

## CASE REPORT

# Anomalous Cervical Spinous Process Leading to Myelopathy

Yogesh Kishorkant Pithwa, FNB (Spine Surgery)

**Study Design.** A case report and literature review.

**Objective.** To present a rare case of anomalous spinous process of sixth cervical vertebra invaginating within the spinal canal, causing myelopathy and being successfully managed with surgical excision.

**Summary of Background Data.** Though anomalous development of posterior arch of atlas and axis have been documented to cause impingement on spinal cord, there has been no documented literature on impingement of anomalous free-floating spinous process of subaxial spine causing compressive myelopathy.

**Methods.** A 42-year old female patient presenting with features of cervical myelopathy was investigated and found to have anomalous free-floating spinous process of sixth cervical vertebra impinging onto the cord.

**Results.** Patient underwent surgical excision of the anomalous bone and had a satisfactory clinical outcome.

**Conclusion.** Though hitherto unreported, this rare anomaly of anomalous spinous process needs to be borne in mind while evaluating a relatively young patient with myelopathy. Surgical excision of the free-floating anomalous spinous process yields satisfactory outcome.

**Key words:** anomalous spinous process, cervical, spine, myelopathy, anomaly, invaginated spinous process, congenital cause of myelopathy.

**Level of Evidence:** N/A

**Spine** 2015;40:E1117-E1119

**A**nomalies of posterior arch of cervical spine are relatively rare.<sup>1-9</sup> Though there have been such reports pertaining to C1 and C2, anomalous development of posterior arch in subaxial spine leading to myelopathy has not been reported till date.

HOSMAT Hospital, Bengaluru, India.

Acknowledgment date: March 15, 2015. Acceptance date: April 29, 2015

The manuscript submitted does not contain information about medical device(s)/drug(s).

No funds were received in support of this work.

No relevant financial activities outside the submitted work.

Address correspondence and reprint requests to Yogesh K. Pithwa, FNB (Spine Surgery), Flat No. D-209, USHAS Apartments, Site No. 26, 16th Main, Jayanagar 4th Block, Bengaluru 560011, India; E-mail: info@spine-surgeon.org

DOI: 10.1097/BRS.0000000000001088

Spine

Copyright © 2015 Wolters Kluwer Health, Inc. Unauthorized reproduction of this article is prohibited.

The case presented here deals with anomalous free-floating spinous process of C6 vertebra, invaginating into the spinal canal and causing myelopathy.

## CASE REPORT

A 42-year old female patient presented with insidious onset, gradually progressive clumsiness in gait of 6 months duration. Her bladder and bowel continence was well-preserved. On examination, she was found to have bilateral lower limb hyper-reflexia with inverted supinator jerk. She had positive Babinski's sign. Romberg's sign was positive with eyes closed. She was unable to perform tandem-walk. She had difficulty performing fine function with upper limbs with her finger grip and release being 12 and 13 on right and left side, respectively in a time span of 10 seconds.<sup>10</sup> She underwent investigations in the form of plain radiographs, magnetic resonance imaging (MRI) and computed tomography (CT) scan of cervical spine. These revealed the presence of anomalous spinous process of C6 vertebra invaginating within the spinal canal and causing compressive myelopathy [Figure 1A and 1B]. Interestingly, the other subaxial cervical spinous processes did not show the normal "bifid" tips [Figure 2].

Patient underwent surgical decompression. During surgery, the anomalous spinous process was found to be free-floating. Careful dissection allowed complete excision of the same without necessitating a laminectomy at that level [Figure 3A and 3B]. Non-bifid tips of other subaxial cervical spinous processes visualized in preoperative CT scans, were noticeable during surgery as well [Figure 3A].

