

Case Report

ELONGATED ODONTOID PROCESS OF AXIS VERTEBRA

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ABSTRACT

Introduction: Odontoid process is a bony projection of axis around which the atlas rotates. It measures 1 to 1.25 cms in length and projects upwards from the body of Axis. An elongated odontoid process may narrow the foramen magnum causing compressive neurological symptoms. It can cause cervical stiffness, serious restrictions of neck movement, and even a bone-derived torticollis.

Observation: During routine osteology classes, we encountered an Axis vertebra with an elongated odontoid process. The measurements of the elongated odontoid process were taken using digital Vernier slide calipers.

Conclusion: Elongated odontoid process can be mistaken for fracture of dens in radiological images; hence the knowledge of elongated odontoid process is useful for the radiologists, neurosurgeons and orthopaedicians for accurate diagnosis and treatment involving cranio-vertebral junctions.

KEY WORDS: Elongated odontoid process, Crowned dens syndrome, Calcification, Apical ligament, Alar ligament, Neck stiffness, Atlanto-axial instability, Cranio-vertebral junctions.

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INTRODUCTION

Dens/ odontoid process is a small, tooth like upward projection from the second cervical vertebra of the neck which forms the pivot median atlanto-axial joint with the anterior arch of atlas[1].

It measures about 1-1.25cms in length and it gives attachment to apical ligament, alar ligament. Calcification of alar ligaments due to deposition of hydroxyapatite or calcium pyrophosphate dehydrates (CPPD) gives rise elongated odontoid process or "Crowned dens syndrome". The term "Crowned dens syndrome" derives from the crown-like density surrounding the odontoid process was first coined in the year 1985. Crowned dens syndrome has been confused with giant cell arteritis, polymyalgia rheumatica and meningitis, among other cond-

itions. Elongated odontoid process can cause cervical stiffness, serious restrictions of neck movement, bone-derived torticollis and lead to atlanto-axial instability [2,3,4,5].

The present case report was found incidentally during the routine osteology teaching for first MBBS students. The knowledge of elongated odontoid process is of immense importance to clinicians, radiologists and neurosurgeons. In this case report, the incidence, aetiology and clinical importance of elongated odontoid process are discussed.

OBSERVATIONS

During routine osteological classes of head and neck region for the undergraduate students in M S Ramaiah Medical College, Bangalore. We observed the presence of elongated odontoid

process in one of the 2nd cervical vertebra. The specimen was examined in detail and photographed (Fig 1 and Fig 2). The length and thickness of the elongated odontoid process was measured using a digital Vernier slide calipers and the same were tabulated (Table -1).

Fig. 1: Anterior view of Axis, arrow pointing the elongated odontoid process.



Fig. 2: Posterior view of Axis, arrow pointing the elongated odontoid process.



DISCUSSION

Elongated odontoid process is due to deposition of hydroxyapatite or calcium pyrophosphate dehydrate in the apical and alar ligaments of the odontoid process [3,4,5]. This may resemble the crown or halo surrounding the odontoid process on radiographic imaging resulting in Crowned dens syndrome, which is characterized by recurrent neck pain [6].

The apical ligament of dens is attached to apex of dens on one side and the anterior margin of foramen magnum on other side. The alar ligaments originate bilaterally from the tip of the odontoid process and run cranially and laterally to get attached to the medial aspect of the occipital condyles. They are strong, rounded

Table 1: Showing the Measurements of the elongated odontoid process of Axis.

Specimen	Length (mm)	Transverse Diameter (mm) at		
		Base	Midway between base and tip	Apex
Specimen	24.28	11.08	9.05	12.5

structures that play an important role in stabilising the head during rotary motion of the cranio-vertebral junction. Calcification of alar ligaments of dens usually develops after 40 years of age, or following a minor trauma of cervical region [7].

The ligament ossification is associated with various degenerative disorders like [8,9,10,11]:

1. Diffuse Idiopathic Skeletal Hyperostosis (DISH),
2. Ankylosing Spondylitis (AS),
3. Calcium PyroPhosphate Dihydrate Crystal Deposition Disease (CPPD CDD)
4. Spondylo Arthritis (SpA)

Arnold Chiari Malformation Type II can be associated elongated retroflexed odontoid process [12].

There have been few reports of calcification of alar ligament along with the transverse ligament of atlas, ligamentum flavum (Table 2). In the present case, there is calcification of apical ligament and alar ligament of axis resulting in the elongated odontoid process.

Table 2: Showing the incidence of calcification of alar ligament around odontoid process of Axis in various studies.

Authors	Year	No. of cases (Calcified alar ligament)	No. of cases (Along with calcified other ligaments of Neck Region)
Ziza et al [13]	1982	1	-
Bouvet et al [3]	1985	4	4, Transverse ligament of atlas
Yasukawa et al [14]	1990	-	1, Ligamentum flavum
Yoshida et al [15]	1993	-	1, Ligamentum flavum
Kobayashi et al [16]	2001	2	-
Sim et al [17]	2006	1	-
Soubai et al [8]	2012	1	1, Transverse ligament of atlas
Present Case Report	2014	1	1, Apical ligament of Dens

Clinical Significance:

Elongated odontoid process can cause cervical stiffness, serious restrictions of neck movement, and even a bone-derived torticollis [18]. It may limit the rotation of the atlas and skull. The malformed odontoid process may lead to atlanto-axial instability. The calcification of the

alar ligament mimics fracture of the Cranio-vertebral Junction in radiological studies. When there are abnormal osseous formations that originated from the odontoid process, they might narrow the foramen magnum and may produce compressive neurological symptoms. The endoscopic endonasal approach is emerging as a feasible alternative to the trans-oral route for the resection of the odontoid process, when the latter produces a compression of the brainstem and cervicomedullary junction [19].

CONCLUSION

During radiological examination of the cranio-vertebral junction, the radiologist should be aware of such rare presentation. Elongated odontoid process should be kept in mind by the neurosurgeons and orthopaedicians during surgical procedures involving cranio-vertebral junctions.

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Conflicts of Interests: None

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