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# Secondary displacement of distal radial fracture fixed by a plate – a case report

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**ABSTRACT**

Distal radial fractures are one of the most common types of fractures in the elderly. Treatment of these injuries can be conservative and operative, and the decision to undergo surgery is made on the basis of various factors, the most important of which is the anticipated fracture instability. Fixation of this fractures by a plate is considered very stable, and if correctly done, provides almost 100% of stability (it means that the risk of secondary displacement is extremely low). In the article we present a case of apparently correct fixed distal radial fracture which displaced in the course of the treatment and was discovered at the follow-up assessment at 5 years after surgery. The patient presented with wrist deformation and severe disability of the hand. Possible causes of this situation are discussed.

**Keywords**: distal radial fracture; palmar plate fixation; secondary displacement; operative treatment failure.

## INTRODUCTION

Distal radial fractures are one of the most common types of fractures in the elderly. They are more common in women than in men, which is primarily due to higher life expectancy in females. Factors that contribute to fractures are osteoporosis and balance disorders common in older age [1, 2]. Treatment of these injuries can be conservative and operative, and the decision to undergo surgery is made on the basis of various factors, the most important of which is the anticipated fracture instability, i.e. the possibility of significant displacement after reduction [3, 4, 5]. Therefore, fractures with a high degree of instability are treated surgically, usually by osteosynthesis with a titanium plate [2, 5]. Such fixation is characterized by excellent stability so that treatment can be carried out without any additional immobilization.

Distal radial fractures usually consolidate within 4–5 weeks, but unstable fractures which are treated conservatively in the plaster splint can displace, even at third and fourth week. Also fractures treated operatively by percutaneous with K-wire fixation can dislocate during first 1 month, because this type of osteosynthesis, in some circumstances (osteoporotic bone, comminuted fracture), does not warrant enough stability [3, 5]. In contrast, plate fixation is considered very stable, and if correctly done, provides almost 100% of stability. It means that the risk of secondary displacement of the fracture stabilized by plate is extremely low. In some circumstances, i.e. so called "troublesome palmar, marginal fragment" or "lunar facet" – when the fracture involves thin, palmar fragment of the medial column, standard fixation with the palmar titanium plate may be not sufficient and the fracture can displace 2–3 weeks after surgery (usually it associated with dislocation of the whole carpus). The palmar marginal fragment is a small peripheral piece of bone which is critical to carpal stability. Failure to achieve good fixation of this fragment can result in palmar subluxation of the carpus and distal radioulnar joint instability. Due to its small, distal nature, this fragment can be easily missed and difficult to fix [6, 7]. However, except of this very particular situation, severe displacement of distal radial fractures fixed by plate is extremely rare. In this paper we present such a case which occurred in the authors institution.

## CASE REPORT

In May 2018 year, a 73 years-old women sustained fracture of her distal radius and ulna of the right hand as a consequence of fall on an outstretched hand. It was serious injury and the fracture was comminuted, multi-fragmental, displaced palmarly and of very unstable configuration (Fig. 1). The fracture can be classified as group C2 in the AO classification. The patient was given surgery the day after admission to the authors' institution. Operation was performed under brachial plexus block anaesthesia, with a tourniquet, using a palmar approach. The fracture of the distal radius was reduced and stabilized with titanium plate (Aptus, Medartis), whereas the fracture of the distal ulna underwent spontaneous reduction to acceptable position and was left without fixation. Post-operative X-rays showed good alignment of bone fragments (Fig. 2). The wrist was next immobilized in a plaster splint for 4 weeks, mostly due to fracture of the distal ulna. Post-operative course was uneventful and the patient recovered within 2 months. The lady had on month-course of formal rehabilitation. After completing of the informal rehabilitation she did not present in the authors' outpatient clinic.

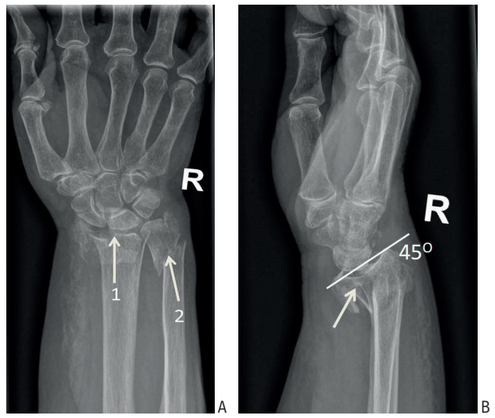
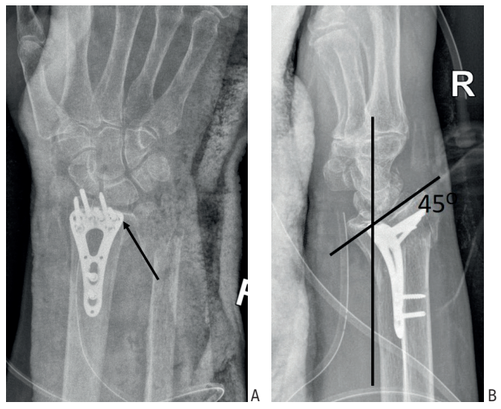



