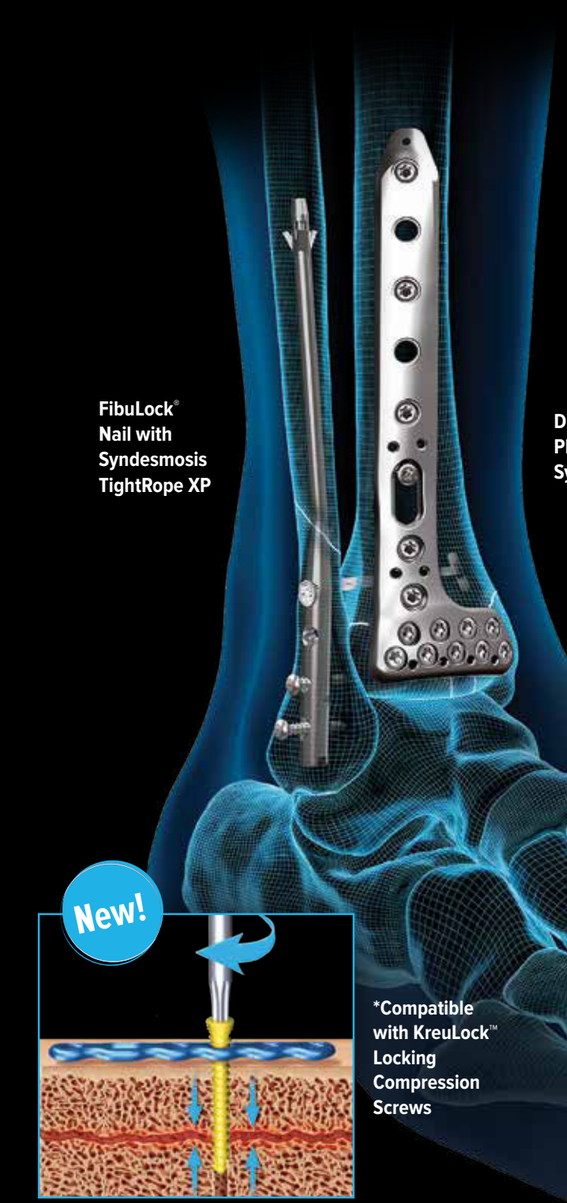
2022 Campbell Orthopaedic Journal

Volume 8

Treat Ankle Fractures with Confidence

From complex fractures to soft-tissue or articular cartilage injuries,
***only Arthrex** delivers a portfolio of comprehensive solutions*



FibuLock® Nail with Syndesmosis TightRope XP

SS/Ti Ankle Fracture Plates* with Syndesmosis TightRope® XP and *Internal*Brace™ Repair

Distal Tibia Plating System*

Mini Comprehensive Fixation System*

BioCartilage® Extracellular Matrix for Focal Articular Defects

*Compatible with KreuLock™ Locking Compression Screws

Arthrex®

Ad.Arthrex.com/Trauma

Smith+Nephew

OXINIUM◊
Oxidized Zirconium

THE MOMENT OF CHANGE

It's time to change everything

As the number of cases increase and the age of patients broadens, orthopaedic applications demand a high performance bearing surface that can deliver proven clinical performance in hip and knee arthroplasty.[1-8]

Choose **OXINIUM Oxidized Zirconium**, a step change for implant technology, combining the durability of metal, the wear properties of a ceramic and corrosion resistance better than both.[9-15]

OR3O◊
Dual Mobility with OXINIUM DH Technology

JOURNEY◊ II TKA
Total Knee Arthroplasty with OXINIUM Technology

References
1. Klug A, Gramlich Y, Rudert M, et al. The projected volume of primary and revision total knee arthroplasty will place an immense burden on future health care systems over the next 30 years. Knee Surgery, Sports Traumatology, Arthroscopy. 2020;15:1-12. **2.** Sloan M, Premkumar A, Sheth NP. Projected Volume of Primary Total Joint Arthroplasty in the U.S., 2014 to 2030. J Bone Joint Surg Am. 2018;100:1455-1460. **3.** Ackerman IN, Bohensky MA, Zomer E, et al. The projected burden of primary total knee and hip replacement for osteoarthritis in Australia to the year 2030. BMC Musculoskeletal Disorders. 2019;23(1):90. **4.** Davis ET, Pagkalos J, Kopjar B. Bearing surface and survival of cementless and hybrid total hip arthroplasty in the National Joint Registry of England, Wales, Northern Ireland and the Isle of Man. Journal of Bone Joint Surgery. 2020;5(2):pe0075. **5.** Peters RM, Van Steenbergen LN, Stevens M, et al. The effect of bearing type on the outcome of total hip arthroplasty. Acta Orthopaedica. 2018; 89(2):163-169. **6.** Atrey A, Ancarani C, Fitch D, Bordini B. Impact of bearing couple on long-term component survivorship for primary cementless total hip replacement in a large arthroplasty registry. Poster presented at: Canadian Orthopedic Association; June 20–23, 2018; Victoria, British Columbia, Canada. **7.** Australian Orthopaedic Association National Joint Replacement Registry (AOANJRR) Hip, Knee & Shoulder Arthroplasty: 2020 Annual Report. **8.** Innocenti M, Matassi F, Carulli C, Nistri L, Civinini C. Oxidized zirconium femoral component for TKA: A follow-up note of a previous report at a minimum of 10 years. The Knee. 2014;21:858–861. **9.** Hunter G, Dickinson J, Herb B, et al. Creation of oxidized zirconium orthopaedic implants. Journal of ASTM International. 2005;2:1-14. **10.** Long M, Riester L, Hunter G. Nano-hardness Measurements of Oxidized Zr-2.5Nb and Various Orthopaedic Materials. Abstract presented at: 24th Annual Meeting of the Society for Biomaterials. April 22-26, 1998, San Diego, California. **11.** Parikh A, Hill P, Pawar V, Sprague J. Long-term Simulator Wear Performance of an Advanced Bearing Technology for THA. Poster presented at: 2013 Annual Meeting of the Orthopaedic Research Society. Poster no. 1028. **12.** Papannagari R, Hines G, Sprague J, Morrison M. Long-term wear performance of an advanced bearing technology for TKA. Poster presented at: 2011 Annual Meeting of the Orthopaedic Research Society. Poster no. 1141. **13.** Smith+Nephew 2010. OR-10-155. **14.** Aldinger P, Williams T, Woodard E. Accelerated Fretting Corrosion Testing of Zirconia Toughened Alumina Composite Ceramic and a New Composition of Ceramicised Metal Femoral Heads. Poster presented at: 2017 Annual Meeting of the Orthopaedic Research Society. Poster no. 1037. **15.** Smith+Nephew 2016. OR-16-127.

www.oxinium.com

CAMPBELL ORTHOPAEDIC JOURNAL

Volume 8, May 2022

Campbell Clinic® ORTHOPAEDICS

Campbell Clinic Foundation MOVING LIVES

A JOINT PUBLICATION OF

Campbell Clinic Orthopaedics • Campbell Clinic Foundation
University of Tennessee Health Science Center-Campbell Clinic
Department of Orthopaedic Surgery & Biomedical Engineering

TABLE OF CONTENTS

Class of 2022 Resident Research

Campbell Clinic Staff Research

Letter from the Editor-in-Chief

Frederick M. Azar, MD

Chief of Staff, Campbell Clinic Orthopaedics
Professor and Sports Medicine Fellowship Director

Campbell Clinic Foundation Family and Friends,

On December 14, 2021, the Campbell Clinic Foundation reached its 75th anniversary. Milestones like these give us a chance to reflect on our achievements and set new goals for the future, but they also give us a great sense of appreciation.

It is because of you - our patients, alumni, industry partners, staff, and donors around the world - that we have flourished as leaders in orthopaedics. We have benefited greatly by your passion and generosity. Thanks to you, we have been able to continue to excel in patient care, resident and fellow education, and clinical research. We are indebted to all of you.

Like you, we have confronted the challenges of the pandemic with priorities to protect our patients, our trainees, our employees, and our staff – adapting to the many changes in technology, public policy and workforce health. Thanks to our dedicated team, we have embraced technology that now augments resident and fellow recruitment and training, and enhances communication with our patients, partners and one another.

In recent years, the Foundation has made great strides in fulfilling its mission:

- A 400% growth in clinical research in the last six years, spanning all subspecialties and including several prospective, randomized clinical trials
- Expanding care at the Center of Excellence for Cerebral Palsy Care & Research, which served more than 400 patients in 2021 alone
- Annually producing more than 100 presentations, publications, and posters to share the results of our research at numerous scientific conferences throughout the United States and internationally
- Establishing the James W. Harkess MD Total Joint Fund, to expand research and training in adult reconstruction and capitalizing on our two outpatient surgery centers
- Establishing a robust Diversity, Equity and Inclusion Committee, consisting of staff, alumni and partners
- Drawing the best and brightest residents, fellows and faculty

This year, we also hired two of our own from the UT- Campbell Clinic class of 2020. Carson Rider, MD, a foot and ankle subspecialist, completed a fellowship at the Hospital for Special Surgery in New York, NY in 2021, and Chad Campion, MD, a spine specialist, completed his fellowship at the Norton-Leatherman Spine Center in Louisville, KY in 2021. Both are tremendous physicians, with a shared passion for patient care, teaching, and research.

In the last year, we felt the tremendous loss of our dear colleague and friend, Kay C. Daugherty. For 43 years, Kay embraced every opportunity to serve our Clinic, foundation, and families near and far. She will forever be regarded as an iconic person in the history of the Campbell Clinic and Foundation. In her honor, we have created the Kay C. Daugherty Memorial Fund and will name a space in 2023 to honor her lifetime of mentorship, leadership, and contributions.

The physicians at Campbell Clinic remain dedicated to the standards of excellence in patient care established by our founder, Willis C. Campbell, MD, more than 110 years ago in 1909. While the healthcare environment has changed significantly since the early years of the 20th century, our commitment to faith, family, and patient care remain steadfast.

Together, we are Moving Lives.

Best regards,

Frederick M. Azar, MD
Campbell Clinic Chief of Staff

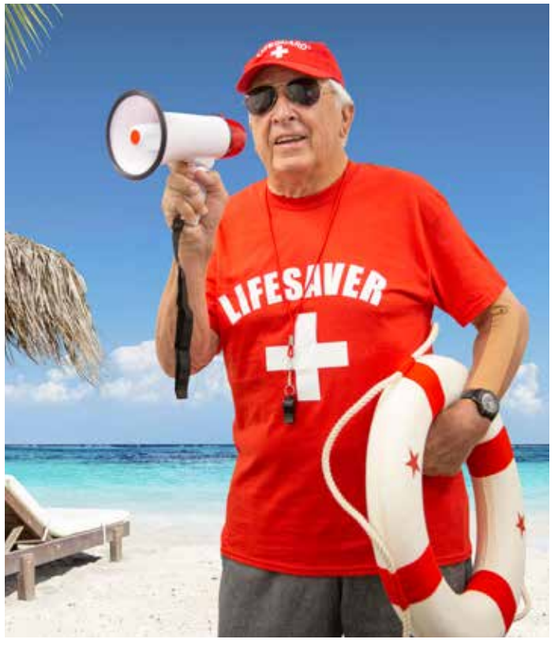
A Tribute to:

Jack R. Blair

The entire Campbell family owes a debt of gratitude to Jack R. Blair, who served as Campbell Clinic Foundation Chairman of the Board of Trustees from 2000-2021. With Jack's leadership–and the decision to engage community leaders to serve on the Board–the Foundation was transformed and has been on a growth trajectory ever since.

"One of the best things we ever did was ask Jack Blair to join the Campbell Clinic Foundation board," says James H. Beaty, MD.

Jack's involvement with the Campbell Clinic dates back to 1980, when he first joined Richards Medical in Memphis, first serving as the President of the International Division, and then in 1982, becoming company president. In 1986, he became the Smith & Nephew President of Orthopaedics, and later he became Group President of North America, South America, and Japan as well as Member of the S+N Board of Directors from 1988-1998.



During Jack's tenure, the Foundation Board of Trustees expanded to include prominent local leaders to strengthen the organization's financial position, expand community outreach and raise its public profile. Over the years, the Board built an endowment that now exceeds $10 million.

The research program has grown from a few dozen projects to more than 150 current studies, including clinical trials and multicenter studies. Investment from local companies and foundations has yielded new education and community outreach, as well as the annual Footprints in Motion gala and auction.

Seeing an opportunity to better coordinate care for children with cerebral palsy and neuromuscular disorders, Jack played a pivotal role in establishing the Center of Excellence for Cerebral Palsy Care and Research in partnership with Le Bonheur Children's Hospital in 2018. Thanks to a lead gift from the Children's Foundation of Memphis, this operation now serves hundreds of Mid-South families caring for children with cerebral palsy. The "one-stop-shop" approach to care informs treatment decisions and protocols with multi-disciplinary, comprehensive care and treatment.

"Jack's dedication, resourcefulness, and strategic mind make him a one-in-a-million leader and mentor," says Jenny Koltnow, Executive Director of the Campbell Clinic Foundation. "He leads with heart, builds trust, and has put the Foundation on a path for continued success."

Jack was born and raised in Ohio and attended Miami University in Oxford, OH, where he was in the Navy ROTC. When he went to serve his country for a couple of years, the Vietnam War turned them into 5 years. Once home again, he got his master's degree on the GI Bill and began work in the accounting and financial department at a company called American Hospital Supply Co., gaining vast international and healthcare experience along the way.

Jack has distinguished himself as one of the most dedicated, active board leaders in Memphis, serving as either Chairman or President of SCB Computer Corp Inc, DJ Orthopedics Inc, NuVasive, and Buckman Laboratories, among others. In addition, his unparalleled community leadership has included serving as Chairman of Memphis Symphony Orchestra, Trustee of Rhodes College, Chairman of Dixon Gallery & Gardens, and Chairman of the Memphis Development Foundation (Orpheum Theatre), as well as many other organizations in support of the arts, healthcare, and education.

Jack is married to Kathy, and 2022 marks their 50th wedding anniversary!

On behalf of the entire Campbell family, thank you, Jack, for your exceptional service, commitment, and leadership.

...Life means all that it ever meant.
It is the same as it ever was.
There is absolute and
unbroken continuity.

Henry Scott Holland

In memory of Kay C. Daugherty

October 8, 1945 to September 18, 2021

Kay was born on October 8, 1945 to Juanita and Laurence Clements of Barton, Arkansas. She graduated as valedictorian from Barton High School in Lexa, Arkansas, and received her undergraduate degree in English at Arkansas State University in Jonesboro, where she was a Chi Omega and President of her chapter.

After years of teaching high school English, Kay came to the Campbell Clinic Foundation as the Librarian, serving a pivotal role in research and education. With a talent for writing and a keen eye for grammar, she was quickly enlisted to help with the editing of *Campbell's Operative Orthopaedics*, ultimately serving as the Senior Medical Editor for nine editions of the text in addition to other textbooks and countless chapters and journal publications for Campbell Clinic authors and alumni. Her editing style remains the benchmark for medical writing throughout the publishing world.

During her 43-year career with the Campbell Clinic Foundation, she provided invaluable assistance to so many of our Campbell Clinic physicians and alumni in their professional and academic pursuits and worked determinedly with many professional organizations on their behalf. The familiar expression, "I don't know. Call Kay," still reverberates in the halls of the Foundation and in the minds and hearts of those who cherish and miss her.

Kay played a pivotal role in the lives of residents and fellows, as well. Generations agree that, as articulated by one alum, "One of her greatest contributions may have been as one who counseled, encouraged and even mothered hundreds of orthopaedic residents during some of their hardest days. She was loved."

Kay is survived by three children and four grandchildren.

CAMPBELL CLINIC MISSION

The mission of the Campbell Clinic is to provide unsurpassed patient care while being recognized as a leader in teaching and research in the profession of orthopaedic surgery.

CAMPBELL CLINIC VISION STATEMENT

Another century of world-class orthopaedic care restoring function and quality of life.

CAMPBELL CLINIC CORE VALUES

EXCELLENCE
We aim to exceed expectations by providing an exceptional patient experience through accessible & efficient quality care, a comfortable and safe environment, and effective communication.

INTEGRITY
We embrace, expect, and exhibit honesty, accountability and professionalism toward patients, each other, and outside partners.

COMPASSION
We commit to cultivating an environment of compassion for each patient and family member through sensitivity, sincerity, and empathy.

INNOVATION
We commit to delivering innovative technologies, products, and services through our rich orthopaedic heritage and a strong research foundation.

COMMITMENT
We commit to each other, to excellent patient care, to education, to innovation and research, to community service, and to orthopaedic leadership.

LEGACY
We will do what is right for the Campbell Clinic, our patients, and our employees.

UNITY
Everything we do, we do together.

13th Consecutive Year as BEST ORTHOPAEDIC/SPORT MEDICINE CLINIC
in the Commercial Appeal's Memphis Most Award

Campbell Clinic® ORTHOPAEDICS

WORLD-CLASS ORTHOPAEDICS MEETS UNMATCHED PATIENT CARE


Frederick M. Azar, MD

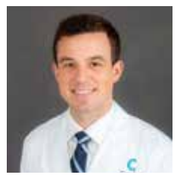

Nahum M. Beard, MD


James H. Beaty, MD


Michael J. Beebe, MD


David L. Bernholt, MD


Clayton C. Bettin, MD


Christopher T. Cosgrove, MD


John R. Crockarell, MD


Gregory D. Dabov, MD

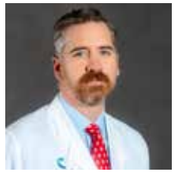

Dee Dockery, MD


Marcus C. Ford, MD


Matthew J. Gilbert, MD


Santos F. Martinez, MD


Anthony A. Mascioli, MD


Benjamin M. Mauck, MD


Marc J. Mihalko, MD


William M. Mihalko, MD, PhD


Robert M. Miller, MD


Carlos E. Rivera, MD


Matthew I. Rudloff, MD


Jeffrey R. Sawyer, MD


Benjamin W. Sheffer, MD


Henry L. Sherman, MD


David D. Spence, MD


William J. Weller, MD


A. Paige Whittle, MD


Keith D. Williams, MD


Tyler J. Brolin, MD


Steven T. Brown, MD


James H. Calandruccio, MD


Chad E. Campion, MD


Douglas T. Cannon, MD


Kevin B. Cleveland, MD


Benjamin J. Grear, MD


James L. Guyton, MD


James W. Harkess, MD


Robert K. Heck, MD

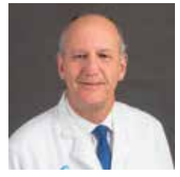

John C. Hyden, MD


Derek M. Kelly, MD


G. Andrew Murphy, MD


Wesley M. Owen, MD


Ashley L. Park, MD


Barry B. Phillips, MD


David R. Richardson, MD

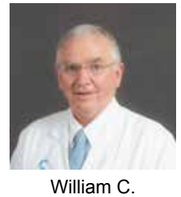

Carson M. Rider, MD


Norfleet B. Thompson, MD


Kirk M. Thompson, MD


Quin Throckmorton, MD


Patrick C. Toy, MD


William C. Warner, MD


John C. Weinlein, MD

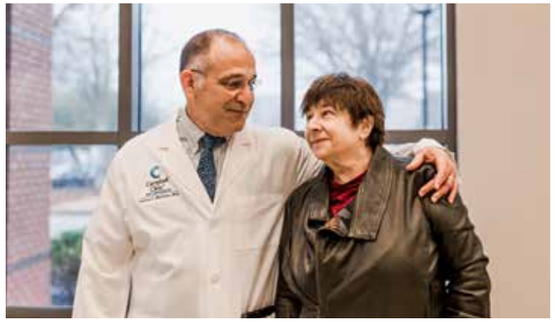
Find a world-class physician to meet any orthopaedic need.

Celebrating 75 Years

Moving Lives Since 1946

In 2021, in anticipation of the Foundation's 75th anniversary, trustees, staff, and stakeholders considered an important question: "How can we raise awareness and increase engagement in what we do?"

The result? We have updated our name, redesigned our logo and website, and redefined our purpose. As we honor the legacy of Dr. Willis C. Campbell and decades of achievements, this statement reinforces our commitment to world-class education and patient care.



We believe that mobility is the foundation of health.

Since 1946, the Campbell Clinic Foundation has trained the physicians and funded the research that has helped people in our community – and around the world – keep moving toward their best lives.

We work every day to take that legendary orthopaedic leadership to the next level, to make life better for those of us who have bone and joint injuries and conditions. To make life better for all of us.

We believe the Campbell Clinic Foundation develops the transformational leadership and innovation an active world needs.

We believe in moving lives.

Our principles and priorities as a Foundation have not changed: We lead surgeon education programs, orthopaedic research, and community healthcare that inform and serve practitioners and patients worldwide.

In honor of the Foundation's 75th anniversary, now is the perfect time to get to know us—and how we can better help you. Our new website has up-to-date information, event listings, a blog, and more to familiarize you with our mission, impact, and opportunities for involvement.

We are grateful to our generous donors, partners, and colleagues who make this work possible.

Help us build a bright future of *MOVING LIVES.*

Campbell Clinic Foundation

MOVING LIVES

STAFF

Rosemary Bankston
Fellowship Program Coordinator

Kathy Brooks
Editorial Assistant

Derek Dixon
Research Scholar

Robert Renn Eason, MS
Research Scholar

Linda Jones
Deputy Editor

Margaret C. Knack, RN, MS, CCRP
Research Manager

Jenny T. Koltnow, MEd
Executive Director

William Murphy, MD
Research Scholar

Renée Poe, MS
Residency Program Coordinator

Tonya Priggel
Medical Librarian

Karen Romer, RN, BSN
Research Nurse

Angie Smith
Nonprofit Accountant

Anne H. Tipton
Editorial Assistant

Rebecca Williams
Foundation Coordinator

ALVIN J. INGRAM MEMORIAL LECTURE

To honor his commitment to education, the annual Alvin J. Ingram, MD Memorial Lecture was initiated in memory of former Campbell Clinic Chief of Staff and Department Chairman, Alvin J. Ingram, MD, through a gift from members of his family. Dr. Ingram was a graduate of our residency program and a world authority on the treatment of polio.

The lectureship highlights achievements in surgeon education and features a Distinguished Professor and presentations from the Campbell Clinic Foundation graduating residents. Since 2014, under the guidance of Course Director, Derek M. Kelly, MD, the Ingram program has expanded, with lectures by renowned visiting faculty --including several past presidents of the American Academy of Orthopaedic Surgeons-- and an expert panel.

The Ingram Lecture, which provides continuing education credits for physicians and other allied health professionals, regularly attracts more than 150 surgeons, scientists, allied health professionals and others dedicated to excellence in orthopaedics.

We are proud that the Ingram legacy includes the following list of esteemed leaders in the orthopaedic community who have served as Distinguished Professor:

2014
TERRANCE PEABODY, MD
Edwin W. Ryerson Professor & Chairman
Northwestern University Feinberg School of Medicine

2015
J. LAWRENCE MARSH, MD
Chairman, Professor
Residency Director, Carroll B. Larson Chair
Department of Orthopaedic Surgery
University of Iowa Hospitals & Clinics

2016
WILLIAM J. MALONEY, MD
Elsbach-Richards Professor in Surgery
Chair, Stanford University School of Medicine - Orthopaedic Surgery

2017
DAVID A. HALSEY, MD
Medical Director, Adult Reconstructive Surgery
Professor, University of Vermont
College of Medicine

2018
KRISTY L. WEBER, MD
Chief, Orthopaedic Oncology
Department of Orthopaedic Surgery
Perelman School of Medicine
University of Pennsylvania

2019
JOSEPH A. BOSCO, III, MD
Professor & Vice Chair
Department of Orthopaedic Surgery
NYU Langone Health

2020
DANIEL K. GUY, MD, FAAOS
Emory Southern Orthopedics
Medical Director, Emory Surgery Center at La Grange

2021
FELIX "BUDDY" SAVOIE, MD
Ray J. Haddad Professor of Clinical Orthopaedics
Chief of the Division of Sports Medicine
Tulane School of Medicine
Director, Tulane Institute of Sports Medicine

2022 Ingram Memorial Lecture
April 22 – 23, 2022

Coinciding with the 25th Campbell Club Triennial–the reunion of graduates of the University of Tennessee-Campbell Clinic Residency and Fellowship Programs and Campbell Clinic staff–the 2022 Ingram Program is a two-day program with a national audience of orthopaedic surgeons who represent diverse orthopaedic subspecialties, academic institutions, private practices, and spheres of influence.

