ACFAS 2023
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STEP IT UP
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FEBRUARY 9-12

Who Ya Gonna Call?
To Get Started on Research

Nicole Cates, DPM, AACFAS

Tommy Saing, DPM, Moderator

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Presenter Disclosures

Nicole Cates, DPM, AACFAS

Nothing to disclose

Tommy Saing, DPM

Nothing to disclose

Overview

- Why get involved in research?
- Where are we as a field?
- Staying up to date
- How to get started
- How to actually do research

Why get involved in research?

For the profession

Increase knowledge base

Make us all better physicians

Parody with other specialties

Personally

Fellowship / Jobs

Speaking opportunities

Consulting


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Nicole K. Cates,
DPM, AACFAS
Techniques for
Posterior Malleolar
Fractures in
Trimalleolar Equivalent


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MedStar Georgetown University Hospital's
Diabetic Limb Salvage:
A Team Approach
April 27 to 30, 2022
A Unique Virtual Experience
Conference Chairmen
Christopher E. Attinger, MD
John S. Steinberg, DPM
MedStar Health
AGENDA
FACULTY
CREDITS
ABSTRACTS
REGISTRATION
DLS 2022 celebrates International Women's Day 2022!
International Women's Day is a global day celebrating the social, economic, cultural, and political achievements of women. We are proud and grateful to these internationally recognized faculty members for being a part of what makes the Diabetic Limb Salvage conference so successful!
Karen Kim Evans, MD
MedStar Georgetown University Hospital
Washington, D.C.
Nicole Cates, DPM
Hand and Microsurgery Medical Group
San Francisco, CA
Janet D. Conway, MD, FAAOS
Sinai Hospital of Baltimore
Baltimore, MD
Frances Game, MDN
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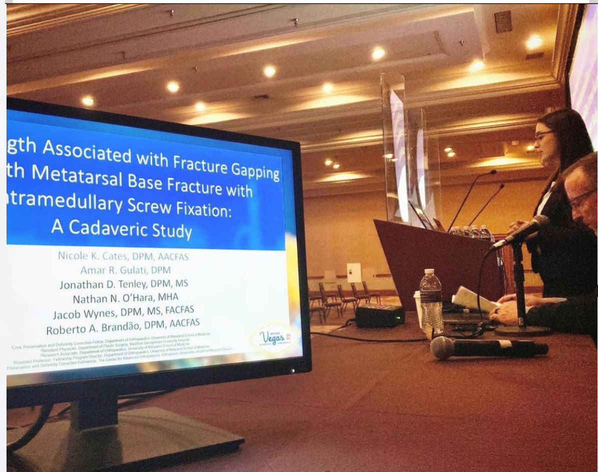

gth Associated with Fracture Gapping
th Metatarsal Base Fracture with
ntramedullary Screw Fixation:
A Cadaveric Study
Nicole K. Cates, DPM, AACFAS
Amar R. Gulati, DPM
Jonathan D. Tenley, DPM, MS
Nathan N. O'Hara, MHA
Jacob Wynes, DPM, MS, FACFAS
Roberto A. Brandão, DPM, AACFAS

Where are we as a field?

- Podiatry Database Registry
- Mentorship program
- Annual ACFAS Clinical & Scientific Research Grant

Podiatry Database Registry

Upcoming

Clinical Data Registries Play Crucial Roles

Registry Purposes

- Quality improvement
- Benchmarking
- Clinical research
- Clinical effectiveness
- Cost effectiveness
- Device surveillance
- Treatment surveillance
- Population surveillance

Registry Uses

- Decision support
- Guideline development
- Measure development
- Regulatory and public reporting (MACRA/MIPS, QCDR)
- Value-based reimbursement and payment
- Patient engagement
- Post-market surveillance
- Registry-based clinical trials
- Education development
- Certification and accreditation

ArborMetrix

Mentorship Program

- Develop a network of seasoned researchers who will function as mentors to young members within the ACFAS committee.

Upcoming

Annual ACFAS Clinical & Scientific Research Grant

American College of Foot and Ankle Surgeons®

Who We Are | Education & Professional Development | Research & Publications | Policy & Advocacy | Search

ACFAS Clinical & Scientific Resources

- **Clinical & Scientific Research Grant**
- Research Videos
- Research Programs
- Virtual Journal Club
- Evidence Based Medicine Lectures & Papers

Applications for the ACFAS Clinical & Scientific Research Grant are now open!

Thanks to support from PICA and the ACFAS Regions, the College will again be offering funding of up to $75,000 for an established investigator and $25,000 for a new researcher.

Important Dates
Letters of intent were due September 15 at 5:00 pm CT.
Final applications must be received by October 15 at 5:00 pm CT.
Awards will be announced in December and funding will be provided in January 2023.

How to Apply
All applications must follow a modified NIH R21 format. The principal investigator (PI) must be a member of ACFAS in good standing. Fellows and residents may not serve as PI. Applicants must identify if they are seeking an established investigator award or new researcher award. Generally speaking, established investigators will have a history of prior funding and publications.

$25,000 Grant

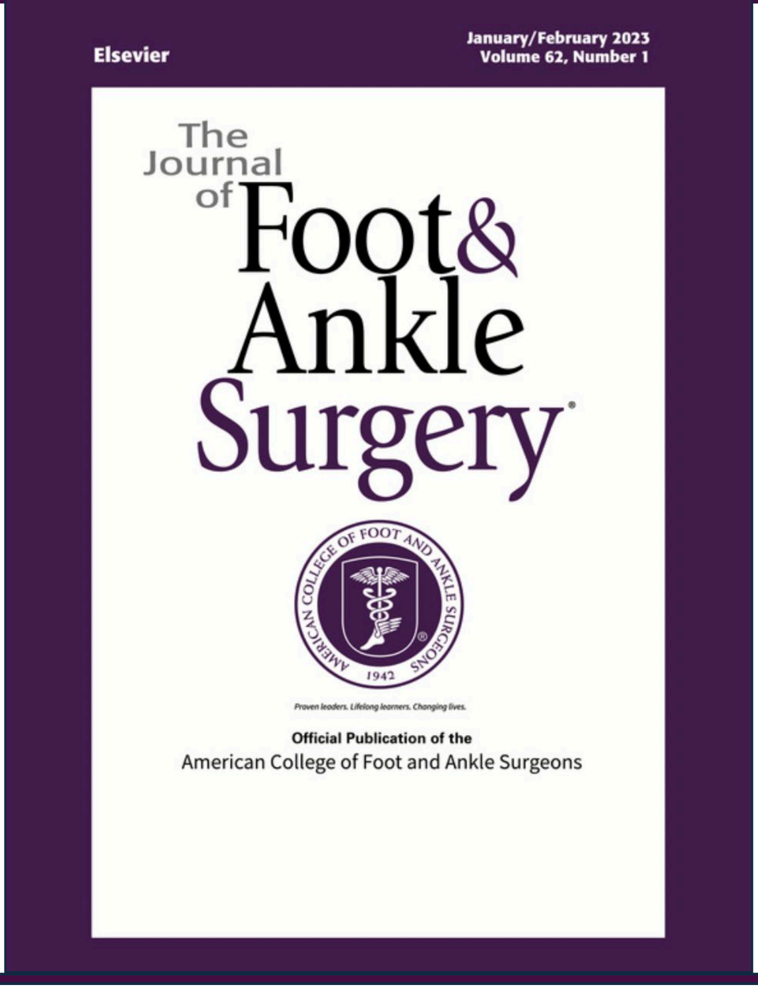
New researchers

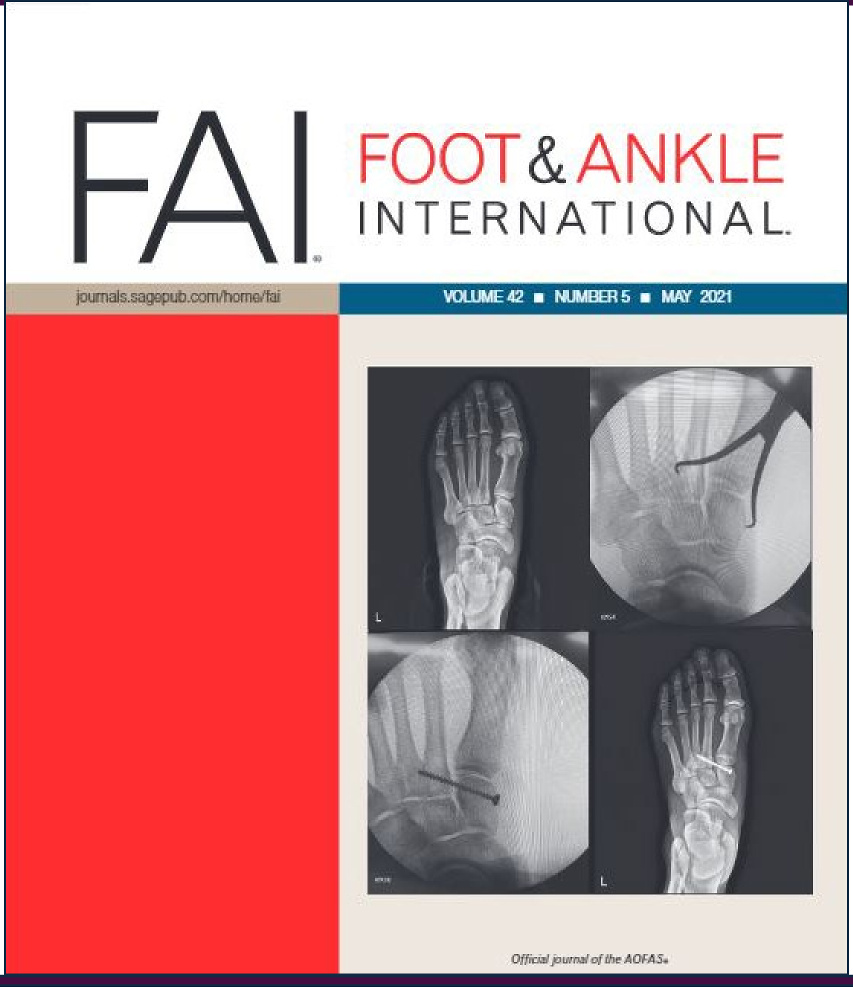
https://www.acfas.org/research-publications/research-resources/acfas-clinical-scientific-research-grant

