Re-alignment of operated anterior odontoid screw displaced Odontoid type 3 without resurgery: an unusual case report with a brief review of literature

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Abstract: Odontoid fractures are particularly dangerous variety of cervical injury, due primarily to spinal cord trauma. In this article, we describe the re alignment of displaced operated type 3 odontoid # with anterior screw fixation with cervical traction.
Key words: odontoid fracture, anterior odontoid screw, traction.

Introduction

Odontoid fractures comprise 9-20% of all cervical spine fractures. (1, 2, 3, 4) Many patients succumb to their injury at the time of accident due to spinal cord trauma, due to the strategic location of these fractures. (5) Pain is the most common symptom, followed by neurological deficits in surviving patients. (6) Nonunion and delayed myelopathy are the main problems associated with conservative management of these fractures. (7, 8) In this case report, we discuss about re- alignment of operated anterior odontoid screw displaced #type 3 with traction.

Case report

A 56 year old man presented following road traffic accident after twenty-five days to us with nape of neck pain and qaudriparesis. Bilateral increased tone in upper and lower limbs was noted. Power in bilateral upper limbs was 3/5 and lower limbs was 4/5. A CT craniovertebral junction (Figures 1 and 2) and MRI CVJ and cervical spine (Figure 3) revealed displaced Type 3 odontoid # with hyperintense signals at CVJ cord with cord compression. The patient was placed on traction, which improved power in his limbs and aligned the displaced odontoid segment. Anterior Odontoid screw (OS) fixation was performedand patient was given Philadelphia collar. The patient being highly non-compliant removed his collar on post-op day 1, moving his neck violently. Post-op CT CVJ (Figures 4, 5) revealed displaced odontoid segment. The patient reported a reduction in his limb power. He was again placed on traction, which resulted in an increase in his limb power, signifying instability. Repeat radiology (Figure 6) revealed alignment of # odontoid segment. He was advised posterior fixation but due to financial constraints, the patient party refused for surgery. He was given four post cervical collar for the stabilisation of # odontoid, after a few days of traction.

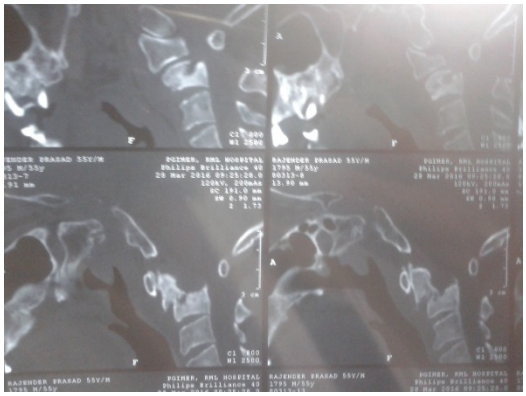

Figure 1 - Sagittal CT images showing displaced odontoid # type 3

Figure 4 - Sagittal CT image showing displaced odontoid segment following anterior OS fixation

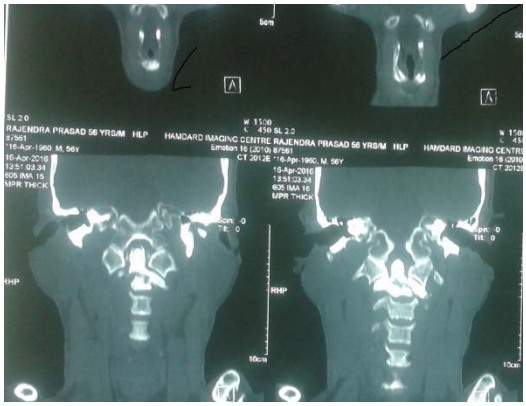

Figure 2 - Coronal CT images showing type 3 odontoid

Figure 5 - Coronal CT image following anterior OS fixation

Figure 3 - Sagittal MRI image showing cord hyperintense signals with compression

Figure 6 - X-ray CVJ with aligned odontoid # segment following anterior OS fixation with post OP traction

Discussion

Goel A., (9) compared odontoid with a typical Kolkata hand rickshaw puller. The weight of the entire rickshaw is on the two wheels, and the rickshaw puller primarily has to guide and direct the vehicle without bearing any weight on himself. He can run with the rickshaw for kilometers without feeling any weight on his shoulders. The rickshaw puller may be an old man or may even be injured, but can still carry on his work. This is essentially because the entire weight of the rickshaw is on the two wheels that are also the primary site of movement. Moreover, the rickshaw will lose its direction, movement, and even its stability if there is no rickshaw puller or if the rickshaw puller is unable to stand on his feet. On similar lines, the facets are the only true joints in the entire spine. The odontoid process and the intervertebral discs have similar roles of assisting or guiding and providing a purpose to the movements that are initiated and completed in the facets. The concept in the treatment of odontoid fracture is based on the premise that if the odontoid process is injured such that the spinal alignments have altered and dynamic images show evidence of instability, the surgery has to aim at providing stability to the region by fixation of the facets.

