Radiology Case Reports

Volume 6, Issue 4, 2011

Unique case of solitary osteochondroma of left lamina of C2 presenting with neurologic deficits

Yulia Volokhina, DO, and David Dang, MD

Osteochondroma is the most common benign tumor of bone, and the majority arise in the appendicular skeleton. Spinal osteochondromas are uncommon, with 50% occurring in the cervical spine. Only 0.5% to 1% of spinal osteochondromas present with neurological dysfunction. Only 12 of such solitary symptomatic osteochondromas have been previously reported in the literature to arise from C2. We report an unusual case of solitary osteochondroma arising from the left lamina of C2 and presenting with neurological deficits. We also review the imaging characteristics, potential complications, and management of such lesions.

Case report

A 26-year-old male with a two-year history of paresthesias and numbness in his right upper extremity presented with right-sided weakness after chiropractic manipulation on the day of presentation. At the emergency room, he was found to have complete paresis of the right side except the wrist and hemiparesis of the left side, as well as temperature and sensation deficits on both sides.

A stat CT exam of the cervical spine demonstrated an osseous outgrowth from the left C2 lamina projecting into the spinal canal, directed superiorly towards the dens (Fig. 1). The outgrowth had bulbous expansion at its tip where the chondroid matrix was seen. It measured maximally 2.3 cm and caused severe narrowing of the spinal canal. Subsequent MRI of the cervical spine showed a compressive effect on the spinal cord (Fig. 2). Heterogeneous T2 signal consistent with a chondroid matrix was seen within the bulbous portion of the outgrowth. The lesion was continuous with the cortex and medullary cavity of the C2 lamina. A skeletal x-ray survey showed the lesion in the cervical spine but did not demonstrate any additional osteochondromatous lesions (Fig. 3).

The patient was started on Decadron and taken to the operating room, where he underwent C2 laminectomy and removal of the extradural bony-cartilaginous mass, which was found to be severely impinging on the spinal cord. Pathologic analysis confirmed a diagnosis of an osteochondroma. Postoperative imaging showed complete removal of the osteochondroma and residual myelopathic changes of the spinal cord.

Discussion

Osteochondroma, or osteocartilaginous exostosis, is the most common benign tumor of bone, composing 35% of benign bone tumors and 9% of all bone tumors (1). These lesions originate from within the periosteum and grow progressively by enchondral bone formation; an osseous component capped by cartilage is the hallmark of these tumors (2). The majority of osteochondromas arise in the appendicular skeleton, occurring as either solitary or multiple entities (1).

Spinal osteochondroma is uncommon, representing only 1.3% to 4.1% of all osteochondromas (3). Spinal osteochondroma is a rare but potential cause of spinal-cord compression that represents a diagnostic challenge because it is rare, has a gradual onset of symptoms, and is often inconspicuous on radiographs (2). Because the majority of these lesions grow out of the spinal canal, spinal-cord compression by an osteochondroma is an unusual and extremely rare phenomenon, with only 0.5% to 1% of spinal osteochondromas presenting with neurological

Citation: Volokhina Y, Dang D. Unique case of solitary osteochondroma of left lamina of C2 presenting with neurologic deficits. *Radiology Case Reports.* (Online) 2011;6:551.

Dr. Volokhina is at the Loma Linda University Medical Center, Loma Linda CA. Dr. Dang is at the San Antonio Community Hospital in Upland CA, and also at Loma Linda University Medical Center. Contact Dr. Volokhina at yvolokhina@llu.edu.

Competing Interests: The authors have declared that no competing interests exist.

