Clinical History:

A 15-year-old boy presented to Urology with bilateral scrotal lumps first noticed a month ago. Both lumps were painless on palpation and the boy denied any associated symptoms.

Imaging Findings:

Ultrasound of the left hemiscrotum revealed a benign simple epididymal cyst, corresponding to the lump felt by the patient. Examination of the right testis revealed an intratesticular lesion measuring 1.4x1.3x1.2 cm, which was heterogeneous, predominantly hypoechogenic and containing wall calcification and internal linear areas of hyperechogenicity interspersed with areas of hypoechogenicity resembling an “onion-ring”. (Fig. 1a) Colour and power Doppler technique revealed no vascularity within the lesion and a peripheral rim of increased vascularity. (Fig. 1b, c) On tissue elastography (Shear wave elastography with colour coding), the lesion demonstrated a homogeneously “hard” pattern, with increased absolute measurement of the shear wave velocities compared with the normal testicular parenchyma. (Fig. 2a, b) On contrast-enhanced ultrasound (CEUS), following the intravenous administration of 4.8 ml of SonoVue (SonoVue™, Bracco, SpA, Milan), no enhancement was demonstrated within the lesion. (Fig. 2c, d) These appearances on MPUS indicate the diagnosis of an epidermoid cyst. Histology after testis-preserving surgery confirmed the diagnosis.

Discussion:

Epidermoid cysts (EC) are uncommon intratesticular benign lesions, accounting for 1% of testicular tumours. [1] They contain keratin and are considered to have a germ cell origin. [2] EC usually affect patients between 20 and 40 years of age presenting with an incidentally found painless scrotal lump, but are also found in children aged 1-17 years, accounting for less than 2% of resected intratesticular masses. [2-4]

Ultrasound is the established modality for evaluating scrotal masses. EC appearance depends on the cyst’s age and content, typically appearing as solid well-demarcated 1-3 cm mass which on greyscale give the classic impression of a laminated, onion-ring shaped structure. [1, 2, 5] This appearance contains multiple alternating hyper- and hypoechogenic layers which reflect the multiple keratin layers. [2] Alternative reported patterns include a target
composed of a central hyperechoic area and a halo, a well-defined mass with a rim calcification and a solid mass with a hyperechoic rim. [1, 2, 5] These patterns frequency was recently investigated and it was concluded that mural calcification represents the commonest pattern occurring in 86% of cases, followed by the onion-ring appearance in 62% and the central echogenic area in 33%. [6] In children EC may also appear heterogeneous or anechoic. Smaller cysts attached to the main abnormality were also seen in paediatric patients. [3] Colour and spectral Doppler imaging typically reveals no vascularity within the mass. [1, 2] However, the sensitivity of colour Doppler imaging may be limited in smaller tumours, low flow and often problematic in the paediatric testis. Consequently malignant tumours with the misleading finding of no intraluminal flow have been reported; intraluminal vascularity is accepted as the hallmark of malignancy. [7, 8] This discrepancy highlights the need for more confident diagnostic modalities. Although highly suggestive, greyscale ultrasound findings are not pathognomonic of EC as malignant tumours are known to mimic EC. [1, 2, 5] All ultrasonographic modalities should be performed for a confident diagnosis. The use of modern techniques of elastography and CEUS, combined with conventional aspects of ultrasound is termed multiparametric ultrasound. [9] CEUS is superior to colour Doppler in identifying vascularity and EC typically show no internal enhancement but a rim of enhancement has been identified in larger lesions. [7, 8, 10] Strain elastography shows EC to be consistently and predominantly hard, with high values of strain ratio. [8, 10] When the combination of ultrasonographic findings is consistent with an EC and tumour markers are negative, a testis-sparing enucleation can be safely performed instead of orchiectomy. [1, 2, 4]

**Differential Diagnosis List:** Intratesticular epidermoid cyst, Epidermoid cyst, Immature teratoma, Benign teratoma, Yolk sac tumour, Sarcoma

**Final Diagnosis:** Intratesticular epidermoid cyst

**References:**

**Figure 1**

a

**Description:** Greyscale US image showing the intratesticular lesion of heterogeneous but predominantly low reflectivity. An onion-ring shape is created by some internal alternating hyper- and hypoechoic areas. Some mural calcifications are also noted (arrowhead). **Origin:** Radiology, King’s College Hospital, London, UK.

b

**Description:** Colour Doppler imaging showing no internal blood flow signals but a rim of increased peripheral vascularity (arrowheads). **Origin:** Radiology, King’s College Hospital, London, UK.
Description: Power Doppler imaging confirms the previous findings. Origin: Radiology, King’s College Hospital, London, UK.
Description: On colour-coded strain elastography, the lesion appears uniformly red, indicating hard tissue. **Origin:** Radiology, King’s College Hospital, London, UK.

Description: On quantitative map of elastography, the lesion shows increased shear wave velocities compared to testicular parenchyma. **Origin:** Radiology, King’s College Hospital, London, UK.
Description: On contrast-enhanced ultrasound 25 seconds after the administration of microbubbles, the lesion showed no internal enhancement. **Origin:** Radiology, King’s College Hospital, London, UK.

Description: 45 seconds after the administration of microbubbles still no enhancement was visible within the lesion. A rim of peripheral enhancement is visualized (arrowheads). **Origin:** Radiology, King’s College Hospital, London, UK.