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Thank You from the Co-Editor

Welcome to the 14th volume of the *Western Journal of Orthopaedics* (*WJO*) published in conjunction with the Research Division of The University of New Mexico (UNM) Orthopaedics & Rehabilitation Department. This edition updates educational and research activities from the Department and features 13 articles that focus on orthopaedic innovations and cases of interest to the readership. Many of the articles are authored by UNM alumni, faculty, fellows, residents, students, and staff, but we also receive several external submissions from around the nation and the globe that contribute to the overall scientific quality of *WJO*. We are delighted to offer authors the opportunity to share their research and perspective on a wide variety of orthopaedic topics and invite you to submit to next year's 15th volume.

I would like to extend my heartfelt congratulations to our graduating residents and fellows. Their steadfast dedication and hard work have brought them to this exciting milestone, and we wish them continued success and growth in their journeys as surgeons. I would like to acknowledge the outstanding work of our research team, with special thanks to Dr. Laurie Wells – an expert statistician and clinical researcher. Her unwavering commitment to advancing the department's capabilities in data analysis is deserving of the highest recognition. To further support the department's research efforts, Dr. Wells pursued and completed a Master's degree in Data Science. We are deeply appreciative of Leorrie Watson, our Sports Medicine Research Manager, for her support and dedication to furthering the department's research endeavors. I would like to express my appreciation for Gail Case, Administrative Supervisor, for her continued leadership and support of our research efforts. We are all appreciative of our Interim Chair, Dr. Gehron Treme, for his leadership and support of the department, and especially for his commitment to advancing our research initiatives.

In this edition, I want to express my deepest appreciation for our dear friend and colleague, Joni Roberts, whom we sadly lost late last year. Her professional and personal contributions to our department will be deeply missed. I am grateful for Arianna Medina, our managing editor, for her publication support in gathering, copyediting, and formatting submissions to *WJO*. My thanks as well to Angelique Tapia, our layout editor, for her work in producing this volume of *WJO*.

I look forward to the work we will all continue to create together in the coming years.

Deana Mercer, MD
Professor
Department of Orthopaedics & Rehabilitation
The University of New Mexico

CALL FOR SUBMISSIONS

WJO 2026; Volume 15

YEARLY DEADLINE: NOVEMBER 1

***WJO* highlights the following types of articles relevant to orthopaedic surgery and engineering:** clinical and basic-science original research, case reports, reviews, technical notes, new technology, pilot studies, education articles, and reflections.

Short (1-Page) Instructions for Authors:
https://orthopaedics.unm.edu/research/research-journal.html

Email your Title Page, Blinded Manuscript, Figures, and Tables to WJO@salud.unm.edu

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INSTRUCTIONS FOR PEER REVIEWERS

WJO follows a double-blind peer review process to maintain the highest standards of academic quality. Reviewers participate in the following steps:

STEP 1

The *WJO* Editorial Team sends the Reviewer a PDF of the submission, a Response Form, and assessment guidelines.

STEP 2

The Reviewer submits their initial review within two weeks, including an overall assessment, author-specific feedback, and a publication recommendation for the Co-Editors.

STEP 3

The *WJO* Editorial Team sends the Author a blinded copy of the review, and the Author has two weeks to respond to Reviewer comments.

STEP 4

The *WJO* Editorial Team returns the revised submission and Author responses to the Reviewer for final approval or disapproval.

Reviewers will not be asked to review more than two submissions for a given volume. We understand that reviewer's time is limited and valuable. If the request is not possible, or if you believe that the content does not align with your expertise, please let us know immediately. A prompt review helps encourage authors to submit future work and allows our team to meet printing and publication deadlines.

PEER REVIEWERS: *WJO* 2025

The Co-Editors and Editorial Team of *WJO* extend our thanks to our peer reviewers, whose generous contributions of time, insight, and expertise play a vital role in shaping the scientific integrity and relevance of our content. Your thoughtful reviews uphold the standards of academic excellence we strive for.

Together, we continue progressing on our shared journey toward official indexing in PubMed and expanding the reach and impact of *WJO*.

Justin Bartley
Patrick Bosch
Trevor Crean
Thomas DeCoster
Rebecca Dutton
Shawn Duxbury
Rick Gehlert
Mischa Hopson
Samer Kakish
Eric Kruger
Eric Lew
Richard Miller
Beth Moody Jones
Drew Newhoff
Blake Obrock
Laura Shevy
Andrew Veitch
Adam Walsh

SHORT INSTRUCTIONS FOR AUTHORS

Western Journal of Orthopaedics

The Western Journal of Orthopaedics (WJO) is a peer-reviewed (double blinded) publication of the UNM Department of Orthopaedics & Rehabilitation. *WJO* publishes annually in June and highlights original research relevant to orthopaedic-focused surgery and engineering, with the goal of MEDLINE indexing.

The submission deadline for *WJO* volume 15 is November 1, 2025. Manuscripts submitted afterward will be considered for volume 16. Email questions to WJO@salud.unm.edu.

