

## Presacral epidermoid cyst: imaging findings with histopathologic correlation

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Received: 16 May 2000/Accepted: 14 June 2000

### Abstract

**Background:** The aim of this study was to determine the imaging characteristics of presacral epidermoid cysts and correlate the imaging findings with the histopathologic findings.

**Methods:** We retrospectively reviewed sonographic, computed tomographic, and magnetic resonance examinations in four consecutive patients with a pathologically proven presacral epidermoid cyst. Imaging findings of the presacral epidermoid cyst were correlated with the histopathologic findings.

**Results:** In all four patients, sonography showed a presacral mass with a heterogeneous low echogenicity, and computed tomography showed a discrete well-defined hypodense presacral mass with a thin wall. In the three patients who underwent magnetic resonance imaging, the mass showed a heterogeneous low signal intensity on the T1-weighted image and a high signal intensity with multiple small foci of low signal intensity in the nondependent portion of the mass on the T2-weighted image. These imaging findings correlated well with the pathologic results. Aggregates of keratinous material contributed to these imaging findings.

**Conclusion:** In the diagnosis of the presacral epidermoid cyst, sonographic and magnetic resonance imaging findings may be helpful.

**Key words:** Epidermoid cyst—Presacral space—US—CT—MRI.

ectodermal tissues misplaced during embryogenesis [1]. Histologically, it often has a thin wall lined by stratified squamous epithelium, surrounding a mixture of desquamated debris, cholesterol, keratin, and water [2]. Although several reports have described the pathologic and clinical features of this tumor [1–6], there is a paucity of information regarding the imaging features. To our knowledge, only two case reports have been described its computed tomographic (CT) and magnetic resonance (MR) findings [7, 8].

The purpose of this study was to describe the imaging characteristics of presacral epidermoid cysts in four patients and to correlate the imaging findings with the histopathologic findings.

### Materials and methods

We retrospectively reviewed the medical records and radiologic features of presacral epidermoid cysts in four consecutive patients who presented between 1994 and 1999. All patients were women, with an age range of 24–37 years (mean = 32 years). The presenting symptoms were low back pain in one patient and an asymptomatic presacral mass in the other three patients incidentally found at physical examination after delivery ( $n = 1$ ) or sonography ( $n = 2$ ).

All four patients underwent sonography and CT. Sonographic procedures were performed with a 2–4-MHz convex transducer on an Acuson 128 scanner (Acuson, Mountain View, CA, USA) in two patients and on an ATL HDI 3000 scanner (Advanced Technology Laboratories, Bothell, WA, USA) in the other two patients. Contrast-enhanced CT examinations were performed on a

Epidermoid cyst of the presacral space is a rare congenital lesion of ectodermal origin. It develops from a remnant of

nonhelical scanner (TCT 300S, Toshiba, Nasu, Japan) in two patients and on helical scanners (Somatom plus S and Somatom plus 4, Siemens, Erlangen, Germany) in the other two patients. In addition, three of the four patients had MR examinations performed. A 0.38-T scanner (Resonex 4000E; Resonex Co, Sunnyvale, CA, USA) was used on one patient and a 1.5-T scanner (Magnetom Vision, Siemens) was used on the other two patients. Pulse sequences included T1-weighted (repetition time/echo time = 500–600 ms/14–20 ms) and T2-weighted (1500–4300 ms/80–132 ms) spin-echo images.

All four patients underwent complete surgical excision of the mass with transperineal ( $n = 2$ ), transabdominal ( $n = 1$ ), and a combined approach ( $n = 1$ ). The pathology reports were reviewed, and the histopathologic findings correlated with the imaging findings.

## Results

On sonography, all four masses showed a presacral mass with a heterogeneous low echogenicity and slight increase through transmission of sound (Fig. 1A). The maximal tumor diameter ranged from 5 to 9 cm, with a mean of 7 cm. In all four patients, CT examination showed a discrete, well-defined, homogeneously hypodense presacral mass with a thin wall that displaced the rectum anteriorly (Figs. 1B, 2A). Calcification was not present. On the unenhanced T1-weighted MR image, the mass showed a heterogeneously low signal intensity in three patients (Fig. 1C). On the T2-weighted image, the mass showed high signal intensity and contained multiple small foci, with a low signal intensity in the nondependent portion of the mass in three patients (Figs. 1D, 2B). These foci with the low signal intensity on the T2-weighted MR image appeared to correspond to aggregates of keratin shown by histopathology (Fig. 1E).

