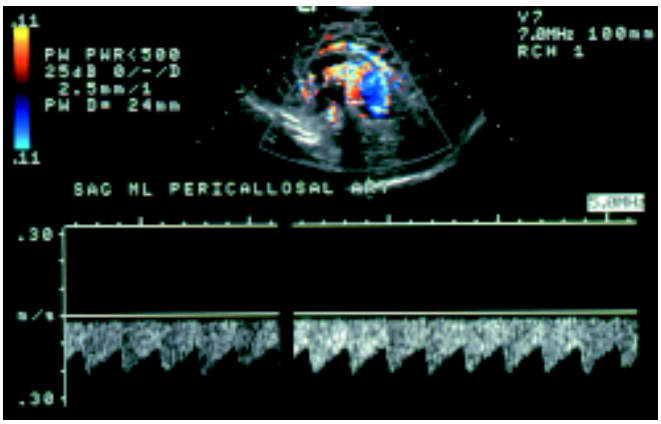

Figure 4 Doppler sagittal image of malformation.

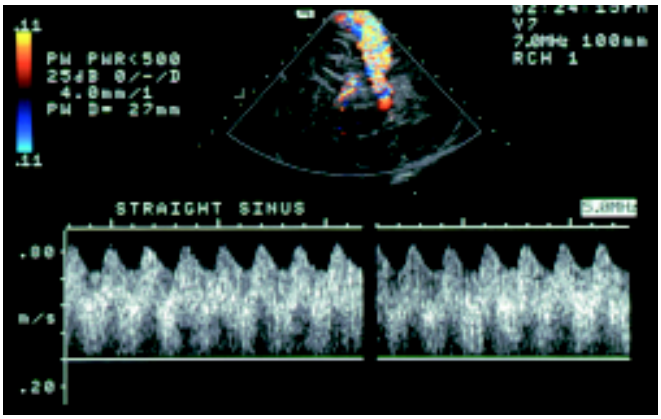

Figure 5. Spectral trace of the straight sinus taken from the posterior fontanelle, which lies between the parietal and occipital bones.

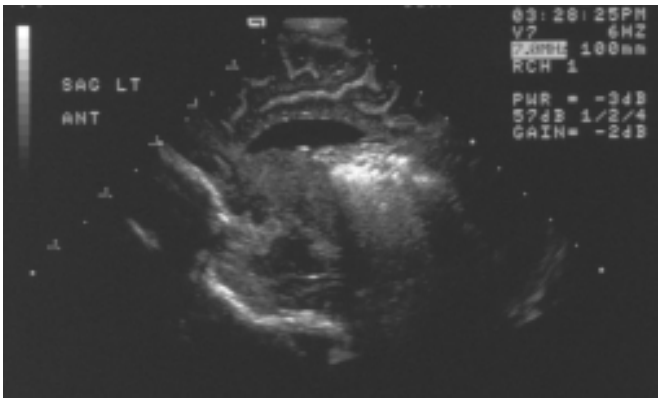

Figure 6. Sagittal image of malformation with coils in situ.

Jack's follow up scans showed no improvement and his condition deteriorated with worsening cardiac failure.

On the 7/8/97, three major feeding arteries were embolised, two were super glued and one was coiled. Entry was via the thoracic artery. His initial follow-up scan on the 8/8/97

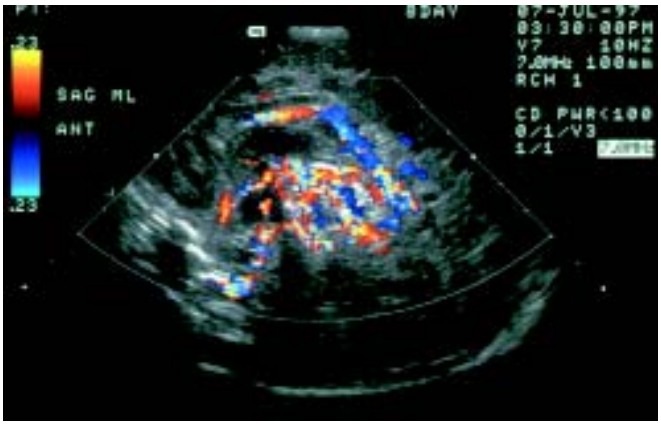

Figure 7. Colour sagittal image of malformation.

showed no improvement, however, by the 18/8/97, his cardiac failure had improved, his ventriculomegaly had decreased and peak systolic velocity in the straight sinus was down to 70 cms^{-1}. Jack made a remarkable recovery and was discharged on 20/8/97. By 22/1/98, his straight sinus had further decreased in calibre and the peak systolic velocity was reduced to 31 cms^{-1}.

A cerebral angiogram on 20/8/98 showed persistent supply of the malformation from the posterior cerebral artery circulation. His management team decided not to embolise as he was clinically well. He remained well on follow-up with good developmental signs.

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Acknowledgements

Dr A. Michelle Fink and Tina Layt of the Ultrasound Department of The Royal Children's Hospital for their support in researching Jack's history. Glenn Davis of Acuson for his assistance in producing the Images

*The infant's name has been changed for reasons of privacy.

Ultrasound of Foreign Bodies (continued from page 17)

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Toxoplasmosis: An unusual cause for a fetal brain cyst

Brian R Pridmore FRCOG, FRACOG, DDU Dept of Obstetrics and Gynaecology, The Queen Elizabeth Hospital, Woodville, SA
T Yee Khong MD, FRCPath, Dept of Histopathology, Women's and Children's Hospital, North Adelaide, SA

Abstract

A case is presented of fetal hydranencephaly diagnosed at 19 weeks gestation, which was found, after pregnancy termination to be due to toxoplasmosis. Toxoplasmosis, if detected antenatally, is usually associated with small flecks of calcification in brain or liver and / or hydrocephalus.

The fetus also had a renal abnormality associated with oligohydramnios demonstrating that multiple abnormalities can have separate pathologies.

Case Report

A 37 year old woman presented at 19 weeks in her fifth pregnancy; the previous four all being normal. She was hepatitis C positive and a heavy alcohol user.

A scan prior to the age related amniocentesis demonstrated the following features:-

Oligohydramnios, kidneys not demonstrated, and a 2-3 cm cystic area in the left supratentorial occipito-parietal region of the fetal brain (Fig 1).

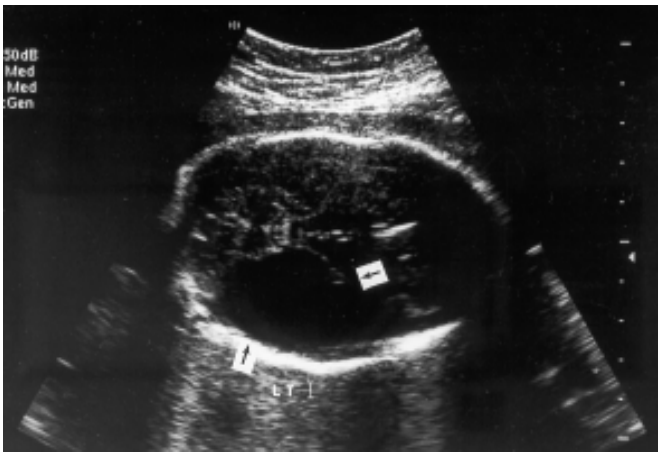

Figure 1 Cystic area in the occipito-parietal region

The cyst had posterior enhancement, no echoes or Doppler signals within. The cyst did not connect with the ventricular system which appeared normal.

The couple were given a poor prognosis, without a definite diagnosis, and opted for termination without further testing. This was performed vaginally uneventfully using Cervagem pessaries.

The important post mortem features were:

- Chromosomes: 46XX
- External: low set ears and externally rotated lower limbs
- Brain: Cyst contained necrotic material (hydranencephaly) with a chronic inflammatory reaction in the meninges. The brain cells surrounding the area contained toxoplasma tachyzoites(Fig 2).
- Pleural and pericardial effusions.
- Toxoplasma microcysts in the heart.
- Cross-fused renal ectopy (Fig 3) with cystic dilatation of the collecting duct systems (not toxoplasmosis).
- Pronounced extramedullary haemopoiesis in liver.

Following the diagnosis of toxoplasmosis the patient remembered she had nursed several sick kittens in early pregnancy. She did not remember being unwell herself.

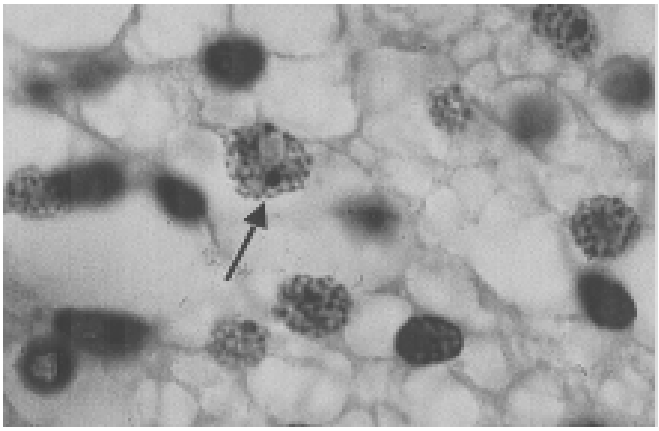

Figure 2 Tachyzoites in brain cells surrounding cyst

Discussion

Toxoplasmosis is caused by an intracellular parasite *Toxoplasma gondii* whose natural host is the domestic cat. Cats, usually kittens, carry the organism and pass it in their faeces but do not become sick themselves. They become infected by eating raw meat, birds, rodents etc.

