



## Case Report

# Congenital cervical isthmic spondylolisthesis: A case report

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## ABSTRACT

**Background:** There are only 20 reported cases of cervical isthmic spondylolisthesis in literature that have been surgically managed either anteriorly or posteriorly. Herein, we report such a case managed with circumferential fusion.

**Case Description:** A 27-year-old male became progressively quadriparetic due to cervical isthmic spondylolisthesis at the C6–C7 level. Removal of the posterior arch of C6 with subsequent C5–C7 pedicle screw/rod fixation and anterior interbody fusion resulted in marked recovery and adequate cervical realignment.

**Conclusion:** For patients with cervical isthmic spondylolisthesis, circumferential fusion provides the best surgical option to achieve stability and sagittal balance.

**Keywords:** Cervical isthmic spondylolisthesis, cervical pedicle screw, cervical sagittal balance, cervical spine, circumferential fusion, 360 Spinal fixation

## INTRODUCTION

Spondylolysis of the subaxial cervical spine is uncommon, being reported in only 5% of the population.<sup>[6,11,14]</sup> Forsberg *et al.* determined that congenital cervical spondylolysis was unilateral in 75% of cases and bilateral just 25% of the time.<sup>[6,11]</sup>

Bilateral subaxial cervical spondylolysis resulting in spondylolisthesis was first described by Perlman and Hawes since <20 cases have been reported.<sup>[1-5,7-10,12,13]</sup> Most occur at the C6 level followed by C5 and C4.<sup>[1-10,12,13]</sup>

Herein, we present a patient with cervical isthmic spondylolisthesis at the C6 level and slippage on C7 vertebra. Removal of the loose arch followed by circumferential stabilization results in marked recovery.

## CASE REPORT

A 27-year-old male was presented with 1 year of neck pain, dysesthesias in both hands, and difficulty walking. His neurological examination only showed hyperreflexia with Babinski signs.

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### Diagnostic studies

The cervical lateral radiograph showed a 2-mm anterolisthesis at C6–C7, with bilateral defects at the pedicle-laminar junction of C6 vertebra. Furthermore, the spinous process of the C6 vertebra was abnormally long and narrow [Figure 1a and b].

The axial computerized tomography (CT) showed a linear defect at the C6 pedicle-laminar junction bilaterally with sclerosis, Grade I spondylolisthesis, and an abnormally long C6 spinal process [Figure 2a and b]. Other CT findings included intrusion of spinolaminar junction into the spinal canal with enlargement of C5–C6 neural foramina [Figure 2c and d]. The MRI confirmed spinal cord compression at the C6 level attributed to a T1 isointense dorsolateral fibrous mass [Figure 3a and b]. The T2

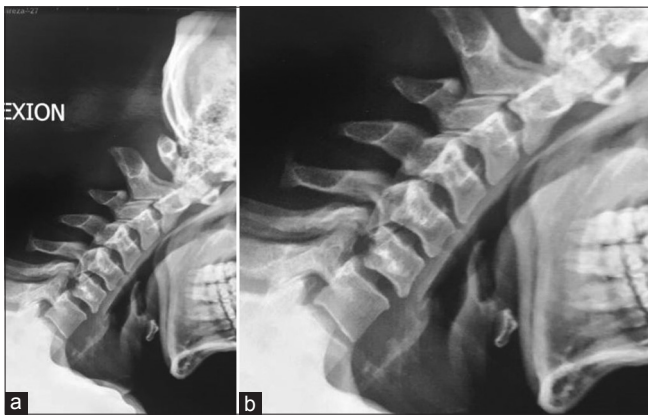
sagittal images also showed an increased central C6 level cord signal [Figure 3c and d].

### Surgery

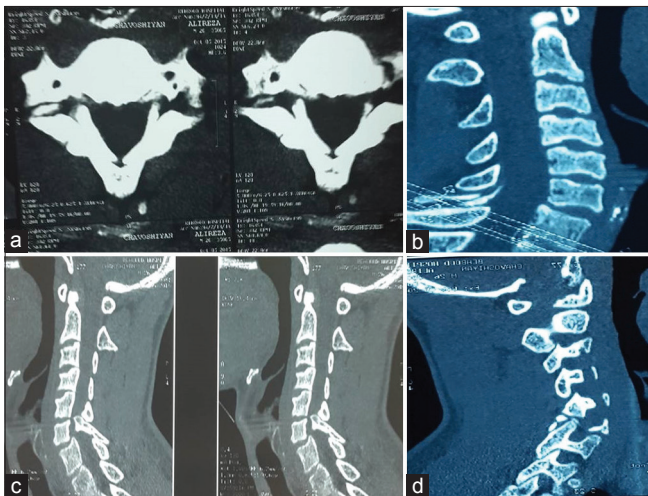
The patient first underwent a posterior decompression (C6 posterior arch) with C5–C7 pedicle screw fusion [Figure 4]. This was followed by a C6–C7 anterior cervical discectomy/fusion (ACDF) using an appropriate size PEEK cage filled with demineralized allograft chips [Figure 5]. Postoperatively, the patient gradually improved within 4 months and continued to do well 2 years later [Figure 5].