Submit the Title Page, Blinded Manuscript, each table, and each figure to **WJO@salud.unm.edu.**

General Formatting: Title Pages and Blinded Manuscripts must be submitted as Microsoft Word documents. *WJO* follows the style and format of the *AMA Manual of Style* (11th ed). Use Times New Roman, 12-point typeface, and 1-inch margins. Use continuous line numbering, continuous page numbering in the upper-right corner, and double spacing. Spell out numbers less than 10 except measurements (eg, "4 days"). Use SI metric units. Only include up to 2 significant digits (eg, $P = 0.05$, $P < 0.01$).

Title Page: State the paper's title. List authors' names in the desired order of appearance. For authors, include their highest academic degree, current affiliations, and any changed affiliations since the time of the study. Identify the corresponding author's name, physical address, and email. Include five informative statements: 1) funding, 2) conflict of interest, 3) informed patient consent for case reports *OR* your Institutional Review Board approval number if the research involved humans, 4) preferred subspecialties of reviewers for your submission (eg, pediatric spine), and 5) acknowledgments of any non-authors who contributed.

Blinded Manuscript: Excluding the references, abstract, tables, and figure legends, we will accept ≤3200 words for reviews; ≤2500 for scientific articles, pilot studies, education articles, and new technology; ≤1200 for case reports and technical notes; and ≤1000 for reflections. For scientific articles and education articles, include the following headings: Abstract, Introduction, Methods, Results, Discussion, References, and Figure Legends if figures are used. For reviews, use the same headings but replace Discussion with Conclusion. For case reports, the headings are Abstract, Introduction, Case Report, Discussion, References, and Figure Legends. Email us about headings for other submission types. Subheadings may vary but are generally not included in the Introduction, Discussion, or Conclusion sections.

Abstract: ≤250 words for scientific articles, structured into four paragraphs: Background, Methods, Results, Conclusions. ≤150 words for education articles, case reports, technical notes, new technology, and pilot studies (≤250 for reviews) in an unstructured paragraph format. At the end, list 3 to 5 keywords using terms searchable in the MeSH database (https://meshb.nlm.nih.gov/search).

References: List in order of appearance (not alphabetically) and cite in the text using superscript numbers. Format all references in *AMA Manual of Style* (11th ed). All listed references must be cited in the text and vice versa.

Tables/Figures: Create tables using only the Microsoft Word table function. Number each table and include a descriptive title. Place each table on a separate page after the References section in the Blinded Manuscript. For figures, place each one at the end of the Blinded Manuscript and also email us each one as an EPS, TIFF, PPT, or JPEG file in 300 DPI. Provide a brief description of each figure in the last page of the Blinded Manuscript, under a Figure Legends heading. When submitting a figure published elsewhere, provide information about the obtained permission. All figures and tables must be cited in the text.

We welcome all relevant orthopaedic and engineering submissions. We encourage manuscripts from faculty, fellows, residents, alumni, and colleagues. **For detailed instructions, view http://orthopaedics.unm.edu/research/research-journal.html.**

Thank you for considering *WJO* as an avenue to feature your research.

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Letter from the Chair of Orthopaedics

What an exciting time of year! The Alumni conference and the publication of the *Western Journal of Orthopaedics (WJO)* are celebrations of another successful year for our team – treating patients, exploring research questions, and training the next generation of orthopaedic surgeons.

Summer is a time to welcome our newest class of residents and to cheer on our graduating chiefs as they continue their journeys as orthopaedic surgeons into fellowship and beyond. Time always seems to fly – it seems like just yesterday that our graduates were rotating with us and interviewing for residency.

With Match Day 2020 coming just nine days after the World Health Organization declared COVID-19 a global pandemic, Nick, Tyler, Will, Solomon, and Audrey embarked on an already uncertain and challenging journey during one of the most uncertain and challenging times in our country's recent history. With a style that has been the calling card of their class throughout their time here at UNM, they rose to meet and conquer these challenges, leaving all of us better than they found us five years ago.

Every year seems to bring a sense of transition, and this past year has been no exception. Since our last edition of *WJO*, we lost our long-term friend and colleague, Joni Roberts. Joni faced her cancer diagnosis with remarkable courage and her characteristic grace. Her absence has left an unfillable void, especially as we celebrate our graduates without her for the first time in nearly 20 years. We miss you dearly, Joni, and wish you were here to share this time with us. We dedicate this year's Alumni Conference and *WJO* to your memory.

I am so grateful and proud to be part of the UNM Orthopaedic Family, and it is an honor to congratulate our residency and fellowship graduates. We are all fortunate to have participated in your training and to now count you among our colleagues. We are incredibly proud of each and every one of you.

Gehron P. Treme, MD
Interim Chair
UNM Department of Orthopaedics & Rehabilitation

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Sydney Slenes PA-C
Amanda Stratmoen, CNP

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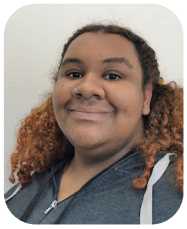

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2024 Alumni Conference Highlights

The 43rd annual UNM Orthopaedic Alumni Conference was held on June 7, 2024, at the Sandia Resort Event Center. This conference is intended to provide an update in current orthopaedic practices. Our audience comprises of practicing orthopaedic surgeons, advanced practice providers, therapists, and other professionals who work in the orthopaedic realm. This year's conference topic was "Orthopaedic Spine Surgery, Practice Management, and Diversity in Orthopaedics," with four main objectives:

1. Understand emerging concepts in spine injuries and deformities and appropriate treatment options
2. Identify injuries and patients appropriate for surgical intervention
3. Understand choosing a career path as a spine surgeon: academia vs. private practice
4. Understand emerging concepts in orthopaedics: hand, sports, and trauma

We had the honor of hearing presentations from two talented orthopaedic surgeons, Dr. Evalina Burger, from the University of Colorado Anschutz Medical Campus, and Dr. Supriyah Singh, from the London Health Sciences Centre Victoria Hospital, our 2024 invited speakers. The conference was followed by a graduation dinner for the chief residents and fellows where our interim chair of orthopaedics, Dr. Gehron Treme, delivered a thoughtful keynote speech.