Staying up to date

- Journals
- Virtual Journal Clubs
- Podcasts
- Residencies Academics

Journals






JAPMA

JOURNAL OF THE AMERICAN PODIATRIC MEDICAL ASSOCIATION

VOLUME 110 NUMBER 3 MAY/JUNE 2020

ORIGINAL ARTICLES

Characteristics of Patients with Charcot's Arthropathy and its Complications in the Saudi Diabetic Population: A Cross-Sectional Study
Khalid Al-Rubeaan, FRCPC, Khaled H. Aburisheh, MRCP, Yousuf Al Farsi, MD, Mohammad Al Derwish, BN, Samir Ouizi, Bsc, MPodMed, Fahad Alblaihi, MBBS, ABFM, Ali Jaber ALHagawy, MBBS, ABFM, Rakan Khalid AlSalem, MBBS, Musab Abdualaziz Alageel, MBBS, Mona Heide Toledo, BN, Amira M. Youssef, BPharm

Intraobserver and Interobserver Reliability of Three Classification Systems for Hallux Rigidus
Peter Pham, DPM, Sarita Dillard, DPM, Christina Schilero, DPM, Sharon Chiang, PhD

Effect of Metatarsal Head Shape on the Development of Hallux Valgus Deformity: 10 Years of Natural Follow-up
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Dermoscopic Features of Toenail Onychomycosis
Noureddine Litaiem, MD, Ines Nakouri, MD, Sabrine Bouhlel, MD, Yasmine Mansour, MD, Meriem Bouchakoua, MD, Faten Zegaloui, MD

Evaluation of Plantar Foot Sensation, Balance, Physical Performance, and Fear of Movement in Substance Use Disorders
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Anusha Pundu, DPM, Bruce Lehnert, DPM

Simultaneous Pantalar Dislocation and Bimalleolar Ankle Fracture
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Virtual Journal Club

American College of Foot and Ankle Surgeons®

Who We Are | Education & Professional Development | Research & Publications | Policy & Advocacy | Search

Virtual Journal Club

Virtual Journal Club

Archived Journal Club Sessions

As part of ACFAS' live educational events designed to help teach the A to Zs of research, please join us monthly for the ACFAS Virtual Journal Club series, brought to you by the ACFAS Research Committee.

Each 60-minute session is hosted and presented by research experts from fellowship programs with ACFAS status. The ACFAS Virtual Journal Club is open to all students and residents and will review noteworthy articles on pertinent topics of research.

Upcoming Virtual Journal Club Sessions

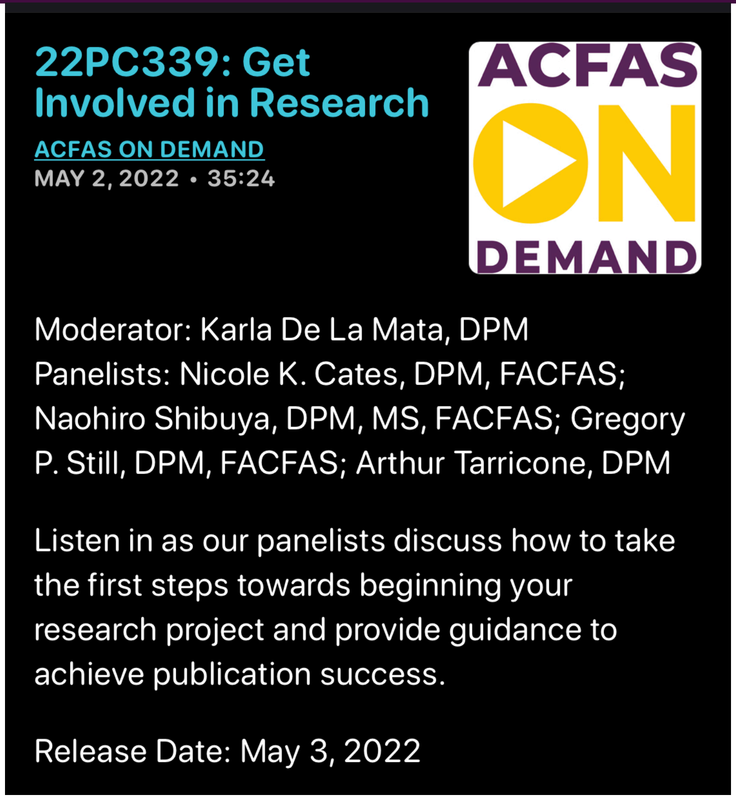
TARs
Thursday, January 19 | 7:00 pm CT
Host: Pennsylvania Intensive Lower Extremity Fellowship
Fellowship Director: Jason R. Miller, DPM, FACFAS and Krista Kotzeva, DPM
The following articles will be presented:

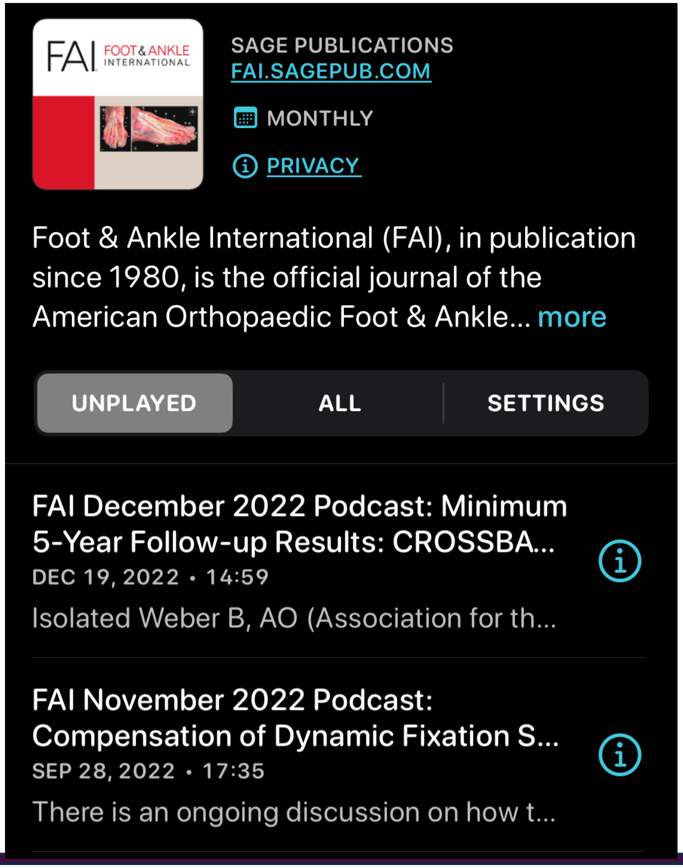
Age-Related Outcomes in Total Ankle Arthroplasty: An Analysis of 112 Patients, Cottom 2020
Effect of age on outcome and revision in total ankle arthroplasty, Gaugler 2020
Total Ankle Arthroplasty Survivorship, Complication, and Revision Rates in Patients Younger Than 55 Years, Consul 2022

Register

Podcasts

- Podcasts
  - ACFAS On Demand
  - Foot & Ankle International





How to get started

The Vertical Contour Calcanectomy, an Alternative Approach to Surgical Heel Ulcers: A Case Series

Nicole K. Cates, DPM • Kaihua Wang, DPM • Jered M. Stowers, DPM • Christopher E. Attinger, MD • Paul J. Kim, DPM, MS, FACFAS • John S. Steinberg, DPM, FACFAS

DOI: https://doi.org/10.1053/j.jfas.2019.04.010

Peripheral Vascular Disease Diagnostic Related Outcomes in Diabetic Charcot Reconstruction