The cats pass the oocytes which take 2-5 days to change into a form which can infect humans. Careful hand washing after handling kittens, especially the litter tray, will reduce infection risk. However the cysts can remain infective for up to 18 months in moist soil allowing other animals and even vegetables to carry the organism.

Less common sources of infection in this country are eating uncooked meat and raw vegetables.

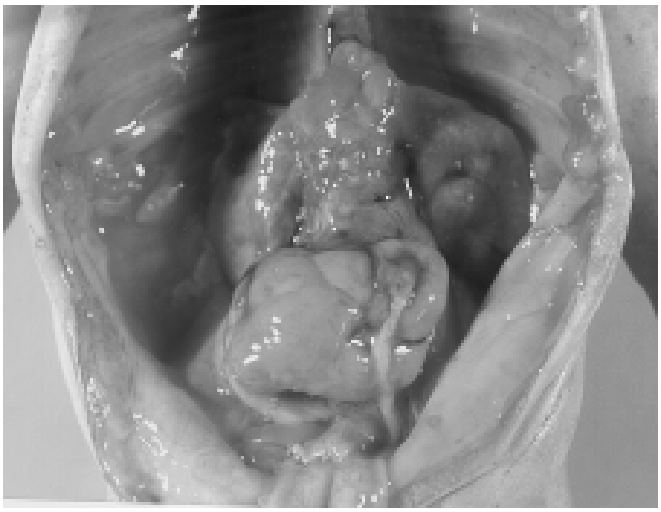

Figure 3 Cross-fused renal ectopy

About 30-50% of the adult population has had toxoplasmosis usually without symptoms and carries the microcysts somewhere. The intracellular stage in the human is called the tachyzoite. Unless the person becomes immuno-compromised they have no further problems.

In immuno-competent women only those who become infected during pregnancy for the first time risk infecting the fetus. The risk of fetal infection rises from 20% in the first trimester to 60% in the third trimester. However, the earlier the gestation the more severely the infant is likely to be infected with around 20% severely affected. Symptoms include chorioretinitis, deafness, convulsions, hydrocephalus, and hepatosplenomegaly. The eye symptoms may not appear for some time after birth leading to blindness in adolescence.

The mother is usually asymptomatic (and is not diagnosed unless blood testing is performed following exposure to cats) or presents with an unexplained infective illness. Diagnosis of Toxoplasmosis by ultrasound is not common in this country, but should be suspected if flecks of calcium are seen in the brain or liver (calcified microcysts) in the presence of hydrocephalus, or pleural and pericardial infusions.

Hydranencephaly has been reported (1) but must be uncommon, as ultrasound textbooks do not include Toxoplasmosis in the differential diagnosis of fluid collections in the head. This case is reported to remind us when presented with hydranencephaly.

It is common practice, when confronted with multiple malformations, to attempt to put them together as a syndrome or aneuploidy. Occasionally more than one problem can coexist, in this case Toxoplasmosis with a congenital renal abnormality resulting in non-functioning kidneys.

Reference

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Book Reviews

3D Ultrasound in Obstetrics and Gynecology

Editor: Eberhard Merz
Publisher: Lippincott Williams and Wilkins
Year: 1998
Pages: 155
Price: $A183.00

This timely publication summarises the current status of 3D ultrasound in obstetrics and gynaecology. It is a multi author book produced by enthusiasts who are engrossed in the technology. In their enthusiasm for the technique and its potential, some contradictions appear eg. in the assessment of the fetal heart it is suggested that with "conventional 3D ultrasound equipment….critical areas of cardiac anatomy are generally poorly visualised due to motion and small size" yet the summary highlights "improved visualisation of normal and abnormal cardiac structures" with 3D compared to 2D.

The first three chapters are a well presented overview of the technology. Missing from this section, and not presented elsewhere in the book, is any discussion on power levels relative to 2D ultrasound, particularly with 3D colour power imaging.

The gynaecologic section includes chapters on assessment of congenital uterine anomalies and IUCD's with convincing evidence of clinical benefit. The authors' enthusiasm for 3D ultrasound in the infertility chapter is palpable and the promotion of its use tends to blur the boundary between what might be useful and what has been shown to be of clinical benefit. Few data are presented to justify the claimed benefits. The technique is also strongly advocated for assessment of ovarian cysts but again without supportive clinical data. One of the limits of 3D is the assessment of solid ovarian tumours which unfortunately is the very area where major limitations are found with 2D ultrasound.

Chapters also include urogynaecology and breast ultrasound. The overall impression is that 3D ultrasound has a clinical role in certain specific gynaecologic problems but data is not presented to give confidence that it would have a broad clinical impact.

The section on obstetric use of 3D ultrasound provides convincing evidence that there is a current role for this technology. On carefully reading this book, many clinical limitations are noted although it is easy to become captivated by some of the glorious images. Several authors highlight the time required to master the technology. Although some suggest that less time is required per patient and that the evaluation need take no more time than 2D ultrasound (Kratochwil), views conflict as it is also noted that examining a single area of interest with 3D takes 10 minutes. The final chapter on the psychological influence on women was interesting with 49 of 65 women indicating that it gave them a positive influence on their perception of the fetus. It should be noted however that Benoit indicated that in over 9,000 examinations, 3D surface renderings were possible in only one examination in ten.

The clinicians involved clearly found a relevant clinical role for 3D ultrasound. It is felt to improve the reliability of obstetrical diagnosis and to be of value in assessment of the fetus after the patient has left the premises (Kratochwil). It provides a more accurate assessment of volume. It is highlighted that the critical factor is to obtain optimal 2D pictures before volume rendering, post processing being very time consuming and allowing only limited improvements in the image. It is noted that it will be some time before academic units are able to produce objective evidence of improvements in diagnostic rates of abnormalities using 3D and that we will need to be satisfied with subjective assessments in the interim.

In summary this is a well presented book by enthusiasts who provide convincing evidence that there is clinical value in 3D ultrasound in obstetrics and gynaecology. Scientific documentation of improvement in diagnostic accuracy is, in most situations, still unavailable.

Lachlan de Crespigny

Color and Power Doppler Sonography - A Teaching File

Author R Brook Jeffery Jnr and Phillip W Ralls
Publisher Lippincott Raven - Philadelphia
Year 1998
Pages 314 (Figs 153)
Price $A311

This very well illustrated text presents, through a series of cases, the scope of applications of conventional colour and power Doppler imaging. The majority of the text is concerned with the abdomen and pelvis with chapters devoted to the liver and spleen, gall bladder and bile ducts, pancreas, kidney and gastrointestinal tract. There is a separate chapter on the female pelvis as well as chapters on the testes and small parts scanning. There is a further chapter relating to some of the major vessels in the abdomen as well as a limited number of cases of peripheral vascular pathologies.

In each chapter the cases comprise grey scale and colour Doppler imaging and appropriate other imaging modalities to illustrate the findings, including angiography and CT scans. The illustrations are accompanied by a description of the findings, diagnosis, discussion and a brief list of references.

The authors have included an opening chapter outlining basic principles of colour Doppler (conventional and power)

as well as discussion of pitfalls and practical hints. This chapter summarises some of the important technical aspects of the technology although does not develop the discussion relating to all of the controls in any detail.

The main value of this volume is that it highlights the range of clinical applications where colour and power Doppler can be of value, particularly in the abdomen. It is not, and does not intend to be, comprehensive in either technical or clinical areas.

This is a well presented text which is easy to browse and should be of interest to those who perform predominantly abdominal ultrasound and are relatively new to the field of colour and power Doppler. It should therefore be of value to trainees (and therefore training departments, libraries) as well as to more experienced operators who have recently acquired colour capable equipment.

Robert N Gibson MB BS FRACR DDU

Guidelines and Gamuts in Musculoskeletal Ultrasound

Edited by	**Rethy K Chhem and Etienne Cardinal**
Publisher	**John Wiley & Sons Inc, New York,**
Year	**1999**
Pages	**390**
Price	**$A200.00**

Chhem and Cardinal have written this 390 page book to emphasise the useful role well-performed ultrasound can have in musculoskeletal imaging and to provide a practical guidebook for everyday ultrasound.

Good musculoskeletal ultrasound requires a sound understanding of musculoskeletal anatomy, normal variants and pathology which this text provides. The main chapters outline the anatomy, clinical ultrasound indications, technical guidelines and pathology for conditions of the shoulder, elbow, wrist, hip, knee and ankle and for muscle, fascia and bone. The final 2 chapters describe an algorithmic approach to soft tissue masses in both the adult and paediatric population. In my practice I see a number of bone or soft tissue tumours where an ultrasound report (usually of muscle haematoma) has delayed the diagnosis. The ultrasound-first approach of this book is useful provided the sonologist/sonographer is strict about recommending further imaging if a definite positive ultrasound diagnosis of a specific 'pseudotumour' cannot be made.

A long bibliography follows each chapter. Tables and diagrams in the appendix illustrate ultrasound oriented anatomy of the major joints, the upper arm, forearm, thigh and lower leg.

The book was not written as a complete reference. The text is clear and brief and well-illustrated with up-to-date high resolution images and a number of diagrams. Each chapter includes gamuts for clinical conditions; for example, in the hip chapter there are gamuts for common clinical indications for ultrasound; for anterior, lateral and posterior hip pain, and for painful hip prosthesis. There are also checklists to ensure complete examination of each region covered.

Ultrasound should not be regarded as the primary investigation for many of the disorders discussed in this text but discussion of them is useful because they can present differently. It is a valuable working resource for anatomy, the performance of ultrasound and for the ultrasound features of pathology.