Evalina Burger, MD

Evalina Burger, MD, is a Professor and the Chair in the Department of Orthopaedics at the University of Colorado Anschutz Medical Campus. Dr. Berger earned her undergraduate degree from the University of the Orange Free State, South Africa where she also completed her MB ChB. She completed residency at the University of Pretoria Academic Hospital, South Africa, after which she completed the American-British-Canadian Traveling Fellowship, where she became the first female orthopaedic surgeon from South Africa and only the third woman ever to receive this prestigious fellowship program awarded to highly accomplished young surgeons from English-speaking countries. Dr. Burger specializes in complex spinal surgery, adult deformity, and scoliosis.

Supriya Singh, MD

Supriya Singh, MD, is an Assistant Professor in the Division of Orthopaedic Surgery at London Health Sciences Centre's Victoria Hospital, Ontario. Dr. Singh earned her medical degree and completed her orthopaedic surgery residency at the Schulich School of Medicine and Dentistry, Western University, Ontario. She completed her fellowships in Adult and Pediatric Spine Surgery at The University of British Columbia, Canada. During her time in residency and fellowship, Dr. Singh was involved with Team Broken Earth, doing spine surgery outreach work in Haiti. Dr. Singh specializes in orthopaedic surgery with a focus on adult and pediatric spinal injuries.

Letter from the Residency Director

As we celebrate the publication of the 14th edition of *WJO*, I remain profoundly impressed by our residents' unwavering dedication to advancing research. Their contributions extend far beyond articles published in our journal, with many residents' research being showcased in other prestigious journals as well. While our department houses extensive talent, I would like to take this opportunity to acknowledge the extraordinary achievements within our Residency program.

Our Residency program continues to grow, offering several research opportunities for both faculty and staff, and residents excelling in their individual research interests. We take pride in the fact that a number of our residents exceed the two-project minimum for graduation, with many taking on additional projects within the department. Our focus is not only on developing residents into skillful surgeons and clinicians, but also on fostering overall personal and professional growth. I am honored to be part of a program that provides residents with the educational and clinical foundation that will guide them throughout their careers as orthopaedic surgeons.

Lastly, I would like to recognize the outstanding work of the *WJO* co-editors, Dr. Deana Mercer and the Vice Chair of Research and fellow *WJO* co-editor, Dr. Dustin Richter. I also want to express my gratitude for Dr. Christina Salas, former *WJO* co-editor. Dr. Salas' support and dedication have been instrumental in the journal's growth and success. The co-editors' commitment to project completion, involving medical students, and supporting residents during their didactics is greatly appreciated. In my 19 years at UNM, I have witnessed tremendous growth within the department, much of which is owed to our amazing research team. Monthly research meetings, dedicated staff supporting project completion across divisions, and the growth of *WJO* have played a key role in our success. As our department continues to grow and evolve, I have confidence that with Dr. Dustin Richter's leadership our research will continue to thrive.

Thank you to the entire research team and to *WJO* for supporting our residents and faculty.

Selina Silva, MD
Orthopaedic Surgery Residency Program Director
The University of New Mexico School of Medicine

Orthopaedic Residents

PGY 4


Cesar Cardenas MD


Colin Carroll MD


Taylor Gurnea MD


Kate Parker MD


Ryan Price MD

PGY 3


Carolyn Ardizzone MD


Tomas Holy MD


Hayley Urreiztieta MD MPH


Kylan Larsen MD


Nicholas Newcomb MD

PGY 2


Cory Alford MD


Mathew Gremillion MD


Naomi Kelly MD


Hernan Lebensohn MD


Lauren Nun MD

PGY 1


Lorena Fuentes Rivera Lau MD


Matthew Gasparro MD


Johnathan Jensen MD


Hoang Nguyen MD


Tobi Odeneye MD

Chief Residents

Audrey Wassef, MD

Medical School: Baylor College of Medicine
Fellowship: The Ohio State University - Spine

Many surgeons say that even as children they dreamed of becoming surgeons. As a child, I would have confidently said that I would be a WNBA star or a professional food taster. Luckily, neither of those options played out and I ended up in the greatest profession possible.

I grew up in Houston, Texas and attended Rice University for my undergraduate studies. At Rice, I ran cross country and track, an experience that honed the work ethic that would carry me through long call weekends in the years to come. Throughout this time, I lived with my twin sister, Chrissy, who pushed me to become the best student and athlete I could be, while also being my best friend.

I attended Baylor for medical school, only venturing out to do my orthopaedics sub-internships. The first of those sub-internships was at UNM, which very quickly felt like the place I wanted to pursue residency. Around this time, I also met Raf, who I somehow convinced to marry me during my fourth year of residency after over three years of long distance.