**FIGURE 1.** An X-ray of the: A. p-a view. Distal radial fracture (marked with 1) and distal ulna (marked with 2); B. fracture, lateral view. An oblique line show palmar angulation of 45° of the palmar fragment (marked with an arrow)




an oblique line – palmar tilt of the articular surface (45°); vertical line – position of the carpus; note palmar dislocation of the carpus of about 1 cm

**FIGURE 2.** Postoperative X-ray of the fracture fixed by a plate: A. p-a view. Bone fragment of the middle column which may not have been caught by the screw is marked with an arrow; B. lateral view. Note that palmar angulation is not reduced (oblique line)

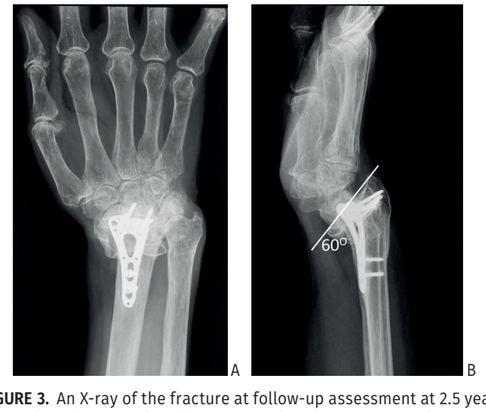



**FIGURE 3.** An X-ray of the fracture at follow-up assessment at 2.5 years: A. p-a view; B. lateral view. Note palmar displacement of the distal radius (angulation of 60°), and palmar shift of the carpus of about 1.5 cm

In January 2024 (5 years after the operation) the patient was invited for a follow-up visit during the study conducted in the authors' institution. Surprisingly, she presented with serious deformation of the wrist and severe disability of the affected hand. The wrist deformation was bayonet-like, she declared mild pain at wrist movements of 2 points in the Numeric Pain Scale (NRS; range 0–10), considerable reduced wrist range of motion – palmar flexion 30°, dorsal flexion 20° (50% and 26% of the contralateral healthy wrist), very weak grip (grip strength 2 kG (25% of the other hand) and extremely high score of the Disability of Arm, Shoulder and Hand questionnaire (DASH) – 79, suggesting severe disability of the extremity. An X-ray performed showed distal radius united in considerable displacement (malunion), without failure of the hardware (Fig. 3). The patient was proposed reconstructive surgery (removal of the plate followed by corrective osteotomy), but at the moment she did not decide to undergo next surgery.

## DISCUSSION

The presented case is strange, unique, and never seen before in the authors' institution which deals with 200–300 of distal radial fractures a year. An analysis of X-ray did not allow to explain of such a strange course of apparently correct fixed fracture. Secondary displacements of distal radial fractures treated conservatively, even very severe, are fairly common (Fig. 4). Secondary displacements of these fractures treated by percutaneous K-wire pinning are rare, but they may occur. However, secondary displacement of the fracture correctly fixed by a plate is extremely rare. It can occur in the case of additional trauma, i.e. fall on operated hand, but it was not a case in present patient. Looking at the post-operative X rays one may find some irregularities, i.e.:

- palmar tilt (angulation) of the articular surface was too big (45°; Fig. 2B), while it should be 10–15°. It suggests intraoperative incorrect reduction of the bone fragments;

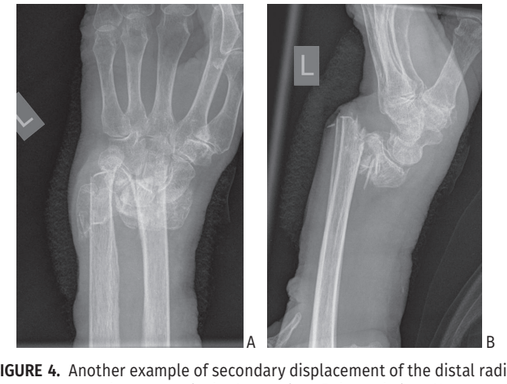



**FIGURE 4.** Another example of secondary displacement of the distal radial fracture, treated conservatively: A. p-a view; B. lateral view. Note severe dislocation of the carpus of about 2.5 cm

- middle column (ulnar side) of the distal radius seems not to fixed with the screws (Fig. 2A).

Both these findings can suggest that fixation of this fracture was not perfect and that created a risk of subsequent displacement of the middle column, together with the whole carpus. It could be a situation similar to those described in some articles as "troublesome palmar, marginal fragment", "anterior rim fracture" or "lunar facet fracture" [6, 7]. The authors can only speculate that this was the scenario leading to the current situation.

The vast majority of scientific papers, especially case reports, present successes and examples of mastering difficult or rare cases. Presentation of failures, for obvious reasons, is much rarer. It seems, however, that discussion of failures has been even more instructive than bragging about successes, because a wise proverb says that it is best to learn from the mistakes of others.

The authors did not find similar case in the literature and this prompted them to prepare and submit this article.

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