Scientific sessions feature two distinguished visiting professors, five expert panels, featuring many alumni and current Campbell Clinic staff, and to honor tradition, eight graduating residents' research presentations. Presenters will address a range of pressing issues, from new techniques in orthopaedic surgery to resources for practice management.

The 2022 event features two esteemed Visiting Faculty: Dr. Amy L. Ladd from Stanford University School of Medicine and Dr. Michael L. Parks from Weill Cornell Medical College at the Hospital for Special Surgery.

Amy L. Ladd, MD, FAOA, FAAOS
Elsbach-Richards Professor of Surgery, Stanford University School of Medicine; Vice-Chair of Academic Affairs, Department of Orthopaedics; Chief, Chase Hand & Upper Limb Center; Assistant Dean for Medical Student Advising

Dr. Amy L. Ladd graduated with honors from Dartmouth College in Hanover, New Hampshire, and received her medical degree from SUNY Upstate Medical Center in Syracuse, with a general surgery rotation at the Swedish Hospital Medical Center in Seattle. She completed her Orthopaedic Residency at the University of Washington and the University of Rochester and Hand Surgery Fellowships at Brigham & Women's Hospital, Harvard University, and at the L'Institut de la Main in Paris. At Stanford University School of Medicine, she currently serves as Professor of the Department of Orthopaedic Surgery, Professor of the Division of Immunology and Rheumatology, Professor of the Division of Plastic Surgery, the Elsbach-Richards Professor of Surgery, Chief of the Robert A. Chase Hand and Upper Limb Center, and Chief of the Children's Hand Clinic at Lucile Salter Packard Children's Hospital at Stanford. She also is the Assistant Dean of Medical Advising, Vice-Chair of Academic Affairs, and Chair of the Committee on Appointments and Promotions.

Dr. Ladd is a member of the American Academy of Orthopaedic Surgeons (AAOS), the American Society for the Surgery of the Hand (ASSH), the Ruth Jackson Orthopaedic Society, the American Association for Hand Surgery, the International Wrist Investigators Workshop, the Association of Bone and Joint Surgeons, the International Bone Research Association, the Orthopaedic Research Society, the American Orthopaedic Association (AOA), among many others. She has served on multiple committees and task forces of these organizations and most recently served on the AAOS Board of Directors and as Program Chair of the 2022 Annual Meeting, the Chair of the Board of Specialties Nominating Committee, and Mentor of the Orthopaedic Leadership Institute. She serves on the Nominating Committees of the ASSH, the Ruth Jackson Orthopaedic Society, and the AOA Board of Directors as well.

Dr. Ladd has published more than 125 peer-reviewed journal articles in hand surgery and 27 book chapters. In addition, she has served on review boards of top-tier journals, including the Journal of Bone and Joint Surgery, Journal of Orthopaedic Research, Journal of Hand Surgery, and Clinical Orthopaedics and Related Research as well as editor of books such as Orthopaedic Knowledge Online and American Society of Surgery of the Hand. She holds 22 patents for technological innovations and bone implants, which are the result of her research interest in musculoskeletal biomechanics. She is internationally known for research on carpometacarpal joint osteoarthritis.

Among many honors and awards, Dr. Ladd has been named one of the Best Doctors in America for 10 years in a row. She was the recipient of the ASSH Andrew Weiland Award and the Emanuel B. Kaplan Excellence in Anatomy Award as well as the Association of Bone and Joint Surgeons' Nicolas Andry Award for her significant contribution in musculoskeletal research. Besides her clinical and academic work over the years, she has volunteered her services to the Navajo Nation through the Department of the Interior and has volunteered surgical care to children with hand conditions in Vietnam. Dr. Ladd's many committee and leadership roles throughout her career exemplify her keen interest in advancing the field of orthopaedic surgery across all gender, racial, and cultural barriers.

Michael L. Parks, MD

Associate Professor of Clinical Orthopaedic Surgery at Weill Cornell College of Medicine; Associate Attending at the Hospital For Special Surgery

Dr. Michael L. Parks graduated from Duke University with an undergraduate degree in chemistry and received his medical degree from the Medical University of South Carolina in Charleston, where he was the recipient of the President's Clinical Science Award. He completed his internship in general and thoracic surgery and his Orthopaedic Residency at Duke University Medical Center in Durham, NC followed by a Hip and Knee Fellowship at the Hospital for Special Surgery (HSS) in New York. Dr. Parks is now an Associate Attending Orthopaedic Surgeon at HSS and an Associate Professor at Weill Cornell Medical College.

In addition to numerous memberships in local and regional societies, on a national level, he is a member of the Orthopaedic Research Education Foundation (OREF), American Orthopaedic Association (AOA), the American Academy of Orthopaedic Surgeons (AAOS), American Association of Hip and Knee Surgeons (AAHKS), the J. Robert Gladden Society, the National Medical Association, and, on an international level, the Société Internationale de Chirurgie Orthopédique et de Traumatologie (SICOT). He is the immediate Past President of the OREF and the New York State Society of Orthopaedic Surgeons and currently serves on the Board of Directors of the AAOS as Treasurer. Dr. Parks has served on many committees and is currently on the Steering Committee of the Movement is Life Caucus, which is a multi-stakeholder group working to decrease musculoskeletal healthcare disparity.

His extensive mentorship experience over the years at his academic institution has served him well in his current role as a member of the AAOS Leadership Fellows Program, which focuses on identifying and promoting future AAOS leaders. In 2019 he received the AAOS Diversity Award for promoting diversity in the field of orthopaedic surgery. Dr. Parks is actively involved in clinical research and has authored many peer review journal articles as well as book chapters and has served on several journal review and editorial boards. With a multitude of presentations, lectures, and visiting professorships to his credit, Dr. Park's focus remains joint replacement and biomechanical implant retrievals.

With a special interest in race, ethnicity and gender as pertains to patient care, his most current research project, funded by the National Institute of Health, centers around outcomes of total hip and knee arthroplasty based on race. His study seeks to identify factors, such as preoperative expectations, pain, function, education, insurance and socioeconomic status, that may adversely affect treatment outcomes after total joint replacement.

ALVIN J. INGRAM MEMORIAL LECTURE

JOINTLY ACCREDITED PROVIDER™
INTERPROFESSIONAL CONTINUING EDUCATION

In support of improving patient care, this activity has been planned and implemented by Medical Education Resources (MER) and Campbell Clinic Foundation. MER is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

THANK YOU!

To the sponsors who support the Alvin J. Ingram Memorial Lecture in its commitment to provide continuing education to physicians and health professionals dedicated to excellence in orthopaedics.

GENTLEMAN ORTHOPEDIC
SPORTS MEDICINE SOLUTIONS

Smith+Nephew

Exclusively foot & ankle Paragon 28

OSTEOREMEDIES
ADVANCED MEDICAL TECHNOLOGIES

stryker

COPI
Center for Orthotics & Prosthetics, Inc.

DePuy Synthes
THE ORTHOPAEDICS COMPANY OF Johnson & Johnson

Medtronic

exactech

PACIRA
BIOSCIENCES, INC.

bioventus

CrossRoads Extremity Systems
Breakthroughs for Faster Healing

DJO GLOBAL

Hanger
Empowering Human Potential

isto
BIOLOGICS

Medacta
USA

micare
PATH

NUVASIVE

ORTHOFIX

FERRING
PHARMACEUTICALS

stryker
Spine

ZIMMER BIOMET
Your progress. Our promise.

MicroPort

SVMIC

Campbell Clinic Foundation

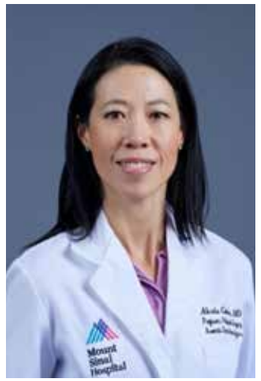
MOVING LIVES

VISITING PROFESSOR LECTURE SERIES 2021-2022

The Campbell Clinic Foundation is honored to host leading experts as visiting faculty each year to both strengthen our educational offerings and foster the next generation of orthopaedic leaders. Each Visiting Professor event features renowned orthopaedic experts who challenge, train, and inspire participants and prepare them for the complex world of 21st-century healthcare.

Stephanie Chen, MD, Chief Resident, explains, “These visiting professor lectures are very informative and allow us as residents to gain insight from outside experts in a collegial environment with faculty, our co-residents, fellows and other staff and industry partners.”

We are grateful to our faculty, industry partners, and staff for making these exceptional learning opportunities available.



Alexis C. Colvin, MD

Professor of Orthopaedic Surgery and Associate Dean for Alumni Affairs, Icahn School of Medicine at Mount Sinai, New York

On October 25, 2021, Dr. Alexis C. Colvin, Professor of Orthopaedic Surgery and Associate Dean for Alumni Affairs, Icahn School of Medicine at Mount Sinai, presented the topic, “Staging the U.S. Open in 2021,” for our Sports Medicine Program. Due to pandemic restrictions, the meeting was held virtually.

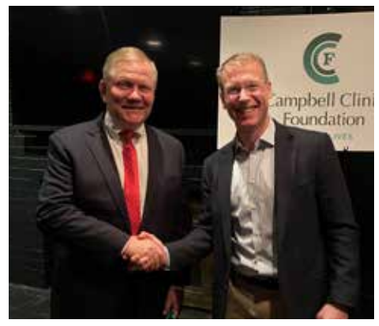
Dr. Colvin received her medical degree from Mount Sinai and completed her Orthopaedic Residency at NYU Hospital for Joint Diseases. During her residency, Dr. Colvin was selected for one of the most prestigious Sports Medicine Fellowships in the country at the University of Pittsburgh Medical Center, where she took care of professional athletes, including the Pittsburgh Steelers and Penguins, collegiate athletes at the University of Pittsburgh, and numerous other collegiate and high school athletes. Dr. Colvin specializes in the surgical treatment of knee, shoulder, and hip disorders. She has authored numerous scientific publications and has presented both at national and international meetings on sports medicine and orthopaedic surgery. Dr. Colvin is a member of the American Academy of Orthopaedic Surgeons, the American Orthopaedic Society for Sports Medicine, Arthroscopy Association of North America, and International Society for Hip Arthroscopy. In 2019, she was recognized in Crain’s New York Business and has been selected as a NY Magazine Top Doctor yearly since 2016. It was a privilege to have Dr. Colvin share her experiences of being a physician at the U.S. Olympic Training Center in Colorado Springs.

John E. (Jed) Kuhn, MD

Kenneth D. Schermerhorn Professor of Orthopaedic Surgery and Chief of Shoulder Surgery at Vanderbilt University Medical Center

Our Sports Medicine Program hosted the first 2022 lecture on January 27 with featured speaker, Dr. John E. (Jed) Kuhn, the Kenneth D. Schermerhorn Professor of Orthopaedic Surgery and Chief of Shoulder Surgery at Vanderbilt University Medical Center. More than 40 orthopaedic surgeons, residents and allied health providers attended the lecture at Folk’s Folly. The topic of the night was “The MOON Shoulder Group: Understanding Rotator Cuff Tears Through Multi-Center Collaboration,” which detailed Dr. Kuhn’s extensive research, collaboration, and practice of these complex shoulder injuries. The topic was the culmination of Dr. Kuhn’s many years of extensive research on shoulder injuries.

As an authority on shoulder and elbow surgery, he has presented over 300 invited lectures at local, national, and international meetings and has authored over 150 articles and 50 book chapters on the subject. Dr. Kuhn received his degree and completed his Orthopaedic Residency at the University of Michigan and a Sports Medicine and Shoulder Fellowship at the Steadman Hawkins Clinic in Vail, Colorado. He has served as the Vanderbilt Sports Medicine Fellowship Director for over a decade and is the Medical Director of the Vanderbilt NFL Hall of Fame Health Initiative and Ombudsman of the Departmental Board Initiative. He is currently the Vice President of the American Shoulder and Elbow Surgeons (ASES). Dr. Kuhn has also served as team physician for collegiate-level and national teams and since 2008 has been the Medical Director and Head Team Physician for the Nashville Predators ice hockey team. It was an honor to have Dr. Kuhn as our Visiting Professor.



Robert L. Barrack, MD

Charles F. and Joanne Knight Distinguished Professor of Orthopaedic Surgery at Washington University School of Medicine, St. Louis

To expand education in the subspecialty of Total Joint, the Campbell Clinic Foundation, with support from staff, alumni, and friends, established a fund to honor the lifetime contributions made by Campbell Clinic physician, Dr. James W. Harkess. This fund will benefit generations of orthopaedic surgeons in training and research. The inaugural James W. Harkess, MD Total Joint Fund Lectureship was held on February 17, 2022, at the Ridgeway Country Club. The support for both Dr. Harkess' recognition and Dr. Robert L. Barrack's lecture was tremendous, with so many attendees that only standing room was available.

Dr. Barrack, a graduate of Vanderbilt University, completed his Orthopaedic Residency at Tulane University, with a Sports Medicine Fellowship at Hughston Orthopaedic Clinic in Columbus, Georgia and a Total Joint Fellowship at the New England Baptist Hospital, and Brigham and Women's Hospital in Boston. He is Chief of Service and Head of Adult Reconstructive Surgery as well as the Resurfacing and Replacement Fellowship Director at Washington School of Medicine. Dr. Barrack is the recipient of numerous awards for his extensive research efforts and has authored over 350 journal articles and book chapters. He is also the current editor for the Bone and Joint Journal.

Dr. Barrack's topic for the night was "TKA 2022: Problems and Solutions," which was an excellent overview of some of the problems encountered in total knee arthroplasty with up-to-date information on evidence-based solutions. We were privileged to have Dr. Barrack, our esteemed colleague and expert, as our first James W. Harkess, MD Total Joint Fund Visiting Professor.

Mininder S. Kocher, MD

Professor of Orthopaedic Surgery at Harvard Medical School; Chief of the Division of Sports Medicine, the O'Donnell Family Endowed Chair, and the Director of Sports Medicine Fellowship of Boston Children's Hospital

After a two-year pandemic hiatus, the Campbell Clinic Foundation was honored to host Dr. Mininder S. Kocher, President of the Pediatric Orthopaedic Society of North America, as the 2022 James H. Beaty, MD Fund Visiting Professor for Pediatric Orthopaedics. Dr. Kocher's main practice focus is Pediatric Sports Medicine and Pediatric Orthopaedic Trauma. Following remarks by Dr. Jeffrey Sawyer, Pediatric orthopaedic surgeon, and recognition of Dr. James Beaty, Dr. Kocher presented a lecture entitled "ACL Injuries in Children and Adolescents: Getting to PLUTO." He also participated in an afternoon of case discussion and research strategy discussion with staff, residents and fellows and research team members.

Dr. Kocher graduated from Duke University as a Davidson Scholar, completed his Orthopaedic Residency at Harvard University, Pediatric Orthopaedic Fellowship at Boston Children's Hospital and a Sports and Arthroscopy Fellowship at the Steadman Hawkins Clinic. He is a member of numerous professional organizations, including the American Academy of Orthopaedic Surgeons (AAOS), the American Orthopaedic Society for Sports Medicine (AOSSM), the Pediatric Orthopaedic Society of North America (POSNA), the International Pediatric Orthopedic Think Tank (IPOTT), the Herodicus Society, and the 20th Century Orthopaedic Association. He is Past President of Pediatric Research in Sports Medicine (PRISM), which he founded, and he is a founding member of the Research in Osteochondritis Dissecans of the Knee (ROCK). In addition, he is a team physician for numerous high schools, Babson College, Northwestern University, the Boston Ballet, and the U.S. Ski and Snowboard, Track and Field, and Figure Skating teams.

CHANGING OF THE GUARD

The Willis C. Campbell Club has been fortunate to have dedicated alumni serve on the Alumni Board. The Campbell Clinic Foundation's 75th anniversary and the Campbell Club's 25th Triennial prompt reflection on where we've been, where we are, and how we forge ahead to advance orthopaedics and serve patients.

Dr. Randy Davidson

Dr. Chris Ihle

We interviewed our outgoing and incoming Campbell Club Alumni Board presidents:

Dr. Randy Davidson (1990) of Columbia, TN is a foot and ankle subspecialist at the Mid Tennessee Bone and Joint Clinic and has been Campbell Club president since 2018. Dr. Chris Ihle (1985) of Omaha, NE recently retired after a 30-year career as an orthopaedic surgeon and sports medicine specialist and will succeed Davidson as president in April 2022. Both have served in many leadership roles throughout their careers, including their respective state orthopaedic societies. They recently reminisced about their Campbell Clinic days, discussed the orthopaedic profession, and shared memorable advice from mentors.

What are the things that you remember most about your time at Campbell Clinic?

DAVIDSON: Two things come to mind – In the old Madison Avenue building, the residents and staff would all eat together. When you are first starting out, and you're being trained by people who are internationally famous orthopaedic surgeons, it is intimidating. After a while you realize that you are being trained by colleagues who care about you as a person. It was a humbling experience, and it really set the stage for the rest of my practice.

The second thing is living at The Med and operating at The Med. Back then, when we did trauma, we did 24 (hours) on and 24 off, which usually meant 36 on and 12 off. You learned how to operate and how to be a surgeon. That is a real asset for all of the future surgeons.

IHLE: When I look back on the experience, it was and still is really unique among residencies. We got both teaching hospital experience and exposure to the private clinic side. They expected you to teach others and let you operate and develop confidence and skills in the OR. It made you well-rounded and ready to go out into the world of private medicine. Very few residencies gave young doctors this complete training. And like all things, you got out of it what you were willing to put into it.

Describe an experience or an individual who helped you become a better clinician.

IHLE: So many of them added to me in different ways! Dr. Sisk expected you to show up ahead of time, go into the OR and make sure all the equipment we were going to need was there. I did that in every case the rest of my career. I remember him telling me one time, "Always make sure you read the night before to know what you're going to do the next day, think about it and plan it out." And I did that. Many times that saved me.

[Sisk] also taught me, "Never be afraid to speak out in the OR if you think something's not right." I took that to my clinic, where we had a saying, "Assume nothing." If you don't know, you ask. You don't assume. Dr. Sisk was a very special mentor for me both during my time at the clinic and after. He introduced me to the American Orthopaedic Society for Sports Medicine (AOSSM) and encouraged my involvement.

DAVIDSON: I would like to recognize Greer Richardson. Greer was one of the staff when I was there and has since retired. Greer was always about, "Be sure to take care of your family. Be sure to keep your faith strong." Early on, he spelled out the formula for avoiding burnout: diversify what you're doing and realize that your family and your faith always should come above work. I think that advice has helped me throughout my practice.

What advice did you receive early in your career that you would like to pass on to new orthopaedic doctors?

DAVIDSON: There is going to be lots of static from the insurance companies, from families, and internet sources. Always put the patient first – always do what's best for the patient.

IHLE: Dr. Stewart talked about economics and gave some really good advice: What you make as an orthopaedist, you need to invest and not just live on what you make. And he talked about investments. That really stuck with me.

What excites you about the world of orthopaedic surgery today?

DAVIDSON: Probably the most exciting change has been the move from inpatient procedures to outpatient procedures. When I started, people had ACL reconstructions in the hospital and stayed for days. Now you can have a total knee or a total hip as an outpatient. There are also more minimally invasive procedures and advanced arthroscopic procedures.

IHLE: The new joint-preservation techniques and the biologics. I think the next quantum leap we're going to make is going to be in biologics so we can put off the plastic and metal joint replacements, at least in extremity surgery.

What challenges does the orthopaedic community face these days?

DAVIDSON: I think the biggest thing is the explosion of knowledge and trying to keep up with the most recent trends in treatment in an era where you are being bombarded by patients who have been on the internet and want to tell *you* about the latest procedures.

IHLE: One challenge is reimbursement. I really feel for the young surgeons coming out of residencies and fellowships now; first of all, most of them are strapped with debt. Then the reimbursements are getting cut, and surgeons are required to see more and more work for the same reimbursement. They have to increase the quantity and maintain the quality. I'm concerned there's going to be a breaking point there.

What's on the horizon for you?

IHLE: Being asked to be the president of the Campbell Club is quite an honor for me. I am very thankful and honored to have the opportunity to pay it forward. I would like to find ways to increase the alumni involvement, including getting more of us back to the Triennials. Personally, I'm not done! I want to explore more and more outside of orthopaedics and medicine.

DAVIDSON: Chris and I have talked about this in the past. We would like to find a way to get alumni at all stages of their careers to be more involved. On a personal level, I am planning on retirement in the next couple of years. I am nearing the end of my full-time practice and plan to spend more time with my family and doing more things outside of medicine. I have 6 children and 12 grandchildren who are seven years old and under!

Interestingly, both Ihle and Davidson started their careers in Franklin, TN. Since 2011, another Campbell alum, Dr. Ken Moore, has been Mayor of the City of Franklin. Small world!

RESIDENCY OVERVIEW

For nearly 100 years, the University of Tennessee Health Science Center—Campbell Clinic Department of Orthopaedic Surgery has produced outstanding surgeons and physician leaders trained to provide unsurpassed patient care. "This residency is one of the most well-rounded programs in the country, offering learning opportunities in all subspecialties in addition to training in the business of orthopaedics, making them better prepared to enter the workforce," explains Residency Assistant Director, Clayton C. Bettin, MD.

The program has also evolved to meet the demands of the complex world of healthcare. Applicants for residencies these days are technologically savvy, expecting programs to offer digital resources and technology to augment their work. In addition, candidates expect residencies to have strong policies, programs, and training that emphasize diversity and inclusion. "As our field gains more diverse professionals and perspectives, our specialty will advance in countless ways," says Residency Director, Derek M. Kelly, MD.

The Campbell Clinic Department of Orthopaedic Surgery, which receives almost 1,000 applications annually, has evolved to meet the needs of 21st century learners. Formal teaching and research have moved online. Hybrid learning for the Monday Night Meetings and all subspecialty conferences allows for scheduling flexibility, and virtual resident recruitment offers an opportunity to meet a more diverse set of candidates. The new residency website, CampbellResidency.com, and a strong Instagram presence (@ccorthoresidency) have enhanced communication and engagement with prospective residents and alumni alike.

Today, 40 residents are enrolled in the accredited 5-year program, which combines rigorous academic learning with a heavy operative load and extensive clinical exposure. Residents train in all subspecialties: trauma, sports medicine, total joint, general, pediatric orthopaedics, adult reconstructive surgery, foot and ankle surgery, hand and spine surgery, orthopaedic oncology, and anatomy and pathology. They are gradually exposed to surgical techniques through a series of rotations in these areas. Training sites include Regional One Medical Center, Le Bonheur Children's Hospital, Spence and Becky Wilson Baptist Children's Hospital, Methodist Le Bonheur Healthcare's Central and Germantown locations, Baptist Memorial Hospital-Collierville, and Campbell Clinic's Wolf River and Midtown surgery centers.

Dr. Stephanie Chen, Chief Resident, explains, "We get a lot of autonomy early, and our trauma experience at Regional One is truly unique. The volume and pathology that we see there are unrivaled. The amount of resident-to-resident teaching here is also something special, and it has been both humbling and rewarding to be on both sides of that."