Leaving Texas, my family, and my friends behind for residency was a tough decision but was ultimately the right one. I am tremendously grateful for the patience, encouragement, and time that all of our attendings have invested in my development as a surgeon. I have enjoyed learning from you all more than I can express.

None of this would be possible without my family and friends who supported me along the way. My parents spent hours helping me and my siblings with homework, driving all over Texas for track meets, and encouraging us through medical school. Thank you for believing in me when I did not believe in myself. My siblings have been in busy residencies as well but always take the time to talk. Thank you for cheering me on as we all navigated this experience together. Thank you to Kate Parker, who has been the best roommate, friend, and cat aunt I could ever ask for. Finally, my husband Raf has been my rock, never wavering in his faith in me. Thank you for your patience, willingness to jump on hundreds of flights to see me, and for single handedly planning our entire wedding.

I look forward to my spine fellowship at The Ohio State University, where I hope to make you all proud. I am forever grateful for my years here in New Mexico.

Tyler Chavez, MD

Medical School: Harvard Medical School
Fellowship: Harborview Medical Center - Trauma

I was born and raised in Las Cruces, New Mexico. I grew up surrounded by a big New Mexican family and spent most of my free time playing and watching sports. Baseball was my first love, filling my early summers with competitive games and fun times with friends. I also loved music from a young age, playing both trumpet and guitar.

I completed my undergraduate studies at New Mexico State University (Go Aggies!), where I majored in Genetics & Biotechnology in the college of agriculture. There, I found life-changing mentors who saw my potential before I did and pushed me to pursue it. In my spare time, I developed a passion for medicine while working as a medical scribe in our local Las Cruces emergency department. I then attended Harvard Medical School, where my world view expanded exponentially, and I was fortunate to connect with people who remain some of my best friends and greatest supporters to this day. I discovered my excitement for the operating room and the fulfillment that comes with caring for injured patients. This led me to pursue a career in orthopaedic trauma surgery.

Choosing UNM for residency was an easy decision. I knew the program was special from the day I arrived as a visiting student. The supportive culture, excellent mentorship, and hands-on surgical training have remained top notch throughout my five years. I will be forever grateful for all of the outstanding surgeons I have had the privilege of learning from within the department. Outside of work, I continue to enjoy all things sports related. On my days off, you can typically find me in the gym, on the pick-up basketball court, or on the golf course. I also enjoy trail running in the New Mexican high desert, good food, live music, and country dancing.

I would like to thank all of my supportive family and friends who have helped and encouraged me along the way. I certainly could not have made it this far without their support and guidance. Most of all, I would like to thank my loving mother, Rebecca, for being an unwavering source of inspiration, love, and support.

Next year, I will complete a fellowship in orthopaedic trauma surgery at Harborview Medical Center in Seattle, Washington. After fellowship, I hope to return to the Southwest to fulfill my lifelong mission of increasing access to specialty trauma care in my community.

Chief Residents

Nicholas Brady, MD

Medical School: University of Texas, San Antonio
Fellowship: Robotics Institute at Ortho Rhode Island - Joint Reconstruction

My path to becoming an orthopaedic surgeon has been unconventional. After earning my undergraduate degree in economics and an MBA from The University of New Mexico, I began my career in the investment industry here in my home state, New Mexico. Early on, I realized that my true calling was in medicine. I was fortunate to have incredible mentors who guided me toward a new path, ultimately leading me to orthopaedics.

I attended the University of Texas at San Antonio for medical school and had the privilege of rotating at UNM as a medical student. During my rotation, I worked with Drs. Treme, Silva, Miller, Chafey, Gehlert, Kakish, and Richter. From the outset, I knew that this was where I wanted to train as an orthopaedic surgeon. I feel lucky to have learned from them and all the faculty at UNM over the past five years.

Growing up as a competitive golfer, I developed a particular passion for joint reconstruction, as the surgeries often require a similar thought process needed to compete in golf: patience during challenging moments, developing a reliable routine, and the ability to adapt. Both are highly technical and elusive, yet appear very simple on the surface. Next year, I will continue my passion for robotic joint replacements with a fellowship in adult joint reconstruction at the Robotics Institute at Ortho Rhode Island.

I am profoundly grateful to The University of New Mexico Orthopaedics & Rehabilitation Department for providing me the opportunity to train and grow as an orthopaedic surgeon. To my parents, Bill and Yoshiko, thank you for always believing in me and supporting me; none of this would be possible without you. I would also like to thank my sister, Christina, an unwavering role model and friend, and my brother-in-law, Zach, who helped me realize that I could become a physician—your support means the world to me. Most importantly, thank you to my wife, Emily, for standing by my side and supporting me throughout the last five years. To Nora, my little nugget, you made my journey every bit worth it.

William Curtis, MD

Medical School: University of Southern California
Fellowship: Columbia University - Shoulder/Sports Medicine

I grew up just outside San Francisco in San Rafael, CA with my mother Tina-Lise, father David, and younger brothers Wes and Sam. Growing up in an outdoorsy household, I spent most of my free time mountain and road biking with my dad, skiing, and hiking with the family dogs. In high school, I began racing mountain bikes at an international level, raced with the National Team in Europe, and represented the United States at the World Championships.

