

# Case report of a testicular epidermoid cyst and review of its typical sonographic features

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## ABSTRACT

A case of testicular epidermoid cyst, demonstrating multiple characteristic sonographic patterns in a single lesion, is presented with a brief review of the distinctive ultrasound features. It is important to remember that the sonographic patterns describing testicular epidermoids represent the varied amounts and arrangements of keratin of a particular lesion. A given lesion may demonstrate subtle variability or more than one characteristic pattern at any given time. With this in mind, preoperative characterization of testicular epidermoids should allow for increasing utilization of testicular sparing surgery in the management of this benign lesion.

## CASE REPORT

### CASE REPORT

A 32 year old gentleman presented to a local internist for establishment of primary care. Past medical, surgical, and social history were unremarkable. There was no provided history of sexually transmitted disease. There were no complaints referable to the testes. The patient's only complaint was unintentional weight gain of 10 pounds over the last 5 years. Dietary and lifestyle modifications were prescribed. Physical examination revealed painless nodular irregularity of the right testicle for which the patient was referred for ultrasound.

Sonography revealed a 1.7x1.7x1.8 cm well circumscribed lesion in the right testicle with a heterogeneous appearance (Figure 1-3). The periphery of the lesion demonstrated a discontinuous hyperechoic rim (Figure 2). There was no central echogenic focus. A few areas of alternating hypoechoic and hyperechoic lines were identified suggesting an onion like appearance (Figure 1). Centrally, hypoechoic clefts were present and there was no internal

blood flow (Figure 3). Differential considerations at that time included focal hematoma, infarction, and epidermoid cyst, with a malignant lesion such as seminoma still possible.

Tumor markers including AFP (alpha-fetoprotein) and -hCG (beta human chorionic gonadotropin) were negative. CT scan of the chest, abdomen and pelvis demonstrated a non specific 5 mm non calcified right lower lobe pulmonary nodule and was otherwise unremarkable (Figure 4).

A right radical orchiectomy was performed. Gross pathologic examination revealed a yellow/gray, ovoid, firm, well-circumscribed mass in the right testicle abutting the tunica albuginea. Microscopic evaluation described a cystic structure lined by keratinizing squamous epithelium with focal calcifications and without germ-layer components compatible with a benign epidermoid cyst (Figure 5-7).

## DISCUSSION

Although 95% of intratesticular tumors are malignant, accurate preoperative characterization of benign lesions is increasing the utilization of testicular sparing surgery [1-4]. Epidermoid cysts are benign lesions accounting for approximately 1-2% of testicular masses [4-6]. A case of testicular epidermoid cyst is presented with a brief review of the various imaging findings of such lesions.

The embryologic origin of epidermoid cysts is not established [5,6]. The most accepted theory is that they represent a monodermal development of a teratoma. They often occur in the second through fourth decades and in whites more often than blacks. At presentation, these lesions average 2 cm in diameter. They are clinically indistinct from other testicular lesions often presenting as painless masses.

While variable appearances have been described, the possibility of an epidermoid cyst should be considered when sonography reveals a well circumscribed inhomogeneous intratesticular lesion without any internal blood flow. Sonographic appearances described in the literature include the following:

- 1) Concentric onion skin appearance.
- 2) Well defined ossified or calcified lesion demonstrating an intensely reflective surface and posterior shadowing.
- 3) Well demarcated poorly reflective cyst with variable rim, peripheral or central calcification.
- 4) Poorly defined heterogeneous lesion [5-9].

The improving resolution of ultrasound allows for increasingly accurate radiologic-pathologic correlation. Therefore, the interpreting radiologist should remember that the variable sonographic patterns listed above depend upon the amount and arrangement of keratin within the cyst. For example, the well known sonographic onion skin pattern corresponds to the pathologic finding of multiple keratin layers [9].