Patsy Robertson MB, ChB, FRACR

New Members November 1999 - January 2000

Associate Members

R Abdelmalek	NSW
S Andretzke	Vic
W Barrett	NZ
M Behn	NSW
K Brown	NZ
M Bryant	WA
P Cain	Vic
M Champion	NSW
R Crockart	SA
P Currie	WA
F Dunn	NZ
R Girdler	NSW
J Green	NSW
R Haupt	SA
C Hume	WA
A Inglis	NSW
L James	NSW
M Kemp	NSW
R Kumar	NSW
L Le	NSW
K Lodding	NSW
C Loosemore	TAS
Q Lu	NSW
E Luckhurst	SA
T McCahon	TAS
D Nicholas	SA
A Ollenburg	NSW
S Pierre-Humbert	WA
C Pomery	QLD
M Quinn	QLD
D Roberts	SA
N Schmitzer	NSW
L Sugar	NSW
C Thiel	NSW
Y Virski	NSW
M Xian	NSW

Full Members

K Addison	WA
C Bertke	WA
H Clarke	WA
J Hemsley	SA
S Hikaka	NZ
D Palomares	Vic
M Schulze	Vic
T Tan	Vic

Trainee Members

S Shenouda	Vic

Obituary

Peter Verco 1919 - 1999

Dr Peter Verco died at home on Christmas day 1999.

Peter was a radiologist who, at a very early stage, recognised the potential for ultrasound and was the first to use it in South Australia.

He was born and educated in South Australia completing his medical degree with honours in 1942. This was followed by war service as a doctor until discharged with amoebic hepatitis in 1945.

On return, he became a member of the Royal Australian College of Physicians (subsequently Fellow); a member of the Royal Australasian College of Radiologists (subsequently Fellow) as well as obtaining an MD.

He commenced radiology practice in 1948 and later founded and headed the radiology department at the Queen Victoria Maternity Hospital (now the Women's & Children's Hospital) from 1951–1984.

He served in a variety of roles in the College of Radiology including President in 1983.

Peter saw the potential value of ultrasound from an early stage and purchased the first machine in South Australia in 1973 for the QVH (a black and white Unirad). He was a founding member of ASUM in 1974 and an original holder of the Diploma in Diagnostic Ultrasound. He served on Council from 1976 and was President in 1980-84. He was an examiner and later chairman of the DDU exam board.

I first met Peter at the end of 1974 after returning to The Queen Elizabeth Hospital as a newly qualified obstetrician. I was given the role of establishing the ultrasound department with the second Unirad in the State. Peter was generous in time and advice to me as we spent many hours staring at blips on a screen and Polaroid. Looking at today's image, it was a wonder we diagnosed anything with the black and white images produced.

Peter set high standards and very much included sonographers as part of the team at a time when such an approach was not fashionable.

As chairman of the State Branch of ASUM, he encouraged research and education both through the Branch and the universities. In the early years he helped organise courses, and clinical meetings for sonographers and trainee doctors that at the time were probably the most advanced of any state.

Parties and clinical meetings with Peter had very little downtime. A temporary failing of the projector saw Peter rise to his feet with an ultrasound anecdote or joke, most of which can not be repeated in this publication.

Outside medicine, Peter had wide sporting interests in golf, cricket and sailing and he owned a farm in the north of South Australia. He had a keen interest in antiques, Australian furniture and art. A visit to an art show with Peter was a rewarding experience.

He is survived by his wife Pat and four children, all of whom work in health related areas.

Brian Pridmore

1998 GE Beresford Buttery Overseas Traineeship

Alison Lee-Tannock DCR, B App Sc, DMU, Dept of Maternal Fetal Medicine, Mater Mothers' Hospital, Brisbane

At the 1998 ASUM annual conference in Melbourne I was thrilled to receive the Beresford Buttery Overseas Traineeship sponsored by GE. The award covered course fees, accommodation and airfare to enable me to attend an ultrasound course of my choice (four days) at the Jefferson Ultrasound Research and Educational Institute in Philadelphia.

The institute offers a wide variety of courses in all areas of ultrasound and I opted to attend two specialised two-day courses rather than the generalised four-day course in obstetric ultrasound.

Both courses were conducted in a dedicated educational area that has a small lecture theatre and video viewing rooms where a library of educational videos could be viewed by registrants, at no charge, for the duration of the course.

The first course I attended was in 3D ultrasound. This is an area I am particularly interested in as I am currently undertaking my Masters in this field. The course covered an introduction to 3D ultrasound, brief summary of the physical principles, future aspects and some current applications. The faculty included local and overseas speakers. All speakers gave informative presentations. The highlights were Dr Anna Lev-Toaff's presentation on gynaecological applications and Mr Karl Kettl's and Dr Alfred Kratochwil's presentations on the future of this technology.

There was no practical scanning time for registrants but the faculty demonstrated the 3D capabilities of their dedicated Kretz-Voluson 530 on mock patients.

Three weeks later, after some R and R, I attended the fetal echocardiography course. This course was extremely well organised and co-ordinated by the key presenters Dr Paul Anisman, cardiologist and Mr Dennis Wood, cardiac sonographer. Again all speakers gave informative presentations, with the key presenters being particularly impressive.

The technical aspects of fetal cardiac scanning were covered from the screening examination to the detailed fetal echo. Other topics included cardiovascular development, embryology and physiology, differential diagnoses, arrhythmias and surgical treatments and outcomes for complex CHD. The second day concluded with examples of pathological cardiac specimens. This really emphasised to us all how small the heart is at 20 weeks gestation and it is no wonder that cardiac anomalies are difficult to diagnose at this stage.

Philadelphia was an interesting city. I stayed in the historical district and could walk to Thomas Jefferson Hospital via the Liverty Bell and the site where the Statute of Independence was signed.

I would like to thank ASUM and Diasonics GE, and in particular Luke Fay, for the opportunity to attend these courses. I learnt a lot from the experience. No only did I increase my knowledge in these two areas but I also realised that we should be proud of the high standard of ultrasonography that currently exists in Australia.

ASUM Council Meeting - Adelaide Sept 1999

Mary Young
Honorary Secretary

The meeting opened with acceptance of minutes of the May Council Meeting. Business arising included accreditation of Vascular Laboratories – standards have been set by AVUAB, however, funding is required to implement such accreditation. Meanwhile, the ASAR has received government funding, and is progressing with accreditation of sonographers, and eventually, with accreditation of ultrasound courses and overseas qualifications.

The Honorary Treasurer's Report was received, and there was some discussion about the Society's financial position and sources of funding and expenditure. The full annual financial report was distributed to all members in October 1999.

Reports were received from all of the committees, and professional supervision was again a hot topic, with the doctor on-site clause again a bone of contention over the position of the conjunction.

Congratulations to those candidates who passed the DDU. By now the DMU candidates will also have their results. Congratulations to all those who have passed.

The Standards of Practice Committee has revised many of the ASUM Policies and Statements and these have been distributed.

Luke Fay, on behalf of the Marketing Committee put forward a passionate plea to revitalise ASUM, especially from the members' perspective, and redistribute responsibilities more equitably by clearly defining roles of committees and chairmen.

The retiring Councillors were thanked for their generous contribution to the Society, however many will continue to be involved on subcommittees and new Councillors were warmly welcomed. A complete list of Councillors and Committee Chairmen is listed on page 52 of this *Bulletin*.

DMU Examination Results 1999 and Board of Examiners Report

The 1999 Diploma of Medical Ultrasonography examinations commenced on 25 September 1999 with the written papers for both Part I and Part II. Written papers were held at 35 venues across Australia and New Zealand in 8 capital cities, 17 major towns and 10 remote venues including London and Dubai. Following a successful trial in 1998, the Board implemented 'on-site' practical examinations wherever possible. In 1999, the 'orals' component of the Part II exams were held in the OSCE format (Objective Structured Clinical Examination).

Two hundred and seven (207) candidates presented for the Part I examination. The overall pass rate was 77%. The pass rate for each branch was: New South Wales 70%, Victoria 83%, South Australia 82%, Queensland 85%, Tasmania 50% (6 candidates), Western Australia 88%, ACT 71% (7 candidates), and New Zealand 78%.

One hundred and fifty-nine (159) candidates presented for the Part II examination. Eighty-five percent (85%) passed the written examination and were subsequently admitted to the Practical and Oral/OSCE examinations. The overall pass rate was 56%. The pass rate for each branch was: New South Wales 59%, Victoria 47%, South Australia 40% (5 candidates incl 1 from NT), Queensland 45% (9 candidates), Tasmania 67% (3 candidates), Western Australia 56%, ACT 50% (2 candidates) and New Zealand 71%.

Part 2 Examinations - Overall performance:

General
The overall standard of candidate preparation was good. Areas in which the majority of candidates were well prepared included:

Application of knowledge to breast lesions, renal pathology and fetal cranial abnormalities, and the bioeffects of ultrasound.

Areas in which the overall standard of candidate preparation was below expected included:

Identification of abdominal vasculature including vasculature of the liver, assessment of fetal growth in the third trimester, the production of colour Doppler ultrasound, mirror artefact.

Cardiac
The overall standard was very good. Areas in which the majority of candidates were well prepared included:

Application and understanding of the continuity equation and Doppler calculations in the assessment of shunt lesions.

Areas in which the overall standard of candidate preparation was below expected included:

The basic principles of colour Doppler imaging (including optimisation of controls), understanding the general mechanism of artefacts and how they are produced and can be minimised, recognition of a lens artefact, interpretation of normal and abnormal hepatic Doppler profiles and determination of the pressure half-time from the Doppler velocity spectrum.