Nicole K. Cates, DPM • Tammer Elmarsafi, DPM, MBBCh • Taylor J. Bunka, DPM • ... John S. Steinberg, DPM, FACFAS • Christopher E. Attinger, MD • Paul J. Kim, DPM, MS, FACFAS

Charcot Reconstruction: Outcomes in Patients With and Without Diabetes

Nicole K. Cates, DPM, AACFAS • Emily C. Wagler, DPM • Taylor J. Bunka, DPM • ... Karen K. Evans, MD • John S. Steinberg, DPM, FACFAS • Christopher E. Attinger, MD • Show all authors

Published: August 07, 2020 • DOI: https://doi.org/10.1053/j.jfas.2020.05.019

FOOT & ANKLE SURGERY: TECHNIQUES, REPORTS & CASES

Adjunctive lateral ankle stabilization in midfoot Charcot reconstruction for ankle joint preservation

Nicole K. Cates, DPM, AACFAS • Deepal H. Dalal, DPM, MS • Jacob Wynes, DPM, MS, FACFAS

Open Access • Published: August 26, 2021 • DOI: https://doi.org/10.1016/j.fastrc.2021.100078

Evaluation of Peripheral Perfusion in the Presence of Plantar Heel Ulcerations Status After Transmetatarsal Amputation With Achilles Tendon Lengthening

Nicole K. Cates, DPM, AACFAS • Mira Pandya, DPM • Nicholas D. Salerno, DPM • ... Paul J. Kim, DPM, MS, FACFAS • John S. Steinberg, DPM, FACFAS • Christopher E. Attinger, MD • Show all authors

Published: June 21, 2020 • DOI: https://doi.org/10.1053/j.jfas.2019.11.002

Abstract

The objective of this study is to evaluate peripheral perfusion in patients who developed plantar heel ulcerations status after transmetatarsal amputation and Achilles tendon lengthening. Peripheral perfusion was assessed via contrast angiography of the 3 crural vessels (anterior tibial, posterior tibial, and peroneal arteries), as well as intact heel blush and plantar arch. The secondary objective is to correlate the arterial flow to time to develop heel ulceration and incidence of minor and major lower-extremity amputation. Diagnostic angiography without intervention was performed on 40% of patients (4/10), and interventional angiography was performed on 60% of patients (6/10). In-line flow was present in 0% (0/10) of the peroneal arteries, 60% (6/10) of the anterior tibial arteries, and 70% (7/10) of the posterior tibial arteries. Heel angiographic contrast blush was present in 60% (6/10), and intact plantar arch was present in 60% (6/10). Patients developed heel ulcerations at a mean time of 7.6 months (range 0.7 to 41.2) postoperatively. The incidence of major lower-extremity amputation was 30% (3/10), with a mean time of 5.2 months (range 3.5 to 8.3) from time of heel wound development. No amputation occurred in 6 patients (60%). Among them, intact anterior tibial inline arterial flow was present in 3, intact posterior tibial inline arterial flow was present in 6, and heel blush was present in 5. Our results demonstrate that an open calcaneal branch of the posterior tibial artery is sufficient to heal plantar heel ulcerations to potentially increase rates of limb salvage.

Complications of Charcot Reconstruction in Patients With Peripheral Arterial Disease

Nicole K. Cates, DPM, AACFAS • Tammer Elmarsafi, DPM, MBBCh, AACFAS • Cameron M. Akbari, MD • ... John S. Steinberg, DPM, FACFAS • Christopher E. Attinger, MD • Paul J. Kim, DPM, MS, FACFAS • Show all authors

A Systematic Review of Angular Deformities in Charcot Neuroarthropathy

Nicole K. Cates, DPM, AACFAS • Jonathan Tenley, DPM • Helene R. Cook, DPM • Paul J. Kim, DPM, MS, FACFAS

Published: October 06, 2020 • DOI: https://doi.org/10.1053/j.jfas.2020.10.003

Retrocalcaneal Enthesophyte Resection With Functional Lengthening of the Achilles Tendon and Buried Knot Technique: A Case Series

Nicole K. Cates, DPM, AACFAS • Emily C. Wagler, DPM, AACFAS • Shirley Chen, DPM, AACFAS • Laurence G. Rubin, DPM, FACFAS

Risk Factors and Outcomes After Surgical Reconstruction of Charcot Neuroarthropathy in Fracture Versus Dislocation Patterns

Nicole K. Cates, DPM, AACFAS • Jonathan Furmanek, DPM • Korey S. Dubois, DPM, AACFAS • Jacob Wynes, DPM, MS, FACFAS

Published: July 25, 2021 • DOI: https://doi.org/10.1053/j.jfas.2021.07.020

Split Anterior Tibial Tendon Transfer to Dorsal Lateral Foot for Cavovarus Deformities With Neuropathic Ulcerations: A Case Series

Nicole K. Cates, DPM, AACFAS • Taylor J. Bunka, DPM • Amber M. Kavanagh, DPM • Jacob Wynes, DPM, MS, FACFAS

Published: August 14, 2021 • DOI: https://doi.org/10.1053/j.jfas.2021.08.004

Abstract

Cavovarus deformity leads to increased peak pressure on the plantar lateral foot, which can lead to ulceration, and can potentially progress to amputation. Techniques have been suggested in the treatment of cavovarus deformity, such as peroneus brevis or longus tendon transfer, anterior tibial tendon lengthening, posterior tibial tendon transfer, or boney resection. This case series shows split anterior tibial tendon transfer as a surgical reconstruction of cavovarus pedal deformity. Our technique of split anterior tibial tendon in-phase transfer to the dorsal lateral foot, restores the eversion and dorsiflexory pull necessary to offset peroneal attenuation. The procedure can be performed primarily or staged, in order to achieve infection temporization prior to the transfer. A total of 14 patients underwent split anterior tibial tendon transfer, 57.14% (8/14) of which had preoperative ulcerations, and 42.86% (6/14) of which had preoperative hyperkeratotic pre-ulcerative lesions. The preoperative ulcerations were present for an average of 67.89 weeks (range 2-232), with an average area of 6.09 ± 7.44 cm^2. The ulcerations healed in 75% (6/8) of the patients, at 19.67 weeks (range 1.57-76), with new ulceration occurrence in 7.14% (1/14) of patients, 7.14% (1/14) rate of ulceration recurrence. None of the patients went on to minor or major amputation. The goal of the tendon transfer is to decrease midfoot plantar pressures on the lateral foot and allow for resolution of pre-existing ulcerations and rebalancing the foot and ankle.

Student Research Lecture Series

American College of Foot and Ankle Surgeons® | Who We Are | Education & Professional Development | Research & Publications | Policy & Advocacy

Student Research Lecture Series

2022

May
Manuscript Writing, Presentation, and Review Process

Western University College of Podiatric Medicine, Student Club President Mereat Askander, DPM, '24
ACFAS Regions Case Speaker: Tenaya West, DPM, AACFAS
ACFAS Research Committee Volunteer: Calvin Rushing, DPM, AACFAS

April
Article/Data Analysis

Kent State University College of Podiatric Medicine, Student Club President Kiara Francis, DPM, '23
ACFAS Regions Case Speaker: Hayley Iosue, DPM, AACFAS
ACFAS Research Committee Volunteer: Elizabeth Ansert, DPM, MBA, MA

March
Survey Studies

Des Moines University School of Podiatry, Student Club President Erica Reed, DPM, '23; Alexandra Arnold, '24
ACFAS Regions Case Speaker: Troy Boffeli, DPM, FACFAS
ACFAS Research Committee Volunteer: Calvin Rushing, DPM, AACFAS

February 15
Metanalyses and Systematic Reviews
7pm CST
View Recording

Scholl College of Podiatric Medicine, Student Club President Carly Goehring, DPM, '24; Sarah Langer, '24
ACFAS Regions Case Speaker: Jessica Marie Knight, DPM, AACFAS
ACFAS Research Committee Volunteer: Rachel Albright, DPM, MPH, AACFAS

January 11
Literature Review
7pm CST
View Recording

Arizona College of Podiatric Medicine, Student Club President Shadi Mattar, DPM, '23
ACFAS Regions Case Speaker: John J. Anderson, DPM, FACFAS
ACFAS Research Committee Volunteer: James Connors, DPM, FACFAS

2021

December 15
Conducting a Prospective Study
8pm CST
View Recording

California School of Podiatric Medicine, Student Club President Jake Loitz, DPM, '23
ACFAS Regions Case Speaker: Matthew Doyle, DPM, AACFAS
ACFAS Research Committee Volunteer: Paul Kim, DPM, MS, FACFAS

November 17
Conducting a Retrospective Study
7pm CST
View Recording

Barry University School of Podiatric Medicine, Student Club President Adam McAteer, DPM, '23
ACFAS Regions Case Speaker: Bradley Lamm, DPM, FACFAS
ACFAS Research Committee Volunteer: Nicole Cates, DPM, AACFAS

