Cervical Myelopathy Secondary to Ossification of the Posterior Longitudinal Ligament in a Caucasian Patient

Falah B. Maroun, Akira P. Makino, Tommy R.S. Tong, Philip G. Perkins, Rudolph Arts, Jacob C. Jacob and R. Reddy

ABSTRACT: Cervical myelopathy consequent on ossification of posterior longitudinal ligament (OPLL) is very rare in Caucasians. A 65-year-old Anglo-Saxon woman developed progressive gait disturbance, paresthesia in both legs and urinary urge incontinence. Radiological examination showed OPLL from fifth to seventh cervical vertebral level; the dense OPLL was graphically displayed by three-dimensional computerized tomography. Medial corpectomy, C5 to C7, and removal of OPLL, with subsequent fusion C4 to T1 using a free fibula graft resulted in clinical improvement. Three dimensional computerized tomographic imaging is a valuable diagnostic procedure in OPLL.

RÉSUMÉ: Myélopathie cervicale secondaire à une ossification du ligament vertébral commun postérieur chez une caucasienne. La myélopathie cervicale dérivant d'une ossification du ligament vertébral commun postéieur (OLVP) est trés rare chez les Caucasiens. La malade d'origine anglosaxonne ágée de 65 ans, dévelope des troubles progressifs de la marche avec paresthésies des deux membres inférieurs et incontinence urinaire. L'examen radiologique montre l'ossification du 5éme ou 7éme niveau cervical vertébral. Cette dense ossification est démontré graphiquement par la tomodensimétrie tri-dimensionnelle. L'amélioration clinique est évidente après une vertébrectomie antérieure de C5 à C7 avec extirpation du ligament ossifié et greffe osseuse. La tomodensimétrie tri-dimensionnelle est une démarche diagnostique inportante dans l'O.L.V.P.

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Ossification of the posterior longitudinal ligament (OPLL) is a common cause of cervical myelopathy in Japan but is very rare in Caucasians.[1-3]

Case Report

The patient is a 65-year-old housewife, of Anglo-Saxon descent who had lived and worked on a farm. In 1981 she developed low back pain and numbness in the gluteal region and thighs. A year later, paresthesia were experienced in the legs, including the dorsum of feet (L > R), together with weakness in the left leg. There was progressive weakness of the left leg over the next eight years. In 1990 pins and needles sensation were noted in the left hand; as well as urgency of micturition.

Family history is non-contributory. Abnormality on clinical examination was confined to the central nervous system; speech, and cranial nerve functions were normal. Neck movements were unimpaired and pain free. On admission, she needed a cane to walk; gait was spastic. Relatively mild paresis of the left upper and lower limb muscles was detected. Hyperreflexia was clearly more marked in the left upper and lower limbs (compared with the right). She could not climb stairs without support. Upgoing left plantar response, left ankle clonus was elicited. Hypalgesia and dysesthesiae were noted below the level of the groin, and in the ulnar distribution of the left hand.

Laboratory investigations were normal, including urinary excretion of calcium and phosphate.

Radiological Findings

Lateral views of the cervical spine showed an irregular longitudinal retrovertebral opacity from C5 to C7 (Figure 1). Metrizamide myelogram showed total obstruction to flow of contrast at upper dorsal spine. CT scan demonstrated an intraspinal high density mass along the posterior aspect of the vertebral bodies from C5 to C7, which was compatible with OPLL (Figure 2). The spinal canal was markedly constricted at the sixth cervical level because of the OPLL. Three dimensional CT imaging (TCT - 900S Toshiba) clearly showed the ligamentous ossification extending from the posterior aspect of C5, down to the lower margin of C7, with the most prominent anteroposterior extension at C6 level (Figure 3).

Operation

Cervical traction using a Gardner-Wells skull tong (Codman, Boston, Mass.) was maintained during surgery. The anterior surface of vertebral bodies C4 to T1 was exposed through an oblique incision made along the anteromedial anterior margin of the left sternocleidomastoid muscle. Discectomy was carried

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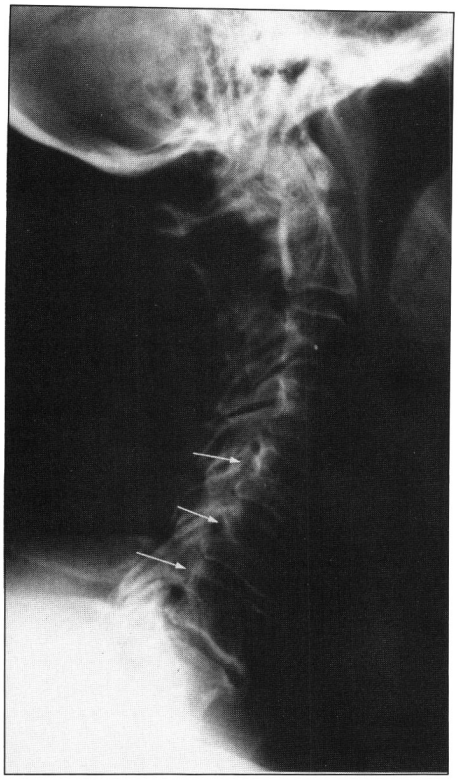