Vascular
Overall the candidates demonstrated an adequate knowledge of questions relating to ultrasound physics and diagnostic interpretation. Areas in which the overall standard of candidate preparation was below expected included:

The understanding of non-imaging modalities particularly in the areas of peripheral waveform analysis, haemodynamics in the presence of acquired arterio-venous fistulae and PPG interpretation in the presence of digital ischaemia.

The Board of Examiners would like to thank the extensive team of volunteer sonographer and sonologist examiners and supervisors, and the participating hospitals and practices, without whose contributions the examinations could not be held.

The Board of Examiners extends congratulations and best wishes to the successful candidates for their future careers as sonographers.

Jill Clarke
Chairman, Board of Examiners
Diploma of Medical Ultrasonography

Part I Examination

Al-Haouli, Bassima - Vic
Anderson, Kylie - Qld (Cardiac)
Anderson, Rohan - Qld
Angilletta, Guido - Vic
Archbold, Julie - Vic
Armstrong, Susan - WA
Barker, Sharon - WA
Batten, Penelope - NSW
Begg, Kaylene - SA (Cardiac)
Bieniek, Louise - NSW
Bishop, Michelle - SA
Blackwell, Leigh - ACT
Bligh, Larissa - NSW
Bowmast, Heidi - WA
Brewer, Samantha - NSW
Broderick, Shannon - NSW (Cardiac)

Bui, Quang - NSW
Buick, Megan - NZ
Bull, Neva - NSW (Vascular)
Calder-Mason, Tony - NSW (Cardiac)
Cameron, Leonie - NZ
Campbell, Andrea - Vic (Cardiac)
Carter, Laetitia - Tas
Casimir, Melissa - NSW
Chamberlain, Janelle - Vic
Chandler, Amanda - NSW
Charnstrom, Dana - SA
Cheetham, Kylie - SA
Cheng, Mei - WA
Chesworth, Penelope - NSW
Cipriani, Stephen - WA
Clough, Amy - Vic (Vascular)
Cole, Christen - Qld (Cardiac)
Coleman, Kate - NZ (Vascular)
Collins, Mary - NZ
Collis, Julie - WA (Cardiac)
Connor, Carmen - NSW
Coomber, Sondra - NSW
Cottle, Lisa - NSW
Couch, Julie - NSW
Cox, Allison - ACT
Crisafio, Danielle - WA
Culbert, Stacey - NSW
Dallemolle, Gail - Vic (Cardiac)
Delimitros, Kon - Vic
Dimovska, Kalina - Vic
Dinon, David - Vic
Donaldson, Stella - Vic
Driver, Ritza - Vic (Cardiac)
Duncan, Angela - Vic (Vascular)
Eagles, Katherine - NSW
Fawcett, Alison - NSW
Forbes, Martin - Vic (Vascular)
Francica, Emanuela - NSW
Fryer, Kylie - Qld (Cardiac)
Gash, Stephen - WA (Vascular)
Gent, Maria - SA
Giblett, Janet - WA
Gordon, Jeanine - Vic
Granland, Bryn - WA
Grono, David - NSW
Harberts, David - Vic (Cardiac)
Harris, Nicole - ACT
Harvey, Katherine - NSW
Hawes, Karen - SA
Hobbs, Kelli - SA
Horsfall, Hayley - SA (Cardiac)
Hunter, Christopher - Vic (Cardiac)
Hutchings, Sarah - NSW
Illes, Carolyn - Tas (Cardiac)
Ippolito, Leanne - NSW
Johnson, Shaun - SA (Vascular)
Johnston, Angela - SA
Jones, Suzanne - WA
Kelly, Pamela -WA
Khalil, Lee- NSW
Khan, Sohail - Vic
Kirumba, Louise - NSW
Kong, Hongsheng - NZ (Cardiac)
Kortesidis, Steliani - SA (Cardiac)
Lau, Elaine - NSW
Le, Hoang - NSW
Lewis, Christopher - Qld
Little, Sara - NSW (Cardiac)
Long, Vicki - NZ (Cardiac)
Lowe, Kirste - SA
Lunghi, Adam - WA (Cardiac)
Lynn, Katherine - NSW (Vascular)
Mack, Michelle - WA (Cardiac)
Magee, Janine - Vic
Mann, Lisa - Qld
McDonald, Emily - Vic
Milenkoski, Jimmy - NSW
Miller, Christopher - Vic (Vascular)
Mornane, Simon - Vic (Cardiac)
Morrall, Matthew - SA (Cardiac)
Muir, Lynette - SA (Cardiac)
Muller, Sheree - ACT
Naidu, Direshni - WA
Namah, Aliyh - NZ (Obstetric)
Needham, Kelly - NSW
Nelson, Peter - Vic
Nesovic, Marija - NZ
Ngo, Hoa - NSW
Nguyen, Hanh - WA
O'Connell, Gerard - Vic
O'Connell, Justine - NSW
O'Dwyer, Kerry - Vic
Omere, Maria - Vic
Page, Jodi - NSW
Parker, Stuart - Qld (Cardiac)
Pavan, Dennis - NSW
Pedersen, Jodie - Tas
Pengelly, Rebecca - Vic (Vascular)
Peters, Joshua - NSW
Platt, Luke - NSW
Pleming, Vickie - Vic
Powers, Christopher - WA
Pritchard, Amy - NSW
Pronger, Sheree - Qld (Cardiac)
Pyc, Sharon - NSW (Cardiac)
Rafferty, Lori - ACT
Rapp, Carol - Vic
Readdy, Craig - Qld
Reynolds, Gordon - NSW (Vascular)
Richardson, Kathleen - WA (Cardiac)
Riordon, Amy - Vic
Roberts, Lynette - Qld
Sablyak, Igor - NZ
Sanford, Jacqualine - WA
Schwartzel, Hester - NZ
Shu, Jing - Vic
Shurmer, Toni - NSW
Simic, Matilda - NZ
Singhal, Ashmita - NSW
Skinner, Leisa - Vic
Spargo, Amanda - Qld (Vascular)
Stanley, Linda - WA (Cardiac)

Thomas, Naomi - NSW
Tritico, Kiani - NSW
Truong, Phi - NSW
Tweddle, Leigh - Vic
Undrill, Simon - NZ (Cardiac)
Vicino, Pauline - Vic
Vogdanos, Jim - Vic
Waalwyk, Karen - Vic (Obstetric)
Wade, Ann - NSW
Wademan, Carmen - NSW
Wakefield, Patricia - WA
Walsh, Rebecca - NSW
Walter, Leanne - NSW
Ware, Amanda - NSW (Cardiac)
White, Christina - WA
Williams, Alan - Vic
Williams, Jodi - NZ
Williamson, Jacqueline - Vic (Cardiac)
Wilson, David - Vic
Woods, Marina - Vic (Cardiac)
Wooton, Rebecca - NSW (Obstetric)
Worms, Catherine - NSW
Zegarac, Katarina - NZ
Zhu, Judith - NZ (Cardiac)

Part II Examination

The Board of Examiners has recommended to the ASUM Council that the Diploma of Medical Ultrasonography be awarded to the following candidates:

Annand, Shelley - NZ
Armstrong, Deanna - NSW
Asbeutah, Akram - Vic
Au, Loi YL - NSW (Obstetric)
Bellesini, Michelle - NSW
Breen, Anne - NZ (Cardiac)
Burking, Andrew - WA
Burns, Megan - NSW
Carter, Anne - Vic (Vascular)
Cates, John - NSW
Clarke, Siobhan - NSW (Cardiac)
Collins-Evans, Brigid - NSW
Cowcher, Joseph - WA
Cunneen, Debbie - NSW
Dalton, Andrea - NSW
Davis, Kim - NSW
Derkley, John - NSW
Dogao, Loretta - NSW (Cardiac)
Dorsett, Karen - NSW
Drinkwalter, Cherie - NSW
du Preez, Mia - NZ
Eastley, Maree - Tas
Eid, John - Vic
Finlay, Mandy-Lou - NSW
Foster, Deborah - WA
Gabriel, Kerrie - NSW
Garcey, Caroline - Vic (Cardiac)
Gatt, Louise - Vic
Gould, Francoise - Vic (Vascular)
Hall, Andrew - NZ
Happer, Melinda - Vic
Hill, Kristine - NSW
Hull, Marc - NZ
Kavanagh, Sally - Qld (Cardiac)
Keech, Ruth - NSW (Vascular)
Kelly, Deborah - NZ
Leggott, Belinda - NSW
Lightfoot, Craig - Vic (Cardiac)
Long, Jodie - NSW
Major, John - WA (Vascular)
McDonald, Mark - NZ
McCormick, Madeline - NZ
Menzies, Gregory - Qld
Millar, Jennifer - NZ (Cardiac)
Millner, Philip - Tas
Mitchell, Julie - NZ
Mitchell, Maureen - Qld
Moran, Karen - Vic
Morgan, Brett - Vic
Moularides, Dorothea - SA (Cardiac)
Nerwal, Surinder - ACT
Nidorf, Louise - WA (Cardiac)
Patterson, Lyn - WA (Vascular)
Pedretti, Michelle - WA
Petro, Sally - NZ
Pritchard, Stephanie - Qld (Cardiac)
Pry, Rodney - NSW (Cardiac)
Quayle, Jane - NSW
Restall, Roger - Vic (Cardiac)
Rochester, Barry - NSW
Russell, Peter - Vic
Ryan, Francis - SA
Shipp, Mai - NZ
Smedley, Petrina - Vic
Smith, Alison - NSW (Vascular)
Smith, Kim - WA
Steffanetti, Paul - WA
Stewart, Richard - WA (Cardiac)
Swinton, Vivienne - NSW
Tarrant, Gayle - NSW
Turner, Lisa-Claire - NSW (Vascular)
Walter, Jennifer - NSW
Webber, Nicole - NSW
Wright, Jacqueline - NSW
Yuan, Zhi - NSW (Cardiac)

DDU Examination Results

The following candidates were successful in the DDU Part I Examination held in November 1999

Bui, Chuong - NSW
Evans, Richard - SA
Kirkwood, Ian - SA
Lee, Siobhan - NSW
Ng, Stanley - NSW
Trim, Geoffrey - Qld
Wilson, Kay - SA

Mater Mothers' Hospitals

Part-Time Ultrasonographer

(48 Hours per fortnight)

Vacancy No: 00P21

An exciting opportunity exists for an experienced Ultrasonographer in the Mater Mothers' Hospital, South Brisbane. The position is initially offered on a temporary basis with the contract to be negotiated. Mater Mothers' Hospital is part of the Mater Misericordiae Hospitals Complex which is a major teaching institution for the University of Queensland with University Departments represented on campus.