Not surprisingly, given the varied possible histologic composition of any given lesion, new sonographic features have emerged beyond those listed above. Some authors have described a hyperechoic rim, representing a fibrous capsule surrounding keratin as well as a central echogenic focus [1,4,9,10]. Others have described multiple hypoechoic clefts throughout the lesion [8].

This case reinforces the concept of variability, as there is a mixture of sonographic patterns within a single lesion. There was an incomplete echogenic rim at the periphery, an onion like appearance in some regions, and multiple hypoechic clefts centrally (Figures 1-3).

In 1969, Price defined the following pathologic guidelines for identifying an intratesticular lesion as an epidermoid cyst [6]. These guidelines help to differentiate epidermoid cysts from germ cell tumors or rare intratesticular dermoids:

- (a) The lesion must be an intraparenchymal testicular cyst,

- (b) The lumen must be occupied by keratinized debris or proteinaceous material with cleft like spaces,
- (c) The cyst wall should consist of fibrous tissue more often with a complete or incomplete inner lining of squamous epithelium,
- (d) The cyst wall or adjacent testicular parenchyma must contain no teratomatous components or adnexal structures such as sebaceous glands or hair follicles),
- (e) No scar may be seen in the remaining testicular parenchyma since the scar may represent malignant germ cell tumor.

In addition to Price's pathologic criteria above, Dieckmann et al. have suggested that the establishment of the absence of testicular intraepithelial neoplasia in the surrounding tissue is valuable for the confirmation of benignity [11]. As a result, Heidenreich et al recommended testicular sparing surgery including enucleation and two perilesional biopsies [3]. Subsequently, several reports have confirmed the appropriateness of testicular sparing enucleation [1-3,5,11,13].

Therefore, when preoperative ultrasound suggests an epidermoid cyst of typical size less than 3cm in a patient with negative tumor markers, testicular sparing surgery should be considered as an alternative to radical orchiectomy [1-4, 12,13]. Currently, this type of surgery would include enucleation, intraoperative frozen section analysis, and perilesional biopsy.

In addition to the highlighted sonographic features of the lesion, there were clinical points of interest unique to this case. According to the available encounter notes, the small 5mm right lower lobe pulmonary nodule was considered clinically insignificant given the lack of tumor marker elevation, the nodule's small size, and the endemic presence of coccidioidomycosis. Ultimately, the decision to pursue radical orchiectomy was guided by the lingering preoperative diagnostic possibility of neoplasm, the surgeon's experience, and the patient's wishes.

## TEACHING POINT

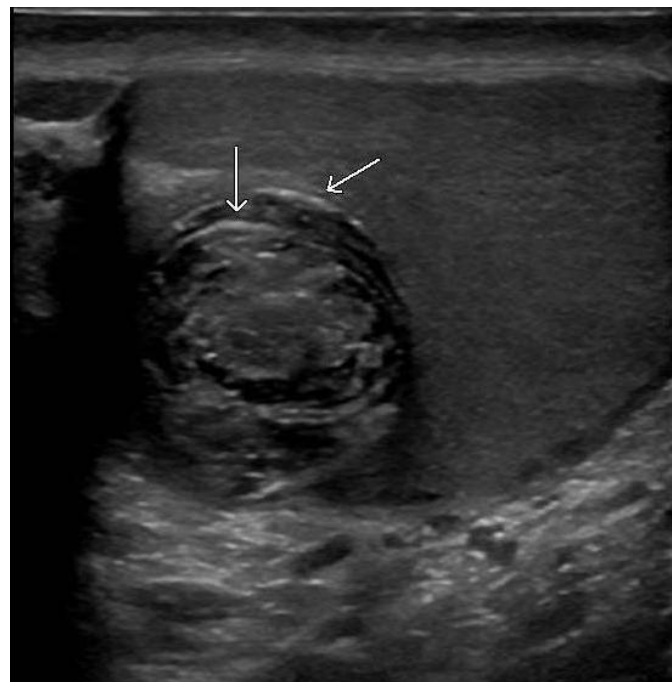
Testicular epidermoid cysts are rare benign lesions described as keratinous cysts at pathology. Ultrasound examination can make the preoperative suggestion of an epidermoid cyst, allowing for increased utilization of testicular sparing surgery.

