ORIGINAL ARTICLE

Anterior odontoid screw fixation using Acutrak screw: Report of 19 patients

Yusuf Kurtuluş Duransoy, M.D.,[1] Mesut Mete, M.D.,[1] Ülkün Ünlü Ünsal, M.D.,[2] Murat Aydın, M.D.,[3] Mehmet Zileli, M.D.[4]

[1]Department of Neurosurgery, Manisa Celal Bayar University Faculty of Medicine, Manisa-*Turkey*
[2]Department of Neurosurgery, Manisa City Hospital, Manisa-*Turkey*
[3]Department of Neurosurgery, Ödemiş State Hospital, İzmir-*Turkey*
[4]Department of Neurosurgery, Ege University Faculty of Medicine, İzmir-*Turkey*

ABSTRACT

BACKGROUND: This paper aims to present clinical and radiological results of patients who underwent anterior odontoid screw fixation (AOSF).

METHODS: In this study, 19 consecutive patients with an unstable odontoid fracture were operated on using an Acutrak screw.

RESULTS: The patients were followed for a mean duration of 12.5 months. Radiological fusion on CT scans was detected in 87.5% of the patients.

CONCLUSION: Acutrak screws can be used for AOSF. This study contains the maximum number of patients using the Acutrak screw in the literature. However, larger prospective clinical studies can provide more accurate information about the effectiveness of the Acutrak screws for odontoid fractures.

Keywords: Acutrak screw; anterior odontoid screw fixation; odontoid fracture.

INTRODUCTION

Odontoid fractures are relatively common injuries, account for approximately 15–20% of all cervical spine fractures.[1–4] Contemporary treatment strategies of odontoid fractures can vary from conservative management with an external immobilization (cervical collar, halo-west and other cervicothoracic orthoses) to operative methods.[2] However, the most appropriate management for these fractures remains controversial. The classification systems are helpful to decide the treatment method. Odontoid fractures are reported by Anderson and D' Alonzo in 1974.[5] The classification system divides odontoid fractures into three types according to the level of the fracture plane. Type I fracture through the upper portion of the dens, type II fracture at the base of the dens and type III fracture extending into the body of the axis.[5]

It is believed that type I and type III fractures will be successfully treated non-operatively.[3] However, type II odontoid fractures are the most difficult to treat.[6] Type II fractures are associated with a high rate of nonunion when managed conservatively.[2] Sometimes, it can be challenging to precisely define when a type II odontoid fracture extends inferior enough to be considered a type III fracture. These fractures fall into a grey zone. Many authors refer to such intermediate fractures as "shallow" or "high" type III fractures. It is also widely accepted that type II and rostral "shallow" type III odontoid fractures represent highly unstable entities.[7–10] Also, type II odontoid fractures were reclassified by Roy-Camille et al.[11] The authors divided the fractures into three types according to the direction of the fracture line, anterior oblique (oblique

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Address for correspondence: Ülkün Ünlü Ünsal, M.D.
Manisa Şehir Hastanesi, Beyin ve Sinir Cerrahisi Kliniği, Manisa, Turkey
Tel: +90 236 - 229 26 00 E-mail: ulkununlu@hotmail.com

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downward and forward), posterior oblique (oblique downward and backward) and horizontal.
Potential surgical indications for unstable (type II and rostral "shallow" type III) odontoid fractures are primarily based on the risk of nonunion with conservative treatment. Factors that are effective in deciding on surgery can be listed as fracture displacement (>5–6 mm) and fracture gap (>2 mm), high-grade angle, patient age (>40–65 years), delay in diagnosis (>6 month), long term traction and severe neurological deficit.[1,2,7,10] Two main approaches for the surgical treatment of unstable odontoid fractures include the anterior odontoid screw fixation (AOSF) and posterior C1-C2 instrumented fusion techniques. Both surgical approaches have a high success rate.[2,3,4,8,12] In this paper, we reported 19 patients with unstable odontoid fractures who were treated with the AOSF method by using Acutrak 3/5 screw.