After graduation, most Campbell Clinic residents go on to competitive fellowship programs. Members of the Class of 2021, for example, proceeded to sub-specialty training at the American Sports Medicine Institute, OrthoCarolina, Hospital for Special Surgery, Rush University, NorthShore Orthopaedic Institute, Mississippi Sports Medicine and Orthopaedics Center, University of Pittsburgh, and Steadman Clinic.

Every day, patients in need of care and compassion see Campbell-trained physicians. Whether suffering debilitating pain or struggling to walk, patients' needs are met and well-being restored. Your investment is important to moving lives—serving patients worldwide and training generations of physicians in "the Campbell way."

Campbell Clinic®
ORTHOPAEDICS

RESIDENT RESEARCH

Nathaniel B. Alexander, MD[2]
Raymond J. Gardocki, MD[1]

[1] Vanderbilt Orthopaedics Franklin, Tennessee

[2] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

Awake Transforaminal Endoscopic Discectomy in an Ambulatory Surgery Center

ABSTRACT

Background

Transforaminal endoscopic discectomy has been found to have equivalent outcomes to traditional discectomy techniques. Controversy exists concerning whether this should be performed under general anesthetic with neuromonitoring or can be safely performed on awake patients without neuromonitoring. Performing such procedures on awake patients has the benefit of avoiding general anesthesia as well as the costs associated with neuromonitoring without affecting the safety profile of the procedure.

Aims/Objectives

To evaluate the safety and effectiveness of awake endoscopic discectomy in an ambulatory surgery center setting.

Methods

One hundred consecutive patients with lumbar disc herniations treated with transforaminal endoscopic discectomy by a single surgeon were enrolled in the study. All procedures were performed under conscious sedation with local anesthetic. Preoperative and postoperative visual analog pain scores (VAS) were recorded and compared. Time spent in recovery prior to discharge home and complications were also recorded. All patients tolerated the procedure well and none had to be transitioned to general anesthetic. Patients were required to ambulate and void prior to discharge home. No patients required inpatient admission.

Results

Patients' average VAS score went from a mean of 6.85 to 0.74 immediately postoperatively. The average time spent in postanesthesia care unit (PACU) prior to discharge was 56.7 minutes. Complications in this series include one cerebrospinal fluid leak, eight cases of radiculitis and five recurrences within the global period. One patient developed remote recurrence. Two patients developed adjacent segment disease. No postoperative infections were recorded. Rates of radiculitis following transforaminal endoscopic discectomy varied depending upon the need to manipulate the dorsal root ganglion (DRG). Eight patients developed radiculitis postoperatively. Seven of these patients required direct manipulation of the DRG due to the pathology extending into the foramen or far lateral zone. One patient with a central/paracentral herniation developed radiculitis. This patient had a cephalad extrusion necessitating a higher positioning of the endoscope in the foramen, which likely caused inadvertent compression of the DRG.

Conclusions

Endoscopic transforaminal discectomy can safely be performed under local anesthetic with conscious sedation without the need for neuromonitoring. This offers multiple advantages including cost savings and avoiding issues with general anesthesia (urinary retention, nausea, vomiting, delirium, etc.). Patients with cephalad extrusions may benefit from more aggressive bone resection, or even a modified approach in order to avoid impingement on the DRG. Radiculitis occurred in 23.3% of cases requiring direct manipulation of the DRG. One patient was lost to follow-up prior to radiculitis resolution.

Corresponding Author:

Raymond J. Gardocki, MD
206 Bedford Way
Franklin, TN 37064
P: 615-790-3290
Raymond.gardocki@vumc.org

NATHANIEL B. ALEXANDER, MD

Hometown: Paris, AR

Undergraduate Institution: University of Arkansas

Medical School: University of Arkansas for Medical Sciences

Personal: Dr. Alexander's father is a family medicine doctor, while his uncle is a radiologist. He met his wife, Evan, through mutual friends during college; they bonded over a mutual love of the outdoors.

Hobbies: Spending time with Evan and their families, tackling home-improvement projects, skiing, visiting microbreweries, fishing, and paddling.

Asked why he chose medicine as a career: *I grew up in a small town with a family-medicine doctor and registered nurse as parents, so I figured I should go into the family business.*

And why he chose orthopaedics as a specialty: *Acute problems, working with my hands and the ability to improve a patient's quality of life consistently through direct interventions is why I selected this medical field.*

Favorite memory of residency: *Wilderness hand journal club and the Roast.*

Plans after Campbell: Dr. Alexander will pay back an obligation to the U.S. Navy by serving for them as a general orthopaedist.

Dr. Alexander adds: *Thanks to all of the staff, especially the trauma attendings, for trusting us with their patients and all the lessons they taught us over the past five years. Our residency experience is second to none.*

Stephanie N. Chen, MD[1]
Tyler Ragsdale, MD[2]
Alice Moisan, BSN, RN[3]
Leslie Rhodes, DNP[4]
Lindsey Locke, MSN, CPNP-PC[4]
Derek M. Kelly, MD[1]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

[2] University of Tennessee Health Science Center, College of Medicine, Memphis, Tennessee

[3] ICON PLC, Clinical Research Associate, Brentwood, Tennessee

[4] Methodist Le Bonheur Children's Hospital, Memphis, Tennessee

Acknowledgments:

David Heinsch, MD
Leigh Holland Trotti, NP
Shannon Knierim Pruitt, PT
Lauren McGee, PT
Konstance Hines, PT
Jodi Beth Haberman, PT
Aristea Wells, DPT-PCS
McKinsey Juarez, DPT

Corresponding Author:

Derek M. Kelly, MD

1458 W. Poplar Avenue, Suite 100
Collierville, TN 38107
P: 901-759-5522
F: 901-435-5654
dkelly@campbellclinic.com

Prospective, Randomized Ponseti Treatment for Clubfoot: Orthopedic Surgeons versus Physical Therapists

ABSTRACT

Introduction

Clubfoot is a common congenital foot deformity in children. Over the past three decades, the Ponseti method has become the standard of care in clubfoot treatment. Currently, clubfoot casting is performed in many centers by both orthopedic surgeons and physical therapists. While multiple studies have been conducted on the Ponseti method of clubfoot treatment as well as on the treatment of clubfoot by orthopaedic surgeons and physical therapists utilizing various methods of manipulation and casting, there has been no direct comparison of outcomes and complications of this treatment in this patient group between orthopedic surgeons and physical therapists. This study was designed to prospectively compare the outcomes of patients with clubfoot treated by these two groups of specialists.

Methods

One hundred and twenty-six patients between (January 2010 and December 2014) with a diagnosis of clubfoot under the age of 12 months were included in the study. Patients meeting inclusion criteria were randomized into either an Orthopedic Surgeon (MD) group or a Physical Therapist (PT) group. Following randomization, patients received weekly serial casting by the same treatment team until the deformity was completely corrected or until a percutaneous tendo-achilles tenotomy (perc TAT) procedure was performed. Brace wear was then implemented until 3 years of age. Patients were followed until 3 years of age. Pirani and Dimeglio scores were calculated at the initial visit, at end of casting, and at each in-brace follow-up visit. Outcome measures included the number of casts required to either achieve correction or until perc TAT was performed, casting and in-brace follow-up appointment compliance, brace-wear compliance, recurrence of deformity including the need for surgical intervention, skin or cast complications, satisfaction with treatment, and barriers to compliance. Failure was defined as either surgical failure (the need to proceed with surgical intervention beyond perc TAT) or clinical recurrence (an increase in Pirani and/or Dimeglio scores after the completion of serial casting and/or perc TAT).

Results

Patient demographics and characteristics (gender, race, a family history of clubfoot, laterality) were similar between treatment groups, with the only significant difference being the mean age of entry into the study (1.19 months in the MD group and 2.11 months in the PT group [p= 0.01]). The number of casts needed to achieve correction trended towards a lower number in the MD group (3.77 in the MD group vs 4.34 in the PT group for right-sided casting [p= 0.04], 3.92 in the MD group vs 4.45 in the PT group for left-sided casting [p= 0.09]). At 6 months, there were no surgical failures in the MD group and 3 surgical failures in the PT group. At 12 months, there were 3 surgical failures in the MD group and 8 surgical failures in the PT group. At 3 years, there were 10 surgical failures in the MD group and 15 surgical failures in the PT group. There was no significant difference in the number of surgical failures between groups at any time point. Recurrence rates based on Pirani scores were 31% and 34% at 6 months in the MD and PT groups respectively, 44% and 55% at 12 months, and 57% and 69% at 3 years. Recurrence rates based on Dimeglio scores were 21% and 29% at 6 months in the MD and PT groups respectively, 38% and 52% at 12 months, and 62% and 71% at 3 years. There was no significant difference in recurrence rate between groups at any time point. All outcome measures were also equivalent between both groups at 6 months, 12 months, and 3 years.

Conclusions

Ponseti casting for treatment of clubfoot performed by both orthopaedic surgeons and physical therapists results in equivalent outcomes without any difference in complications. While the number of casts needed to achieve deformity correction or require perc TAT trended to a lower number in the MD group, this likely does not result in any clinical significance, as the difference in cast number equaled less than one week's difference in the overall duration of serial casting. These comparable results between Ponseti casting performed by MDs and PTs can hopefully give confidence to centers around the world that properly trained providers functioning in the setting of a clubfoot clinic can achieve equivalent results for babies with clubfoot deformity.

STEPHANIE N. CHEN, MD

Hometown: Pittsburgh, PA

Undergraduate Institution: Case Western Reserve University

Medical School: University of Toledo College of Medicine

Personal: Dr. Chen's father is an anesthesiologist. She met her significant other, Aaron Walsh, during the first year of medical school. He is a pediatric cardiology fellow at Nationwide Children's Hospital.

Hobbies: Traveling, enjoying food and drink, watching Pittsburgh sports and Netflix, spending time with family and friends.

Asked why she chose medicine as a career: *I grew up around medicine and shadowed my dad and his colleagues. Being able to combine my interest in anatomy/physiology with the ability to do good for patients made it a natural choice.*

And why she chose orthopaedics as a specialty: *I was influenced by the fact that most orthopaedic surgeons actually enjoy their jobs. I love the surgeries and the ability to significantly improve someone's functional status and well-being.*

Favorite memory of residency: *Making lifelong friends as we went through the highs and lows of residency together.*

Plans after Campbell: Dr. Chen will complete a Pediatric Orthopaedic Fellowship at Nationwide Children's Hospital.

Dr. Chen adds: *Thank you to all of the faculty, my co-residents, fellows and staff at the Campbell Clinic. These last five years have been unforgettable and I am so grateful to have had the opportunity to train at such an esteemed program with such wonderful and talented people.*

Travis B. Eason, MD[1]
William M. Mihalko, MD, PhD[1]
Patrick C. Toy, MD[1]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

Robotic-assisted Total Knee Arthroplasty in the Ambulatory Surgery Center

ABSTRACT

Introduction

Robotic-assisted total knee arthroplasty (RA-TKA) has become more popular in the United States. With TKA removed from the Medicare designated inpatient-only list, there has been an increasing trend toward outpatient TKA in ambulatory surgery centers (ASC), which has been shown to be safe. There is limited data reviewing the use of newer robotic systems and their use in the ASC. The goal of this study is to determine the safety and efficacy of RA-TKA in an ASC.

Methods

A retrospective review identified 172 outpatient TKAs (86 RA-TKAs and 86 conventional instrumented TKAs) performed between January 2020 and January 2021. All surgeries were performed by the same surgeon at the same free-standing ASC. Patients were followed for at least 90 days after surgery; complications, reoperations, admissions, emergency room visits, operative time, and patient-reported outcomes were recorded.

Results

Both conventional TKA and RA-TKA showed similar results. There were no statistical differences between robotic and conventional instrumentation groups regarding age, gender, race, American Society of Anesthesiologist (ASA) score, tobacco use, or alcohol use. All patients in both groups were successfully discharged home from the ASC on the day of surgery. No statistically significant differences were noted in intraoperative complications ($P = 1$), post-operative complications ($P = 0.7$), reoperations ($P = 0.4$), hospital admissions ($P = 1$), or delays in discharge ($P = 0.7$). RA-TKA had slightly longer average operative times (79 vs. 75 minutes [$P = 0.017$]), but matched conventional instrumentation by the last quarter (n = 22) of cases (72 vs. 75 minutes [$P = 0.3$]). RA-TKA increased total length of stay at the ASC (468 vs. 412 minutes [$P < 0.0001$]) compared to conventional TKA. No significant differences were noted in pain scores or KOOS JR outcome scores at 2-, 6-, or 12-week follow-up.

Conclusions

This study demonstrates that RA-TKA can be safely and successfully performed in an ASC with similar outcomes compared to TKA using conventional instrumentation. There were no differences in complications or patient-reported outcomes between the cohorts. Initial surgical times were increased secondary to the learning curve of implementing RA-TKA but matched convention instrumentation times by the end of the study cohort. Long-term follow-up is necessary to determine implant longevity and long-term outcomes.

Corresponding Author:

Patrick C. Toy, MD

1458 W. Poplar Avenue, Suite 100
Collierville, TN 38017
P: 901-759-5537
F: 901-435-5653
ptoy@campbellclinic.com

TRAVIS B. EASON, MD

Hometown: Raleigh, NC

Undergraduate Institution: North Carolina State University

Medical School: East Carolina University Brody School of Medicine

Personal: Dr. Eason is the first doctor in his family. NC State is where he met his wife, Mikayla, who is a graphic designer. They have two children, three-year-old Brooke and 6-month-old Abraham.

Hobbies: Sports, being outdoors, hiking, playing board games

Asked why he chose medicine as a career: *It's an excellent way to apply science to directly help people.*

And why he chose orthopaedics as a specialty: *I was drawn to orthopaedics primarily because of the mechanical nature of surgeries. I am gratified that orthopaedic patients typically have successful recoveries.*

Favorite memory of residency: *I will cherish the memories of hanging out with my classmates at the Roast, golf tournament, courses, and the wilderness hand journal club.*

Plans after Campbell: Dr. Eason will complete an Adult Reconstruction Fellowship at the University of Kentucky.

Dr. Eason adds: *Thank you to all the Campbell Clinic staff that have made me the surgeon that I am today. Thank you Drs. Kelly, Throckmorton, and Bettin for their leadership of our residency program. Lastly, I would like to thank the residents who have become my family over the past five years.*

Richard A. Hillesheim, MD[1]
Padam Kumar, BS[2]
Tyler J. Brolin, MD[1]
David L. Bernholt, MD[1]
Paul M. Sethi, MD[3]
Marc S. Kowalsky, MD[3]
Frederick M. Azar, MD[1]
Thomas W. Throckmorton, MD[1]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

[2] University of Tennessee Health Sciences Center, College of Medicine, Memphis, Tennessee

[3] Orthopedic & Neurosurgical Specialists, ONS Foundation, Greenwich, Connecticut

Financial Support: Internal institutional support

Financial Disclaimer: None

Institutional Review Board approval was received from the University of Tennessee Health Science Center (no. 17-05558-FB)

Acknowledgments: Margaret C. Knack, RN, BSN, MS, CCRP assisted with patient recruitment and data abstraction. Daniel T. Dibaba, PhD performed the statistical analysis.

Reprinted from J Shoulder Elbow Surg. 2021 Dec;30(12):2691-2697. PMID: 34537339

Corresponding Author:

Thomas W. Throckmorton, MD

1400 S. Germantown Road
Germantown, TN 38138
P: 901-759-3100
F: 901-759-3195
tthrockmorton@campbellclinic.com

Periarticular Liposomal Bupivacaine Mixture Injection versus Single-Shot Interscalene Block for Postoperative Pain in Arthroscopic Rotator Cuff Repair: A Prospective Randomized Controlled Trial

ABSTRACT

Background

The pain control efficacy, postoperative opioid requirements, and costs among patients undergoing major shoulder surgery using different perioperative analgesia modalities has been a topic of active debate. Several studies have compared periarticular injection (PAI) to interscalene block (ISB) in shoulder arthroplasty, but there is a paucity of data comparing them in arthroscopic rotator cuff repair.

Methods

Patients aged 18-80 with full-thickness rotator cuff tears and undergoing primary arthroscopic rotator cuff repair at two different shoulder centers were screened and subsequently randomized to receive either periarticular injection (PAI) of liposomal bupivacaine mixed with 0.25% bupivacaine (n=41) or single shot interscalene nerve block (ISB) (n=36). Visual analog scale (VAS) pain scores, oral morphine equivalent (OME) use, Single Assessment Numerical Evaluation (SANE) scores, and costs were collected. Differences with $P < 0.05$ were considered statistically significant.

Results

Day of surgery VAS and OME usage were significantly reduced with ISB vs. PAI (0.69 vs. 4.65, $P = < 0.001$ and 18.66 vs. 34.39, $P = < 0.001$, respectively). There were no significant differences between groups regarding VAS in postoperative days (PODs) 1-3; however, OME usage on POD 1 (50.5 vs. 38.8, $P = 0.03$), and 2 (48.1 vs. 37.8, $P = .04$) was significantly more in the ISB group. At POD 3, VAS (4.13 vs 3.97, $P = 0.60$) and OME use (28.60 vs. 31.16, $P = 0.51$) were similar. At 6 and 12 weeks, there were also no significant differences between groups regarding VAS and OME use. There was no difference in SANE score at 12 weeks following surgery between groups and no difference between average 12-week cumulative OME use between groups. The average charge for the PAI was $455, and the average charge for ISB was $745.

Conclusion

Both ISB and PAI provide acceptable pain control following arthroscopic rotator cuff repair. Patients have less pain on the day of surgery with ISB, but rebound pain is significant after the block wears off, resulting in substantially increased opioid use in the first 2 postoperative days. However, cumulative opioid use between groups was similar. There were also no significant differences at the end of the 12-week episode of care in any of the other variables studied. The charge per patient for PAI is approximately $300 less than ISB. Thus, PAI may offer surgeons and patients an effective postoperative analgesic modality as an alternative to ISB.

RICHARD A. HILLESHEIM, MD

Hometown: Naperville, IL

Undergraduate Institution: Washington University

Medical School: Jefferson Medical College

Personal: Dr. Hillesheim's older brother, Paul, is a pathologist and his uncle, Richard Driessnack, is a retired hip and knee surgeon. He met his future wife, Mikaela, when they were playing volleyball in Charlotte, NC. *"She thought I was way too competitive."* Mikaela is a certified public accountant for International Paper. The Hillesheims have a son, 18-month-old Edwin Nelson.

Hobbies: Cycling, volleyball, visiting breweries, and traveling.

When asked why he chose medicine as a career: *I left a career in education to pursue medicine, which was a very difficult decision. Still, I felt it was the best match for me to satisfy intellectual curiosity and help improve lives for a living.*

And why he chose orthopaedics as a specialty: *I knew I wanted to be a surgeon when I entered medical school and eventually realized that orthopaedic surgeons are the most enjoyable to be around, so I decided to become one.*

Favorite memory of residency: *There are so many! Memphis in May concerts, the wilderness hand journal club, and pretty much any social event with the other residents.*

Plans after Campbell: Dr. Hillesheim will complete a Hand and Upper Extremity Fellowship at the Indiana Hand to Shoulder Center.

Dr. Hillesheim adds: *Much love and appreciation to Drs. Calandruccio and Weller for being hand surgery, professional, and personal mentors; the trauma staff—Drs. Rudloff, Weinlein, Beebe, and Cosgrove—for being the backbone of my surgical training; and Drs. Beaty, Azar, Throckmorton, Kelly, Spence and Bettin for being role models in both surgery and in life.*

Austin B. Murphy, MD[1]
Tyler J. Brolin, MD[1]
David L. Bernholt, MD[1]
Frederick M. Azar, MD[1]
Thomas W. Throckmorton, MD[1]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

Accuracy of MRI to Detect Lateral Ulnar Collateral Ligament Tears

ABSTRACT

Background

The use of magnetic resonance imaging (MRI) to detect tears of the lateral ulnar collateral ligament (LUCL) has been controversial. Historical studies suggest MRI may not be accurate in making the diagnosis. We proposed to compare preoperative MRI to surgical findings in a series of patients undergoing surgery for lateral elbow pathology. We hypothesized that modern MRI sequences would show improved accuracy in detecting LUCL tears.

Methods

This retrospective cohort study was conducted at a single institution and consisted of all patients undergoing surgery for lateral elbow pathology between 2012 and 2019. Inclusion criteria for this study were patients greater than 18 years old and preoperative MRI scans of the operative elbow performed using MRI machines located at the authors' facility or affiliated facilities. Exclusion criteria included patients who had a previous operation on the elbow of interest, MRI scans not in the study institution's electronic medical record, or patients with fractures of the elbow. Two shoulder and elbow fellowship-trained orthopaedists blindly reviewed preoperative MRIs to determine the presence of complete lateral ulnar collateral ligament tears. The consensus of MRI interpretations was compared to operative reports that revealed the true status of the lateral ulnar collateral ligament.

Results

Fifty-nine patients were included in the study. There were 27 men and 32 women. The average age was 46 (range 16-73). Eleven patients had LUCL tears that were confirmed intraoperatively. The remaining patients underwent surgery for recalcitrant lateral epicondylitis. Inter-observer reliability of the two fellowship-trained shoulder and elbow staff was moderate (k = 0.54). Observer 1 had 90.9% sensitivity and 81.3% specificity. Observer 2 had 90.9% sensitivity and 91.6% specificity. Original unblinded radiologist reads had a sensitivity of 72.7% and specificity of 97.9%. The combined consensus sensitivity of the MRI in detecting LUCL tears was 100% and specificity was 95.8%. Positive predictive value was 84.6% while negative predictive value was 100%. The overall accuracy was 96.6%.

Conclusion

Visualization of the LUCL on MRI has been felt to be difficult due to the oblique orientation of its fibers and variability in the clarity of scanning protocols and magnet strength. However, this study suggests that clinical interpretation by shoulder-and-elbow-trained specialists results in moderate interobserver agreement for the diagnosis of complete LUCL disruption. Despite modest positive predictive value, these data indicate high accuracy, sensitivity, specificity, and negative predictive value using MRI to detect LUCL tears.

Corresponding Author:

Thomas W. Throckmorton, MD
1400 S. Germantown Road
Germantown, TN 38138
P: 901-759-3100
F: 901-759-3195
tthrockmorton@campbellclinic.com

AUSTIN B. MURPHY, MD

Hometown: McDonough, GA

Undergraduate Institution: Samford University

Medical School: University of Alabama School of Medicine

Personal: Dr. Murphy met his wife in pre-med classes at Samford. Ann Elizabeth Murphy is a pediatrician. They have one daughter, 1-year-old Elizabeth “Ellie” Murphy.

Hobbies: Golf, grilling, hunting, woodworking.

Asked why he chose medicine as a career: *I wanted to have a career where I could use my interests in science and engineering while still being able to interact with individuals and affect their lives.*

And why he chose orthopaedics as a specialty: *I never really considered anything else. It combined mechanical thinking and a hands-on approach to helping patients get over their ailment.*

Favorite memory of residency: *Wilderness hand journal club. There’s nothing better than combining nature, camaraderie, and our profession. Great memories.*

Plans after Campbell: Dr. Murphy will complete a Hand Fellowship at the Indiana Hand to Shoulder Center.

Dr. Murphy adds: *Special thanks to Drs. Calandruccio, Weller, Mauck, and Thompson for showing me the intricacies of hand surgery and helping me discover my passion.*

David L. Parker, MD[1]
Robert Neel, BS[2]
Benjamin M. Mauck, MD[1]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

[2] University of Tennessee Health Sciences Center, College of Medicine, Memphis, Tennessee

Does Closed Reduction Affect Surgical Rates of Distal Radius Fractures? A Retrospective Study

ABSTRACT

Introduction

Closed reduction of certain displaced distal radius fractures is a widely applied practice, but the effect of the closed reduction on surgical rates and complications remains unclear. This study examined: (1) Does closed reduction of displaced distal radius fractures affect surgical rates? (2) Does closed reduction of displaced distal radius fractures affect complication rates?

