

PICTORIAL ESSAY

Sonographic Spectrum of Tunica Albuginea Cyst

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ABSTRACT

Tunica albuginea (TA) cyst is the most common extratesticular benign mass, which is usually palpable. Ultrasound examination is the imaging modality of choice to characterize palpable testicular lesions. This pictorial essay presents the spectrum of sonographic features of TA cysts in order to assist radiologists in making the correct diagnosis and avoid unnecessary surgeries.

Key words: Testicular cyst, tunica albuginea cyst, tunica albuginea, ultrasound

INTRODUCTION

Tunica albuginea (TA) cyst is the most common extratesticular benign mass, which is usually palpable. The purpose of this article is to describe the various sonographic appearances of the TA cyst.

Ultrasonography is the modality of choice for characterization of testicular lesions. Extratesticular lesions are more common than intratesticular lesions. More than 95% of intratesticular lesions are malignant.^[1] Most malignant tumors are palpable, whereas the majority of intratesticular cysts are not palpable except when they are at the periphery of the testis.^[2] Tunica albuginea cysts, regardless of size, are usually palpable.

DISCUSSION

Tunica albuginea cysts arise from tunica albuginea (TA).

The TA, a fibrous layer below the tunica vaginalis, closely covers the testicle. The posterior surface of the TA extends into the interior of the testis, forming an incomplete septum known as the mediastinum testis.^[2] The TA can be seen as a bilayered echogenic structure around the testicle [Figure 1].^[3]

Benign tumors involving the tunica albuginea include TA cyst, adenomatoid tumor, and fibrous tumor. The incidence of TA cysts is 0.35%.^[4]

Tunica albuginea cysts are the most common extratesticular benign masses, and most of the times are discovered incidentally by the patient. Patients usually present with a firm pinhead-sized palpable mass and rarely present with pain and swelling.^[2] In 1929, Frater^[5] described TA cysts as a separate disease entity from intratesticular cysts.

The pathogenesis of TA cyst is not known, but they are

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believed to be mesothelial in origin.^[6] Under microscopic analysis, they are lined by non-ciliated cuboidal cells and contain serous fluid and cellular debris.^[7]

Tunica albuginea cysts are characteristically located at the upper anterior or lateral aspect of the testis. They may be associated with a history of trauma, hemorrhage, or infection.^[8] Tunica albuginea cysts range from 2 to 5 mm in diameter and are brought to medical attention when a patient presents with a palpable lump.^[5] The mean age at presentation is 40 years and can even be seen in the 5th and 6th decades.^[2]

Non-neoplastic cystic lesions represent a subset of testicular lesions of which the majority are benign. It is important for the practicing radiologist to recognize this benign subset to prevent unnecessary surgical exploration.^[2] Patients with an extratesticular nodule in the upper anterior or lateral aspect of the TA can be easily treated with enucleation.

SPECTRUM OF SONOGRAPHIC FEATURES

Simple cyst

This is the classic appearance of a TA cyst. Ultrasound reveals a small (2-5 mm), sharply demarcated,

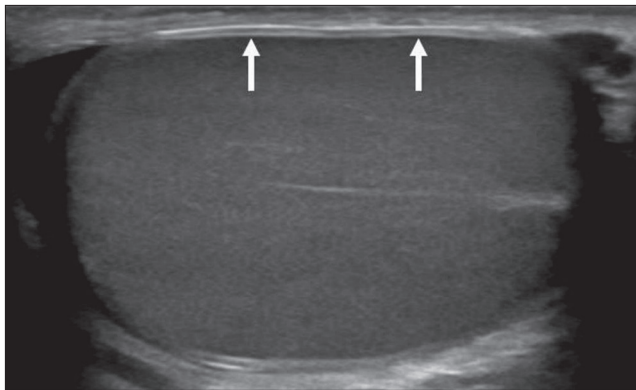


Figure 1: Normal testicle. Longitudinal gray-scale ultrasound image of the testis shows the Tunica albuginea as a bilayered echogenic band surrounding the testis (arrows).

