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Symptomatic Osteochondroma of Lumbosacral Spine: Report of 5 Cases

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Abstract

We describe 5 cases of osteochondroma (OC) originating from lumbosacral spine which caused radiculopathy. Four cases originated from the lumbar spine; all from L4 inferior articular process and presented L5 radiculopathy, the other one case originated from the sacrum; the case from S1 superior articular process presented L5 radiculopathy. In all cases, definitive diagnosis was made with histopathological findings; typical cartilaginous capping was confirmed. The functional recovery was completed in all 5 cases. As for imaging study, postmyelography computed tomography revealed the most diagnostic tool for understanding the relationship between nerve tissue and the tumor. In all 5 patients, the tumors contained a high signal intensity on T_2-weighted images in the central medullary area. OCs are sometimes difficult to diagnose because they mimic other conditions like bony spur formation due to osteoarthritis, so we should never fail to confirm the histopathological diagnosis of such lesions when suspected.

Key words: osteochondroma, lumbar, sacrum, radiculopathy, cartilaginous cap

Introduction

Although osteochondroma (OC) is a common benign tumor, OC of the spine is a rare manifestation. Spinal OCs are more often located in the cervical and upper thoracic vertebrae, whereas the inferior thoracic, lumbar and especially sacral levels are rarely involved. We describe 5 cases of OC originating from lumbosacral spine that caused L5 radiculopathy. In all cases, histological study confirmed the diagnosis of OC with cartilaginous capping.

Case Reports

Patient 1: A 57-year-old man presented with right leg pain over L5 dermatome for about 6 years. Computed tomography after myelography (CTM) showed a high density mass with medullary continuity between the tumor and the vertebra arising from right L4 inferior articular process, projecting into spinal canal (Fig. 1a). The lesion contained central cancellous bone displaying high signal intensity in T_2-weighted image (Fig. 1b). Lumbar laminectomy was performed and the bony mass compressing right L5 nerve root was resected. The patient did not complain of symptoms at 6 years follow-up.

Patient 2: A 63-year-old woman presented with a 9-month history of motor weakness at right lower extremity (tibialis anterior and extensor hallucis longus) and numbness over right L5 dermatome. CTM showed a bony mass with cortical and medullary continuity with superior articular process of the right S1 vertebra (Fig. 2a). Magnetic resonance imaging (MRI) showed a high intensity cancellous area in T_2-weighted image (Fig. 2b). The bony mass was resected via a right partial hemilaminectomy at the L5-S1 level. The mass severely compressed dural theca and right L5 nerve root. Her motor weakness gradually improved and she did not complain of symptoms at the 7 years follow-up.

Patient 3: A 48-year-old woman presented with severe low back and left leg pain over L5 dermatome for a few years. MRI showed a high signal intensity medullary area within the tumor arising from right L4 inferior articular process. The bony mass compressing the right L5 nerve root was resected via a right partial hemilaminectomy at the L4-5 level. She is free from leg pain, but still shows slight low back pain at the 3 years follow-up.

Patient 4: A 32-year-old man presented with a 2-year history of pain involving right buttock and lateral surface of thigh. CTM showed a small bony tumor arising from inferior articular process of the right L4 vertebra (Fig. 3a). The cortex of the tumor was in continuity with the inferior articular process of the right L4 vertebra compressing right L5 nerve root. MRI showed a high

