CASE REPORT

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Anterior Stabilization Application With Odontoid Screw In A Patient With Type 2 Odontoid Fracture A Case Report

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ABSTRACT

The treatment of type II odontoid fractures has been discussed for many years. Due to the complex anatomy of the craniocervical junction, many- questions are encountered in the diagnosis and treatment of such fractures. However, in centers without Neuro-navigation and O-arm, free hand technique still remains a viable option for the surgical treatment of such cases. Although there is no neuronavigation and O-arm in our center, we will present our case of type II odontoid screw placement with free hand technique that we successfully applied in our elderly patient with a Type II fracture

Keywords: Odontoid fracture, odontoid screw, anterior approach, halo, craniocervical junction

Introduction

The treatment of type II odontoid fractures has been discussed for many years(1). Conservative treatment, which was previously a routine practice, was followed by long-term halo vest application. Many disadvantages of halo application such as insufficient fusion in the fracture line, discomfort during use in patients, and the necessity to use for a long time have been observed (1,2). Nakanishi and Bohler described the first odontoid screw placement in type II odontoid fractures in 1982(3,4).

10-15% of all cervical spinal fractures are odontoid fractures. Due to the complex anatomy of the craniocervical junction, many- questions are encountered in the diagnosis and treatment of such fractures (5,6). Type II fractures constitute up to 60% of odontoid fractures divided into 3 subgroups by Anderson and D.Alonzoare (7). Type II and superficial type III fractures are considered unstable, and up to 6% carry a risk of morbidity and mortality (8). As a conservative treatment for stable odontoid fractures, stabilization with cervical orthosis, halo cap and body -jacket is recommended (9.10)

In parallel with the use of today's technological tools in surgery, the use of odontoid screws such as Neuronavigation and O-arm in the surgical treatment of odontoid fractures ensures safer, easier and lower morbidity rates (11) However, in centers without Neuro-navigation and O-arm, free hand technique still remains a viable option for the surgical treatment of such cases. Although there is no neuronavigation and O-arm in our center, we will present our case of type II odontoid screw placement with free hand technique that we successfully applied in our elderly patient with a Type II fracture.

Case Report

60-year-old male patient was examined in an out of town center where he was taken with complaints of neck pain after falling from a walnut tree. A diagnosis of C2 odontoid fracture was made as a result of her examinations and treatment could not be performed, and he was admitted to our hospital as a third step center. The patient, who complained of pain in his neck and limitation of movements, did not have any motor and sensory deficits in his upper and lower extremities in his neurological examination.

Type 2 odontoid fracture, which caused separation of the odontoid, was detected in the CT taken in our hospital (Figure -1,2).

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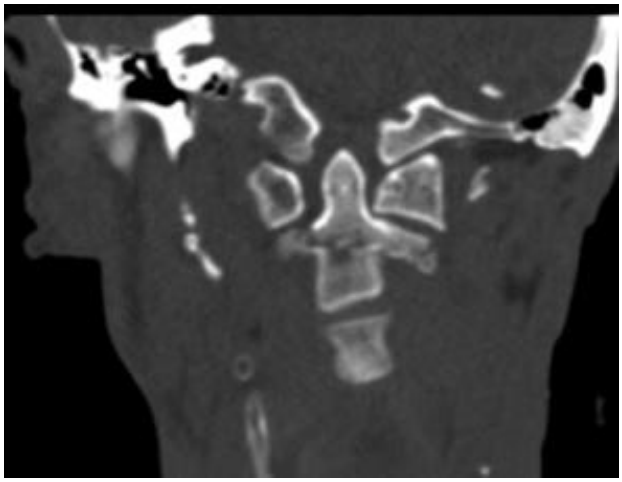


Fig. 1. Preoperative Coronal Section CT

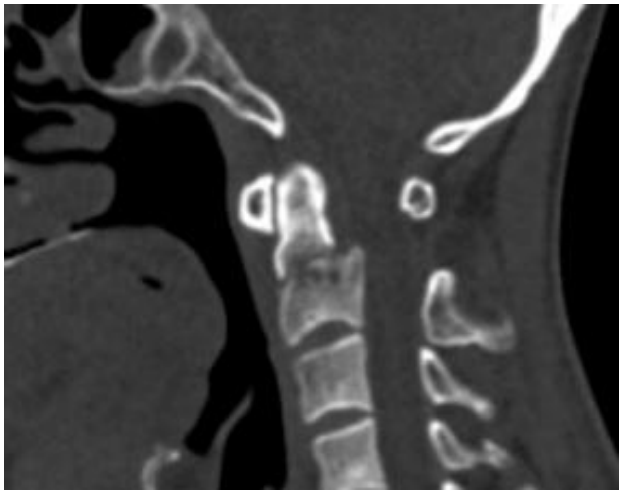


Fig. 2. Preoperative Coronal Section CT

Operation: Under general anesthesia, the patient was positioned on the operating table in a supine position with the neck slightly extended. A skin incision perpendicular to the neck of 5 cm was made, starting 2 cm below the right angulus mandible and following the anterior margin of the sternocleidomastoid. The platysma muscle was cut open in the same direction.

