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Intraspinal epidermoid cyst: diffusion-weighted MRI

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Abstract We report a 7-year-old boy who presented with two-month history of worsening low back and right leg pain. Conventional MR images demonstrated a poorly outlined intradural mass recognized by the displacement of the conus medullaris and the nerve roots of the cauda equina at the L2–3 level. The signal intensity of the lesion was similar to CSF. There was no contrast enhancement of the lesion. Diffusion-weighted images and ADC values revealed restricted diffusion within the mass. Myelography confirmed the mass as an intradural filling defect with myelographic block at the L2–3 level. The patient underwent total surgical excision of the mass. Pathologic examination revealed the diagnosis of epidermoid cyst.

Keywords Spinal epidermoid cyst · Magnetic resonance imaging · Diffusion-weighted imaging

Introduction

Spinal epidermoid tumors are rare (about 1.5–2 % of spinal tumors), and are generally lumbosacral [1]. Intraspinal epidermoid cysts may be congenital or acquired, the latter a complication of lumbar puncture, resulting from implantation of epidermal elements into the spinal canal [2,3].

Diffusion-weighted imaging (DWI) has been used to differentiate intracranial arachnoid cysts from epidermoid tumors [4,5]. However, DWI findings in spinal epidermoid tumors have not been established, due the technical difficulties of applying DWI to the spine. We present a spinal epidermoid cyst with DWI findings.

Case report

A 7-year-old boy was admitted with low-back and right leg pain of 2 months duration. He had been sleeping with pillows propping his back into a sitting position. He was the product of a 35-week gestation twin pregnancy and required ventilator support during the first 5 weeks of life. Several lumbar punctures were performed in the neonatal intensive care unit, as part of investigation for meningitis.

At presentation his gait was unsteady and reflexes in the legs were slightly decreased. Laboratory findings were normal. Plain radiographs of his lumbosacral spine were normal, but MRI demonstrated a poorly visible intraspinal lesion with posterior displacement of the cauda equina at L2–3. The lesion gave high signal on T2- and low signal on T1-weighted images (Fig 1), similar to the cerebrospinal fluid (CSF). There was no contrast enhancement (Fig. 1 b).

DWI was performed to distinguish epidermoid tumor from the other diagnostic consideration of an arachnoid cyst. It was carried out at 1.5 tesla, with single-shot spin-echo echo-planar imaging with three orthogonal diffusion gradients with b values of 1000 s/mm^2 and 0 s/mm^2. The imaging parameters were TR 4987 ms TE 103 ms, one excitation; slice thickness 3 mm; field of view 23 × 23 cm; and matrix 256 × 256; acquisition time was 24 s. This was our routine brain DWI sequence, except that the imaging plane was changed from axial to sagittal. DWI demonstrated a discrete high-signal lesion at L2–3 (Fig. 2). The apparent diffusion coefficient (ADC) of the mass was 0.69×10^{-3} mm^2/s, while those of the spinal cord and CSF were 1.70 and 2.6×10^{-3} mm^2/s, respectively. These findings, with a lower ADC, suggested an epidermoid cyst.

At surgery an intradural 'pearly' tumor at L2–3 was completely resected. Histologic examination confirmed the diagnosis of epidermoid cyst.

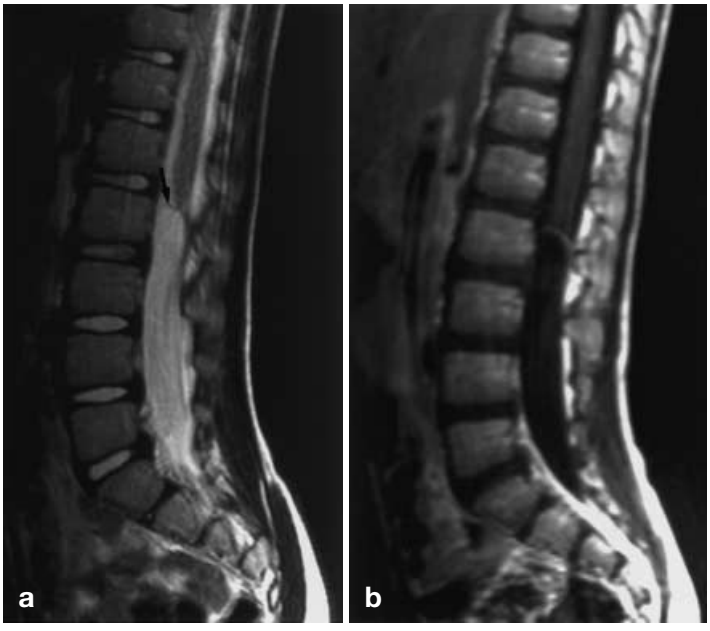

Fig. 1 **a** Sagittal T2-weighted image reveals a high-signal lesion displacing the conus medullaris and cauda equina posteriorly (*arrow*). It is impossible to delineate the inferior border of the lesion due to its isointensity with cerebrospinal fluid (CSF). **b** Sagittal contrast-enhanced T1-weighted image shows no pathological enhancement. The high signal at the superior border of the lesion was also seen on unenhanced T1-weighted images and probably related to fat