October 19
IRB Processes and Ethics
7pm CST
View Recording

New York College of Podiatric Medicine, Student Club President Gregory Rose, DPM, '23; and Paul Jicman, '23
ACFAS Regions Case Speaker: Robert Fridman, DPM, FACFAS
ACFAS Research Committee Volunteer: Elizabeth Ansert, DPM, MBA, MA

September 20
Formulating a Research Topic
8pm CST
View Recording

Temple University School of Podiatric Medicine, Student Club President Emily Kate Cziraky, DPM, '23
ACFAS Regions Case Speakers: Andrew Meyr, DPM, FACFAS and D. Scot Malay, DPM, FACFAS
ACFAS Research Committee Volunteer: Elizabeth Ansert, DPM, MBA, MA

https://www.acfas.org/student-resources/student-research-lecture-series

Type of Publications

- Technique papers
- Case Report / Case Series
- Reviews- ***Student Research Lecture Series***
    - *Systematic Reviews*
    - *Metanalyses*
- Original Research- ***Student Research Lecture Series***
    - *Retrospective*
- Perspectives - ***Student Research Lecture Series***

Technique Papers

- Abstract
  - Discussion the topic (standard approach), why the new technique is relevant (easier technique, less complications), review the new technique
- Introduction
  - Traditional approach review, pitfalls, last paragraph briefly introduce new technique
- Technique
  - Step by step outline of how it is performed
  - *Optional: Case Example*
- Discussion
  - Benefits of new technique, review of any pertinent literature, limitations, conclusion
- Figures

Case Series

- Abstract
- Introduction
- Patients & Methods
- Results
- Discussion
- Figures

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Contents lists available at ScienceDirect

The Journal of Foot & Ankle Surgery

journal homepage: www.jfas.org

ELSEVIER

Case Reports and Series

The Vertical Contour Calcanectomy, an Alternative Approach to Surgical Heel Ulcers: A Case Series

Nicole K. Cates, DPM[1], Kaihua Wang, DPM[1], Jered M. Stowers, DPM[1], Christopher E. Attinger, MD[2], Paul J. Kim, DPM, MS, FACFAS[2], John S. Steinberg, DPM, FACFAS[2]

[1] *Resident Physician, Department of Plastic Surgery, MedStar Georgetown University Hospital, Washington DC, USA*

[2] *Attending Physician, Department of Plastic Surgery, MedStar Georgetown University Hospital, Washington, DC, USA*

ARTICLE INFO

Clinical Level of Evidence: 4

Keywords:
below-the-knee amputation
calcaneal ulceration
functional outcomes

ABSTRACT

Heel ulcers have a significant impact on lower-extremity morbidity and confer high risk of major amputations. Treating these ulcers is difficult because of poor tissue coverage and the bony os calcis, often leading to proximal amputation. This case series shows the vertical contour calcanectomy (VCC) as a surgical alternative in functional limb salvage. Sixteen feet (14 patients) with recalcitrant heel wounds who underwent VCC were identified. The minimum follow-up time for inclusion was 1 year. Body mass index, diabetes, renal disease, peripheral vascular disease, lymphedema/venous insufficiency, smoking status, Charcot, amputation, vascular intervention, wound recurrence, reoperation rate, and ambulatory status were evaluated. The average follow-up time was 27.1 months (range 13.5 to 51.1). At 1 year of follow-up, 56% of heel wounds (9 of 16) treated with the VCC remained closed. An average of 1.44 subsequent surgeries were required per patient. Baseline or improved ambulatory status was achieved in 69% of patients (9 of 14) at 1-year follow up and 100% of patients (8 of 8) at 2-year follow up. The overall rate of major amputation was 19%. The long-term ambulatory status of patients treated with the VCC shows promise. The VCC should be considered as an alternative, reliable, surgical limb salvage tool for heel ulcerations.

Case Series: Abstract

Introduce the topic

Introduce the cohort

Brief overview of methods

Brief overview of results

Conclusion

ABSTRACT

Heel ulcers have a significant impact on lower-extremity morbidity and confer high risk of major amputations. Treating these ulcers is difficult because of poor tissue coverage and the bony os calcis, often leading to proximal amputation. This case series shows the vertical contour calcanectomy (VCC) as a surgical alternative in functional limb salvage. Sixteen feet (14 patients) with recalcitrant heel wounds who underwent VCC were identified. The minimum follow-up time for inclusion was 1 year. Body mass index, diabetes, renal disease, peripheral vascular disease, lymphedema/venous insufficiency, smoking status, Charcot, amputation, vascular intervention, wound recurrence, reoperation rate, and ambulatory status were evaluated. The average follow-up time was 27.1 months (range 13.5 to 51.1). At 1 year of follow-up, 56% of heel wounds (9 of 16) treated with the VCC remained closed. An average of 1.44 subsequent surgeries were required per patient. Baseline or improved ambulatory status was achieved in 69% of patients (9 of 14) at 1-year follow up and 100% of patients (8 of 8) at 2-year follow up. The overall rate of major amputation was 19%. The long-term ambulatory status of patients treated with the VCC shows promise. The VCC should be considered as an alternative, reliable, surgical limb salvage tool for heel ulcerations.

Case Series: Introduction

- Background Literature Review
  - Literature overview of the problem and traditional techniques
- Introduce Case series
  - Literature pitfalls with traditional methods
  - Introduce case study technique
- Introduce the Cohort
  - Primary aim +/- secondary aim
  - Outcomes overviews
  - Hypothesis of results

Plantar heel ulcers are notoriously difficult to treat because of plantar pressures, prevalence of infection/osteomyelitis, tenuous vascular supply, and neuropathy in patients with high-risk medical comorbidities (1). Increased posterior pressures in bed-bound patients and increased plantar pressure during ambulation decrease wound healing ability, especially in patients with complex comorbidities (2). In the lower extremity, the heel is the most common location for pressure ulceration, and the second most common in the body (3). The effects of heel ulcerations on patient function are devastating. Diabetic foot ulcerations are the number 1 cause of below-the-knee amputation (BKA) from nontraumatic causes (4). Decubitus heel ulcerations increase mortality by 2.81 times for in-hospital patients (5). With an expanding population of obese patients, the difficulty in treating heel ulcers and the rate of heel ulcerations is increasing (6).

Heel ulcerations are further complicated by the presence of infection and osteomyelitis. Calcaneal osteomyelitis accounts for 7% to 8% of all osteomyelitis in adults (7). In cases of necrotizing soft tissue infection and sepsis, a proximal amputation is often required (1, 8). Osteomyelitis in the calcaneus can increase the odds of a major amputation by 15 times, although extension of the ulcer to the calcaneus does not definitively indicate osteomyelitis (1, 9). Eradication of the infection is indicated; however, a dead space can result from aggressive curettage of the calcaneus and can increase the recurrence of the infection (10).

With the prevalence of peripheral artery disease in this patient population, regardless of other compounding ulcer etiology, vascular intervention is often necessary. Shah et al (11) showed limb salvage rates of 86% at 5 years for diabetic patients with heel ulcerations treated with revascularization. Although vascular intervention can address large vessel disease, microvascular disease often present in patients with advanced diabetes is exceedingly difficult to treat. The effects of microvascular disease are pronounced in wound healing and peripheral sensation (12). This cascade of microvascular disease, and in turn, the sensory deficits, can lead to higher plantar pressures and shear forces, which result in ulceration (13).

To address a lack of evidence-based options between partial calcanectomy and major lower-extremity amputation, the vertical contour calcanectomy (VCC) was introduced (2). With the ultimate goal of functional limb salvage, the VCC provides a functional alternative to the traditional partial calcanectomy while avoiding or delaying major lower-extremity amputation in cases of heel ulcerations. The VCC is a modification of the partial calcanectomy that provides a consistent approach and reproducibility. The long-term outcomes of the VCC as a treatment for recalcitrant heel ulcerations with and without osteomyelitis are unknown at present.

The primary aim of the present study is to analyze the outcomes of patients who underwent a VCC procedure because of plantar heel ulceration with a minimum of 1-year follow up. The outcomes included number of postoperative surgeries, major lower-extremity amputation, 30-day readmission rates (related to the lower extremity only), mortality, and ambulatory status. The VCC, in theory, has the ability to maintain ambulation in patients that would have otherwise lost a limb to amputation.

Case Series: Patients & Methods

- Methods
  - IRB approval & dates of patient collection
  - How patients were identified: CPTs / ICD-10s
  - Specific criteria for inclusion /exclusion
  - Total patients in study
- Demographics
  - List & define all information collected
    - Preoperative factors
    - Postoperative outcomes
- Statistical analysis
  - Specifics on how statistical analysis was performed

Patients and Methods

The study was approved by Georgetown University Hospital Institutional Review Board. We performed a comprehensive chart and radiographic review of all patients who underwent a VCC from March 2014 to July 2016 using Current Procedural Terminology code 28120 (partial saucerization of bone, calcaneus), querying the records of 3 of the authors (C.E.A., P.J.K., and J.S.S.). All radiographs were evaluated by physicians to confirm the VCC technique was used. The patients in the cohort were treated over a 2.4-year period (year to year) by the Georgetown Limb Salvage team for acute or chronic heel wounds. Patients were treated on an outpatient basis or admitted to the Georgetown Limb Salvage team for treatment of lower-extremity infection and/or ischemic changes. Patients had surgical debridement before VCC based on need to eradicate infection determined by clinical signs of infection and postlavage cultures. VCC and closure were performed after eradication of infection, and vascular optimization was ensured. Patients were excluded from the cohort if they were <18 years of age, had <1 year postoperative follow-up, were treated with nonsurgical management, or did not have a VCC performed. With the above exclusion criteria, 14 patients (16 limbs) were included in the cohort.

