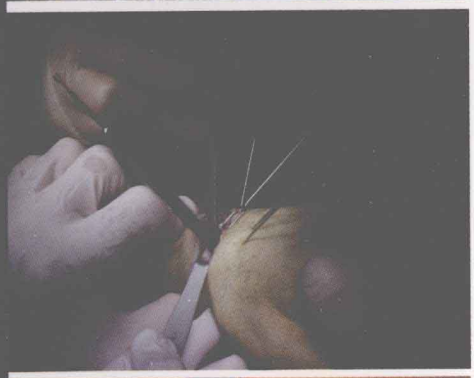
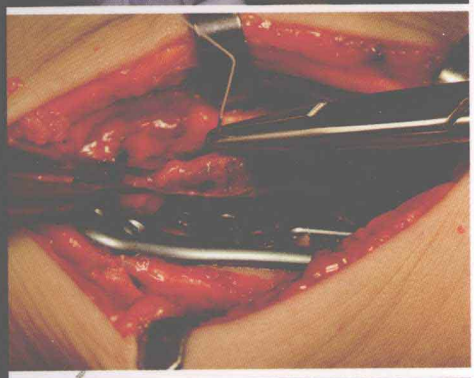
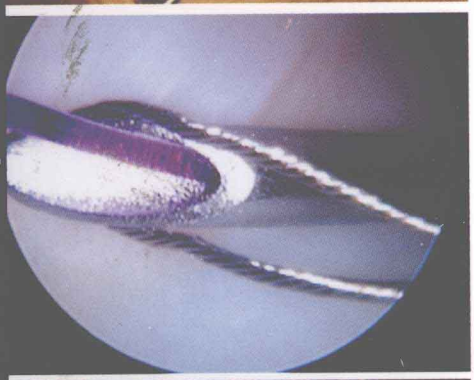
Master Techniques in Orthopaedic Surgery