### DISCUSSION

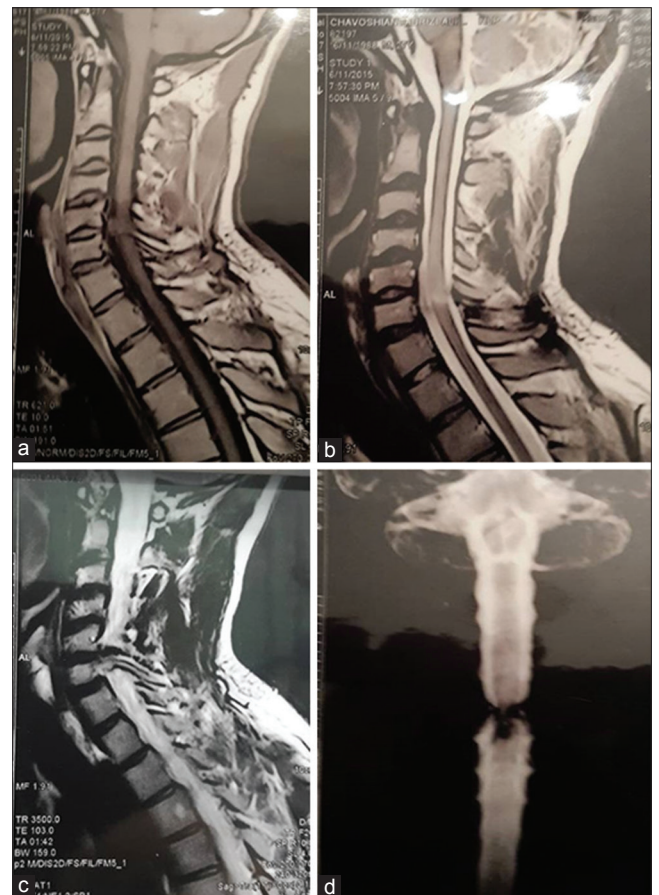
Cervical spondylolysis is a relatively rare congenital anomaly which might be unilateral or bilateral and typically involves the lower cervical spine.<sup>[6,11]</sup> Majority of the patients with symptomatic cervical isthmic spondylolisthesis are diagnosed in their third decade of life with male predominance.<sup>[11-5,7-13]</sup> Approximately



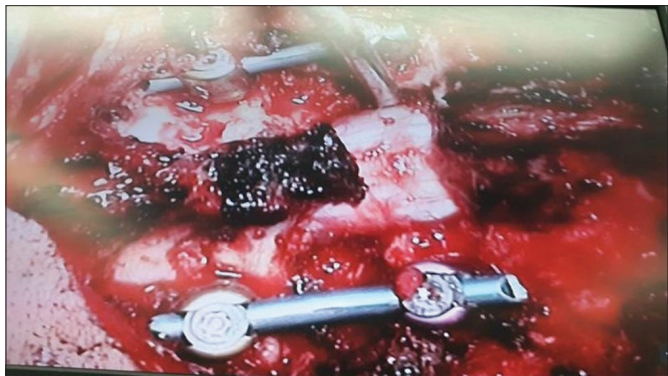
**Figure 1:** Lateral flexion radiograph (a) shows anterolisthesis of C6 on C7, (b) elongation of C6 spinal process is also seen.



**Figure 2:** (a) The axial computed tomography (CT) scan on bone window settings reveals defect at the joints vertebral body with well-defined border, (b) sagittal reconstruction CT shows slippage of C6 on C7 and abnormally narrow and elongated spinal process of C6 vertebra are demonstrated, (c) paramedian slices show intrusion of spinolaminar junction into the spinal canal at C6 level, (d) in a more lateral sagittal slices, wide foramen which is combination of two foramina are demonstrated.



**Figure 3:** (a) T1-weighted sagittal view shows an isointense wrap around the theca which is probably fibrous. (b) T2-weighted sagittal magnetic resonance imaging (MRI) demonstrates myelomalacia at C6 level. (c) A more lateral T2-weighted sagittal MRI a block at C6 level is seen. (d) MR myelogram shows complete block between C6 and C7 levels.



**Figure 4:** Intraoperative photograph showing the dura and pedicle screws on C5 and C7 level.



**Figure 5:** Postoperative cervical X-ray. (a) Lateral cervical radiograph showing C5 and C7 pedicle screws in appropriate place and C6-C7 interbody fusion, (b) cervical anteroposterior radiograph of the same patient.

one-third of the patients present with mild neck pain or single nerve root brachialgia.<sup>[6,11]</sup>

However, bilateral cervical spondylolysis may result in spondylolisthesis, associated with radiculopathy, and progressing to quadriparesis.<sup>[1-5,7-10,13]</sup>

### Radiographic presentation

Plain lateral radiograph document the spondylolisthesis often accompanied by bilateral hypoplasia of the pedicles, spina bifida, and elongation of the spinal processes. Oblique images may also demonstrate asymmetrical enlargement of the corresponding neural foramina.

CT studies clearly confirm the bilateral vertebral body-pedicle junction defects resulting in anterior anterolisthesis. The articular mass-vertebral body junction defects are clearly seen on these studies along with dysplasia of the posterior neural arches and elongation/deformed spinous processes.

The extent/severity of cord affection is best shown on the cervical T2-weighted sagittal MR images.<sup>[1]</sup>

### Treatment

In the ideal treatment of symptomatic cervical spondylolisthesis is circumferential fusion. This typically requires posterior decompression with pedicle screw-rod fixation followed by ACDF.

### CONCLUSION

Cervical spondylolisthesis is rare and is best managed with circumferential fusion utilizing posterior decompression pedicle screw fixation followed by ACDF.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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