Leveraging the Plate: Reliably Restoring Volar Tilt of Distal Radius Fractures

Alexander S. McLawhorn, MD, MBA; Elizabeth A. Cody, MD; Alison Kitay, MD; Elan M. Goldwyn, MD; Alexander Golant, MD; Tony Quach, MD

Abstract: Restoration of volar tilt is critical when performing open reduction and internal fixation of distal radius fractures. A reproducible technique is required to consistently achieve this goal. A simple technique using the locking plate and an electrocautery scratch pad as reduction tools can reliably generate volar tilt. This technique can be performed with minimal aid from surgical assistants. [Orthopedics. 2013; 36(12):918-921.]

Distal radius fractures are common, with an increasing annual incidence across age groups and geographies.1-3 These fractures are frequently dorsally angulated.4 Indications for operative fixation are postreduction intra-articular displacement greater than 2 mm, radial shortening greater than 3 mm, or dorsal tilt greater than 10°.5,6 Along with articular reduction, a primary goal of operative management is restoration of the normal anatomic volar tilt of the distal radius. Numerous methods for reduction and fixation have been published.7 Volar locking plates are a popular fixation option, given a perceived decreased risk of dorsal soft tissue complications compared with dorsal plating and the rigidity of the locking plate construct.8 The technique described herein has allowed the authors to reliably and reproducibly achieve volar tilt in dorsally angulated distal radius fractures treated with volar locking plates. A single surgeon can perform this technique with minimal assistance from other surgical personnel.

Surgical Technique

The patient is positioned supine on the operating table with a hand table extension. A standard volar (Henry) approach is performed, exposing the distal radius and fracture fragments. A provisional manual reduction is performed with gentle traction and volar carpal translation, and attention is turned toward fixation (Figures 1A-1F).

Step 1: The provisional reduction is held with Kapandji-style K-wires (Figure 1A).9

Step 2: The appropriately sized volar locking plate is selected and positioned in the desired proximal-distal and medial-lateral dimensions. The authors most commonly use a 3-hole, 2.4-mm, variable-angle distal radius locking compression plate (Synthes Inc, West Chester, Pennsylvania). A threaded drill guide inserted into one of the distal locking screw holes is useful in manipulating the plate position, and the plate is secured to the distal bone provisionally with a K-wire (Figure 1B).

Step 3: A quarter of the Bovie (Bovie Medical Corp, Melville, New York) scratch pad (approximately 20×20×5 mm) is cut and folded in half (Figure 2A). This section of scratch pad is added to the surgical count by the surgical technician and circulating nurse. It is then placed deep to the plate, proximal to the oblong hole, levering the plate such that its distal aspect is flush to the bone and the proximal aspect is elevated. The bulk and friction of the scratch pad serves to minimize toggle of the plate on the bone in a hands-free fashion. The coronal alignment of the plate is fine-tuned under direct visualization and with fluoroscopy, and a single cortical screw is placed through the center of the elongated hole such that bicortical fixation is achieved without significant compres-
Sion of the scratch pad (approximately 2 mm). The coronal alignment and length of the construct is thus fixed, and the plate remains flush to the radius distally in a hands-free manner (Figures 1C and 2B).

Step 4: Distal locking screws are applied through the plate in the usual fashion (Figure 1D).

Step 5: With the plate secured to the distal fragment, all K-wires and the scratch pad segment are removed. The cortical screw is tightened, advancing the proximal aspect of the plate to the radial shaft. This maneuver takes advantage of the fixed-angle device to augment volar tilt in a predictable fashion. Bringing the plate down to the radial shaft brings the distal fracture fragment volarly as it is locked to the distal aspect of the plate.

Step 6: Remaining bicortical shaft screws are placed, and the screw in the elongated hole is exchanged for a shorter one of appropriate length (Figure 1E).

The final reduction and hardware placement are confirmed on lateral and anteroposterior fluoroscopic views (Figures 1E-1F), and closure proceeds in the usual fashion.

**DISCUSSION**

Volar plate fixation has gained popularity for dorsally displaced distal radius fractures. Some studies suggest that patients treated with volar locked plating have earlier return of hand function and higher satisfaction compared with patients treated with other fixation methods, including dorsal plating, radial column plating, and external fixation.10-12 The volar approach also affords greater ease of reduction because the volar cortex tends to be less comminuted than the dorsal cortex.13

Although using the plate as a reduction aid is not a novel technique for distal radius fracture reduction,14,15 the modification described herein uses a Bovie scratch pad segment as a wedge to stably lever the plate onto the distal fracture fragment(s). The bulk and fric-
The technique described herein has the advantage of hands-free stabilization of the proximal plate, which facilitates appropriate distal screw placement and a predictable degree of volar angulation. The authors have found this technique particularly useful for patients with significantly osteoporotic bone, for fractures with significant dorsal comminution, and in scenarios with little or poor surgical assistance. To ensure success with this technique, it is critical to obtain fixed-angle fixation in the distal fragment(s) so that the locking screws will not pull out on final seating of the proximal cortical screw. If there is inadequate bone stock distally, other reduction and fixation methods should be considered. If there is metaphyseal bone loss necessitating application of graft or bone substitute, the authors suggest applying these after the reduction is finalized and the hardware is in place.

**Conclusion**

This technique provides a simple, inexpensive method of restoring volar angulation of dorsally displaced distal radius fractures fixed with volar plates. This technique may be especially useful for surgeons operating with limited surgical assistance.

**References**


