

Arthroscopic Management of Intra-articular Malunion in Fractures of the Distal Radius



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KEYWORDS

- Arthroscopic-assisted osteotomy • Inside-out osteotomy • Distal radius malunion
- Arthroscopic arthrolysis • Intra-articular malunion radius

KEY POINTS

- Intra-articular malunions of the distal radius are time sensitive. Delaying treatment for more than 3 months can result in irreversible cartilage damage.
- Arthroscopic treatment of intra-articular malunions allows for better visualization, precision, and preservation of capsular blood supply than open techniques.
- Dry arthroscopy allows for adequate visualization of the wrist joint without excessive edema caused by wet arthroscopy.
- Resection arthroplasty is an acceptable alternative to wrist arthrodesis in certain cases.

INTRODUCTION

Intra-articular malunion after a distal radius fracture can be debilitating. The diagnosis is often elusive and patients may arrive in your office in a delayed fashion. Unfortunately, during the delay, irreversible damage to the cartilaginous surfaces may occur.¹⁻³ Patients are often diagnosed with complex regional pain syndrome, as there is chronic pain after the distal radius fracture that is in fact a malunion and being missed. This is unfortunate because the malunion, when diagnosed early, can be successfully treated and panarthrodesis can be avoided.

Traditional treatment for the malunion of the articular surfaces after a distal radius fracture was pioneered in the 1990s.⁴⁻⁹ Intervention involved re-cutting the displaced fragments and reducing them anatomically under fluoroscopic guidance. Osteotomies were made volarly or dorsally based on the location of the malunion. These are considered “outside-in” techniques.

There are reports of excellent results with the outside-in approach.⁷⁻⁹ However, the capsular window must be made very large to allow for adequate visualization during osteotomy, and even then, it is somewhat blind, especially when treating a volar shear malunion, as the volar ligaments must be maintained. Additionally, once the malunion is reduced, the joint space becomes extremely narrow. Maintenance of reduction can be relied on only with “feeling” and fluoroscopy.¹⁰

Arthroscopic treatment of intra-articular malunions was developed in an effort to better maintain the blood supply to the surrounding tissue and to attain better visualization of the osteotomy sites. At first, “wet” arthroscopy was implemented; however, visualization remained difficult. Dry arthroscopy resulted in a much better visualization and has become our gold standard for the treatment of distal radius malunions.^{11,12}

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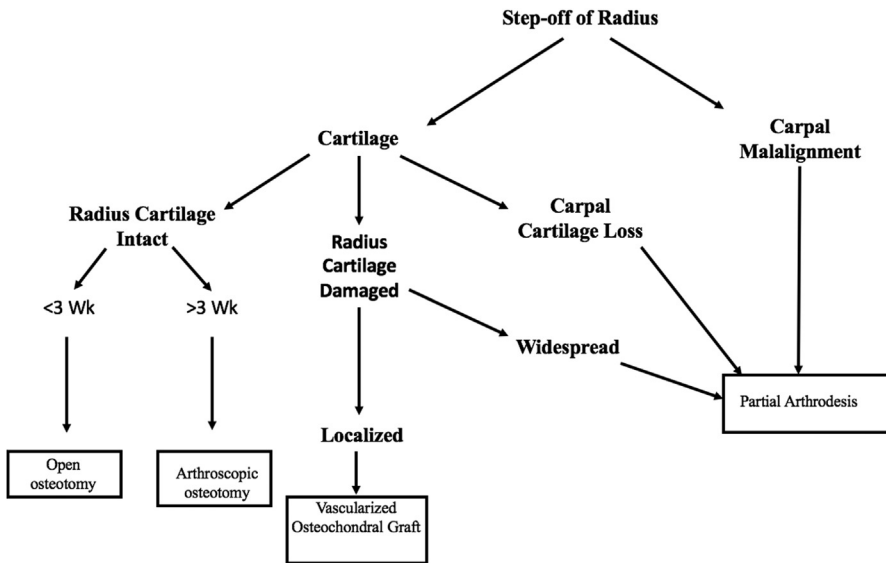


Fig. 1. Decision tree for treatment of intra-articular distal radius malunions.

We describe our arthroscopic method for the treatment of intra-articular malunions of the distal radius.

INDICATIONS AND CONTRAINDICATIONS

Candidates for traditional “outside-in” osteotomies are also eligible for arthroscopic-guided “inside-



Fig. 2. Volar-ulnar and limited Henry approach for a complex multipiece malunion. (© Dr Piñal, 2010.)

out” osteotomy.¹³ A preoperative computed tomography (CT) scan is essential for decision making and operative planning.

Traditionally, a patient with a malunion and an intra-articular step-off of 2 mm or more would be a candidate for an osteotomy, whether there was pain or not.¹ A more controversial approach would include patients with a step-off of 1 mm.^{14,15} In fact, if a patient is young and active, a step-off at the lunate or scaphoid fossa will produce symptoms even if it is only a 1-mm step-off. On the other hand, in a low-demand patient or if the step-off is not at the lunate and scaphoid fossa, but in the sagittal crest, it may be possible to avoid a procedure to correct an area that may not undergo much cartilage wearing. These situations should be considered on a case-by-case basis.

Timing is also important. Beyond 6 to 8 weeks after the fracture, the fracture sites are filled up with mature bone rather than scar and granulation tissue, which makes osteotomies more difficult. Some would suggest waiting and would intervene when the patient finally has symptoms of cartilage wear. However, in our opinion, this treatment approach burns the bridge, as the major contraindication to intra-articular osteotomy is the loss of the radius or carpal articular cartilage. Waiting has no benefit, and solutions have to be sought to prevent further cartilage wear. When the radius cartilage is worn but the carpals are fine, our preferred approach is to reconstruct the radius by means of a vascularized osteochondral graft.^{16,17} If both the radius and carpal bones have loss of cartilage, resection arthroplasty is our best option and we experienced very pleasing postoperative

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