Demographic data collection included age, body mass index, diabetes mellitus, Charcot neuroarthropathy, renal disease (including chronic kidney disease and end-stage renal disease), peripheral vascular disease, transplant history, coronary artery disease, cancer history, human immunodeficiency virus history, autoimmune disease history, and smoking history (current or former). Additionally, data were collected on whether the patient preoperatively had an angiography and angiography intervention, whether the patient had preoperative osteomyelitis (based on bone biopsy), the length of time in days with heel ulceration before VCC, and contralateral amputation. Operative data included number of surgical debridements before VCC, whether primary closure was performed, and number of surgeries to closure after VCC. Postoperative data on number of surgeries post-VCC, whether major lower-extremity amputation (defined as BKA, knee disarticulation, or above-the-knee amputation [AKA]) was performed, 30-day readmission rate (related to lower extremity only), and mortality. Data on ambulation status was collected and categorized into full weightbearing, partial weightbearing, and non-weightbearing before surgery and after surgery at 1, 2, and 3 years.

For statistical analysis, descriptive statistics were used to describe study subjects. Continuous variables were described by means, mode, and range (minimum–maximum).

Case Series: Results / Tables

- **Demographics of cohort**
  - ***Results***: 1st paragraph~ Type out all demographics from table 1
  - ***Table 1***: list demographics
    - Categorical variables: %(n/N)
      - Ex: Diabetes: 85.7% (12/14)
    - Continuous variables: mean(range)
      - Ex: Age 63.8 (51 to 86)
- **Preoperative factors /operative techniques / postoperative outcomes**
  - ***Results***: List all data in paragraph form
  - ***Tables:*** List all data, using same categorical & continuous variables structure

Results

Overall demographic data is presented in Table 1. There were 14 patients and 16 limbs in the cohort. The mean age at the time of VCC was 63.8 years (range 51 to 86; mode 59). The mean body mass index was 34 kg/m^2 (range 23 to 53; mode 26). The prevalence of diabetes was 85.7% (12); Charcot neuroarthropathy, 28.6% (4); renal disease (chronic kidney disease and end-stage renal disease), 28.6% (4); peripheral vascular disease, 50% (7); transplant history, 14.3% (2); coronary artery disease, 14.3% (2); cancer, 28.6% (4); human immunodeficiency virus, 7.1% (1); autoimmune, 0% (0); lymphatic/venous disease, 35.7% (5); and smoking (current or former), 50% (7).

Table 1 Demographics of patients who underwent vertical contour calcanectomy (N=14)

Age (years)		63.8 (51 to 86)	59
Body mass index (kg/m^2)		34 (23 to 53)	26
Diabetes mellitus	85.7 (12)		
Charcot neuroarthropathy	28.6 (4)		
Renal disease (CKD/ESRD)	28.6 (4)		
PVD	50 (7)		
Transplant	14.3 (2)		
CAD	14.3 (2)		
Cancer	28.6 (4)		
HIV	7.1 (1)		

Abbreviations: CAD, coronary artery disease; CKD, chronic kidney disease; ESRD, end-stage renal disease; HIV, human immunodeficiency virus; PVD, peripheral vascular disease.

Open table in a new tab

Outcomes categorized into preoperative considerations, operative course, and postoperative outcomes are seen in Table 2. Preoperative osteomyelitis diagnosed by bone biopsy was prevalent in 50% (8 of 16 limbs). Patients had a preoperative ulceration for an average of 292.1 days (range 10 to 1247; mode 129). Contralateral amputation (BKA or AKA) was present preoperatively in 7.1% (1). Preoperative angiography was performed in 68.8% (11 of 16 limbs), with intervention performed in 31.3% (5 of 16 limbs). Before the VCC surgery, surgical debridement was performed in a range of 1 to 4 surgeries. Before VCC, a single surgery was performed in 12.5% (2 of 16 limbs), 2 surgeries in 56.3% (9 of 16 limbs), 3 surgeries in 25% (4 of 16 limbs), and 4 surgeries in 6.3% (1 of 16 limbs). Primary closure post-VCC was performed in 50% (8 of 16 limbs). The number of surgeries after VCC ranged from 0 to 3. No postoperative surgeries occurred in 50% (8 of 16 limbs), 1 postoperative surgery in 12.5% (2 of 16 limbs), 2 postoperative surgeries in 18.8% (3 of 16 limbs), and 3 postoperative surgeries in 12.5% (2 of 16 limbs). At 1 year of follow-up, 56% of heel wounds (9 of 16 limbs) treated with the VCC remained closed. Major lower-extremity amputation (BKA/AKA) occurred in 18.8% (3 of 16 limbs), and 30-day readmission rate (related to lower extremity only) was 14.3% (2 patients). There was a mortality rate of 21.4% (3 patients).

Table 2 Operative considerations and outcomes of 16 lower extremities undergoing VCC (N=14 patients)

Factor	Percent (n/N)	Mean (range)
Preoperative considerations		
Osteomyelitis	50 (8/16)	
Ulcer prior to VCC surgery (days)		292.1 (10 to 1247) (mode 129)
Contralateral amputation	7.1 (1/14)	
Angiography	68.8 (11/16)	
Angiography intervention	31.3 (5/16)	
Operative course		
Primary closure	50 (8/16)	
Surgeries before closure of VCC		
One	12.5 (2/16)	

Abbreviation: VCC, vertical contour calcanectomy.

Open table in a new tab

Ambulation status categorized into full weightbearing, partial weightbearing, and non-weightbearing is seen in Table 3. Preoperatively, 50% of patients (7) were full weightbearing, 28.6% (4) were partial weightbearing, and 21.4% (3) were non-weightbearing. At 1 year postoperatively, 42.9% (6) were full weightbearing, 28.6% (4) were partial weightbearing, and 28.6% (4) were non-weightbearing. At 2 years postoperatively, 75% (6 of 8) were full weightbearing, 25% (2 of 8) were partial weightbearing, and 0% were non-weightbearing. At 3 years postoperatively, 75% (3 of 4) were full weightbearing, 25% (1 of 4) was partial weightbearing, and 0% were non-weightbearing.

Table 3 Demographics of patients who underwent vertical contour calcanectomy (N=16)

Ambulatory Status	Preoperative (n=14)	Postoperative		
		1 Year (n=14)	2 Years (n=8)	3 Years (n=4)
Full weightbearing	50 (7)	42.9 (6)	75 (6)	75 (3)
Partial weightbearing	28.6 (4)	28.6 (4)	25 (2)	25 (1)
Non-weightbearing	21.4 (3)	28.6 (4)	0 (0)	0 (0)

Data are % (n).

Open table in a new tab

Case Series: Discussion

- **Why the topic is relevant**
  - Brief paragraph re-introducing the topic
- **Summarize the results**
  - Review literature that explains the findings
- **Limitations paragraph**
  - Limitations in manuscript: how patients were identified, data collection, institutional biases, etc.
- **Conclusion paragraph**
  - Summarize overall message of manuscript

Discussion

Patients with plantar heel ulcerations pose a particular challenge to clinicians and are at a high risk for major lower-extremity amputations. With the ultimate treatment goals of eradication of infection, soft tissue coverage, biomechanical stability, and function limb salvage, there are nonsurgical and surgical interventions available. Nonsurgical options include offloading, local wound care, antibiotics, and medical comorbidity management (1, 14). Hyperbaric oxygen can be used as adjunctive treatment in wound care to accelerate the rate of healing because of possible physiological angiogenesis at the site of the ulcer (15). Nonsurgical intervention does not typically address the true etiology of heel ulceration, including poor vascular supply, infection, biomechanical instability, and soft tissue coverage.

Surgical interventions include soft tissue work consisting of debridements, skin grafts, and/or flap reconstruction; osseous intervention including partial and total calcanectomies; vascular intervention; and major limb amputations (BKA/AKA) (16). In cases of large soft tissue defects, as a result of infection or skin breakdown from pressure or biomechanical instability, methods of soft tissue coverage can be used, including negative pressure wound therapy, local rotational flaps, or free flaps (17). Flap reconstruction is a useful tool for heel ulceration; however, it has some relative contraindications. In a study by Oh et al (18), the rate of flap loss rate was increased by an odds ratio of 17 in the patients with a history of angioplasty and increased by an odds ratio of 10 in patients with peripheral arterial disease. Other significant risk factors for flap loss include diabetes mellitus, venous insufficiency, underlying osteomyelitis, noncompliance, and age >40 years, all of which are common in the nontrauma heel ulceration cohort (19). Ducic and Attinger (20) found that diabetes did not have a direct impact on flap success; however, diabetes significantly increased the number of surgical debridements, increased the healing times, and decreased the long-term survival rate.

