



# Can Distal Humerus Fractures Be Treated without Risking the Radial Nerve?

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## ABSTRACT

Distal humerus fractures appear with high energy traumas especially in young patients. They are treated with high surgical methods due to their anatomical location. It is commonly treated with plate osteosynthesis. The most common complication is radial nerve palsy. In our case, we aimed to provide rigid fixation without causing nerve injury. We provided osteosynthesis by using unilateral fixator with elastic nail support. This method both shortened the duration of the operation and prevented the risk of nerve injury. Since the splint is not used, it allows early rehabilitation. This surgical technique is an effective method that can be used safely in distal humeral fractures when applied correctly.

**Keywords:** Distal humerus fractures, radial palsy, external fixator

## ÖZ

### Distal Humerus Kırıkları Radial Sinir Riske Atılmadan Tedavi Edilebilir mi?

Distal humerus kırıkları özellikle genç hastalarda yüksek enerjili travmalarla karşımıza çıkmaktadır. Anatomik yerleşimi nedeniyle yüksek oranda cerrahi yöntemlerle tedavi edilirler. Yaygın olarak plak osteosentez ile tedavi edilir. En sık görülen komplikasyonu radial sinir palsisidir. Biz vakamızda sinir yaralanmasına sebep olmadan rijit fiksasyon sağlamayı amaçladık. Elastik nail destekli unilaterale fiksatör kullanılarak osteosentez sağladık. Bu yöntem hem ameliyatın süresini kısaltmış hem de sinir yaralanması riskinin önüne geçmiştir. Atel kullanılmadığı için de erken rehabilitasyona izin vermektedir. Bu cerrahi teknik doğru uygulandığında distal humerus kırıklarında güvenle kullanılacak etkin bir yöntemdir.

**Anahtar Kelimeler:** Distal humerus kırıkları, radial palsi, eksternal fiksatör

## INTRODUCTION

It is mandatory to perform a meticulous radial nerve exploration in the open reduction + plate-screw osteosynthesis used commonly in distal humerus fractures. This condition prolongs surgical time; however, iatrogenic radial nerve damage is seen in at a rate of 10% (1,2). A surgical method not risking the radial nerve was tried in this case. It was aimed to obtain the required stability supporting the unilateral external fixator with elastic nail.

## CASE REPORT

A 38-year-old male patient presented to our emergency service due to a motorcycle accident. Right humerus distal spiral fracture was detected following physical and radiological evaluation. The patient did not suffer vascular deficit. Motor deficit was not found on radial nerve examination. Localized hypoesthesia was observed on the tip of his thumb. It was evaluated as neuropraxia. Following preparation, the patient was taken into surgery under general anesthesia. A 2-mm elastic nail was

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Figure 1. Pre-operative X-ray.



Figure 3. Post-operative day 45.



Figure 2. Post-operative day 1.

pushed forward until the line of the distal fracture through a 1 cm incision from the anterior of humerus proximal metaphysis. Index finger of one hand was placed through the incision into the fracture line, and the soft tissue was detracted from the fracture line. While reduction was provided holding the elbow of the other hand, the elastic nail was pushed forward until it fastened onto the distal metaphysis. There was no deterioration in the reduction when the arm was set free. Proximally, two 6-Schanz screws were placed 1 cm distally to the distal adhesion site of the deltoid muscle. Distally, two 6-Schanz screws were placed, one proximally and the other distally to the fossa olecrani. It was observed that the movement of the elbow joint was sound. Monolateral carbon tube fixator rods were placed between the Schanz screws. Manual compression was performed, and the system was locked. Although the fracture was spiral, dislocation did not occur when heavy compression was performed. We believe that this is due to the fact that the fracture locks the fracture by sliding over the elastic nail. Surgical time was 27 minutes. Splint stabilization was not performed. A triangle sling was applied, and active elbow movement was started on post-operative day 1. Hypoesthesia of the thumb recovered at the end of the first month. The patient was called for follow-up visits on days 20, 45 and 90. All implants were removed with sedation anesthesia on day 100. No complication was observed during this period of time. Shoulder range of motion

