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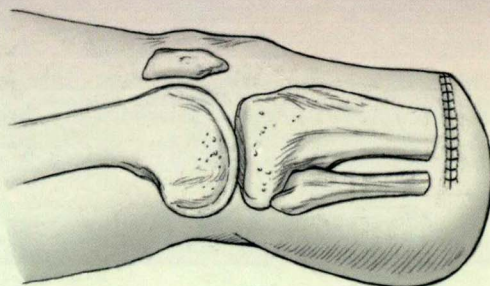
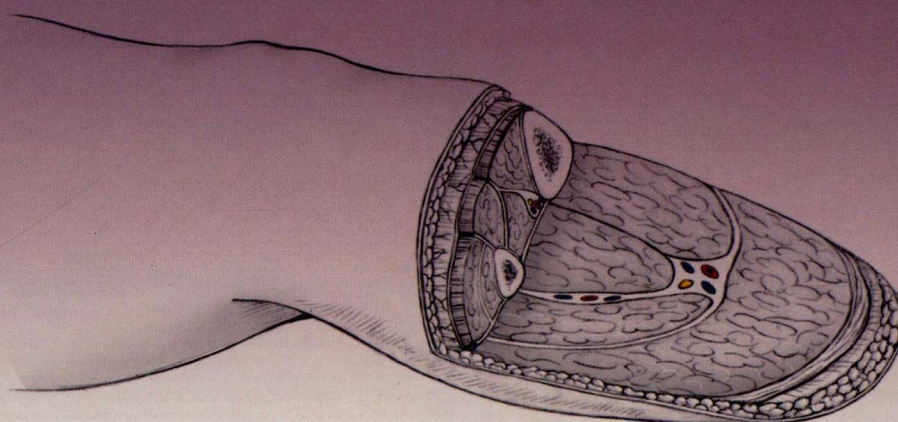
Soft Tissue Surgery

SECOND EDITION



Series Editor

Bernard F. Morrey



Steven L. Moran
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Soft Tissue Surgery

SECOND EDITION

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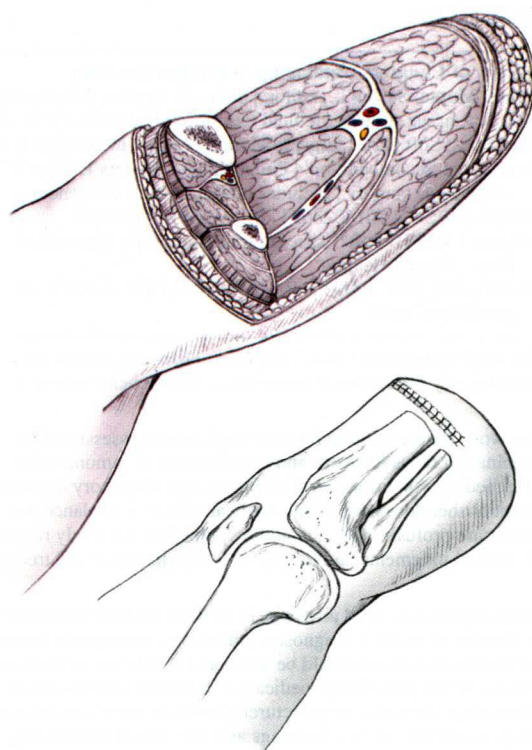
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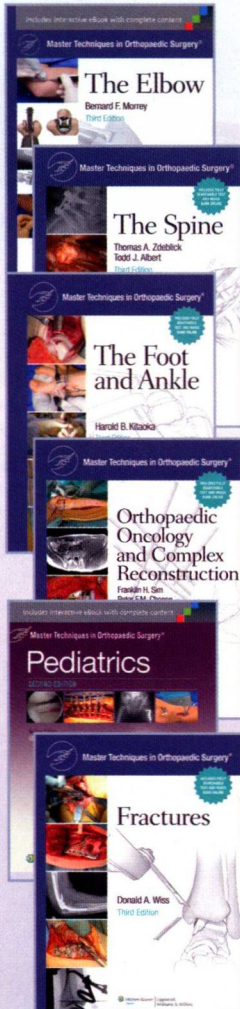
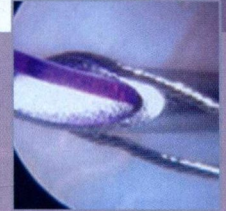
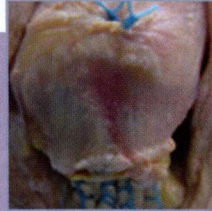
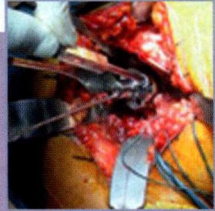
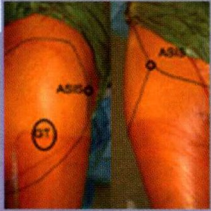