Methods

The authors retrospectively reviewed adult patients ages 18-65 with displaced distal radius fractures who underwent operative versus nonoperative treatment and closed reduction versus no closed reduction from 2008-2013. Five hundred thirty-eight patients were included in the study and were divided into two groups: the operative group (266 patients) and the non-operative group (272 patients). Each group was then stratified according to whether a closed reduction was performed. Each patient's radiographs were reviewed and classified according to the AO classification of distal radius fractures. The authors conducted univariate and multivariable analyses to compare the outcomes of distal radius fracture surgeries with and without closed reduction. Two binary outcomes of interest were defined: post-reduction surgery required (yes/no) and complications (yes/no). For univariate analyses, chi-square or Fisher's exact tests (for any cell count <5) and logistic regression were used. With chi-square/Fisher's exact tests, the authors looked at outcomes by AO classification and with AO classifications combined.

For multivariable analyses, logistic regression with AO classifications combined was used. Covariates were included in multivariable regression based on statistical significance in univariate regression and/or clinical significance. Backward selection with an alpha level of removal of .05 was then applied; no variables were removed from the model using this criterion. All tests were considered significant at alpha = 0.05. Analyses were performed using SAS 9.4.

Results

Distributions of variables of interest were stratified by closed-reduction status. Univariate logistic regression associations of closed-reduction status with variables of interest were analyzed. AO classification, postreduction surgery required, and complications were all found to be statistically associated with closed-reduction status.

In chi-squared univariate analyses, patients who underwent closed reduction were found to have a higher percentage of surgery required compared to patients who were not closed reduced. (57% versus 43%, *P*=0.0020) and a higher percentage of complications (15% versus 8%, *P*=0.0136).

For AO classification 23-A2, closed-reduction procedures also had a higher percentage of complications (21% versus 8%, *P*=0.0239). Other comparisons at the level of AO classification did not find statistically significant differences, perhaps due to smaller sample sizes.

Multivariable logistic regression associations were analyzed. Complications had a statistically significant association with closed reduction when controlling for AO classification, gender, and postreduction surgery. The odds of complications were nearly double with closed-reduction procedures, with a ratio of 1.98 (CI 1.10-3.56, *P*=0.022).

Conclusions

This study showed that patients with displaced distal radius fractures who underwent closed reduction experienced a statistically significant increase in surgical rates and complications compared with patients who were managed without closed reduction. The increased rate of complications after closed reduction was found in the chi-square analysis and the controlled multivariable logistic regression analysis. In addition, the 23-A2 AO classification group experienced a statistically significant higher percentage of complications after closed reduction. Individual AO classification groups did not have a statistical increase in surgical rates after closed reduction, perhaps due to smaller sample sizes.

Corresponding Author:

Benjamin M. Mauck, MD

1400 S. Germantown Road
Germantown, Tennessee 38138
P: 901-759-3277
F: 901-759-3278
bmauck@campbellclinic.com

DAVID L. PARKER, MD

Hometown: Wildomar, CA

Undergraduate Institution: Brigham Young University

Medical School: University of North Dakota

Personal: Dr. Parker said his father-in-law, Dr. Steven Pennington, has been a great help and mentor. He met his wife, Lauren, in organic chemistry class. Lauren, who tutored him, also outperformed him on every test. She is a neuroscientist, vaccine editor, writer/editor and mother of Dru, 7; Estella, 4; and Scarlett, 1.

Hobbies: Basketball, football, skateboarding, wakeboarding, snowboarding

Asked why he chose medicine as a career: *Understanding how the body works and how to treat disease fascinates me. I also wanted to follow in the footsteps of some of the great doctors who have treated me and my family.*

And why he chose orthopaedics as a specialty: *I love learning about the skeletal system and how to best treat orthopaedic injuries. I also love sports, so orthopaedics was the perfect combination of medicine and personal interests.*

Favorite thing about residency: *The camaraderie. Having so many great people in the same boat as you is priceless! The parties, get-togethers and working together in the trenches is something I will never forget.*

Plans after Campbell: Dr. Parker will complete a Sports Surgery Fellowship at the American Sports Medicine Institute in Birmingham, AL.

Dr. Parker adds: *I appreciate all of the residents and attendings who taught me and spent time to help me become a better person and orthopaedic surgeon. I will always remember my time and the people at the Campbell Clinic.*

Naveen Pattisapu, MD[1]
Shumaila Sarfani, MD[2]
Jane Yeoh, MD[3]
Clayton C. Bettin, MD[1]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

[2] Ortho San Antonio Sports Medicine & Joint Replacement, San Antonio, Texas

[3] Nanaimo Orthopaedics, Nanaimo, British Columbia

Operative Management of Charcot Neuropathy of the Foot and Ankle: A Retrospective Study

ABSTRACT

Introduction

Treatment of Charcot neuropathy (CN) of the foot and ankle remains a challenge for both patient and surgeon. Nonoperative treatment with immobilization in a cast/orthosis has long been the mainstay of treatment, but more recently surgical intervention has gained interest because of the poor long-term outcomes with nonoperative care.

Methods

A retrospective chart review was done to analyze demographics, comorbidities, complications, and outcomes of operative management in CN. A retrospective chart review analyzed gender, BMI, comorbidities, demographics, and complications (ulceration, infection, and below the knee amputation).

Results

This study identified 63 patients with CN who were treated surgically over a period of 11 years, with an average follow-up of 46 months (median: 35 months, range: 0-173 months). The mean age of the 37 male and 26 female patients was 60.3 (29-81) years, and the average body mass index was 34.3. Diabetes was the cause of CN in 58 patients (92%). Operative or nonoperative care was chosen based on shared decision-making between patient and surgeon.

Among the 63 patients who underwent surgical intervention, 32 underwent nonreconstructive surgery and 31 underwent reconstructive surgery. Nonreconstructive surgery entailed debridement and irrigation, exostectomy, or temporizing external fixation. Reconstructive surgery included tibiotalocalcaneal nail fusion, or bolt and beam fusions. After surgery, the rate of new infections was lower in the nonreconstructive group 8/32 (25%) vs 12/31 (38.7%). The rate of new ulcerations was also lower in the nonreconstructive group 11/32 (34.4%) vs 13/31 (41.9%). The rates of below-the-knee amputation were similar between the groups, with the non-reconstructive group being 7/32 (21.9%) and the reconstructive group being 6/31 (19.4%).

Conclusions

Both nonreconstructive and reconstructive surgery of CN of the foot and ankle have high complication rates, including infections, ulcerations, and amputations. Nonreconstructive surgical intervention may prove superior to reconstructive modalities for the patient presenting with ulceration or infection. This study provides a large cohort of CN patients with mid- to long-term follow-up data to be utilized when considering operative management for CN.

Summary

An 11-year retrospective review of operative management of Charcot neuropathy in 63 patients at a tertiary referral center found high rates of ulceration, infection, and amputation with both nonreconstructive and reconstructive interventions.

Corresponding Author:

Clayton C. Bettin, MD
1211 Union Avenue, Suite 500
Memphis, TN 38104
P: 901-759-5422
F: 901-759-3278
cbettin@campbellclinic.com

NAVEEN PATTISAPU, MD

Hometown: Dallas, TX
Undergraduate Institution: University of Texas at Austin
Medical School: Baylor College of Medicine
Personal: Medical careers are a tradition in Dr. Pattisapu's family. His father is a surgeon, his brother is an ear, nose and throat specialist, and his uncle is a neurosurgeon. Dr. Pattisapu met his partner, Victoria Honnell, online. She is working on her PhD in neurobiology/epigenetics at St. Jude Children's Research Hospital.
Hobbies: Songwriting (guitar/voice), meditation, basketball.
Asked why he chose medicine as a career: *I read the book "Mountains Beyond Mountains" while I was in college and also worked at an HIV clinic in Austin. Those things helped inspire me about the ability to transform lives through medicine.*
And why he chose orthopaedics as a specialty: *To have the privilege to help people go back to work, play sports and perform other activities that they love.*
Favorite memory of residency: *Fixing my first tibia as a chief on call, then watching that patient thrive postoperatively.*
Plans after Campbell: Dr. Pattisapu will complete a Foot and Ankle Fellowship at Cedars-Sinai Medical Center in Los Angeles.
Dr. Pattisapu adds: *Thanks to Drs. LaVelle, Heck, Whittle, and Calandruccio.*

Michael P. Morwood, MD[1]
Benjamin D. Streufert, MD[2]
Amy Bauer, MD[2]
Catherine Olinger, MD[3]
Devon R. Tobey, MD[3]
Michael J. Beebe, MD[3]
Frank Avilucea, MD[4]
Andres R. Buitrago, MD[5]
Cory Collinge, MD[5]
Roy Sanders, MD[1,2]
Hassan Mir, MD, MBA, FACS[1,2]

[1] Florida Orthopaedic Institute, Tampa, Florida

[2] University of South Florida, Tampa, Florida

[3] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

[4] University of Cincinnati, Cincinnati, Ohio

[5] Vanderbilt University, Nashville, Tennessee

Reprinted with permission:
Morwood M, Streufert B, Bauer A, Olinger C, Tobey D, Beebe MJ, Avilucea F, Buitrago AR, Collinge C, Sanders R, Mir H. Intramedullary Nails Yield Superior Results Compared to Plate Fixation When Using the Masquelet Technique in the Femur and Tibia. J Orthop Trauma. 2019 Nov;33(11):547-552. doi: 10.1097/BOT.0000000000001579. PMID: 31403558

Corresponding Author:

Hassan Mir, MD, MBA, FACS

Florida Orthopaedic Institute
University of South Florida
5 Tampa General Circle, Suite 710
Tampa, FL 33609
e-mail: hmirwvu@aol.com

Intramedullary Nails Yield Superior Results Compared With Plate Fixation When Using the Masquelet Technique in the Femur and Tibia

ABSTRACT

Objectives
To determine the optimal fixation method [intramedullary nail (IMN) vs. plate fixation (PF)] for treating critical bone defects with the induced membrane technique, also known as the Masquelet technique.

Design
Retrospective cohort study.

Setting
Four Level 1 academic trauma centers.

Patients/Participants
All patients with critical bone defects treated with the induced membrane technique, or Masquelet technique, between January 1, 2005, and January 31, 2018.

Intervention
Operative treatment with a temporary cement spacer to induce membrane formation, followed by spacer removal and bone grafting at 6–8 weeks.

Main Outcome Measurements
Time to union, number/reason for reoperations, time to full weight-bearing, and any complications.

Results
One hundred twenty-one patients (56 tibias and 65 femurs) were treated with a mean follow-up of 22 months (range 12–148 months). IMN was used in 57 patients and plates in 64 patients. Multiple grafting procedures were required in 10.5% (6/57) of those with IMN and 28.1% (18/64) of those with PF (P = 0.015). Reoperation for all causes occurred in 17.5% (10/57) with IMN and 46.9% (30/64) with PF (P = 0.001). Average time to weight-bearing occurred at 2.44 versus 4.63 months for those treated with IMN and plates, respectively (P = 0.002). The multivariable adjusted analysis showed that PF is 6.4 times more likely to require multiple grafting procedures (P = 0.017) and 7.7 times more likely to require reoperation (P = 0.003) for all causes compared with IMN.

Conclusions
This is the largest study to date evaluating the Masquelet technique for critical size defects in the femur and tibia. Our results indicate that patients treated with IMN had faster union, fewer grafting procedures, and fewer reoperations for all causes than those treated with plates, with differences more evident in the femur. The authors believe this is a result of both the development of an intramedullary canal and circumferential stress on the graft with early weight-bearing when using an IMN, as opposed to a certain degree of stress shielding and delayed weight-bearing when using PF. We, therefore, recommend the use of an IMN whenever possible as the preferred method of fixation for tibial and femoral defects when using the Masquelet technique.

Key Words
Masquelet technique, induced membrane, intramedullary nail, plate fixation, reoperation, bone grafting

Level of Evidence
Therapeutic Level III. See Instructions for Authors for a complete description of levels of evidence.

DEVON R. TOBEY, MD

Hometown: Kennesaw, GA
Undergraduate Institution: University of Georgia
Medical School: Mercer University School of Medicine
Personal: Dr. Tobey met her husband, Derek Brown, at a Mercer University medical school/law school mixer. He is a lawyer. Their family includes three dogs, Max, Luna, and Jase.
Hobbies: Dr. Tobey's hobbies include being outside and going on adventures, biking, running, and anything that involves their dogs.
Asked why she chose medicine as a career: *I always enjoyed science classes. After seeing a documentary about the first open-heart surgery, I knew that I wanted to be part of a surgical field to help people.*
And why she chose orthopaedics as a specialty: *I enjoy performing the surgeries. I also liked playing sports when I was growing up, so I wanted to make people better so they could continue participating in their sports and other physical activities.*
Favorite memory of residency: *All of the good times at The Med, wilderness hand journal club with Dr. Calandruccio, and the golf tournaments.*
Plans after Campbell: Dr. Tobey will complete an Orthopaedic Oncology Fellowship at Emory University.
Dr. Tobey adds: *Thank you to all of our staff for allowing us to learn from you and trusting us with the care of your patients.*

University of Tennessee Health Science Center - Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering

Residents 2021-2022

Campbell Clinic Foundation
MOVING LIVES

PGY-4 Residents


Seth R. Cope


Austin T. Hardaway


Hayden S. Holbrook


Caleb A. Jones


Anthony J. Marois


Zachary A. Mosher


Daniel J. Smigielski


Eric D. Villarreal

PGY-3 Residents


Tyler E. Calkins


David W. Cooper


Zachary R. Diltz


Ilya M. Gutman


Claire E. Hays


W. Colby Skinner


Carson J. Smith


Clayton W. Wing

PGY-2 Residents


Andrew J. Couture


Nolan D. Farrell


Andrew D. Gailey


Brenton R. Jennewine


Andrew D. Nahr


Evan R. Porter


Eric J. West


Jacob T. Zalewski

PGY-1 Residents


Matthew R. Colatruglio


Lauren A. Foropoulos


Paul T. Greenfield


Evan P. Johnson


Mateo J. Kirwan


Elliot N. Konrade


Tanner R. Poppe


Ryan G. Rogero

Current Orthopaedic Residents

INTERNS

MATTHEW R. COLATRUGLIO, MD
Undergraduate: The Ohio State University
Medical School: Ohio State University College of Medicine

LAUREN A. FOROPOULOS, MD
Undergraduate: University of Mississippi
Medical School: University of Tennessee Health Science Center College of Medicine

PAUL T. GREENFIELD, MD
Undergraduate: Rice University
Medical School: Emory University School of Medicine

EVAN P. JOHNSON, MD
Undergraduate: University of South Florida
Medical School: University of Central Florida College of Medicine

MATEO J. KIRWAN, MD
Undergraduate: University of Kansas
Medical School: University of Kansas School of Medicine

ELLIOT N. KONRADE, MD
Undergraduate: Washburn University
Medical School: University of Kansas School of Medicine

TANNER R. POPPE, MD
Undergraduate: University of Kansas
Medical School: University of Kansas School of Medicine – Wichita

RYAN G. ROGERO, MD
Undergraduate: University of California
Medical School: Lewis Katz School of Medicine at Temple

CLINICAL YEAR 2

ANDREW J. COUTURE, MD
Undergraduate: University of Central Arkansas
Medical School: University of Arkansas for Medical Sciences College of Medicine

NOLAN D. FARRELL, MD
Undergraduate: The Ohio State University
Medical School: Ohio State University College of Medicine

ANDREW D. GAILEY, MD
Undergraduate: Tulane University
Medical School: University of North Carolina at Chapel Hill School of Medicine

BRENTON R. JENNEWINE, MD
Undergraduate: Case Western Reserve University
Medical School: University of Virginia School of Medicine

ANDREW D. NAHR, MD
Undergraduate: Newman University
Medical School: University of Kansas School of Medicine

EVAN R. PORTER, MD
Undergraduate: Drury University
Medical School: Geisinger Commonwealth School of Medicine

ERIC J. WEST, MD
Undergraduate: Lafayette College
Medical School: The Brody School of Medicine at East Carolina University

JACOB T. ZALEWSKI, MD
Undergraduate: Sewanee: The University of the South
Medical School: East Tennessee State University James H. Quillen College of Medicine

Current Orthopaedic Residents

CLINICAL YEAR 3

TYLER E. CALKINS, MD
Undergraduate: West Virginia University
Medical School: West Virginia University School of Medicine

DAVID W. COOPER, MD
Undergraduate: Tusculum College
Medical School: East Tennessee State University James H. Quillen College of Medicine

ZACHARY R. DILTZ, MD
Undergraduate: The University of Alabama
Medical School: Ohio State University College of Medicine

ILYA M. GUTMAN, MD
Undergraduate: The University of Alabama
Medical School: University of Alabama School of Medicine

CLAIRE E. HAYS, MD
Undergraduate: Louisiana State University
Medical School: Louisiana State University School of Medicine

W. COLBY SKINNER, MD
Undergraduate: University of Georgia
Medical School: Medical College of Georgia at Augusta University

CARSON J. SMITH, MD
Undergraduate: University of Miami
Medical School: University of South Florida Health Morsani College of Medicine

CLAYTON W. WING, MD
Undergraduate: University of Georgia
Medical School: Medical College of Georgia at Augusta University

CLINICAL YEAR 4

SETH R. COPE, MD
Undergraduate: Brigham Young University
Medical School: University of Texas School of Medicine at San Antonio

AUSTIN T. HARDAWAY, MD
Undergraduate: The University of Alabama
Medical School: University of Tennessee Health Science Center College of Medicine

HAYDEN S. HOLBROOK, MD
Undergraduate: Wake Forest University
Medical School: Wake Forest School of Medicine

CALEB A. JONES, MD
Undergraduate: Tyler Junior College
Medical School: University of Texas School of Medicine at San Antonio

ANTHONY J. MAROIS, MD
Undergraduate: Wake Forest University
Medical School: Wake Forest School of Medicine

ZACHARY A. MOSHER, MD
Undergraduate: Auburn University
Medical School: University of Alabama School of Medicine - Huntsville

DANIEL J. SMIGIELSKI, MD
Undergraduate: University of Alabama
Medical School: University of Tennessee Health Science Center College of Medicine

ERIC D. VILLEREAL, MD
Undergraduate: University of Mississippi
Medical School: University of Tennessee Health Science Center College of Medicine

Campbell Clinic Foundation

MOVING LIVES

FELLOWSHIP PROGRAM

The Campbell Clinic Foundation is proud to offer some of the most highly sought-after orthopaedic surgery fellowships in the United States, providing each fellow with a well-rounded foundation in the science and art of orthopaedic surgery so they may advance as practitioners and physician leaders. We pride ourselves on fostering surgeons "the Campbell way".

While patient care and medical knowledge are the most visible core competencies, each fellowship provides comprehensive practice-based learning. Hospital and surgical experiences include daily rounds on all inpatients, postoperative checks before discharge, seeing all consults on inpatients to evaluate conditions and diagnostic data, discussing patients with attending staff physicians, serving as first assistant to primary surgeon and overseeing postoperative orders. Fellows supervise residents and participate in surgery. Scholarly experiences, local and national conferences, presentations, and lecture series enhance proficiency and medical acumen. System-based practice skills are refined by the completion of necessary administrative roles required for both inpatient and outpatient care.

Interpersonal and communication skills and professionalism are reenforced by one-on-one interaction with faculty members, who instruct and evaluate fellows' professional behavior and ability to communicate with patients of all ages and circumstances.

All fellows are expected to participate in at least one research project during the fellowship year that will result in presentation, publication, or both. Support from the Campbell Clinic Foundation are available for clinical and basic science research.

Sports Medicine and Shoulder Surgery Fellowship

Frederick M. Azar, MD, Professor, Sports Medicine Program Director

Tyler J. Brolin, MD, Assistant Professor and Associate Program Director, Shoulder and Elbow Surgery

David L. Bernholt, MD, Clinical Instructor, Sports Medicine

Thomas W. Throckmorton, MD, Professor, Shoulder and Elbow Surgery

The Sports Medicine and Shoulder Surgery Fellowship offers a truly unique experience that combines six months of both Sports Medicine and Shoulder and Elbow fellowship training. This hybrid program allows each fellow exposure to a breadth of both routine and complex pathology of the knee, shoulder, and elbow with unique focuses on shoulder arthroplasty, open shoulder surgery, and multi-ligamentous knee reconstruction. Fellows also have the opportunity to gain training in hip arthroscopy, hip preservation, and pediatric sports medicine. An integral part of the fellowship is the opportunity to participate in high-level team coverage which includes sports medicine clinics, team and event coverage, and pre-participation physical exams for the Memphis Grizzlies, Memphis Hustle of the G League, 901 FC of the United Soccer League, Memphis Redbirds AAA Baseball, University of Memphis, Christian Brothers University, and Rhodes College. Clinical experiences are focused at Campbell Clinic, Campbell Clinic Ambulatory Surgery Centers, and major metropolitan hospitals including both a pediatric and adult Level 1 trauma hospital. Fellows are exposed to practice management and coding training to gain invaluable knowledge on how to run a successful private practice. They are an integral part of a robust Sports/Shoulder and Elbow research division that will foster academic pursuits.

Hand Surgery Fellowship

Benjamin M. Mauck, MD, Associate Professor, Hand Program Director

James H. Calandruccio, MD, Associate Professor

Norfleet B. Thompson, MD, Instructor

William J. 'Jake' Weller, MD, Instructor

The University of Tennessee Health Science Center – Campbell Clinic Department of Orthopaedic Surgery Fellowship in Hand Surgery is an accredited 12-month fellowship in surgery of the adult hand directed by fellowship-trained specialists, with the Certificate of Added Qualifications (CAQ) in Hand Surgery. Clinic time is focused on diagnosis and care of hand conditions as well as treatment for nonsurgical problems. Extensive exposure to surgical management of acute and reconstructive upper extremity procedures in adults and children is a strength of the Fellowship. Hospital and surgical experiences span various facilities, including Baptist Memorial Health Care, Methodist Le Bonheur Health Care, Regional One Health, and Campbell Clinic Surgery Centers.

Foot and Ankle Surgery Fellowship

Clayton C. Bettin, MD, Assistant Professor, Foot and Ankle Fellowship Director

Benjamin J. Grear, MD, Instructor

G. Andrew Murphy, MD, Associate Professor

David R. Richardson, MD, Associate Professor

Carson M. Rider, MD, Instructor

The University of Tennessee Health Science Center – Campbell Clinic Department of Orthopaedic Surgery Fellowship in Foot and Ankle Surgery is a 12-month fellowship in surgery of the adult foot and ankle. Two fellowship opportunities are available each academic year. Five days each week are spent with the foot and ankle staff in an office practice nearly exclusively weighted toward foot and ankle problems. There is excellent exposure to acute and reconstructive surgery of the foot and ankle, as well as a broad exposure to clinical nonsurgical problems. There is no mandatory night call. The fellowship is focused on education (as opposed to routine clinical tasks), with ample time for reading and research. Experiences include performing all procedures, including removal of pins, administration of injections, and routine foot care. Hospital and surgical experiences include sharing daily rounds with staff physicians for all inpatients, serving as first assistants to primary surgeons, writing postoperative orders, brief operative notes, dictating all operative notes, and performing anesthetic blocks as directed.

Pediatric Fellowship

Derek M. Kelly, MD, Professor, Pediatric Orthopaedic Fellowship Director

James H. Beaty, MD, Professor

Jeffrey R. Sawyer, MD, Professor

Benjamin W. Sheffer, MD, Assistant Professor

David D. Spence, MD, Assistant Professor

William C. Warner, MD, Professor

The Pediatric Orthopaedic Surgery Fellowship is designed to provide subspecialty training in all areas of pediatric orthopaedic surgery with one of the top pediatric orthopaedic teams in the country. The 12-month

ACGME- and POSNA-accredited fellowship program combines clinical training and research, preparing surgeons for a career in both private practice and academic settings. Training locations include Le Bonheur Children's Hospital and Campbell Clinic Orthopaedics. The fellowship offers extensive exposure to pediatric conditions including trauma, scoliosis, clubfoot, hip diseases, limb deformities, tumors, hand and upper extremity conditions, sports orthopaedics, metabolic and genetic conditions, neuromuscular disorders, cerebral palsy, myelomeningocele, degenerative diseases, congenital conditions, and other conditions that affect the spine, hip, foot and ankle, and hand.

