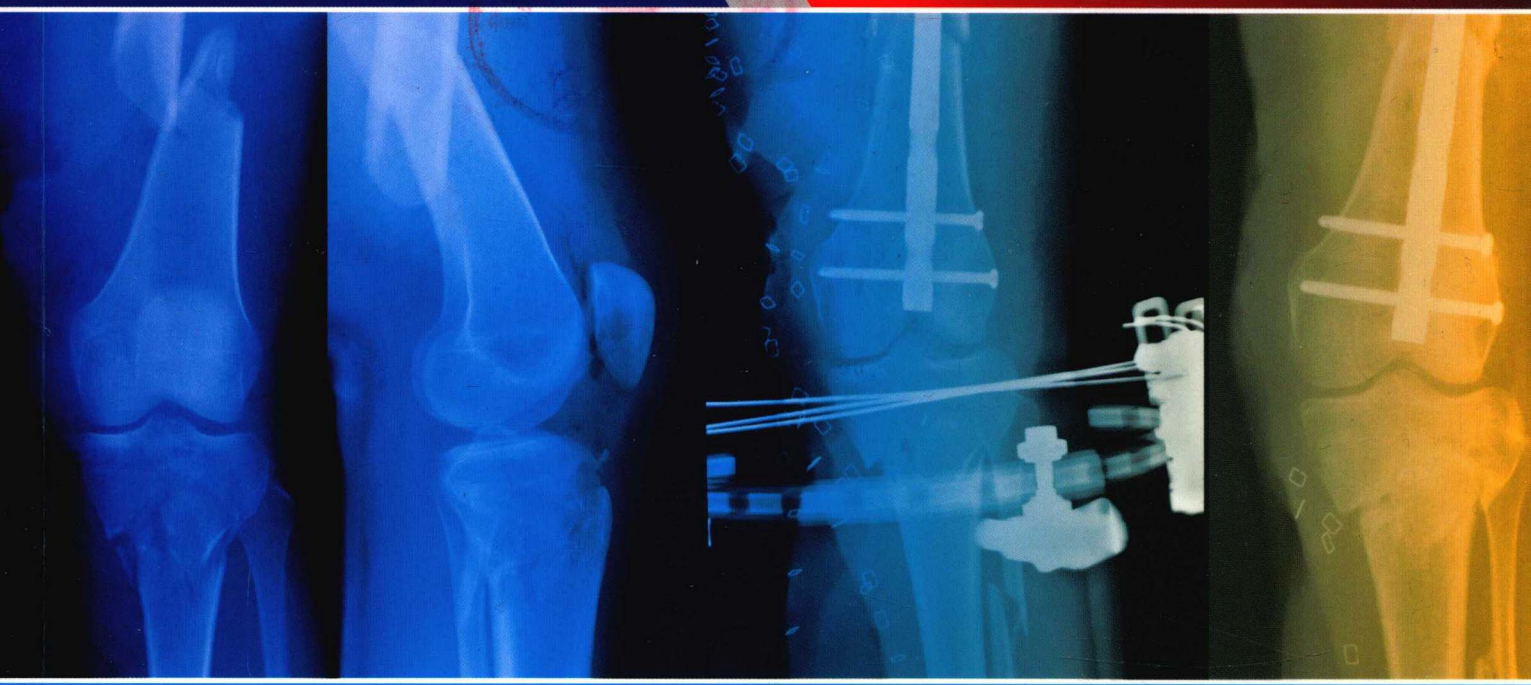

CASE COMPETENCIES in ORTHOPAEDIC SURGERY

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This book aims to educate young surgeons on how to achieve excellence in the operating room. To my mentors, teachers, and coaches—thank you for having the patience to teach me your tips, tricks, pearls, and above all else, passion. To my family and friends—thank you for your love, support, and inspiration—this book would not be possible without you.

Rachel M. Frank

To my family, Jennifer, Abigail, Robert, and Cameron, for providing inspiration and support; to my mentors and colleagues for creating this opportunity; and to the study and practice of orthopaedics for fulfilling a passion for lifelong education.

Brian Forsythe

This book is dedicated to my family for their loving support and to my mentors, fellows, residents, and students, who all have taught me so much.

Matthew T. Provencher

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INTRODUCTION

In 2012, the Accreditation Council for Graduate Medical Education (ACGME)'s Residency Review Committee (RRC) for orthopaedic surgery released a list of 15 case categories "that are representative of broader procedural experiences of a non-fellowship-educated surgeon in the specialty, as well as expectations for minimum numbers in each case category." The purpose of this textbook is simple: to give orthopaedic trainees an efficient reference to prepare for the cases most commonly encountered during training. While all of the techniques described may be found within the literature, never before have they been centralized into a single resource. Notably, this text does not aim to replace or reproduce the content provided by other excellent review sources for in-training and board examinations. Rather, it elaborates on the technical pearls necessary to actually perform the cases. Overall, this text aims to function as a standalone reference that will allow the resident to prepare for a case and perform the relevant surgical steps with confidence and competence.