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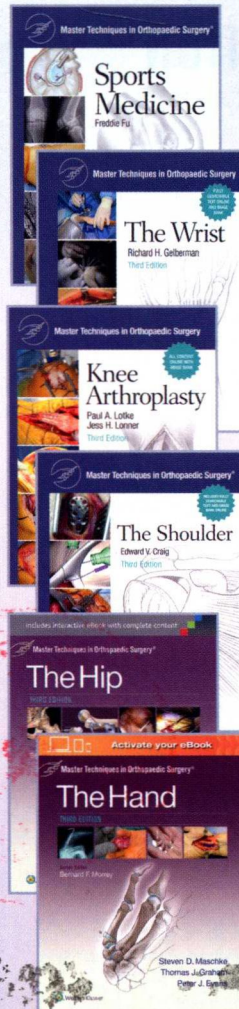
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To my wife, Andrea, and three children, Jack, Wyatt, and Maggie.

—For helping me focus on what matters.—

Steven L. Moran, MD

To my wife, Heidi, and my children, Monica, Lucas, Caroline, and Charlie.

—For giving me perspective on what is important and for your constant support and encouragement.—

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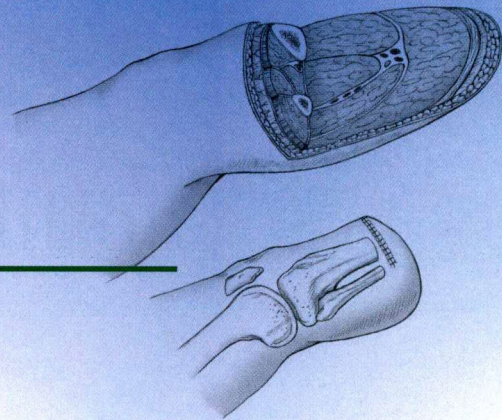
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Preface



We are honored that the interest in the first edition of *Master Techniques in Orthopaedic Surgery: Soft Tissue Surgery* has created the demand for a second edition. The key educational goal of the text is to demonstrate how to avoid wound problems in the realm of orthopedic surgery and how to cover them if they occur. While the principles of surgical exposure and surgical debridement have not changed, a great deal has advanced our ability to manipulate the wound environment in preparation for wound closure. We have provided needed updates on the use of negative pressure wound therapy and newer wound dressings, which can prepare the wound for skin grafting and closure. Additional chapters have been devoted to coverage of difficult areas such as the elbow, back, and knee, and newer concepts of soft tissue coverage including the keystone flaps, perforator flaps, and free flaps have been added to increase the surgeon's armamentarium for managing soft tissue loss. We have again drawn on the vast experience of our military colleagues to discuss the topics of debridement and early wound management as these are the cornerstones of a successful outcome.

The book's format continues to emphasize the pertinent anatomy, indications, and surgical approach to allow the reader to quickly incorporate these techniques into his or her practice. We have expanded the content with video techniques for some of our newer chapters. As with the first edition, the reader may not feel comfortable performing every procedure described, but at least, you will know what to expect or request during specialist consultation. Finally, the book has continued to emphasize the importance of a team approach to the management of these difficult issues. Over the past decade, we have utilized this team approach at the Mayo Clinic to provide our patients with a broad perspective for the management of bone and soft tissue injury, allowing for improved limb salvage and successful outcomes.