With finger dissection, the sternocleidomastoid muscle, vessel nerve bundle were moved laterally, esophagus and trachea medially. The distance was determined by fluoroscopy and the paravertebral area was reached. First,discectomy was performed after reaching C2-3 dics distance with blunt dissection. . With lateral and anterior posterior fluroscopy, a hole was prepared from the anterior and lower middle points of the C2 body, passing the fracture line through the C2 body and holding the odontoid (Figure-3). As calculated in the pre-operative CT, a 4 mm width 38 mm long screw with a grooved back was sent through the prepared hole. It was observed that the broken odontoid was restored and stabilized by checking with anterior posterior and lateral fluoroscopy (Figure-4,5). The patient was extubated and taken to the service without any complications.

It was observed that the patient had mild neck and sore throat complaints in the post-operative period. The odontoid screw and odontoid bone were observed in right place on the cervilcal CT (Figure -6). The patient was discharged three days after surgery. He had no complaints at the first month follow-up.

Discussion

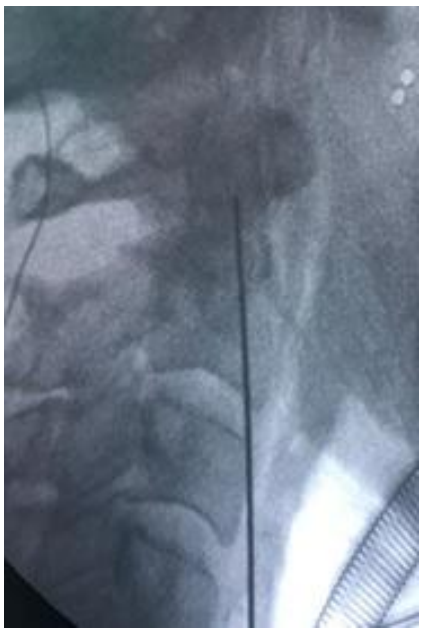
Odontoid type II fracture guarantees surgical fixation (12). Although halo vest and conservative treatment are an option and are still used in some centers, surgical treatment is far superior to other methods in terms of fusionat the fracture site (13,14).

The main advantages of C2 odontoid screw fixation are preserving C1 - C2 rotation, providing early stability and high fusion rate (15). Teeth on the end of the screw help connect the broken pieces together. Thus, it allows early fusion development. In the treatment performed with this method, it is not necessary to use allografts or autologous bone grafts (12). Chronic pain at the graft site, especially during allograft removal, is also avoided.

In the choice of surgical procedure, it is necessary to see that the transfers ligament is intact and the spine alignment is normal during surgery on MRI before surgery (12). In our case, the STIR sequence cervical MRI showed that the transfers ligament was intact and the cervical alignment was normal on the cervical direct radiography.

Kazan et al. demonstrated the percutaneous anterior odontoid screw insertion technique in the cadaver (16). In our case, we completely exposed the C3 anterior corpus and determined the C2-3 disc distance by fluoroscopy. After fixing the C2 odontoid bone with the help of palpation and dissection and confirming the midline with fluoroscopy, we replaced the K-wire followed by the screw with a grooved back.

There are authors who believe that more than one screw increases the risk of dislocation of broken segments (12). Twin screws also increase the likelihood of intraoperative failure and surgical difficulty (17). In addition, , no difference was observed in the load-bearing capacity of the screws in terms of fusion rate following single or double odontoid screws (18).



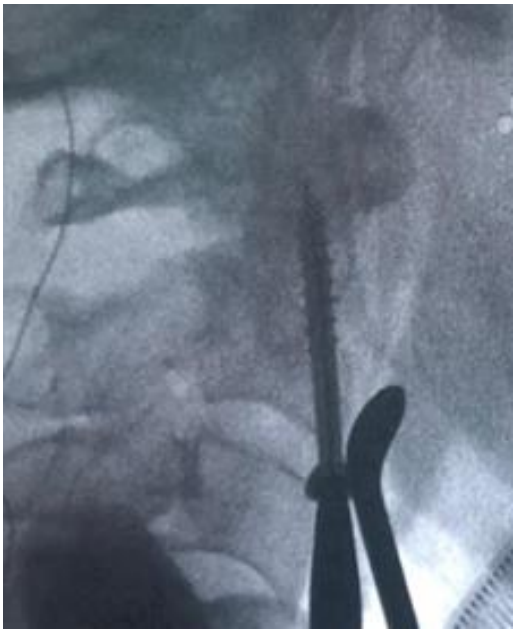


Fig. 3,4,5: Intraoperative Scope View

Anterior odontoid screw placement is a challenging surgery that can always lead to major complications. Most of these complications are malposition of the implant and screw loosening. - Andersson S et al., reported that anterior odontoid screw placement surgery had to be abandoned in two cases due to screw loosening (19). In addition, severe neurovascular injury and severe dysphagia have been mentioned in the application of anterior odontoid screws (6,20)In our case, no complications were observed, either vascular injury or esophagus and nerve injury. In the literature, the rate of fusionafter odontoid screw fixation varies between 81-100% (6). Munakomi S et al. reported that they reached 100% fusion rate (12).