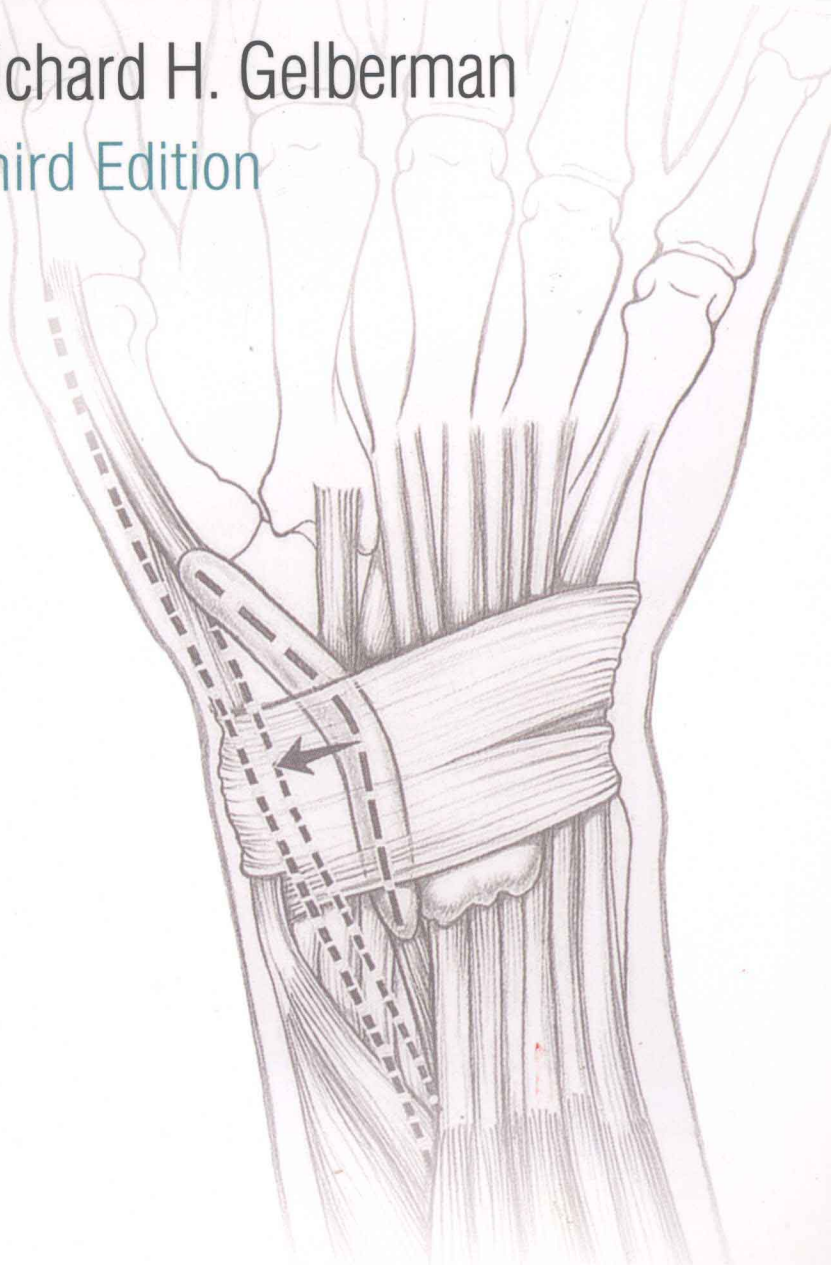


FULLY SEARCHABLE TEXT ONLINE AND IMAGE BANK

The Wrist

Richard H. Gelberman

Third Edition



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Master Techniques in Orthopaedic Surgery

The Wrist

Third Edition

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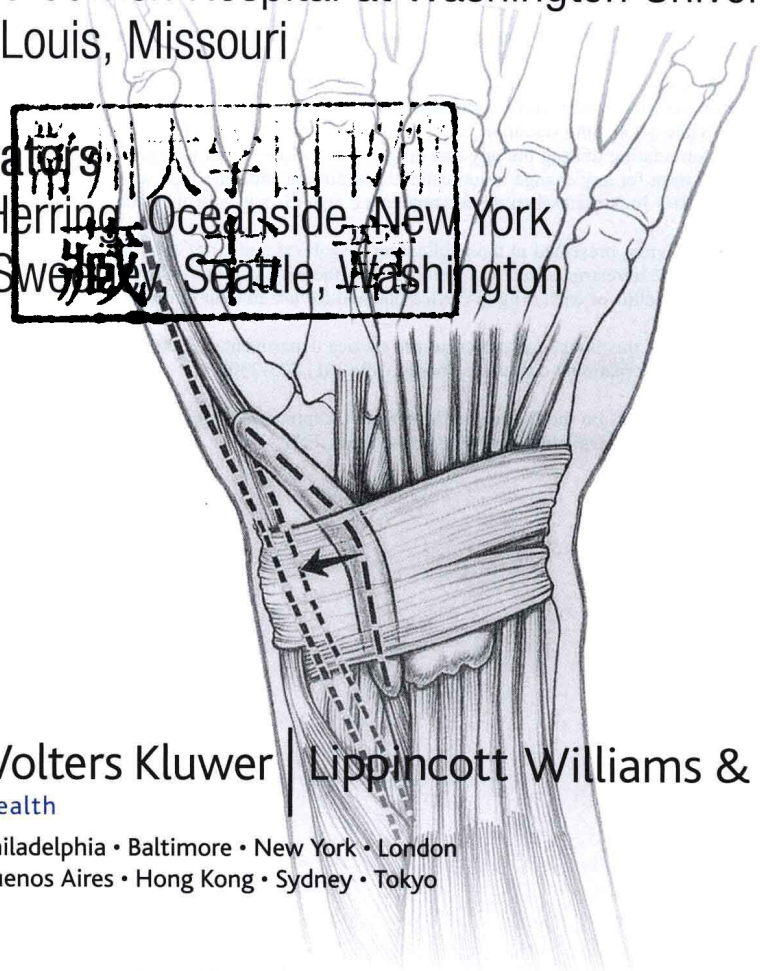

