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A Soft Tissue Chondroma Originating from the Dura Mater of the Lumbar Spinal Canal and it Mimicked a Nerve Sheath Tumor: A Case Report with the MR Imaging[1]

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Soft tissue chondromas are the benign chondro-osseous tumors of soft tissue that usually occur in the extra-osseous and extra-synovial regions of the extremities. We present here a rare location for a soft tissue chondroma that originated from the dura mater in the lumbar spinal canal, and it mimicked a nerve sheath tumor. We present here the MRI findings and pathologic features of this tumor.

Index words : Chondroma
Spine
Magnetic resonance (MR)
Dura mater
Lumbar vertebrae

Chondromas are common benign tumors that typically form in the adult type, mature cartilage (1, 2). Pathologically, chondromas are classified as enchondromas when they are located within the bone (within the medullary cavity), as periosteal chondromas when they are on the surface of the bone and as soft tissue chondromas when they are in the extra-osseous and extra-synovial soft tissue regions (2).

Soft tissue chondromas are also called extraskeletal chondromas (fibrochondroma, myxochondroma and osteochondroma) or chondromas of soft parts, and these are benign chondro-osseous tumors of soft tissue that usually occur in the extra-osseous and extra-synovial regions of the fingers, hands, toes and feet (2). There are rare case reports of chondromas in the skin, upper aerodigestive tract, fallopian tube and dura mater. For the tumors located in the dura mater, all of them have been reported in intracranial locations (3, 4). We present here the MRI findings and pathologic features of the first case of a soft tissue chondroma in the lumbar spinal canal and the tumor originated from the dura mater.

Case Report

A 49-year-old woman presented with a two-week history of progressive lower back pain that had suddenly occurred. The neurological examinations revealed tingling sensations along the left L2 and L3 dermatomes. The motor examinations and deep tendon reflexes were all intact. A straight leg raising test did not evoke any radicular pain.

The MRI revealed a 2.0×0.7 cm elongated mass along the left L2 nerve root at the L2-3 disc level. The mass showed low signal intensity (SI) on the T1-weighted im-

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ages, heterogeneously high SI on the T2-weighted images and peripheral enhancement after gadolinium administration (Figs. 1A–C). The sagittal and coronal MR images clearly revealed the epidural location of the mass with mild smooth indentation of the left anterior side of the dural sac (Figs. 1D, E). The mass was separated from the posterior margin of the L2 body and it had no relationship with the facet joint of the L2-3 vertebrae. The preoperative diagnosis was a nerve sheath tumor along the left side of the L2 nerve root. As the plain films of lumbar spine and MRI showed no definite bony changes, we did not perform spinal CT.

We performed a L2 left hemilaminectomy. On the intraoperative field, an oval shaped mass was attached to the dura mater at the posteroinferior aspect. We completely removed the mass. Macroscopically, the specimen was composed of multiple small fragments of creamy yellow soft tissue without frank necrosis or hemorrhage. The microscopic cut-sections of the fragmented tumor revealed lobules of mature hyaline cartilage that consisted of chondrocytes in the lacunae that had focally grown in clusters, and these clusters were scattered in the myxoid to mildly fibrous stroma (Fig. 2A). The indicated fragments of the tumor were focally ensheathed by a thin, membranous and fibrocollagenous dural tissue, and the tumor revealed strong positivity for Masson's trichrome stain (Fig. 2B). The individual chondrocytes were generally small with bland-looking, normochromatic nuclei and no mitotic activity (Fig. 2C). The tumor cells were also diffusely reactive for vi-

