Pictorial review

Scrotal calcification: ultrasound appearances, distribution and aetiology

L H BUSHBY, MBBS, FRCS, F N A C MILLER, MBBS, MRCP, S ROSAIIRO, MBBS, J L CLARKE, MSc and P S SIDHU, MRCP, FRCR

Department of Diagnostic Radiology, King’s College Hospital, Denmark Hill, London SE5 9RS, UK

Abstract. This pictorial review illustrates the ultrasound appearances of scrotal calcification, distinguishing between intratesticular and extratesticular calcification. Intratesticular calcification may be due to phleboliths, spermatic granulomas or vascular calcification, or it may occur in association with tumours. Extratesticular calcification is more frequently encountered and is usually related to previous inflammatory disease of the epididymis. Testicular microlithiasis, a rare condition characterized by multiple scattered echogenic foci within the testis, is produced by the formation of microliths from degenerating cells in the seminiferous tubules. Testicular microlithiasis has been demonstrated as an incidental finding as well as in association with both benign and malignant tumours of the testis.

Calcification within the scrotum is an uncommon finding, but the site, extent and distribution can aid diagnosis.

Intratesticular calcification

Changes in echogenicity within the testis are readily identified against the normal homogeneous echotexture. Solitary punctate intratesticular calcific foci, with or without acoustic shadowing, represent phleboliths or spermatic granulomas and are of no pathological significance [1]. Vascular calcification within the testicular parenchyma may also be identified by a cluster of punctate foci (Figure 1).

A cluster of calcification, when seen in association with a hypoechoic area in the testis, is a significant finding and suggests a testicular tumour or chronic testicular infarction. The distinction between focal infarction and tumour may be difficult. Infarction may be due to trauma, may develop secondary to severe epididymitis where the swollen epididymis compresses the vessels to a segment of the testis, or may be due to torsion (Figure 2). Focal infarction is usually peripheral and wedge-shaped, with linear edges containing specks of calcification representing areas of necrosis [2].

Most primary germ cell testicular tumours are well defined hypoechoic lesions with varying amounts of heterogeneity [2]. Calcification is frequently encountered but its presence and distribution does not reflect a specific cell type [3] (Figure 3). The commonest germ cell tumour, the seminoma, is more homogeneous and infrequently shows calcific foci, in contrast to embryonal, mixed germ cell tumours and teratomas, which are usually more heterogeneous and commonly contain focal areas of increased echogenicity due to necrosis or calcification [1]. Malignant teratomas may be particularly heterogeneous in appearance, with an architecture reflecting their complex origin; well differentiated squamous cysts filled with echogenic bone, cartilage, mucous glands, smooth muscle and neural tissue (Figure 4). Teratocarcinoma, the commonest mixed germ cell tumour, containing elements of both teratoma and embryonal cell carcinoma, is an aggressive tumour that often contains highly reflective focal areas of microcalcification within a mass of mixed echotexture (Figure 5). The appearance of a large calcified scar within the testis, producing an acoustic shadow termed a “burned out tumour”, is a rare but recognized phenomenon (Figure 6). In patients presenting with retroperitoneal germ cell tumour and palpably normal testes, such calcific foci in the testis have been shown to contain histological evidence of a regressed testicular tumour [4].

The association of calcification with benign lesions in the testis is well documented. Benign
intratesticular tumours, commonly derived from the Sertoli and Leydig cells of the seminiferous tubules, are difficult to distinguish from malignant tumours and sometimes demonstrate calcification (Figure 7). Epidermoid tumours are variable in their ultrasound appearance, some having distinguishing features such as a well demarcated hypoechoic mass with calcification in the wall (Figure 8) or a mass surrounded by concentric rings, described as an “onion ring” appearance [5]. Simple testicular cysts are usually thin walled and anechoic, but they may contain calcification within the rim (Figure 9). Granulomatous disease can also present with a hypoechoic testicular mass containing areas of calcification that may be extensive (Figure 10).