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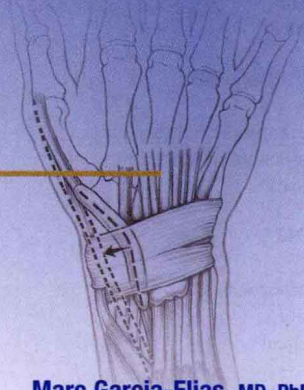

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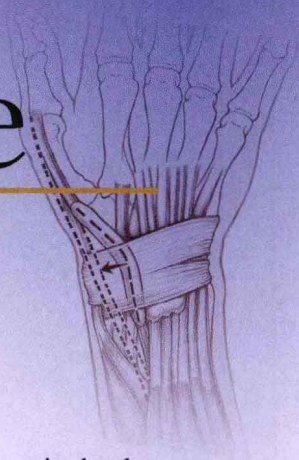
Series Preface



Since its inception in 1994, the *Master Techniques in Orthopaedic Surgery* series has become the gold standard for both physicians in training and experienced surgeons. Its exceptional success may be traced to the leadership of the original series editor, Roby Thompson, whose clarity of thought and focused vision sought "to provide direct, detailed access to techniques preferred by orthopaedic surgeons who are recognized by their colleagues as 'masters' in their specialty," as he stated in his series preface. It is personally very rewarding to hear testimonials from both residents and practicing orthopaedic surgeons on the value of these volumes to their training and practice.

A key element of the success of the series is its format. The effectiveness of the format is reflected by the fact that it is now being replicated by others. An essential feature is the standardized presentation of information replete with tips and pearls shared by experts with years of experience. Abundant color photographs and drawings guide the reader through the procedures step-by-step.

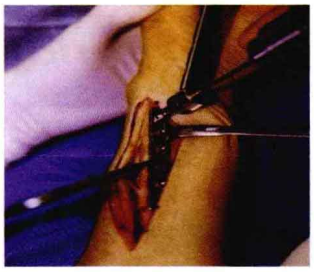
The second key to the success of the *Master Techniques* series rests in the reputation and experience of our volume editors. The editors are truly dedicated "masters" with a commitment to share their rich experience through these texts. We feel a great debt of gratitude to them and a real responsibility to maintain and enhance the reputation of the *Master Techniques* series that has developed over the years. We are proud of the progress made in formulating the third edition volumes and are particularly pleased with the expanded content of this series. Six new volumes will soon be available covering topics that are exciting and relevant to a broad cross-section of our profession. While we are in the process of carefully expanding *Master Techniques* topics and editors, we are committed to the now-classic format.

The first of the new volumes is *Relevant Surgical Exposures,* which I have had the honor of editing. The second new volume is *Essential Procedures in Pediatrics.* Subsequent new topics to be introduced are *Soft Tissue Reconstruction, Management of Peripheral Nerve Dysfunction, Advanced Reconstructive Techniques in the Joint*, and finally *Essential Procedures in Sports Medicine.* The full library thus will consist of 16 useful and relevant titles.

I am pleased to have accepted the position of series editor, feeling so strongly about the value of this series to educate the orthopaedic surgeon in the full array of expert surgical procedures. The true worth of this endeavor will continue to be measured by the ever-increasing success and critical acceptance of the series. I remain indebted to Dr. Thompson for his inaugural vision and leadership, as well as to the *Master Techniques* volume editors and numerous contributors who have been true to the series style and vision. As I indicated in the preface to the second edition of *The Hip* volume, the words of William Mayo are especially relevant to characterize the ultimate goal of this endeavor: "The best interest of the patient is the only interest to be considered." We are confident that the information in the expanded *Master Techniques* offers the surgeon an opportunity to realize the patient-centric view of our surgical practice.

Bernard F. Morrey, MD

Preface to the First Edition



Because of the wide range of innovative concepts introduced over the past 15 years, wrist surgery has become an area of special interest among orthopaedists, hand surgeons, and traumatologists. As a result, it has become increasingly important for wrist surgeons to have a resource that provides systematic accounts of commonly performed operative procedures. This text is designed primarily to describe the indications and contraindications, as well as the operative techniques and pitfalls associated with the use of selected surgical approaches to clinical problems involving the wrist. Moreover, it is constructed to provide a detailed step-by-step account of the technical details that are required to carry out procedures that are used commonly, in an accomplished manner.

