Neuroimaging Highlight

Editors: William Hu, Mark Hudon

Ossification of the Posterior Longitudinal Ligament

Submitted by: A.P. Mitha, J.H. Wong, S.J. du Plessis

Can. J. Neurol. Sci. 2003; 30: 61-62

A 51-year-old gentleman of Chinese descent presented for neurological evaluation following a two-year history of cervical neck pain associated with left arm numbness. His symptoms were initially stable, but had progressed over the past six months to include weakness of his entire left arm and leg and symptoms of bladder urgency. Two weeks prior to presentation, he suffered repeated falls due to worsening gait difficulties. The past medical history was significant for type II diabetes mellitus.

The neurological examination identified moderate (grade 4/5) weakness of his left arm and pyramidal-type weakness of his left leg. Hoffman's sign was present bilaterally. The left lower extremity demonstrated an upgoing plantar response and hyperreflexia without clonus. Sensory testing revealed a glove distribution loss of pinprick sensation in his left arm.

Plain x-ray (Figure 1) and computed tomographic (CT) scan (Figure 2) of the cervical spine demonstrated degenerative changes as well as marked enlargement and ossification of the posterior longitudinal ligament. Magnetic resonance imaging (MRI) (Figure 3) revealed significant spinal cord compression from C2-C5 with intramedullary signal changes due to compression from the ligamentous lesion.

Ossification of the posterior longitudinal ligament (OPLL) is a disorder characterized by progressive ectopic bone formation within the paravertebral ligament. The prevalence of OPLL in North America is much less than the 2% rate in Japan where it was first described.[1] It most commonly affects the mid-cervical spine (C3-C5) and causes symptoms and signs of a compressive myelopathy.[2]

Plain x-ray films and CT imaging are useful in demonstrating ossification of the ligament and the relevant bony anatomy.

Figure 1: *Plain lateral cervical spine x-ray showing high density longitudinal lesion in spinal canal (arrow).*

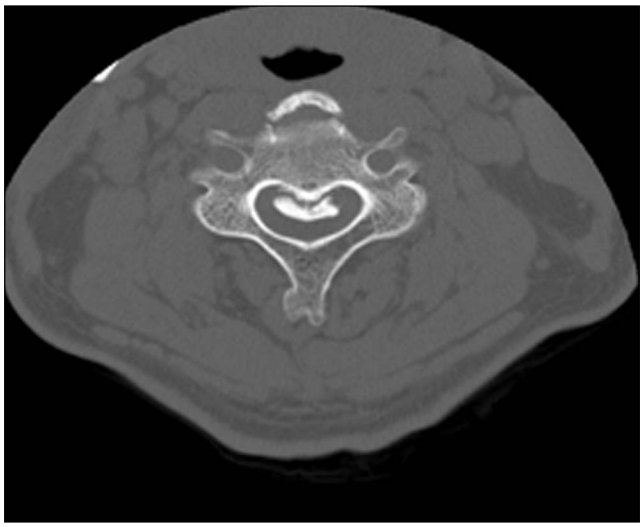

Figure 2: *CT demonstrates characteristic radiolucent line separating the post-vertebral margin from the ossified ligament.*

From the Division of Neurosurgery, University of Calgary, Calgary, AB, Canada.
RECEIVED NOVEMBER 27, 2002. ACCEPTED IN FINAL NOVEMBER 27, 2002.
Reprint requests to: John Wong, Division of Neurosurgery, Room C1242B, Foothills Medical Centre, 403 – 29th St. N.W., Calgary, Alberta T2N-2T9

Figure 3: *MRI (Sagittal T2) demonstrates C2-C5 cord compression and intramedullary signal changes.*

Figure 4: *Postoperative lateral cervical spine x-ray.*

Characteristic features include a sharp radiolucent line separating the post-vertebral margin from the ossified ligament.[2,3] T1-weighted MRI sequences may demonstrate increased signal intensity due to the fatty bone marrow of a thickly ossified lesion,[1] while T2-weighted sequences are most effective for evaluating spinal cord compression, abnormal spinal cord signal intensity, and any associated lesions of the intervertebral disc.

Attempts to clarify the pathogenesis of OPLL have resulted in associations with abnormalities of a collagen gene and linkage with genes known to be involved in bone metabolism.[4,5] Interestingly, glucose intolerance is frequently found in patients with OPLL as in our patient, and one study has demonstrated a markedly positive association between the extent of OPLL and the insulin secretory response.[6]

Treatment of OPLL is largely based on the clinical and radiographic features of individual cases, including the extent of concomitant degenerative spine disease, and a thorough evaluation of the risks and benefits of various operative procedures and approaches. Techniques commonly employed include multilevel anterior cervical corpectomy with fusion and/or posterior cervical lamniectomies/laminoplasty.

Our patient underwent a planned staged decompression of the cervical spine, including anterior and posterior approaches, in order to improve the fusion rate. A posterior approach was performed first, with the goal of achieving partial decompression and minimizing the greater inherent risks of the subsequent anterior approach. The initial procedure involved multilevel C3-6 bilateral laminectomies and insertion of C2 pars screws, C3-6 lateral mass screws, and C7 pedicle screws. One week later, the patient underwent anterior C3-5 corpectomies, C2 and C6 partial corpectomies, and instrumented fusion from C2 to C6 with a Harms bone cage and titanium plate (Figure 4). Some ossification extended into the adjacent dura, which was removed and replaced with a synthetic dural patch.

Postoperatively, the patient was managed in the intensive care unit due to anticipated pharyngeal edema with airway compromise. Upon discharge two weeks later, he had some residual left arm weakness and was mobilizing with a walker. Physical therapy and rehabilitation provided ongoing functional improvement and, by three months postoperatively, he was ambulating independently.

References

1. Otake S, Matsuo M, Nishizawa S, et al. Ossification of the posterior longitudinal ligament: MR evaluation. AJNR Am J Neuroradiol 1992; 13: 1059-1067.
2. Soo MY. Clinics in diagnostic imaging (55). Ossification of the posterior longitudinal ligament. Singapore Med J 2000; 41(11): 557-562.
3. Soo MY, Rajaratnam S. Symptomatic ossification of the posterior longitudinal ligament of the cervical spine: pictoral essay. Australas Radiol 2000; 44(1): 14-18.
4. Sakou T, Matsunaga S, Koga H. Recent progress in the study of pathogenesis of ossification of the posterior longitudinal ligament. J Orthop Sci 2000; 5(3): 310-315.
5. Furushima K, Shimo-Onoda K, Maeda S, et al. Large-scale screening for candidate genes of ossification of the posterior longitudinal ligament of the spine. J Bone Miner Res 2002; 17(1): 128-137.
6. Akune T, Ogata N, Seichi A, et al. Insulin secretory response is positively associated with the extent of ossification of the posterior longitudinal ligament of the spine. J Bone Joint Surg Am 2001; 83-A(10): 1537-1544.

https://doi.org/10.1017/S0317167100002456 Published online by Cambridge University Press