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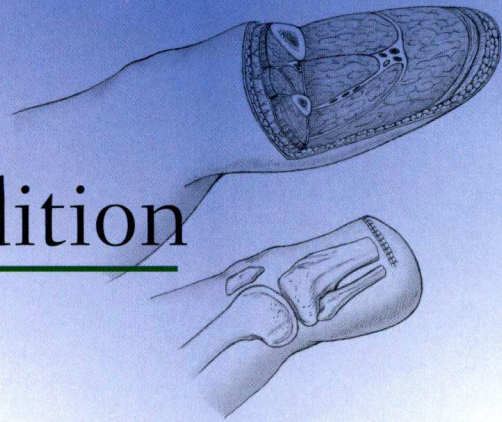
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Preface to the First Edition

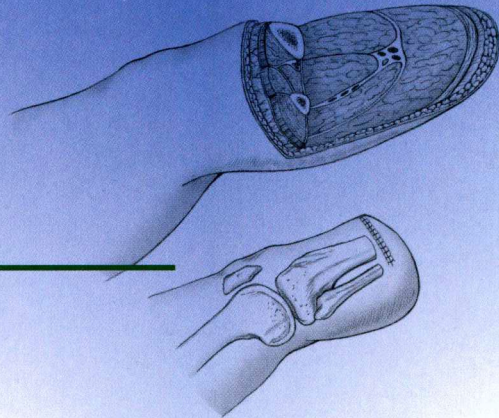


Over the past 30 years, options for the soft tissue management of traumatic defects have increased with an improved understanding of pedicled flaps, the advent of microsurgery, and the development of negative pressure sponge therapy. Wound complications have decreased due to advances in antibiotic therapy and better debridement techniques. Improved knowledge of surgical anatomy has helped to develop surgical incisions, which provide better exposure while preserving regional blood supply. Despite these advances, there is still a need for every surgeon to know the techniques of debridement, soft tissue management, and proper incision placement—for these are the foundation of successful surgery.

The educational goal of this text is to demonstrate how to avoid wound problems and how to cover wound problems if they should occur. Chapters illustrate pertinent anatomy, indications and contraindications for specific incisions, and methods for flap coverage in cases of soft tissue loss. Step-by-step accounts of the technical details are provided to carry out these exposures and procedures so that readers will feel they are watching over the shoulder of the contributing author in the operating room. Contributors are experienced in both soft tissue and bony management. Though all surgeons may not feel comfortable with performing all procedures presented in this book, they will at least know what they can expect or request during specialist consultation. This volume of the *Master Techniques in Orthopaedic Surgery* series focuses on the management of the soft tissues as they relate to orthopedic trauma but is a text designed for all traumatologists, orthopedic surgeons, plastic surgeons, and anyone who has had the pleasure (or displeasure) of taking care of a difficult wound.

Steven L. Moran, MD
William P. Cooney III, MD

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 orthopedic 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 orthopedic surgeons on the value of these volumes to their training and practice.

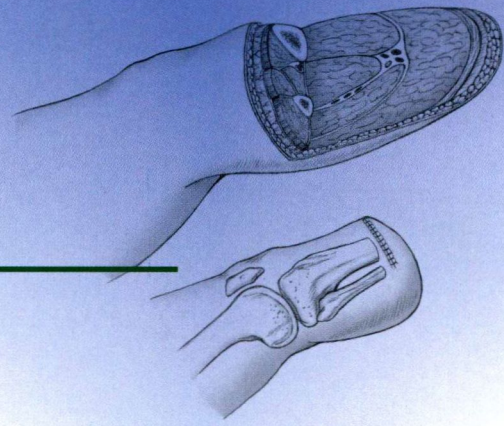
A key element of the success of the series is its format. The effectiveness of the format is reflected by the fact that it is now being replicated by others. An essential feature is the standardized presentation of information replete with tips and pearls shared by experts with years of experience. Abundant 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 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 orthopedic 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

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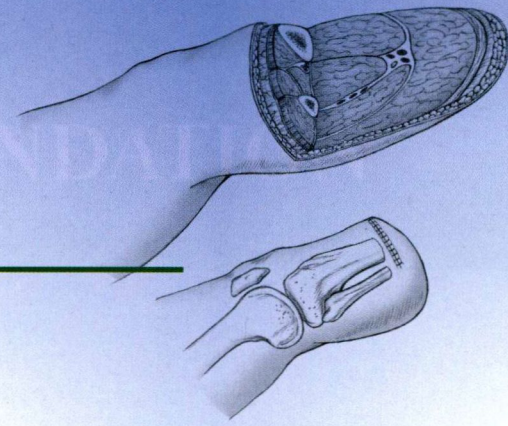