We have expanded the 15 categories of "orthopaedic surgery case minimums" as determined by the ACGME into 40 technique-based chapters. There are more chapters than categories because some of the categories (i.e., operative treatment of femoral and tibial shaft fractures and all pediatric procedures) cover multiple important procedures commonly performed throughout the duration of orthopaedic training. In addition, several additional chapters cover other categories of commonly utilized surgical techniques (i.e., fasciotomies for compartment syndrome, traction pin placement, etc.) that are often encountered during orthopaedic training but do not fall into the categories defined by the ACGME case minimums.

Each chapter will contain a brief introduction to the case, including the minimum number of cases needed to satisfy ACGME requirements, as well as the commonly used CPT and ICD9 and ICD10 codes relevant to the procedure. Each procedure is described in detail, from room set-up and patient positioning, to surgical steps and postoperative protocols. Surgical steps are accompanied by intraoperative photographs so that the reader has a visual understanding of exactly how each case is performed. Each chapter also contains tables that outline the surgical steps, equipment needed, technical pearls, and common pitfalls. The goal of each chapter is to highlight schematics and photographs, while minimizing text to only essential information, in order to allow the reader to visualize each step of the case before scrubbing in. Finally, intraoperative videos supplement multiple chapters, demonstrating the surgical steps of the specified procedure in real time.

The intended audience of this book includes orthopaedic surgery interns, orthopaedic surgery residents, and orthopaedic surgery fellows. In addition, orthopaedic surgery physician extenders as well as rotating students will benefit from the step-by-step approaches provided in each chapter to prepare for cases. Certainly, this book will not substitute for the content provided by subspecialty textbooks and/or journals with surgical technique sections dedicated to specific cases. Rather, the aim of this textbook is to provide orthopaedic residents and other trainees with a quick, go-to, easy-access reference to prepare for the cases that the ACGME has deemed most appropriate to represent the breadth of surgical experience obtained and required during residency.

FOREWORD

It is an honor to be asked to craft the "Foreword" for this textbook, *Core Competencies in Orthopaedic Surgery,* edited by Drs. Rachel Frank, Brian Forsythe, and Matt Provencher. Reflecting back on a 40-year adventure in orthopaedic surgery and now in my 30th year as a clinician, educator, researcher, and leader in orthopaedic sports medicine, I recall the paucity of textbooks that were available to us as residents in the early 1980s. In this digital and informational age, we have experienced an explosion of high-quality orthopaedic education opportunities. Our CME courses are better, the industry provides focused educational formats on their products, numerous motor skills courses are accessible, and podcasts are provided by the AAOS and most orthopaedic surgical subspecialties. In addition, resources such as VuMedi provide an opportunity to teach techniques in a way we could have only dreamed of 30 years ago! The quality of our association journals are superb with exceedingly high-impact factors for the *American Journal of Sports Medicine, Journal of Bone and Joint Surgery,* and the *Arthroscopy* journal, among many others. Collaboratively, the AAOS, AOSSM, AANA, and multiple other specialty societies have partnered with a tremendous philanthropic effort by its members to build an outstanding new motor skills facility at the new AAOS building in Rosemont, Illinois. Textbooks are the backbone of education and have grown almost exponentially. All areas of orthopaedics are well represented with outstanding textbooks. In sports medicine alone, I recently donated a significant portion of my personal library to our residents' library with over 100 textbooks represented!

So where does this new textbook, *Core Competencies in Orthopaedic Surgery,* fit into our educational buffet? The organizational structure of this text fills a void for our trainees. The ACGME has designated "core competencies" in many pertinent areas of orthopaedics. For example, in how many cases does a resident have to participate to develop a reasonable level of competence? The general organizational format is easily palatable and digestible for residents of all levels. Introductory paragraphs on a topic are followed by common-related CPT and ICD codes. This in itself is quite unique in textbooks. The pertinent aspect of a specific procedure are defined in easily readable bullet point fashion. Room preparation, patient positioning, patient prepping, and specifics regarding the selected procedures focus on fundamental, pearls, and avoiding pitfalls. Tables, photographs, and videos and postoperative protocols complement the concise, efficiently presented material.