DOI: 10.2484/rcr.v6i4.551

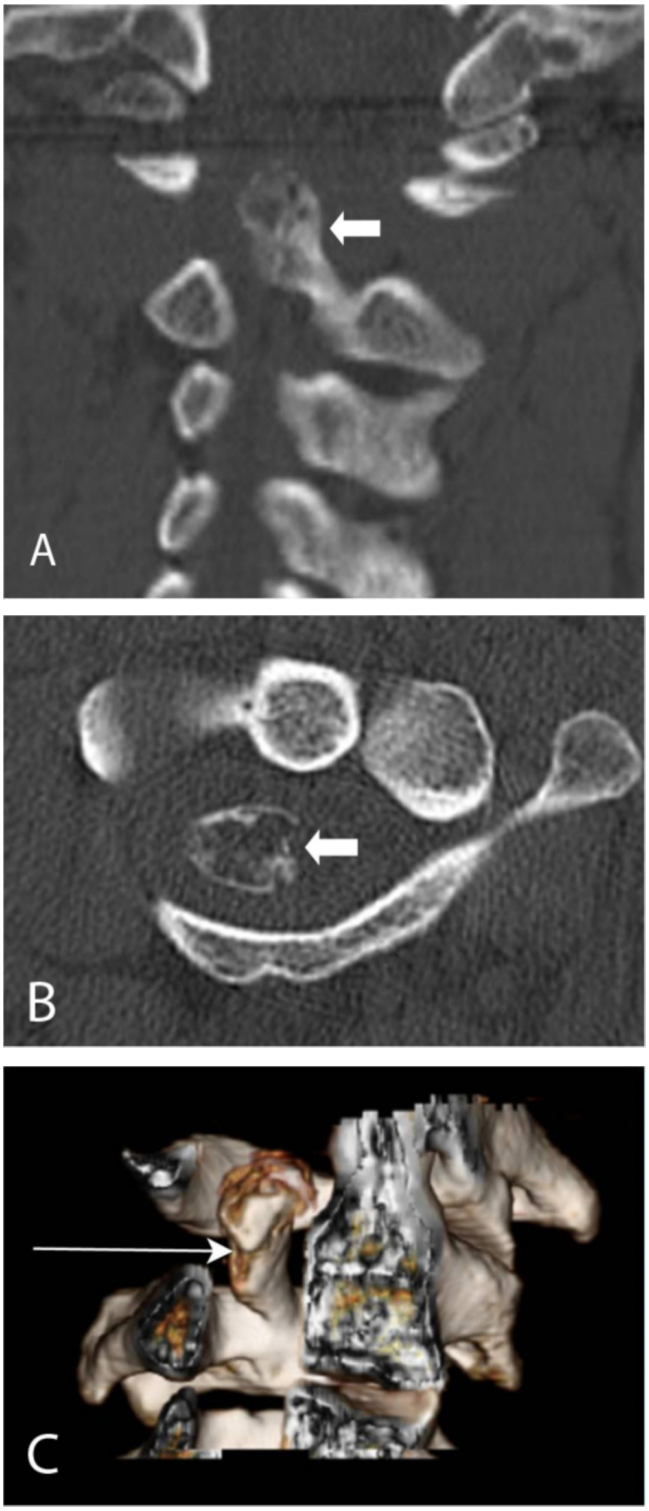

Figure 1. Coronal (A) and axial (B) CT images of the cervical spine demonstrate osteochondroma (arrow) arising from the left C2 lamina and projecting into the spinal canal. 3D reconstructed image (C) demonstrates the osseous outgrowth projecting superiorly towards the dens (arrow).

dysfunction (2).

Approximately 50% of spinal osteochondromas originate in the cervical spine (1). There is a tendency for the tumor to develop in the posterior vertebral elements such as the