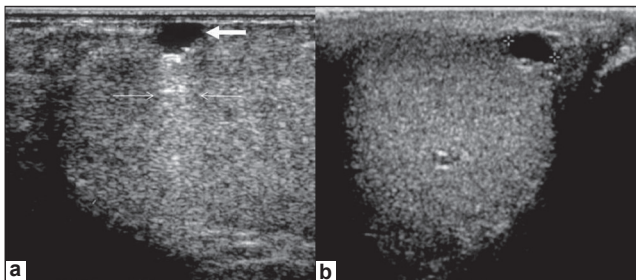


Figure 2: Classic Tunica albuginea cyst in a 34-year-old man. (a) Longitudinal and (b) transverse gray-scale ultrasound images demonstrate a well-defined cystic lesion in the anterior and upper portion of the testis (arrow), a characteristic location for a Tunica albuginea cyst. The TA cyst demonstrates through transmission (small arrows). (*Reproduced with permission from Radiographics.^[2])

unilocular or multilocular cyst without solid components, no disturbance of the adjacent parenchyma, and with posterior through transmission [Figure 2].^[9] They are usually very firm, even when small.^[2]

These cysts meet all the three criteria of a simple cyst - an imperceptible wall, anechoic center, and through transmission. They are avascular on color flow Doppler examination [Figure 3].

Mimicking intratesticular cyst

Tunica albuginea cysts when large in size can compress the testicular parenchyma and may appear to be intratesticular in location, making the differentiation from an intratesticular cyst difficult [Figure 4].^[2] When larger than 10 mm, these

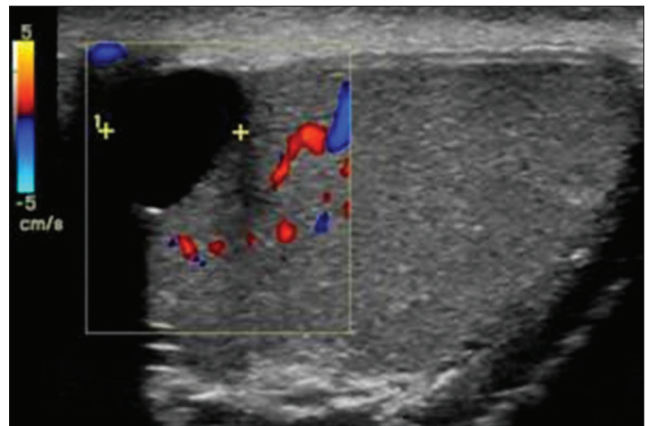


Figure 3: Tunica albuginea cyst. Longitudinal color flow Doppler image of the testis demonstrates classic location of the TA cyst with imperceptible wall, anechoic center, through transmission, and absence of blood flow.

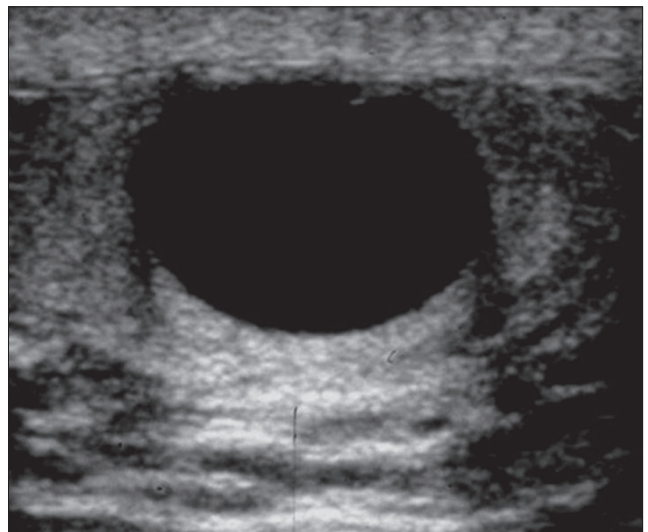


Figure 4: Tunica albuginea cyst mimicking an intratesticular cyst. Tunica albuginea cyst in an asymptomatic 70-year-old man, who had a palpable left testicular mass. Longitudinal ultrasound image shows a well-defined cyst with an imperceptible wall, an anechoic center, and through transmission. A diagnosis of intratesticular cyst was advanced. Findings of tumor markers were negative, but because the mass was palpable, the urologist suspected a malignant tumor. The patient underwent radical orchiectomy, after which a Tunica albuginea cyst was confirmed. (*Reproduced with permission from Radiographics.^[2])

