

Non-Traumatic Anterior Atlas Fracture Following C1 Laminectomy – Case Report

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Abstract

Atlas fracture usually result from traumatic injury but only 3 cases of non-traumatic atlas fracture have described in the literature. The authors hereby describe a case of non-traumatic anterior atlas fracture following C1 laminectomy following the decompressive surgical procedure for the ossification of posterior longitudinal ligament. Originally droopy posture and iatrogenic disruption of the posterior arch with invading musculoligamentous structures from axis laminoplasty might increase the stress for anterior atlas. Due to the failure of bony fusion despite the use of an external orthosis, surgical intervention was necessary.

Keywords: Anterior atlas fracture; Non-traumatic; C1 laminectomy

Introduction

Atlas fracture usually result from traumatic injury and non-traumatic atlas fracture is very rare. This article describes a case of non-traumatic anterior atlas fracture following C1 laminectomy in the decompressive treatment of ossification of posterior longitudinal ligament, and discuss this rare phenomenon.

Case Report

A 78-year-old man presented with progressive cervical myelopathy due to ossification of posterior longitudinal ligament (OPLL). He hadn't any history of non-infectious inflammatory disease. He underwent posterior decompression from C1 to Th1 and his symptom improved. Approximately 4 months following surgery, he experienced severe posterior cervical pain without traumatic event. Neurological examination revealed no evidence of deterioration his myelopathy but he had severe neck pain. Plain radiographs demonstrated increased droopy posture (Figure 1). Cervical CT demonstrated linear fracture of anterior arch of atlas (Figure 2). MRI



Figure 1: X-ray image after C1 laminectomy and C2-7 laminoplasty showing droopy posture.

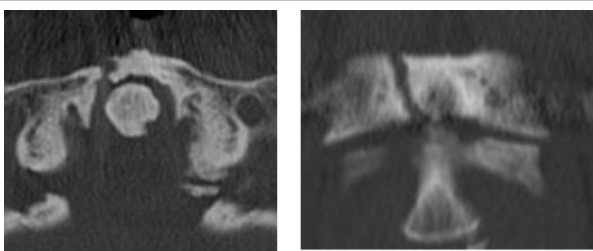


Figure 2: Cervical CT demonstrated linear fracture of anterior arch of atlas.

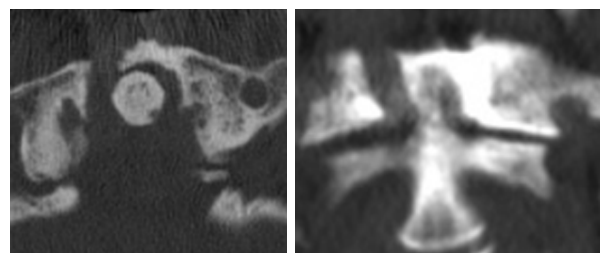


Figure 3: CT performed one month later revealed enlargement of fracture and nonunion.

revealed no evidence of pathological fracture and injury of transverse ligament. Initially, he was treated conservatively by using a hard cervical collar (Philadelphia collar), but cervical CT performed one month later revealed enlargement of fracture and nonunion (Figure 3). So internal surgical fixation was performed. We thought C1 lateral mass screw was unsuitable for the unstable condition, so using Medtronic vertex systems, Oc-C2 fusion with autogenous iliac bone graft was performed (Figure 4). Postoperative course was uneventful, follow-up CT revealed a bony fusion 6 months postoperatively (Figure 5).

Discussion

Atlas fracture caused by trauma which has first reported Jefferson [1], non-traumatic atlas fracture is extremely rare. To our knowledge, this is the third report of this phenomenon in the English literature and first report of the case except Chiari I malformation. The other report of non-traumatic atlas fracture were two cases of anterior atlas fracture following suboccipital decompression for Chiari I malformation described by O'shaughnessy et al. [2] and a case by Hirano et al. [3].

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Figure 4: Using Medtronic vertex systems, Oc-C2 fusion with autogenous iliac bone graft.

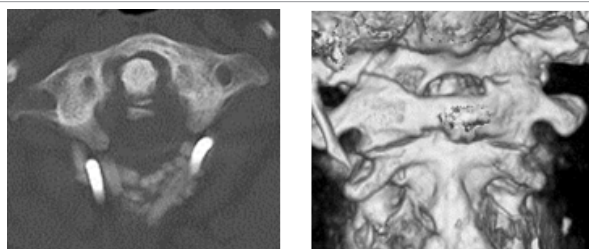


Figure 5: CT revealed a bony fusion 6 months postoperatively.

All cases experienced severe posterior cervical pain without traumatic events approximately 5 or 6 months following posterior decompression included C1 laminectomy.

Most of the atlas fracture are caused by motor vehicle accidents, falls and diving, and mechanism of injuries is the bone disruption to an axial load force transmitted from the occiput to the lateral mass of C1 [4,5]. In most cases fracture occurs anterior arch or posterior arch or both arch which has the weakest ability to withstand an axial load force. They hypothesize that axial loading does indeed play a role in the pathological origins of their two cases of anterior atlas fracture following C1 laminectomy [1,2]. In our case, the patient suffered severe posterior neck pain without traumatic event 5 months after decompression surgery for OPLL. We thought that his originally droopy posture and iatrogenic disruption of the posterior arch with invading musculoligamentous structures following axis laminoplasty might increase the stress for anterior atlas. C1 laminectomy is common technique but recently C1 laminoplasty instead of C1 laminectomy is reported by some authors. The authors believe that C1 laminoplasty maintains the ring structure of C1 and increases the ability to withstand an axial load force. We need to recognize the possibility of anterior atlas fracture when the patients experienced severe neck pain following C1 laminectomy.

Usually diagnosis is done using X-rays and/or CT, especially coronal image of multidetector CT is the most useful tool for

measurement of lateral mass distance (LMD) which is important for determining the treatment options. LMD over 6.9mm in suspected injury of transverse ligament is considered unstable fracture [6]. Also, MRI is useful tool for detection of infection and tumor or pathological fracture and injury of transverse ligament [7].

Isolated atlas fracture is treated depending whether it is stable or unstable. Anterior arch fracture, posterior arch fracture and burst fracture with LMD not more than 6.9mm are considered stable fractures, conservative treatment such as cervical collar is recommended [8-10]. On the other hand, in unstable burst fracture strong external fixation such as halo vest or internal fixation is recommended. In the index case, initial conservative treatment using external orthotic immobilization in a hard cervical collar because of no evidence of transverse ligament injury and minimal displacement of lateral mass was indicated. However, CT performed one month after demonstrated enlargement of fracture and nonunion, therefore the surgical intervention was employed. Two cases from O'Shaughnessy et al. series underwent surgical treatment because of failure to conservative treatment [2]. Hirano et al. series also were treated surgically because there was existence of C1-2 instability [3]. We thought that initially strong external fixation such as halo vest or internal fixation was needed for the treatment of anterior arch fracture following C1 laminectomy which was considered unstable type fracture.

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