

# CONTENTS

## Preface

Frederick M. Azar

xv

## Knee and Hip Reconstruction

### Opioid-Related Genetic Polymorphisms of Cytochrome P450 Enzymes after Total Joint Arthroplasty: A Focus on Drug–Drug–Gene Interaction with Commonly Coprescribed Medications 361

Brendan J. Farley, Mohamed E. Awad, Paige Anderson, Ali S. Esseili, Justin Hruska, Gamal Mostafa, and Khaled J. Saleh

Pharmacogenomic testing, together with the early detection of drug–drug–gene interactions (DDGI) before initiating opioids, can improve the selection of dosage and reduce the risk of adverse drug interactions and therapeutic failures following Total Joint Arthroplasty. The variants of CYP genes can mediate DDGI. Orthopedic surgeons should become familiar with the genetic aspect of opioid use and abuse, as well as the influence of the patient genetic makeup in opioid selection and response, and polymorphic variants in pain modulation.

### Osteonecrosis of the Knee: Not all Bone Edema is the Same 377

Matthew C. Pearl, Michael A. Mont, and Giles R. Scuderi

Knee pain is among the most common complaints that an orthopedic surgeon may see in practice. It is often worked up with X-rays and MRI, leading to a myriad of potential diagnoses ranging from minimal edema patterns to various types of osteonecrosis. Similarities in certain causes can pose diagnostic challenges. The purpose of this review was to present the 3 types of osteonecrosis observed in the knee as well as additional causes to consider to help aid in the diagnosis and treatment.

### Tendinopathies and Allied Disorders of the Hip 393

Gerard A. Sheridan, Michael E. Neufeld, Rotem Moshkovitz, Donald S. Garbuz, and Bassam A. Masri

There are many soft tissue structures around the hip joint that may serve as a source of pain in both the native and prosthetic hip. In this review, the role of the gluteal, piriformis, iliopsoas, and rectus femoris musculotendinous units in the etiology of pathology around the hip joint will be discussed. Management options ranging from tailored physical therapy regimens to local steroid infiltration along with more invasive open and arthroscopic surgical techniques will be reviewed for each pathological entity. While not all conditions are well understood, advancements have been made in the management of each of these often challenging cases in both the native and prosthetic hip settings. This review explores these advancing treatment methods which will supplement the practice of any hip surgeon who is presented with problematic tendinopathy around both the native and prosthetic hip joint.

### **Acetabular Retroversion: Dysplasia in Disguise that Leads to Early Arthritis of the Hip** 403

Mohammad S. Abdelaal, Ryan M. Sutton, Steven Yacovelli, Joshua D. Pezzulo, Dominic M. Farronato, and Javad Parvizi

We aimed to assess the prevalence of acetabular retroversion (AR) in patients undergoing total hip replacement (THA) based on age. We retrospectively compared preoperative anteroposterior pelvic radiographs of patients younger than 40 years of age who underwent THA with the age- and body mass index-matched control of 40 years and older patients. Retroversion was determined based on the presence of cross-over sign, ischial spine sign, posterior wall sign, and elephant's ear sign with data stratified based on presence of dysplasia.

### **Physical and Mental Demand During Total Hip Arthroplasty** 413

Kevin Abbruzzese, Alexandra L. Valentino, Laura Scholl, Emily L. Hampp, Zhongming Chen, Ryan Smith, Zackary O. Byrd, and Michael A. Mont

This study compared differences in (1) task duration; (2) biometric parameters (ie, caloric energy expenditure, heart rate); and (3) subjective measures of mental as well as physical demand of robotic-assisted total hip arthroplasty (THA) and manual THA. A total of 12 THAs were performed on 6 cadaveric specimens by two surgeons using a wearable technology to track biometric parameters and taking a questionnaire to compare the physical and mental demands. The results of our study suggest that as compared with manual techniques, robotic assistance for THA may reduce mental and physical fatigue.