MATERIALS AND METHODS

This retrospective study included 19 consecutive patients with an unstable odontoid fracture who underwent AOSF using Acutrak screws with a specially designed guide cannula which we reported previously.[1] Local ethics committee approval (No: 20.478.486) was obtained from Manisa Celal Bayar University School of Medicine.

Surgical Technique

The surgical technique we used has been reported previously.[1] Briefly, all patients are positioned in a neutral supine position with a slight extension of the neck on the radiolucent operating table. A 3–4 cm transverse skin incision is made on the medial border of the right sternocleidomastoid muscle at the C4-C5 disc space level. Minimal dissection was made to expose the C4-C5 disc level by separating planes between the carotid artery laterally and the trachea and esophagus medially. After exposing the anterior cervical spine, the entry point, the anterior aspect of the inferior margin of the C2 vertebral body, is marked under fluoroscopy control, and the sharp end of the guide tube is placed. The estimated trajectory of the guide tube is checked under fluoroscopy whether it reaches the tip of the odontoid. The K-wire is placed through the inner guide tube. K-wire is advanced through the fracture line into the distal fragment of the dens until it catches and fixes the fractured odontoid process. Then, the screw with the appropriate length is placed over the K-wire and inserted with the screwdriver into the fractured fragment.

RESULTS

The age, gender, mechanism of injury, fracture type and line, direction and degree of fracture displacement (millimeter),

Table 1. Characteristics of all patients are seen

Case no	Age	Gender	Mechanism of injury	Fracture type	Fracture line	Fracture displacement direction and degree (mm)	Neurol. Deficits	Additional cervical fracture	Screw type	Length of follow-up (month)	Result
1	55	F	TA	Type II	Post-oblique	No displacement	Yes	Yes	Acutrak	6	Fusion
2	56	M	TA	Type II	Post-oblique	Posterior 5.3	Yes	No	Acutrak	6	Fusion
3	16	M	TA	Type III	Post-oblique	Anterior 6.4	Yes	Yes	Acutrak	20	Fusion
4	20	M	TA	Type II	Horizontal	Posterior 6.7	No	No	Acutrak	38	Fusion
5	79	F	Fall	Type II	Horizontal	Posterior 5.2	No	No	Acutrak	No follow	Unknown
6	44	F	Fall	Type III	Horizontal	Posterior 2.3	No	Yes	Acutrak	30	Fusion
7	41	M	TA	Type II	Horizontal	No displacement	No	Yes	Acutrak	14	Fusion
8	60	M	TA	Type II	Post-oblique	Posterior 5.2	No	No	Acutrak	25	Fusion
9	15	M	TA	Type II	Post-oblique	No displacement	Yes	No	Acutrak	1*	Non-union
10	68	F	TA	Type II	Post-oblique	Anterior 5.8	No	No	Acutrak	1*	Non-union
11	32	M	TA	Type III	Ant oblique	Anterior 7.2	Yes	No	Acutrak	21	Fusion
12	72	F	Fall	Type II	Horizontal	No displacement	No	Yes	Acutrak	No follow	Exitus
13	87	F	Fall	Type III	Post-oblique	Posterior 5.7	No	No	Acutrak	6	Fusion
14	71	M	TA	Type III	Post-oblique	Posterior 5.5	No	Yes	Acutrak	6	Fusion
15	55	M	TA	Type II	Post-oblique	Posterior 1.5	No	No	Acutrak	6	Fusion
16	81	F	Fall	Type II	Post-oblique	Posterior 3.7	No	No	Acutrak	7	Fusion
17	19	M	TA	Type II	Post-oblique	Anterior 5.5	No	Yes	Acutrak	No follow	Unknown
18	68	M	TA	Type II	Post-oblique	Anterior 3.7	No	No	Acutrak	7	Fusion
19	54	M	TA	Type II	Post-oblique	Anterior 3.1	No	No	Acutrak	6	Fusion

M: Male; F: Female; TA: Traffic accident. 1*: Patient who came for control in the 1st month after surgery but did not come to the controls later.

length of follow-up (month), were evaluated and data are summarized in Table 1.