In all four patients, the gross appearance of the mass was that of a unilocular cyst, and microscopic examination showed typical fibrous tissue lined by stratified squamous epithelium (Fig. 1F). The cyst was filled with keratinous material (Fig. 1E). This keratin produced the lamellar appearance seen at histologic examination. Imaging findings of our cases, which show heterogeneous echogenicity on sonography, heterogeneous signal intensity on the T1-weighted MR image, and multiple hypointense foci on the T2-weighted image, correlated well with these histopathologic findings.

## Discussion

Many different types of tumors develop in the presacral space [1–6], but epidermoid cyst is rarely seen. It has

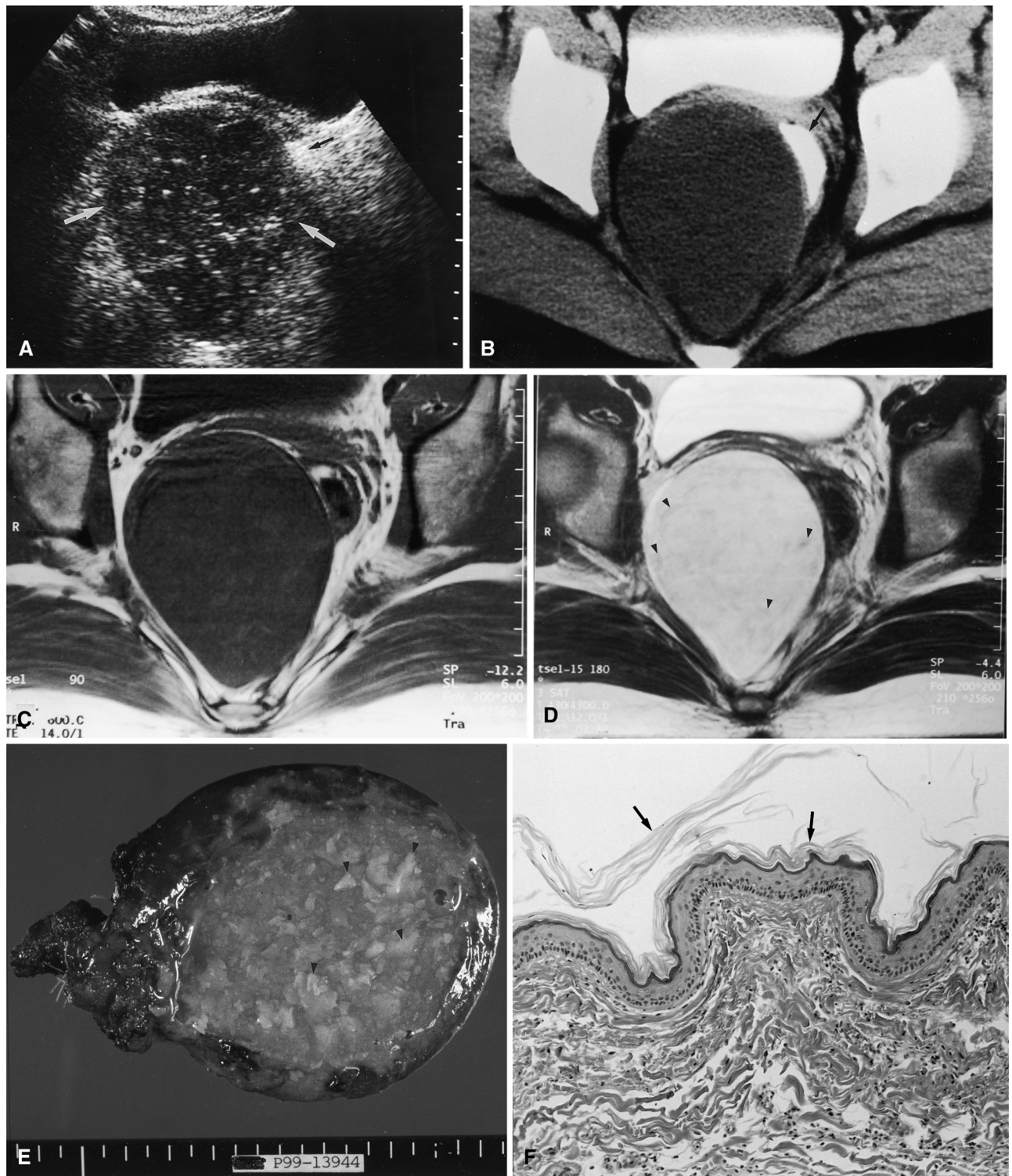
stratified squamous epithelium with keratin but no skin appendages, such as sweat glands, hair follicles, and sebaceous glands, which are seen in the dermoid cyst [7]. Presacral epidermoid cyst occurs most often in women, being rarely encountered in men [1–4]. All of our four patients were women. Although it causes a dull pain in the lower part of the back or perineum, it usually produces no symptoms and the patient may be unaware of its presence until an infection, fistula, or compression of the rectum occurs [3].

