Pictorial review

Unusual causes of spinal foraminal widening

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Abstract. Spinal neural foraminal widening is usually caused by benign lesions, most commonly neurofibromas. Rare lesions can also cause spinal neural foraminal widening. Computed tomography and/or MRI are the modalities of choice for studying the spinal foraminal widening. The present pictorial review describes six rare lesions, namely a lateral thoracic meningocele, a malignant fibrous histiocytoma, a tuberculous abscess, an osteoblastoma, a chondrosarcoma and a malignant tumour of the lung which caused spinal neural foraminal widening.

Key words: Spinal neural foramina widening – CT – MRI

Clinical aspects and radiological findings of rare lesions causing spinal neural foraminal widening

Lateral thoracic meningocele

Lateral thoracic meningocele is characterized by cerebrospinal fluid (CSF)-filled protrusions of dura and arachnoid through one or more enlarged neural foraminal space [3]. The lesion is seen clearly on MR images as a rounded or oval mass with homogeneous signal intensity typical of cerebrospinal fluid (low on T1- and high on T2-weighted images) which communicates via a neural foramen with the subarachnoid space (Fig. 1). It can be unilateral or bilateral and is commonly associated with scoliosis. Males and females are affected equally. The majority of lateral thoracic meningoceles occur on the right side in the upper thoracic region, typically at T5–T6. Lateral meningoceles are most common in patients with mesenchymal disorders such as neurofibromatosis, Marfan’s and Ehler-Danlos syndromes. Neurofibromatosis is present in 85% of cases [3]. The meningoceles are usually asymptomatic but may cause pain (23%) and neurological deficits (19%).

Malignant fibrous histiocytoma

Malignant fibrous histiocytomas (MFH) are distinctive neoplasms because they are composed of a mixture of cells resembling fibroblasts, myofibroblasts, histiocytes, primitive mesenchymal cells and cells having intermediate or mixed features (i.e. fibrohistiocytoid cells). Additional features include rich vascularization and varying numbers of giant cells and lipid-laden xanthomatous cells [4]. Malignant fibrous histiocytoma occurs mainly in soft tissues, but also occasionally in bone [5]. It is believed that these tumours arise from primitive mesenchymal cells capable of multidirectional differentiation [4]. Although complete excision in the axial skeleton remains a near impossibility, it is believed that adequate
anterior decompression combined with postoperative radiation therapy is the best treatment option [5]. The patient in our study (Fig. 2) received radiation therapy and chemotherapy and 12 months later remains stable with no clinical or radiological indications of recurrence.

Spinal tuberculosis

The spine is the most commonly involved part of the skeleton by tuberculosis accounting for 25–60% of cases [6]. It is usually the result of haematogenous spread but can also occur as direct extension from the lungs or subarachnoid space in cases of tuberculous meningitis. The intervertebral space remains relatively intact longer in tuberculosis than in pyogenic infections. Plain radiographs are very useful to demonstrate bone and joint involvement which may be similar to pyogenic infections. Computed tomography is a very sensitive procedure for demonstrating spinal and extraspinal tuberculosis. However, the findings are not specific because they are similar to those of other osteomyelitic processes. Although intraspinal involvement may be demonstrated by CT, additional myelography or MRI may be necessary to reveal intraspinal involvement. Epidural extension may cause compression of the spinal cord or of the cauda equina [7]. The posterior arch of the vertebra is reported to be involved in 2–10% of cases of spinal tuberculosis [7]. However, involvement of the posterior arch with sparing of the vertebral body has been seen in less than 2% of spinal tuberculosis cases, with the pedicle being most often affected [8]. The case described in our study (Fig. 3), in which foraminal widening is caused, is the first such case, to our knowledge, reported in the literature.

Osteoblastoma

Osteoblastoma is a benign uncommon (1% of all primary bone tumours) bone-forming tumour characterized by the synthesis of osteoid matrix that may become mineralized [9]. Almost 90% of these lesions are encountered in persons between the first and the third decades of life, and spinal location accounts for 44% of cases. It is a painful lesion and the symptoms are a result of neurological compression. Radiographically it is characterized by a lytic lesion, usually more than 1.5 cm in size, with sclerotic border affecting primarily lamina and pedicles. As complete surgical removal of these tumours is the treatment of choice, the radiological evaluation should demonstrate the bony as well as soft tissue portions of the tumour (Fig. 4).

Chondrosarcoma

Chondrosarcoma is a skeletal malignancy producing hyaline cartilage and 25% of them arise in the spine and ribs [10]. Radiologically osteosarcoma is characterized by the location, the shape (cauliflower-like) and calcification pattern of the intraspinal component of the lesion (seen clearly on CT images), associated with large paraspinous soft tissue mass, which shows enhancement after administration of paramagnetic contrast on MR images. Nevertheless, radiological and histological findings may be indistinguishable or only subtly different from those of benign lesions, leading all too often to underdiagnosis and inadequate treatment. Chondrosarcoma readily implants into the soft tissues, with such recurrences adversely affecting survival. Thus, resection must be radical, including a wide margin of normal tissue. Therefore, MRI is the method of choice because it can provide the appropriate preoperative information for a successful resection. In our case (Fig. 5) the possibility of multiple hereditary exostosis was excluded by radiological investigation. To our knowledge, spinal neural foramen widening caused by chondrosarcoma is rare, with only one case having been reported previously [11].