

Cervical Ossified Posterior Longitudinal Ligament

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Introduction

Cervical ossified posterior longitudinal ligament is a common cause of myelopathy. It is frequently encountered in busy spine clinic with varied presentation; however there are lots of controversies in this topic. Etiopathogenesis and natural history is unknown and progression is unpredictable. Timing of surgery and type of approach is also controversial and many factors should be taken into account for surgical planning.

Nature, natural course and progression of ossified posterior longitudinal ligament (OPLL)

There are two types of ossification present. Endochondral ossification is always seen whereas intramembranous ossification is seen in few. Histologically OPLL represents normal bone; hence it's less likely to dissolve on its own (1). The natural course of OPLL is not clearly defined. Various studies were been undertaken to find factors affecting risk of progression. Age and family history were studied but were not found to affect progression (2). Mixed type of OPLL appeared to be progressive in one of the study; however the results of the study were variable (1). However, progression of OPLL (more than 2 mm in thickness and length) was seen in 60 % of patients who underwent laminoplasty (3). OPLL masses that are contiguous with the vertebral body and have trabecular formation are useful findings for identifying masses that are less likely to progress (4)

Factors affecting development of myelopathy Development of myelopathy in patients with OPLL depends on static and dynamic factors. Presence of thickened ossified ligament is denoted by occupancy ratio (thickness of the ossified lesion divided by the anteroposterior diameter of the spinal canal) and space available for cord (SAC). Occupancy ration within the range of 30-60% has been found critical in several studies for development of myelopathy (5). SAC in a range of 6-9 mm is an indicator for myelopathy (6). Therefore occupancy ratio and SAC help in deciding surgical management in patients with mild symptoms. In patients with myelopathy having reasonably less thickened OPLL, dynamic factors play a major role in development of myelopathy (7). In patient with thickened OPLL with mild or no symptoms, the mechanism by which compressed cord mask the symptoms are unknown.

Management

Surgical treatment in ossified posterior longitudinal ligament is controversial and there are two schools of thoughts towards approaching this issue. Surgery is clearly indicated in patients with severe myelopathic signs and /or severe cord compression. In case of mild symptoms, some surgeons advocate prophylactic surgery since better surgical techniques have evolved and OPLL is not known to regress on its own. On the other hand certain surgeons oppose prophylactic surgery in view of inherent risk of neurodeficit

in these surgeries and lack of literature supporting prophylactic surgery. Conservative treatment

Skull traction, immobilization with collar, steroids and prostaglandin E1 has been described as conservative management. However their efficacy is not proven. There is no role of conservative management in patients where surgery is indicated (8).

Surgical management

Prognosis :The prognosis of recovery after surgery depends on age at surgery, duration of symptoms before surgery, severity of myelopathy prior to surgery, history of trauma etc (9).

Early versus late surgery: Prophylactic surgery helps as the surgical results depends on extent of myelopathy. However chance of progression is well documented after posterior surgery and at inoperable levels after anterior surgery. Also posterior surgery does not address OPLL physically. Prophylactic surgery is not advised based on current literature (1). Authors believe that aggressive management in early myelopathy give better chance of recovery and decreases surgery related complications.

Anterior versus posterior surgery: Anterior surgery provides direct decompression while posterior surgery (laminectomy or laminoplasty) gives indirect decompression allowing the spinal cord to fall back. Studies

have shown that occupancy ratio of more than 60 % and hill shaped lesion, anterior surgery should be performed and posterior surgery gives poor result. Also posterior surgery does not always create adequate space in cases with locally protruded OPLL (10). Authors prefer posterior laminectomy in multilevel pathology and anterior surgery in focal compression with significant canal

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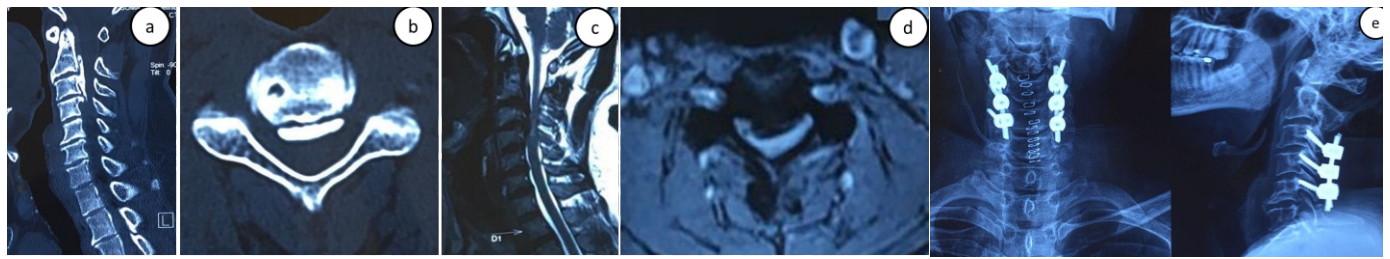