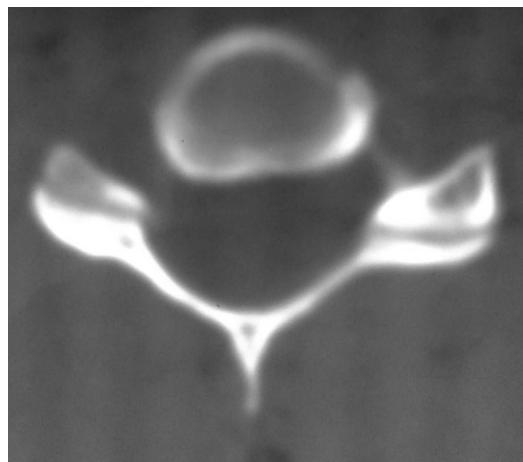
Histopathological examination of the excised bone revealed well-formed bone. Patient had a good recovery in her neurology in postoperative period. Her gait unsteadiness improved. At 1 month follow-up, her finger grip improved to 24 and -25 on right and left side in a time span of 10 seconds. Postoperative MRI revealed satisfactory decompression of the cervical spinal cord [Figure 4]. Postoperative CT scan confirmed complete excision of the anomalous bone [Figure 5].

## DISCUSSION

Embryologically, 4 posterior vertebral arch chondrification centers unite to form 2 ossification centers on each side of the midline in the tenth week of gestation.<sup>1,3,6,8</sup> Each of the 2 ossification centers forms a pedicle, a lateral mass, and one-half of the lamina. The 2 ossification centers fuse posteriorly



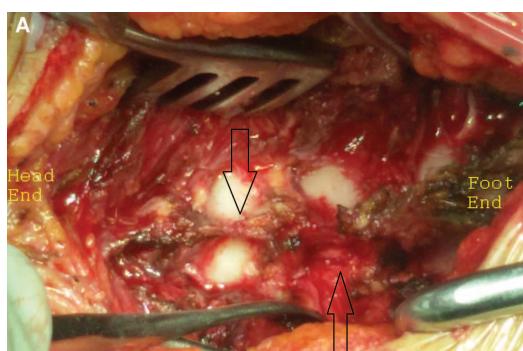
**Figure 1.** (A) Preoperative CT scan—serial axial scans showing the anomalous left-sided free-floating spinous process of C6 spinous process. (B) Preoperative MRI scan showing invagination of the anomalous spinous process into the spinal canal leading to cord compression.



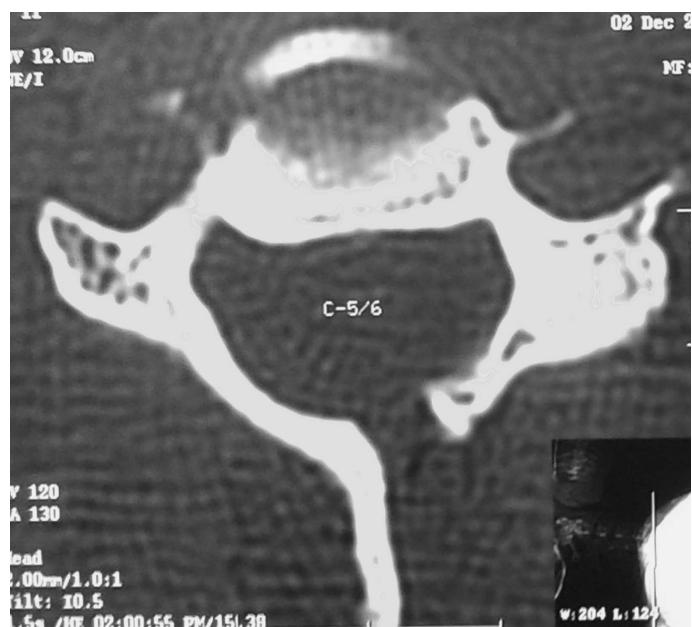
**Figure 2.** Preoperative CT scan showing anomalous “non-bifid” spinous process of other subaxial vertebrae [C5 in this image].



