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Letter to the Editor: New Observation

Lumbar Spinal Chondroma with Intradural Extension

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Chondromas are benign cartilage-forming tumors, most common in the small bones of the hands and feet, but any bone is susceptible.[1] Spinal chondromas are uncommon, representing only 4% of these tumors.[1] Notably, the vast majority of spinal chondromas originate in the bone, while soft tissue spinal chondromas are extremely rare. Although 15 patients with lumbar spine chondromas have previously been identified,[2] there has only been one report of an intradural chondroma in the entire spine, and it was in the cervical spine.[3] We describe the first case of lumbar dumbbell-shaped soft tissue chondroma originating from dura mater.

History

A 44-year-old woman presented with a 3-month history of progressive back pain, worsening numbness and dysesthetic pain to the top and lateral aspect of her right foot, and sensation loss to the perineum. No muscle weakness was identified. On testing, there was a reduction of sensation to pinprick at L5, S1, and S2 on the right side at approximately 70–80% of normal. Plantar response was normal.

Magnetic Resonance Imaging (MRI) identified a well-circumscribed dumbbell-shaped $2.3 \times 5.3 \times 4.7$ cm intracanalicular spinal lesion centered at L5–S1 (Fig. 1). The mass extended to the right-side L5–S1 neural exit foramen without evidence of osseous destruction. The bulk of the intraspinal component of the lesion appeared predominantly extradural and medially displaced/compressed the thecal sac. The mass was T2 hyperintense to the vertebra, although of lower T2 signal than cerebro-spinal fluid (CSF). It enhanced peripherally and heterogeneously following contrast administration. It compressed the nerve roots of the cauda equina and was indistinguishable from the exiting right L5 nerve root. Imaging diagnosis favored schwannoma.

At surgery, the tumor was residing nearly entirely in front of the thecal sac which was pushed to the left and dorsally. The tumor was encapsulated and densely adherent to the thecal sac, particularly between the L5 and S1 nerve roots. The tumor had no extradural attachments, and it was not adherent to the facet joint. A portion of the tumor extended intradurally. Removal of this component required opening of the dura. Rootlets of the cauda equina were preserved. The extradural component of the tumor was quite densely adherent to the L5 nerve root. To achieve tumor resection, the inferior articular process of L5 was removed, followed by the superior articular process of S1, skeletonizing the L5 nerve roots. Following this, the tumor could be carefully separated from the right L5 nerve root sheath, though it was densely adherent. Ultimately, a complete resection was achieved.

Postoperatively, patient experienced minimal pain. The functionality was preserved.

Histopathological Examination

Tissue sections demonstrated a lobulated and hypocellular chondroid neoplasm set within an abundant hyaline matrix (Fig. 2a–c). The neoplasm was composed of eosinophilic polygonal cells often present within lacunae. The nuclei were round-ovoid with scattered atypia and binucleation. Mitotic activity was inconspicuous. There was patchy enchondral ossification. Focal necrosis was identified (<5%). Permeative growth was not present. On immunohistochemical studies, the tumor was positive for D2-40, with patchy immunoreactivity for S100 (Fig. 2d, e). It was negative for SOX10, brachyury, CD34, low molecular weight keratin, and epithelial membrane antigen. The Ki-67 proliferative index was < 5% (Fig. 2f). Phosphohistone H3 staining showed rare mitotic figures, but it was unclear whether these corresponded to the neoplasm or surrounding reactive tissue.

The histological appearance and absence of SOX10 expression ruled out a nerve sheath tumor.[4] Morphologically, the differential diagnosis included chondroma and low-grade chondrosarcoma. There was a mild increase in cellularity and scattered nuclear atypia; however, the clinical-radiological circumscription and absence of permeative growth favored benignancy.[5] A diagnosis of chondroma was rendered.