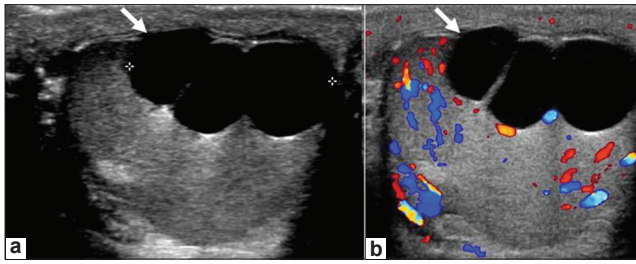


Figure 5: Tunica albuginea cyst mimicking an intratesticular cyst 35-year-old man with a palpable lump in the right testicle. (a) Longitudinal ultrasound image shows a 2.4 × 1.3 cm multilocular cystic lesion in the anterior aspect of the testis (arrow) producing a classic indentation on the testicular parenchyma. This lesion corresponded to the patient's palpable lump. (b) Color flow Doppler examination revealed no vascularity within the cyst.

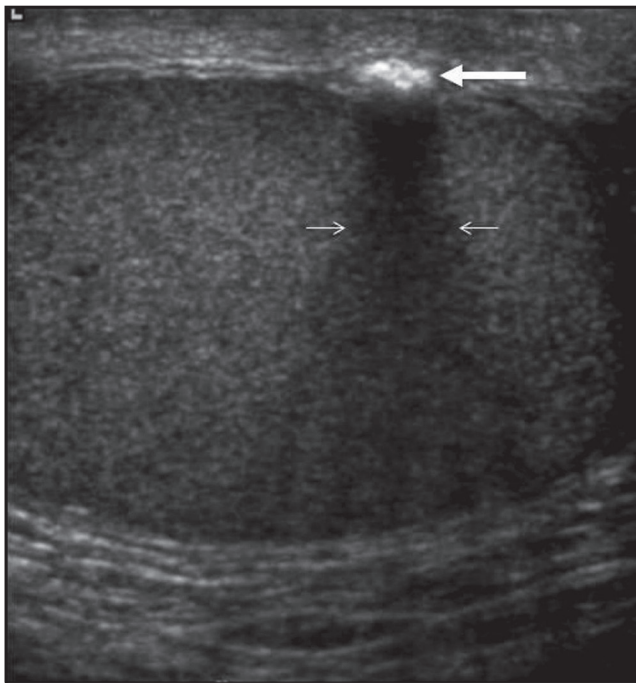


Figure 6: Calcified Tunica albuginea cyst. A 24-year-old man with a palpable mass in the right testicle. Longitudinal ultrasound image shows a well-circumscribed calcified lesion (large arrow) with acoustic shadowing (small arrows).

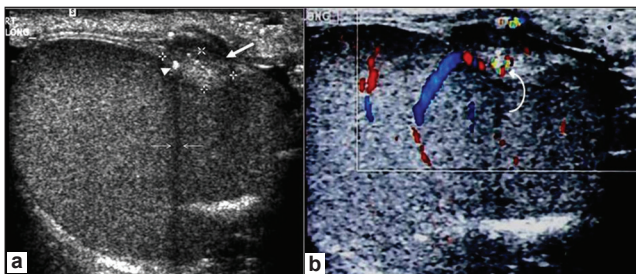


Figure 7: Calcified Tunica albuginea cyst. (a) Longitudinal image show a unilocular, well-circumscribed lesion in the upper region of the testis (large arrow) arising from TA with calcifications inside it (arrowhead) with acoustic shadow (small arrows). Calipers outline the complete TA cyst. (b) Color flow Doppler examination demonstrates twinkling artifact (curved arrow) suggesting presence of calcium.

cysts typically produce an indentation on the testicular parenchyma [Figure 5].