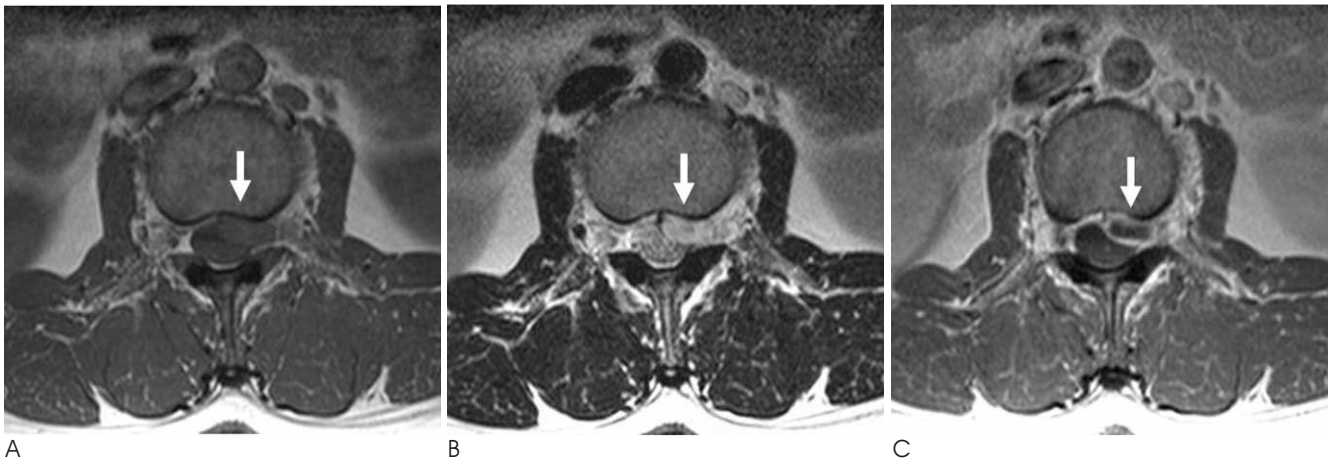

Fig. 1. A 49-year-old woman with a soft tissue chondroma of the lumbar spinal canal.
A. An oval mass at the left side of the ventral epidural area with mild and smooth indentation of the dural sac; it showed low SI on the axial T1-weighted images (white arrow). Note that the mass seems to extend into the neural foramen.
B. It showed heterogeneously high SI on the axial T2-weighted images (black and white arrow).
C. After gadolinium administration, the mass showed a peripheral rim-like enhancement on axial contrast-enhanced T1-weighted images (empty white arrow).
D. The sagittal T2-weighted images revealed the epidural location of the mass with heterogeneously high SI (black and white arrows). Note that the signal intensity of the spinal bodies is preserved.
E. The coronal gadolinium-enhanced T1-weighted images showed peripheral ring enhancement (empty white arrows).

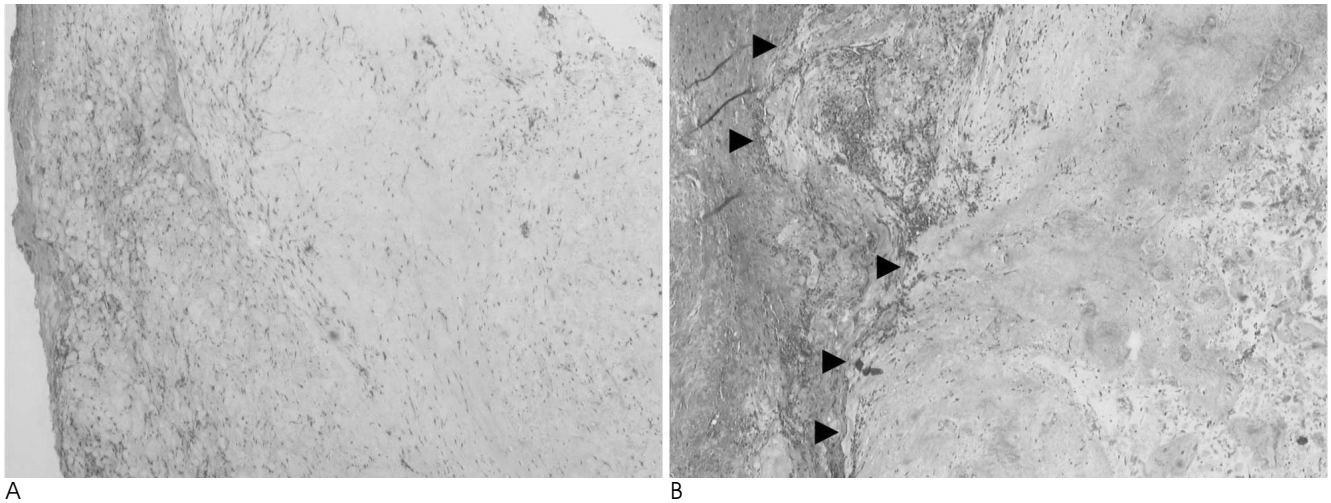

Fig. 2. Photomicrographs of the tumor.
A. The circumscribed lobulated solid tumor is composed of mature hyaline cartilage (H & E, ×40).
B. The selected fragment revealed the tumoral-dural interfaces (arrowheads) (Masson's trichrome, ×40)
C. The tumor cells are bland-looking chondrocytes (black arrows) located in lacunae (H & E stain, ×400). Notice the strong immunoreactivities of the tumor cells with S100 protein in the small box (white arrows), which is similar to normal cartilaginous cells (PAP, ×40).

mentin and S100 protein, which suggested a chondroid differentiation (Fig. 2C).

