

Exposure of the Forearm and Distal Radius



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KEYWORDS

- Henry approach • Thompson approach • Flexor carpi radialis approach
- Dorsal distal radius approach • Distal radius approach

KEY POINTS

- The use of internervous planes allow access to the underlying bone without risk of denervating the overlying muscles.
- The choice of approach is based on the injury pattern and need for exposure.
- The Henry and Thompson approaches are useful for radial shaft fractures.
- The distal radius can be approached volarly through the flexor carpi radialis (FCR) approach or dorsally through the extended Thompson approach.
- The extended FCR approach is useful for intraarticular fractures of the distal radius as well as mal-unions and subacute fractures.

INTRODUCTION

Safe operative approaches to the bones of the forearm and wrist include the use of internervous planes. These planes lie between muscles that are innervated by different nerves. By utilizing these planes for dissection, extensive mobilization of muscles and therefore large areas of exposure may be obtained without the risk of muscle denervation.

A successful operative plan also must include consideration of the soft tissues, particularly flexion creases. Elective incisions should not cross the wrist crease or antecubital fossa perpendicularly. Scars contract with time, and incisions that cross these creases can result in loss of extension secondary to scar contracture on the flexion surface. If crossing the flexion crease is necessary, a transverse or zig-zag incision should be incorporated to prevent this scar contracture.

ANATOMY OF THE FOREARM

Muscles

The muscles of the forearm are split into 4 compartments: The superficial volar, the deep volar, the extensor, and the mobile wad (**Table 1**). The median nerve supplies all of the volar muscles of the forearm except the ulnar half of the flexor digitorum profundus and the flexor carpi ulnaris that are supplied by the ulnar nerve. The radial nerve proper supplies the brachioradialis and extensor carpi radialis longus. The posterior interosseous branch of the radial nerve supplies the other muscles of the dorsal compartment. Variations do exist, notably the innervation of the extensor carpi radialis brevis (ECRB), which is supplied by the superficial (sensory) branch of the radial nerve in 58% of cases.¹

Arteries

The brachial artery is the main arterial supply to the forearm and distal structures. Below the elbow

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Table 1
Four compartments of the forearm

	Origin	Insertion	Innervation
Superficial volar forearm			
Pronator teres	Medial epicondyle	Mid third of radius	Median
Flexor carpi radialis	Medial epicondyle	Base of second MC	Median
Palmaris longus	Medial epicondyle	Palmar fascia of hand	Median
Flexor carpi ulnaris	Medial epicondyle	Pisiform/base of fifth MC	Ulnar
Flexor digitorum superficialis	Medial epicondyle	Base of middle phalanx of index, long, ring, small	Median
Deep volar forearm			
Flexor digitorum profundus	Ulna/interosseus membrane	Base of distal phalanx of index, long, ring, small	Median (anterior interosseous branch) (index, long)/ulnar nerve (ring, small)
Flexor pollicis longus	Distal third of radius	Base of thumb distal phalanx	Median (anterior interosseous branch)
Pronator quadratus	Distal third of ulna	Distal third of radius	Median (anterior interosseous branch)
Dorsal forearm			
Abductor pollicis longus	Mid-third dorsal radius	Radial base of thumb MC	Radial (posterior interosseous branch)
Extensor pollicis brevis	Mid-third dorsal radius	Dorsal base of thumb proximal phalanx	Radial (posterior interosseous branch)
Extensor pollicis longus	Dorsal ulna	Dorsal base of thumb distal phalanx	Radial (posterior interosseous branch)
Extensor digitorum communis	Lateral epicondyle	Dorsal base of distal phalanx of index, long, ring, small	Radial (posterior interosseous branch)
Extensor indicis proprius	Dorsal ulna	Dorsal base of index distal phalanx	Radial (posterior interosseous branch)
Extensor digiti quinti	Lateral epicondyle	Dorsal base of small distal phalanx	Radial (posterior interosseous branch)
Extensor carpi ulnaris	Lateral epicondyle	Dorsal base of small MC	Radial (posterior interosseous branch)
Supinator	Lateral epicondyle	Proximal third of radius	Radial (posterior interosseous branch)
Mobile wad			
Brachioradialis	Lateral condyle humerus	Distal radius styloid	Radial
Extensor carpi radialis longus	Lateral condyle humerus	Dorsal base of second MC	Radial
Extensor carpi radialis brevis	Lateral condyle humerus	Dorsal base of 3rd MC	Radial (posterior interosseous branch)

Abbreviation: MC, metacarpal.

crease and distal to the biceps aponeurosis, it divides into the radial and ulnar branches. The radial artery travels between the brachioradialis and pronator teres proximally and becomes more superficial distally, where it lies between

the brachioradialis and flexor carpi radialis (FCR). The ulnar artery lies superficial to the flexor digitorum profundus and between the flexor carpi ulnaris ulnarly and the flexor digitorum superficialis radially.

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