### **Considerations in the Sickle Cell Patient Undergoing Hip Reconstructive Surgery** 421

Sara J. Sustich, Benjamin M. Stronach, Jeffrey B. Stambough, C. Lowry Barnes, and Simon C. Mears

Sickle cell disease (SCD) is a hemoglobinopathy that commonly has musculoskeletal effects including osteonecrosis of major joints (most often the hip) and medullary infarcts with resultant pain, functional limitations, and decreased quality of life. Patients with SCD may require surgical intervention, including total hip arthroplasty, frequently at a young age. The underlying pathologic process of SCD creates unique medical and surgical challenges that place these patients at increased risk of complications. This necessitates a multidisciplinary approach for providing surgical care to patients with SCD.

## **Trauma**

### **A Review on Management of Insufficiency Fractures of the Pelvis and Acetabulum** 431

Colin K. Cantrell and Bennet A. Butler

Insufficiency fractures of the pelvis and acetabulum are occurring at increasing rates. Osteoporosis is the most prevalent risk fracture. Diagnosis begins with plain radiographs followed by advanced imaging with computed tomography and/or MRI. Pelvic ring fragility injuries are classified by the Fragility fractures of the pelvis system. Elderly acetabular fractures may be classified by the Letournel system. Management of these injuries is primarily nonoperative with early immobilization when allowed by fracture characteristics. When warranted, percutaneous fixation and open reduction internal fixation are options for both. Both acute and delayed total hip arthroplasty are options for acetabular fractures.

## Pediatrics

- Osteochondritis Dissecans Lesions of the Pediatric and Adolescent Knee** 445  
John Roaten, Borna Guevel, Benton Heyworth, and Mininder Kocher

Osteochondritis dissecans of the knee in pediatric and adolescent patients remains an incompletely understood entity, with multiple theories proposed for its underlying cause and variable treatment modalities. In addition to the importance of history and examination, treatment is primarily guided by lesion stability, which can be determined by MRI and arthroscopic findings. Other important factors that can influence healing include patient skeletal maturity, lesion location, and the size of the lesion. The purpose of this article is to review the most current epidemiology, classification, and pathoanatomy of the disease and discuss the different treatment options.

- The Insidious Effects of Childhood Obesity on Orthopedic Injuries and Deformities** 461  
Breann Tisano, Kendall Anigian, Nyssa Kantorek, Yves J. Kenfack, Megan Johnson, and Jaysson T. Brooks

The current childhood obesity epidemic, affecting approximately 20% of American children and adolescents, is accompanied by unique orthopedic manifestations. The growing musculoskeletal system is susceptible to the endocrine effects of obesity, resulting in decreased bone mass and quality. As a result, obese children are at increased risk of musculoskeletal injury, fracture, and lower extremity deformities. The efficacy of nonoperative treatment such as casting or bracing may be limited by body habitus and surgical treatment is accompanied by increased risk of perioperative complications.

## Shoulder and Elbow

- Management of Failed Rotator Cuff Repairs: A Review** 473  
Ian J. Wellington, Annabelle P. Davey, Michael R. Mancini, Benajmin C. Hawthorne, Maxwell T. Trudeau, Colin L. Uyeki, and Augustus D. Mazzocca

Failed rotator cuff repairs present a complex issue for treating surgeons. Many methods of management exist for this pathology including revision repair with biologic augmentation, repairs with allograft, tendon transfers, superior capsular reconstruction, balloon arthroplasty, bursal acromial reconstruction, and reverse total shoulder arthroplasty. This review discusses the current literature associated with these management options.