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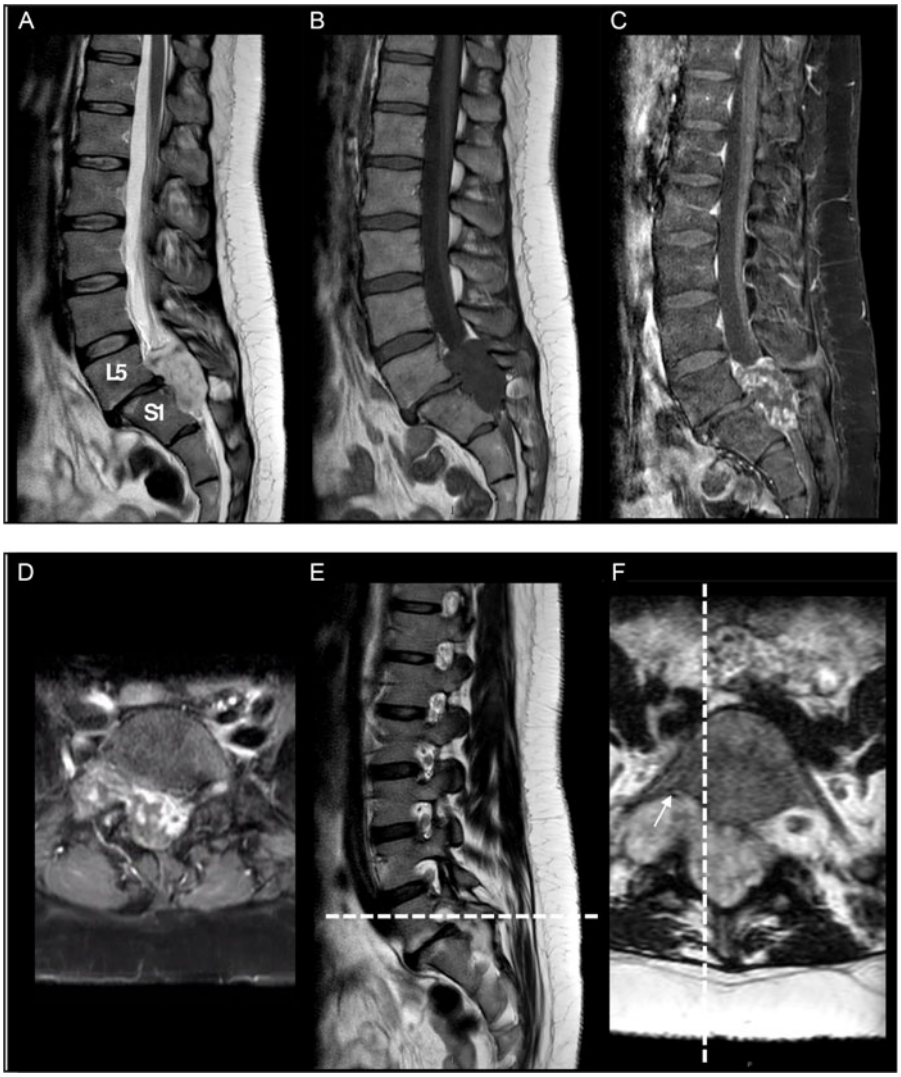

Figure 1: Preoperative parasagittal and axial MR images showing a well-circumscribed intradural extramedullary L5–S1 mass extending to the right-sided L5–S1 neural exit foramen without bone destruction. Hyperintensity on T2-weighted image (A), although of lower T2 signal than CSF. Isointensity on T1-weighted image (B). Peripheral heterogeneous rim enhancement following gadolinium administration, sagittal view (C) and axial view (D). Nerve roots of the cauda equina are compressed by the mass and indistinguishable from the exiting right L5 nerve root (indicated by an arrow), sagittal view (E) and axial view (F).

Chondromas are classified as enchondromas, periosteal chondromas, or soft tissue chondromas based on their origin.[2] Enchondromas develop intraosseously and may compress the dura mater; periosteal chondromas arise from the cortical bone surface, and soft tissue chondromas arise from a site separate from the bone, such as muscle tendons or synovial sheaths.[2] When a chondroma is located extradurally in the spinal canal, distinguishing between periosteal and soft tissue chondroma may be challenging.[2] Typically, the absence of continuity with the adjacent vertebrae signifies soft tissue origin. As reported by Russo et al.,[6] most spinal chondromas originate from the vertebral body, the pedicle, the lamina, or the spinous process. These tumors infiltrate the bone and are easily separated from the dura mater. Chondromas originating from the dura mater are primarily intracranial: only one case of soft tissue chondroma in the spine (cervically located) has been previously described.[3]