If the large TA cyst corresponds to the palpable lesion, this

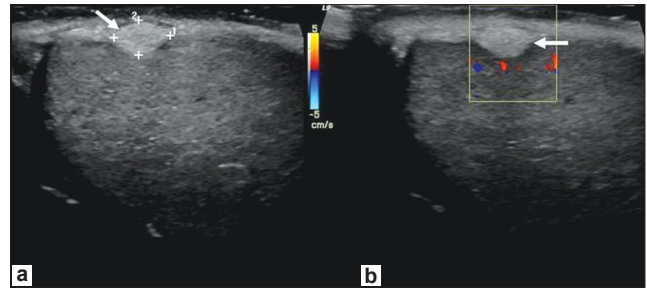


Figure 8: Tunica albuginea cyst with milk of calcium. (a) Longitudinal ultrasound image of the right testicle shows a well-defined homogeneous echogenic smooth-walled lesion measuring 6 × 4 mm in the upper anterior pole of the testicle without any acoustic shadow; this lesion corresponded to the palpable lump (arrow). (b) Color Doppler examination reveals no vascularity within the lesion (arrow). Tumor markers were negative.

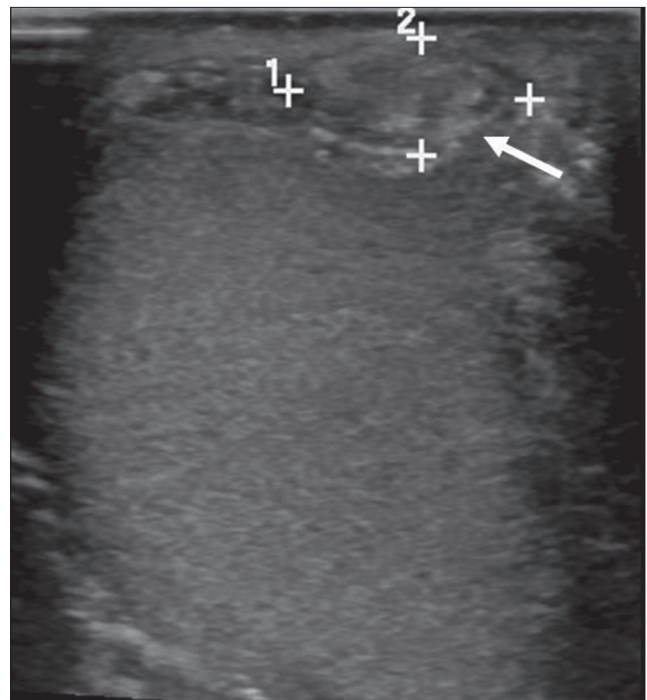


Figure 9: Complex Tunica albuginea cyst. A 36-year-old man with a right testicular palpable mass. Transverse ultrasound image shows a heterogeneous 10 × 5 mm lesion in the upper anterior aspect of the testis arising from the TA (arrow); this lesion corresponded to the palpable abnormality.

feature can help differentiating intratesticular cyst from the TA cyst. The intratesticular cysts are not usually palpable and most of the time they are incidentally discovered on ultrasound examination.^[10]

Calcified TA cyst

Tunica albuginea cysts may calcify and produce a posterior acoustic shadow [Figure 6].^[7] The etiology of calcification is not known and may be related to prior hemorrhage. Color Doppler examination, demonstrating twinkling artifact, may help in the diagnosis of calcified TA cysts [Figure 7].

Milk of calcium

Milk of calcium describes the precipitation of calcium in a cyst or other fluid-containing structure with stasis that may

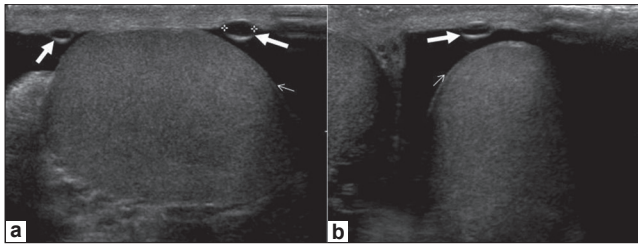


Figure 10: Tunica vaginalis cyst. (a) Longitudinal and (b) transverse ultrasound images of the left testicle show a moderate hydrocele and two simple cysts arising from the Tunica vaginalis (large arrows). Location of these cysts is away from the Tunica albuginea (small arrows).