Trauma Fellowship

John C. Weinlein, MD, Assistant Professor, Trauma Fellowship Director

Matthew I. Rudloff, MD, Assistant Professor, Assistant Trauma Program Director

Michael J. Beebe, MD, Instructor

Christopher T. Cosgrove, MD, Instructor

The University of Tennessee Health Science Center – Campbell Clinic Trauma Fellowship participates in the match program and is Orthopaedic Trauma Association (OTA) accredited, offering a comprehensive trauma experience at a high-volume Level I trauma center serving as a referral facility for five states including Tennessee, Arkansas, Mississippi, Missouri, and Kentucky with four orthopaedic traumatologists on staff. This program is primarily focused on the operative and nonoperative management of complex polytrauma including pelvic, acetabular, and periarticular fractures; reconstructive fracture management including nonunions, malunions, and deformity correction; and clinical investigation and research, which provides extensive operative exposure of complex fractures with an emphasis on pelvic and acetabular injuries. Interaction with two orthopaedic trauma teams includes daily morning report/fracture conferences, which are attended by residents, fellow, and staff and include discussion of indications and preoperative planning as well as review of past operative and nonoperative cases. The fellow then has first choice of operative cases in a minimum of three orthopaedic trauma rooms that are available daily. The fellow has opportunities to pursue additional areas of interest including arthroplasty for certain fractures and deformity correction.

2022 ORTHOPAEDIC FELLOWS

BRADEN J. BOYER, MD • FOOT AND ANKLE FELLOW

Hometown: Sandy, UT

Undergraduate Institution: Brigham Young University

Medical School: University of Oklahoma

Orthopaedic Residency: University of Texas Health—San Antonio

Personal: Dr. Boyer is the first doctor in his family. He met his wife, Mandy, when they were neighbors during undergraduate studies. She is a teacher/homemaker and mother to Brightyn, 11; Jack, 9; Porter, 6; and Oliver, 4.

Hobbies: Fly fishing

Asked why he chose medicine as a career: *I saw an infomercial when I was in kindergarten that depicted physicians helping in underserved communities, which touched me and sparked the desire to use my talents in that way. My desire to go into medicine has never wavered since.*

And why he chose orthopaedics as a specialty: *You can't have a healthy heart and healthy lungs unless you are functional and moving. Thus, I help people be healthy in the most fun way.*

Favorite memory of fellowship: *Introducing my family to my attendings at a welcome party at one of their homes, only to have my son jump on and shatter a formal entryway table.*

Research activities: Dr. Boyer is researching, "Nail-plate construct for hindfoot charot arthropathy - a novel technique." He also has helped write a chapter on hindfoot fusions for "Master Techniques in Orthopaedic Surgery: Foot and Ankle," 4th edition.

Plans after Campbell: *I'm trying to decide between returning to the University of Texas-Health in San Antonio or OrthoArizona in Phoenix, AZ.*

Dr. Boyer adds: *I have been extremely impressed with the quality of residents, support staff, and attending physicians here at Campbell Clinic. I have the best mentoring staff physicians and am grateful for the friendships I've developed with them. I appreciate the help and support during these first six months and know that my last six months are going to be great. Thank you everyone for taking me into the Campbell Clinic family.*

JOHN WUNN CANCIAN SR, MD • FOOT AND ANKLE FELLOW

Hometown: Chesapeake, VA

Undergraduate Institution: Harvard University

Medical School: Eastern Virginia Medical School

Orthopaedic Residency: Portsmouth Naval Hospital

Personal: Dr. Cancian's uncle, David, and sister-in-law, Maddie, also are physicians. He met his wife, Brianna, at a restaurant in Washington, DC. She holds a PhD and is a clinical psychologist turned full-time mother to Eldaree, 9; John "Jack" Jr, 8; and Charles, 6.

Hobbies: Reading, model building, exercising, chasing after children.

Asked why he chose medicine as a career: *I enjoyed science and wanted to apply it in service to others.*

And why he chose orthopaedics as a specialty: *I enjoy having tangible victories and significantly improving patients' quality of life. I also enjoy procedural medicine.*

Favorite memory of fellowship: *Working with the faculty and residents, who have become wonderful friends and mentors. I've also enjoyed comparing pictures of smoked meat with Dr. Bettin.*

Plans after Campbell: *I'm going to return to Portsmouth Naval Hospital and take care of sailors and Marines.*

Dr. Cancian adds: *This has been a wonderful year! I am truly thankful to the Campbell Clinic family for taking us under its wings.*

ALEXANDER GREENSTEIN, MD • TRAUMA FELLOW

Hometown: West Bloomfield, MI

Undergraduate Institution: Michigan State University

Medical School: Wayne State University

Orthopaedic Residency: University of Rochester

Personal: Dr. Greenstein's mother, Annette, is an obstetrician/gynecologist and his sister, Victoria, is an orthopaedic resident. He met his wife, Melanie Elise, on a blind date. *My college roommate set us up and the rest is history.* She is a social worker and mother of Olivia Rose, 4; and Owen Alexander, 2.

Hobbies: Rowing, photography, technology

Asked why he chose medicine as a career: *Medicine provides a unique opportunity that allows me to serve others during their times of greatest need.*

And why he chose orthopaedics as a specialty: *Orthopaedic surgery treats well-defined problems with definitive solutions that restore mobility and function.*

Favorite memory of fellowship: *Rolling with back-to-back acetabular fractures starting at 2 a.m.*

Research activities: Dr. Greenstein participated in a multicenter study that examined tibio-talo-calcaneal nailing of high-energy lower extremity fractures.

Plans after Campbell: Orthopaedic trauma practice with Texas Joint Institute in Dallas, TX, Medical City Dallas and Medical City Plano.

Dr. Greenstein adds: *Thank you to the trauma faculty for all they have done for me. Thank you to Dr. Rudloff for teaching me to hit home runs, open it up and fix it anatomically; to Dr. Weinlein for teaching me to follow the science, and lessons from his career; to Dr. Beebe for teaching me about billing and how to turn fractures into sawbones; and to Dr. Cosgrove for teaching me how to learn and improve from every case. Thank you to all of the residents for their help and hard work -- I learned more from you than I could ever teach.*

NICHOLAS JAMES, MD • HAND FELLOW

Hometown: Jacksonville, FL

Undergraduate Institution: University of North Florida

Medical School: University of South Florida

Orthopaedic residency: University of Florida-Jacksonville

Personal: Both of Dr. James' parents are anethesiologists. He met his wife, Alexandra, in high school, and they started dating after both had finished undergraduate studies. She is an accountant. They have four children: Bianca, 6; Giselle, 5; Hudson, 2; and Arabella, 6 months.

Hobbies: Spending time with family, golf, rugby and drawing.

Asked why he chose medicine as a career: *I wanted to make a significant, positive impact on my patients' lives.*

And why he chose orthopaedics: *In anatomy, I was always drawn to the musculoskeletal system. Orthopaedics gave me the opportunity to build on that and provide patients with tangible improvements to their health. Specific to hand surgery, I enjoy the complex anatomy and challenge, both diagnostically and surgically.*

Favorite memory of fellowship: *The breadth of pathology seen both in the outpatient setting and at the trauma center.*

Research activities: *I am working on a research project that assesses how residents and fellows in hand surgery look for their first job. The hope is to provide future residents a road map of when to start looking for employment and what residents are looking for in a job. I am also working on a project with the shoulder and elbow department, assessing the association of superior humeral head osteophytes to rotator cuff tears in patients with glenhumeral osteoarthritis.*

Plans after Campbell: *I will be headed back to Jacksonville to work with the residency program at the University of Florida.*

Dr. James adds: *I want to thank the hand faculty for their investment in me, challenging me, and helping me to improve as a surgeon.*

KYLE MILLER, MD • PEDIATRIC FELLOW

Hometown: Atkinson, IL

Undergraduate Institution: University of Texas at Dallas

Medical School: Duke University School of Medicine

Orthopaedic Residency: University of Wisconsin

Personal: Dr. Miller is the first physician in his family. He met his girlfriend, Mary Galle, during his residency; she is a veterinarian.

Hobbies: Fishing, hiking, dog training, eating.

Asked why he chose medicine as a career: *I wanted to help heal people and make a difference in their lives.*

And why he chose orthopaedics as a specialty: *We have the best surgeries and power tools.*

Favorite memory of fellowship: *Getting to work alongside and learn from some of my heroes in pediatric orthopaedics.*

Research activities: Dr. Miller's current research includes, "Long-Term Patient-Reported Outcomes in Early Onset Scoliosis," which will be a 2022 podium presentation at the Pediatric Orthopaedic Society of North America (POSNA) annual meeting; "Management of Radial Neck Fractures," published in JPOSNA; evaluation for metallosis and host-implant response in patients treated with PRECISE Nails; radiographic measurements in SCFE diagnosis; "Making Cast Saws Safer," funded by a Le Bonheur Quality, Safety, and Innovation Grant; orthopaedics training and educational models; and the chapter "Pediatrics Forearm Fractures," published in the book, "Complications in Pediatric Orthopedics Surgery."

Plans after Campbell: *I will be working at Gillette Children's Specialty Healthcare in Twin Cities, treating pediatric orthopaedic conditions. This includes an academic appointment with the University of Minnesota. I also will be teaching residents and conducting research.*

Dr. Miller adds: *I am very grateful for my time training here. The providers, support staff, and residents have made me feel incredibly welcome. Thanks for making Memphis feel like home for a year!*

WILLIAM (WILLIE) POLIO, MD • SPORTS MEDICINE FELLOW

Hometown: Owensboro, KY

Undergraduate Institution: Centre College

Medical School: University of Louisville

Orthopaedic Residency: University of Louisville

Personal: Dr. Polio is following in the footsteps of his mother, Felicity, and grandfather, Bill Ward, who are family medicine doctors; his father, Joe, who is an orthopaedic surgeon; and his brother, Joey, who is a foot and ankle surgeon.

Hobbies: Running, triathlon, hunting, fishing, reading

Asked why he chose medicine as a career: *I was influenced by the direct and positive impact that physicians have on individuals in their community.*

And why he chose orthopaedics as a specialty: *I enjoy performing procedures and helping people regain their function and mobility.*

Favorite memory of fellowship: *I have enjoyed becoming a member of the Campbell Clinic family and Memphis community at large.*

Research activities: Dr. Polio researched, "Muscle activation patterns during active external rotation after reverse total shoulder arthroplasty: An electrophysiological study of the teres minor and associated musculature."

Plans after Campbell: *I plan on joining Advanced Orthopaedics in Owensboro, KY, and practicing alongside my father and brother.*

Dr. Polio adds: *I am very grateful for the faculty who have welcomed me into their practices and imparted a great deal of wisdom and knowledge. Additionally, I am thankful for the residents and support staff who have helped me feel at home and make every day at work an enjoyable experience.*

Campbell Clinic®

ORTHOPAEDICS

STAFF RESEARCH

Aaron Baessler, MD[1]
Patrick J. Smith, MD[1]
Tyler J. Brolin, MD[1]
Robert T. Neel, MD[2]
Saunak Sen, PhD[3]
Rongshun Zhu, PhD[3]
David L. Bernholt, MD[1]
Frederick M. Azar, MD[1]
Thomas W. Throckmorton, MD[1]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

[2] University of Tennessee Health Science Center, College of Medicine, Memphis, Tennessee

[3] Department of Preventive Medicine, University of Tennessee Health Science Center, Memphis, Tennessee

Reprinted with permission:
Published in J Shoulder Elbow Surg 2021 Aug 30:S1058-2746(21)00643-1.

https://www.sciencedirect.com/science/article/pii/S1058274621006431?via%3Dihub

Corresponding Author:

Thomas W. Throckmorton, MD

1211 Union Avenue, Suite 510
Memphis, Tennessee 38104
P: 901-759-3277
F: 901-759-3278
tthrockmorton@campbellclinic.com

Preoperative Opioid Usage Predicts Markedly Inferior Outcomes 2 Years After Reverse Total Shoulder Arthroplasty

ABSTRACT

Background

Reverse total shoulder arthroplasty (RTSA) has proved to be a highly effective treatment for rotator cuff-deficient conditions and other end-stage shoulder pathologies. With value-based care emerging, identifying predictive factors of outcomes is of great interest. Although preoperative opioid use has been shown to predict inferior outcomes after anatomic total shoulder arthroplasty and rotator cuff repair, there is a paucity of data regarding its effect on outcomes after RTSA. We analyzed a series of RTSAs to determine the influence of preoperative opioid use on clinical and radiographic outcomes at a minimum of 2 years' follow-up.

Methods

A retrospective review of primary RTSA patient data revealed 264 patients with ≥2 years of clinical and radiographic follow-up. Patients were classified as preoperative opioid users (71 patients) if they had taken narcotic pain medication for a minimum of 3 months prior to surgery or as opioid naive (193 patients) at the time of surgery. Assessments included preoperative and postoperative visual analog scale pain scores, American Shoulder and Elbow Surgeons scores, strength, and range of motion, as well as complications and revisions. Radiographs were analyzed for signs of loosening or mechanical failure. The Mann-Whitney U and Fisher exact tests were used for comparisons between groups. Statistical significance was set at $P < .05$.

Results

The mean patient age was 69.9 years, and the mean follow-up time was 2.8 years. Opioid users were significantly younger (66.1 years vs. 70.7 years, $P < .001$) at the time of surgery and had significantly higher preoperative rates of mood disorders, chronic pain disorders, and disability status (all $P < .05$). Postoperatively, opioid users had inferior visual analog scale pain scores (2.59 vs. 1.25, $P < .001$), American Shoulder and Elbow Surgeons scores (63.2 vs. 75.2, $P < .001$), active forward elevation ($P < .001$), and internal and external rotational shoulder strength (all $P < .05$) compared with opioid-naive patients. Periprosthetic radiolucency (8.45% vs. 2.07%, $P = .026$) and subsequent revision arthroplasty (14.1% vs. 4.66%, $P = .014$) occurred more frequently in opioid users than in opioid-naive patients. Both groups improved from baseline preoperatively to most recent follow-up in terms of functional outcomes and pain.

Conclusion

Preoperative opioid use portended markedly inferior clinical outcomes in patients undergoing RTSA. Additionally, opioid users had significantly increased rates of periprosthetic radiolucency and revision. Preoperative opioid use appears to be a significant marker for adverse outcomes after RTSA.

Tyler E. Calkins, MD[1]
Zachary A. Mosher, MD[1]
Thomas W. Throckmorton, MD[1]
Tyler J. Brolin, MD[1]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

Reprinted with permission:
Published in J Am Acad Orthop Surg 2022 Jan 15; 30(2):e233-e241.

https://journals.lww.com/jaaos/Fulltext/2022/01150/Safety_and_Cost_Effectiveness_of_Outpatient_Total.17.aspx

Corresponding Author:

Tyler J. Brolin, MD
1211 Union Avenue, Suite 510
Memphis, TN 38104
P: 901-759-3277
F: 901-759-3278
tbrolin@campbellclinic.com

Safety and Cost Effectiveness of Outpatient Total Shoulder Arthroplasty: A Systematic Review

ABSTRACT

Introduction

Changes in healthcare policy have driven many hospital-based surgeries to the outpatient environment. Multiple studies have shown outpatient total shoulder arthroplasty (TSA) is a safe alternative to the inpatient setting. This systematic review evaluates patient selection, perioperative protocols, complications, costs, patient satisfaction, and clinical outcomes of outpatient TSA and compares these with their inpatient counterparts.

Methods

The Embase, Medline, and CENTRAL databases were queried on April 30, 2020, for outpatient TSA studies, identifying 232 articles, with 21 meeting inclusion criteria. This involved 25,808 and 231,408 patients undergoing outpatient and inpatient TSA, respectively. Failed same-day discharge, readmissions, revision surgeries, cost, and complications among outpatient TSA were aggregated when raw numbers were available. Statistical significance for comparisons among outpatient and inpatient TSA within individual studies was alpha = 0.05.

Results

Ten studies evaluated same-day discharge rate, with 440 of 446 patients (98.7%) meeting the goals. Fourteen studies evaluated readmissions, revision surgeries, and complications, with readmissions in 238 of 6,133 patients (3.9%), revision surgeries in 32 of 1,484 patients (2.1%), and complications in 376 of 4,977 patients (7.6%). Readmission rates were similar between inpatients and outpatients, with only one study finding more readmissions after inpatient TSA. Complications were more common in inpatient TSA in five studies. Outpatient TSA demonstrated a charge reduction of $25,509 to $53,202 per patient, and patient satisfaction after outpatient TSA was "good to excellent" in more than 95% of patients. Patient selection for outpatient TSA used patient age, medical comorbidities, social support, living proximity to location of surgery, and lack of preoperative opioid use.

Discussion

Outpatient TSA in appropriately selected patients is a safe and cost-effective alternative to inpatient TSA. However, the literature is limited to national database or small retrospective studies. Large prospective, cohort studies are necessary to further assess differences in complication profiles between outpatient and inpatient TSA.

Level of evidence

Level IV; systematic review.

Chad E. Campion, MD[1]
Charles H. Crawford, BS[2]
Fehmi Berkay, BS[3]
Tino Mkorombindo, BS[3]
Leah Y. Carreon, MD, MSc[2]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

[2] Norton Leatherman Spine Center, Louisville, Kentucky

[3] University of Louisville School of Medicine, Louisville, Kentucky

Reprinted with permission:
Published in The Spine J 2021; 21(9 Supplement) S68-S69.

https://www.sciencedirect.com/science/article/pii/S1529943021004290?via%3Dihub

Corresponding Author:

Chad E. Campion, MD
1211 Union Avenue, Suite 510
Memphis, TN 38104
P: 901-759-3277
F: 901-759-3278
ccampion@campbellclinic.com

Correction, Maintenance of Cervical Alignment and Revision Rates: Three-Level ACDF Versus Corpectomy ACDF Hybrid Procedures

ABSTRACT

BACKGROUND CONTEXT

Anterior cervical discectomy and fusion (ACDF), anterior cervical corpectomy and fusion (ACCF), and hybrids (combination ACCF-ACDF) are common procedures used to treat symptomatic cervical spondylosis. Although there is a relative abundance of literature comparing 1-level ACCF vs 2-level ACDF and 2-level ACCF vs 3-level ACDF, detailed comparisons of 3-level ACDF vs hybrid procedures have not been extensively addressed.

PURPOSE

The objective of this study is to compare 3- and 12-month radiographic sagittal parameters and patient-reported outcomes (PROs) in patients who underwent 3-level ACDF or a hybrid procedure.

STUDY DESIGN/SETTING

Longitudinal observational comparative cohorts from a large, multisurgeon database.

PATIENT SAMPLE

Patients who underwent a 3-level ACDF (3L-ACDF, N=47) or 1-level corpectomy/1-level ACDF (Hybrid, N=52) with at least 12-month postop data available were identified.

OUTCOME MEASURES

EuroQOL-5D (EQ-5D), Neck Disability Index (NDI), neck and arm pain.

Methods

Standard demographic, surgical and (PROs) were collected in addition to pre- and postoperative radiographic data including C2 plumb line (C2PL), C2-C7 lordosis (CL), segmental lordosis (SL), and T1 slope (T1S).

Results

The two cohorts were similar in terms of demographics at baseline. At 3 months postop, CL (9.04°vs -2.12°, p=0.00) and SL (6.06°vs -2.26°, p=0.003) were significantly greater in the 3L-ACDF group versus the Hybrid group. This significant difference was maintained at 12 months postop for CL (6.62°vs -0.60°, p=0.015) but not for SL (2.36°vs -1.09°, p=0.199). There were no differences in PROs between the two groups prior to surgery, at 3 months postop, or at 12 months postop. Seven patients required revision surgery in the 1-year study period (1 in the 3L-ACDF, and 6 in the Hybrid p<0.001).

Conclusions

Three-level ACDF resulted in greater C2-C7 lordosis and segmental lordosis postoperatively, which was maintained at 1 year for cervical lordosis. While patient-reported outcomes were similar between the groups, patients with hybrid instrumentation required significantly more revision surgeries than those treated with 3-level ACDF.

Travis A. Doering, MD[1]
Benjamin M. Mauck, MD[1]
James H. Calandruccio, MD[1]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

Reprinted with permission:
Published in Orthop Clin North Am 2021 Apr; 52(2):149-155.

https://www.clinicalkey.com/#!content/playContent/1-s2.0-S0030589821000043?returnurl=https:%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS0030589821000043%3Fshowall%3Dtrue&referrer=https:%2F%2Fpubmed.ncbi.nlm.nih.gov%2F

Corresponding Author:

James H. Calandruccio, MD
1211 Union Avenue, Suite 510
Memphis, Tennessee 38104
P: 901-759-3277
F: 901-759-3278
jcalandruccio@campbellclinic.com

Hot Topics in Hand and Wrist Surgery

ABSTRACT

The field of hand surgery continues to evolve in new and exciting directions. Advances in diagnosis and management for common complaints and complex injuries allow higher-level care, while still being cognizant of the cost of health care delivery. Indications and protocols for past paradigm shifts, such as volar locked plating for distal radial fractures, continue to be honed, and the outcomes seen for modern flexor tendon repairs are impressive. Open questions remain, but promising results for scaphoid nonunion surgery and peripheral nerve reconstruction with processed allograft will continue to shed light on these unsolved problems.

Lauren Henderson, DO[1,2]
Mindy Longjohn, MD[1,2]
Adam Greeley, BSc[3]
Rudy Kink, MD[1,2]
Derek M. Kelly, MD[4,5]

[1] Department of Pediatrics, University of Tennessee Health Science Center

[2] LeBonheur Children's Hospital

[3] College of Medicine, University of Tennessee Health Science Center

[4] Department of Orthopaedics and Biomedical Engineering, University of Tennessee Health Science Center

[5] Campbell Clinic

Conflict of Interest:
The authors have no conflicts of interest to disclose.

Corresponding Author:

Derek M. Kelly, MD

1211 Union Avenue, Suite 510
Memphis, Tennessee 38104
P: 901-759-3277
F: 901-759-3278
dkelly@campbellclinic.com

The Relationships Between Restraint Type, Long-Bone Fractures, and Other Associated Trauma in Properly Restrained Pediatric Victims of Motor Vehicle Collisions

ABSTRACT

Background

Mortality and morbidity in motor vehicle collisions are significantly reduced when children are properly restrained, but data are limited about specific injuries. The purpose of this study was to evaluate the relationships between restraint type, long-bone fractures, and other associated trauma in properly restrained child passengers, with the hypothesis that long-bone fractures and femoral fractures would be more common in children properly restrained in car seats than other restraint types.

Methods

Using our Level I trauma registry, we reviewed records of children who presented to our emergency department from January 2011 to July 2016 after a motor vehicle collision. Only patients 12 years of age and younger who were properly restrained passengers were included. Data collected included demographics, restraint type, collision specifics, type of injuries, and outcomes.

Results

Two hundred and three patients out of 565 (35%) met the inclusion criteria of being properly restrained. Head injury, other fracture, long bone fracture, facial injury, and intra-abdominal injury were the most common injury types. Of these injury types, only long bone fracture and head injury were correlated to one another. Although femoral fractures occurred more commonly in children properly restrained in car seats (14) as compared to all other restraint types (9), this relationship did not reach statistical significance.

Conclusion

Almost two thirds of the children presenting to a Level-1 pediatric trauma system were not properly restrained. Long-bone fractures commonly occur in this patient group (23%) despite being properly restrained. However, despite our anecdotal experience that seemed to indicate a higher rate of femoral fracture in children who were properly restrained in a car seat, this analysis failed to find such a relationship.