Renowned as one of Australia's leading and busiest specialist maternity hospitals, the Mater Mothers' Hospital provides a comprehensive range of Obstetric and Neonatal Services. The Department of Maternal Fetal Medicine is the only unit in Queensland accredited by the Royal Australian College of Obstetricians & Gynaecologists for training in the sub-specialty of Maternal Fetal Medicine. This dynamic department is undergoing rapid expansion and attracts tertiary referrals from all over Queensland, is actively engaged in training and research, and provides a full range of ultrasound services to the Hospital, including interventional procedures. Facilities within the unit include state of the art colour Doppler ultrasound equipment, digital storage, computerised database network, videoconferencing and teleultrasound services, and many others.

Applicants should possess relevant qualifications with extensive experience in the field of Obstetric & Gynaecologic ultrasonography. The successful applicant is expected to provide ongoing education and training for other staff, be able to work effectively as part of a team, and be involved in various research projects.

Further information (after you have received your application package) can be obtained by contacting Dr Fung Yee Chan, Director of Maternal Fetal Medicine on telephone (07) 3840 8844, facsimile (07) 3840 1949 or email fchan@Mater.org.au

Total remuneration value up to $58,298 consisting of full-time salary of $45,985 - $50,303 per annum, annual leave loading (17.5%), and employer contribution to superannuation (14.55%). Membership of the Hospitals' Staff Superannuation Scheme is compulsory.

Mater Misericordiae Hospitals

South Brisbane

For God and Humanity

TMP D1/201

With more than 4,000 staff, the Mater comprises three public and three private hospitals which together deliver care to more than 70,000 inpatients and 350,000 outpatients and ambulatory patients in any given year. Owned and administered by the Sisters of Mercy, the Mater provides high standards of patient care, health related education and research.

Application packages containing position description and selection criteria may be obtained by phoning: (07) 3840 8626. Applications should address the selection criteria, quote the vacancy number and include a curriculum vitae with two referees. Send applications to: The Recruitment Officer Human Resources, Mater Public Hospitals, South Brisbane, Q, 4101.

Locum Sonographer

Six Month New Zealand Contract

Hawkes Bay Radiology is a private provincial radiology practice located in the beautiful Hawkes Bay. We have two sites, one in sunny Hastings and another 20 minutes away in Napier, The Art Deco capital of the world.

We are offering a 6 month full or part time contract for a suitably qualified Sonographer to work in our practice. The position runs from 1 July 2000 to 24 December 2000. Experience in all aspects of general ultrasound and vascular skills including Doppler ultrasound and musculoskeletal ultrasound would be an advantage.

Remuneration is by negotiation but would take into account the short duration of the position.

For further information please contact Darryl Tremain, phone New Zealand 06 878 9908.

Written applications should be sent to: Darryl Tremain
Practice Manager
Hawkes Bay Radiology,
325 Prospect Road
Hastings New Zealand

or email: hbrad@xtra.co.nz

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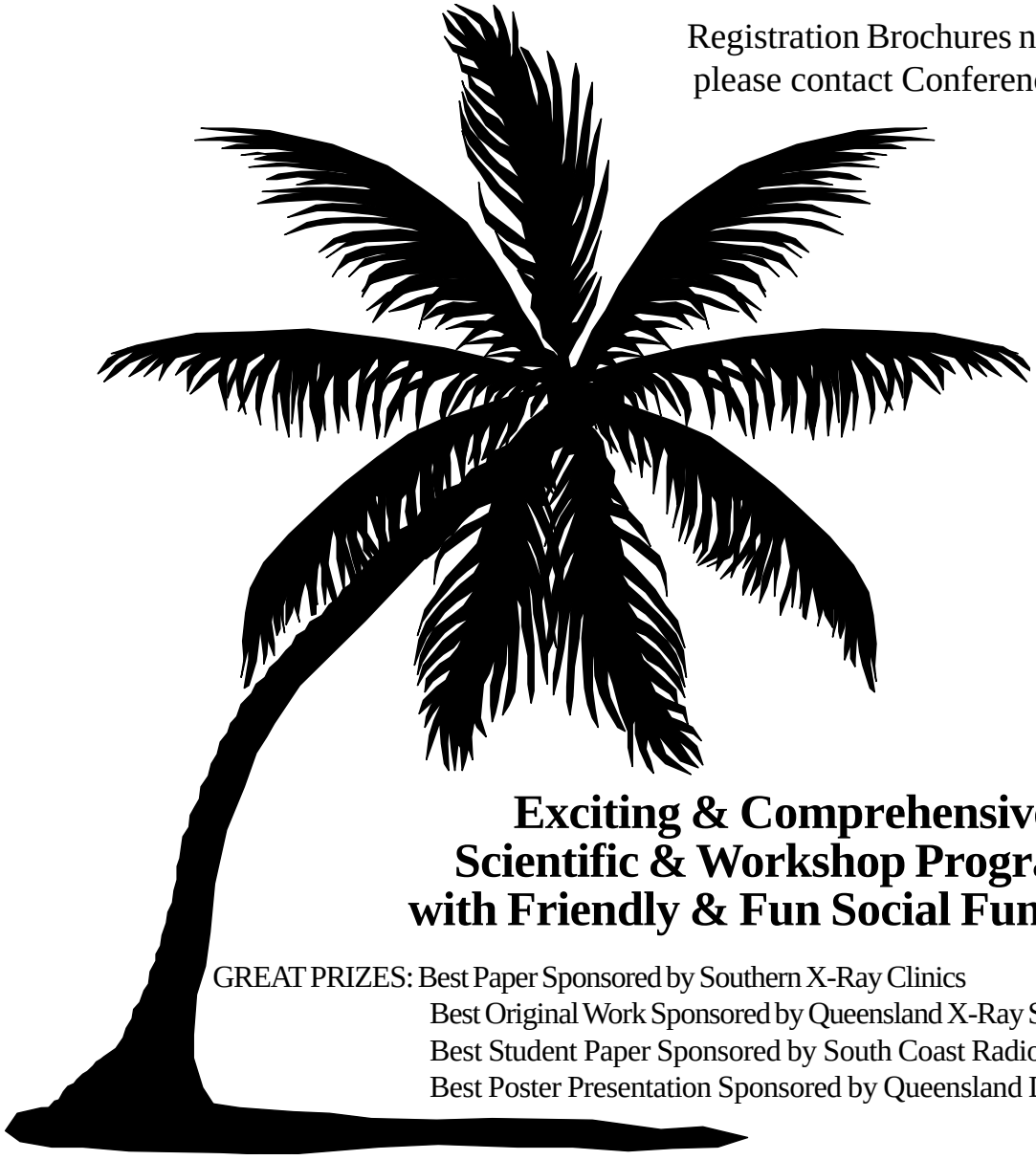
ASA 2000

BRISBANE CONVENTION CENTRE

Friday 19 May 1.00pm start
to Sun 21 May 4.00 pm

Registration Brochures now available - please contact Conference Secretariat



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Please contact the Conference Secretariat for further details:

ASA 2000 Secretariat
PO Box 746, TURRAMURRA NSW 2074
Ph. 02 9449 1525 Fax 02 9488 7496 Email bradfld@ozemail.com.au

Chris Kohlenberg Teaching Fellowship (sponsored by Diasonics GE)

ASUM in association with Diasonics GE established a teaching fellowship to increase the opportunity for members outside the main centres to have access to quality educational opportunities. It has been awarded twice in 1998 and once in 1999 to provide educational opportunities for members in Regional areas of New Zealand, Queensland and New South Wales. In 1999 the fellowship was renamed the Chris Kohlenberg Teaching Fellowship to honor Chris Kohlenberg who died while travelling to educate sonographers.

The Chris Kohlenberg Teaching Fellowship is awarded to a member of ASUM on the basis of demonstrated knowledge, background and teaching ability. The Fellow is appointed by the Education Committee which considers nominations from committees, branches and members of ASUM. The Teaching Fellow will conduct workshops and meetings primarily (but not exclusively) in Australian and/or New Zealand centres which would not normally host scientific meetings. In addition the Teaching Fellow will be available to conduct workshops in hospital ultrasound departments during the day.

Members wishing to nominate for the fellowship in 2000 should provide details of their background and experience which qualifies them for appointment as the Chris Kohlenberg Teaching Fellow.

