



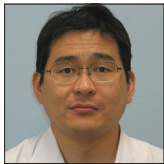
Case Report

A surgical case of C1 arch stenosis: A case report and review of literature

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ABSTRACT

Background: Isolated symptomatic cervical stenosis of the atlas is quite rare; there have been 11 cases reported in literature.

Case Description: A 76-year-old male presented with myelopathy attributed to C1 arch stenosis. Neuroimaging studies revealed posterior atlas compression of the spinal cord. Following a cervical laminectomy involving excision of the arch of the atlas, and the patient's symptoms resolved.

Conclusion: C1 stenosis resulting in cervical myelopathy due to posterior compression from the arch of the atlas is easily missed. Notably, C1 arch laminectomy may be very effective in resolving this entity.

Keywords: Atlas, Cervical myelopathy, Hypoplasia, Stenosis

INTRODUCTION

Only 11 prior cases of symptomatic cervical stenosis due to C1 posterior arch compression have been reported in the literature.^[1,3-5,7-9,11] Here, we describe a case of cervical myelopathy attributable to C1 arch stenosis that was readily resolved with operative decompression.

CASE PRESENTATION

A 74-year-old male presented with a 6-month history of gait disturbance, and clumsy hands that had exacerbated over the past 2 months; there was no history of trauma. He exhibited a spastic gait, bilateral hyperactive deep tendon reflexes in the upper/lower extremities, and bilateral positive Hoffmann's signs. Plain radiographs showed marked narrowing of the cervical spinal canal, while the axial and sagittal computed tomography (CT) scans revealed a hypoplastic but intact posterior arch of the atlas [Figure 1a-c]. At the atlas level, the retrodental space was only 9.0 mm. Notably, there was no atlantoaxial instability on flexion and extension X-rays [Figure 1c and d]. The sagittal diameter of the spinal canal ranged from 11.5 to 13.8 mm at the other cervical spine levels. The magnetic resonance imaging revealed focal dural compression due to the hypoplastic posterior C1 arch along with a high T2-weighted intrinsic cord signal [Figure 2a and b]. The patient underwent a C1 laminectomy and resulting in an uneventful postoperative course [Figure 3a-c].

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Table 1: Summary of literature review on congenital C1 stenosis.

Author	Age/Sex Concomitant diseases	AP diameter (C1/C4)	Symptom	Treatment
Sawada <i>et al.</i> (1989) ^[9]	38/M	7/12.5 mm	Myelopathy	C1 laminectomy
Komatus <i>et al.</i> (1993) ^[3]	56/M	7/11.7 mm	Myelopathy	Laminectomy (C1) laminoplasty C2
Tokiyoshi <i>et al.</i> (1994) ^[11]	55/M	8/13.0mm	Myelopathy	Laminectomy C1 FMD
Noguchi <i>et al.</i> (1998) ^[5]	81/M	10/12 mm	Stiff shoulder myelopathy	Laminoplasty C1
Phan <i>et al.</i> (1998) ^[8]	80/M	8/-mm	Myelopathy	Laminectomy C1), FMD
	75/M	10/-mm	Myelopathy	Laminectomy C1
Hoshimaru <i>et al.</i> (1999) ^[1]	81/M	10/12 mm	Myelopathy	Laminectomy C1,2 laminoplasty C3-7
Nishikawa <i>et al.</i> (2001) ^[4]	82/M	12/-mm	Myelopathy	Laminectomy C1 laminoplasty C2
	72/M	12/-mm	Myelopathy	Laminectomy C1
	42/F	9/-mm	Neck pain, headache	Laminectomy C1
Pascual-Gallego <i>et al.</i> (2014) ^[7]	5/M Down syndrome	-/-mm	Myelopathy	Laminectomy C1
Present Case (2020)	76/M	9/12 mm	myelopathy	Laminectomy C1

AP: Anteroposterior, FMD: Foramen magnum decompression

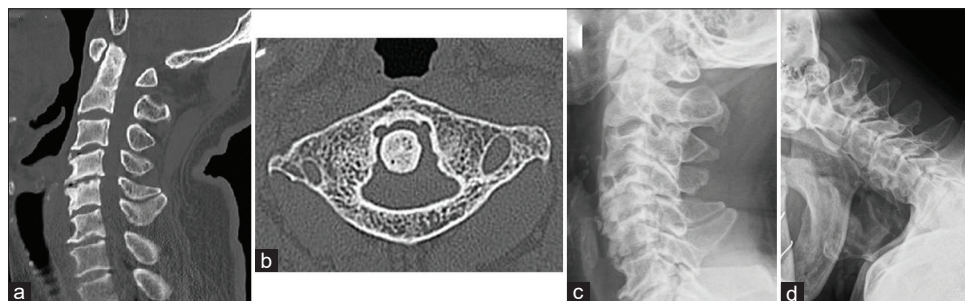


Figure 1: Preoperative mid-sagittal and axial image of computed tomography (a and b) demonstrating a hypoplastic but intact posterior arch of the atlas. Flexion (c) and extension (d) cervical lateral radiograph revealed no atlantoaxial instability.