Figure. 1: a- preoperative MRI scan, b,c-preoperative CT scan, d-postoperative CT scan, e-Postoperative MRI scan

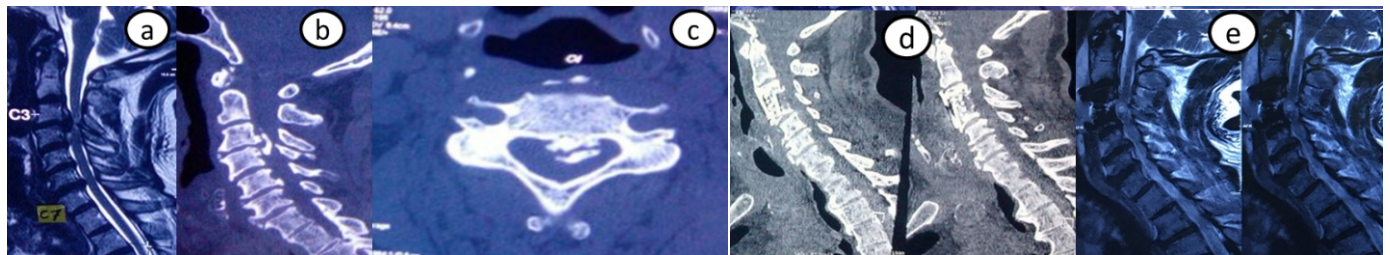


Figure. 2: a,b-preoperative CT scan, c,d-preoperative MRI scan, e-postoperative radiograph

compromise. We believe that posterior surgery is surgically safer and quick with less cord handling and hence less chance of intraoperative complications. Anterior surgery although directly addresses OPLL and theoretically advisable, it is surgically challenging at times and one should be very careful of adhered dura with ossified mass. Figure 1 shows cervical myelopathy with significant focal compression and canal compromise operated with anterior surgery. Figure 2 shows diffuse OPLL operated with posterior decompression and lateral mass fixation.

Cervical spine alignment

Preoperative cervical spine alignment also plays a role in deciding type of approach. Anterior surgery is indicated in presence of focal kyphosis. Suda et al showed poor results with laminoplasty in presence of kyphotic alignment and suggested anterior surgery or posterior correction of kyphosis along with laminoplasty in such situation. Progression of kyphosis is seen at long term follow up with

posterior surgery (11). Sakai et al and Iwasaki et al showed progression of kyphosis after laminoplasty procedure. This change in alignment is proven to be the cause of late neurological deterioration in some cases (12). Authors advise posterior laminectomy in lordotic spine and anterior surgery in kyphotic spine.

Progression of OPLL

Postoperative progression of OPLL is seen in some cases. Many authors have concluded that progression of OPLL after surgery is more after posterior surgery than anterior surgery. This causes late neurological deterioration in few (3). Recently few studies have shown posterior surgery with fixation prevents progression of OPLL (13). We believe that stable spine might prevent progression of OPLL, but majority of patients are elderly and osteoporotic, thus implant related complications are also high. Hence pros and cons of fixation should be weighed well before surgical planning.

Neurological outcome

Long term favorable neurological outcome is seen with anterior surgery than posterior surgery. This is because loss of lordosis and progression of OPLL is seen more often with posterior surgery and causes late neurological deterioration. Also creating a stable environment around the spinal cord by stabilization prevents progression of OPLL and improves alignment (12).

Complications of surgery

Anterior surgery has complications related to graft /implants, CSF leaks and has long learning curve. Commonly ossified dura is encountered increasing chance of CSF leak and neuro-deterioration (14). Hence some authors have described floating method in which some part of ossified lesion is left after decompressing the cord (15). Therefore posterior surgery is supposed to be comparatively safer procedure. Posterior cervical surgery is associated with complications of arm pain and loss of (10).

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