**Figure 4.** Postoperative MRI scan showing adequate canal clearance.



**Figure 3.** (A) Intraoperative photograph showing the defect [upward arrow] in lamina after excision of the anomalous free-floating spinous process of C6 level and the “non-bifid” spinous process [downward arrow] of other subaxial vertebrae. (B) Excised anomalous free-floating spinous process of C6 with the arrow pointing at the inner tip that was impinging onto the spinal cord.



**Figure 5.** Postoperative CT scan showing complete excision of the anomalous spinous process.

when the child is 2 to 3 years of age. Pathogenesis of such rare laminar anomalies has been hypothesized to be failure of the normal fusion process of these chondrification or ossification centers leading to either a separated or a free-floating lamina or spinous process as in the present case.<sup>8</sup> This same

mechanism has also been hypothesized in the genesis of spina bifida occulta.<sup>8</sup>

Though congenital, manifestation of compressive myelopathy in posterior arch anomalies of cervical spine has been reported only in or after fourth decade of life.<sup>3–8</sup> Sakai *et al* explained that this late onset might be the result of developmental adaptation of spinal cord.<sup>7</sup> Asakawa *et al* considered that late-onset myelopathy might be the result of complications arising during aging process, which caused progressive narrowing of cervical spinal canal and consequently, spinal cord compression in a congenitally small spinal canal.<sup>3</sup>

Presence of posterior arch anomalies in the cervical spine though rare, have been reported for atlas and axis.<sup>8,9</sup> To our knowledge however, this is the first report in literature to describe anomalous spinous process in subaxial spine leading to compressive cervical myelopathy. Preoperative investigations including CT scan were helpful in identifying this hitherto unreported entity. Surgical excision of the anomalous free-floating spinous process led to a successful outcome in resolution of patient's symptoms.

## ➤ Key Points

- A case of anomalous free-floating spinous process of sixth cervical vertebra is reported.
- Preoperative MRI and particularly, CT scanning helped identify this extremely rare anomaly.
- This anomaly was also associated with anomalous development of spinous processes of other

subaxial cervical vertebrae which were found to be "non-bifid."

- Surgical excision of the free-floating anomalous spinous process led to satisfactory improvement in myelopathy.

## References

1. Schwartz AM, Wechsler RJ, Landy MD, et al. Posterior arch defects of the cervical spine. *Skeletal Radiol* 1982;8:135–39.
2. Vangilder JC, Menezes AH. Craniovertebral junction abnormalities. *Clin Neurosurg* 1983;30:514–30.
3. Asakawa H, Yanaka K, Narushima K, et al. Anomaly of the axis causing cervical myelopathy. Case report. *J Neurosurg* 1999;91(1 Suppl):121–3.
4. Jiang Y, Xi Y, Ye X, et al. A cervical myelopathy caused by invaginated anomaly of laminae of the axis in spina bifida occulta with hypoplasia of the atlas: case report. *Spine (Phila Pa 1976)* 2010;35:E351–5.
5. Kawano K, Uehara S, Nagata Y. A case of myelopathy due to a peculiar anomaly of the axis. *No Shinkei Geka (Jpn)* 1987;15:543–546.
6. Koyama T, Tanaka K, Handa J. A rare anomaly of the axis: report of a case with shaded three-dimensional computed tomographic display. *Surg Neurol* 1986;25:491–94.
7. Sakai S, Sakane M, Harada S, et al. A cervical myelopathy due to invaginated laminae of the axis into the spinal canal. *Spine* 2004;29:E82–4.
8. Sakaura H, Yasui Y, Miwa T, et al. Cervical myelopathy caused by invagination of anomalous lamina of the axis. *J Neurosurg Spine* 2013;19:694–6.
9. Sharma A, Gaikwad SB, Deol PS, et al. Partial aplasia of the posterior arch of the atlas with an isolated posterior arch remnant: findings in three cases. *AJNR Am J Neuroradiol* 2000;21:1167–71.
10. Bridwell KH, Anderson PA, Boden SD, et al. What's new in spine surgery. *J Bone Joint Surg Am* 2008;90:1609–19.