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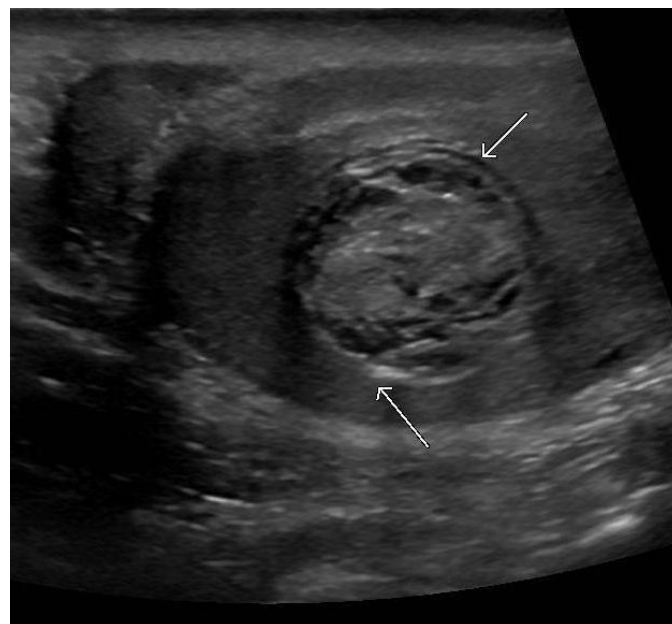
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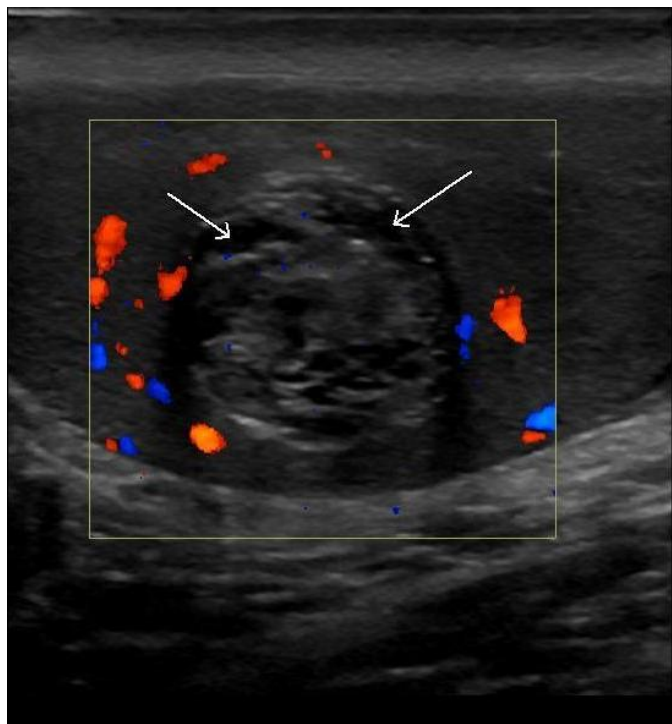
## FIGURES



**Figure 1:** 32 year old male with testicular epidermoid cyst. Transverse gray scale sonogram of the right testis demonstrates a well defined heterogeneous lesion with an area of alternating hyperechoic (arrows) and hypoechoic rings in the periphery. [GE Linear high frequency (14MHz) transducer]