Contributors were carefully chosen for this volume. Not only are they leaders in research and clinical care in wrist surgery, but they are responsible for having either described or popularized the surgical approaches they depict. Each has accrued vast hands-on experience, allowing for the construction of uniquely detailed accounts of the most well-accepted operative methods. While the techniques described here are not the only ones that are used for specific clinical problems, I know of few techniques currently performed that are more soundly established in both principle and practice. Overall, it is the objective of this text to elevate the practice of wrist surgery to a plane that will see improved clinical outcomes with a reduced incidence of operative morbidity.

Richard H. Gelberman, MD

Preface to the Second Edition

The second edition of this practical, popular text includes many important new chapters for the wrist surgeon. Four new chapters cover the treatment of distal radius fractures: limited open reduction and internal fixation, intrafocal arum pinning, fixation using SRS bone cement, and nonunion treatment using the LoCon T plate. For scaphoid nonunions, a new chapter describes open reduction internal fixation (ORIF) using a dorsal approach for small pole fragments. For treatment of the scaphoid-lunate advanced collapse (SLAC) wrist, I have added a chapter covering capitolunate fusion with scaphoid and triquetrum excision. New chapters for arthroscopic repair of the triangular fibrocartilage complex, ulnar shortening osteotomy, salvage of the failed Darrach procedure, and matched ulnar resection arthroplasty enhance the procedures for distal radioulnar joint instability.

To complement the new chapters, the original chapters have been updated thoroughly to include any changes since publication of the first edition, as these surgeons continue to refine their surgical technique. Although there is much content that is new in this second edition, the goals of this text have not changed, so the preface to the first edition is included.

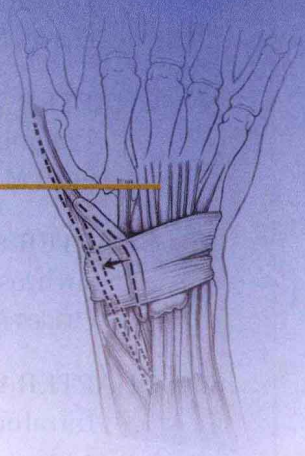
Richard H. Gelberman, MD

Preface to the Third Edition

This third edition of *The Wrist* is designed to be materially improved over prior volumes. Consistent with a series of remarkable advances in the field of wrist surgery, new subjects are included such as arthroscopic-assisted limited open reduction of the radius, distal radius osteotomy, percutaneous fixation of the scaphoid, dorsal intercarpal ligament capsulodesis, and four-corner arthrodesis with headless screws. Where earlier chapters have been retained based on their continued relevance to clinical practice, they have been revised, enriched, and updated. Existing illustrative matter has been expanded and, in some cases, reconfigured for easier visualization. The format has been enlarged to include 12 sections with expanded coverage of nonunion and malunion of the radius, of carpal instability, of scaphoid fractures and nonunions—with and without arthritis, and of distal radioulnar instability.

As was the case with previous editions, contributors were carefully chosen for this volume. Not only are they leaders in wrist surgery, but they are also responsible, in many cases, for having described and having popularized the surgical approaches they depict. Each is an authority with vast experience. Together they provide a unique series of surgical descriptions—representative of some of the most innovative, thoughtful and well-supported advances in upper limb surgery. As was the goal of previous texts, the overall objective of this edition is to elevate the practice of wrist surgery to a level where substantially improved clinical outcomes occur with reduced operative morbidity.

Contents



PART I
UTILITARIAN OPERATIVE APPROACHES

1 Operative Exposure

Jeffry T. Watson, Richard H. Gelberman, and Martin I. Boyer

EXTERNAL FIXATION FOR DISTAL RADIUS FRACTURES

External fixation is a well-established method of treatment for fractures of the distal radius. Several different systems are available, but all use bony fixation points in the shaft of the radius and in the index metacarpal. The fixator is placed along the dorsoradial plane of the radius. The ideal interval for proximal pin placement is the space between the extensor carpi radialis longus and the brachioradialis tendons.

