

Case Report

A Case Report and Imaging on Fracture of Odontoid Process

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Abstract: Odontoid process also called as dens, is a protuberance of axis (C2 vertebra). Odontoid process is the central pillar of the craniovertebral junction. Imaging of this small structure continues to be a challenge for the radiologists due to complex bony and ligamentous anatomy. A wide range of developmental and acquired abnormalities of odontoid have been identified. Fracture usually occurs in young due to high energy trauma, in elderly age group due to low energy trauma. The mechanism is due to hyperextension of neck and hyperflexion trauma. We report a case of a 24 year old female patient who presented to emergency with alleged history of self fall from two wheeler and inability to move the neck. X-ray, CT and MRI were done which revealed significant type II comminuted fracture of odontoid process.

Keywords: Odontoid process fracture, type II comminuted, X- ray, MDCT, MRI.

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INTRODUCTION

The odontoid process is a part of the C2 or axis vertebra and forms pivot of the structures forming the craniovertebral junction (CVJ). Fracture of odontoid process usually occurs in young due to high energy trauma and in elderly age group due to low energy trauma. The mechanism is due to hyperextension of neck and hyperflexion trauma. The injury is associated with an increased mortality as a result of complications related to fracture non-union and high co-morbidity rates in this particular patient population.

METHODS

It is a descriptive study and is carried out in the department of Radio-diagnosis at Sree Balaji Medical college & hospital, Chennai. A female patient aged 24 years presented with alleged history of skid and fall from 2-wheeler comes with complain of neck pain. The

patient voluntarily included in the study and the patient was neither supported nor additionally burdened financially.

CASE REPORT

A 24 year old female patient was brought to emergency department with alleged history of skid and fall from 2 wheeler and sustained injury to her neck. Patient complains of painful restricted range of movements of neck. The rest of the clinical examination was unremarkable. The time interval between the incident and admission to hospital was half an hour. The patient initially underwent frontal and lateral X- ray of cervical spine which revealed a radiolucent line at the base of odontoid process. There was a suspicion of superior displacement of dens because the anterior surface of odontoid process was not in alignment with anterior surface of the body of C2 vertebrae.

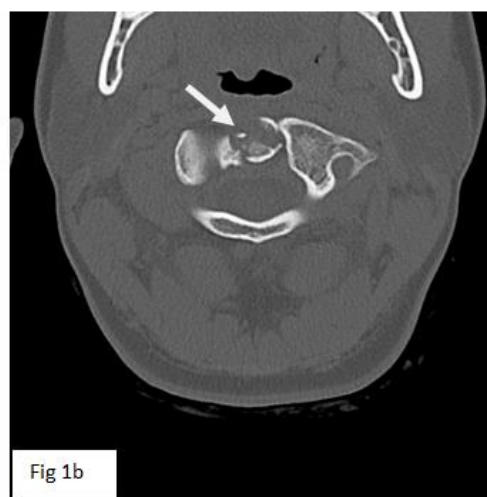
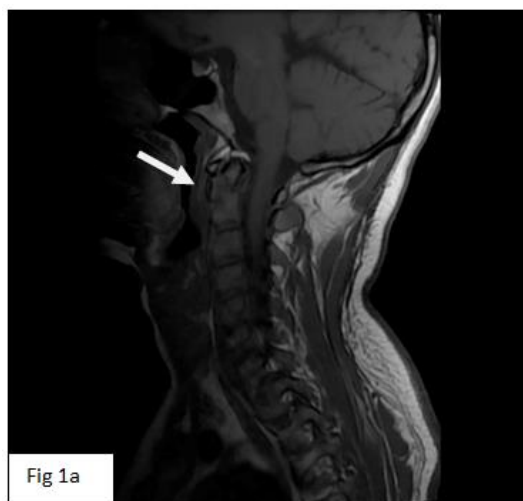


Figure 1a T2 SAG MRI, Figure 1b axial CT: shows type II comminuted fracture with superior displacement of fracture fragments and posterior displacement of the other adjacent fracture fragments with mild ventral thecal sac indentation

The patient underwent MD-CT of cervical spine after one hour of admission which revealed type II comminuted fracture with superior displacement of odontoid process and posterior displacement of other adjacent fracture fragments with mild ventral thecal sac indentation. Patient underwent MRI (3T) of cervical spine to know injury of soft tissues which revealed type II comminuted fracture with superior displacement of fracture fragments of odontoid process of C2 vertebrae and posterior displacement of the other adjacent fracture fragments with mild ventral thecal sac indentation. No evidence of spinal cord compression or impingement.

DISCUSSION

Odontoid process of C2 articulates with C1 vertebrae with three joints, central atlantoaxial joint and bilateral, lateral atlantoaxial joint. Transverse and dentate ligaments provide stability rotational and translational stability. Transverse ligament holds dens in close approximation to anterior arch of C1 vertebra. Cervical spine fractures are classified by location (Anderson and D'Alonzo classification). Type I (<5%) Extends through the tip of dens. Type II (>60%) fracture at the base of dens at its attachment to body of C2. Type III (30%) sub dentate, through the body of C2. Sometimes in elderly age group pain may be minimal but the neurologic deficit must be taken in to account. The Canadian C-spine rule can be used when examining patients suspected of cervical spine fracture to decide imaging is needed or not. The fracture line and the displacement of the distal fragment are the two direct signs of dense fracture in radiography. When evaluating the lateral radiography, the distance between the anterior surface of the dens and the anterior arch of atlas must not exceed 3mm in adults and 5 mm in children and posterior surface of the dens must form a continuous line with posterior surface of body of C2 vertebrae. Swelling of prevertebral soft tissue (thickness >7mm) and disruption of the ring of C2 (Harris's ring)

are indirect signs of fracture on the lateral radiograph, with the latter raising suspicion of a type III fracture. CT is considered as the primary imaging modality when plain radiographs are inadequate. MRI can better demonstrate soft tissue and spinal cord injuries. Type I fractures are treated with hard collar for 6-8 weeks. Type II fractures are treated with halo immobilization for 12-16 weeks, operative fixation (odontoid screw), arthrodesis of C1 to C2. Type III fractures can be treated with a halo or surgically. Differential diagnosis: Fracture of the odontoid process (type II), Os odontoideum, Persistent ossiculum terminale, Mach effect [1, 2].

CONCLUSION

In conclusion, Odontoid process is the central pillar of the craniocervical junction. Imaging this is a challenge for the radiologists due to complex bony and ligamentous anatomy. Assessment of type of fracture is important for further treatment. MDCT and MRI scans showed type II comminuted fracture with superior displacement of odontoid process of C2 vertebrae with no evidence.

Compliance with ethical standards

Funding: There is no funding.

Conflict of interest: Author declares that they have no conflict of interest.

Ethical approval (animals): This article does not contain any studies with animals performed by any of the author(s).

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research

committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from individual participant included in the study.

Authors' contributions

1. **DR. GEETANJALI (DG)**
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Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work – **DG,ES,KS,PM**.

Drafting the work or revising it critically for important intellectual content - **DG,ES,KS,PM**. Final approval of the version to be published – **DG,ES,KS,PM**.

Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved – **DG,ES,KS,PM**

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