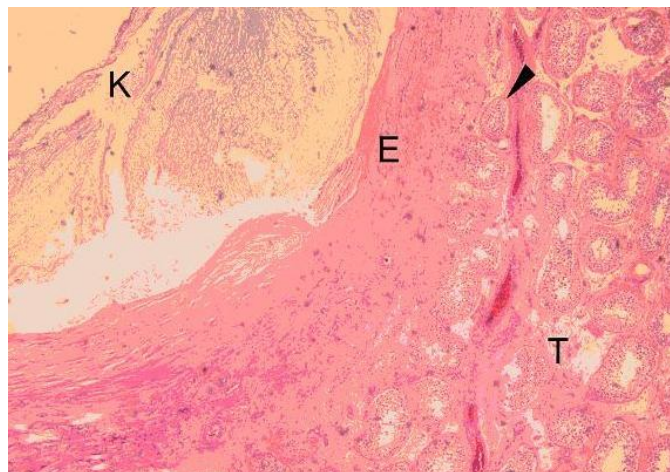
**Figure 2:** 32 year old male with testicular epidermoid cyst. Longitudinal sonogram of the right testis demonstrates a well defined heterogeneous lesion with an echogenic rim (arrows) representing the capsule. [GE Linear high frequency (14MHz) transducer]



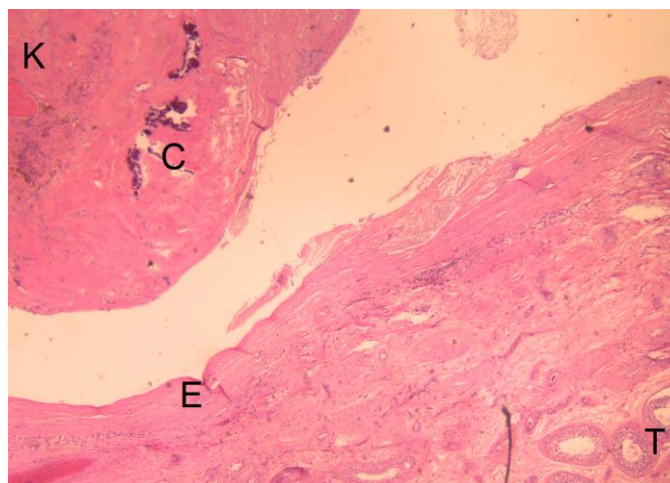
**Figure 3:** 32 year old male with testicular epidermoid cyst. Longitudinal sonogram of the right testis with color Doppler demonstrates a well defined heterogeneous lesion with central hypoechoic clefts (arrows) and no blood flow. [GE, Linear high frequency (14MHz) transducer]



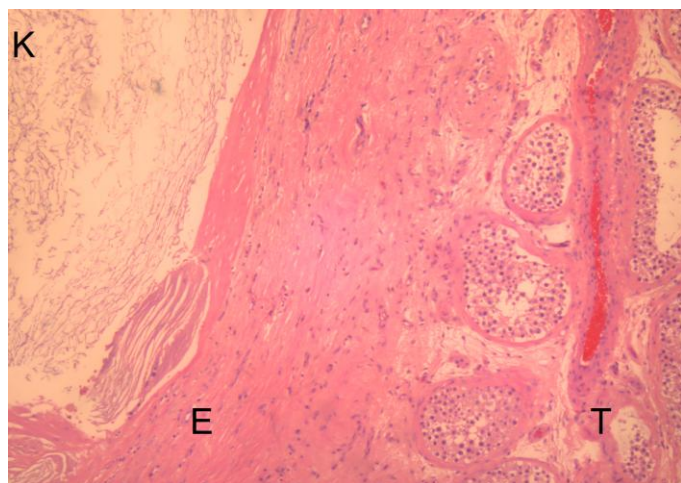
**Figure 4:** 32 year old male with testicular epidermoid cyst. Axial contrast enhanced CT image of the chest demonstrates a non specific non calcified 5 mm nodule (arrow) in the right lower lobe. Elsewhere there are no lesions in the chest. (Toshiba 64 slice scanner, 400 mAs, 120 kV, 3 mm. slice thickness, 100 ml Oxilan intravenous contrast material.)



