Screw Fixation for Odontoid Fracture: How I Do it

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Abstract

Odontoid fracture frequently occurs following cervical trauma. As C1-2 vertebral level allows the maximum motion in the cervical spine, these fractures may often be unstable, causing catastrophic spinal cord trauma and respiratory compromise. Based on the type of the fracture, the management that can be offered is different. Reporting a case of odontoid fracture and how anterior approach screw fixation was done for that patient.

Keywords: Odontoid; Screw Fixation

Introduction

Odontoid fractures account for 9 to 15% of adult, cervical spine fractures [1]. In the elderly, these injuries occur due to hyperflexion or hyperextension of the cervical spine during low-energy impact, whereas in the young and middle aged it usually involves high-energy trauma.

Case presentation

A 28 year-old gentleman, presented to the emergency department with a chief complain of cervical pain associated with upper and lower bilateral limbs weakness after suffering a fall from 20 feet height. Initial imaging modalities suggested that he sustained a C2 Odontoid peg fracture (type 2).

He was initially put on a cervical collar and head immobilizer to immobilise temporarily. Further imaging modalities (CT scan) confirmed the diagnosis of undisplaced/displaced odontoid fracture of the C2 (type 2). Sensation over the bilateral upper and lower limbs impaired with motor power of MRC Grade 2 over the left upper limb and MRC Grade 4 right upper limb. Motor power over the bilateral lower limb was MRC Grade 4.

The patient underwent screw fixation of the odontoid emergently using the anterior approach. A 4.5cm right transverse skin

incision made at the level of C2 - C3. Minimal dissection was made to expose the anterior surface of the second and third vertebra by separating planes between the carotid artery laterally and the trachea and esophagus medially. A direct view of the C2 - C3 level was allowed after an optimal placement of the specular retractor. A minimal groove was made at the anterior-superior portion of the C3 vertebral body in the midline. The k-wire was placed in the desired direction under biplanar fluoroscopy. A cannulated screw 40mm length and 3,5mm diameter was inserted through the prepared tract, across the fracture line and the tip of odontoid process. Finally the K-wire was removed, and platysma was closed with absorbable suture and skin was closed with subcuticular sutures.

Post operatively, neurological assessment was performed immediately, and then daily until the patient was discharge. There was improvement of the motor power over the left upper limb, grade 4. He was able to ambulate on a wheelchair and on regular physiotherapy and rehabilitation. Postoperative xray radiographs confirmed the good position of the odontoid screw and a Philadelphia neck collar was worn.

Patient was reviewed back a month after post operation. Motor power was grade 5 bilateral upper limb and lower limb. Patient was able to ambulate without aid.

Figure 1 and 2: MRI cervical coronal and sagittal view.

Figure 2: Two image intensifier needed, where by AP and lateral views taken simultaneously.

Figure 4: Appropriate screw length measured using a depth gauge.

Figure 5 and 6: Screw placement and direction.

Figure 7 and 8: Post operative check x-rays.

Figure 9 and 10: Post fixation 2 months.

Patient is clinically well, no neurological deficits.

Discussion

The Anderson and D'Alonzo classification system is the most commonly used classification for odontoid fractures. Type I and III are generally thought to be relatively stable and are often treated non operatively with immobilization. Type II fractures are less stable, and there are different opinions regarding the precise definition and optimal treatment. However, the specifics of type IIb of anatomy (oblique downward and backward fracture line) make these fractures unstable and life threatening [2].

Figure 11 and 12

Several management options are described in the literature, which are the rigid and non rigid immobilizations, anterior screw fixation of the odontoid and posterior fusion of the C1/C2 complex [3].

Because various methods of treatments exist for type II and III odontoid fractures, considerable controversy exists regarding the best method for stabilising these fractures [2,3]. Initial treatment has relied primarily on immobilization by using a rigid orthosis such as a halo vest or a Minerva jacket. Reported success with such immobilization has varied widely from 37 to 75%. Relatively high failure rate associated with this method of treatment have led several authors to attempt operative treatment as definitive care [4-8].

Direct fixation of the odontoid process has been viewed a method to provide direct fixation of the fracture fragment, eliminating the need for more extensive C1 - C2 arthrodesis techniques and allows rapid return to normal lifestyle.

The complications associated with anterior screw fixation are principally related to either hardware failure (biomechanical problems of the screw fixation) or due to the technical demands of the procedure. A 10% hardware complication rate is reported in the literature and the most common complication was screw pull-out. In our patient, we would like to report that he suffered from neither complication post-surgery.

Conclusion

Odontoid fracture should not be missed, either clinically and on radiographs as well. Appropriate immobilization and fixation is important in order to prevent lifelong complications, such as consistent neck pain and stiffness.

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