Branches wishing to propose programs for the Teaching Fellow should, in the first instance, contact Keith Henderson ph 02 9958 6200 fax 02 9958 8002 email khenderson@asum.com.au

New Titles Videotape Lending Scheme Collection

ASUM is pleased to release two new titles for the Videotape Lending Scheme. These videotapes are the first two of the series that have been compiled from sessions recorded at the 29th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine, Adelaide, 1999.

Evaluation of arterial injuries with color duplex ultrasonography
Non-invasive evaluation of the radial artery for coronary artery bypass grafting
(Gail Sandager)

Male infertility and ultrasound (Charles Lott)
Female fertility (Karen Shand)

The first addition to the Videotape Lending Scheme Collection features two of the sessions presented by Gail Sandager. Gail is the Technical Director, Vascular Laboratory, University of Maryland Medical Centre, Baltimore and has extensive experience in ultrasound application in arterial and venous vascular disease.

The second videotape release features a session on male infertility, presented by Charles Lott and a session on the topic of female fertility presented by Karen Shand.

Multiple copies of the two videotapes are available through the Videotape Lending Scheme. The catalogue with an order form is inserted in this edition of the *Bulletin*.

ASUM Workshop

Ultrasound Update Workshop

18 – 19 March 2000
The Royal Melbourne Hospital
Convenor: Matthew Andrews

A hands-on course designed to meet the needs of **Radiologists and Obstetricians** seeking to update their technical skills, and **Radiology and Obstetric Registrars** developing their technical skills in ultrasound in preparation for examination. Numbers will be restricted in order to assure all participants the opportunity for hands-on scanning with live patients in the small group workshops covering:

- greyscale imaging
- 18-20 week scan
- abdominal scanning
- carotid Doppler
- Kidneys
- DVT

Other topics covered in didactic lectures include image optimisation, artifacts and nuchal translucency assessment.

Registration is restricted to medical practitioners who:

- hold a specialist qualification in ultrasound, or
- are enrolled in a recognised course in preparation for a specialist qualification in ultrasound, or
- have passed DDU Part 1

A registration brochure is included with this *Bulletin* and on ASUM's internet site: http:/ www.asum.com.au

ASUM Workshop

Obstetric Ultrasound 2000

14 – 15 July 2000
The Royal Women's Hospital, Melbourne
Convenor: Victor Hurley

How will ultrasound be delivered to pregnant women in the new millennium?

This workshop, featuring Dr Gregory De Vore from Salt Lake City, USA and a panel of local experts, will explore this question in the context of didactic presentations, panel discussions and live scanning sessions.

Further information and a registration brochure is included in this issue of the *Bulletin* and on ASUM's website at http://www.asum.com.au

ASUM 2000 Annual Scientific Meeting

The organizing committee of ASUM 2000 invites you to attend ASUM's 30th Annual Scientific Meeting in Auckland. The exciting international faculty includes Prof Ulrich Willi (Zurich, Switzerland), Prof Nicholas Fisk (London, UK) and Prof David Cosgrove (London, UK) and Assoc Prof Marsha Neumeyer. A large Australasian faculty will also be speaking and conducting workshops.

New Zealand offers excellent conference facilities within easy reach of internationally acclaimed tourist and sporting facilities. Assistance with pre and post conference skiing and sightseeing tours is available on request.

Additional information is included on ASUM's internet site. The registration brochure is enclosed in this issue of the Bulletin and on ASUM's internet site at http://www.asum.com.au

ASUM CD-ROM Image Library

ASUM is developing an image database for organising and displaying ultrasound images. The intention is to collect images, be they teaching cases or just good examples of pathology, organise them in the database, and produce these on a CD-ROM. The CD will be sent to members near the start of each membership year.

We invite members to assist by submitting cases. A pro forma for image case contribution may be obtained by contacting ASUM.

A typical teaching case will have a few lines on clinical presentation, a series of images for inspection, perhaps with some comments about technique. The diagnosis should then be provided, perhaps with accompanying literature about the case. Additional supporting images may be appropriate, which may be from other modalities, eg an angiogram for a vascular case. Images can be submitted either as JPEG or TIFF files in PC format, as film.

For further information contact Keith Henderson, Education Officer, ASUM, 2/181 High Street, Willoughby NSW 2068 Australia ph: 02 9958 6200 fax: 03 9958 8002 Email: khenderson@asum.com.au

Beresford Buttery Overseas Traineeship (sponsored by Diasonics GE)

Since its foundation more than a century ago, Diasonics GE has constantly been at the forefront of research and technical innovation, with Diasonics GE Medical Systems today being recognised as a world leader in the supply of diagnostic imaging systems.

It is with great pride that Diasonics GE has the opportunity to offer this annual traineeship in the field of obstetric and gynaecological ultrasound, in memory of Beresford Buttery FRACOG, DDU, COGUS who made an inestimable contribution to his profession.

The award covers attendance at an appropriate educational program at the Thomas Jefferson Research and Education Institute in Philadelphia and includes tuition fees, economy airfare and accommodation for the duration of the course (usually 4 days).

ASUM and Diasonics GE invite applications for the 2000 Diasonics GE Beresford Buttery Traineeship Award

The award is made to applicants:

1. who seek to further develop their skills and experience in obstetric and gynaecological ultrasound
2. have as a minimum qualification Part 1 of the DDU or DMU (or equivalent) or have been awarded the DDU or DMU (or equivalent) within the last 5 years (since 31 December1995)
3. have been financial members of ASUM for a minimum of 12 months prior to the closing date

Applications should include:

- a curriculum vitae
- details of current employment
- testimonials from two referees in support of the application including contact address and telephone number
- an outline of professional goals and objectives
- an indication of benefit from award of the Traineeship

The successful applicant is asked to provide a written report on return from the course at Thomas Jefferson Research and Education Institute.

Applications addressing the criteria should be forwarded by **Friday 2 June 2000** to:

Diasonics GE Beresford Buttery Overseas Traineeship
c/- ASUM
2/181 High Street
Willoughby NSW 2068 Australia

Examination Dates

DMU Dates and Deadlines 2000

Fri 28 Apr 2000 Closing date for applications for exemption
Fri 2 Jun 2000 Closing date for Part I and Part II applications
Sat 2 Sep 2000 DMU Part I examination. Part II written examination

DDU Dates and Deadlines 2000

Mon 27 Mar 2000 Closing date for Part I and Part II applications
Mon 22 May 2000 DDU Part I and Part II written examinations
Sat 17 Jun 2000 DDU Part II oral examinations in Sydney (except Cardiac candidates, who will be examined in Melbourne on a date to be advised)
Mon 9 Oct 2000 DDU Closing date for Part I applications
Mon 20 Nov 2000 DDU Part I examination

Contact: ASUM
2/181 High St, Willoughby NSW 2068
Ph: 02 9958 7655; Fax: 02 9958 8002;
Email: asum@asum.com.au

ASUM Workshop in association with AMSIG

Musculoskeletal Ultrasound

14 - 16 April, 2000
Wrestpoint Casino
Convenor: Robert Jones

The program will focus on the practical application of musculoskeletal ultrasound and will feature leading speakers from Australia and New Zealand.

This workshop will be held concurrently with the AMSIG meeting with conjoint plenary sessions on regional musculoskeletal ultrasound. The ASUM program will consist mainly of workshop sessions, while the AMSIG program will comprise a comprehensive program of speakers with coverage of all modalities. Those who register for the ASUM workshop will be entitled to elect to attend some AMSIG sessions at no additional cost.

Further information and a registration brochure are included with this *Bulletin* and on ASUM's Internet site: http://www.asum.com.au

Ultrasound Events

Sat 18 Feb 2000 - 5 days. ISRRT/AIR Radiography Conference 2000. Venue: Sydney Conv & Exhibition Centre, Darling Harbour, Australia. Contact: Conference Secretariat, c/- ICMS Australasia, GPO Box 2609, Sydney NSW 2000 Australia. Ph: +61 2 9241 1478; Fx: +61 2 9251 3552; Email: radio@icmsaust.com.au

Mon 21 Feb 2000 - 5 days. Obstetrical U/S Course. Venue: Winston-Salem, NC, USA. Contact: Wake Forest Univ. Sch. Of Med., Cntr for Med. U/S, Medical Center Boulevard, Winston-Salem, NC 27157-1039, USA. Ph: 1 336 7164505; Fx: 1 336 7164204; Email: cmu@wfubmc.edu

Wed 23 Feb 2000 - 5 days. ASUM DMU Part II Preparation Course - General and Obstetric. Venue: The Royal Melbourne Hospital and The University of Melbourne. Contact: Wendy Calvert, ASUM, 2/181 High Street, Willoughby, NSW, 2068. Ph: 02 99586200; Fx: 02 9958 8002; Email: education@asum.com.au

Wed 23 Feb 2000. ASUM Victorian Branch Ultrasound Lecture Series. Choosing Equipment - Dave Carpenter. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Wed 1 Mar 2000. ASUM Victorian Branch Ultrasound Lecture Series. Fetal Malformations - Jackie Oldham. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Sat 4 Mar 2000 – 2 days. IBUS. Venue: Vienna, Austria. Contact: ECR Office, Neutorgasse 9/2A, A-1010 Vienna, Austria. Ph: 43 1 5334064; Fx: 43 1 53340649.

Mon 6 Mar 2000 – 5 days. 10th International Postgraduate Course on Advances in Cardiac Ultrasound. Venue: Davos, Switzerland. Contact: Mrs H Kleis-van Amersfoort, L.M.C., PO Box 593, NL-3700 AN Zeist, The Netherlands. Ph: 31 343 515134; Fx: 31 343 533357.