There were 12 male and seven female patients. The ages of the patients ranged from 15 to 87 years (mean 52 years and two months). The mechanism of injury was fall and traffic accident in five and 14 patients, respectively. All patients underwent detailed neurological and radiologic examination. Radiological evaluation included neck flexion/extension radiographs, 3D cervical computed tomography (3DCT) scans and magnetic resonance imaging (MRI) of cervical spine.

According to Anderson and D'Alonzo,[5] our patients' fracture types were classified as type II and III. Also, the fracture line was determined in all patients according to Roy-Camille[11] classification system. Fracture line was anterior oblique, posterior oblique and horizontal in one, 13 and five patient respectively. In addition, anterior displacement, neutral and posterior displacements were detected in six, four and nine patients, respectively.

Seven of 19 patients had multiple cervical vertebrae fractures, such as odontoid, atlas and lower cervical vertebrae. One of the seven (Case 3) had atlantoaxial joint instability and this patient was treated with triple anterior screw fixation. Fourteen (73.6 %) patients were neurologically intact. However, five of 19 patients were presented with neurological deficits. One of these five patients had severe neurological deficits. Patient was 32 years old male. He was unconscious after the trauma and was tetraplegic (Case 11). He remained clinically the same in the postoperative period.

There was no complication, such as vascular injury, infection or additional neurological deficits. Successful positioning of the odontoid screws and spinal stabilization was achieved in 18 patients. One of 19 patients had screw malposition in the postoperative CT scan. In this patient, the screw was longer. She underwent revision surgery and a screw with suitable length was inserted (Case 1).

One of the 19 patients (Case 12) died for another cause in the follow-up period. In remaining two of the 18 patients (Cases 5 and 17) did not come to the controls in the postoperative period. Radiological fusion on CT scans was detected in 14 of the remaining 16 (87.5%) patients. Two of 16 patients had nonunion during follow-up time (Cases 9, 10). These two patients underwent posterior C1 lateral mass C2 pedicle screw fixation and fusion surgery.

The patients were followed for a mean duration of 12.5 months.

Case Presentations

Case 6– A 44 years old female patient was admitted to our emergency department with a complaint of neck pain after fall from two meters in height. Her neurological examination was normal. Cervical CT demonstrated type III shallow fracture (Fig. 1a, b). On the posttraumatic 3rd day, she underwent surgery. AOSF was performed, and she was discharged on the postoperative 3rd day. In the 6th months control, cervical CT demonstrated the fusion (Fig. 1c, d).

Case 11– A 32-year-old male patient was brought to the emergency service with intubation, and Glasgow Coma Score was 3. In anamnesis, we learnt that cardiopulmonary resuscitation was done for eight minutes due to cardiac and respiratory arrest after a traffic accident. Radiological examinations demonstrated the type III odontoid fracture. The fracture line was anterior oblique (Fig. 2a, b). Cervical MRI demonstrated the spinal cord injury at the C1-2 vertebra level. He hospitalized in the anesthesia intensive care unit. In the following period, he opened his eyes, but he was quadriplegia. Cervical X-ray was taken. Although he was in cervical color, the odontoid fracture was observed to make significant pressure on the brainstem in a neutral position (Fig. 2c). Thus, the patient was taken to Gardner well traction and the cervical alignment was tried to be corrected (Fig. 2d). During this time, the wound was opened on the patient's neck. Thus, although the anterior approach is not preferred for anterior oblique fractures, transodontoid screw fixation was done