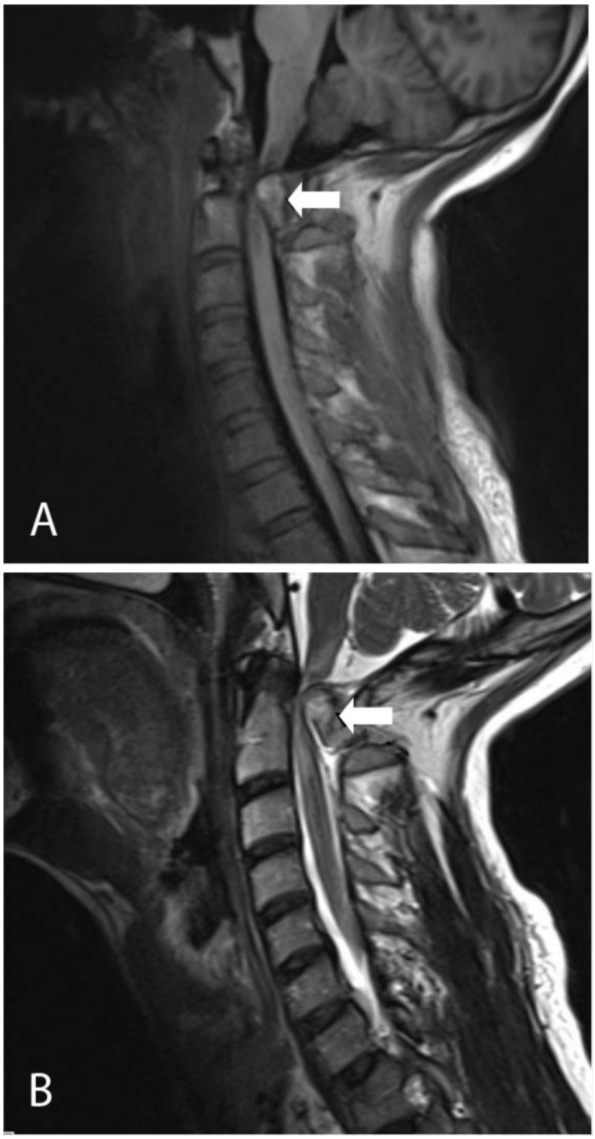

Figure 2. Sagittal STIR (A, TR 2000 and TE 22) and T2 (B, TR 4000 and TE 108) MR images of the cervical spine demonstrate osteochondroma (arrow) arising from the left C2 lamina and compressing the spinal cord.The lesion is continuous with the cortex and medullary cavity of the C2 lamina.

spinous, transverse, and articular processes, thought to be due to the abundance of secondary ossification centers within the neural arch (1). The predilection for the cervical spine is thought to be related to the relatively increased flexibility in the cervical spine when compared to the other divisions of the spine, predisposing cervical vertebrae to

greater stress and thereby increasing the risk of microtrauma to the epiphysis and promoting exostotic growth (1).

Osteochondromas of the cervical spine have been previously reported to arise from various levels, with 24.24% arising at C2, followed by 18.83% at C1 and 15.15% at the C7 vertebral body, according to one literature review (2).

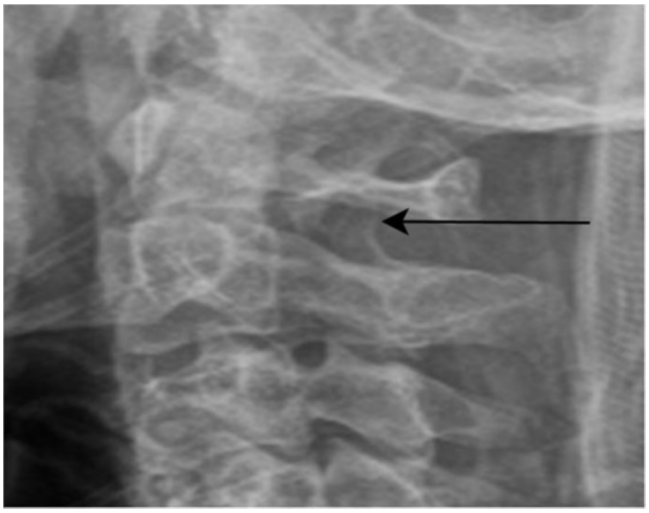

Figure 3. Cross table lateral radiograph of the cervical spine demonstrates osteochondroma (arrow) arising from the left C2 lamina and projecting into the spinal canal.