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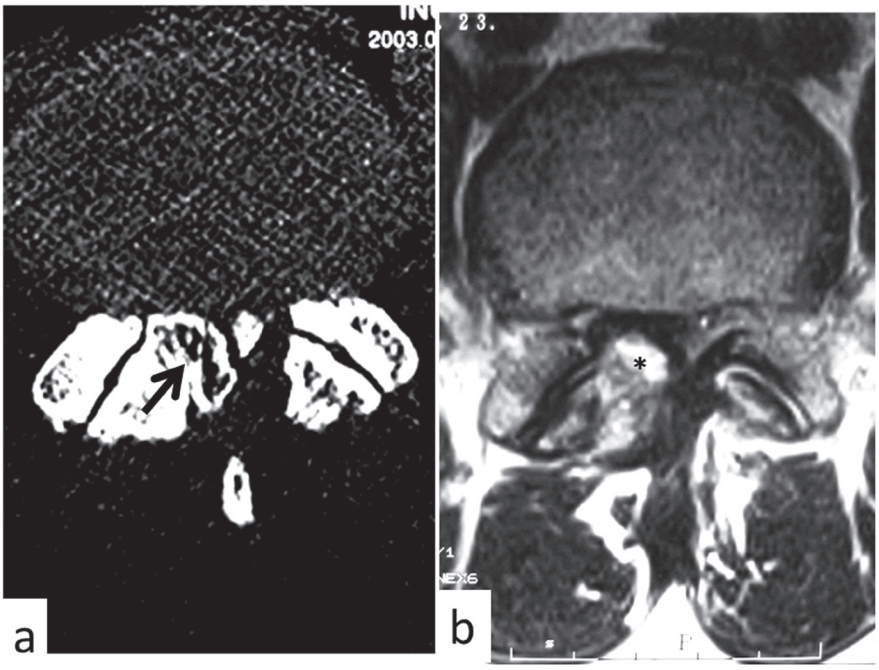

Fig. 1 (Patient 1) Computed tomography after myelography showed a bony tumor (*arrow*) with cortical and medullary continuity with inferior articular process of the right L4 vertebra (a). The lesion contained central cancellous bone (*asterisk*) displaying high signal intensity in T_2-weighted image (b).

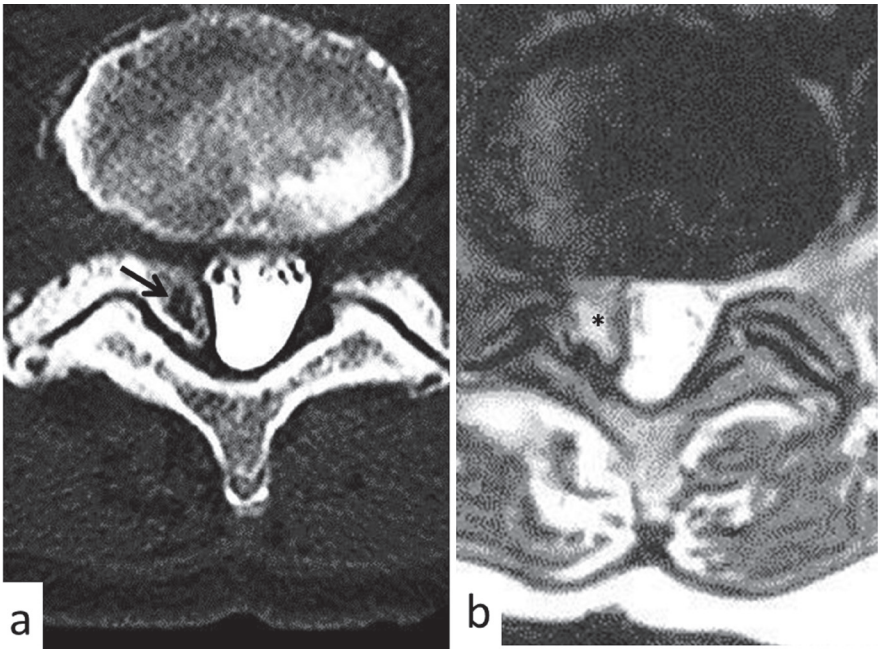

Fig. 2 (Patient 2) Computed tomography after myelography showed a bony mass (*arrow*) with cortical and medullary continuity with superior articular process of the right S1 vertebra (a). Magnetic resonance imaging showed a high intensity cancellous area (*asterisk*) in T_2-weighted image (b).

signal intensity medullary area within the tumor arising from right L4 inferior articular process (Fig. 3b). The tumor with smooth surface was meticulously resected via a right partial hemilaminectomy at the L4-5 level (Fig. 4a). Histological diagnosis was OC (Fig. 4b). The patient became symptom-free immediately after surgery. At the 19 months follow-up, the postoperative course was uneventful (Fig. 4c).