*Figure 1 — **Lateral Cervical X-ray**. Irregular longitudinal retrovertebral opacity.*

out at C4/5, C5/6, C6/7 and C7/T1 levels followed by medial corpectomy of the 5th, 6th, 7th vertebral bodies. After drilling the cancellous bone of the vertebral body, the posterior cortical bone was noted to be partly fused with the ossified posterior longitudinal ligament. The ossified ligament was indenting the spinal cord. Since the ossification was firmly adherent to the dura in the thickest part, the mass of ossification was thinned out and left undetached from it. As soon as the main part of the ossification was removed the dura mater bulged upwards. Removal of the OPLL was done under magnification. A free Fibula graft was harvested from the left lower leg and was fashioned into appropriate contour. The cartilaginous surface of C4 and T1 was removed. A stainless steel screw was used to fix the graft on the vertebral body in each side (Figure 4).

The patient remained in traction for 4 days and was thereafter allowed to ambulate with a Halo Vest (Can-Med Surgical Supplies, Halifax, NS). Postoperatively, her gait improved and spasticity of the left leg decreased. Paresthesia in the left hand and both legs, as well as dysuria, resolved. Follow up 8 months post-operatively revealed slight spasticity and mild residual weakness of the left leg.

Prevalence

Various etiologies have been postulated for OPLL including degenerative disc disease, inflammation, trauma, chronic fluoride poisoning, and disordered calcium metabolism.[3-9] High incidence among Japanese may suggest a hereditary predilection. However, none of the suggested etiologies has been proved to be definitively implicated in the pathogenesis of OPLL and this

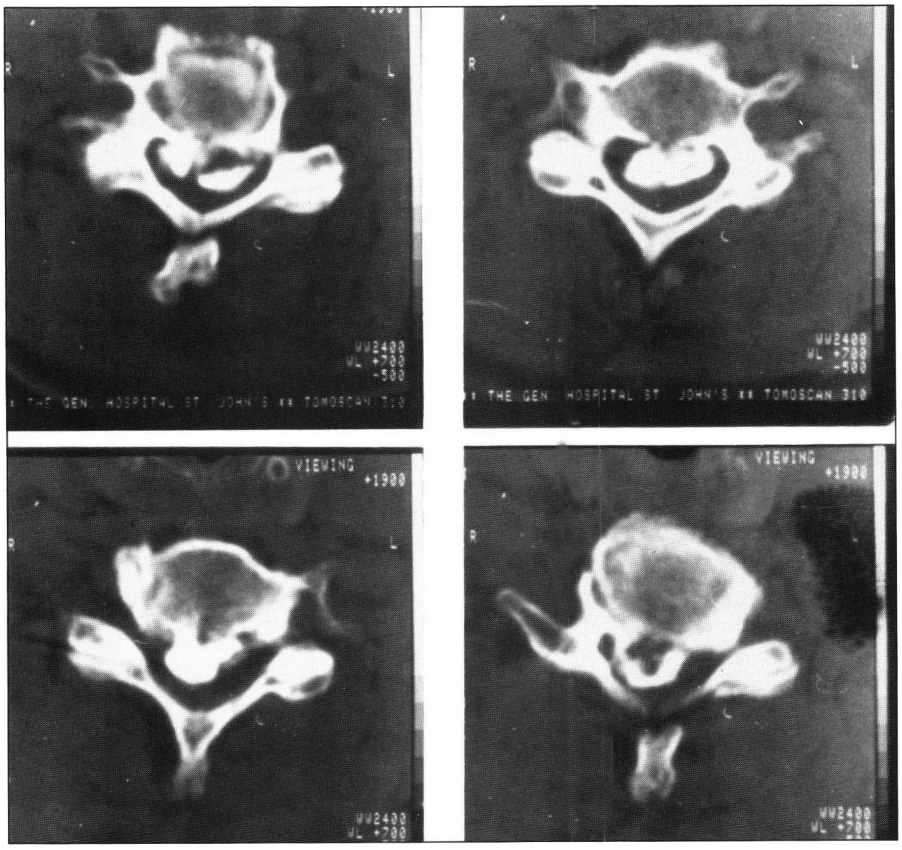

*Figure 2 — **C.T. Scan**. There is a huge high density mass attaching to the posterior aspect of the vertebral body. A bony density image shows the texture of the lesion is similar to the vertebral body.*

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issue still remains to be elucidated. Yamauchi reported the prevalence of OPLL was 1.7% in Japan, Korea and Hong Kong, 0.2% in Mayo Clinic and 0.6% in Hawaii.[10] In a review of plain cervical spine films, prevalence of OPLL among Japanese patients was 2.04% (143 of 6994), 0.95% in Koreans, 0.12% in North Americans and 0.10% in Germans.[11] Lee[12] reviewed 5167 patients with cervical complaints and found 43 OPLL cases (0.8%). Dong[13] reported the incidence of OPLL as 0.5% (20 of 3694). Some clinical reports of cervical OPLL are common in Japan but very few in North America.[2,14-18] This report seems to be the first one in Canada.

