

Principles of External Fixation in conjunction with Internal Fixation in distal radius fractures: a 31-case sample

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SUMMARY

This study discusses external fixation associated with internal fixation in distal radius fractures. Among the treatment methods, External Axial Fixation (FEA) is usually chosen for unstable fractures, such as C2-C3 (AOSpine Trauma Classification). Our experience and 3 case studies are provided.

KEY WORDS

Distal radius fractures, External Axial Fixation, Internal fixation.

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INTRODUCTION

In this study, our experience on External Fixation associated with Internal Synthesis in distal radius fractures is provided.

In the treatment of these fractures, procedures should follow the the guiding principles of anatomical reduction and early functional recovery, especially in young and/or active workers (EDWARDS, 1991).

Among the treatment methods, External Axial Fixation (FEA) is usually chosen for unstable fractures, such as C2-C3 (AOSpine Trauma Classification) (CHEN & JUPITER, 2007) (Fig. 1).

MATERIAL AND METHODS

From 2005 to 2018 we have treated over 90 cases of fractures with FEA. Over the years, we aimed to minimize failures and to optimize results, gaining the following insights:

1) Some of the advantages: greater comfort, removal of plaster cast, early functional recovery, better management of exposed fractures;

2) Some of the disadvantages: greater commitment and longer learning curve, increased risk of iatrogenic lesions, quicker post-operative management;

3) What we learned: the FEA cannot be well positioned without fracture alignment in traction (Fig. 1), the FEA does not allow for early mobilization, the FEA cannot be angled like a plaster cast, the FEA alone is not enough to maintain the fractures reduction and that it can be removed before consolidation.

Today we believe that: the FEA should be applied to the limb already in traction through ligamentotaxis; searching for a position that allows early mobilization is misleading; it is dangerous to keep the FEA in traction and its angulation without intrinsic stability of the fracture. Misuse of the FEA can lead to its worst complication, algodystrophy (Fig. 2).

Therefore, in accordance with recent literature (LAURI & CERUSO, 2001; ROGACHEFSKY ET AL., 2021; SLUTSKY, 2007; KLEINLUGTENBELT ET AL., 2017), we believe that in distal radial fractures, the FEA should be used with extreme caution and only in a technical-operational function to support the reduction. Conversely, for the best result, fracture synthesis should be entrusted to intrinsic means (K-wires, free screws, normal or angular stability plates, etc.). Hence, our current protocol: 1) FEA application with limb in traction and in functional position; 2) if reduction is acceptable we can proceed with percutaneous synthesis (wires, screws, etc.) (Fig. 3);

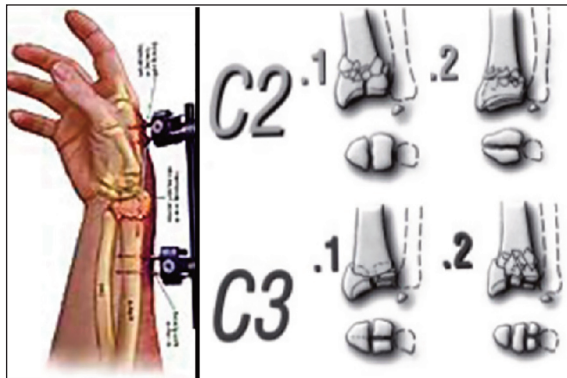


Figure 1. External Axial Fixation (FEA) is usually chosen for unstable fractures, such as C2-C3 (AOSpine Trauma Classification).



Figure 2. Misuse of the External Axial Fixation (FEA) can lead to its worst complication, algodystrophy (as seen in the photos).



Figure 3. In the first phase of the FEA, if the synthesis is acceptable, we can proceed with the percutaneous synthesis (wires, screws, etc.).

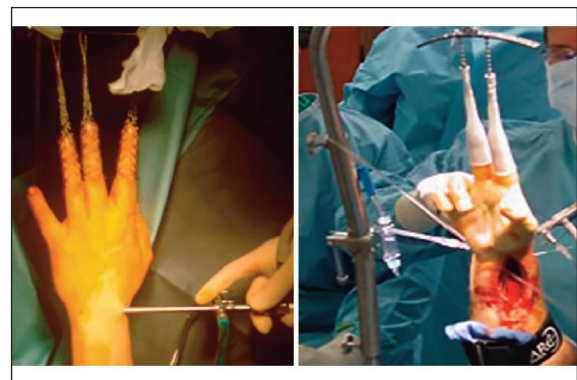


Figure 4. If the reduction is not acceptable, we proceed with arthroscopic reduction and percutaneous synthesis or open reduction and synthesis with plates, wires, etc.

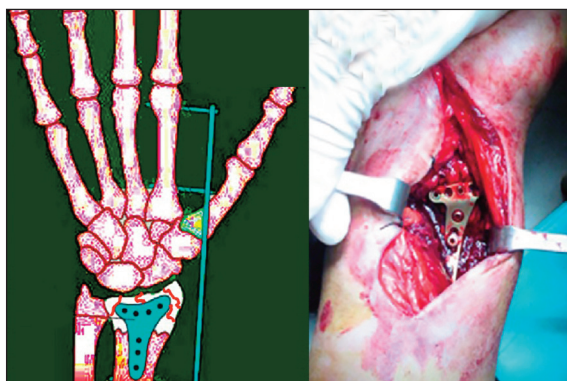


Figure 5. In open synthesis, the FEA is the best operator aid as it allows you to work on the fragments, like in an isolated anatomical piece.