The creation of this text was the result of a tremendous effort of many people. Wolters Kluwer has provided us with incredible resources and a dedicated knowledgeable staff. We are deeply indebted to the team of Brian Brown, Executive Editor; Grace Caputo, Developmental Editor; and David Murphy, Editorial Coordinator. We are also deeply indebted to our medical illustrator Bernie Kida, who has provided the countless hours of work bringing the surgeons' sketches to life. We would also like to thank Dr. Bernard Morrey for giving us the opportunity to produce this second edition. Finally, we are deeply indebted to our coauthors who have provided insightful, organized, and beautifully illustrated chapters explaining the techniques involved in these reconstructive procedures. It is through their hard work that we are able to provide you with this text.

Steven L. Moran and S. Andrew Sems

Video List

WOUND AND FOUNDATION



Chapter 4 Integra Bilayer Wound Matrix in Combination with Negative Pressure Wound Therapy for Treatment of Extremity Wounds

Case 1. Eleven videos illustrating details of the surgical technique and the Integra BWM application in 41-year-old woman with a history of common variable immune deficiency and multiple prior cutaneous bacterial infections who suffered a necrotizing soft tissue infection of her left dorsal forearm.

- Video 4-1** Case 1 Dorsal Forearm Part 1
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- Video 4-1** Case 1 Dorsal Forearm Part 3
- Video 4-1** Case 1 Dorsal Forearm Part 4
- Video 4-1** Case 1 Dorsal Forearm Part 5
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- Video 4-1** Case 1 Dorsal Forearm Part 7
- Video 4-1** Case 1 Dorsal Forearm Part 8
- Video 4-1** Case 1 Dorsal Forearm Part 9
- Video 4-1** Case 1 Dorsal Forearm Part 10
- Video 4-1** Case 1 Dorsal Forearm Part 11

Case 2. Four videos illustrating details of surgical technique in a 40-year-old man who sustained an open distal tibial shaft fracture with an open medial leg wound that necessitated soft tissue coverage.

- Video 4-2** Case 2 Medial Leg Part 1
- Video 4-2** Case 2 Medial Leg Part 2
- Video 4-2** Case 2 Medial Leg Part 3
- Video 4-2** Case 2 Medial Leg Part 4

Case 3. One video illustrating ankle motion after healed soft tissue reconstruction with Integra DRT and skin graft in a 33-year-old man who sustained multiple gunshot wounds.

- Video 4-3** Case 2 Achilles Tendon

Chapter 33 Propeller Flaps and Keystone Flaps in the Lower Extremity

- Video 33-1** Propeller Flap: Planning, design, and harvest of a peroneal perforator flap for a lower leg traumatic defect with bony exposure.
- Video 33-2** Keystone Flap: Planning and harvest of a keystone flap for an anterior thigh defect following sarcoma resection.

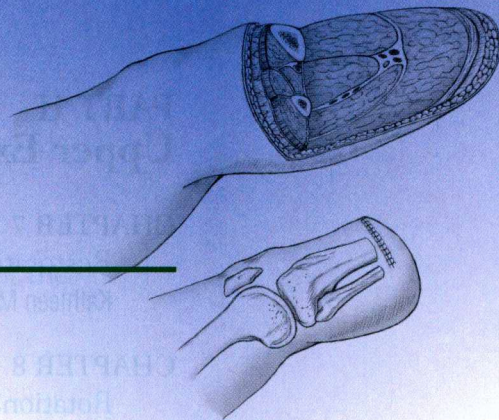
Chapter 34 Fasciotomies of the Lower Extremity

- Video 34-1** From Maryland Shock Trauma shows the fascial compartment release of the lower extremity for compartment syndrome. (Provided by Dr. Jason Nascone.)

Chapter 42 Replantation of Digits

- Video 42-1** Replantation of Digits

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