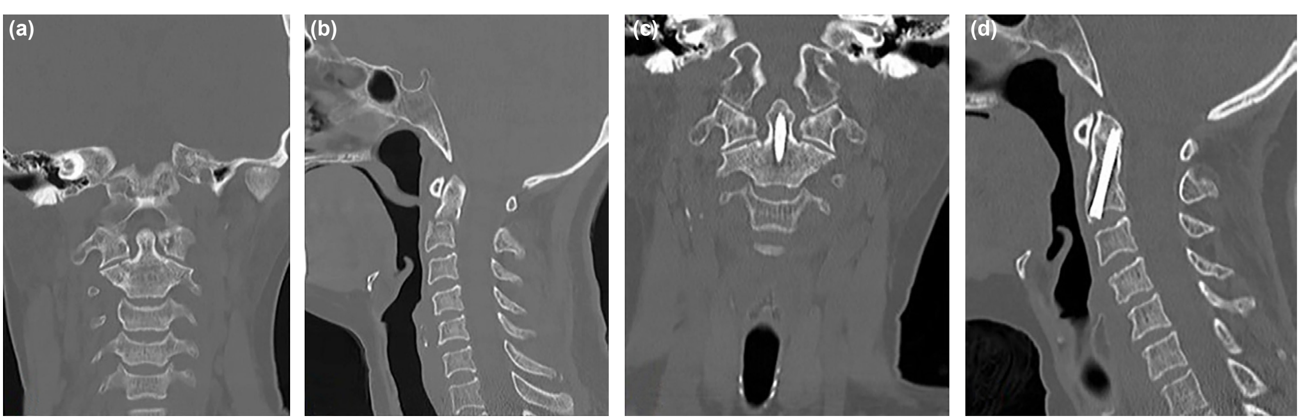

Figure 1. Type III Shallow fracture was seen in coronal and axial CT sections **(a, b)**. Fusion was seen in **c** and **d**.