Radiological Examination

Longitudinal retrovertebral opacity is the most common finding of OPLL on plain cervical spine x-ray. This can be best diagnosed by CT scan. Saggital reconstruction aids estimation of the superoinferior extent of the mass.[2] Metrizamide myelography and subsequent CT scan delineate the deformed cord well.[2] MRI seems less effective than CT scan although it can also demonstrate cord compression. Three dimensional display of CT images is a relatively new technique to provide better information about the lesion and its structural characteristics. The basic process is essentially the same as two-dimensional reconstructive CT images but is the one-step advanced imaging method displaying sequential two-dimensional reconstruction views in overlaying fashion.

Surgical Approach

During the 1960's and 70's, posterior decompression was the procedure of choice. Nagashima reported 10 cases of OPLL treated by extensive decompressive laminectomy and multiple bilateral facetectomies, with or without foramen magnum decompression.[19] However, complications though uncommon are known to occur following posterior decompressive laminectomy: postoperative losses of neural function due to manipulation of the spinal cord at surgery, production of further kyphotic deformity, secondary dislocation and formation of scar tissue leading to further posterior compression.[20] Postoperative spinal deformity with neurological symptoms can occur several years after operation.[21] OPLL itself cannot be removed through the posterior approach and since nerve roots remain stretched around the bony mass, radiculopathy may persist or worsen.[2,14] Anteriorly locating compressive masses are removed at great risk by the posterior route.[15,22,23]

On the other hand, the anterior approach has the major advantage of possible extirpation of the anterior compressing mass. Although the surgical procedure is lengthy and requires post operative fixation with Halo vest the results are generally favourable. Abe reported 12 cases treated with anterior decompression and fusion.[1] Remarkable or moderate improvement of both radicular and spinal cord signs was obtained in all 12 cases. Harsh followed 19 cases for a mean period time of 15 months after medial corpectomy and fusion, and found functional improvement in all of 17 patients with cervical myelopathy.[2] Kojima applied this procedure to 45 patients with cervical myelopathy due to multi-level spondylosis in 19 patients, OPLL in 12, and combined pathology in 14.[24] He reported 39 of 45 patients (87%) had good results and 5 patients (11%) did not improve.

Decompressive laminoplasty is another procedure for those with extensive involvement of more than 3 or 4 levels, and those with a large plaque at C2 or T1 because the length of bone graft for anterior interbody fusion may be limited and medial corpectomy of C2 or T1 may be difficult.[1,21,25,26] The procedure should be decided upon taking account for all those factors such as age, general condition, severity of symptoms and extension of the lesion.

Regardless of the procedure, it is crucial that surgeons understand the nature and extension of lesions precisely. From the experience of this case, three dimensional display of lesion was extremely informative.

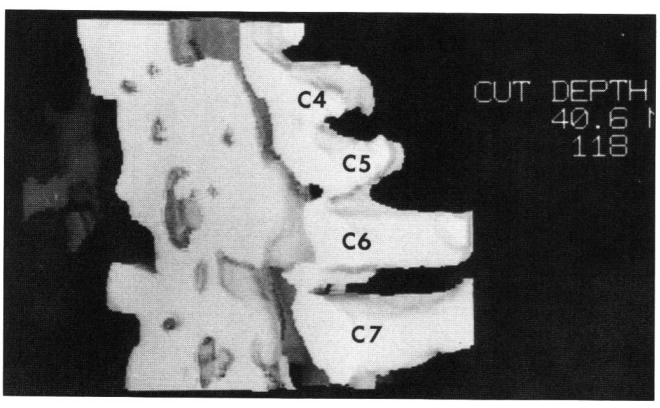

*Figure 3 — **Three dimensional CT**. The intraspinal mass starts at C5 and extends down to T1 with irregular undulation in the posterior surface making the canal very narrow. The most significant encroachment is at the C6 level.*

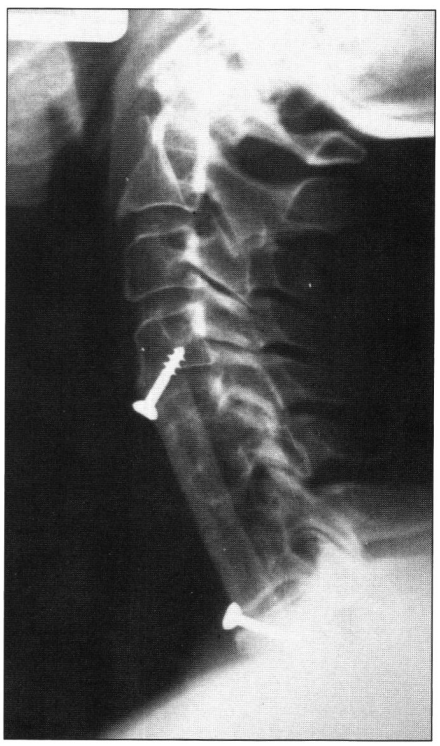

*Figure 4 — **Post-operative C. Spine X-ray.** Free fibula graft with screw in place.*

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