Ultrasound Image Optimisation; the differential diagnosis of testicular lesions.

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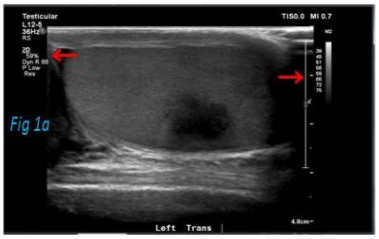
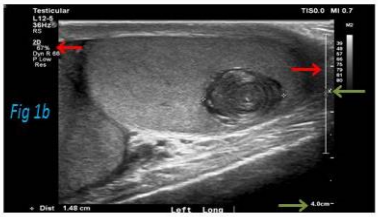
Background & Introduction

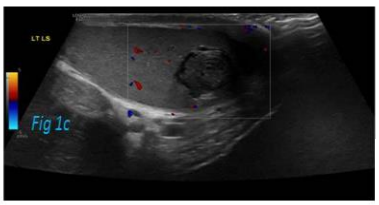
Testicular lesions encompass a broad spectrum of pathology, and treatment strategies can range from a 'leave alone' approach, to aggressive and early surgery. Ultrasound (US) is the preferred, and often only, modality for imaging the testes, thus it is crucial that sonography is able to give as unequivocal an answer as possible. The practitioner dependant nature of US can therefore greatly impact diagnosis and treatment. We present a selection of four 'mini case studies' of testicular lesions, seen in the US department of a busy tertiary centre. The clinical context is given, along with an emphasis upon the importance of image optimisation in each case.

Case 1: 31 year old male. Several months history of a slowly enlarging, smooth, left testicular lump.

- *Fig 1a* shows a hypoechoic testicular parenchymal lesion, the initial appearances of which would raise suspicion for malignancy.
- *Fig 1b* and *1c* demonstrate image optimisation:
  - Appropriate use of increasing 2D gain (red arrows) to highlight crucial internal *'onion ring'* architecture of lesion.
  - Appropriate depth and focal zone (green arrows) to keep lesion in the centre of field of view.
  - Colour Doppler demonstrates absence of vascularity/angiogenesis, with a mean colour velocity 0cm/sec in the lesion itself.





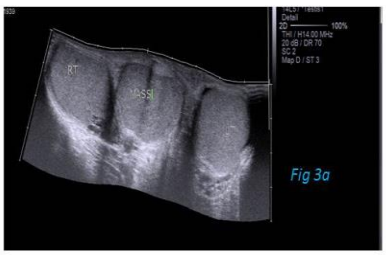


Diagnosis = Typical Testicular Epidermoid[1].

1) Loya AG, Said JW, Grant EG. Epidermoid cyst of the Testis; Radiologic-Pathologic Correlation, *RadioGraphics*, 2004, 24:243-246.

Case 3: 79 year old man with a new, tender anterior scrotal 'lump'. No past history of malignancy

- *Fig 3a* demonstrates effective use of the panoramic function by the practitioner to demonstrate quite clearly that the mass is NOT testicular.
- Initial colour Doppler showed some flow; *Fig 3b* demonstrates how power Doppler, along with a pulse-wave Doppler spectral trace (maximum scale velocity value >5cm/sec) have been used to prove the lesion is indeed vascular.
- Image optimisation has proven that the mass is scrotal, but extra-testicular, is solid, and is vascular.

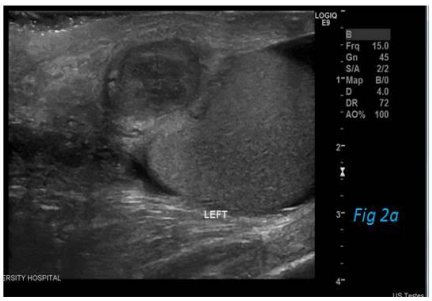


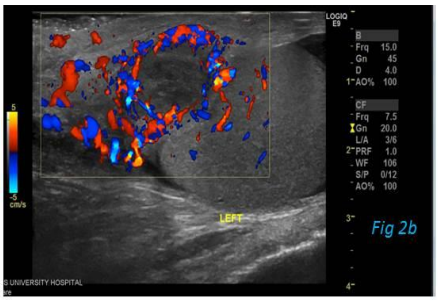
Diagnosis = There is a differential, but suspected Primary scrotal wall malignancy[3] with normal testes. Patient sadly passed away prior to histological confirmation.