I completed my undergraduate studies at University of California at Santa Cruz, where I lived all four years with future co-resident, Nick Newcomb, and continued to race mountain bikes professionally while completing a degree in human biology. My parents soon followed me down to Santa Cruz County, where they still live today with their dog, Millie. Following a series of injuries and surgeries after college, I became passionate about a career in orthopaedic surgery. I then attended University of Southern California for medical school, where I graduated Summa Cum Laude and rotated at UNM as a fourth-year student. I was lucky enough to match at UNM for residency and have loved living in New Mexico since.

I currently live in Albuquerque with my lovely fiancée, Emi, and our husky, Jackson. We enjoy riding bikes on the many trails around the Sandias, resort and backcountry skiing, exploring New Mexico, and walking Jackson in the trails by our house (although never as much as he would like). We are excited to spend the next year in New York City, where I will complete a fellowship at Columbia University in shoulder and sports medicine. We hope to return to New Mexico following fellowship.

I would like to thank my family for their endless support throughout the many phases of my career. Emi, thank you for your unwavering love despite many missed dinners and altered plans. I would also like to thank my co-residents for making work fun every day, and all my mentors at UNM who have embodied what it means to be a compassionate, skilled, and well-rounded physician.

Chief Residents

Solomon Oloyede, MD

Medical School: University of Oklahoma
Fellowship: New England Baptist Hospital - Spine

I was born in Nigeria and raised in Edmond, Oklahoma. I earned my bachelor's degree in biology from the University of Central Oklahoma before attending the University of Oklahoma School of Medicine, where I graduated in 2020. Completing residency at The University of New Mexico has been an incredible journey, allowing me the chance to pursue my orthopaedic surgery training.

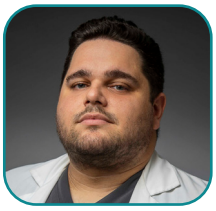
The past five years have been a transformative experience, and I am indebted to the exceptional attendings who have mentored me. Their unwavering support, constructive feedback, and invaluable wisdom have been instrumental in my growth. After completing my orthopaedic surgery residency, I will be pursuing a fellowship in spine surgery at New England Baptist Hospital in Boston, Massachusetts. Outside of the hospital, I enjoy playing soccer, weightlifting, and exploring the beautiful state and national parks nearby.

To my parents, thank you for the innumerable sacrifices that changed the trajectory of my life forever; this is for you. To my amazing wife, thank you for your unwavering love and support. You have been my rock through the highs and lows of this journey. I love you.

Fellows

Christopher Canario, DO
Fellowship: Sports Medicine
Residency: Rocky Vista University of Osteopathic Medicine
Medical School: Good Samaritan Regional Medical Center

Matthew Eads, MD
Fellowship: Hand
Residency: University of Kentucky
Medical School: University of Kentucky



Gabriel Echegray, MD
Fellowship: Hand
Residency: University of Puerto Rico School of Medicine
Medical School: University of Puerto Rico School of Medicine

Robert Mercer, MD
Fellowship: Trauma
Residency: University of Nevada Las Vegas
Medical School: The University of New Mexico School of Medicine

Dustin Richter, MD
Fellowship: Sports Medicine
Residency: Medical College of Wisconsin
Medical School: Medical College of Wisconsin

SAGITTAL ALIGNMENT CONCEPTS

Audrey Wassef, MD

Sagittal alignment refers to the balanced relationship between the cranium, spine, and pelvis. It is not just relevant to deformity surgeons, but should be a fundamental consideration for all spine surgeons to avoid creating unintended deformities. Recent advancements have led to a better understanding of what constitutes normal anatomy and how surgical interventions can preserve or restore it.

Lordosis refers to the natural inward curvature of the lumbar spine. Pelvic incidence (PI) is a static measure that remains unchanged regardless of surgery or posture. Sacral slope represents the angle between the sacral plate and the horizontal plane, while pelvic tilt describes the angle formed between the vertical axis and the line connecting the sacral midpoint to the femoral heads. The sagittal vertical axis measures how far the upper body shifts forward or backward relative to the pelvis. Additionally, T4 Pelvic Angle (T4PA) and L1 Pelvic Angle (L1PA) have emerged as critical angles for determining alignment goals in surgical planning.

Historically, several classification systems have attempted to provide a structured approach to sagittal alignment. The SRS-Schwab classification was useful for correlating radiographic findings with quality of life outcomes, but was not developed from a disease-free population. The Roussouly Classification, based on sacral slope and the apex of lumbar lordosis, recognized individual variability in alignment, but proved difficult to use intraoperatively with poor interrater reliability. The global alignment and proportion score introduced a predictive formula for mechanical failure risk, but it remained challenging to reproduce and still relied heavily on pelvic incidence.

Recent findings have helped establish more precise surgical targets. The equation for L1-S1 lordosis is given as Lordosis = 0.60(PI) + 30, while the L1PA goal is calculated as L1PA = 0.5(PI) - 20. Furthermore, the T4PA goal should be maintained within -3° to +1° of L1PA to minimize the risk of mechanical failure. These new parameters allow for more objective and standardized alignment targets in surgical planning.