There have been few studies reporting the imaging findings of presacral epidermoid cysts [7, 8]. To our knowledge, the sonographic features have not been reported. In all four patients, these masses were heterogeneously hypoechoic, with slight posterior enhancement. Heterogeneous echo texture in the epidermoid cyst can be explained by keratin material.

On CT images, epidermoid cysts generally appear as thin-walled cystic masses with fluid density [7, 8]. In our patients, although these masses had a large amount of keratinous material, CT findings were not heterogeneous but rather homogeneously hypodense and similar to those of previous studies [7, 8]. Although CT can show the size of the lesion and its spatial relation to the adjacent structures, the CT findings of epidermoid cysts in our cases are not specific enough to differentiate them from other presacral masses [9, 10].

The MR findings of the presacral epidermoid cyst have been described as a mass of low signal intensity or high signal intensity in relation to the muscles on the T1-weighted image [7, 8]. However, its finding on the T2-weighted MR image has not been described. The T2-weighted MR findings on an epidermoid cyst in the ischiorectal fossa have been described as a mass with high signal intensity with hypointense keratin in the dependent portion [11]. Kransdorf et al. [12] reported that the epidermoid cyst had a large amount of debris in the dependent portion on the T2-weighted image, and this finding was not seen in other tumors. However, in our all patients, hypointense foci on the T2-weighted image, which are aggregates of keratin, were seen in the nondependent portion of the mass. On the cut specimen of the epidermoid cyst, these keratin aggregates did not sink but floated. This finding may be a possible explanation for multiple hypointense foci observed in the nondependent portion of the mass on the T2-weighted MR image. To our knowledge, this MR finding has not been described in other presacral masses [10, 13–15]. Although it is difficult to explain the cause of the difference between results of the previous report [9] and our results in the location of hypointense foci on the T2-weighted MR image, we suggest that the difference in the amount of keratin may be a contributing factor.

In summary, presacral epidermoid cyst was displayed as a mass with heterogeneous low echogenicity on sonography, homogeneous low attenuation on CT, heteroge-



**Fig. 1.** A 30-year-old woman with a presacral epidemoid cyst. **A** Transverse US scan shows a large retrorectal mass (*white arrows*) with heterogeneously decreased echogenicity and posterior enhancement. The rectum (*black arrow*) is anteriorly displaced by the mass. **B** Contrast-enhanced CT shows a well-defined hypodense mass with a thin wall in the presacral space. The rectum (*arrow*) is compressed and anteriorly displaced. **C** On unenhanced T1-weighted MR image, the mass shows

heterogeneously low signal intensity. **D** On T2-weighted MR image, the mass shows a high signal intensity, with multiple, small hypointense foci in the nondependent portion of the mass (*arrowheads*). **E** Photograph of the cut section of the gross specimen shows a thin-walled cyst filled with a large amount of keratin (*arrowheads*). **F** Photomicrograph of the histologic specimen shows a fibrous tissue lined by stratified squamous epithelium containing keratinous materials (*arrows*).



**Fig. 2.** A 35-year-old woman with a presacral epidermoid cyst. **A** Contrast-enhanced CT shows a well-defined hypodense mass with a thin wall in the presacral space. The rectum is compressed and anteriorly displaced. **B** T2-weighted MR image shows a hyperintense mass containing multiple hypointense foci (*arrowheads*).

neous low signal intensity on the T1-weighted MR image, and high signal intensity with multiple small hypointense foci in the nondependent portion on the T2-weighted MR

image. These findings correlated well with the pathologic findings; multiple keratinous material contributed to these findings. These findings may be seen in other cystic and solid presacral masses, especially if infection or hemorrhage occur.

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