Patient 5: A 62-year-old man presented with a 6-month history of pain involving bilateral buttocks and legs. CTM showed a small bone spicule continuing with inferior articular process of the right L4 vertebra. MRI showed a high intensity mass in the T_2-weighted image. The tumor was resected via a right partial hemilaminectomy at the L4-5 level. He was relieved from pain. At 1 year follow-up, the postoperative course was uneventful.

Discussion

OC is caused by the separation of a fragment of growth

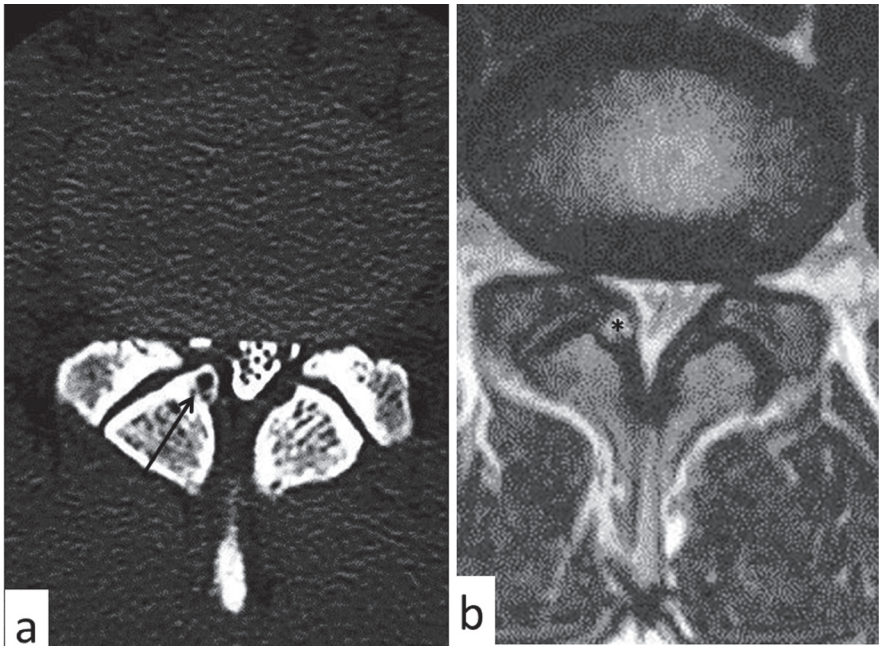

Fig. 3 (Patient 4) Computed tomography after myelography showed a small bony tumor (*arrow*) with cortical and medullary continuity with inferior articular process of the right L4 vertebra (a). Magnetic resonance imaging showed a high intensity cancellous area (*asterisk*) in T_2-weighted image (b).