I believe this textbook will be well received and on most residents personal libraries. The book is an adjunct to other many outstanding textbooks but its value is in the concise fashion in which materials are presented. One can quickly "skim the icing" off the cake preparing for a case and focus on the essentials of the technical exercise at hand. Kudos to the authors for identifying an important niche for this textbook. I am thrilled to see this textbook prepared by division partner (Brian Forsythe), former fellow (Matthew Provencher), and current chief resident and future fellow (Rachel Frank) come to fruition.

Bernard R. Bach, Jr., MD

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CONTENTS

CHAPTER 1

DIAGNOSTIC KNEE ARTHROSCOPY

SURGICAL TECHNIQUE

Rachel M. Frank | Bernard R. Bach, Jr.

The ability to perform a basic diagnostic knee arthroscopy is a critical skill for orthopaedic surgeons. With few exceptions, knee arthroscopy is likely to be performed multiple times per year, regardless of the field in which an orthopaedic surgeon ultimately decides to specialize. In many instances, especially for surgeons who specialize in sports medicine or practice general orthopaedic surgery, knee arthroscopy is the cornerstone of the surgical practice. The surgical skills necessary for thorough, accurate, and efficient knee arthroscopy are typically developed early in residency training. With limitations in work hours, combined with the 2013 Accreditation Council for Graduate Medical Education (ACGME) implementation of skills training requirements for junior residents, development of excellent habits during initial training sessions is now, more than ever, imperative to build a foundation on which to expand one's ability to treat different knee pathologies arthroscopically. The purpose of this chapter is to provide up-to-date technical pearls for performing a thorough, accurate, and efficient diagnostic knee arthroscopy. Of note, many different techniques are used to effectively navigate through the knee, and the technique presented here represents just one of these techniques. As such, the authors wish to emphasize that the reader understand the importance of learning and developing a specific routine for performing a diagnostic knee arthroscopy in order to perform the procedure in a routine fashion for every single knee.

SURGICAL TECHNIQUE

Room Set-Up

- Ensure that all appropriate equipment is in the room.
- Ensure that all implants and instruments are available and sterile.
- Confirm that the monitors are ergonomically positioned.
- Confirm that the video monitor, pump, and shaver systems are functional.
- The video monitor should be placed opposite the surgeon at head level.

Patient Positioning

- The patient is placed in a supine position on the operating table, with the knee at or below the break of the bed.
- A tourniquet is placed high on the thigh, even if inflation is not planned, so that one is prepared in the case of unexpected bleeding; padding around the thigh before placement of the tourniquet is advised. The tourniquet is typically set to 250 to 300 mm Hg.
- A plastic drape (sticky-u) is then placed around the tourniquet to create a barrier between the preparation solution and the tourniquet.

CASE MINIMUM REQUIREMENTS

- N = 30 (knee arthroscopy)

COMMONLY USED CPT CODES

- CPT Code: 29850—Arthroscopically aided treatment of intercondylar spine(s) and/or tuberosity fracture(s) of the knee, with or without manipulation; without internal or external fixation (includes arthroscopy)
- CPT Code: 29851—Arthroscopically aided treatment of intercondylar spine(s) and/or tuberosity fracture(s) of the knee, with or without manipulation; with internal or external fixation (includes arthroscopy)
- CPT Code: 29855—Arthroscopically aided treatment of tibial fracture, proximal (plateau); unicondylar, includes internal fixation, when performed (includes arthroscopy)
- CPT Code: 29856—Arthroscopically aided treatment of tibial fracture, proximal (plateau); bicondylar, includes internal fixation, when performed (includes arthroscopy)
- CPT Code: 29860—Arthroscopy, hip, diagnostic with or without synovial biopsy (separate procedure)
- CPT Code: 29866—Arthroscopy, knee, surgical; osteochondral autograft(s) (e.g., mosaicplasty; includes harvesting of the autograft[s])
- CPT Code: 29867—Arthroscopy, knee, surgical; osteochondral allograft (e.g., mosaicplasty)
- CPT Code: 29868—Arthroscopy, knee, surgical; meniscal transplantation (includes arthrotomy for meniscal insertion), medial or lateral
- CPT Code: 29870—Arthroscopy, knee, diagnostic, with or without synovial biopsy (separate procedure)