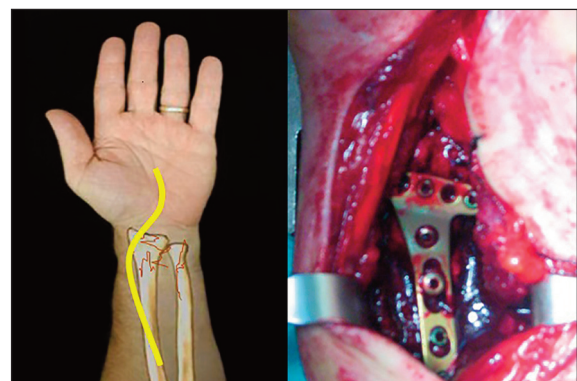


Figure 6. The preferred way of surgical access in this study is volar, curved in an Italic S shape to have ample room for maneuver (see photos).

3) if the reduction is not acceptable we can proceed with arthroscopic reduction and percutaneous synthesis or open reduction and synthesis with plates, wires, screws, etc. (Fig. 4); 4) after synthesis, neutralize the tension on the FEA; 5) in the 3rd week, remove the FEA and start the physio-kinesiotherapy. It is important to keep in mind that in open synthesis the FEA is the best assistant operator as it allows you to work on the fragments, like in an isolated anatomical piece (Fig. 5).

Our preferred way of surgical access is the volar surface, curved in an Italic S shape to have ample room for maneuver and to neutralize scar retraction. The FEA is applied dorsally, angled at 45 degrees on the interosseous plane, as to not disturb the operator and to facilitate osteosynthesis (Fig. 6).

RESULTS

The results are valued according to a modified version of the functional scale of Green-O'Brien on a sample of 31 patients (13 males and 18 females) all treated with FEA plus volar plaque, from October

2005 to December 2018. The mean follow-up has been of 18.8 months. The patients showed the following results: 22 were very good-good (71%), 6 were discrete (20%), 3 were discrete-poor (9%). A few cases as examples:

Case 1: Pre and post-operative comminuted distal radio-ulna fracture-dislocation (Figs. 7, 8).

Case 2: Pre and post-operative palmar distal radial fracture-dislocation (Barton type) (Figs. 9, 10).

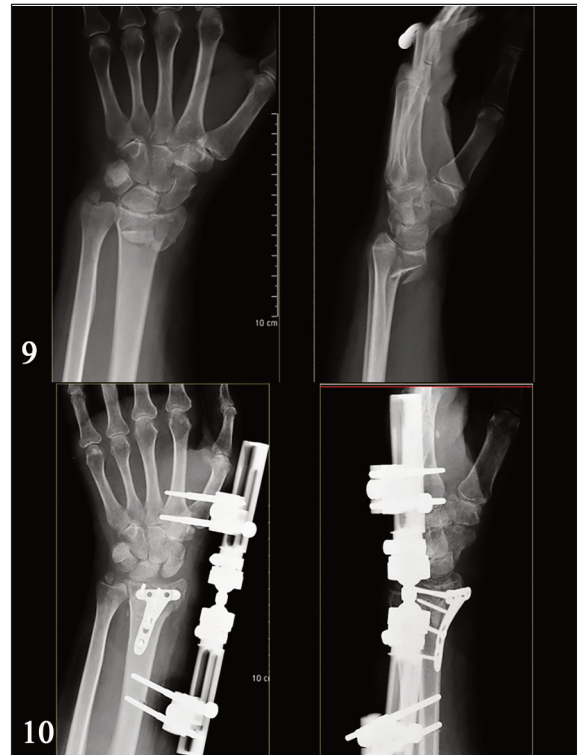
Case 3: Unstable pre and postoperative multifragmentary distal radial fracture in right and left wrist (Figs. 11, 12).

CONCLUSIONS

In distal radial fractures (type C2-C3, AO classification system; III - IV type Universal classification system; V-VI-VII-VIII Frykman classification systems; etc.) the association FEA + internal synthesis is the best choice.

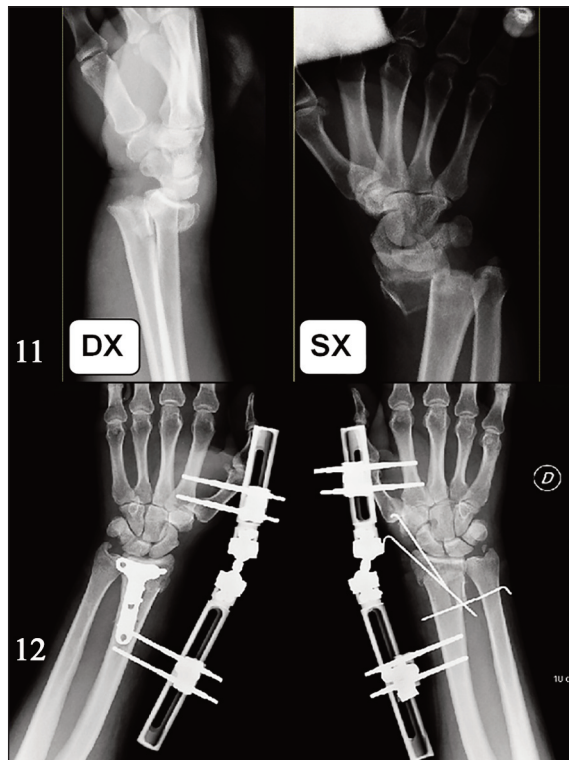


Figures 7, 8. Case 1: pre and post-operative comminuted distal radio-ulna fracture-dislocation.



Figures 9, 10. Case 2: pre and post-operative palmar fracture-dislocation RD (Barton type).

The aforementioned protocol has proved to be a valid and optimal procedure.



Figures 11, 12. Case 3: pre and postoperative multifragmentary fracture unstable distal radius in right and left wrist.

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