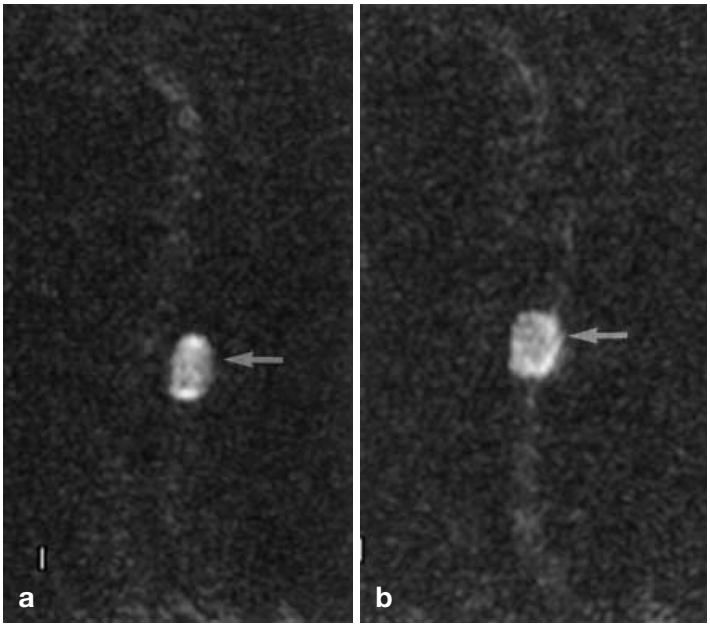

Fig. 2 a, b Sagittal diffusion-weighted images demonstrate a high-signal upper lumbar tumour (*arrows*). Its apparent diffusion coefficient was 0.69×10^{-3} mm^2/s while that of the CSF was 2.6×10^{-3} mm^2/s. Due to signal suppression and probably to susceptibility effects, the bony anatomy of the spinal column is poorly seen

Discussion

Congenital spinal epidermoids are related to inclusion of ectoderm, with or without dermal elements, at the time of closure of the neural tube, between the 3rd and 4th weeks of fetal life. This accounts for the midline location of most cysts, and their possible association with defects of the overlying bone and skin [6]. It is estimated that 40 % of intraspinal epidermoid tumors are iatrogenic [7]. It is thought that they result from the iatrogenic deposition of skin fragments. They are seen after single or multiple lumbar punctures [8], sometimes several years after the procedure(s) [2, 3,9]. The time between the puncture and diagnosis ranges from 1.5 to 23 years [10]. In our case, the lesion is presumably iatrogenic, with an interval to diagnosis of 7 years.

MRI of spinal epidermoid cysts has been reported. The lesions usually give low signal on T1- and high signal on T2-weighted images [11]; they may be homogeneous or heterogeneous. Contrast enhancement has

been occasionally described as a thin rim [12]. Atypical features included high signal on T1- and low signal on T2-weighted images [13]. Our case showed the typical signal intensities. On the unenhanced MR study our differential diagnosis was arachnoid cyst, epidermoid tumor, primary tumors such as schwannoma, metastasis, and infections such as cysticercosis. The absence of contrast enhancement, narrowed the differential diagnosis to arachnoid cyst versus epidermoid tumor.

The value of DWI in differentiating intracranial epidermoid from arachnoid cysts has been described. The ADC of arachnoid cysts is similar to CSF whereas that of epidermoid tumors indicates their more solid nature and restricted water diffusion [4]. Kikuchi et al. [14] described the utility of DWI with navigator-echo technique for the diagnosis of spinal epidermoid cysts. However, the navigator-echo technique is not widely available. We used single-shot spin-echo echo-planar imaging, which is more widely available, to determine whether we could differentiate a presumed spinal epidermoid tumor from other cystic structures. Its ADC was significantly lower than that of CSF, consistent with restricted diffusion, indicating a solid lesion. These findings helped us to make the preoperative diagnosis.

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