Wed 8 Mar 2000. ASUM Victorian Branch Ultrasound Lecture Series. Obstetrics - Normal Development - Amanda Sampson. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Thu 9 Mar 2000. ASUM ACT Branch Education Program. "Feeling Liverish" - the upper abdomen. Facilitator: Dr J Price. Contact: Pam Cooke, Ph: 02 6282 2888; Fx: 02 6293 1212; Email: cookefm@dynamite.com.au

Wed 15 Mar 2000. ASUM Victorian Branch Ultrasound Lecture Series. Obstetric Complications; IUGR - Lachlan de Crespigny. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Sat 18 Mar 2000 - 2 days. Ultrasound Update Workshop (Medical Practitioners). Venue: The Royal Melbourne Hospital. Contact: Wendy Calvert, ASUM, 2/181 High Street, Willoughby, NSW, 2068. Ph: 02 9958 6200; Fx: 02 9958 8002; Email: education@asum.com.au

Mon 22 Mar 2000. DDU Examinations. Closing date for Part I and Part II Applications. Contact: DDU Co-ordinator, ASUM, 2/181 High Street, Willoughby, NSW, 2068. Ph: 02 9958 7655; Fx: 02 9958 8002; Email: asum@asum.com.au

Wed 22 Mar 2000. ASUM Victorian Branch Ultrasound Lecture Series. Antenatal Echocardiography - Greg Davison; Transvaginal Scanning - Peter Renou. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Mon 27 Mar 2000 - 4 days. Peripheral Vascular Ultrasound Course. Venue: Winston-Salem, NC, USA. Contact: Wake Forest Univ. Sch. Of Med., Cntr for Med U/S, Med. Cntr Boulevard, Winston-Salem, NC 27157-1039, USA. Ph: 1 336 7164505; Fx: 1 336 7164204; Email: cmu@wfubmc.edu

Wed 29 Mar 2000. ASUM Victorian Branch Ultrasound Lecture Series. Gynaecology - Christine Acton. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Apr 2000. Meeting on Technological Advances in Ultrasound. Venue: United Kingdom. Contact: Kitti Kottasz, BIR, 36 Portland Place, London W1N 4AT, UK. Ph: 44 171 307 1429; Fx: 32 2 5551335.

Sun 2 Apr 2000 – 4 days. AIUM 2000. Venue: San Francisco. Contact: Stacey Bessling, AIUM, 14750 Sweitzer Lane, Suite 100, Laurel, Maryland 20707-5906. Email: conv_edu@aium.org

Sun 2 Apr 2000. ASUM ACT Branch Annual Luncheon. Presentation of Education Certificates. Venue: Canberra Yacht Club. Contact: Pam Cooke, Ph: 02 6282 2888; Fx: 02 6293 1212; Email: cookefm@dynamite.com.au

Sun 2 Apr 2000 - 3 days. 16th Congress of the International Society "The Fetus as a Patient". Venue: Fiuggi, Rome. Contact: 2nd Inst. of OB/GYN, University "La Sapienza", V. le Regina Elena, 324, I 00161 Rome, Italy. Ph: 39 06 4460484/4460507; Fx: 39 06 4469128/9089691; Email: perinat@flashnet.it

Tue 4 Apr 2000. ASUM Victorian Branch Scientific Meeting. Quiz Night. Private Practice vs Public. Contact: Mark Brooks, Ph: 03 9496 5431; Fx: 03 9459 2817.

Wed 5 Apr 2000. ASUM Victorian Branch Ultrasound Lecture Series. Ultrasound in Infertility, Ultrasound Guided Procedures, Assessment of fetal wellbeing - Victor Hurley. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Wed 12 Apr 2000 - 4 days. Advanced Cardiac Ultrasound Techniques & Practical Echocardiography Skills. Venue: Carlton Crest Hotel, Melbourne. Practical Day: The Alfred Hospital Heart Centre, Prahran. Contact: Miss Johan Reeves, Agilent Technologies, Healthcare Solutions Group. Ph: 03 9210 5458; Fx 03 9210 5465; Email: johan_reeves @aus.agilent.com

Wed 12 Apr 2000. ASUM Victorian Branch Ultrasound Lecture Series. Workshop 1 - Obstetric & Gynaecology. Venue: Mercy Hospital for Women. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Thu 13 Apr 2000. ASUM ACT Branch Education Program. Contact: Pam Cooke, Ph: 02 6282 2888; Fx: 02 6293 1212; Email: cookefm@dynamite.com.au

Fri 14 Apr 2000 - 3 days. ASUM Workshop in association with AMSIG. Musculoskeletal Ultrasound. Venue: Wrestpoint Casino, Hobart. Contact: ASUM, 2/181 High Street, Willoughby, 2068. Ph: 02 9958 7655; Fx: 02 9958 8002; Email: asum@asum.com.au

Wed 19 Apr 2000. ASUM Victorian Branch Ultrasound Lecture Series. Liver, Spleen, Pancreas. - Matthew Andrews. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Wed 26 Apr 2000. ASUM Victorian Branch Ultrasound Lecture Series. GB and Biliary Tree - Patsy Robertson. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Wed 26 Apr 2000 - 4 days. Course Ultrasound/Women's Imaging. Venue: Westin Hotel Copley Place, Boston, MA, USA. Contact: Danielle Pokoraki, Dept. of Radiology, 75 Francis Street, Boston, MA 02115, USA. Ph: 1 617 7326265; Fx: 1 617 7326509.

Fri 28 Apr 2000 - 3 days. Spring Ultrasound Conference Los Angeles Radiological Society. Venue: Los Angeles Convention Centre, Los Angeles, CA, USA. Contact: Beth Filip, 2615 Pacific Coast Highway, Suite 222, Hermosa Beach, CA 90254, USA. Ph: 1 310 3741452; Fx: 1 310 3746652.

Fri 28 Apr 2000. DMU. Closing date for application for an exemption. Contact: DMU Co-ordinator, ASUM, 2/181 High Street, Willoughby, NSW, 2068. Ph: 02 9958 7655; Fx: 02 9958 8002; Email: dmu@asum.com.au

Wed 3 May 2000. ASUM Victorian Branch Ultrasound Lecture Series. Renal/Bladder - Prue Neerhut. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Thu 4 May 2000. ASUM ACT Branch Education Program. "Sharing a joint or two". Dr Iain Duncan. Venue: The Canberra Hospital Lecture Theatre. Contact: Pam Cooke, Ph: 02 6282 2888; Fx: 02 6293 1212; Email: cookefm@dynamite.com.au

Sat 6 May 2000 – 5 days. 9th Triennial Congress World Fed. For Ultrasound In Medicine and Biology. Venue: Florence. Contact: Organising Secretariat, O.S.C. Bologna, Via S. Stefano, 30, I 40125 Bologna, Italy. Ph: 39 51 224232; Fx: 39 51 226855; Email: infoosc@osc.dsnet.it

Mon 8 May 2000 - 5 days. Obstetrical Ultrasound Course. Venue: Winston-Salem. Contact: Wake Forest Univ. Sch. Of Med., Cntr for Med. U/S, Medical Center Boulevard, Winston-Salem, NC 27157 1039, USA. Ph: 1 336 7164505; Fx: 1 336 7164204; Email: cmu@wfubmc.edu

Wed 10 May 2000. ASUM Victorian Branch Ultrasound Lecture Series. Paediatric Abdomen, Renal Tract - RCH Radiologist. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Wed 10 May 2000 - 3 days. SFAUMB '2000: French Society for the Applic. of U/S Techn. In Med. & Biol. Venue: Paris. Contact: Prof. J-F. Moreau, Hop. Necker-Enfants Malades, 161, rue de Sevres, F-75743 Paris Cedex 15, France. Ph: 33 1 43069270; Fx: 33 1 47344189.

Wed 17 May 2000. ASUM Victorian Branch Ultrasound Lecture Series. Paediatric Cranial, Musculoskeletal - RCH Radiologist. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Fri 19 May 2000 - 3 days. ASA National Conference. Venue: Brisbane Convention Centre. Contact: Conference Secretariat, PO Box 746, Turramurra, NSW 2074. Ph: 02 9449 1525; Fx: 02 9488 7496; Email: bradfld@ozemail.com.au

Mon 22 May 2000. DDU Examinations. Part I and Part II Written Examinations. Venue: Various Contact: DDU Co-ordinator, ASUM, 2/181 High Street, Willoughby, NSW, 2068. Ph: 02 9958 7655; Fx: 02 9958 8002; Email: asum@asum.com.au

Wed 24 May 2000. ASUM Victorian Branch Ultrasound Lecture Series. Abdominal Doppler, Intervention - Rob Gibson. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Wed 31 May 2000. ASUM Victorian Branch Ultrasound Lecture Series. Workshop 2 - Abdomen/Paediatrics. Venue: Radiology Department, 1st Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Fri 2 Jun 2000. DMU Examinations. Closing date for Part I and Part II Applications. Contact: DMU Co-ordinator, ASUM, 2/181 High Street, Willoughby, NSW, 2068. Ph: 02 9958 7655; Fx: 02 9958 8002; Email: dmu@asum.com.au

Wed 7 Jun 2000. ASUM Victorian Branch Ultrasound Lecture Series. Thyroid and Testis - Colin Styles. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Thu 8 Jun 2000. ASUM ACT Branch Education Program. Contact: Pam Cooke, Ph: 02 6282 2888; Fx: 02 6293 1212; Email: cookefm@dynamite.com.au

Sat 10 Jun 2000. ASUM Queensland Branch Meeting. Hamilton Island Conference. Venue: Hamilton Island. Contact: Roslyn Savage; Ph: 0417 720 875; Fx: 07 3881 2464; Email: markros@powerup.com.au

Wed 14 Jun 2000. ASUM Victorian Branch Ultrasound Lecture Series. Prostate - Alain Lavoipierre, Eye - Opthalmology Registrar. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Thu 15 Jun 2000 - 3 days. 13 Congresso Nazionale Della Societa Italiana Di Ecografia Andrologica Nefrologica. Venue: Trieste, Italy. Contact: The Office, Via S. Nicolo, 14, I 34121 Trieste, Italy. Ph: 39 040 368343; Fx: 39 040 368808; Email: sieun@theoffice.it

Sat 17 Jun 2000. DDU Examinations. Part II Oral Examinations (except Cardiac candidates.)
Venue: Sydney (Cardiac - Melbourne on a date to be determined). Contact: DDU Co-ordinator, ASUM, 2/181 High Street, Willoughby, NSW, 2068. Ph: 02 9958 7655; Fx: 02 9958 8002; Email: asum@asum.com.au

Wed 21 Jun 2000. ASUM Victorian Branch Ultrasound Lecture Series. Breast - Allison Rose, Examination Techniques - Janet Radford. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Mon 26 Jun 2000 - 3 days. RANZCOG Provincial ASM. Venue: Cairns. Contact: RANZCOG. Ph: 03 9417 1600.