Testicular microlithiasis (TM) describes the ultrasound appearance of multiple tiny echogenic foci within the testis, measuring 1–3 mm in diameter (Figure 11). The number of calcific foci and the pattern of distribution can vary. Diffuse symmetrical distribution of foci is the characteristic pattern, but asymmetrical distribution, unilateral foci and peripheral clumping have all been described [6]. The formation of microliths is thought to result from degenerating cells in the seminiferous tubules. Acoustic shadowing is not seen, probably owing to the small size of the calcifications. Although usually an incidental finding during the investigation of testicular symptoms, TM has been found in association with benign tumours and malignant germ cell tumours of the testis (Figure 12) and with various medical conditions including infertility, cryptorchidism, Down’s syndrome and pulmonary alveolar microlithiasis. The natural history of incidentally discovered TM and the possible association between TM and testicular malignancy is as yet undefined.

**Extratesticular calcification**

Calcification within the extratesticular portion is more frequent than intratesticular calcification and usually represents benign disease [7]. The focus of calcification is often solitary and the site of calcification usually yields the diagnosis. A relatively common appearance is that of a scrotal pearl, a calcified loose body lying between the membranes of the tunica vaginalis. These are usually solitary, although occasionally they may be multiple, round and measure up to 1 cm in diameter, producing a discrete acoustic shadow (Figure 13). The aetiology of a scrotal pearl is unclear, originating either as a fibrinous deposit in the tunica vaginalis or as a remnant of a detached torsed appendix testis or appendix epididymis. Scrotal calculi are often found in association with a secondary hydrocoele, thus rendering them impalpable [8]. The tunica vaginalis may occasionally calcify more extensively, producing a linear plaque with acoustic shadowing (Figure 14). Calcification in or adjacent to the epididymis is a common finding and is usually due to chronic epididymitis (Figure 15). Granulomatous disease should always be considered in these circumstances (Figure 16). Haematoma and sperm granulomas (sperm extravasation with granuloma formation) may produce a solitary echogenic area within the epididymis (Figure 17). The appendix epididymis and appendix testis may calcify and they are recognized by their characteristic position and shape (Figure 18).

![Figure 1](image-url)

**Figure 1.** Echogenic foci due to vascular calcification. (a) Several punctate foci (arrows). (b) Cluster of echogenic foci (arrow).
Figure 2. Missed testicular torsion. Multiple echogenic foci seen within a testis of hypoechoic echotexture.

Figure 3. Mixed germ cell tumours. (a) Longitudinal section demonstrating a discrete mass of similar echogenicity to the testis (arrows), containing a central calcific focus. (b) A large germ cell tumour in a different patient (arrowheads), with peripheral calcification (arrow).

Figure 4. Malignant teratoma. A well defined hypoechoic mass (open arrows) with a peripheral focus of calcification (curved arrow).

Figure 5. Teratocarcinoma. A heterogeneous mass (small arrows) containing several foci of calcification both centrally and peripherally (large arrows).
Figure 6. “Burnt out tumour”. A focal area of calcification (arrow) within the testis, representing a regressed testicular tumour.

Figure 7. Sertoli cell tumour. Large smooth curvilinear calcification (curved arrow) at the periphery of a heterogeneous mass (open arrows).

Figure 8. Epidermoid tumour. Well demarcated hypoechoic mass with two foci of calcification (arrows) within the wall.

Figure 9. Simple intratesticular cyst. The cyst is perfectly anechoic and has calcification within the rim.

Figure 10. Granulomatous disease. Characteristic multiple large areas of calcification are demonstrated within the testis.

Figure 11. Testicular microlithiasis. Scattered echogenic foci are seen throughout the testis.
Figure 12. Testicular microlithiasis. In association with a seminoma (a) and an intratesticular cyst (b).

Figure 13. Scrotal pearl (arrow).

Figure 14. Tunical calcification. A linear plaque of calcification with acoustic shadowing (arrow).

Figure 15. Calcification (arrow) within the epididymal head.

Figure 16. Tuberculous granulomas (arrow) within the epididymis.
References


Figure 17. Sperm granulomas demonstrated within the epididymis.

Figure 18. Calcification of the appendix testis. This commonly occurs following a torsion of the appendix testis.