Discussion

Chondromas of the spine are rare; they comprise only 3% of all the cases of chondroma and only 2% of all spinal tumors (1, 5). Spinal cartilage-forming tumors may affect any part of the vertebral body, the pedicle, the lamina and the transverse and spinous processes (1, 5). However, chondromas more frequently involve the thoracic segments (5). We found 13 cases of chondromas affecting the lumbar column in the English-language literature (1, 5-7). Of them, there was no mention that any of these 13 chondromas originated from the dura mater. We can speculate that the exact distinction of the dura mater of the spinal column is occasionally not easy to make because of the narrow space where it is located and the spinal dura is quite thin.

There are 127 reports of intracranial chondroma in the English-language literature (3, 4, 8). Among them, 19 cases were reported as having originated from the falx and dural convexities (3). In rare cases, the MRI features of soft tissue chondromas of intracranial lesions have been reported to be nonspecific. The generally accepted MRI findings are that of low SI on the T1-weighted images and high SI on the T2-weighted images, and inhomogeneous and slight peripheral enhancement after the administration of gadolinium (3, 4).

CT has occasionally demonstrated the calcific components of the previously reported tumors, and the relationships between the bony spine and the tumor. As compared to the CT imaging, MRI can detect the chondroid components of the tumor and show the exact extent of the tumor. The MRI findings in our case are similar to those of the previously reported intracranial lesions, but they were nonspecific for the signal characteristics. In particular, the mass showed a peripheral enhancement that extended along the neural foramen, and this mimicked a nerve sheath tumor.

Some published papers have confusingly used the terms "chondroma of a dural origin" (3), "intracranial chondroma" (4) and "dural chondroma" (8), and they failed to distinguish whether the tumor was categorized as a soft tissue tumor or a bony tumor. The distinctions were based on the pathological findings. Yet sometimes pathologists cannot confirm the exact origin of a tumor because the given specimens are usually fragmented and so they do not show the complete features of dural-tumoral interfaces. Moreover, the compression of the dura by the massive growth of the tumor may hinder the ability to pinpoint the origin of the tumor.

For the cases of intracranial lesions, the tumor can be ensheathed by layers of the dura mater or it is attached to the subdural surface of the dura or falx (4).

Several histogenetic possibilities for the soft tissue chondromas of intracranial lesion have been discussed in the past (3, 4). One hypothesis is that they may arise as a result of the metaplasia of arachnoid elements.

The differential diagnosis in this case included nerve sheath tumors, meningiomas, sequestrated herniated intervertebral discs and osteochondromas. The generally accepted typical MRI findings of spinal nerve sheath tumors are isointensity relative to the cord on T1-weighted images, hyperintensity on T2-weighted images and homogeneously strong enhancement after contrast administration (9). Meningiomas in the spinal canal are usually located in the thoracic spine, they are rarely calcified and they may show a broad-based dural attachment with moderate and relatively homogeneous enhancement (9). Herniated intervertebral discs frequently show cephalad and caudal extensions equally with low SI (9). Osteochondromas most commonly arise at the atlantoaxial joint of the cervical spine, and they may reveal calcific components on plain radiographs or CTs. MRI may demonstrate the iso-SI of a central core that is similar to that of the bone marrow and a peripheral rim of low SI that's produced by the cortical bone (10).

The best course of treatment is complete surgical removal and the long-term prognosis is good (2, 4, 5).

In summary, we describe here a soft tissue chondroma originating from the dura mater in the lumbar spinal column and it mimicked a nerve sheath tumor. This tumor showed MR signal characteristics that were similar to those of the intracranial lesions, but they were nonspecific for making the differential diagnosis.

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신경초종으로 오인된 요추부 척수강내 경막에서 발생한 연부조직연골종: 증례 보고 및 자기공명영상 소견[1]

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연부조직연골종은 연조직의 양성 연골-골 종양으로 주로 사지의 골 외 및 활액막 외 부위에서 생긴다. 저자들은 신경초종으로 오인된 요추부 척수강내 경막에서 기원한 연부조직연골종 한 예를 보고한다. 저자들은 자기공명영상 소견 및 병리학적 소견들을 도해하였다.