In studies conducted, traffic accidents (vehicle , motorcycle or bicycle accident) and falling from heights are among the causes of odontoid fracture (6,12). Munakomi S et al. showed that 60% of odontoid fractures were caused by traffic accidents, and Chi YL et al. similarly showed that 80% of traffic accidents were the cause (6,12).

Andersson S et al. reported high-energy trauma in 10 patients and low-energy trauma in 19 patients (19). Since it is the walnut harvest season in the summer in our region, there are many falls from the walnut tree. Thoracolumbar fractures are usually seen in such cases. In our patient, odontoid fracture type II, which we rarely encounter in cases of falling from a tree, was detected.

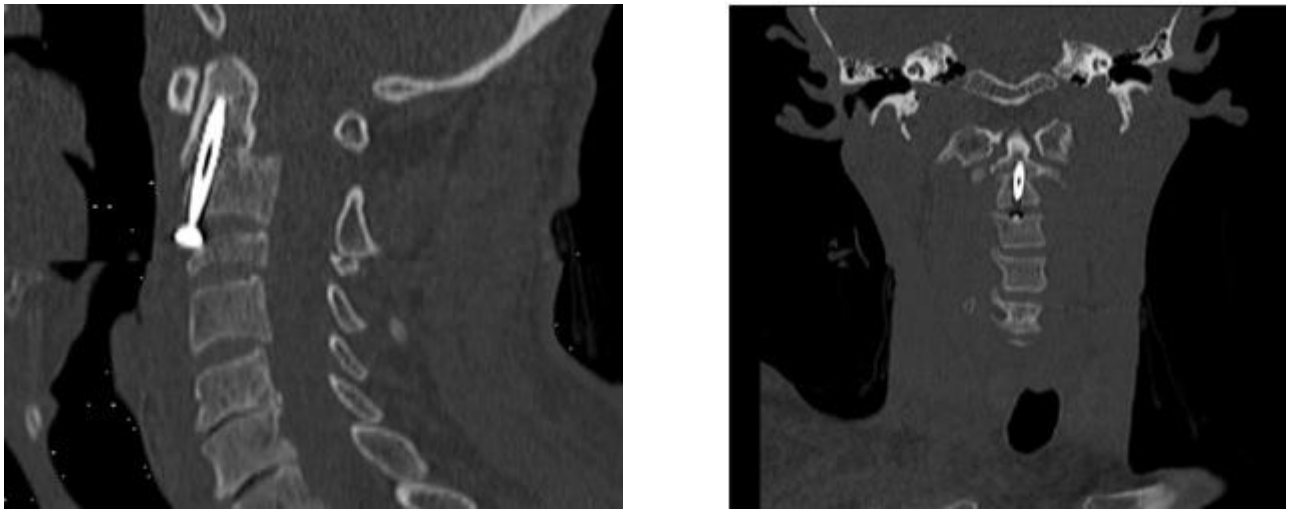


Fig. 6,7: Postoperative sagittal and coronal CT

The most important advantage of our technique is that the surgery can be successfully performed using only a single C-arm scope during surgery in centers where neuronavigation and O-arm screws are not available. In addition, due to the less use of the C-arm for obtaining coronal images, less exposure to radiation and the shorter duration of the surgery performed with an experienced surgeon.

An anterior approach is not appropriate in cases with transverse ligament rupture, fragmented and significantly displaced fracture segments, and posterior element injuries (21). At the same time, surgery should not be considered as a high rate of spontaneous fusion cannot be observed in patients over 70 years of age with osteoporosis. (22). In such cases, posterior C1-2 fusion is a more valid approach (21). We also think that in such cases, it should be followed up with an external orthosis in terms of posterior approach or spontaneous fusion in advanced age, in accordance with the literature.

We think that the case should be evaluated well in terms of treatment options with pre-operative X-ray, CT and MR images taken in different sequences.Anterior odontoid screw surgery technique in appropriate indications is a very effective and successful treatment method in patients with odontoid fractures due to its high treatment success and minimal morbidity in experienced hands. By mastering the technique with cadaver courses, learning time can be minimized by staying in centers where such cases are common.

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