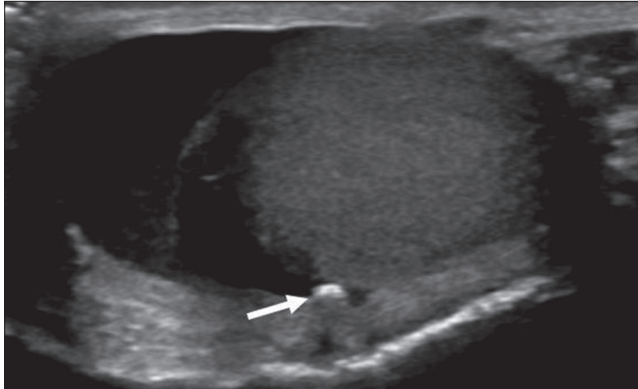


Figure 11: Scrotal pearl. Transverse gray-scale ultrasound image of the left testicle shows moderate hydrocele and an echogenic round calcification lying adjacent to Tunica vaginalis corresponding to a scrotal pearl (arrow).

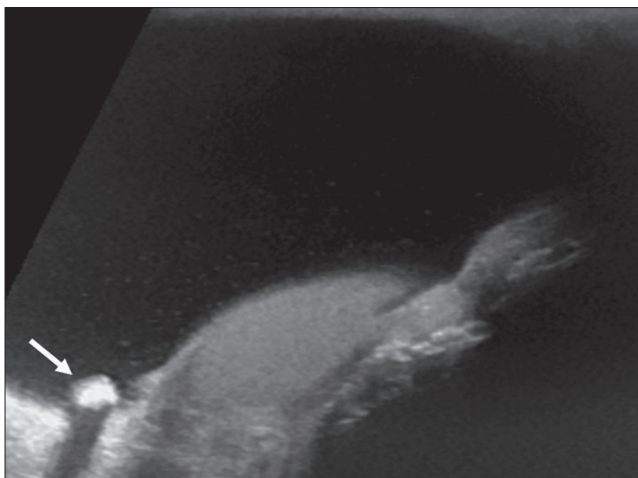


Figure 12: Scrotal pearl. Longitudinal gray-scale ultrasound image of the right testicle demonstrates a large hydrocele, with a scrotal pearl (arrow) with posterior acoustic shadowing.

be associated with low-grade inflammation.^[11] It consists of small crystals of carbonate-apatite, hydroxyapatite, or calcium carbonate.^[12]

The sonographic appearance of a cyst containing milk of calcium is that of highly echogenic material which may demonstrate layering in the dependent portion of the cyst or may completely fill the cyst giving an appearance of an echogenic lesion, which may not have posterior acoustic shadowing [Figure 8].^[9]

Complex cyst

Poster et al^[13] reported a benign complex TA cyst where the echogenic material proved to be inflammatory debris on pathological examination after orchiectomy.

These complex cysts present as a well-defined echogenic mass, with no calcium or cystic portions. There is absence of internal color flow on the Doppler examination [Figure 9].

DIFFERENTIAL DIAGNOSIS OF TUNICA ALBUGINEA CYST

Tunica vaginalis cyst

Most of the scrotal tunica cysts arise from the TA, but they may arise from layers of the tunica vaginalis as well.^[14]

Cystic lesions that arise from the visceral layers of the tunica vaginalis may be small or large. They may be idiopathic or post-traumatic in origin. In general, a cyst of the tunica vaginalis is completely anechoic [Figure 10], except in the occasional post-traumatic setting where they may demonstrate presence of internal echoes or calcium.^[15] The tunica vaginalis cysts may be more easily recognized in the presence of hydrocele.

Scrotal calculi

Also called as scrotal pearls or scrotoliths, are freely mobile calcified bodies that lie between the layers of the tunica vaginalis. Their origin is unclear.^[14] They are usually seen as a sequela to hematoma or inflammatory changes within the scrotum, or loose bodies from a twisted epididymal or testicular appendix.^[16]

Sonographically, scrotal calculi are seen as small (<1 cm) echogenic foci with posterior acoustic shadowing [Figures 11 and 12].^[8] The presence of hydrocele facilitates their recognition.

CONCLUSION

The TA cyst can have variable sonographic appearances, ranging from a simple cyst to that of a complex appearance including calcification or debris. These cysts do not demonstrate blood flow on color Doppler examination and have a typical location in the testis. It is important to recognize the various appearances of TA cysts in order to avoid unnecessary surgery.

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