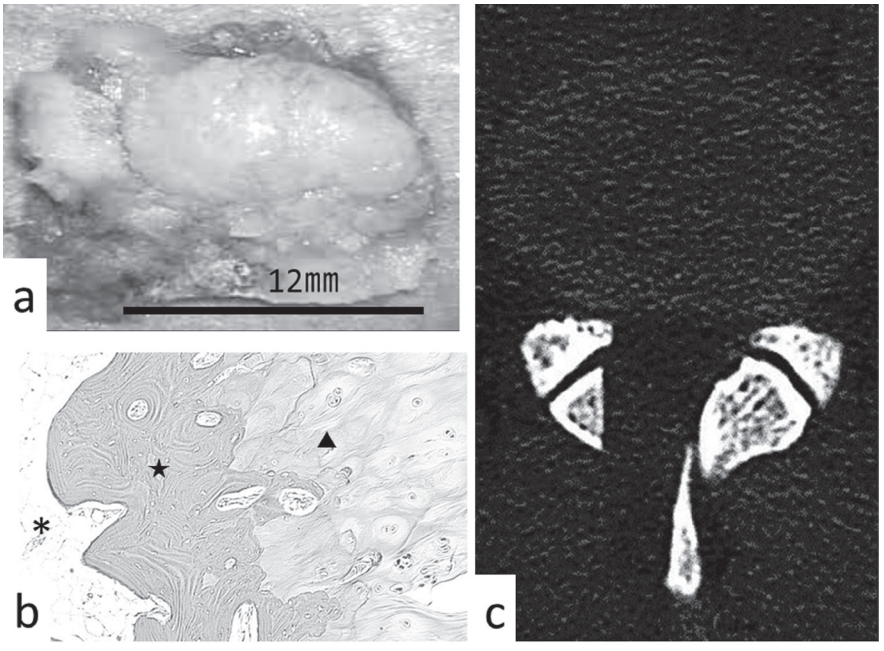

Fig. 4 (Patient 4) A macroscopic photograph of the surface of the tumor. The tumor is covered with a smooth cartilaginous capping (a). A photomicrograph showing cartilaginous capping (▲), the mature trabecular bone (★) and fatty bone marrow (*asterisk*) (H & E, original magnification ×10, b). Postoperative computed tomography (19 months) scan shows the absence of tumor recurrence (c).

plate cartilage, which grows as a result of progressive enchondral ossification, leading to subperiosteal osseous excrescence with a cartilage cap that projects from the bone surface. Enchondral ossification leads to medullary bone with a fatty or hematopoietic marrow.[1] OC is a common tumor affecting bone. OCs are classified as either solitary or multiple. Solitary OCs develop in a single bone and are not hereditary. Multiple OCs can occur either spontaneously or in an autosomal dominant disorder known as hereditary multiple exostoses (HME). The lesions are rarely found in the spine; only 1.3% to 4.1% of solitary OCs and 3% to 9% of HME arise in the spine.[2–5]

Symptomatic OCs compressing the neural structures are rare, because the majority of these lesions grow out of the spinal canal.[6,7] Spinal OCs are more often located in the cervical and upper thoracic vertebrae, whereas the inferior thoracic and lumbar levels are rarely involved, especially sacrum.[8] In the English language literature, there are only 11 reported cases of symptomatic OC in the lumbar spine with sufficient information about the patient's age, sex, symptom, the situation of the tumor, and the outcome.[6,7,9–14] In this report, we presented

additional 4 cases of OCs arising from lumbar vertebra; all tumors originated from right L4 inferior articular process and presented L5 radiculopathy (Table 1). As to the symptomatic OC in the sacral spine, Sung et al. reported their experience of 54 primary tumors originated from the sacrum including 2 cases of OCs in 1987.[15] In the report, there is little information about the patient's age, sex, symptom, the situation of the tumor, and the outcome. To the best of my knowledge, Hanakita and Suzuki reported the first case in 1988 with detailed information.[16] Adding our new case (Patient 2), there are only 4 reported cases of symptomatic OCs originating from the sacrum (Table 2).[16–18] Complete excision of the cartilaginous component is recommended to decrease the likelihood of local recurrence.[18] Malignant transformation to chondrosarcoma is also reported to be 10% to 30% in HME as compared to 1% to 5% in solitary OC, so complete excision of such lesion is very important.[6,19] In the present report, using microscope in all surgery, no recurrence was observed for more than 1 year after total excision of the tumor including the cartilaginous cap. According to 11 reported cases with present 4 cases (Table 1), the origin of symptomatic lumbar spinal OCs was from articular process in 9 cases (60%), lamina in 3 cases (20%), pedicle in 2 cases (13%), and vertebral body in 1 case (7%).[6,7,9–14] Predominance of articular process is explained by the existence of so-called secondary ossification center. Secondary ossification centers lie in the spinous process, transverse process, articular process, and the endplate of vertebral body. The cartilage of these secondary ossification centers could be the origin of aberrant islands of cartilaginous tissue that cause OC to form.[6]