Ultimately, sagittal alignment should be considered in every spinal surgery, even in cases involving only one or two degenerative levels, because changes at one level affect the entire spine. Failing to account for proper alignment may lead to progressive complications like Proximal Junctional Kyphosis or catastrophic implant failure, requiring multiple future surgeries. The field is continuously evolving, and while recent research has provided new insights, current data only extend to two-year follow-ups, leaving many long-term outcomes yet to be determined.

THE INS AND OUTS OF SHOULDER INSTABILITY

William Curtis, MD

Anterior shoulder instability is a relatively common orthopaedic condition that affects 1.0% to 2.0% of people in their lifetime. It is seen more frequently in men and in military populations, and leads to chronic instability in up to 90.0% of patients experiencing their initial instability episode at under 20 years old. It is normally caused by an anterior-directed force to an abducted, externally-rotated shoulder, but can also be secondary to generalized ligamentous laxity and/or repetitive microtrauma. Glenohumeral instability has been associated with increased risk of future shoulder arthropathies.

The stabilizing elements of the native glenohumeral joint can be separated into static and dynamic stabilizers. The static stabilizers include the glenoid fossa, joint capsule, glenoid labrum, glenohumeral ligaments, and synovium. Dynamic stabilizers include the rotator cuff muscles, which create a concavity-compression effect.

Work up of anterior glenohumeral instability includes a history focused on risk factors for chronic instability (eg, age, previous instability, mechanism, daily activities) and exam that focuses on range of motion, rotator cuff strength, and apprehension. Radiographs will commonly show a Hill-Sachs lesion (HSL) at the posterior humeral head and anterior-inferior bone loss at the glenoid. Magnetic resonance imaging (MRI) is used in initial work up to evaluate the labrum, cartilage, and rotator cuff. Computed tomography scan can be used to better characterize bone loss, although recent literature has demonstrated efficacy of MRI in characterizing bone loss. Advanced imaging can be used to calculate the glenoid track and HSL, from which "on-" (non-engaging) versus "off-track" (engaging) lesions can be determined.

Treatment is based on the amount of bone loss at both the glenoid and humeral head. Nonoperative management with physical therapy focused on rotator cuff and periscapular strengthening can be attempted for first-time dislocations but has a high failure rate, especially in young and athletic populations. Patients with glenoid bone loss of less than 13.5% with an on-track HSL can be treated with arthroscopic labral repair, while those with an off-track HSL can be treated with labral repair with Remplissage, open capsular shift, or a bone-block procedure, such as Latarjet or distal tibial allograft. Patients with greater than 25.0% glenoid bone loss should be treated with a bone-block procedure, regardless of whether the HSL is on-track or off-track. Treatment of patients with moderate glenoid bone loss (13.5%-25.0%) is less well defined, but includes labral repair with Remplissage, open capsular shift, or bone-block procedures. Allograft procedures to address large HSLs (>30.0%) have also been described with promising early results.

Future research should focus on timing of return to sport, definition and treatment of "subcritical" glenoid bone loss, prevention of future arthropathy, and treatment of shoulder instability in the setting of global hyperlaxity.

THE ROLE OF ROBOTICS IN TOTAL KNEE ARTHROPLASTY

Nicholas Brady, MD

The field of joint arthroplasty faces two critical challenges: 1) rising costs due to advanced technologies, and 2) increasing demand for joint replacements, while Center for Medicare and Medicaid Services reimbursement rates decline. Surgeons must do more with fewer resources. The introduction of expensive, disruptive technology without long-term outcome data naturally sparks controversy.

Patient dissatisfaction with total knee replacements stems from various factors, including component malpositioning, poor soft-tissue balancing, overlooked pain sources, aseptic loosening, and infection. Compared to patients who undergo total hip replacements, those who undergo total knee replacement report lower satisfaction rates. This discrepancy likely arises from the complexity of the knee. While sports medicine literature has extensively documented native knee biomechanics, total knee replacement alters these biomechanics by removing stabilizing ligaments and modifying soft tissue. Since the introduction of the total condylar knee in the 1970s, surgeons have sought to replicate native knee mechanics with various implant designs. No single design has definitively prevailed, but advancements in materials have significantly reduced aseptic revisions.

How does robotics improve outcomes? First, it's crucial to distinguish between technologies. "Passive" systems require the surgeon to manually cut with a hand-held saw, whereas "semi-autonomous" systems use a robotic arm to control the saw blade. Another distinction is whether the system uses a computed tomography (CT) scan. Navigation systems rely on the surgeon to map bone architecture, while CT-guided systems integrate anatomic landmarks with a CT scan, providing a three-dimensional view of the bone.

The paradigm shift in knee arthroplasty comes from the ability to balance the knee before making bone cuts. Traditional manual techniques involve cutting the bone first to restore mechanical alignment, then adjusting soft tissues to balance the knee—akin to forcing a square peg into a round hole. Robotic-assisted CT-guided systems allow for precise bone cuts with minimal soft-tissue manipulation.

Robotics should be seen as a tool that enhances surgical precision, particularly in achieving accurate bone cuts. However, two key challenges remain: 1) objectively assessing soft-tissue tensioning, and 2) determining each patient's ideal constitutional alignment and joint line obliquity. Regardless of whether a surgeon favors mechanical or kinematic alignment, robotics can help achieve the desired outcome.

