

# Complications of Distal Radius Fixation



Dennis S. Lee, MD<sup>a,\*</sup>, Douglas R. Weikert, MD<sup>b</sup>

## KEYWORDS

• Complications • Tendon rupture • Distal radius fracture • Tenosynovitis

## KEY POINTS

- Complications following fixation of distal radius fractures remain prevalent despite advances in fixation technology.
- Volar locked plating, dorsal plating, dorsal bridge plating, fragment-specific fixation, external fixation, and percutaneous pinning confer fixation-specific risks as well as complications common to all treatment modalities.
- Understanding of the complications associated with various fixation options is essential to informed decision making and optimizing patient outcome.

## BACKGROUND

Distal radius fractures are common upper extremity injuries, with an annual incidence of 16.2 fractures per 10,000 persons,<sup>1</sup> or more than 640,000 cases per year.<sup>2</sup> Prior studies have highlighted the significant variation in treating these injuries owing to regionality, patient age, sex, race, and whether a hand surgeon is the treating provider.<sup>3–5</sup> Regardless, the burden of distal radius fractures is expected to increase as the US population ages, concomitant with a trend toward more widespread use of internal fixation.<sup>6</sup>

Fixation strategies for distal radius fractures have undergone a rapid shift toward open treatment since the introduction of volar locked plating (VLP), particularly among younger US orthopedic surgeons.<sup>7</sup> In addition to VLP, there exists a myriad of other fixation options, including percutaneous pinning, external fixation (bridging and non-bridging), dorsal plating, dorsal bridge plating, and fragment-specific fixation.<sup>8</sup>

VLP seems to be trending as the most popular choice of fixation,<sup>7</sup> but enthusiasm for this option should be tempered by an understanding of its complications compared with other methods. A recent meta-analysis by Li-Hai and colleagues<sup>9</sup> showed similar complication rates between external fixation and VLP at 30.9% and 23.9%, respectively, but also found a significantly higher rate of reoperation caused by complications in the latter. In a randomized controlled trial with 5-year follow-up, Williksen and colleagues<sup>10</sup> found that the incidence of secondary operations for complications was 31% in patients treated with VLP, which was significantly greater than the 17% incidence in those treated with external fixation and percutaneous pinning. Arora and colleagues<sup>11</sup> reported an overall complication rate of 27%, with flexor and extensor tendon injury being the most frequent complications (57%). The risk of complications may also be higher in elderly patients undergoing VLP, as suggested by a randomized controlled trial by Arora and colleagues<sup>12</sup>

Disclosures: The authors report no potential conflicts of interest.

<sup>a</sup> Orthopaedic Surgery and Rehabilitation, Vanderbilt University Medical Center, 1215 21st Avenue South, Medical Center East, South Tower, Suite 4200, Nashville, TN 37232, USA; <sup>b</sup> Orthopaedic Surgery and Rehabilitation, Hand and Upper Extremity Center, Vanderbilt University Medical Center, 1215 21st Avenue South, Medical Center East, South Tower, Suite 3200, Nashville, TN 37232, USA

\* Corresponding author.

E-mail address: [dennis.lee@vanderbilt.edu](mailto:dennis.lee@vanderbilt.edu)

Orthop Clin N Am 47 (2016) 415–424

<http://dx.doi.org/10.1016/j.ocl.2015.09.014>

0030-5898/16/\$ – see front matter © 2016 Elsevier Inc. All rights reserved.

that found a 36% complication rate in patients older than 65 years of age. Lutz and colleagues<sup>13</sup> reported similar findings.

There is a vast but largely inconclusive body of evidence<sup>14–17</sup> regarding the ideal fixation for distal radius fractures. With the resultant lack of definitive evidence-based guidelines<sup>18</sup> and overall complication rates exceeding 30%,<sup>11,19</sup> familiarity with the complications of various methods of distal radius fixation can better equip practicing surgeons in making informed decisions on a case-by-case basis.