- Perioperative Management in Shoulder Arthroplasty: A Review of Current Practice** 483  
Christine Park, Kier M. Blevins, Alexandra V. Paul, Jason S. Long, Lucy E. Meyer, and Oke A. Anakwenze

Perioperative management for patients undergoing shoulder arthroplasty has evolved significantly over the years to reduce overt complications and improve patient outcomes. The groundwork for perioperative care encompasses initial patient selection and education strategies for achieving successful outcome. Multimodal pain management strategies have advanced patient care with the increased use of new regional/local anesthetics. In addition, complications resulting from blood loss and transfusions have been curtailed with the use of synthetic antifibrinolytic agents. It remains critical for shoulder arthroplasty surgeons to optimize patients during the perioperative period through various modalities to maximize functional progression, outcomes, and patient's satisfaction following shoulder arthroplasty.

## Foot and Ankle

### **Patient Complaints in Orthopedic Surgery: An Analysis Utilizing a Large National Database** 491

Shumaila Sarfani, Andrew Rees, Justin Vickery, John E. Kuhn, Mitchell B. Galloway, Henry Domenico, James W. Pichert, and William O. Cooper

Introduction: Unsolicited patient complaints (UPCs) about surgeons correlate with surgical complications and malpractice claims. Analysis of UPCs in orthopedics is limited. Methods: Patient complaint reports recorded at 36 medical centers between January 1, 2015 and December 31, 2018 were coded using a previously validated coding algorithm Patient Advocacy Reporting System. Results: A total of 33,174 physicians had 4 consecutive years of data across the 36 participating medical centers and met other inclusion criteria. Conclusions: Orthopedists with high numbers of UPCs may benefit from being made aware of their elevated risk status in ways that invite reflection on underlying causes.

### **Modified Lapidus Procedure and Hallux Valgus: A Systematic Review and Update on Triplanar Correction** 499

Dang-Huy Do, Joshua Jian Sun, and Dane K. Wukich

This review article examines contemporary methods and assesses radiographic outcomes and postoperative complications following the modified Lapidus procedure. A systematic review demonstrated significant improvements in intermetatarsal angle, hallux valgus angle, and tibial sesamoid position. We are updating a modified Lapidus technique for achieving triplanar correction of hallux valgus. Two cases of hallux valgus, one primary and one recurrent, are presented. As demonstrated in the systematic review, outcomes of Lapidus procedures create future opportunities. Surprisingly, only 78% of the studies assessed for this review reported on the hallux valgus angle and only 33% reported on tibial sesamoid position.

## Spine

### **Degenerative Cervical Myelopathy: Evaluation and Management** 509

Jestin Williams, Peter D'Amore, Nathan Redlich, Matthew Darlow, Patrik Suwak, Stefan Sarkovich, and Amit K. Bhandutia

Degenerative cervical myelopathy is most commonly caused by cervical spondylosis, with a predominant elderly population, and is the most common cause of spinal cord impairment. Patients typically present with gait dysfunction, hand impairment, and/or the presence of long tract signs: clonus, Hoffman sign, Babinski sign, or inverted radial reflexes. One of the key surgical strategies is deciding an approach, which is based on patient characteristics and cause of pathologic condition. Without operative intervention, there is a high rate of neurological decline. Most surgeons recommended surgical treatment given the favorable outcomes and well understood natural history of disease.

**A Pathway for the Diagnosis and Treatment of Lumbar Spinal Stenosis****523**

Matthew Darlow, Patrik Suwak, Stefan Sarkovich, Jestin Williams, Nathan Redlich, Peter D'Amore, and Amit K. Bhandutia

Lumbar spinal stenosis is a prevalent condition with varied presentation. Most common in older populations, symptoms typically include back, buttock, and posterior thigh pain. Diagnosis is typically based on physical examination and clinical history, but confirmed on imaging studies. Nonsurgical management includes nonsteroidal anti-inflammatories, physical therapy, and epidural injections. If nonoperative management fails or patient presentation involves worsening symptoms, surgical intervention, most commonly in the form of a laminectomy, may be indicated. Recent literature has demonstrated improved pain and functional outcomes with surgery compared with conservative treatment in the middle to long term.