The superficial branch of the radial nerve is at risk of injury in this procedure, lying deep to the muscle and emerging from inter the brachioradialis tendon approximately 6 cm proximal to the radial styloid. Additionally, terminal branches of the lateral antebrachial cutaneous nerve lie subcutaneously in this region and are vulnerable to injury. Percutaneous placement of external fixator pins in the radius is ill advised, as it carries the risk of painful neuroma formation and irreversible loss of sensation distally.

The authors prefer an open approach to the radial shaft for the placement of the proximal fixator pins. This allows the superficial radial nerve to be identified directly. Make a longitudinal incision on the lateral side of the radial shaft, approximately 5 cm proximal to the fracture (Fig. 1-1). Identify branches of the lateral antebrachial cutaneous nerve during subcutaneous dissection down to the forearm fascia, and retract them. Identify the tendons of brachioradialis and extensor carpi radialis longus (the extensor carpi radialis longus can be differentiated from the brachioradialis by observing its excursion with wrist flexion and extension).

Open the fascia overlying the interval and identify the superficial radial nerve, as it lies deep or immediately radial to the tendon of brachioradialis (Fig. 1-2). Dissect the superficial radial nerve free throughout the length of the incision, and retract it. Use Hohmann or right-angle retractors to retract the soft tissues, and place the fixator pins in the radius under direct visualization.

FIGURE 1-1

Incisions made for approach to the distal radial shaft and the second metacarpal.

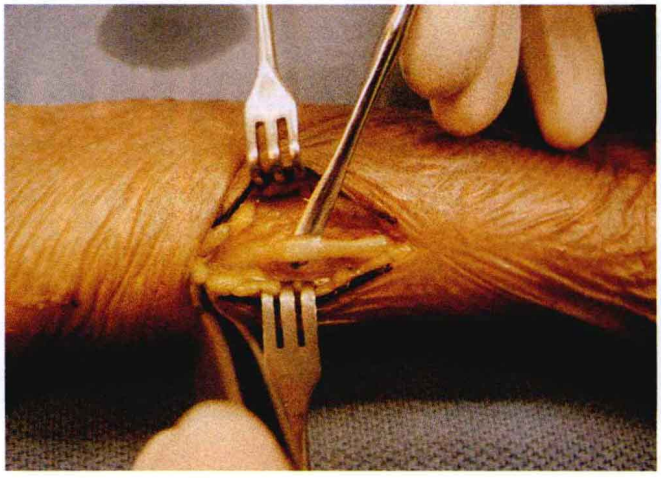


FIGURE 1-2

The sensory branch of the radial nerve.

Either one or two incisions may be used along the dorsolateral or lateral aspect of the index metacarpal for placement of the two distal pins of the external fixator. Because it is possible to encounter terminal branches of the superficial radial nerve, we recommend direct visualization of the index metacarpal for the placement of both distal pins. Identify the metacarpal shaft immediately dorsal to the origin of the first dorsal interosseous muscle. Place the fixator pins into the bone under direct visualization. Close all skin incisions before assembling the fixator apparatus.

DORSAL APPROACHES

Dorsal Longitudinal Approach

The dorsal longitudinal approach provides access to the entire dorsal aspect of the carpus, distal radius, distal radioulnar joint (DRUJ), ulnar head, and ulnocarpal joint. We use this approach frequently for the treatment of acute fractures or osteotomy of the distal radius, management of triangular fibrocartilage complex and DRUJ disorders, carpal ligament repair or reconstruction, intercarpal or total wrist arthrodesis, and total wrist arthroplasty. It allows extension proximally for exposure of the dorsal radial diaphysis and distally for access to the metacarpals. (Figs. 1-3 through 1-8).

Because the areolar tissue along the dorsal aspect of the wrist is loose, longitudinal scar contracture is of minimal consequence and does not limit wrist flexion. Start the utilitarian straight dorsal incision proximally over the central portion of the distal radius, proximal to Lister's dorsal radial tubercle. Continue the incision distally in line with the radius and the long-finger metacarpal (Fig. 1-9). Spread the subcutaneous tissue bluntly, and raise full-thickness skin flaps, exposing the extensor retinaculum (Fig. 1-10).