Total and partial calcanectomies are frequently used to treat recalcitrant heel ulceration both with and without osteomyelitis, with the aim of ambulation and wound closure (21, 22). The benefits of the calcanectomies include removal of infected bone, decrease in plantar pressure, and reduction in bony prominences to allow for soft tissue closure (7). Since Gaenslen described the initial calcanectomy, the conventional partial calcanectomy has been portrayed as a viable alternative to a transtibial amputation (23). However, literature on the partial calcanectomy shows a wide variance of healing, reulceration, major amputation rates, and postoperative morbidity (23). The current literature on the partial calcanectomy reveals a lack of consensus on the amount of bone to resect or the alignment of the osteotomies (21, 22, 24). Because of the lack of evidence-driven guidelines, the amount of resected bone is typically guided by the presence of osteomyelitis (25). In patients who underwent partial calcanectomy secondary to a heel ulceration, 29% went on to BKA (2). The bone-to-soft-tissue ratio must be biased toward a soft tissue closure without tension, especially with postoperative edema (26). Although negative pressure wound therapy and bioengineered allografts with offloading show some success, evidence shows that early soft tissue coverage, especially with the unique fibrofatty heel pad, is key in preventing recurrent osteomyelitis (27). Certain technical drawbacks of the partial calcanectomies include fracturing resulting from weakening of the plantar cortex after osteotomy and delayed wound healing (2, 28).

Major lower-extremity amputations are often used as definite treatment options if limb salvage is unobtainable because of the lack of acceptable surgical options. With diabetic foot ulcerations being the number 1 cause of BKA from nontraumatic causes (4), heel ulcerations are at an extremely high risk of amputation (1, 22, 26). The presence of osteomyelitis increases the rates of major lower-extremity amputation to as high as 52% (9). However, through a multidisciplinary approach, a limb salvage rate as high as 90% can be achieved (29). Although preservation of limb length is certainly a consideration, the main goal of limb salvage should not be focused on sparing the foot but on functional outcomes (30). Ambulation rates after BKA are often a debated topic. The study by Evans et al (3) showed a 30% rate of return to ambulation at 2 years compared with the historical range of 23% to 65% (3). A factor leading to such a low percentage is that many patients never fully learn to ambulate in their prosthetic after a BKA (31). Mortality rates in patients post-BKA are between 20% and 50% at 3 years (32, 33) and 40% and 70% at 5 years (27, 33).

To address a lack of evidence-based options between partial calcanectomy and major lower-extremity amputation, the VCC was introduced (2). With the ultimate goal of functional limb salvage, the VCC provides a functional alternative to the traditional partial calcanectomy while avoiding or delaying major lower-extremity amputation in cases of heel ulcerations. The VCC is a modification of the partial calcanectomy that provides a consistent approach and reproducibility. The VCC addresses the mechanical issues of the partial calcanectomy with resection of the tendoachilles, thus decreasing the stress on the plantar cortex and decreasing probability of fracturing (2). The VCC removes enough bone to allow for more soft tissue coverage and allow for resection of infected bone while maintaining a functional ambulatory limb (2).

Reviews

Systematic review

- Gathers all available empirical research by using clearly defined, systematic methods to obtain answers to a specific question.
    - ***Complete overview of a subject***

Meta-analysis

- The statistical process of analyzing and combining results from several similar studies
    - ***Statistical analysis of a complete subject***

Systematic Review

Formulate an idea

Define
-Key terms
-Inclusion criteria
-exclusion criteria

Collect & review all articles

Analysis included articles

Write the manuscript

Systematic Review

- Defined databases
  - Ex medline, EMBASE, Google Scholar, Cochrane Library, Clinicaltrials.gov and reference lists of included studies, from January 1, 1980 to April 1, 2020
- Defined key terms
  - Charcot neuroarthropathy, diabetic neuroarthropathy, diabetic complication, radiographic, X-ray, angle, angular ulcer, ulceration, deformity progression, alignment, and imaging

The Journal of Foot & Ankle Surgery 60 (2021) 368–373

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journal homepage: www.jfas.org

A Systematic Review of Angular Deformities in Charcot Neuroarthropathy

Check for updates

Nicole K. Cates, DPM, AACFAS[1], Jonathan Tenley, DPM[2], Helene R. Cook, DPM[2], Paul J. Kim, DPM, MS, FACFAS[3]

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[2] *Resident Physician, Department of Plastic Surgery, MedStar Georgetown University Hospital, Washington, DC*
[3] *Professor and Attending Physician, Department of Plastic Surgery, University of Texas Southwestern Medical Center, Dallas, TX*

Systematic Review

- Creating list of included articles
  - Define inclusion / exclusion criteria
  - All abstracts are reviewed independently by two physicians
  - In the case of a disagreement, a third physician read the full article and decided if it should be included.

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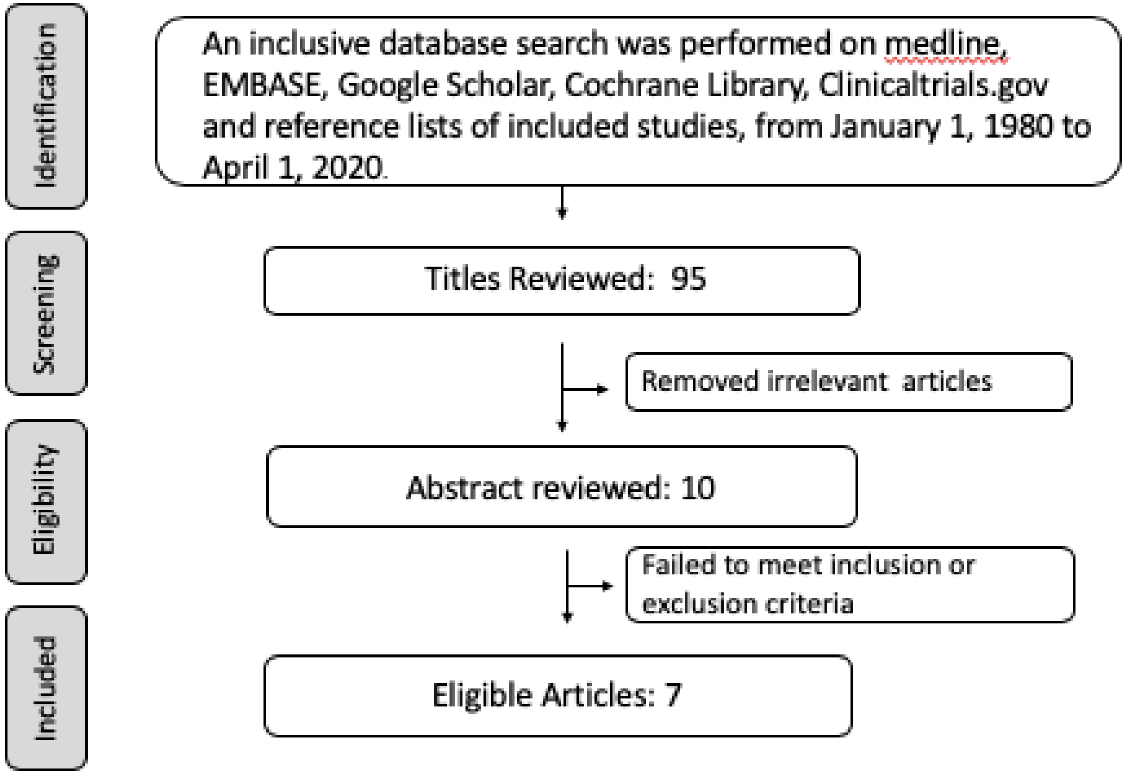
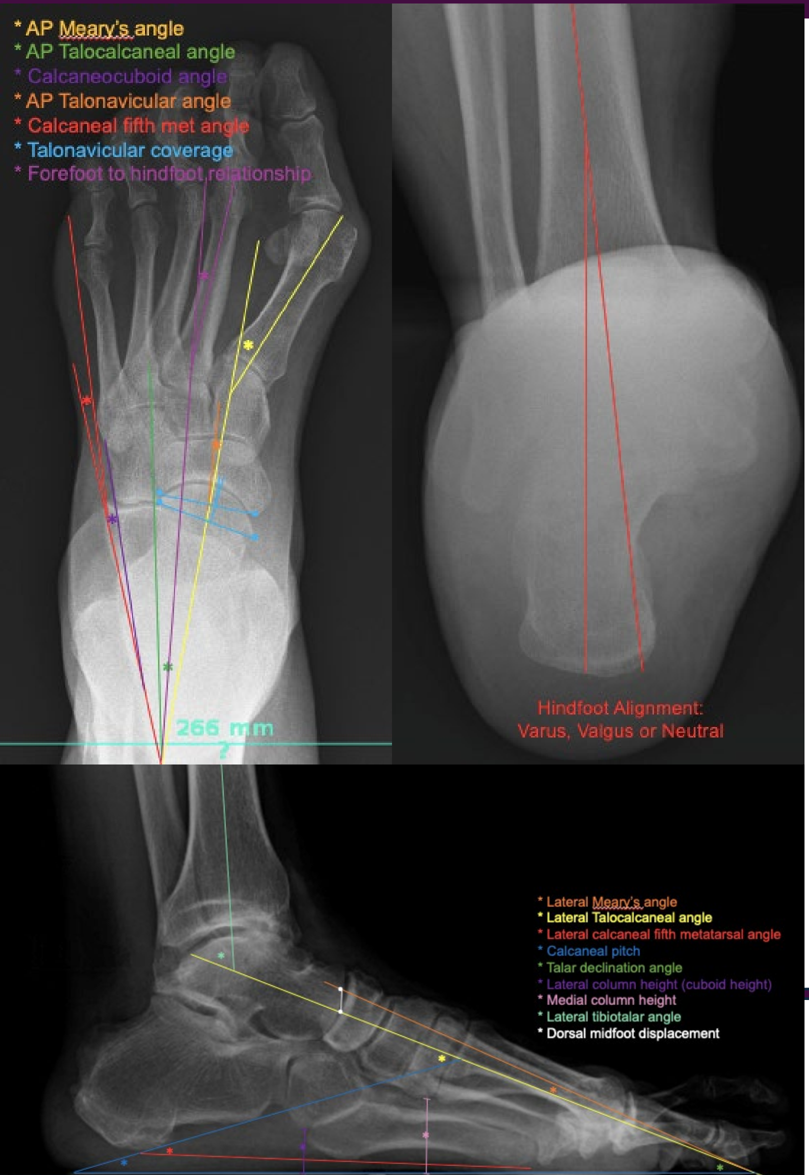
Systematic Review