The next phase of robotics holds exciting potential, particularly in complex primary cases, conversions, and revisions. This is where robotics may prove most valuable, demonstrating significant cost savings and improved outcomes.

NAVIGATING THE EMERGENCE OF NEW TECHNOLOGY IN SPINE SURGERY

Solomon Oloyede, MD

Recent innovations in spine surgery are drastically reshaping how procedures are planned and executed. The integration of advanced imaging technology, robotics, and artificial intelligence (AI) have paved the way for more precise interventions. Surgeons are now able to leverage real-time, three-dimensional images for meticulous preoperative planning and precise implant placements, thereby significantly reducing complications and improving patient outcomes.

Computer-assisted navigation (CAN) has been a transformative force in spine surgery since its emergence in the mid-1990s. By leveraging advanced imaging systems—such as the O-arm® and Ziehm Vision FD—that provide real-time operative feedback, this technology empowers surgeons to achieve exceptional precision. CAN has fundamentally altered the surgical landscape, allowing for more consistent implant placement and enhancing overall procedural safety by minimizing potential complications.

Robotic systems represent another critical evolution in the field. Various robotic platforms assist surgeons by offering enhanced control and precision during both the preoperative and intraoperative phases. These platforms employ rigid robotic arms that provide precise guidance for surgical instrumentation based on detailed preoperative plans. As a result, surgeons can accurately predict the ideal trajectory of pedicle screws, determine the optimal rod length and contour, select the appropriate cage size, and estimate the necessary deformity correction before entering the operating theatre. Notably, patient-specific precontoured rods enable surgeons to efficiently manage large deformity cases.

The evolution of minimally-invasive techniques, particularly those using endoscopic methods, has further advanced spine surgery. Modern endoscopic strategies—including full endoscopy, biportal, and microendoscopy approaches—allow for targeted interventions that minimize tissue disruption and promote faster recovery times. Concurrently, emerging augmented reality (AR) technologies, such as the Augmedics Xvision headset, offer real-time anatomical overlays and hands-free navigation, potentially improving outcomes by reducing line-of-sight interruptions and attention shifts associated with traditional navigation setups.

In exploring the future trajectory of spine surgery, new platforms that are built on the synergy of robotics, CAN, AR, and AI promise to refine and personalize procedures, heralding a new era of technology-driven, patient-centered care.

THE EVOLUTION OF ORTHOPAEDIC TRAUMA SURGERY CARE FOR THE MULTIPLY-INJURED PATIENT

Tyler Chavez, MD

Emergency surgical care of the polytrauma patient is a complex and evolving concept. Overall mortality from polytraumatic injuries has decreased in recent years due to advancements in critical care, resuscitation protocols, and the development of comprehensive trauma systems. As survival rates improve, the orthopaedic management of these patients has become increasingly relevant and crucial in driving positive outcomes and reducing both morbidity and mortality.

Poly-traumatic events pose significant risks to patients, especially in the setting of major chest, abdominal, or brain injuries. While most of these body systems are managed by other surgical services, research has identified the presence of a femur fracture in a polytraumatized patient as an independent risk factor for pulmonary complications, acute respiratory distress syndrome, and mortality. Given this relationship, the orthopaedic trauma surgeon plays a critical role in providing safe surgical care at the appropriate point in the treatment timeline.

Historically, management of femur fractures in the polytrauma setting involved immobilization with splints, casts, or skeletal traction. The invention of the intramedullary nail in the mid 1900s changed orthopaedic trauma practice entirely. Naturally, this raised questions about the most appropriate timing for bony surgical fixation. The earliest guidance within the trauma community was to delay surgical intervention until the traumatized patient was completely clinically stable and had recovered from their other injuries before proceeding with intramedullary instrumentation. However, the complications of prolonged immobilization with this approach were quickly realized.

A major prospective study by Bone et al[1] demonstrated a trend towards increased complications in patients who underwent fixation more than 48 hours after injury. Despite lacking statistical significance, this result led the orthopaedic trauma community to push for definitive fixation as early as possible. Retrospective literature from the 1980s, though limited by confounders, supported the notion that early definitive fixation reduces complications. These studies led to an era defined by "Early Total Care," with emphasis on definitively fixing bony injuries within six hours of injury, despite the majority of studies evaluating time frames between 24 and 48 hours.

The 1990s and 2000s then refuted the benefits of "Early Total Care" by demonstrating increased rates of complications and mortality in the very early care groups. This was especially true in the setting of severe lung or brain injuries and the newer concept of secondary lung or brain injury as a result of early surgery. The concept of a "Damage Control" external fixator was also shown to be a viable option as a safe bridge to definitive fixation.

With much conflicting evidence up to this point, the critical question remained: which orthopaedic trauma patients should be treated in an early versus delayed fashion? Fortunately, important work was also being done to better define hemodynamic resuscitation, using pH, lactate, and base excess values. Vallier et al[2] evaluated these factors in a predictive model to define cut-offs that would predict a patient's resuscitation status and readiness for safe surgery. A follow-up prospective study using these defined parameters then demonstrated significant benefit when adequately resuscitated patients underwent surgery to fix unstable extremity, spine, and pelvic injuries less than 36 hours after injury.[3] This important work has come to define our current era of orthopaedic polytrauma practice as "Early Appropriate Care." This better stratifies patients based on resuscitation status and recommends early fixation (less than 36 hours after injury) for adequately-resuscitated patients and "Damage Control" for clinically unstable or under-resuscitated patients.