Key words

Motor vehicle accident; child restraint, car seat, femur fracture, long-bone

INTRODUCTION

It is estimated that 150 children are treated in emergency departments every hour for injuries sustained in motor vehicle collisions (MVCs).[1] The National Center for Health Statistics (NCHS), a division of the Centers for Disease Control and Prevention (CDC), shows a decline in motor vehicle traffic fatalities over the past few years.[2] Despite this, MVCs remain the top four leading causes of death among children, and are the leading causes of death in children ages 5-19 years.[2-3]

Multiple studies have shown that unrestrained children, regardless of whether they are in the front or rear seat, are at higher risk of injury than those restrained.[4-5] Recently published studies have demonstrated that injury patterns and locations vary according to patient age and restraint mechanism.[6-7] Anecdotal evidence led us to believe that a patient's age, and, therefore their restraint type, might be associated with certain types of fractures in children who are properly restrained. The goal of this study was to evaluate the relationship between the type of car restraint used and the type of long-bone fracture sustained. In addition, associations were sought between other injuries and long-bone fractures in this patient population. Identifying such associations would be helpful in raising suspicion for certain long-bone fractures especially in very young or obtunded patients. This may avoid a delay in diagnosis or a missed fracture.

MATERIALS AND METHODS

This single-institution retrospective study was conducted at our hospital, an American College of Surgeons Level 1 Pediatric Trauma Center. Institutional review board approval was obtained for this study. Using the hospital's trauma registry, we reviewed records of all pediatric patients who were

Table 1: Demographic and Clinical Variables by Restraint Type

Variable	Car Seat (n=99)	Booster Seat (n=55)	Lap/Shoulder Seatbelt (n=49)	Total (n=203)
Age	2.68 (1.78)	4.97 (1.44)	10.52 (1.66)	5.19 (3.57)
Sex				
Female	52 (52.5)	31 (56.4)	25 (51.0)	108 (53.2)
Male	47 (47.5)	24 (43.6)	24 (49.0)	95 (46.8)
Weight (kg) (3 of 203 missing; 1.5%)	14.41 (6.12)	20.16 (4.71)	42.39 (13.59)	22.70 (14.02)
Height (cm) (68 of 203 missing; 33.5%)	89.47 (20.73)	113.14 (13.24)	146.15 (12.33)	110.72 (28.99)
Femoral fracture	14 (14.1)	5 (9.1)	4 (8.2)	23 (11.3)
Long-bone fracture	27 (27.3)	10 (18.2)	10 (20.4)	47 (23.2)
Other fracture besides long bone (skull, spine, ribs, etc)	27 (27.3)	16 (29.1)	8 (16.3)	51 (25.1)
Head injury (concussions, ICH)	39 (39.4)	14 (25.5)	12 (24.5)	65 (32.0)
Facial injury	26 (26.3)	20 (36.4)	13 (26.5)	59 (29.1)
Intra-thoracic injury (pulmonary contusions, PTX)	13 (13.1)	13 (23.6)	7 (14.3)	33 (16.3)
Intra-abdominal injury (splenic/liver lacs, etc)	14 (14.1)	14 (25.5)	18 (36.7)	46 (22.7)
Spinal injuries (neck injuries, etc)	3 (3.0)	8 (14.5)	7 (14.3)	18 (8.9)
Minor injury (abrasions, lacerations, etc)	7 (7.1)	4 (7.3)	5 (10.2)	16 (7.9)
Patient death	3 (3.0)	1 (1.8)	0 (0.0)	4 (2.0)
ISS (1 of 203 missing; 0.5%)	10.46 (10.96)	7.29 (8.15)	9.08 (12.10)	9.27 (10.60)
TRISS (2 of 203 missing; 1.0%)	0.95 (0.16)	0.98 (0.13)	0.98 (0.06)	0.96 (0.14)

Shown are mean (std.dev.) for numeric variables and count (%) for factors. Unless specified, there were no missing data. ISS, injury severity score; PTX, pneumothorax; TRISS, trauma injury severity score.

involved in a MVC and presented to the emergency department from January 2011 to July 2016.

We included children and adolescents 12 years of age or younger. Only patients who were properly restrained were included in the analysis of the paper. Proper restraint was determined by the American Academy of Pediatrics (AAP) guidelines[8-9] and state laws. As the majority of our patients reside in the three states in closest proximity to our center, we reviewed the laws of those three states to help determine if a patient's restraint type was deemed appropriate. Proper restraints are defined as a car seat or 5-point restraint in children younger than 3 years, a booster seat in children between 4 and 8 years of age, and a shoulder-lap belt in children between the ages of 9 and 12 years. The laws regarding lap-belt-only restraints vary from state to state, with some stating that these can be used if the vehicle has no other means of restraint and that they may not be used in conjunction with a car seat in young children. The laws in the above-mentioned areas do not mention the use of lap-belt-only restraints. They are also shown to be inferior to the shoulder-lap-belt restraint.[10] For these reasons, we have excluded patients in a lap-belt-only restraint.

The AAP recommends that children younger than 2 years old be restrained in a rear-facing car seat.[8] The direction in which a car seat was facing was typically not known or not available upon patients' presentation to our emergency department and was not always recorded in the chart. Therefore, children under the age of 3 were considered properly restrained if they were in a 5-point restraint regardless of the direction it might have been facing at the time of the MVA.

Patients were excluded from the study if their restraint status was unknown. Patients were also excluded if it was noted in the chart that the car seat was not properly secured to the vehicle. The questions of patient safety between restrained and unrestrained pediatric patients has been thoroughly studied and documented; therefore, with this analysis we sought to focus only on patients who were properly restrained.

Table 2: Long-Bone Fracture Based on Restraint Type

Long Bone Fracture	Car Seat (n=99)	Booster Seat (n=55)	Lap/Shoulder Seatbelt (n=49)	Total (n=203)
Humerus	2 (2.0)	1 (1.8)	1 (2.0)	4 (2.0)
Ulna	4 (4.0)	1 (1.8)	1 (2.0)	6 (3.0)
Radius	5 (5.1)	1 (1.8)	3 (6.1)	9 (4.4)
Femur	14 (14.1)	5 (9.1)	4 (8.2)	23 (11.3)
Tibia	8 (8.1)	4 (7.3)	2 (4.1)	14 (6.9)
Fibula	1 (1.0)	2 (3.6)	3 (6.1)	6 (3.0)
Metacarpals or Metatarsals	3 (3.0)	0 (0.0)	0 (0.0)	3 (1.5)
Phalanges	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Other	1 (1.0)	0 (0.0)	0 (0.0)	1 (0.5)

Demographic and clinical data were collected, including sex, age, restraint type, type of long-bone fracture, associated injuries, and clinical outcome, including an Injury Severity Score (ISS) and a Trauma Injury Severity Score (TRISS). A higher TRISS is indicative of lower morbidity and mortality. Specifics of the MVC also were reviewed, including location of the patient in the car and location of vehicle impact, if known.

STATISTICAL ANALYSIS

Continuous variables were summarized as mean and standard deviations. Categorical variables were summarized as frequency counts and percentages. Categorical variables were compared using a chi-square test. Odds ratios with a 95% confidence interval were calculated. Results were generated using SAS 9.4 (SAS Institute, Cary, NC).

RESULTS

There were a total of 565 children and adolescents with injuries sustained in MVCs who presented to the emergency department during the study period. Three hundred and sixty-two were excluded for one or more of the exclusion criteria listed above, leaving 203 properly restrained children (36%) based on age and restraint type. Ninety-five were boys (47%) and 108 (53%) were girls. All age groups were represented, with an average age of 5 years old (range, <1-12 years). Analysis of the 203 properly restrained patients demonstrated that 99 children were properly restrained in a car seat (49%), 55 were in booster seats (27%), and 49 were in shoulder-lap harness restraints (24%) (**Table 1**). In terms of mechanism of MVC, 84 (41%) were in head-on collisions followed by rollover (45; 22%) as the second most common mechanism.

The femur was the most frequently fractured long-bone (23 fractures, 11% of patients), followed by the tibia (14 fractures, 7% of patients) and radius (nine fractures, 4% of patients) (**Table 2**). There was no statistically significant association between restraint type and long-bone fracture or restraint type and femoral fracture; P=0.3837 and P=0.4624, respectively. Furthermore, when car seats were examined against both booster seat and lap/shoulder belt, there were no statistically significant associations found for long-bone fracture or femoral fractures, P=0.2335, and P=0.3118, respectively.

Head injury, facial injury, and abdominal injury were the most common injury types outside of long-bone fracture (**Table 1**). The other injury patterns were evaluated against femoral fracture and long-bone fracture. None of these other injury types correlated with femoral fracture; however, head injury did correlate with long-bone fractures in general (P=0.0096). The reason for this relationship is unclear. The median for the TRISS was high in all three restraint types, indicating a high probability of survival in all groups on average. Of the four documented mortalities, none were reported to have a long-bone fracture.

DISCUSSION

During the 4.5-year study period, there were 565 children injured in MVCs who presented to the trauma center. In our study, over two-thirds of the patients were excluded because of improper restraint type or no restraint used, leaving 203 patients for the final analysis. This correlates with other studies, showing that 70-80% of child restraints are either not used or children are prematurely upgraded to shoulder-lap seatbelt.[11-14]

Our experience in treating these patients led us to believe that children properly restrained in car seats, as opposed to other restraint types, were more likely to sustain a long-bone fracture; and, femoral fracture specifically. Of all the long-bone fractures in this study, the femur was the most common bone injured, and the highest number of these femoral fractures did occur in patients restrained in car seats (14, 14%). However, this relationship did not reach statistical significance when compared to other restraint types for long-bone fracture and for femoral fractures (P=0.2334 and P=0.3118, respectively). Our anecdotal experience and hypothesis that long-bone fractures seem to be associated with age and restraint type were not supported by statistical analysis.

The current study has a number of limitations. First, the study was retrospective and thus relied on documentation of the MVC details, restraint use, and seating positions of children. This information was from family members or emergency medical services and may be subject to information bias. Second, there were several confounding variables not accounted for in the analysis of the data. Safety mechanisms, such as airbag location and deployment, were not included. This was a single-center study. Although our institution is a tertiary care center, our population for the study was limited to patients meeting Level 1 trauma center criteria and, thus, was subject to selection bias. Children presenting to outlying hospitals after MVC with injuries, including closed long-bone fractures, could have been discharged home with orthopaedic outpatient follow-up. Finally, as these data were collected at a high-volume, Level-1 trauma center, our patients were likely more severely injured on average compared to all MVCs.

Children presented to a Level 1 trauma center have low rates of proper restraint usage, and those children who are properly restrained have a high likelihood (23%) of sustaining a long-bone fracture. These injuries should be suspected and evaluated carefully in this population. However, restraint type and patient age did not seem to correlate with the incidence of long-bone fractures in general, or femoral fractures specifically.

REFERENCES

1. **Centers for Disease Control and Prevention.** Protect the ones you love: child injuries are preventable. Available at: https://www.cdc.gov/safechild/road_traffic_injuries/index.html. Last revised: April 2016.
2. **McKay MP.** National Highway Traffic Safety Administration (NHTSA) notes. Children injured in motor vehicle traffic crashes. Commentary. Ann Emerg Med. 2010;56:688–689. PMID: 21111250
3. **National Center for Health Statistics.** Ten leading causes of injury deaths by age group highlighting unintentional injury deaths, United States, 2015. Available at: https://www.cdc.gov/injury/images/lc-charts/leading_causes_of_injury_deaths_unintentional_injury_2015_1050w760h.gif. Accessed May 2017.
4. **Greenspan AI, Dellinger AM, Chen J.** Restraint use and seating position among children less than 13 years of age: Is it still a problem? J Safety Res. 2010;41(2):185-185. Doi:10.1016/j.jsr.2010.03.001.
5. **Durbin DR, Chen I, Smith R, Elliott MR, Winston FK.** Effects of seating position and appropriate use on the risk of injury to children in motor vehicle crashes. Pediatrics. 2005;115(3):305-309. DOI:10.1542/peds.2004-1522.
6. **Ernat JJ, Knox JB, Wimberly RL, et al.** The effects of restraint type on pattern of spine injury in children. J Pediatr Orthop. 2016;36:594-601. DOI: 10.1097/BPO.0000000000000502
7. **Loftis CM, Sawyer JR, Eubanks JW, Kelly DM.** The impact of child safety restraint status and age in motor vehicle collisions in predicting type and severity of bone fracture and traumatic injuries. J Pediatr Orthop. 2016; Jan 11. [Epub ahead of print]. DOI: 10.1097/BPO.0000000000000719.
8. **American Academy of Pediatrics—Committee on Injury, Violence, and Poison Prevention.** Policy statement—child passenger safety. Pediatrics. 2011;127:788–793. DOI: 10.1542/peds.2011-0213.
9. **Howard AW.** Children, automobile restraints and injuries. Paediatr Child Health. 2000;5(1):24-29.
10. **Winston FK, Durbin DR, Kallan MJ, et al.** The danger of premature graduation to seat belts for young children. Pediatrics. 2000;105:1179–1183.
11. **Durbin DR, Chen I, Smith R, Elliot MR, Winston FK.** Effects of seating position and appropriate restraint use on the risk of injury to children in motor vehicle crashes. Pediatrics. 2005;115:305-309. PMID: 10835054.
12. **Aita-Levy, JA, Henderson, LM.** Factors affecting booster seat use. Clinical Pediatrics. 2015;55:1132-1137. DOI: 10.1177/0009922815615824.
13. **Bennett TD, Kaufman R, Schiff M, Mock C, Quan L.** Crash analysis of lower extremity injuries in children restrained in forward-facing car seats during front and rear impacts. J Trauma. 2006; 61:592-597. DOI: 10.1097/01.ta.0000195792.26837.99.
14. **Durbin Dennis, Hoffman, Benjamin, and Council on Injury Prevention, Violence, and Poison Prevention.** Child passenger safety. Pediatrics. 2018;142;DOI: 10.1542

Anthony A. Mascioli, MD[1]
Marian L. Shaw, RN, BS, CCRP[2]
Shawn Boykin, PhD[3]
Prakash Mahadevan, PhD[3]
J. Heath Wilder, BS[2]
J. Weston Bell, BS[2]
Gregory D. Dabov, MD[1]
Patrick C. Toy, MD[1]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

[2] The Campbell Clinic Foundation Germantown, Tennessee

[3] Pacira BioSciences, Inc., Parsippany, New Jersey

Reprinted with permission:
Published in J Am Acad Orthop Surg 2021 Dec 1; 29(23):e1184-e1192

https://journals.lww.com/jaaos/Fulltext/2021/12010/Total_Knee_Arthroplasty_in_Freestanding_Ambulatory.10.aspx

Corresponding Author:

Patrick C. Toy, MD

1211 Union Avenue, Suite 510
Memphis, Tennessee 38104
P: 901-759-3277
F: 901-759-3278
ptoy@campbellclinic.com

Total Knee Arthroplasty in Freestanding Ambulatory Surgery Centers: 5-Year Retrospective Chart Review of 90-Day Postsurgical Outcomes and Health Care Resource Utilization

ABSTRACT

Introduction

Migration of total knee arthroplasty (TKA) procedures from the inpatient setting to outpatient venues, especially freestanding ambulatory surgery centers (ASCs), requires the use of reliable patient selection algorithms and standardized perioperative pathways to facilitate favorable outcomes for patients.

Methods

This retrospective chart review included consecutive TKA procedures performed over a 5-year period between January 2014 and January 2019 at 2 freestanding ASCs. The patient selection algorithm was developed on the basis of patient comorbidities to minimize the potential for adverse events. All procedures were performed by one of eight orthopedic surgeons who were identified a priori as adhering to similar multimodal pain management regimens, including the use of spinal anesthesia, general or monitored-care anesthesia, adductor canal blocks, pericapsular injection of liposomal bupivacaine, nonsteroidal anti-inflammatory drugs, gabapentin, tramadol, acetaminophen, and oxycodone on an as-needed basis. Outcomes, including surgical complications, healthcare resource utilization (HCRU), and patient satisfaction, were measured before discharge and at a 90-day follow-up visit.

Results

Four hundred thirty-nine TKA procedures in 386 patients were identified for inclusion. Of these patients, 115 (29.8%) were performed in patients with the American Society of Anesthesiologists physical status IIIa. Mean (standard deviation) length of stay at the ASC was 500 (107) minutes, including 136 (47) minutes of surgery and 201 (78) minutes to ambulation. The overall rates of surgical complications and 90-day hospital admissions were low (1.4% and 0.7%, respectively), as was the need for additional HCRU, including additional surgical procedures related to index surgery, emergency department visits, and unplanned clinic visits or calls. At the 90-day follow-up visit, 96% of patients reported being pleased with their outcomes.

Discussion

With careful patient selection, standardized perioperative pathways, and multimodal analgesia protocols, TKA procedures can be performed in the ASC setting with low complication rates, minimal postdischarge HCRU, and high rates of patient satisfaction.

Level of evidence

III

Matthew J. Mathew, MD[1]
Tyler D. Ragsdale, MD[1]
Zachary K. Pharr, MD[1]
Carson M. Rider, MD[1]
William M. Mihalko, MD, PhD[1]
Patrick C. Toy, MD[1]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

Reprinted with permission:
Published in J Arthroplasty 2021 Nov; 36(11):3681-3685.

https://www.sciencedirect.com/science/article/pii/S0883540321005507?via%3Dihub

Risk Factors for Prolonged Time to Discharge in Total Hip Patients Performed in an Ambulatory Surgery Center due to Complaints of the Inability to Void

ABSTRACT

Background

Postoperative urinary retention (POUR) is among the reasons for delay in discharge after outpatient total hip arthroplasty (THA), occurring in 2%-46% of patients. We hypothesized that the frequency of POUR following outpatient THA in the ambulatory surgery center (ASC) is low compared to previously reported rates and that management can be effective in the perioperative period when it is encountered.

Methods

Three hundred seventy-three THA patients (409 hips) who had arthroplasties in the ASC over a 5-year period were identified. Preoperatively, appropriate demographic information and medical comorbidities were collected from patient health history questionnaires completed during clinic visits. Intraoperatively, albumin volume administered and estimated blood loss were recorded. Postoperatively, post-anesthesia care unit medications, patients who reported an inability to urinate, and those who required urinary catheterization were recorded.

Results

POUR occurred in only 2 patients but complaints of the inability to void occurred in 38 others for an incidence of 9.8%. Factors associated with POUR and the inability to urinate included older age, time spent in the ASC, and intraoperatively albumin volume administered. No significant differences were found in body mass index, preoperative hematocrit, estimated blood loss, surgical time, or operating time.

Conclusion

POUR was infrequent but the reported inability to urinate was not (9.8%) and can be safely managed when it does occur and we found that increased age and albumin volume over 500 mL may increase the risk for a prolonged length of stay due to the inability to urinate.

Corresponding Author:

Patrick C. Toy, MD
1211 Union Avenue, Suite 510
Memphis, TN 38104
P: 901-759-3277
F: 901-759-3278

Can Pediatric Orthopaedic Surgery be Done Safely in a Freestanding Ambulatory Surgery Center? Review of 3780 Cases

Benjamin W. Sheffer, MD[1]
Derek M. Kelly, MD[1]
David D. Spence, MD[1]
Kent L. Walker, DO[1]
Timothy J. Westbrooks, MS[2]
Preston H. Palm, MS[2]
Vikki G. Nolan, DSc, MPH[3]
Jeffrey R. Sawyer, MD[1]

[1] Department of Orthopaedic Surgery and Biomedical Engineering, University of Tennessee Health Science Center-Campbell Clinic, Le Bonheur Children's Hospital

[2] University of Tennessee Health Science Center College of Medicine.

[3] School of Public Health Division of Epidemiology, Biostatistics, and Environmental Health, University of Memphis, Memphis, TN.

Reprinted with permission:
Published in J Pediatr Orthop 2021 Jan 41(1):e85-e89.

https://journals.lww.com/pedorthopaedics/Fulltext/2021/01000/Can_Pediatric_Orthopaedic_Surgery_be_Done_Safely.27.aspx

Corresponding Author:

Benjamin W. Sheffer, MD
1211 Union Avenue, Suite 510
Memphis, Tennessee 38014
P: 901-759-3277
F: 901-759-3278
bsheffer@campbellclinic.com

ABSTRACT

Background

The purpose of this study was to determine the intraoperative and 30-day postoperative complication rates in a large consecutive cohort of pediatric patients who had orthopaedic surgery at a freestanding ambulatory surgery center (ASC). The authors also wanted to identify the rates of same-day, urgent hospital transfers, and 30-day hospital admissions. The authors hypothesized that pediatric orthopaedic procedures at a freestanding ASC can be done safely with a low rate of complications.

Methods

A retrospective review identified patients aged 17 years or younger who had surgery at a freestanding ASC over a 9-year period. Adverse outcomes were divided into intraoperative complications, postoperative complications, need for the secondary procedure, unexpected hospital admission on the same day of the procedure, and unexpected hospital admission within 30 days of the index procedure. Complications were graded as grade 1, the complication could be treated without additional surgery or hospitalization; grade 2, the complication resulted in an unplanned return to the operating room (OR) or hospital admission; or grade 3, the complication resulted in an unplanned return to the OR or hospitalization with a change in the overall treatment plan.

Results

Adequate follow-up was available for 3780 (86.1%) surgical procedures. Overall, there were 9 (0.24%) intraoperative complications, 2 (0.08%) urgent hospital transfers, 114 (3%) complications, and 16 (0.42%) readmissions. Seven of the 9 intraoperative complications resolved before leaving the OR, and 2 required return to the hospital.Neither complications nor hospitalizations correlated with age, race, gender, or length or type of surgery. There was no correlation between the presence of medical comorbidities, body mass index, or American Society of Anesthesiologists score and complication or hospitalization.

Conclusions

Pediatric orthopaedic surgical procedures can be performed safely in an ASC because of multiple factors that include dedicated surgical teams, single-purpose ORs, and strict preoperative screening criteria. The rates of an emergency hospital transfer, surgical complications, and 30-day readmission, even by stringent criteria, are lower than those reported for outpatient procedures performed in the hospital setting.

Level of evidence

Level IV-case series.

Trenton T. Stevens, MD[1]
Jacob T. Hartline, MD[2]
Oluwatosin Ojo, MD[3]
Benjamin J. Grear, MD[1]
David R. Richardson, MD[1]
G. Andrew Murphy, MD[1]
Clayton C. Bettin, MD[1]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

[2] University of Maryland Medical System, Baltimore, Maryland

[3] OrthoGeorgia, Macon, Georgia

Reprinted with permission:
Published in Foot Ankle Int 2021 Jul; 42(7):894-901.

https://journals.sagepub.com/doi/10.1177/1071100721990343?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub++0pubmed&

Corresponding Author:

Clayton C. Bettin, MD
1211 Union Avenue, Suite 510
Memphis, Tennessee 38104
P: 901-759-3277
F: 901-759-3278
cbettin@campbellclinic.com

Race and Insurance Status Association With Receiving Orthopedic Surgeon-Prescribed Foot Orthoses

ABSTRACT

Background

This study looked at the effect of patient demographics, insurance status, education, and patient opinion on whether various orthotic footwear prescribed for a variety of diagnoses were received by the patient. The study also assessed the effect of the orthoses on relief of symptoms.

Methods

Chart review documented patient demographics, diagnoses, and medical comorbidities. Eligible patients completed a survey either while in the clinic or by phone after their clinic visit.

Results

Of the 382 patients prescribed orthoses, 235 (61.5%) received their orthoses; 186 (48.7%) filled out the survey. Race and whether or not the patient received the orthosis were found to be significant predictors of survey completion. Race, type of insurance, and amount of orthotic cost covered by insurance were significant predictors of whether or not patients received their prescribed orthoses. Type of orthosis, diabetes as a comorbidity, education, income, sex, and diagnosis were not significant predictors of whether the patient received the orthosis. Qualitative results from the survey revealed that among those receiving their orthoses, 87% experienced improvement in symptoms: 21% felt completely relieved, 66% felt better, 10% felt no different, and 3% felt worse.