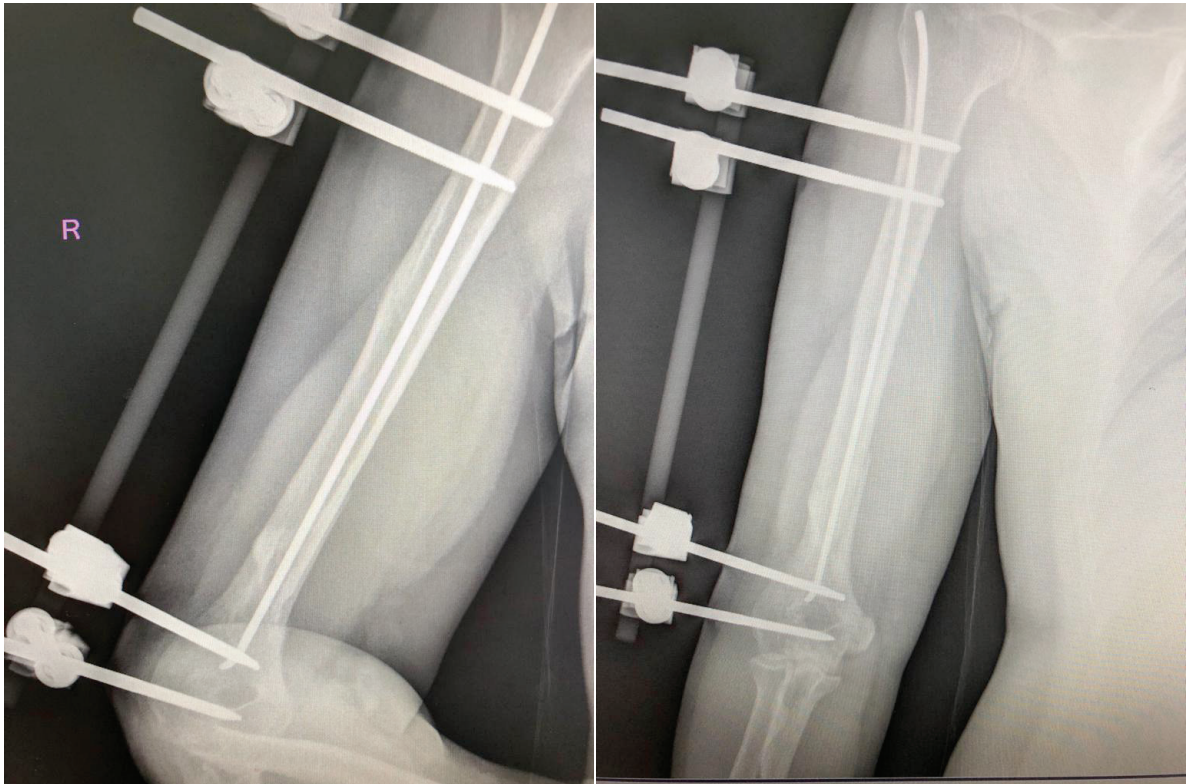


Figure 4. Post-operative day 90.