Familiarity with the location of the sensory branches of both the radial and the ulnar nerves on the dorsal wrist will aid in early identification of these structures after the skin is incised (Fig. 1-11). The sensory branch of the radial nerve becomes subcutaneous 5 to 10 cm proximal to the radial styloid, in the interval between the brachioradialis and extensor carpi radialis longus tendons. It bifurcates into two main branches before reaching the radiocarpal joint. The dorsal branch passes within 1 to 3 cm of the radial side of Lister's tubercle and continues distally to supply the first and second web spaces.

The palmar branch passes within 2 cm of the first dorsal compartment and provides sensory innervation to the dorsolateral aspect of the thumb after passing directly over the extensor pollicis longus tendon. The dorsal cutaneous branch of the ulnar nerve arises from the ulnar nerve deep to the flexor carpi ulnaris tendon and becomes subcutaneous on the ulnar border of the forearm, approximately 5 cm from the proximal border of the pisiform. Branching of the nerve can begin

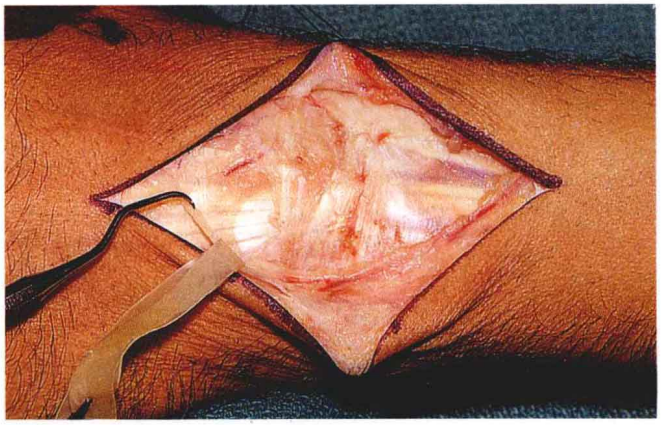


FIGURE 1-3

The dorsal longitudinal approach for wrist arthrodesis begins proximally at the junction of the radial diaphysis and metaphysis. The incision extends distally to the long finger metacarpal. In the distal portion of the incision, the dorsal sensory branch of the ulnar nerve is identified and protected with a rubber drain.

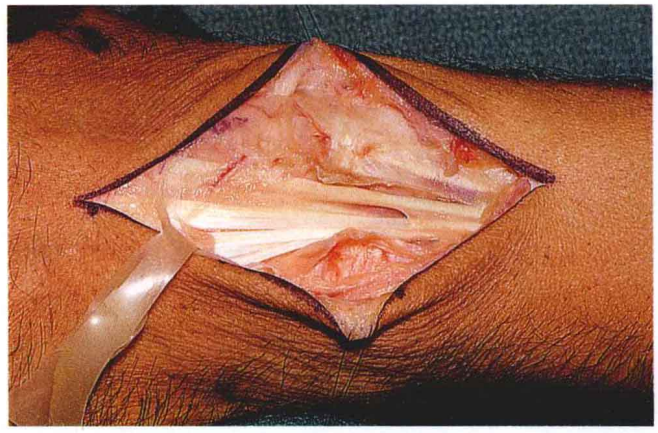


FIGURE 1-4

The extensor retinaculum is incised longitudinally, exposing the extensor digitorum communis tendons and the extensor indicis proprius tendon.