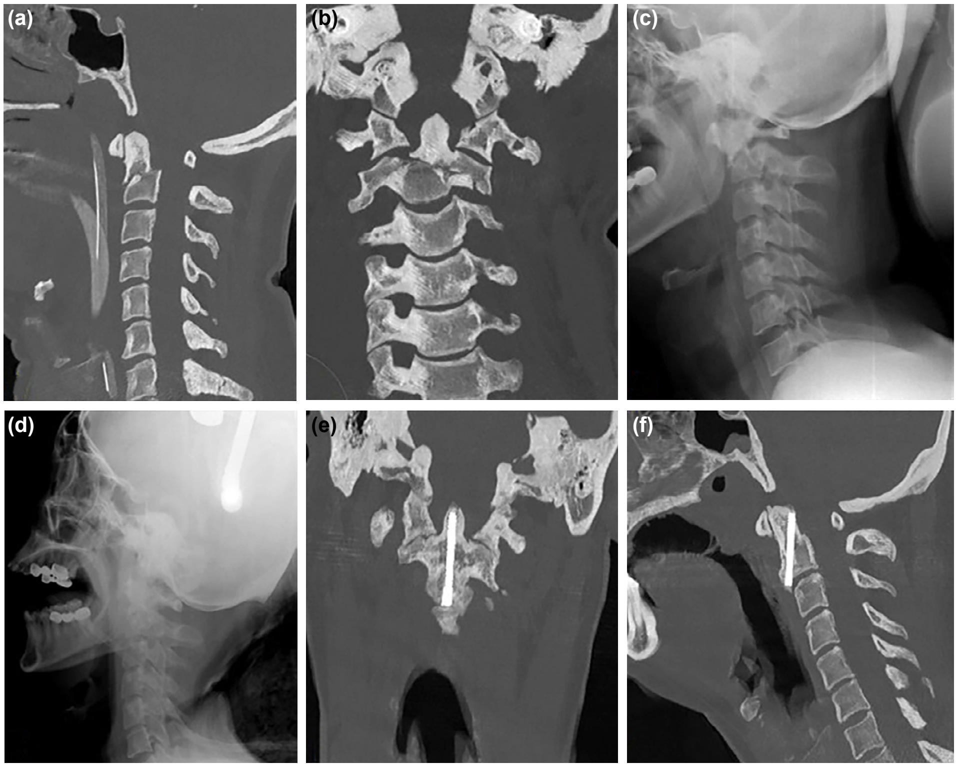

Figure 2. Cervical CT demonstrated type III anterior oblique odontoid fracture **(a, b)**. Lateral cervical X-Ray demonstrated that the odontoid fracture was observed to make significant pressure on the brainstem **(c)**. The patient was taken to Gardner well traction and the cervical alignment was corrected **(d)**. AOSF was done and fusion was detected in cervical CT **(e, f)**.

using the anterior approach. On the follow-up period, CT demonstrated the fusion (Fig. 2e, f).

DISCUSSION

AOSF was first described by Böhler in 1982.[12] This approach is an attractive option for stabilizing unstable odontoid fractures, but it requires an intact transverse ligament and a favorable fracture line to achieve adequate fracture compression.[2] This method has some advantages, such as immediate stabilization with the preservation of rotation in the atlanto-axial joint, lowering the risk of vertebral artery injury, as well as obviating autologous bone grafts and allows a physiological treatment that enables a direct osteosynthesis, with fusion rates from 85 to 100 percent.[1,2,4,6–10,12,13] Many clinical studies have been published in the literature to document the effectiveness of the AOSF technique in the stabilization of unstable odontoid fractures.[4,6,8–10] Fountas et al.[8] have reported the fusion rate as 87.1% in unstable odontoid fractures after AOSF. In our clinical series, the long-term fusion rate was 87.5%, and it was comparable with the literature. In elderly patients, Platzer et al.[4] reported an 89% union rate with relatively low complication rates by AOSF of dens fractures. Similarly, seven of our 19 patients were 65 years old or older. Five of seven patients could be followed up. One of the five patients was non-union. The fusion rate was 80%, and no patient had perioperative complications.

Vascular or neural structure injuries or transient complications, such as postoperative hematoma, dysphagia, and hoarseness, vocal cord paralysis, may occur during AOSF operations.[2] However, spinal surgeons familiar with anterior cervical approaches will have lower complication rates in these stabilization procedures. The most severe potential complication of AOSF remains injury to adjacent vascular and neural structures resulting from over penetration of the apical cortex.[3] There were no perioperative or postoperative complications, such as hematomas, dysphagia, hoarseness, or vascular or neural injuries, in our case series. However, one of the 19 patients had postoperative complications related to the stabilization procedure. Namely, the screw tip penetrated the odontoid tip (Case 1). A screw with suitable size was placed with revision surgery.

To date, various screw types, such as lag screw and Herbert screw, have been used to treat unstable odontoid fractures for AOSF (Fig. 3). Screw properties can be as follow: completely or partially cortical or cancellous bone screws, fully or partially (double partially or single partially) threaded screws, cannulated screws and self-tapping or non-self-tapping screws. These are made of stainless steel or titanium with diameter of 2.7 mm, 3.0 mm, 3.5 mm, 4.0 mm or 4.5 mm screws. All screw types may have different biomechanical properties.[4,9,13] The lag screws (Headed single threaded cannulated screw) are usually used for AOSF to reduce the fracture gap of the

