

Radius Styloid Process Fractures Treated with Break-Away Screws: Two Cases Report

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Abstract

Usually, radius styloid process fractures without displacement are treated with immobilization. However, surgeons have to attend the wrist contracture after immobilization. We report the case of 2 patients (Case 1: a 45-year-old male and Case 2: a 37-year-old male) with radius styloid process fracture without displacement who were operated with break-away screws. Both patients recovered to excellent in the modified Mayo wrist score and no soft tissue complications were recognized.

Keywords: Radius styloid process fractures; Osteosynthesis; Break-away screw

Historical Perspective

The goal of treatment of radius styloid process fractures are not only to restore the articular congruity of the end of the radius but also to restore the length, alignment and integrity of the supporting volar capsular ligaments of the wrist [1]. Usually, radius styloid process fractures without displacement are treated with immobilization. However, immobilization of the wrist needs at least 4 to 6 weeks [1,2]. However, clinicians or surgeons have to attend the wrist contracture after immobilization.

We treated two radius styloid process fractures without displacement with osteosynthesis using break-away screws.

Case reports and indication

Case 1: A 45-year-old male patient who has felt down on the boat when he was fishing in the fishing boat was admitted to the emergency room with left wrist pain. Radiographs showed a radius styloid process fracture (Chauffeur's fracture, AO classification: type B1) with no displacement (Figure 1A and B). Since he was eager to return to his work quickly, osteosynthesis was chosen for this patient, and preservation of wrist and hand contractures due to splint fixation.

Case 2: A 37-year-old male patient who has felt down from

three meters high was admitted to the emergency room with right wrist pain. Radiographs showed a radius styloid process fracture (Chauffeur's fracture, AO classification: type B1) with no displacement (Figure 2).

Surgical technique

The procedure was performed under locoregional anesthesia and tourniquet inflated to 250mm Hg after exsanguination of the extremity.

One cm longitudinal incision was made on the radius styloid process. Dissection of soft tissue was performed with taking care of extensor pollicis brevis, abductor pollicis longus and superficial branch of radial nerve. Guide wire was inserted from tip of the radius styloid process. After surgeon recognized no displacement in fluoroscopy, break-away screw (Acutwist®, Nihon Medical Next, Osaka, Japan) can be inserted as same direction as guide wire. The operative incision was covered with sterile bandage and fixation called for no immobilization after operation.

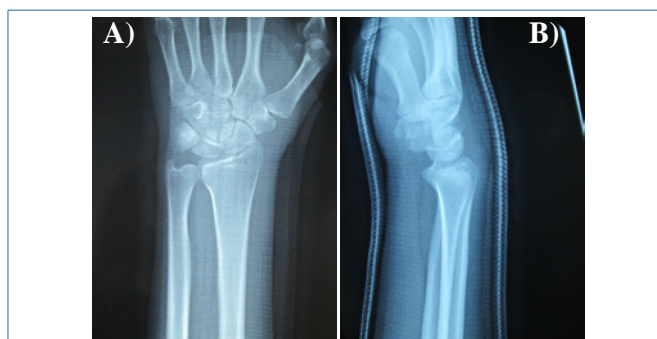


Figure 1: Preoperative radiographs showed radius styloid process fracture without displacement in Case 1. **A:** A-P view. **B:** Lateral view.



Figure 2: Radius styloid process fracture without displacement in Case 2.

Rehabilitation

The postoperative immobilization did not be needed. Active range of motion exercise of wrist and finger was permitted after operation depending on the pain.

Complications

There are no complications in soft tissue and operative scar is almost unrecognized (Figure 3).

Results

Case 1

The fragment of radius styloid process was fixed with 1 break-away screw (Figure 4A and B). Operation time was 10 minutes. At 8 months after operation, the range of wrist motion is 50 for flexion, 45 for extension, 70 for pronation and 90 for supination. The postoperative modified Mayo wrist score is 80 (excellent), Visual analog scale (VAS) is 0/10 and Disabilities of the arm, shoulder and hand (DASH) score is 20.45/100 at 8 months after operation. There are no complications in soft tissue.