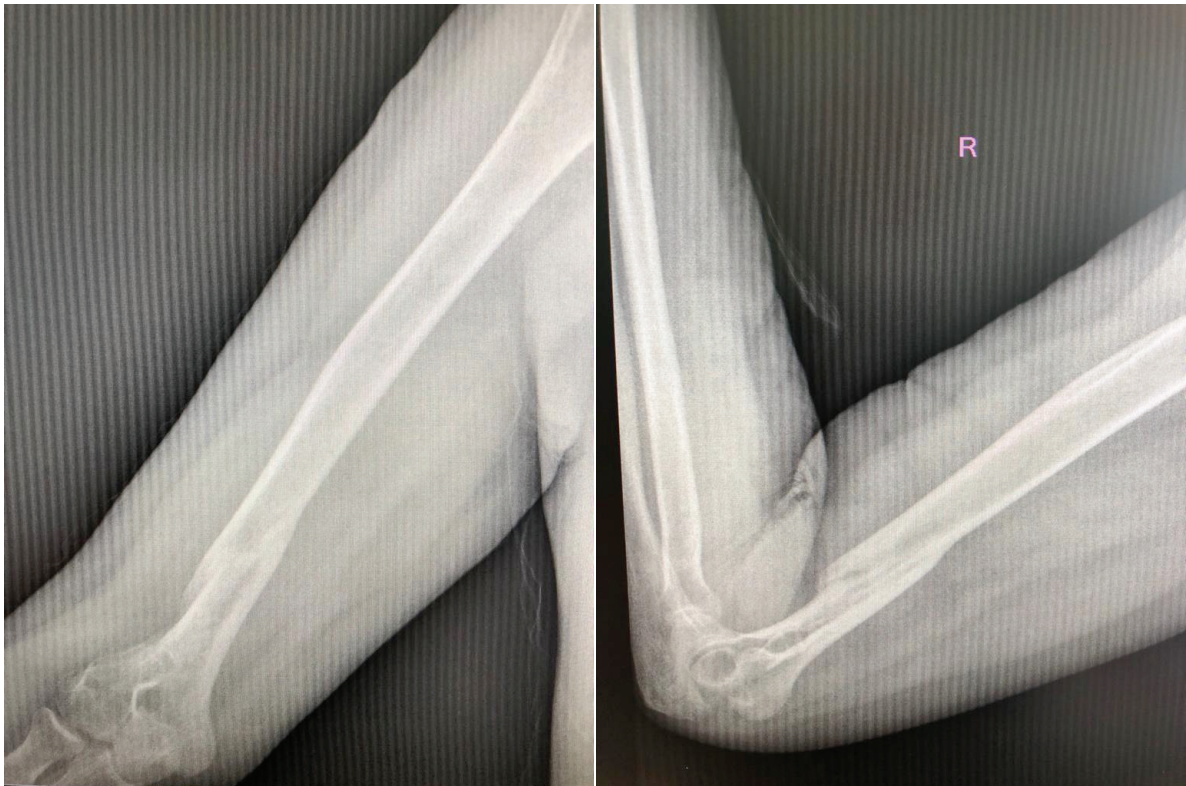


Figure 5. Post-operative day 110.



**Figure 6.** Range of motion of the elbow joint after union.

was sound. Elbow flexion was also sound but there was an 11-degree limitation on elbow extension. The patient did not ask for rehabilitation with physical therapy for this limitation.

## DISCUSSION

Distal humerus fractures constitute 2% of all fractures and approximately two thirds of humerus fractures. The fracture occurs with direct blow to the humerus when one falls onto the elbow in flexion or with an axial stress that develop due to fall onto the open arm. It is easier in osteoporotic patients. In the younger population, these occur due to high-energy traumas like traffic accidents (3).

Following internal fixation, a splint is needed and the pain caused by the wound site delays rehabilitation. Due to the fact that early movement and necessary rehabilitation cannot be provided after treatment, limitation in movement and function may be observed (4).

The most important structure in humerus distal fractures is the radial nerve. It extends distally rotating anterolaterally over the periosteum in 1/3 mediolaterally to the humerus. This condition may cause radial nerve injuries during accidents, while performing reduction or intraoperative exploration (5).

Rates of iatrogenic radial nerve deficit vary in plate-screw osteosynthesis. There are studies reporting iatrogenic radial nerve palsy at a rate of 10% (6).

There are some studies conducted with the usage of Illizarow external fixators for humerus open fractures and non-union cases (7,8). However, we did not come across the use of monolateral external fixator for the treatment of humerus 1/3 distal, close fractures.

In the application of external fixator supported by elastic nail, we provided stability by applying the Schanz screws as far from the fracture line as possible. There is no risk of medullar infection since the elastic nail and Schanz screws do not come in contact. Due to the fact that long arm splint generally required in the plate-screw system for a duration of 20 days postoperatively is not necessary with this technique, rehabilitation is started on postoperative day 1. Our patient started using his hand while eating as of postoperative day 3.

The disadvantage of our study is to live with an external fixator for around three months. However, this surgery becomes advantageous since it seriously shortens operative time, its learning curve is not as long as that of the plate-screw system, there is no risk for radial nerve palsy during surgery and removal of the implants and it is technically easy for the surgeon and the patient .

## CONCLUSION

Application of monolateral external fixator supported with elastic nail is safe and easy in the treatment of distal humerus fractures.

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**Conflict of Interest:** There is no conflict of interest.

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