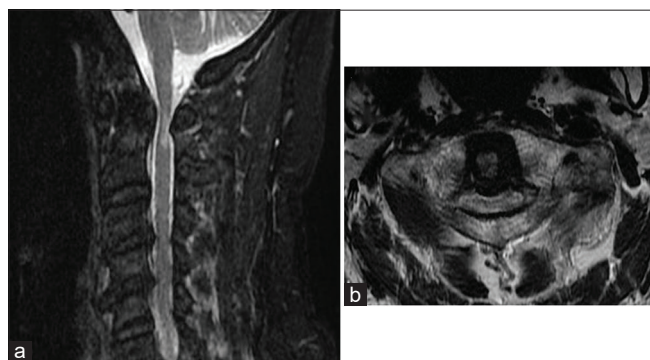


Figure 2: Preoperative T2-weighted magnetic resonance image. Sagittal (a) and axial (b) images show constriction of the dural sac at the level of the atlas and high-intensity area was recognized in the spinal cord.

DISCUSSION

C1 anomaly and stenosis

It is well known that congenital anomalies occasionally involve the arch of atlas. In 2018, Hyun *et al.* reported 5.6%

of such congenital lesions at C1 among their 3273 subjects.^[2] C1 stenosis with an intact posterior arch requiring treatment is rare; only 11 such cases have been reported in the literature [Table 1].^[1,3-5,7-9,11]

Clinical data for 12 total cases

With this case added, a total of 12 prior cases of C1 congenital stenosis resulting in myelopathy all occurred in middle-aged Asian males.^[1,2] Interestingly, most also had spinal canal stenosis at subaxial levels [Table 1].

The threshold of a canal diameter

In the 12 patients cited, the average sagittal canal diameter at the level of atlas in symptomatic patients with C1 stenosis was <10 mm. On routine cervical MR, compression at C1 atlas level is readily established. Further, physicians dealing with such C1 disorders may readily establish the diagnosis on lateral cervical X-rays with careful observation of narrowed AP diameter based upon the spinolaminar line [Figure 4].^[6]

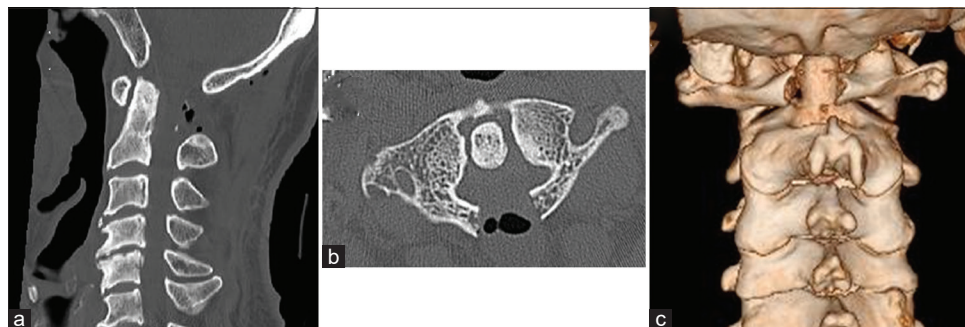


Figure 3: Postoperative mid-sagittal (a) and axial (b) image of computed tomography (CT) and three-dimensional CT (c) showing laminectomy of the atlas posterior arch.

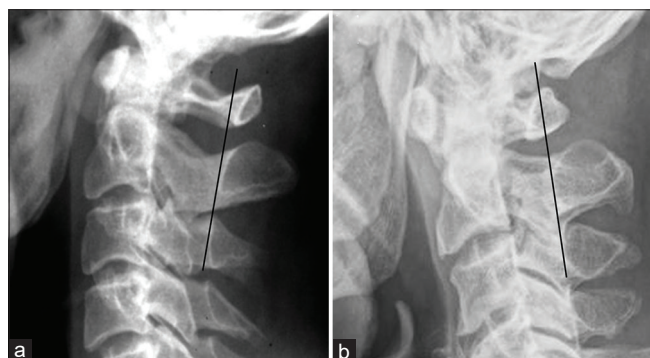


Figure 4: Explanation of spinolaminar line test. The C3–C2 spinolaminar line is drawn extending cranially up to C2. Then, this line is extended up to C1. (a) Example of normal cervical spine. The ventral aspect of the C1 lamina is posterior to this line. (b) Example of positive spinolaminar line test. Ventral lamina of C1 is anterior to this line.

Treatment

For treating C1 stenosis, laminectomy or laminoplasty is typically effective.^[1,3-5,7-9,11] However, instability and the need for fusion should be carefully assessed at the at the atlantoaxial and craniocervical junctions.

If there is a large inferior facet angle and/or subaxial ankylosis, as an anterior arch fracture may occur in up to 14.2% of cases follow a C1 laminectomy or laminoplasty initially be carefully considered.^[10]

CONCLUSION

Symptomatic myelopathy attributed to C1 stenosis may be readily reversed with a decompressive procedure.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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