Systematic Review



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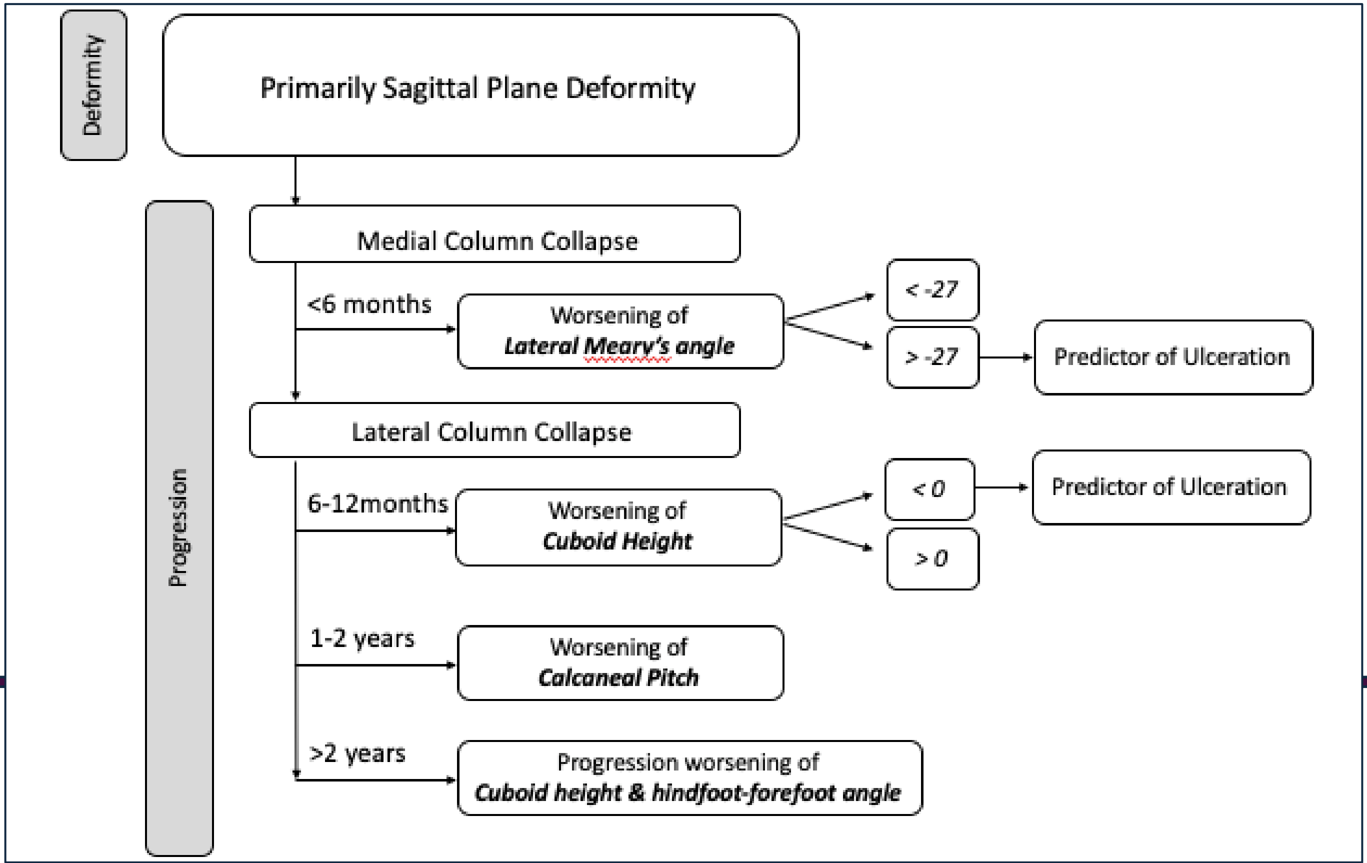
Double Versus Triple Arthrodesis Fusion Rates: A Systematic Review

Nicole K. Cates, DPM, AACFAS[1], Alissa Mayer, DPM[2], Jonathan Tenley, DPM[2], Jacob Wynes, DPM, MS, FACFAS[3], Eshetu Tefera, MS[4], John S. Steinberg, DPM, FACFAS[5], Paul J. Kim, DPM, MS[6], Glenn M. Weinraub, DPM, FACFAS[7]



Retrospective Review

The Journal of Foot & Ankle Surgery 59 (2020) 1229–1233

Contents lists available at ScienceDirect

The Journal of Foot & Ankle Surgery

journal homepage: www.jfas.org

Charcot Reconstruction: Outcomes in Patients With and Without Diabetes

Nicole K. Cates, DPM, AACFAS[1], Emily C. Wagler, DPM[1], Taylor J. Bunka, DPM[1], Tammer Elmarsafi, DPM, MBBCh, AACFAS[2], Eshetu Tefera, MS[3], Paul J. Kim, DPM, MS, FACFAS[4], George T. Liu, DPM, FACFAS[5], Karen K. Evans, MD[2], John S. Steinberg, DPM, FACFAS[2], Christopher E. Attinger, MD[2]

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A R T I C L E I N F O

Level of Clinical Evidence: 3
Retrospective Study

Keywords:
Charcot neuroarthropathy
delayed osseous union
return to ambulation
well controlled diabetic patients

A B S T R A C T

The objective of this study is to compare risk adjusted matched cohorts of Charcot neuroarthropathy patients who underwent osseous reconstruction with and without diabetes. The 2 groups were matched based on age, body mass index, hypertension, history of end-stage renal disease, and peripheral arterial disease. Bivariate analysis was performed for preoperative infection, location of Charcot breakdown, and post reconstruction outcomes, in patients with a minimum of 1 year follow-up period. Through bivariate analysis, presence of preoperative ulceration ($p = .0499$) was found to be statistically more likely in the patients with diabetes; whereas, delayed osseous union ($p = .0050$) and return to ambulation ($p \leq .0001$) was statistically more likely in patients without diabetes. The nondiabetic Charcot patients were 17.6 folds more likely to return to ambulation (odds ratio [OR] 17.6 [95% confidence interval {CI} {3.5-87.6}]), and 16.4 folds more likely to have delayed union (OR 16.4 [95% CI {1.9-139.6)]). Subanalysis compared well-controlled diabetic and nondiabetic Charcot neuroarthropathy patients for same factors. Multivariate analysis, in the subanalysis, found return to ambulation was 15.1 times likely to occur in the nondiabetic CN cohort (OR 15.1 [95% CI 1.3-175.8]) compared to the well-controlled diabetic CN cohort.

Retrospective: Form an Idea

- Cohort: What group are you evaluating?
- Comparison: What are you comparing?
- Factors: What factors are you comparing for?
- Review existing literature to see if study exists: *Database like pubmed*

Retrospective: Form an Idea Example

- Cohort: Charcot patients that underwent reconstructive surgery

- Comparison: Comparing Charcot patients with and without diabetes

- Factors:
  - Preoperative risk factors: age, BMI, HTN, PAD, renal disease, smoking history, location of preoperative ulcer, etc.
  - Postoperative outcomes: delayed union, dehiscence, amputation, Charcot recurrence, postoperative ambulation, etc.