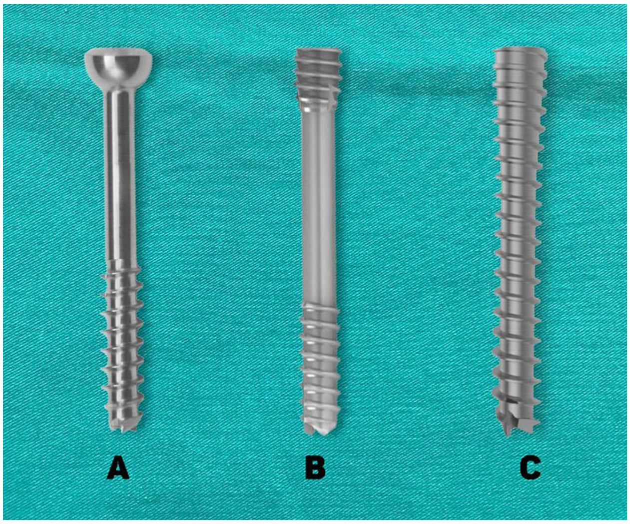

Figure 3. Screw types, such as Lag screw **A**, Herbert screw **B** and Acutrak screw **C**, are seen.

odontoid process. The most typical and widely used of this group is 3.5 mm cannulated lag screw.[3,7,13,14] Theoretically, after the cannulated lag screw has crossed the fracture line, the threads engage the fragment and the lag effect of the screw reduces the fracture gap. Further tightening of the lag screws pulls the odontoid in a caudal direction, compressing the fracture site and enhancing fracture stability, which results in improved healing of the fracture.[3,7,14] Many authors recommended surgical techniques that include perforation of the apical cortex of the dens by lag screw and correct sizing of the implant to obtain bi-cortical purchase to enhance the lag effect during inter-fragmentary compression.[3,7,12,14] In this technique, penetration of the apical cortex could increase the risk of injury of adjacent structures including the brainstem and vertebrobasilar circulation.[3,7,12] In addition, lag screw fixation generally required burr drilling at the upper part of the C3 to make place for the head, and the screw head led to irritation in the anterior upper region C3 in flexion.[3,9] Herbert screws are headless, cannulated and double-threaded, with different pitches on the distal and proximal ends compression screws. It has other unique design features, such as being double-threaded with a different pitch on the leading and trailing thread for inter-fragmentary compression.[7,9,10,14] In 1994, Chang et al.[6] described Herbert screw fixation of displaced type II odontoid fracture. They reported 12 patients using 4.5 mm or 3.0 mm screw with 100% union rate. Also, Sung et al.[10] reported 100% union rate by Herbert screw after AOSF in 10 patients.

The Acutrak screws are a headless, cannulated, self-tapping, tapered and fully threaded with variable pitch designed screw to provide sufficient compressive force across fracture line with insertion.[15,16] Acutrak screw is available in various sizes. The diameter of the Acutrak standard screw is 3.3 mm at the distal end and 3.8 to 4.6 mm at the proximal end. These screws are often used in the treatment of scaphoid fractures by orthopedic surgeons.[15] However, in our literature review, we can found two published article which used Acutrak screw for odontoid fracture. Tonosu et al.[15] treated a 66 years old female patient with Acutrak 4/5 screw who had type II odontoid fracture with anterior displacement. Authors reported that CT scan taken three months after the surgery showed bone union.[15] In other study, Xin et al.[16] identified 14 and 16 patients with odontoid fracture who were treated using the lag screw and Acutrak 4/5 screw respectively. Auhors reported the union rate as 78% and 75% for lag screw and Acutrak screw, respectively.[16] In our clinical series, Acutrak 3/5 screw was used in all patients. We do not know the result of radiology examination for three patients (One patient died and the other two could not be followed). In other 16 patients, evaluation of radiological examinations demonstrated that, 14 of 16 patients (87.5%) had fusion in long term follow-up.