## POSTOPERATIVE INFECTION

Infection is an ever-present risk following distal radius fixation because of violation of the integument. *Staphylococcus aureus* remains the most common isolated microbe, followed by mixed flora.<sup>20</sup> Methicillin-resistant *S aureus* is also increasingly being cultured from hand and wrist infections and should be considered as a causative organism.<sup>21</sup>

Pin-track or superficial infections following external fixation represent the most common type of postoperative infection following distal radius fixation. A 2007 Cochrane Systematic Review found a 25% overall incidence,<sup>14</sup> with smaller series reporting even higher rates in excess of 50% to 67%.<sup>22,23</sup> Percutaneous pinning has a lower, albeit still present, risk of pin-track or superficial infection, with another 2007 Cochrane Review finding a range from 0% to 10%.<sup>17</sup> A more recent meta-analysis of 7 randomized controlled trials by Chaudhry and colleagues<sup>24</sup> revealed an 8.2% incidence. Other smaller series report ranges from 2% to 34%.<sup>25–27</sup> Pins left outside the skin are associated with a significantly greater infection rate than those buried deep to the skin.<sup>25</sup> Nearly all of these studies reported infection resolution with oral antibiotics with or without pin removal.

In contrast, open reduction and internal fixation (ORIF) with volar and/or dorsal plating results in lower infection rates, ranging from 0% to 3%.<sup>11,24,28,29</sup> Open fractures of the distal radius clearly increase the risk of postoperative infection, regardless of fixation, with the largest series reporting a 44% incidence, of which 68% were soft tissue infections and 32% were caused by osteomyelitis.<sup>30</sup>

## EXTENSOR TENDON INJURY

### ***Percutaneous Pinning and External Fixation***

Percutaneous pinning places several of the extensor tendons at risk. Chia and colleagues<sup>31</sup>

delineated specific tendinous structures that may be injured by Kirschner wires (K wires) placed in various trajectories. Their findings are summarized in **Table 1**. Injury to the abductor pollicis longus or extensor pollicis brevis from radial styloid pinning was avoided by ensuring that the starting point was either dorsal or volar to the first dorsal compartment. The investigators recommended making small incisions to facilitate direct visualization and protection of underlying structures, as well as avoiding placement of K wires more than 5 mm ulnar to the Lister tubercle, because this places the extensor digitorum communis (EDC) tendons at risk.

Despite the anatomic risk of extensor tendon penetration with percutaneous pinning, the incidence of clinically relevant tendon injury or rupture is low. Karantana and colleagues<sup>32</sup> found 1 instance of extensor pollicis longus (EPL) rupture from a cohort of 64 patients. More recently, Chaudhry and colleagues<sup>24</sup> documented 6 cases of tendon rupture from percutaneous pinning in their meta-analysis of 875 patients pooled from 7 randomized trials for an incidence of 0.7%. Rates of extensor tendon injury from external fixator pin placement are also low,<sup>14</sup> probably in part because of the generally accepted surgical technique that encourages a formal incision and blunt dissection down to bone when placing pins.<sup>33</sup>

### ***Volar Plating***

Extensor tendon injury, particularly EPL rupture, is a well-documented complication of volar plating or any hardware placed in a volar-to-dorsal trajectory.<sup>34,35</sup> This injury is typically caused by drill bit penetration or prominent dorsal screw tips (**Fig. 1**).<sup>36</sup> The incidence of this complication is

**Table 1**  
**Structures at risk with percutaneous pinning**

<b>Pin Trajectory</b>	<b>Structures at Risk</b>
Volar styloid	SRN branches
Dorsal styloid	SRN branches
Transverse radial	APL, SRN trunk and branches
Dorsal rim	EPL, EDC
Dorsoulnar	EDM

*Abbreviations:* APL, abductor pollicis longus; EDC, extensor digitorum communis; EDM, extensor digit minimi; EPL, extensor pollicis longus; SRN, superficial radial nerve.

*Data from* Chia B, Catalano LW 3rd, Glickel SZ, et al. Percutaneous pinning of distal radius fractures: an anatomic study demonstrating the proximity of K wires to structures at risk. *J Hand Surg Am* 2009;34(6):1014–20.

Download English Version:

<https://daneshyari.com/en/article/4082728>

Download Persian Version:

<https://daneshyari.com/article/4082728>

[Daneshyari.com](https://daneshyari.com)