According to a literature review conducted by Lotfinia et al, only 12 cases of osteochondroma not associated with hereditary multiple exostosis, arising from C2 and presenting with spinal-cord compression, have been reported in the English literature between 1843 and 2009 (2). Several of those were reported arising from the right C2 lamina, odontoid process, or posterior arch. In one case, the osteochondroma appeared to originate from the left arch and spinous process of C2 (4). In our case, the osteochondroma originated from the left C2 lamina. Several additional reports of C2 osteochondroma that did not present with neurological deficits have been previously reported in the literature (5). For example, the accidental finding of osteochondroma of the dens of the C2 vertebra was reported by Chatzidakis et al (6).

The radiographic appearance of osteochondroma is that of a pedunculated or sessile bonelike projection, with cortex and spongiosa contiguous with the underlying bone (3). Spinal osteochondromas are more difficult to detect by radiography, because of the complex image formed by the spine, whereas CT is the imaging modality of choice and demonstrates the cartilaginous and osseous components of the tumor and its relationship to the vertebral and neural elements of the spine (3). The following CT findings have been proposed as typical of spinal osteochondromas (7):

- Roundish, sharply outlined mass
- Bonelike density with scattered calcifications
- Paraspinal, dumbbell, or eccentric intraspinal location
- Osteosclerotic changes in neighboring bone
- Lack of contrast enhancement

MRI is useful in demonstrating the level and the extent of neural compression, as in our reported case, along with the marrow content and the cartilaginous cap (2). The continuity between the exostosis and the underlying bone is a pathognomonic feature of this lesion (1).

Several complications of osteochondroma are worth mentioning. Patients with spinal osteochondromas may present with a palpable mass, local pain, or symptoms due to neurological or vascular compression, such as spinal-cord compression, myelopathy, nerve-root irritation, and compression of the vertebral, carotid, or subclavian arteries (7). Another complication, malignant transformation, usually into a chondrosarcoma, occurs in approximately 1% of solitary osteochondromas and 10% of hereditary multiple exostoses (2). On MRI, malignancy is suspected when the thickness of the cartilaginous cap is > 2 cm in adults and > 3 cm in children (2). Contrast-enhanced MRI may suggest chondrosarcoma when septal enhancement is present—benign osteochondromas enhance only peripherally (2).

The most common operative approach to vertebral osteochondroma presenting with neurological symptoms is a decompressive laminectomy or hemilaminectomy (2). The risk of postoperative recurrence for solitary osteochondromas ranges between 2% to 5% of cases, while incomplete resection with curettage predisposes to reemergence of the exostosis due to continued growth of the cartilaginous cap (1).

References

1. Tubbs RS, Maddox GE, Grabb PA, Oakes WJ, Cohen-Gadol AA. Cervical osteochondroma with postoperative recurrence: case report and review of the literature. *Childs Nerv Syst*, 2010 26:101-104. [PubMed]
2. Lotfinia I, Vahdi P, Tubbs RS, Ghavame M, Meshkini A. Neurological manifestations, imaging characteristics, and surgical outcome of intraspinalosteochondroma. *J Neurosurg Spine*, 2010 12:474-489. [PubMed]
3. Miyakoshi N, Hongo M, Kasukawa Y, Shimada Y. Cervical myelopathy caused by atlas osteochondroma and pseudoarthrosis between the osteochondroma and lamina of the axis. *Neurol Med Chir*, 2010 50:346-349. [PubMed]
4. Prasad A, Renjen PN, Prasad ML, Bhatty GB, Madan VS, Buxi TBS, Agarwal SP. Solitary spinal osteochondroma causing neural syndromes. *Paraplegia*, 1992 30:678-680. [PubMed]
5. Schomacher M, Suess O, Kombos T. Osteochondromas of the cervical spine in atypical location. *Acta Neurochir*, 2009 151:629-633. [PubMed]

6. Chatzidakis E, Lypiridis S, Kazdaglis G, Chatzikonstadinou K, Papatheodorou G. A rare case of solitary osteochondroma of the dens of the C2 vertebra. *ActaNeurochir*, 2007 149:637-638. [PubMed]

7. Kouwenhoven JWM, Wuisman PIJM, Ploegmakers JF. Headache due to an osteochondroma of the axis. *Eur Spine J*, 2004 13:746-749. [PubMed]