Wed 28 Jun 2000. ASUM Victorian Branch Ultrasound Lecture Series. Musculoskeletal ultrasound - Ron Ptasnic. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Thu 29 Jun 2000 - 4 days. IV World Congress of Echocardiography and Vascular Ultrasound. Venue: Berlin. Contact: Martha Mann, Univ. of Alabama at Birmingham, Heart Station/Echo Lab SW/S102, Birmingham, AL 35233, USA. Fx: 1 205 9346747.

Wed 5 Jul 2000. ASUM Victorian Branch Ultrasound Lecture Series. Shoulder - Frank Burke. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Wed 12 Jul 2000. ASUM Victorian Branch Ultrasound Lecture Series. Peripheral Venous - Geoff Matthews. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Sat 15 Jul 2000 - 2 days. ASUM Obstetric Workshop. Venue: Royal Women's Hospital, Melbourne. Contact: ASUM. 2/181 High Street, Willoughby NSW 2068. Ph: 61-2-9958 7655; Fx: 61 2 9958 8002; Email: asum@asum.com.au

Wed 19 Jul 2000. ASUM Victorian Branch Ultrasound Lecture Series. Carotid Doppler - Paula King. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Sat 22 Jul 2000 - 2 days. ASUM Queensland Branch Meeting. DMU Tutorials. Contact: Roslyn Savage; Ph: 0417 720 875; Fx: 07 3881 2464; Email: markros@powerup.com.au

Wed 26 Jul 2000. ASUM Victorian Branch Ultrasound Lecture Series. Lower Limb Arterial Doppler - Ken Myers. Venue: Radiology Seminar Room, 2nd Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369.

Wed 2 Aug 2000. ASUM Victorian Branch Ultrasound Lecture Series. Workshop 3 - Vascular / Small Parts / Musculoskeletal. Venue: Radiology Department, 1st Floor, Royal Melbourne Hospital. Contact: Dr Patsy Robertson, Fx: 03 9342 8369

Sun 6 Aug 2000 - 4 days. CSANZ Annual Scientific Meeting. Venue: Melbourne. Contact: CSANZ, 145 Macquarie Street, Sydney NSW 2000. Ph: 02 9256 5452, Fx: 02 9256 5449.

Fri 25 Aug 2000 - 3 days. ASUM 2000. Venue: Carlton Hotel, Auckland, New Zealand. Contact: ASUM. 2/181 High Street, Willoughby NSW 2068. Ph: 61 2 9958 7655; Fx: 61-2 9958 8002; Email: asum@asum.com.au

Sep 2000. Annual Meeting Diagnostic Medical Sonographers Society. Venue: Dallas, TX, USA. Contact: Suzann J. Oliver, 12770 Coit Road, Suite 708, Dallas, TX 75251-1314, USA. Ph 1 972 2397367; Fx: 1 972 2397378.

Sat 2 Sep 2000. DMU Examinations. Part I examination. Part II written examination. Venue: Various. Contact: DMU Co-ordinator, ASUM, 2/181 High Street, Willoughby, NSW, 2068. Ph: 02 9958 7655; Fx: 02 9958 8002; Email: dmu@asum.com.au

Thu 7 Sep 2000 - 3 days. 24. Dreilaendertreffen der OEGUM, DEGUM, SGUMB. Venue: Vienna. Contact: Ultraschall 2000, c/o ECR-office, Neutorgasse 9/2A, A-1010 Vienna, Austria. Ph: 43 1 5334064; Fx: 43 1 53340649; Email: office@ecr.org

Sun 10 Sep 2000 - 5 days. Ultrasound 2000: 1st International Ultrasound Symposium. Venue: Gazi University, Istanbul, Turkey. Contact: Valor Tourism and Travel Ag., Portakalcicegi Sokak 2/7, A. Ayranci, 06690 Ankara, Turkey. Ph: 90 312 4402490/4409758; Fx: 90 312 4474610.

Thu 14 Sep 2000 - 3 days. Annual Conference of the Diagnostic Medical Sonographers Society. Venue: Dallas. Contact: Betsy Hunt, 12770 Coit Road, Suite 708, Dallas, TX 75251-1314, USA. Ph: 1 972 2397367; Fx: 1 972 2397378.

Oct 2000. Annual Meeting Society of Radiologists in Ultrasound. Venue: Chicago. Contact: Suzanne Bohn, 1891 Preston White Drive, Reston, VA 20191, USA. Ph: 1 703 6488997; Fx: 1 703 2629313.

Wed 4 Oct 2000. 10th World Congress On Ultrasound In Obstetrics and Gynaecology. Venue: Zagreb, Croatia. Contact: Prof. A. Kurjak, Sveti Duh Hospital, Sveti Duh 64, HR-1000 Zagreb, Croatia. Ph 385 1 3700441; Fx: 385 1 3700438; Email: asim.kurjck@public.stve.hr

Wed 4 Oct 2000 - 4 days. 5th Congress of the International Society of Musculoskeletal Ultrasonography (ISMUS). Venue: Prague. Contact: Jan Poul Assoc, Prof. MC, PhD., Univ. Children's Hospital, Cernopolni 9, 662 63 Brno. Czech Republic. Ph: 420 5 45122111; Fx: 420 5 574616; Email: jpoul@mail.muni.cz

Mon 9 Oct 2000. DDU Examinations. Closing date for Part I Applications. Contact: DDU Co-ordinator, ASUM, 2/181 High Street, Willoughby, NSW, 2068. Ph: 02 9958 7655; Fx: 02 9958 8002; Email: asum@asum.com.au

Sun 15 Oct 2000 - 6 days. World Congress of High-Tech Medicine. Venue: Hanover, Germany. Contact: Management Institute Herrenhausen GmbH, Herrenhauser Strabe 83-99, 30 419 Hanover, Germany. Web site: http://www.high-tech-med.com

Tue 17 Oct 2000. ASUM Victorian Branch Scientific Meeting. Ultrasound of the Hand. Contact: Mark Brooks, Ph: 03 9496 5431; Fx: 03 9459 2817.

Tue 24 Oct 2000. ASUM Queensland Branch Meeting. Contact: Roslyn Savage; Ph: 0417 720 875; Fx: 07 3881 2464; Email: markros@powerup.com.au

Nov 2000. ASUM Victorian Branch Scientific Meeting. Combined ASUM/ASA case presentation night. Contact: Mark Brooks, Ph: 03 9496 5431; Fx: 03 9459 2817.

Mon 20 Nov 2000. DDU Examinations. Part I Examination. Venue: Various. Contact: DDU Co-ordinator, ASUM, 2/181 High Street, Willoughby, NSW, 2068. Ph: 02 9958 7655; Fx: 02 9958 8002; Email: asum@asum.com.au

Wed 6 Dec 2000 - 3 days. BMUS 32nd Annual Scientific Meeting and Exhibition. Venue: Devonshire Park Center, Eastbourne. Contact: Mrs Elaine Brown, General Secretary BMUS, 36 Portland Place, London WIN 3DG, United Kingdom. Ph: 44 171 6363714; Fx: 44 171 3232175; Email: B_M_U_S@compuserv.com

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Guidelines for Authors

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

FEATURE ARTICLES

Feature articles are original papers, or articles reviewing significant areas in ultrasound and will normally be illustrated with relevant images and line drawings. Feature articles are commissioned by the Editor who will indicate the size and scope of the article.

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 *Bulletin*. Each listing must contain: activity title, dates, venue, organising body and contact details including name, address, phone number, facsimile number (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

Manuscripts should be submitted in triplicate in print and on PC formatted diskette as MS Word documents.

- Font size: maximum 12, minimum 10
- Double spacing for all pages
- Each manuscript should have the following components: Title page, abstract, text, references, tables, legends for illustrations.
- Title Page should include the following:
  - ❖ 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
- Relevant references should be cited using the Vancouver style, numbered according to the sequence of citation in the text, and listed in numerical order in the bibliography.

Vancouver style format should be used.
Examples of Vancouver style:

1. In-text citation:	....as documented in previous studies (1-3). Note: Not superscript
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

All 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. Up to 8 key words should be listed at the end of the abstract to assist in indexing.

Images

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

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 (eg Letraset). On the back of the print include the authors name, figure number and a directional arrow indicating the top of the print.

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

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