Anderson and D'Alonzo (1974) (10) have classified odontoid fractures into type I, II and III. Based on this universally accepted classification, the type II and III odontoid fractures often require some form of stabilization. (11, 12) However the optimum treatment strategy on whether to perform surgery or to continue the patient on conservative management is still mired in controversy. (6, 13, 14) The surgical approaches prevalent for dealing with acute odontoid fractures include either an anterior odontoid screw (OS) placement or a posterior fixation (PF). (15, 16, 17, 18, 19)

Conservative management using a halo brace is associated with variable fusion rates between 53-93%. The associated morbidity is related to its prolonged usage in a recumbent patient. (1, 20, 21) We gave the patient four post cervical collar, as he was highly irritable and non-compliant with halo brace. Shetty et al. (22) demonstrated an 84.2% fusion rate with conservative management in stable type II fractures. Literature shows that there is a growing trend towards surgical fixation of these fractures as fusion rates are better and

the patients may be mobilized early. (23, 24)

Anterior OS fixation was initially described by Nakanishi (17) and Bohler (1982). (18) This procedure allows for a more physiological fusion by direct osteosynthesis of the fracture lines and has the advantage of preserving normal rotation at the atlanto-axial joint.

Many authors have recommended PF as the procedure of choice for the surgical approach in type IIA and type III fractures due to a slightly higher non-union rate associated with OS fixation. Moon et al., (25) Fountas et al., (26) and Lee et al. (27) in their series showed fusion rates of 100%, 87%, and 96%, respectively. Bhanot et al. (28) reported a 94% fusion rate with one case of non-union and one screw pull-out in their series of 17 type II odontoid fractures after an anterior screw fixation. Shrinivasan et al. (29) could successfully place OS in 84.6% type II fractures with an 82% fusion rate.

Apfelbaum (2000) (16) and Dantas (2002) (30) have advised against the placement of anterior OS in fractures with an anterior oblique fracture line due to the high non-union rates. Whenever the angle of the odontoid fracture line is less oblique and screw trajectory across the fractured segments is achievable, OS fixation should be the first line management option as it provides for better functional results.

Sawarkar DP et al, (31) reported a 100% fusion rate with Magerl`s technique. This technique may be used as a stand-alone procedure or may be supplemented with a C1-C2 sub-laminar wiring. Addition of sub-laminar wiring, however, did not change results of this technique in our series. This procedure is technically difficult and requires a steep upward trajectory. The three-point rigid fixation and cost-effectiveness of the procedure is responsible for its popularity. The Goel/Harms technique of C1-C2 fixation is more versatile when compared to the former procedure. They reported fusion rates of 100% in the 14 patients who underwent this form of fixation. There is, however, a risk of 1.3-5.8% (more with Magerl technique) of vertebral artery injury in posterior fusion procedures. (32) The biomechanical strength of this fixation is also less than ideal as compared to the Magerl or Goel/Harms procedure (that provides a strong rotational stability). (20) Therefore, the C1-C2 sublaminar wiring technique should be used as the last resort.

Goel et al (33, 34, 35, 36, 37) prefers posterior lateral mass fixation in all cases where surgical treatment for fractured odontoid process is contemplated. The dictum should be that whenever one is in doubt about the stability, one should fix it. Any evidence of instability of the region should point at malfunctioning of the facets and the need for fixation. And when one attempts to fix the region, the most versatile and proven method of fixation should be employed. If the surgery is contemplated, it should not be a semifinal surgery; it should be of the type that will result in fixation and fusion of the region. Any surgery in the region is major and should be done with all preparedness and precautions. Although attempts to fuse the fractured odontoid process and to retain the movements at the facet joints can be successful in some cases, he resorts to fixation-arthrodesis of the atlantoaxial joint and settle the score once and for all.

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