The most common clinical manifestation of spinal chondroma, most of which are of vertebral origin, is the low back pain associated with radiculopathy.[2] The presence of a lobulated mass and peripheral rim enhancement of the lesion are common manifestations in cases of spinal chondromas, aiding in the differentiation of this tumor from a migrated disc fragment.[2] Further, spinal chondromas often present with the characteristics of dumbbell spinal tumors (masses with an intraspinal and paraspinal component, connected through a frequently enlarged and eroded intervertebral foramen).[7] The important distinction is that patients with nerve sheath tumors, such as schwannoma or neurofibroma, typically have an enlarged neuroforamen, which is not seen in chondromas; while schwannomas typically take up gadolinium uniformly, in chondromas peripheral enhancement is seen.[2]

Dense adherence to the thecal sac without continuity to any vertebrae suggested that the tumor originated from the dura mater and not from the bone.

A diagnosis of soft tissue chondroma was rendered, marking it the first case of lumbar spine chondroma with dural origin. We suggest soft tissue chondromas to be considered as a differential diagnosis when evaluating intradural spinal tumors.

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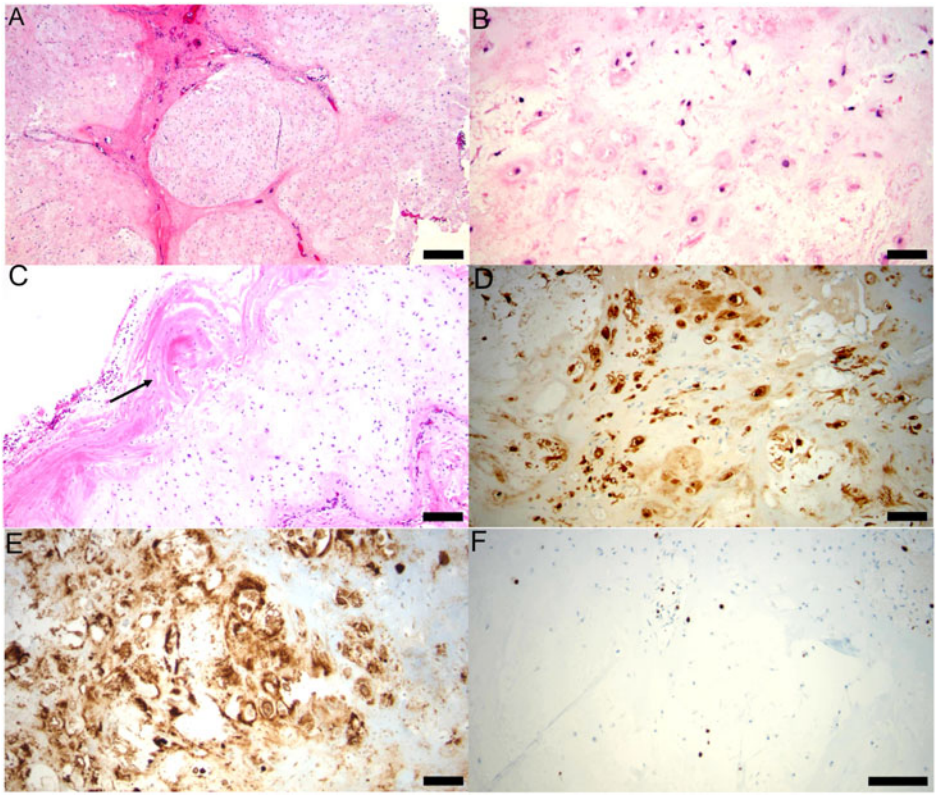

Figure 2: Photomicrographs showing the growth of chondroid cells scattered at low density in a chondroid matrix. H&E, low power (***a***) and high power (***b***). Tumor is encapsulated (indicated by an arrow) (***c***). Immunohistochemistry staining shows patchy immunoreactivity for S100 (***d***), and D2-40 (***e***). The Ki-67 proliferative index is<5% (***f***). Scale bar: (A) 500 μm, (B)–(E) 50 μm, and (F) 75 μm.

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