Continued

- CPT Code: 29871—Arthroscopy, knee, surgical; for infection, lavage and drainage
- CPT Code: 29873—Arthroscopy, knee, surgical; with lateral release
- CPT Code: 29874—Arthroscopy, knee, surgical; for removal of loose body or foreign body (e.g., osteochondritis dissecans fragmentation, chondral fragmentation)
- CPT Code: 29875—Arthroscopy, knee, surgical; synovectomy, limited (e.g., plica or shelf resection; separate procedure)
- CPT Code: 29876—Arthroscopy, knee, surgical; synovectomy, major, two or more compartments (e.g., medial or lateral)
- CPT Code: 29877—Arthroscopy, knee, surgical; débridement/shaving of articular cartilage (chondroplasty)
- CPT Code: 29879—Arthroscopy, knee, surgical; abrasion arthroplasty (includes chondroplasty where necessary) or multiple drilling or microfracture
- CPT Code: 29880—Arthroscopy, knee, surgical; with meniscectomy (medial *and* lateral, including any meniscal shaving)
- CPT Code: 29881—Arthroscopy, knee, surgical; with meniscectomy (medial *or* lateral, including any meniscal shaving)
- CPT Code: 29882—Arthroscopy, knee, surgical; with meniscus repair (medial *or* lateral)
- CPT Code: 29883—Arthroscopy, knee, surgical; with meniscus repair (medial *and* lateral)
- CPT Code: 29884—Arthroscopy, knee, surgical; with lysis of adhesions, with or without manipulation (separate procedure)
- CPT Code: 29885—Arthroscopy, knee, surgical; drilling for osteochondritis dissecans with bone grafting, with or without internal fixation (including débridement of base of lesion)
- CPT Code: 29886—Arthroscopy, knee, surgical; drilling for intact osteochondritis dissecans lesion
- CPT Code: 29887—Arthroscopy, knee, surgical; drilling for intact osteochondritis dissecans lesion with internal fixation
- CPT Code: 29888—Arthroscopically aided anterior cruciate ligament repair/augmentation or reconstruction
- CPT Code: 29889—Arthroscopically aided posterior cruciate ligament repair/augmentation or reconstruction

- A lateral leg post is placed on the outside of the operating table at the level of the midthigh and is positioned so a valgus stress can be applied to allow improved access to the medial compartment. The post should allow the surgeon to stand between the bed and the patient's ankle (as the thigh is pressed against the leg post); often surgeons may need to use their hip against the patient's leg if no assistance is available.
  - Alternatively, a circumferential leg holder can be used, with placement in the same position along the thigh as the leg post. This leg holder is typically placed at the level of the tourniquet.
- An examination of the knee with anesthesia should be performed after appropriate patient positioning, and various motions, including varus/valgus stress, should be performed to confirm that the position is adequate to permit a thorough examination of the knee.
- A time-out should be performed to ensure patient safety and to confirm the procedure to be performed.

Prepping and Draping

- Skin preparation is performed per surgeon/institution preference; the authors typically use alcohol followed by a chlorhexidine preparation solution while the assistant holds the foot in sterile fashion.
- The extremity is then draped in layers, as follows:
  - Down sheet under the operative leg, over the contralateral leg
  - Sticky-u drape with tails aimed proximally around the thigh, just distal to the plastic drape applied before prepping
  - Impervious stockinette applied over the foot to the midcalf, followed by Coban wrapping (3M, Minneapolis, MN) around the stockinette
  - Arthroscopy extremity drape over the leg to the level of the midthigh, creating the final sterile field; this drape typically has a hole in the center that creates a seal
  - The arthroscopy extremity drape is used by anesthesia to create a barrier to the surgical field.
  - Before draping, a mayo stand can be placed near the head of the bed over the patient's torso; after draping, this can be used to hold some of the arthroscopic equipment that is needed during the case.

Landmarks and Portal Placement

- Helpful landmarks are the patella, patellar tendon, and femoral condyles.
- Standard portals used for diagnostic arthroscopy include the anterolateral (AL), anteromedial (AM), superomedial (SM), and superolateral (SL) portals (Fig. 1-1).
  - With the knee flexed to 90 degrees, the landmarks become more visible.
- The AL and AM portals are primarily used for diagnostic knee arthroscopy; the SM and SL portals are often but not always used.
- The AL and AM portals are located in the "soft spot" on either side of the inferior pole of the patella.
  - AL portal: Between the lateral femoral condyle and lateral proximal tibia (AL); primary viewing portal
  - AM portal: Between the medial femoral condyle and medial proximal tibia (AM); primary working portal
- SM and SL portals are made approximately 4 cm proximal to the medial and lateral poles of the patella, respectively.
  - The SM and SL portals are often used for water flow; although these portals are not always created, they can be helpful in cases that involve extensive synovectomies and procedures within the patellofemoral joint.
- Additional portals: The posteromedial (PM) and posterolateral (PL) portals also occasionally are used in diagnostic knee arthroscopy, although these portals tend