In the literature, there are few published biomechanical studies that compare these screws. McBride et al.[17] demonstrated the biomechanical superiority of a single 4/5 mm Herbert screws than 3.5 mm cannulated lag screws for rotational stiffness and compressive force in odontoid fracture models of human cadaver. Wheeler et al.[18] reported that the compression force of standard Acutrak (3/5 mm) screws was stronger than that of both 4.0 mm lag screws and Herbert screws. Magee et al.[3] compared the biomechanical comparison of Acutrak 4/5 screws and 3.5 mm lag screws in type II odontoid fractures in human cadaveric model. Authors demonstrated that stiffness and load to failure were greater for the Acutrak 4/5 screws when compared with the 3.5 mm lag screws. Although headless (Herbert and Acutrak) screws seem biomechanically more durable than lag screw, there are also some disadvantages. Namely, Acutrak screws are the higher cost than lag screws and if the screws must be removed in the future, it would be difficult to remove.[15,16] In our study, we removed three of the 19 patient's screws (Case 1, 10, 17). In one of three patients, radiological examinations demonstrated the intracranial migration of screw on the postoperative 14th months, and there was no problem with the screw removal procedure (Case 10). In one of three patients (Case 1), we removed screw on the postoperative 3rd day. In the remaining one patient (Case 17), the screw extraction process was required during the first surgery, and we could only perform the screw extraction with the reverse threaded screwdriver.

Conclusion

AOSF is a safe and effective surgical treatment option for unstable (type II and rostral "shallow" type III) odontoid fractures. We have noticed that Acutrak screw could be chosen in the treatment of odontoid fracture in addition to the lag screw and Herbert screw. This study contains the maximum number of patients using the Acutrak screw for odontoid fracture in the literature. However, larger prospective clinical studies can provide more accurate information about the effectiveness of the Acutrak screws for odontoid fractures.

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Ethics Committee Approval: This study approved by the Manisa Celal Bayar University Health Sciences Ethics Committee (Date: 11.03.2020, Decision No: 20.478.486).

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Conflict of Interest: None declared.

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REFERENCES

1. Duransoy YK, Mete M, Zileli M, Selcuki M. A new guide tube for odontoid screw fixation for unstable odontoid fractures: report of 6 case series. Turk Neurosurg 2013;23:639–44.
2. Joaquim AF, Patel AA. Surgical treatment of Type II odontoid fractures: anterior odontoid screw fixation or posterior cervical instrumented fusion?. Neurosurg Focus 2015;38:E11. [CrossRef]
3. Magee W, Hettwer W, Badra M, Bay B, Hart R. Biomechanical comparison of a fully threaded, variable pitch screw and a partially threaded lag screw for internal fixation of Type II dens fractures. Spine (Phila Pa 1976) 2007;32:E475–9. [CrossRef]
4. Platzer P, Thalhammer G, Oberleitner G, Schuster R, Vécsei V, Gaebler C. Surgical treatment of dens fractures in elderly patients. J Bone Joint Surg Am 2007;89:1716–22. [CrossRef]
5. Anderson LD, D'Alonzo RT. Fractures of the odontoid process of the axis. J Bone Joint Surg Am 1974;56:1663–74. [CrossRef]
6. Chang KW, Liu YW, Cheng PG, Chang L, Suen KL, Chung WL, et al. One Herbert double-threaded compression screw fixation of displaced type II odontoid fractures. J Spinal Disord 1994;7:62–9. [CrossRef]
7. Cho DC, Park MK, Kim KT, Sung JK, Che X. Analysis of computed tomography scan after anterior odontoid screw fixation with the herbert screw: Is it effective to reduce fracture gap?. World Neurosurg 2018;117:e631–6. [CrossRef]
8. Fountas KN, Kapsalaki EZ, Karampelas I, Feltes CH, Dimopoulos VG, Machinis TG, et al. Results of long-term follow-up in patients undergoing anterior screw fixation for type II and rostral type III odontoid fractures. Spine (Phila Pa 1976) 2005;30:661–9. [CrossRef]
9. Lee SH, Sung JK. Anterior odontoid fixation using a 4.5-mm Herbert screw: The first report of 20 consecutive cases with odontoid fracture. Surg Neurol 2006;66:361–6. [CrossRef]
10. Sung JK. Anterior Screw Fixation using Herbet Screw for type II odontoid process fractures. J Korean Neurosurg Soc 2005;37:345–9.
11. Roy-Camille R, Saillant G, Judet T, de Botton G, Michel G. Factors of severity in the fractures of the odontoid process (author's transl). [Article in French]. Rev Chir Orthop Reparatrice Appar Mot 1980;66:183–6.
12. Böhler J. Anterior stabilization for acute fractures and non-unions of the dens. J Bone Joint Surg Am 1982;64:18–27. [CrossRef]
13. Liu N, Tian L, Jiang RX, Xu C, Shi L, Lei W, et al. An in vitro biomechanical evaluation of an expansive double-threaded bi-directional compression screw for fixation of type II odontoid process fractures: A SQUIRE-compliant article. Medicine (Baltimore) 2017;96:e6720. [CrossRef]
14. Park JW, Kim KT, Sung JK, Park SH, Seong KW, Cho DC. Biomechanical comparison of inter-fragmentary compression pressures: lag screw versus herbert screw for anterior odontoid screw fixation. J Korean Neurosurg Soc 2017;60:498–503. [CrossRef]
15. Tonosu J, Watanabe K, Abe H, Higashikawa A, Kato S, Yamada K. Anterior screw fixation for an odontoid fracture using an Acutrak 4/5 screw: a case report. Arch Orthop Trauma Surg 2013;133:1681–6. [CrossRef]
16. Xin X, Kakareka M, Turtz A, Yocom S. Use of the Acutrak 4/5 headless fully threaded variable pitch compression screw for odontoid fixation in type II odontoid fractures: A technical note and case series compared with the standard Technique in a single institution. AJONS 2017; 96-106. Available from: http://aoaneurosurgery.org/2017.html.
17. McBride AD, Mukherjee DP, Kruse RN, Albright JA. Anterior screw fixation of type II odontoid fractures. A biomechanical study. Spine (Phila Pa 1976) 1995;20:1855–60. [CrossRef]
18. Wheeler DL, McLoughlin SW. Biomechanical assessment of compression screws. Clin Orthop Relat Res 1998;(350):237–45. [CrossRef]