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Letter from the Chief of The Division of Physical Therapy

As we move into the 51st year of the Division Physical Therapy (DPT) at The University of New Mexico (UNM) School of Medicine, I would like to highlight the advancements we have made as a team. In 1968, when a small group put together our charter proposal, there were less than 40 PTs in the state. Today there are over 1,200 physical therapists statewide, and our program has graduated over 1,000 PTs in its short history. We quickly developed and adapted, transitioning from an entry-level bachelor's program to a Doctor of Physical Therapy program. We have now graduated students with a DPT degree for nearly 13 years.

A one-of-a kind research lab is now open at The University of New Mexico DPT program, paving the way for new and innovative research in physical therapy that will improve patient care across the state. The Gait and Motion Analysis Lab conducts cutting-edge research focused on understanding how people move and walk. Using advanced technology, including camera systems and various types of sensors, the lab tracks the movements of muscles, joints, and limbs to gather detailed data on walking mechanics. This research not only helps identify abnormalities, but also contributes to developing better rehabilitation methods and tools. The Gait and Motion Analysis Lab has been pivotal to the Physical Therapy program's success and a cornerstone of its research.

Over 70.0% of the Physical Therapy program's core-faculty at UNM use the lab for their research. In addition to faculty research, the lab will continue to increase research learning experiences for students. Physical Therapy students take part in faculty-led research projects, learning how to gather, export, analyze, and report data. The lab is also used by undergraduate and graduate School of Medicine students, medical residents, and UNM students studying engineering, statistics, and exercise science. The lab's modernization was made possible through a federal Health Resources and Services Administration grant, which allowed for significant renovations, including new cameras and the installation of advanced equipment like the Zeno Walkway. The Zeno Walkway provides critical data on gait and safety. The Gait and Motion Analysis Lab's expansion is not just a technological upgrade; it also represents a broader evolution in the field of physical therapy.

I would like to express my gratitude and appreciation for the hard work and dedication of our students and faculty in the Division of Physical Therapy. As a team, the DPT now averages over 12 peer-reviewed publications per year, close to 20 national and local professional presentations, and participation in grants valuing over $3 million. As we look toward our next 51 years, we will continue working toward funding scholarships for our students, growing our research agenda, and offering pro-bono physical therapy services to our community.

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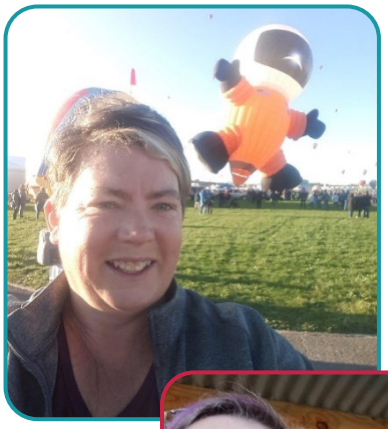
REMEMBERING
Joni Roberts

Joni's impact on us all is immeasurable. She was more than just a colleague – she was a friend, a mentor, and guiding light in our office. We are honored to share some of our favorite memories of Joni that exemplify the kindness, generosity, and dedication that defined her time with us.



"Joni was the best supporter, not just in work but in *life*."

Joni started with the department as a Program Coordinator in 2005. From the beginning of her tenure, Joni was dedicated to our mission and the teammates she worked with. She quickly became our go-to-person for everything office-related, supporting not only the residents but faculty and staff as well. Although her responsibilities continued to grow, she never once complained. She always showed up with a smile, ready to help, and participated fully in every department event. In her 19 years with the department, Joni contributed greatly to several department projects, including our research journal, the *Western Journal of Orthopaedics* (*WJO*) - previously The University of New Mexico Orthopaedic Research Journal. She served as one of the managing editors for 12 of the journal's 13 volumes. We would not have been able to build *WJO* into the successful, peer-reviewed journal that it is today without Joni's many contributions and efforts.

Joni went above and beyond by crocheting blankets for the new babies, babysitting when asked, and even lending an ear during tough times. She had a wealth of knowledge regarding UNM policies and procedures and took on several roles, including being the department notary and our "Chrome River Champion." Joni also contributed to the more mundane tasks, like clearing a copier jam and helping navigate Banner and P-card transactions. We relied on Joni for lots of things, including smaller, non-office-related reminders, like Valentine's Day and Administrative Assistants' Day to name a few. She always knew how to make those days special, sharing cards and gifts with the staff. One of our most cherished memories of Joni is her love for Christmas, specifically her Christmas Countdown Calendar, which brought joy and excitement to us all. We will continue to honor her love of Christmas by displaying her miniature Christmas tree on the front desk. Every time we see it, we will remember her during the holidays. Joni will also be remembered for the small bowl of candy she kept stocked at her desk for anyone who wanted to stop by for conversation and candy. Her candy bowl served as a token of appreciation and an effort to bring a smile to her colleagues; something she did without fail.

Joni's love for her family was obvious for those who knew her. She was the best aunt anyone could ask for, and her love for the Broncos was palpable. Joni was the best supporter, not just in work but in life. We are forever thankful for Joni's contributions to our lives and she will be missed dearly.