Conclusion

We found that white patients had almost 3 times the odds of receiving prescribed orthoses as black patients, even after controlling for type of insurance, suggesting race to be the primary driver of discrepancies, raising the question of what can be done to address these inequalities. While large, systematic change will be necessary, some strategies can be employed by those working directly in patient care, such as informing primary care practices of their ability to see patients with limited insurance, limiting blanket refusal policies for government insurance, and educating office staff on how to efficiently work with Medicare and Medicaid.

Level of evidence

Level III, comparative study.

Major Extremity Trauma Research Consortium (METRC), John C. Weinlein, MD[1]

[1] University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering, Memphis, Tennessee

Original article published in JAMA Surg 2021 May 1; 156(5):e207259.

https://jamanetwork.com/journals/jamasurgery/fullarticle/2777798

Effect of Intrawound Vancomycin Powder in Operatively Treated High-risk Tibia Fractures: A Randomized Clinical Trial

SYNOPSIS

This paper, published in the Journal of the American Medical Association, examined why infections continue to afflict patients with tibial fractures after plate and screw fixation despite the extensive use of antibiotics.

The randomized clinical trial involved 980 patients who had had a tibial pilon or plateau fracture (open and closed) repaired at 36 U.S. trauma centers and were believed to be at high risk of infection. The research occurred between January 1, 2015 and June 30, 2017, and was followed up by 12 months of investigation. It was coordinated by the Major Extremity Trauma Research Consortium at the Johns Hopkins Bloomberg School of Public Health, which also included Dr. John Weinlein.

Each patient in the treatment group was given 1,000 mg of sterile vancomycin powder that was placed directly over the metal implant in the wound before closure. This was ultimately found to reduce the rate of deep gram-positive infections of surgical sites; a 3.7% absolute risk and a 51% relative risk scale reduction were noted.

Trial registration

ClinicalTrials.gov Identifier: NCT02227446.

Corresponding Author:

John C. Weinlein, MD

1211 Union Avenue, Suite 510
Memphis, Tennessee 38104
P: 901-759-3277
F: 901-759-3278
jweinlein@campbellclinic.com

2021 YEAR IN REVIEW

University of Tennessee Health Science Center - Campbell Clinic Department of Orthopaedic Surgery & Biomedical Engineering

ADULT RECONSTRUCTION

- **Calkins T, McClatchy SG, Rider C, Toy PC.** Mepivacaine versus Bupivacaine Spinal Anesthesia in Total Hip Arthroplasty at an Ambulatory Surgery Center. J Arthroplasty. 2021 Nov;36(11):3676-3680. doi: 10.1016/j.arth.2021.07.014. Epub 2021 Jul 30. PMID: 34392991
- **Calkins TE, Hannon CP, Fillingham YA, Culver CC, Berger RA, Della Valle CJ.** Fixed-bearing Medial Unicompartmental Knee Arthroplasty in Patients Younger Than 55 Years of Age at 4-19 Years of Follow-up: A Concise Follow-up of a Previous Report. J Arthroplasty. 2021 Mar;36(3):917-021. doi: 10.1016/j.arth.2020.09.042. Epub 2020 Sep 28. PMID: 33051122
- **Calkins TE, Suleiman LI, Culvern C, Alazzawi S, Kazarian GS, Barrack RI, Haddad FS, Della Valle CJ.** Hip Resurfacing Arthroplasty and Total Hip Arthroplasty in the Same Patient: Which Do they Prefer? Hip Int. 2021 May;31(3):328-334. doi: 10.1177/1120700019882922. Epub 2019 Oct 15. PMID: 31615288
- **Derefinko KJ, Bong Z, Bursac Z, Hand SB, Johnson KC, Mihalko WM.** Opioid Use Patterns After Primary Total Knee Replacement. Orthop Clin North Am. 2021 Apr;52(2):103-110. PMID: 33752831. Review
- **Grupp TM, Schilling C, Schwiesau J, Pfaff A, Altermann B, Mihalko WM.** Response to the Letter to the Editor on: "Tibial Implant Fixation Behavior in Total Knee Arthroplasty: A Study with Five Different Types of Bone Cements". J Arthroplasty. 2021 May;35(5):e32-e33. doi: 10.1016/j.arth.2020.11.002. PMID: 33931148
- **Mascioli AA, Shaw ML, Boykin S, Mahadeva P, Wilder JH, Bell JW, Dabov GD, Toy PC.** Total Knee Arthroplasty in Freestanding Ambulatory Surgery Centers: 5-Year Retrospective Chart Review of 90-Day Postsurgical Outcomes and Health Care Resource Utilization. J Am Acad Orthop Surg. 2021 Dec 1;29(23):e1184-e1192. doi: 10.5435/JAAOS-D-20-00934. PMID: 33443387
- **Mathew M, Ragsdale TD, Pharr ZK, Rider CM, Mihalko WM, Toy PC.** Risk Factors for Prolonged Time to Discharge in Total Hip Patients Performed in an Ambulatory Surgery Center due to Complaints of the Inability to Void. J Arthroplasty. 2021 Nov;36(11):3681-3685. doi: 10.1016/j.arth.2021.06.010. Epub 2021 Jun 24. PMID: 34215461
- **McClatchy SG, Cline JT, Rider CM, Pharr ZK, Mihalko WM, Toy PC.** Blood Management in Outpatient Total Hip Arthroplasty. Orthop Clin North Am. 2021 Jul;52(3):201-208. doi: 10.1016/j.ocl.2021.03.004. Epub 2021 May 6. PMID: 34053565. Review
- **McClatchy SG, Rider CM, Mihalko WM, Pharr ZK, Toy PC.** Defining Outpatient Hip and Knee Arthroplasty: A Systematic Review. J Am Acad Orthop Surg. 2021 Apr 15;29(8):e410-e415. doi: 10.5435/JAAOS-D-19-00636. Online ahead of print. PMID: 32925385
- **Mihalko WM, Urish K.** Optimal Designs and Surgical Technique for Hip and Knee Joint Replacement: The Best is Yet to Come! J Orthop Res. 2021 Sep;39(9):1851-1859. doi: 10.1002/jor.24873. Epub 2020 Oct 13. PMID: 33002224
- **Mihalko WM.** In Vitro Cell Induced Corrosion of Macrophages on CoCrMo Alloy. Pending publication in J of Arthroplasty.
- **Pharr ZK, Rider C, Toy PC.** Outpatient Hip Safety in an Ambulatory Surgery Center is Independent of Approach. J Arthroplasty. 2021 Jan;36(1):231-235. doi: 10.1016/j.arth.2020.07.068. Epub 2020 Jul 31. PMID: 32826145
- **Sauer A, Kebbach M, Maas A, Mihalko WM, Grupp TM.** The Influence of Mathematical Definitions on Patellar Kinematics Representations. Materials (Basel). 2021 Dec 11;14(24):7644. doi: 10.3390/ma14247644. PMID: 34947239
- **Suthon S, Lin J, Perkins R, Crockarell JR, Miranda-Carboni GA, Krun SA.** Estrogen receptor alpha and NFATc1 bind to a bone mineral density-associated SNP to repress WNT5B in Osteoblasts. Am J Hum Genet. 2021 Dec 2:S0002-9297(21)00438-9. doi: 10.1016/j.ajhg.2021.11.018. Online ahead of print. PMID: 34906330
- **Wodowski AJ, Throckmorton TW, Mihalko WM, Toy PC.** Anterior Supine Intermuscular Total Hip Arthroplasty at an Ambulatory Surgery Center versus Hospitalization: Cost and Adverse Events. Orthop Clin North Am. 2021 Jul;52(3):209-214. doi: 10.1016/j.ocl.2021.03.011. PMID: 34053566

FOOT AND ANKLE

- **Fram B, Corr DO, Rogero RG, Pedowitz DI, Tsai J.** Short-term Complications and Outcomes of the Cadence Total Ankle Arthroplasty. Foot Ankle Int. 2021 Sep 22:10711007211043853. doi: 10.1177/10711007211043853. Online ahead of print. PMID: 34549617
- **Friedmann EM, Sims LM, Pattisapu N, Bettin CC.** Early Failure of the Paragon28 Phantom Hindfoot Fusion Nail: A Case Report. JBJS Case Connect. 2021 Jul 8;11(3). doi: 10.2106/JBJS.CC.20.01004. PMID: 34237036
- **Hartnett DA, Walsh DR, Richardson DR, Hsu RY.** The Weekend Warrior: Common Foot and Ankle Injuries in Recreational Athletes. R I Med J (2013). 2021 Dec 1;104(10):26-30. PMID: 34846379

- **Lindsey BB, Bakshi NK, Holmes JR, Talusan PG, Walton DM, Hearty TM.** Percutaneous Fixation of a Fifth Metatarsal Base Fracture. J Orthop Trauma. 2021 Aug 1;35(Suppl 2):S58-S59. doi: 10.1097/BOT.0000000000002165. PMID 34227615
- **Sarfani S, Stone CA Jr., Murphy GA, Richardson DR.** Understanding Penicillin Allergy, Cross-reactivity, and Antibiotic Selection in the Preoperative Setting. J Am Acad Orthop Surg. 2021 Oct 15. doi: 10.5435/JAAOS-D-21-00422. Online ahead of print. PMID: 34669610
- **Sims M, Foropoulos L, Bettin CC.** Bilateral Charcot Arthropathy Treated with Bolt-Beam Constructs in Settings of Unilateral Foot Ulcers: A Report of Two Cases. JBJS Case Connect. 2021 Jul 9;11(3). doi: 10.2106/JBJS.CC.20.00661. PMID: 34242208
- **Stevens TT, Hartline JT, Ojo O, Grear BJ, Richardson DR, Murphy GA, Bettin CC.** Race and Insurance Status Association With Receiving Orthopedic Surgeon-Prescribed Foot Orthotics. Foot Ankle Int. 2021 Jul;42(7):894-901. doi: 10.1177/1071100721990343. Epub 2021 Feb 16. PMID: 33588617
- **Yeoh JC, Ruta DJ, Murphy GA, Richardson DR, Ishikawa SN, Grear BJ, Bettin CC, Smith RA.** Analysis of Wheeled Knee Walker Use Following Foot and Ankle Surgery or Injury. JJ Foot Ankle Surg. 2021 Sep-Oct;60(5):946-949. doi: 10.1053/j.jfas.2021.04.001. Epub 2021 Apr 9. PMID: 33994082

GENERAL

- **Azar FM.** Hot Topics in Orthopedics. Orthop Clin North Am. 2021 Apr;52(2):xv-xvi. PMID: 33752843
- **Azar FM.** Preface. Orthop Clin North Am. 2021 Jan;52(1):xi. PMID: 33222988
- **Azar FM.** Preface. Orthop Clin North Am. 2021 Jul;52(3):xi. doi: 10.1016/j.ocl.2021.03.012. Epub 2021 May 7. PMID: 34053575
- **Azar FM.** Preface. Orthop Clin North Am. 2021 Oct;52(4):xv. doi: 10.1016/j.ocl.2021.06.001. Epub 2021 Jul 29. PMID: 34538356
- **Dooley JH, Bettin KA, Bettin CC.** The Current State of the Residency Match. Orthop Clin North Am. 2021 Jan;52(1):69-76. doi: 10.1016/j.ocl.2020.08.006. Epub 2020 Oct 27. PMID: 33222986 Review
- **Gu Y, Yao L, Meng X, Graff JC, Thomason D, Li J, Dong W, Jiao Y, Aleya L, Maida M, Wang CY, Zangerl B, Genini S, Ray K, Goldman E, Ji J, Alexandrov AV, Sun D, Gu W, Wang Y.** A Cost-effective Plan for Global Testing - An Infection Rate Stratified, Algorithm Guided, Multiple-level, Continuously Pooled Testing Strategy. Sci Total Environ. 2021 Apr 15;765:144241. doi: 10.1016/j.scitotenv.2020.144251. Epub 2020 Dec 24. PMID: 33387925
- **Gu T, Wang L, Xie N, Meng X, Li Z, Postlethwaite A, Aleya L, Howard SC, Gu W, Wang Y.** Toward a Country-Based Prediction Model of COVID-19 Infections and Deaths Between Disease Apex and End: Evidence From Countries With Contained Numbers of COVID-19. Front Med (Lausanne). 2021 Jun 10;8:585115. doi: 10.3389/fmed.2021.585115. PMID: 34179029
- **Ma L, Yu Z, Jiao Y, Lin L, Zhong W, Day SW, Postlethwaite A, Chen H, Li Q, Yin H, Wang G.** Capacity of transportation and spread of COVID-19-an ironical fact for developed countries. Environ Sci Pollut Res Int. 2021 Jul;28(28):37498-37505. doi: 10.1007/s11356-021-12765-5. Epub 2021 Mar 13. PMID: 33713261
- **Yin H, Sun T, Yao L, Jiao Y, Ma L, Lin L, Graff JC, Aleya L, Postlethwait A, Gu W, Chen H.** Association Between Population Density and Infection Rate Suggests the Importance of Social Distancing and Travel Restriction in Reducing the COVID-10 Pandemic. Environ Sci Pollut Res Int. 2021 Aug;28(30):40424-40430. doi: 10.1007/s11356-021-12364-4. Epub 2021 Jan 13. PMID: 33442802
- **Yu Z, Wang G, Goldman E, Zangerl B, Xie N, Cao Y, Chen J, Day SW, Howard SC, Maida M, Ray K, Jablonski MM, Ji J, Postlethwaite A, Gu W, Sun D, Aleya L.** Covid-19 Vaccine: Call for Employees in International Transportation Industries and International Travelers as the First Priority in Global Distribution. Open Med (Wars). 2021 Jan 11;16(1):134-138. PMID: 33521319

HAND

- **Doering TA, Mauck BM, Calandruccio JH.** Hot Topics in Hand Surgery. Orthop Clin North Am. 2021 Apr;52(2):149-155. PMID: 33752836
- **Holbrook HS, Doering TA, Mauck BM.** Common Complications in the Treatment of Distal Radius Fracture. Orthop Clin North Am. 2021 Jul;52(3):241-250. doi: 10.1016/j.ocl.2021.03.009. Epub 2021 May 7. PMID: 34053569. Review
- **Johnson E, Stelzer J, Romero AB, Erntz JR.** Recognizing and Treating Trigger Finger. J Fam Pract. 2021 Sep;70(7):334-340. PMID: 34818165
- **Thompson NB.** Complication of Volar Plating of Distal Radial Fractures: A Review. Orthop Clin North Am. 2021 Jul;52(3):251-256. doi: 10.1016/j.ocl.2021.03.010. Epub 2021 May 7. PMID: 34053570. Review

PEDIATRICS

- **Brown DW, Iorio TJ, Mosher ZA, Beaty, JH, Warner WC, Sawyer JR, Spence DD, Sheffer BW, Kelly DM.** Intra-observer and Inter-observer Reliability of the Peritubercle Lucency Sign in Slipped Capital Femoral Epiphysis. 2021 Mar 1;41(3):159-163. doi: 10.1097/BPO .0000000000001733. PMID: 33332871
- **Kelly DM, Mahmoud K, Mauck BM.** Polydactyly of the Foot: A Review. J Am Acad Orthop Surg. 2021 May1;39(9):361-369. Online ahead of print. PMID: 33443388
- **Kelly DM.** A Foot to Last a Lifetime-Is Hindfoot Fusion Ever Appropriate for Pediatric Orthopaedic Conditions? J Pediatr Orthop. 2021 July1;41(Supp1):S39-S46.doi: 10.1097/BPO.0000000000001777. PMID: 34096536
- **Laine JC, Novotny SA, Tis JE, Sankar WN, Martin BD, Kelly DM, Gilbert SR, Shah H, Joseph B, Kim HKW; International Perthes Study Group.** Demographics and Clinical Presentation of Early-Stage Legg-Calve-Perthes Disease: A Prospective, Multicenter, International Study. J Am Acad Ortho Surg. 2021 Jan15;29(2):e85-e91. doi: 10.5435/JAAOS-D-19-00379. PMID: 32868700
- **McDonald TC, Heffernan MJ, Ramo B, Haber L, Sheffer B, Murphy J, Murphy R, Fletcher N, Coyne K, Lubicky J, Bumpass DB, Crawford C 3rd, Carreon L, Toner S, Stafford WH, Poppino K, Adams T, Song BM, Gidwani S, Taillac H, Cornaghie M, Sukkarieh H, Wright PB, Conklin M, Gilbert S, Thimothee J, Bhanat E, Brooks JT; Pediatric Orthopaedic Obesity Research Consortium.** Surgical Outcomes of Obese Patients From Endemic Areas of Obesity in the United States. J Pediatr Orthop. 2021 Nov-Dec 01;41(10):e865-e870. doi: 10.1097/BPO.0000000000001958. PMID: 34469396
- **Mir H, Downes K, Chen AF, Grewal R, Kelly DM, Lee MJ, Leucht P, Dulai SK.** Physician Wellness in Orthopaedic Surgery: A Multinational Survey Study. Bone Jt Open. 2021 Nov;2(11):932-939. doi: 10.1302/2633-1462.211.BJO-2021-0153. PMID: 34766825
- **Pattisapu N, Elrod R, Piana L, Sheffer BS, Sawyer JR, Spence DD, Beaty JH, Warner WC, Kelly DM.** Infection Trends After Open Fractures in Pediatric Patients: A Study of Data Over 11 Years. Publication pending in JSOA
- **Pennock AT, Heyworth BE, Bastrom T, Bae DS, Boutelle KE, Busch MT, Edmonds EW, Ellis HB, Hergott K, Kocher MS, Li Y, Liotta ES, Pandya NK, Perkins C, Sabatini CS, Spence DD, Willimon SC, Wilson PL; FACTS Study Group, Nepple JJ.** Changes in superior displacement, angulation, and shortening in the early phase of healing for completely displaced midshaft clavicle fractures in adolescents: results from a prospective, multicenter study. J Shoulder Elbow Surg. 2021 Dec;30(12):2729-2737. doi: 10.1016/j.jse.2021.05.006. Epub 2021 Jun 2. PMID: 34089880
- **Rambo A, McGee TS, Spence DD, Sheffer BW, Kelly DM, Beaty JH.** "RAMBO" Lesions: Radiographic Anomalies Missed By Orthopaedists. JPOSNA. Vol 3, No 1: pp. 1-8. (2021):February 2021
- **Rambo A, Rhodes L, Lomax JL, Cao X, Steele J, Romer KR, Spence DD, Sheffer BW, Warner WC, Sawyer JR, Kelly DM.** Factors That Influence Acquisition of Lower Extremity Braces in the Pediatric Orthopaedic Population. J Pediatr Orthop. 2021 Nov 1. doi.: 10.1097/BPO.0000000000001998. Online ahead of print. PMID: 34723893
- **Roye B, Marciano G, Matsumoto H, Fields MW, Campbell M, White KK, Sawyer J, Smith JT, Luhmann S, Sturm P, Sponseller P, Vitale MG; Growing Spine Study Group, Children's Spine Study Group.** Author's Response to Letter to the Editor Regarding "Is Rod Diameter Associated with the Rate of Rod Fracture in Patients Treated with Magnetically Controlled Growing Rods?" Spine Deform. 2021 May 31. doi: 10.1007/s43390-021-00355-x. Online ahead of print. PMID: 34057702
- **Sawyer JR.** Radiation Reduction Strategies in Pediatric Orthopaedics. J Pediatr Orthop. 2021 Jul 1;41(Supp1):S75-S79. doi: 10.1097/BPO.0000000000001822. PMID: 34096542
- **Sheffer BW, Kelly DM, Spence DD, Walker KL, Westbrooks TJ, Palm PH, Nolan VG, Sawyer JR.** Can Pediatric Orthopaedic Surgery Be Done Safety In a Freestanding Ambulatory Surgery Center? Review of 3780 Cases. J Pediatr Orthop. 2021 Jan;41(1):385-e89. doi: 10.1097/BPO.0000000000001670. PMID: 32852367
- **Shore B, Mulpuri K, Spence DD, Shrader W.** Radiographic Hip Screening in Cerebral Palsy: Developing POSNA Wide Consensus. JPOSNA. Vol 3/ No1; pp. 1-13. (2021):February 2021
- **Stewart RJ, Strickland CD, Sawyer JR, Kumar P, Gungor B, Longjohn M, Kelly DM, Kink RJ.** Hunger Games: Impact of Fasting Guidelines for Orthopaedic Procedural Sedation in the Pediatric Emergency Department. J of Emerg Med. 2021 Apr;60(4):436-443. doi: 10.1016/j.jemermed.2020.10.038. PMID: 33323292

PHYSICAL MEDICINE

- **Beard NM.** Nerve Ablation in the Foot and Ankle. Phys Med Rehabil Clin N Am. 2021 Nov;32(4):803-818. doi: 10.1016/j.pmr.2021.05.014. Epub 2021 Jul 29. PMID: 34593145
- **Martinez SF.** Dance is Art. Phys Med Rehabil Clin N Am. 2021 Feb;32(1):xiii. PMID: 33198902
- **Martinez SF.** Foreword. Phys Med Rehabil Clin N Am. 2021 Nov;32(4):xiii-xiv. doi: 10.1016/j.pmr.2021.07.001. Epub 2021 Sep 15. PMID: 34593146
- **Martinez SF.** Innovation and Adaptation. Phys Med Rehabil Clin N Am. 2021 May;32(2):xv. doi: 10.1016/j.pmr.2021.02.002. PMID: 33814070 No abstract available
- **Martinez SM.** Foreward. Phys Med Rehabil Clin N Am. 2021 Aug;32(3):xi-xii. doi: 10.1016/j.pmr.2021.05.002. PMID: 34175018

SHOULDER AND ELBOW

- **Aibinder W, Schoch B, Parsons M, Watling J, Ko J, Gobbato B, Throckmorton TW, Routman H, Fen W, Simmons C, Roche CP.** Risk Factors for Complications and Revision Surgery after Anatomic and Reverse Total Shoulder Arthroplasty. J Shoulder Elbow Surg. 2021 Nov;30(11):e689-e701. doi: 10.1016/j.jse.2021.04.029. Epub 2021 May 5. PMID: 33964427
- **Baesller AM, Joyce MR, Easton RR, Azar FM, Brolin TJ, Throckmorton TW.** Reliability Testing of the Mayo Elbow Performance Score in Postoperative Patients. Publication pending in JSOA
- **Baesller AM, Smith PJ, Brolin TJ, Neel R, Sen S, Zhu R, Bernholt DL, Azar FM, Throckmorton TW.** Preoperative Opioid Usage Predicts Markedly Inferior Outcomes Two Years After Reverse Total Shoulder Arthroplasty. J Shoulder Elbow Surg. 2021 Aug 30:S1058-2746(21)00643-1. doi: 10.1016/j.jse.2021.07.027. Online ahead of print. PMID: 34474138
- **Baessler AM, Brolin TJ, Azar FM, Sen S, Chang M, Zmistowski BM, Routman HD, Namdari S, Gulotta LV, Throckmorton TW.** Development and Validation of a Predictive Model for Outcomes in Shoulder Arthroplasty: A Multicenter Analysis of Over 2000 Patients. J Shoulder Elbow Surg. 2021 Dec;30(12):2698-2702. doi: 10.1016/j.jse.2021.06.007. Epub 2021 Jul 17. PMID: 34284093