**Figure 5:** 32 year old male with testicular epidermoid cyst. Low power photomicrograph (Original magnification x 80; hematoxylin-eosin stain) demonstrates an epidermoid cyst in the upper left. There is keratinized debris (K) centrally with keratinized squamous epithelium towards the periphery (E). Normal testicular parenchyma seen at the bottom right with characteristic seminiferous tubules (T). A compressed atrophic tubule is also at the periphery and marked by a black arrowhead.



**Figure 6:** 32 year old male with testicular epidermoid cyst. Low power image (Original magnification x 80; hematoxylin-eosin stain) highlighting keratinous debris (K) and calcifications (C) staining purple within the epidermoid cyst. Keratinized squamous epithelium (E) and normal seminiferous tubules (T) are seen.



**Figure 7 (left):** 32 year old male with testicular epidermoid cyst. Higher power (Original magnification x 130; hematoxylin-eosin stain again showing keratin (K), squamous epithelium (E) and normal seminiferous tubules (T) on the right. It is important to exclude intratubular germ cell neoplasia or other germ cell elements in the surrounding parenchyma to rule out a mixed germ cell tumor.

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|------------------------------------|---|
| <b>Incidence</b>                   | 1-2% of resected testicular masses.   |
| <b>Gender:</b>                     | Male  |
| <b>Age predilection</b>            | Often in 2 <sup>nd</sup> to 4 <sup>th</sup> decade.   |
| <b>Risk factors</b>                | None determined.  |
| <b>Treatment</b>                   | Often treated with orchiectomy. Some treat with enucleation. With use of preoperative ultrasound, enucleation and frozen section with perilesional biopsy, testicular sparing surgery can more frequently be performed.   |
| <b>Prognosis</b>                   | Excellent   |
| <b>Findings on imaging</b>         | <p><u>Ultrasound:</u> Often well defined. Inhomogeneous without blood flow. There may be the following:</p> <ol style="list-style-type: none"> <li>1) Areas of concentric, onion like appearance</li> <li>2) Complete or incomplete echogenic rim</li> <li>3) Echogenic center</li> <li>4) Partial or complete calcification of rim</li> <li>5) Hypoechoic clefts</li> <li>6) Approximately 2cm in average diameter</li> <li>7) Sometimes poorly defined</li> </ol> |
| <b>Helpful laboratory findings</b> | Normal values of tumor markers  |

**Table 1:** Summary table for testicular epidermoid cyst

| Differential diagnosis           | Imaging findings  |  |  |  |
|----------------------------------|---|--|--|--|
|                                  | Ultrasound  | MRI  |  |  |
|                                  |   | T1   | T2   | Pattern of contrast enhancement  |
| Epidermoid cyst                  | Typically well defined, heterogeneous, and without internal blood flow. Classically associated with an "onion-like" appearance. | Homogeneous with low signal or inhomogeneous. High lipid areas are high in signal and appear of low signal on fat suppressed images. | High signal with or without central low signal foci. Low signal rim.           | No enhancement.  |
| Non-seminomatous germ cell tumor | Typically ill defined, inhomogeneous. Increased blood flow.   | Typically inhomogeneous. Does not contain septa.   | Typically inhomogeneous. Does not contain septa.                               | Inhomogeneous enhancement.   |
| Seminoma                         | Typically well defined and hypoechoic. Echogenicity may vary. Increased blood flow.   | Typically homogeneous and low signal. May be inhomogeneous. May contain septa.   | Typically homogeneous and low signal. May be inhomogeneous. May contain septa. | Enhancement of septa, if present, more than of the tumor tissue. No enhancement in areas of hemorrhage or necrosis which infrequently occur. |

**Table 2:** Differential diagnosis table for of testicular epidermoid cyst

#### ABBREVIATIONS

AFP = $\alpha$ -fetoprotein  
 $\beta$ -HCG =beta human chorionic gonadotropin  
 CT=Computed Tomogram  
 MRI=Magnetic Resonance Imaging

#### KEYWORDS

Testicular epidermoid, Testicular cyst, Testicular ultrasound

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