ORİJİNAL ÇALIŞMA - *ÖZ*

Acutrak vidası kullanılarak yapılan anterior odontoid vida fiksasyonu: 19 hastanın sunumu

Dr. Yusuf Kurtuluş Duransoy,[1] Dr. Mesut Mete,[1] Dr. Ülkün Ünlü Ünsal,[2] Dr. Murat Aydın,[3] Dr. Mehmet Zileli[4]

[1]Manisa Celal Bayar Üniversitesi Tıp Fakültesi, Beyin ve Sinir Cerrahisi Anabilim Dalı, Manisa
[2]Manisa Şehir Hastanesi, Beyin ve Sinir Cerrahisi Kliniği, Manisa
[3]Ödemiş Devlet Hastanesi, Beyin ve Sinir Cerrahisi Kliniği, İzmir
[4]Ege Üniversitesi Tıp Fakültesi, Beyin ve Sinir Cerrahisi Anabilim Dalı, İzmir

AMAÇ: Bu makale, anterior odontoid vida fiksasyonu (AOF) uygulanan hastaların klinik ve radyolojik sonuçlarını sunmayı amaçlamaktadır.
GEREÇ VE YÖNTEM: Unstabil odontoid kırığı olan toplam 19 hasta Acutrak vidası ile ameliyat edildi.
BULGULAR: Hastalar ortalama 12.5 ay takip edildi. Hastaların bilgisayarlı tomografi incelemelerinde %87.5 oranında radyolojik füzyon saptandı.
TARTIŞMA: Acutrak vidaları AOF için kullanılabilir. Bu çalışma, Acutrak vidası kullanılarak yapılan literatürdeki en geniş klinik çalışma olup, Acutrak vidalarının odontoid kırıkların tedavisindeki etkinliğini değerlendirebilmek için daha büyük ileriye yönelik klinik çalışmalara ihtiyaç vardır.

Anahtar sözcükler: Acutrak vidası; anterior odontoid vida fiksasyon; odontoid kırık.

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