- **Calkins TE, Mosher Z, Throckmorton TW, Brolin TJ.** Safety and Cost-Effectiveness of Outpatient Total Shoulder Arthroplasty: A Systematic Review. J Am Acad Orthop Surg. 2021 Oct 7. doi: 10.5435/JAAOS-D-21-00562. Online ahead of print. PMID: 34644715
- **Diltz Z, Baessler AM, Brolin TJ.** Tension Hydrothorax After Attempted Arthroscopic Fixation of Greater Tuberosity Fracture in a Trauma Patient: A Cast Study. JBJS Case Connect. 2021 Nov 4;11(4). doi: 10.2106/JBJS.CC.21.00512. PMID: 34735376
- **Fournier MN, Azar FM, Brolin TJ, Bernholt DL, Throckmorton TW.** Preoperative Comorbidities Predict Lower Physical Therapy Compliance After Shoulder Arthroplasty. SIA:JSES. 2021:1-5. https://doi.org/10.1053/j.sart.2021.09.006
- **Fryberger CT, Azar FM, Bernholt DL, Brolin TJ, Throckmorton TW.** Failure Rates and Outcomes After Anatomic Total Shoulder Arthroplasty are Equivalent Irrespective of Subscapularis Repair Technique. SIA:JSES. 13 Oct 2021. http://doi.org/10.1053/j.sart.2021.08.002
- **Fryberger CT, Oh S, Azar FM, Bernholt DL, Throckmorton TW, Brolin TJ.** Single-dose Antibiotic Regimens in Total Shoulder Arthroplasty are Safe in an Outpatient Surgery Setting. SIA:JSES: 5 June 2021. https://doi.org/10.1053/j.sart.2021.05.009
- **Hartline JT, Nelson CG, Eads RB, Smith RA, Azar FM, Brolin TJ, Throckmorton TW.** Tobacco Use is Associated with Increased Post-operative Pain and Opioid Use After Reverse Total Shoulder Arthroplasty: A Retrospective Cohort Study. Curr Orthop Pract. 32(6):559-554, November/December 2021. doi: 10.1097/BCO.0000000000001046
- **Hillesheim RA, Kumar P, Brolin TJ, Bernholt DL, Sethi PM, Kowalsky MS, Azar FM, Throckmorton TW.** Periarticular Liposomal Bupivacaine Mixture Injection versus Single Shot Interscalene Block for Post-operative Pain in Arthroscopic Rotator Cuff Repair: A Prospective Randomized Controlled Trial. J Shoulder Elbow Surg. 2021 Dec;30(12):2691-2697. doi: 10.1016/j.jse.2021.08.012. Epub 2021 Sep 16. PMID: 34537339 Clinical Trial
- **Hopkins C, Mulligan R, Azar FM, Brolin TJ, Throckmorton TW.** Computed Tomography and Magnetic Resonance Imaging are Similarly Reliable in the Assessment of Glenohumeral Arthritis and Glenoid Version. Arch Bone & Joint Surg; 2021 Jan.9(1):64-69. PMID: 33778117
- **Mahendraraj K, ASES Acromial Stress Fracture Group, Brolin TJ, Knack MC, Throckmorton TW, Jawa A.** Predictors of Acromial and Scapular Stress Fracture after Reverse Shoulder Arthroplasty: An ASES Multicenter Study from the Complications of Reverse Arthroplasty Group. J Shoulder Elbow Surg. 2021 Oct;30(10):2296-2305. doi: 10.1016/j.jse.2021.02.008. Epub 2021 Mar 4. PMID: 33677115
- **Marigi EM, Lenartowicz KA, Jennewine B, Throckmorton TW, Sperling JW.** Clinical and Radiographic Outcomes of Hybrid Glenoid Fixation with a Central Porous Titanium. Publication pending in JSOA
- **Marigi EM, Duquin TR, Throckmorton TW, Sperling JW.** Hybrid Fixation in Anatomic Shoulder Arthroplasty: Surgical Technique and Review of the Literature. JSES: Reviews, Reports & Techniques. February 25, 2021. https://doi.org/10.1016/j.xrrt.2021.01.005
- **Marois A, Azar FM, Bernholt DL, Brolin TJ, Throckmorton TW.** GRIT Score is Predictive of Increased Risk for Opioid Prescription Refill Following Primary Arthroscopic Rotator Cuff Repair. Publication pending in JSOA
- **Marois A, Azar FM, Bernholt DL, Throckmorton TW, Brolin TJ.** An In Depth Assessment of Candidacy for Ambulatory Outpatient Shoulder Arthroplasty. SIA:JSES: 18 July 2021. https://doi.org/10.1053/j.sart.2021.05.016
- **Namdari S, Nicholson T, Brolin TJ, Lu J, Abboud JA, Lazarus MD.** Healing and Functional Results of Dermal Allograft Augmentation of Complex and Revision Rotator Cuff Repairs. Am J. Sports Med. 2021 Jul;49(8):2042-2047. doi: 10.1177/03635465211015194. Epub 2021 May 20.. PMID: 34015245
- **Ochsner MG, Azar FM, Brolin TJ, Bernholt DL, Throckmorton TW.** Reverse Total Shoulder Arthroplasty for Fractures and Post-traumatic Sequelae is Associated with Inferior Forward Elevation strength: A Retrospective Cohort Study. Publication pending in COP
- **Pharr ZK, Walters JD, Walsh RN, Smith RA, Brolin TJ, Azar FM, Brolin TJ, Throckmorton TW.** Outcomes of Reverse Total Shoulder Arthroplasty are Similar in Rotator Cuff-intact and Rotator Cuff-deficient Shoulder. SIA:JSES.4 May 2021; 31(4):662-667. https://doi.org/10.1053/j.sart.2021.04.003
- **Pharr AK, Brolin TJ, Azar FM, Bernholt DL, Throckmorton TW.** Frozen Shoulder Manipulation with the FEAR Technique: A Retrospective Case Series with Minimum Two-Year Follow-up. Publication pending in JSOA

SPINE

- **Campion CE, Crawford CH, Berkay F, Mkorombindo T, Carreon LY.** 137. Correction, maintenance of cervical alignment and revision rates: three-level ACDF versus corpectomy ACDF hybrid procedures, The Spine Journal, Volume 21, Issue 9, Supplement, 2021, Pages S68-S69, https://doi.org/10.1016/j.spinee.2021.05.165
- **Chambers JS, Kropp RG, Gardocki RJ.** Reoperation Rates, and Patient-reported Outcomes of Single and Two-level Anterior Cervical Discectomy and Fusion. Arch Orthop Trauma Surg. 2021 Jul 9. doi: 10.1007/s00402-021-04056-y. Online ahead of print. PMID: 34244874

SPORTS

- **Bernholt DL, DePhillipo NN, Aman ZS, Samulesen BT, Kennedy MI, LaPrade RF.** Increased Posterior Tibial Slope Results in Increased Incidence of Posterior Lateral meniscal Root Tears in ACL Reconstruction Patients. Knee Surg Sports Traumatol Arthrosc. 2021 Nov;29(11):3883-3891. doi: 10.1007/s00167-021-06456-4. Epub 2021 Feb 1. PMID: 33527197
- **Bernholt DL, Lamplot JD, Blck AM, Nepple.** Utility of the Merchant View Radiograph for Assessment of Tibial Tubercle-Trochlear Groove Distance: A Comparison to MRI in Pediatric and Adolescent Patients. J Pediatr

Orthop. 2021 Sep 1;41(8):e628-e634. doi: 10.1097/BPO.0000000000001890. PMID: 34238867

- **Hendrickson BS, Stephens RE, Chang JV, Amburn JM, Pierotti LL, Johnson JL, Hyden JC, Johnson JN, Philip RR.** Cardiovascular Evaluation After COVID-19 in 137 Collegiate Athletes: Results of an Algorithm-Guided Screening. Circulation. 2021 May 11;143(19):1926-1928. doi:10.1161/CIRCULATIONAHA.121.053982. Epub 2021 May 10
- **Minaie A, Bernholt DL, Block AM, Patel RM, Wright RW, Matava MJ, Nepple JJ.** Normative PROMIS Scores in Healthy Collegiate Athletes: Establishing a Target for Return to Function in the Young Adult Athlete. Orthop J Sports Med. 2021 Aug 13;9(8):23259671211017162. doi: 10.1177/23259671211017162. eCollection 2021 Aug. PMID: 34409111
- **Tasaki A, Morita W, Nozaki T, Yonekura Y, Saito M, Phillips BB, Kiamura N.** Arthroscopic Bankart Repair and Open Bristow Procedure in the Treatment of Anterior Shoulder Instability With Osseous Glenoid Lesions in Collision Athletes. Orthop J Sports Med. 2021 May 28;9(5):23259671211008274. doi: 10.1177/23259671211008274. eCollection 2021 May. PMID: 34104661

TRANSLATIONAL

- **Bedingfield SK, Colazo JM, Di Francesco M, Yu F, Liu DD, Di Francesco V, Himmel LE, Gupta MK, Cho H, Hasty KA, Decuzzi P, Duvall CL.** Top-Down Fabricated microPlates for Prolonged, Intra-articular Matrix Metalloproteinase 13 siRNA Nanocarrier Delivery to Reduce Post-Traumatic Osteoarthritis. ACS Nano. 2021 Sep 28;15(9):14475-14491. doi: 10.1021/acsnano.1c04005. Epub 2021 Aug 19. PMID: 34409835
- **Bedingfield SK, Colazo JM, Yu F, Liu DD, Jackson MA, Himmel LE, Cho H, Crofford LJ, Hasty KA, Duvall CI.** Amelioration of Post-Traumatic Osteoarthritis via Nanoparticle Depots Delivering Small Interfering RNA to Damaged Cartilage. Nat Biomed Eng. 2021 Sep;5(9):1069-1083. doi: 10.1038/s41551-021-00780-3. Epub 2021 Aug 19. PMID: 34413494
- **Bhatti FU, Karydis A, Lee BS, Deguchi T, Kim DG, Cho H.** Understanding Early-stage Posttraumatic Osteoarthritis for Future Prospects of Diagnosis: From Knee to Temporomandibular Joint. Curr Osteoporos Rep. 2021 Apr;19(2):166-174. doi: 10.1007/s11914-021-00661-3. Online ahead of print. PMID: 33523424

TRAUMA

- **Kuripla C, Tornetta P 3rd, Foote CJ, Koh J, Sems A, Shamaa T, Vallier H, Sorg D, Mir HR, Streufert B, Spitler C, Mullis B, McGowan B, Weinlein JC, Cannada L, Charlu J, Wagstrom E, Westberg J, Morshed S, Cortez A, Krause P, Marcantonio A, Soles G, Lipof J.** Timing of Flap Coverage With Respect to Definitive Fixation in Open Tibia Fractures. J Orthop Trauma. 2021 Aug 1;35(8):430-436. doi: 10.1097/BOT.0000000000002033. PMID: 34267149
- **Major Extremity Trauma Research Consortium (METRC), Weinlein JC.** Effect of Intrawound Vancomycin Powder in Operatively Treated High-risk Tibia Fractures: A Randomized Clinical Trial. JAMA Surg. 2021 May 1;156(5):e207259. doi:10.1001/jamasurg.20207259. Epub 2021 Mar 12. PMID: 33760010
- **McKnight RR, Ruffolo M, Wally MK, Seymour RB, Jeray K, Matuszewski P, Weinlein JC, Hsu JR.** Traumatic Arthrotomies: Do They All Need the Operating Room? J Orthop Trauma. 2021 Nov 1;35(11):612-618. doi: 10.1097/BOT.0000000000002093. PMID: 34387570

BOOK CHAPTERS

Editors

- **Azar FM, Editor.** Orthopaedic Knowledge Update: Sports Medicine 6 Print + Ebook with Multimedia. 13Jan2021. Wolters Kluwer.
- **Azar FM, Editor.** Orthopaedic Knowledge Update: Sports Medicine 6. Wolters Kluwer, 2021.
- **Beaty JH, Azar FM.** Campbell's Operative Orthopaedics 14th edition, 2021

Book Chapters - Campbell's Operative

- **Azar FM.** Traumatic Disorders. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Beebe MJ.** Fractures of the Acetabulum and Pelvis. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Bettin CC.** Ankle Arthrodesis. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Bettin CC.** Diabetic Foot. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Bettin CC.** Fractures and Dislocations of the Foot. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Brolin TJ, Throckmorton TW.** Salvage Procedures of the Shoulder and Elbow. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Calandruccio JH, Jobe MT.** Tumors and Tumorous Conditions of the Hand. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Calandruccio JH, Mauck BM.** Amputations of the Hand. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Calandruccio JH.** Arthritic Hand. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Calandruccio JH.** Dupuytren Contracture. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Calandruccio JH.** Fractures, Dislocations, and Ligamentous Injuries of the Hand and Wrist. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Cannon DL.** Acute Hand Injuries. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Cannon DL.** Basic Surgical Technique and Postoperative Care. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)

- **Cannon DL.** Flexor and Extensor Tendon Injuries. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Cleveland KB.** Amputations of the Hip and Pelvis. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Cleveland KB.** General Principles of Infection. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Cleveland KB.** Major Amputations of the Upper Extremity. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Crenshaw AH.** Old Unreduced Dislocations. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Crenshaw AH.** Soft-tissue Procedures and Osteotomies about the Knee. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Crenshaw AH.** Surgical Techniques.14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Crenshaw AH.** Tuberculosis and Other Unusual Infections. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Dabov GD.** Arthrodesis of the Hip. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Dabov GD.** Osteomyelitis. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Ford MC.** Amputations of the Lower Extremity. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Ford MC.** Surface Replacement Hip Arthroplasty. 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Gardocki RJ, Park AL.** Degenerative Disorders of the Cervical Spine. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Gardocki RJ, Park AL.** Degenerative Disorders of the Thoracic and Lumbar Spine. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Gardocki RJ.** Anatomic Approaches to the Spine. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Grear BJ.** Disorders of Nails. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Grear BJ.** Disorders of Tendons and Fascia and Adolescent and Adult Pes Planus. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Grear BJ.** Neurogenic Disorders. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Grear BJ.** Surgical Techniques. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Guyton JL.** Hip Pain in the Young Adult and Hip Preservation Surgery. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Harkess JW, Crockarell JC.** Arthroplasty of the Hip. 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Heck RK, Toy PC.** Benign/Aggressive Tumors of Bone. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Heck RK, Toy PC.** General Principles of Tumors. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Heck RK, Toy PC.** Malignant Tumors of Bone. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Jobe MT, Martinez SF, Weller WJ.** Peripheral Nerve Injuries of the Upper and Lower Extremities. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Jobe MT, Weller WJ.** Nerve Injuries at the Level of the Hand and Wrist. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Jobe MT.** Microsurgery. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Jobe MT.** Special Hand Disorders. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Kelly DM.** Congenital and Developmental Abnormalities of the Hip and Pelvis. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Kelly DM.** Congenital Anomalies of the Lower Extremity. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Mascioli AA, Park AL.** Infectious Arthritis. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Mascioli AA.** Acute Dislocations. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Mascioli AA.** Arthrodesis of the Knee. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Mauck BM.** Cerebral Palsy of the Hand. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Mauck BM.** Congenital Anomalies of the Hand. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Mauck BM.** Congenital Anomalies of the Trunk and Upper Extremity. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Mihalko WM.** Arthroplasty of the Knee. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Miller RH, Azar FM, Throckmorton TW.** Shoulder and Elbow Injuries. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Miller RH, Azar FM.** Knee Injuries. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Murphy GA.** Arthroscopy of the Foot and Ankle. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Murphy GA.** Disorder of the Hallux. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Murphy GA.** Lesser Toe Abnormalities. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Murphy GA.** Total Ankle Arthroplasty. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Perez EA.** Fractures of the Shoulder, Arm, and Forearm. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Phillips BB, Brolin TJ.** Arthroscopy of the Upper Extremity. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Phillips BB, Mihalko MJ.** Arthroscopy of the Lower Extremity. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Phillips BB.** General Principles of Arthroscopy. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Phillips BB.** Recurrent Dislocations. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Richardson DR.** Amputations of the Foot. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Richardson DR.** Arthritis of the Foot. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Richardson DR.** Sports Injuries of the Ankle. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Rudloff MI.** Fractures of the Lower Extremity. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Sawyer JR, Spence DD.** Fractures and Dislocation in Children. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Sheffer BW.** Osteochondrosis or Epiphysitis and Other Miscellaneous Affections. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Spence DD, Sheffer BW.** Cerebral Palsy. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Thompson NB.** Compartment Syndromes and Volkmann Contracture. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Thompson NB.** Hand Infections. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Thompson NB.** Paralytic Hand. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Throckmorton TW.** Shoulder and Elbow Arthroplasty. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Toy PC.** General Principles of Amputations. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Toy PC, Heck RK.** Benign Bone Tumors and Neoplastic Conditions Simulating Bone Tumors. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Toy PC, Heck RK.** Soft-tissue Tumors. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Warner WC Jr, Beaty JH.** Paralytic Disorders. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Warner WC Jr, Sawyer JR.** Neuromuscular Disorders. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Warner WC Jr, Sawyer JR.** Scoliosis and Kyphosis. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Warner WC Jr.** Pediatric Cervical Spine. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Weinlein JC.** Delayed Union and Nonunion of Fractures. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Weinlein JC.** Fractures and Dislocations of the Hip. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Weller WJ, Calandruccio JH, Jobe MT.** Compressive Neuropathies of the Hand, Forearm, and Elbow. 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Weller WJ.** Stenosing Tenosynovitis of the Wrist and Hand. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Weller WJ.** Wrist Disorders. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Whittle AP.** General Principles of Fracture Treatment. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Whittle AP.** Malunited Fractures. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Williams KD.** Fractures, Dislocations, and Fracture-Dislocations of the Spine. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Williams KD.** Infections and Tumors of the Spine. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Williams KD.** Spondylolisthesis. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)
- **Witte DH.** Advanced Imaging in Orthopaedics. In Campbell's Operative Orthopaedics 14th edition, 2021. Beaty JH, Azar FM (eds.)

Book Chapters

- **Bernholt DL, Brolin TJ, Azar FM.** The Elbow-Patient Positioning and Portal Placement. In Surgical Techniques of the Shoulder, Elbow, and Knee in Sports Medicine, 3rd edition, Cole BJ, Chahla J eds. 2021.

- **Brolin TJ, Throckmorton TW.** Revision for Instability After Reverse Shoulder Arthroplasty. In Reverse Shoulder Arthroplasty: A Comprehensive Case-Based Approach. Abboud JA (ed). SLACK, Inc., 2021, p. 277-286.
- **Brolin TJ, Throckmorton TW.** Outpatient Shoulder Arthroplasty. In Shoulder Arthroplasty: Principles and Practice. Wolters Kluwer, 2021
- **Champion CE.** Comprehensive Guide to Adult Deformity, Chapter 24: Combined Techniques, Co-author
- **Cline JT, Mihalko WM.** Cement Technique Matters! In The Technique of Total Knee Arthroplasty, 2nd edition. Mihalko WM, Mont M, eds. Elsevier, 2021
- **Eason T, Mihalko WM.** Setting Up An Outpatient or Same-day Discharge Total Knee Arthroplasty Program. In The Technique of Total Knee Arthroplasty, 2nd edition, Mihalko WM, Mont M, eds. Elsevier, 2021

CAMPBELL CLUB IN MEMORIAM

Alfons Altenberg, MD
Lewis D. Anderson, MD
Robin Arena, MD
Borden Bachynski, MD
Troy Bagwell, MD
James Barnett, MD
Robert Basist, MD
Henry Beck, MD
Reginald V. Bennett, MD
Dan R. Bigelow, MD
Thomas H. Blake, Sr., MD
W. Griffin Bland, MD
Michael Bluhm, MD
Harrison O. Bourkard, MD
Robert L. Bourland, MD
William J. Bourland, MD
Harold B. Boyd, MD
David M. Bratton, MD
Hanes H. Brindley, Sr., MD
Robert G. Brashear, MD
Charles E. Brighton, MD
Louis P. Britt, MD
Joseph C. Burd, MD
John G. Caden, MD
Rocco A. Calandruccio, MD
Willis C. Campbell, MD
Dan Carlisle, MD
Peter G. Carnesale, MD
Charles O. Carothers, MD
Charles A. Carraway, MD
Paul A. Caviale, MD
Tom Phillip Coker, MD
Romulo E. Colindres, MD
Harry Collins, MD
Francis V. Costello, MD
John M. Crates, MD
P. Thurman Crawford, MD
A. Hoyt Crenshaw, Sr., MD
Henry I. Cross, MD
Jere M. Disney, MD
Daniel B. Eck, MD
Thomas S. Eddleman, MD
Allen S. Edmonson, MD
J. Kendall Ethridge, MD
E.W. Ewart, MD
W. McDaniel Ewing, MD
Edward L. Farrar, MD
M. Craig Ferrell, MD
Bryan Fleming, MD
Dale E. Fox, MD
Kermit W. Fox, MD
Isaac L. George, MD
Marvin M. Gibson, MD
Gary Giles, MD
A. Lee Gordon, III, MD
Harry R. Gossling, MD
John T. Gray, MD
Basil Griffin, MD
Herbert Alfred Hamel, MD
Joe Frank Hamilton, Jr., MD
Joe Frank Hamilton, Sr., MD
Richard M. Harkness, MD
Benjamin L. Hawkins, MD
David N. Hawkins, MD
C. Leon Hay, MD
Don Henard, MD
Edward D. Henderson, MD
Malcolm E. Heppenstall, MD
George B. Higley, Sr., MD
Kenneth C. Hill, MD
Royce Hobby, MD
John T. Hocker, MD
Frank C. Hodges, MD
James D. Hodnett, MD
Louis Horn, III, MD
John M. Hundley, MD
Wiley C. Hutchins, MD
Alvin J. Ingram, MD
E.R. 'Rickey' Innis, MD
Otis E. James, Jr., MD
Leland H. Johnson, Jr., MD
David S. Johnston, MD
Orville N. Jones, MD
Dan Klinar, MD
Robert A. Knight, MD
Timothy H. Krahn, M.D
F. E. Linder, MD
Stanley Lipinski, MD
Wayne B. Lockwood, MD
John F. Lovejoy, MD
William L. Lovett, MD
Harry A. Luscher, MD
Athey R. Lutz, MD
Michael Lynch, MD
H. B. Macey, MD
Thomas W. Marks, MD
Paul H. Martin, MD
Juan A. Mayne, MD
James M. McBride, MD
Frank O. McGhee, MD
C. C. McReynolds, MD
I. S. McReynolds, MD
Walter C. Metz, MD
Lee W. Milford, MD
T. Rothrock Miller, MD
Alfred F. Miller, MD
Andrew H. Miller, MD
William L. Minear, MD
J. M. Mitchell, MD
Joseph Mitchell, MD
J. M. Mitchner, MD
James D. Moore, MD
Larry B. Morrison, MD
James S. Mulhollan, MD
John T. Murphy, MD
Vernon Nickel, MD
Arthur Osborne, MD
W. Martin Payne, MD
Samuel B. Prevo, MD
George D. Purvis, MD
R. Beverly Ray, MD
Thomas A. Richardson, MD
S. L. Robbins, MD
R. C. Robertson, MD
R. C. Rountree, MD
Fred P. Sage, MD
Stanley Schwartz, MD
T. David Sisk, MD
W. H. Sisler, MD
Donald Slocum, MD
Hugh Smith, MD
J. Spencer Speed, MD
William B. Stanton, MD
Marcus J. Stewart, MD
Bruce Stivers, MD
Mario M. Stone, MD
Henry Thomas Stratton, MD
Ernest J. Tarnow, MD
Ethan O. Todd, MD
Robert E. Tooms, MD
Phillip C. Trout, MD
Thomas C. Turner, MD
Fredrico Van Domselaar, MD
Keith D. VandenBrink, M.D.
Isaac L. Van Zandt, MD
John A. Vann, MD
R. H. Walker, Jr., MD
Thomas L. Waring, MD
Robert E. Wells, MD
Gilbert G. Whitmer, MD
James H. Wiley, MD
Harold Williamson, MD
Frank D. Wilson, MD
Frederick C. Workmon, MD
B. T. Wright, MD

ALVIN J. INGRAM MEMORIAL LECTURE

Exhibitor Ads

Campbell Clinic
Foundation
MOVING LIVES