3) Conzi R et al. Sonography of Scrotal Wall Lesions and Correlation with other Modalities. *Journal of Ultrasound in Medicine.* 2017; 36:2149-2163.

Case 2: 59 year old male, known miliary tuberculosis, new hard testicular 'mass'.

- *Fig 2a* shows an heterogeneous lesion in the left epididymal head. High frequency (15MHz) and appropriate focal zone enable epididymis to be delineated separate to the testis. Appropriate 2D gain allows for appreciation of lesion morphology.
- *Fig 2b* demonstrates:
  - Appropriate elevation of the focal zone to the region of interest.
  - Application of colour doppler which reveals florid circumferential hyperaemia (mean colour velocity ~4cm/sec) indicative of an inflammatory process in the epididymis. Normal flow in the testis.



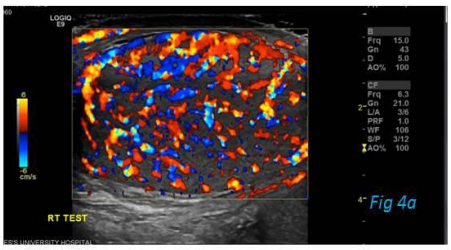


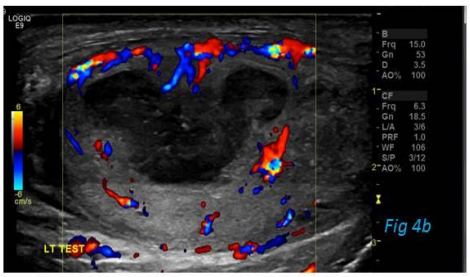
Diagnosis = Acute epididymitis, most likely Tuberculous[2].

2) Muttarak M, Peh CG W, Lojanapiwar B, Chaiwun B. Tuberculous Epididymitis and Epididymo-orchitis: sonographic appearances. *American Journal of Roentenology.* 2001;176: 1459-1466.

Case 4: 49 year old male IV drug misuser, septicaemic with scrotal swelling and pain.

- *Fig 4a* shows florid right testicular hyperaemia (mean colour velocity ~5cm/sec) . Findings are compatible with acute orchitis
- *Fig 4b* shows Low echogenicity left testicular lesion:
  - Measured increase in 2D gain to allow appreciation of internal composition of lesion; mobile, echogenic debris.
  - Doppler demonstrates an avascular lesion (mean colour velocity 0cm/sec) with surrounding hyperaemia (mean colour velocity ~5cm/sec) .
  - A band of posterior acoustic enhancement can be seen. Appropriate drop in the focal zone augments appreciation of posterior enhancement.





Diagnosis = Bilateral epididymo-orchitis with left testicular abscess[4].

4) Dogra V, Gottlieb RH, Rubens DJ, Liao L. Benign Intratesticular Cystic Lesions: US Features. *Radiographics*, 2001; 21:273-281.

Discussion

Suboptimal use of US pre-sets and settings can have an effect upon image quality, and significantly alter scrotal image interpretation. In our cases, we exploited the characteristics of each lesion by making proper use of: 1) Colour, power and spectral Doppler 2) varying of focal zone position 3) technical modifications such as panoramic scanning and 4) artefacts such as posterior acoustic enhancement and shadowing. This allowed us to draw more information from each case, and with the clinical context, form clear and sensible diagnoses with confidence, which if incorrect, would have significant patient management implications.