Case 2

We performed same procedure as Case 1. However, the fragment of radius styloid process in Case 2 was bigger than Case 1, so we put 2 break-away screws (Figure 5). Operation time was 20 minutes. At 12 months after operation, the range of wrist motion is 80 for flexion, 80 for extension, 90 for pronation and 90 for supination. The postoperative modified Mayo wrist score is 90 (excellent), VAS scale is 3/10 and DASH score is 20.45/100 at 8 months after operation. There are no complications in soft tissue.

Discussion

Nondisplaced fractures can be treated with immobilization in an above-elbow cast with the forearm in supination and the wrist in slight ulnar deviation. Displaced fractures tend to be unstable, if treated by closed reduction and plaster immobilization alone, radiographs should be obtained frequently during the initial six weeks [1,2]. The authors agree



Figure 3: The operative scar is almost unrecognized.



Figure 4: Postoperative radiographs showed radius styloid process fracture treated with a break-away screw in Case 1. **A:** A-P view. **B:** Lateral view.



Figure 5: Postoperative radiograph in Case 2.

with Jupiter [1] and Edwards [2] that satisfactory results can be achieved following closed manipulation and casting. However, we have to attend the wrist contracture after immobilization. The rigid internal fixation can allow immediate mobilization of the wrist, decreasing the stiffness and weakness which may follow prolonged immobilization.

Distal radius fractures often have concomitant carpal bone diastases, specifically scapholunate (SL) dissociation due to disruption of the scapholunate ligament [3-5]. Bunker et al reported that 39% of the patients with distal radius fractures had abnormal SL angles [5]. Moreover, Pilný et al reported that SL instability associated with type B fracture was found in 25% of the patients [6]. According to these reports, radius styloid process fractures have high prevalence of intracarpal ligaments tears, in specially SL ligament. During our procedures for both cases, we evaluated carpal instability by fluoroscopy before and after fixation of radius styloid process fracture. Fortunately, carpal instability has not been detected, so it was not necessary to perform the wrist arthroscopy.

Generally, fixation materials, such as Kirschner wires, cannulated screws and Herbert screws, are used for osteosynthesis of the radius styloid process fractures. Also the radius was exposed between the first and second dorsal compartments, using a longitudinal incision for reduction of

radius styloid process and protection of superficial branch of radial nerve, but this incision might be bigger and cosmetic problem for young patients. Break-away screws are very rare items in the field of hand surgery. Until today, there are very few reports about this technique. Maire et al performed 4 corner fusion using break-away screws [7]. We also used this screw for treatment of hamate hook nonunion [8].

The diameter of the break-away screws (Acutwist®) used was 1.5 mm at the screw tip and 2.0 mm at the proximal stump, which are thinner than those of existing hollow screws, expanding the possibility of insertion into bone fragments previously considered as small fragments. In addition, the screw pitch widens in the transition region from the screw tip to the proximal region so that compressive force is applied to the fractured region by screw insertion. Firstly, insertion of two guide wires before screw insertion may keep the reduced position and prevent rotatory dislocation on screw insertion. Since this screw is also capable of loading a strong pressure on the fractured region. Furthermore, screws can be inserted by preparing only a surgical field for guide wire insertion, requiring no soft tissue dissection to prepare a region for applying fixation materials and screw stumps can be buried in the bone or soft tissue, being less invasive for the surrounding tissue.

However, the fixation by only one break-away screw is danger, because small bone fragment with damage of the periosteum may cause rotatory dislocation during screw insertion. The diameter at the proximal stump of this screw is 2.0 mm, and the bone fragment size has to be large enough to insert 2 screws with an interval. Therefore, when small bone fragments are fixed by break-away screws, the preoperative plan should be carefully considered. Moreover, operators have to have the technical skill of inserting screws in the same direction as guide wire insertion because these screws are not hollow. Since it will be very difficult to remove this screw after “break-away”, we have to check that screws with the handles

are in correct position by fluoroscopy before the handles broken away. However, if surgeons make this kind of mistakes, it is possible to remove this screw from inside bone. Because, the instruments for removing it exist. The price of the implant is 319 \$ or 41100 yen in the market.

Osteosynthesis using break-away screws for the radius styloid process fractures is a new method, and no mechanical study has been performed. However, the radius styloid process fixation with break-away screws was favorable, and favorable bone union was achieved. Although there are some points to be carefully considered, as described above, the screw is useful for the fixation of small bone fragments and osteosynthesis applied in a deep surgical field.

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