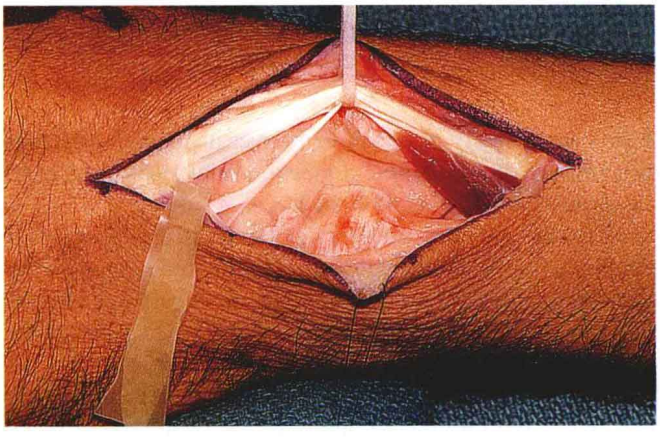


FIGURE 1-5

The extensor tendons are retracted radially, exposing the dorsal capsule of the radiocarpal joint. The muscular portion of the extensor indicis proprius is seen in the proximal limb of the incision.

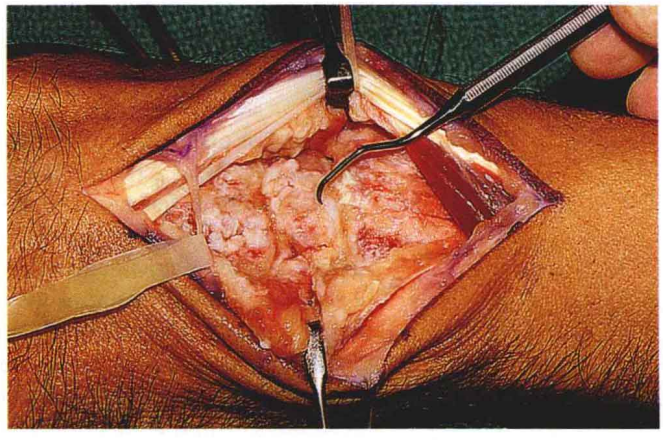


FIGURE 1-6

The infratendinous retinaculum and dorsal capsule are incised longitudinally, and full-thickness radial and ulnar flaps are dissected from the carpal bones and distal radius. The anatomy probe identifies the lunate.

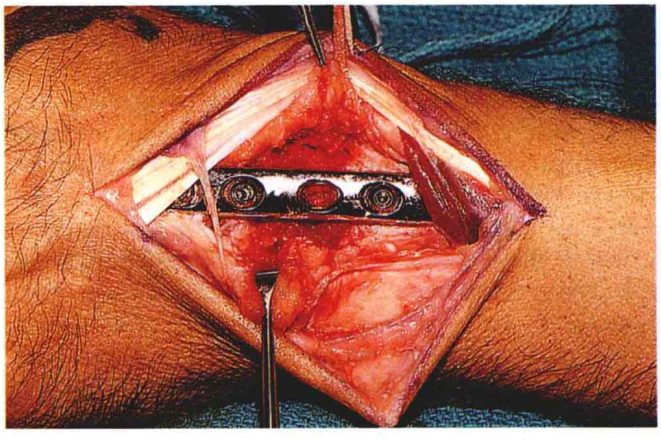


FIGURE 1-7

Following decortication, a dorsal plate is applied from the long finger metacarpal to the radius.

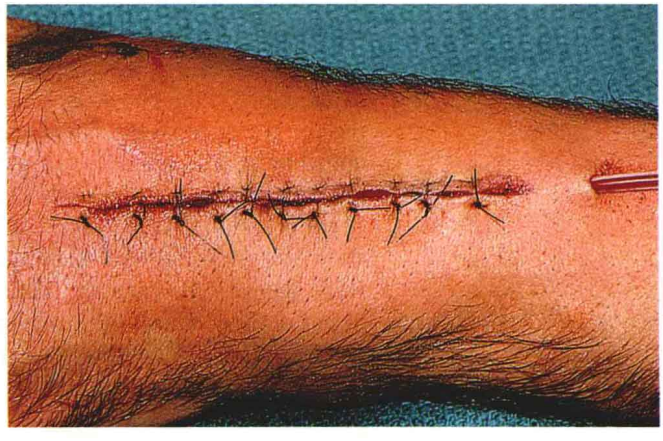


FIGURE 1-8

Following closure of the dorsal capsule and extensor retinaculum, the skin is closed with horizontal mattress sutures over a closed suction drain.