As the neuroradiological examination tools, plain X-rays are insufficient in some cases, because of overlapping of osseous structures of the spine.[16,17,19] The computed tomography (CT) scan is necessary, allowing radiologic diagnosis by showing cortical and medullary continuity between the tumor and the vertebra.[17] At CT, all of our 5 cases contained honeycomb appearance or low density area in the central portion of the tumor. At MR imaging, the lesion manifests with a high intensity in the central area corresponding to the central cancellous bone in T_2-weighted image. Cartilaginous cap also displays high intensity in T_2-weighted image.[20] A chondroid tumor matrix in the

Table 1 Literature review of reported cases of symptomatic lumbar exostoses

Author & year	Age (yrs), sex	Level	Site	Presentation	Lesion type	Outcome
Urso et al. (1977)[12]	9, M	L4	Lamina	Cauda equina synd.	HME	Good
van der Sluis et al. (1992)[13]	26, F	L4	AP	L5, S1 radiculopathy	SOC	?
Fiumara et al. (1999)[6]	35, F	L5	AP	S1 radiculopathy	SOC	Good
Fiechtl et al. (2003)[9]	8, F	L4	Lamina	L4, 5 radiculopathy	HME	Good
Ohtori et al. (2003)[7]	56, M	L3	AP	L4 radiculopathy	SOC	Good
	55, F	L4	AP	L5 radiculopathy	SOC	Good
Gürkanlar et al. (2004)[10]	35, M	??	??	L4, 5 radiculopathy	SOC	Good
Xu et al. (2009)[14]	38, M	L5	Lamina	L5 radiculopathy	SOC	Good
Lotfinia et al. (2010)[11]	29, M	L4	Pedicle	L5 radiculopathy	HME	Good
	58, M	L5	VB	Cauda equina synd.	SOC	Good
	17, M	L3	AP	L4 radiculopathy	HME	Good
Present study	57, M	L4	AP	L5 radiculopathy	SOC	Good
	48, F	L4	AP	L5 radiculopathy	SOC	Good
	32, M	L4	AP	L5 radiculopathy	SOC	Good
	62, M	L4	AP	L5 radiculopathy	SOC	Good

AP: articular process, F: female, HME: hereditary multiple exostoses, M: male, SOC: solitary osteochondroma, VB: vertebral body.

Table 2 Literature review of reported cases of symptomatic sacral exostoses

Author & year	Age (yrs), sex	Level	Site	Presentation	Outcome
Sung et al. (1987)[15]	?	Below S3		?	Good
	?			?	
Hanakita et al. (1988)[16] (our case)	42, F	S1	Lamina	Urinary disturbance, hypesthesia	Good
Agrawal et al. (2005)[17]	14, M	?	Sacral ala	Leg pain	?
Samartzis and Marco (2006)[18]	11, M	S2	Lamina	Leg pain	Good
Present study	63, F	S1	AP	Drop foot, numbness	Good

AP: articular process, F: female, M: male.

cap may show increased signal intensity on T_2-weightd images, but if the cap is thin or highly cellular, distinctive signal characteristics may be absent.[21] Low signal intensity mineralization that serves as a boundary between the medullary space and a thin cartilaginous cap may be present, especially in children.[1] With age, cartilage tends to thin and disappear at numerous points on the surface of an OC.[22] In our 5 patients, cartilaginous cap, confirmed pathologically, could not be detected neither with CT nor MRI. However, all the tumors contained the central cancellous bone displaying high signal intensity on T_2-weighted images (Figs. 1b, 2b, 3b).

Conflicts of Interest Disclosure

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper. All authors have registered online Self-reported COI Disclosure Statement Forms through the website for The Japan Neurosurgical Society (JNS) members.

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