Retrospective: IRB

Retrospective: IRB

ACFAS Research Committee Meeting: IRB Processes and Ethics

TITLE:

PROTOCOL IDENTIFICATION NUMBER:

PROTOCOL VERSION NUMBER:

PROTOCOL PREPARATION DATE:

SPONSOR:

Authorized By:

____________________ ________
Signature Date

____________________ ________
Signature Date

____________________ ________
Signature Date

PROTOCOL AUTHOR:

PRINCIPAL DIRECTOR:

PRINCIPAL INVESTIGATORS:

PRINCIPAL INVESTIGATIVE SITE:

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2. Protocol Summary

Title	
Sponsor	
Investigators	
Investigative Site	
Study Type	
Study Design	
Primary Efficacy Endpoint	
Secondary Efficacy Endpoint	
Tertiary Efficacy Endpoint	
Quaternary Endpoint	
Exploratory Endpoints	
Safety Endpoint	
Number of Subjects	
Study Synopsis	
Eligibility Criteria	
Statistical Analysis	
Treatment Duration	
Study Duration	
Study Cost	

Retrospective: Datamining

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H29 · fx =(H30/26)*100

	B	D	E	F	G	H	J	K	AH	AI	AJ	AK	AL	AO	AP	AQ	AR	AS	AT
1	MRN	Age at repair	BMI value at time of repair	Diabetes 1=yes 0=no	CKD 1=yes 0=no	ESRD 1=yes 0=no	HTN 1=yes 0=no	Smoker hx or current 1=yes 0=no	Preop ulcer 1=yes 0=no	Forefoot 1=yes 0=no	Midfoot 1=yes 0=no	Hindfoot 1=yes 0=no	Ankle 1=yes 0=no	Preopeative Soft tissue infection 1=yes 0=no	Preoperative Osteomyelitis 1=yes 0=no	CN forefoot 1=yes 0=no	CN midfoot (TMTJ+CNJ) 1=yes 0=no	CN hindfoot (TNJ+CCJ+STJ) 1=yes 0=no	CN rearfoot (AJ+calcaneus) 1=yes 0=no
2	6364960	63	24.1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3	824140	47		0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
4	7093616	52	39.8	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5	7189252	64	30.2	0	0	0	1	1	1	0	0	0	1	1	0	0	0	0	1
6	710718	53	20.7	0	0	0	0	0	1	0	1	0	1	1	1	0	0	1	0
7	6331115	58	22.7	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
8	7022186	52	37.9	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
9	7022186	53	37.9	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
10	798609	47		0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1
11	1094031	61		0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0
12	6377648	53		0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0
13	6642957	67	29.05	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
14	6354928	71	29	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
15	680498	53	24.5		1	0	1	1	0	0	0	0	0	0	0	0	1	0	0
16	234402	64		0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
17	947123	57		0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0
18	7207977	57	41.34	0	0	0	1	1	1	0	0	0	1	1	1	0	0	0	1
19	6547008	60	31.6	0	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0
20	7122523	82	29.33	0	0	0	1	1	1	1	0	0	0	0	0	1	0	0	0
21	6581433	35		0	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0
22	7104092	70	25.16	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	1
23	6622103	33	33.32	0	1	0	1	1	1	0	1	1	0	1	1		1	0	0
24	6652583	73	30.52	0	0	0	1	1	1	1	1	0	0	1	0	0	1	0	1
25	6617905	35	37.11	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0
26	418301	62			0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
27	6507640	31		0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1

Retrospective: Datamining

- Cohort: Define cohort and determine how to find the patients
  - ICD-10's: If cohort based on diagnosis can pull patients by diagnostic codes
    - Ex) Dr Foot, patients with PTTD
      "Dr Foot patients for ICD-10: M76.821 & M76.822 (need left & right codes)
  - CPTs: If surgical patients can pull patients by surgical codes
    - Determine if you want single surgeon or multiple surgeons
    - Ex) Dr Foot's patients who had multiplanar external fixator devices. "Dr Foot's patients for CPT 20692"

Retrospective: Datamining

- Inclusion Criteria:
  - Cohort: defined as X
  - Underwent X surgery, surgery defined as

- Exclusion Criteria:
  - <18 years old
  - < 1 year follow up postoperatively

Retrospective: Datamining Example

Inclusion Criteria

- Cohort: Charcot joint involvement defined as joint subluxation, dislocation, presence of small osseous fragments, or osseous fracturing consistent with Charcot neuroarthropathy
- Underwent: Charcot reconstructive surgery which included arthrodesis, osteotomies, or deformity correction of the ankle / hindfoot.

Exclusion Criteria

- <18 years old
- < 1 year follow up postoperatively

Retrospective: Datamining

Define Each Factors:

- Age: defined as age at time of surgery
- PAD: defined as non-triphasic doppler signal
- Renal disease: defined as either CKD or ESRD in medical records
- Amputation
  - Minor amputation: toe, ray, TMA, symes, choparts amputation
  - Major amputation: below the knee or above the knee amputation
- Postoperative ambulation: defined as non-ambulatory (wheelchair bound), partially ambulatory (transfers only or assistive devices and fully ambulatory (unassisted ambulation)

Retrospective: Datamining

- Factors:
  - Continuous variable: value is obtained by measuring
    - Example: age, BMI, A1C

  - Categorical variable: variable that can take on one of a limited, and usually fixed, number of possible values
    - Example diabetes yes = 1, no = 0
    - Example postoperative ambulatory status, non=0, partial=1, full=3

Retrospective: Datamining

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H29 — =(H30/26)*100

	B	D	E	F	G	H	J	K	AH	AI	AJ	AK	AL	AO	AP	AQ	AR	AS	AT
1	MRN	Age at repair	BMI value at time of repair	Diabetes 1=yes 0=no	CKD 1=yes 0=no	ESRD 1=yes 0=no	HTN 1=yes 0=no	Smoker hx or current 1=yes 0=no	Preop ulcer 1=yes 0=no	Forefoot 1=yes 0=no	Midfoot 1=yes 0=no	Hindfoot 1=yes 0=no	Ankle 1=yes 0=no	Preopeative Soft tissue infection 1=yes 0=no	Preoperative Osteomyelitis 1=yes 0=no	CN forefoot 1=yes 0=no	CN midfoot (TMTJ+CNJ) 1=yes 0=no	CN hindfoot (TNJ+CCJ+STJ) 1=yes 0=no	CN rearfoot (AJ+calcaneus) 1=yes 0=no
2	6364960	63	24.1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3	824140	47		0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
4	7093616	52	39.8	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5	7189252	64	30.2	0	0	0	1	1	1	0	0	0	1	1	0	0	0	0	1
6	710718	53	20.7	0	0	0	0	0	1	0	1	0	1	1	1	0	0	1	0
7	6331115	58	22.7	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
8	7022186	52	37.9	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
9	7022186	53	37.9	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
10	798609	47		0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1
11	1094031	61		0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0
12	6377648	53		0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0
13	6642957	67	29.05	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
14	6354928	71	29	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
15	680498	53	24.5		1	0	1	1	0	0	0	0	0	0	0	0	1	0	0
16	234402	64		0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
17	947123	57		0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0
18	7207977	57	41.34	0	0	0	1	1	1	0	0	0	1	1	1	0	0	0	1
19	6547008	60	31.6	0	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0
20	7122523	82	29.33	0	0	0	1	1	1	1	0	0	0	0	0	1	0	0	0
21	6581433	35		0	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0
22	7104092	70	25.16	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	1
23	6622103	33	33.32	0	1	0	1	1	1	0	1	1	0	1	1		1	0	0
24	6652583	73	30.52	0	0	0	1	1	1	1	1	0	0	1	0	0	1	0	1
25	6617905	35	37.11	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0
26	418301	62			0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
27	6507640	31		0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1

Retrospective: Datamining

MRN	Age at repair	BMI value at time of repair	Diabetes 1=yes 0=no	CKD 1=yes 0=no	ESRD 1=yes 0=no	HTN 1=yes 0=no	Smoker hx or current 1=yes 0=no

Preop ulcer 1=yes 0=no	Forefoot 1=yes 0=no	Midfoot 1=yes 0=no	Hindfoot 1=yes 0=no	Ankle 1=yes 0=no	Preopeative Soft tissue infection 1=yes 0=no	Preoperative Osteomyelitis 1=yes 0=no

CN forefoot 1=yes 0=no	CN midfoot (TMTJ+CNJ) 1=yes 0=no	CN hindfoot (TNJ+CCJ+STJ) 1=yes 0=no	CN rearfoot (AJ+calcaneus) 1=yes 0=no

Retrospective: Statical Analysis

Descriptive Statistics for Non-diabetic versus Diabetic Charcot Neuroarthropathy (Bivariate Analysis)			
Post Reconstructive Outcomes	Non Diabetic CN (N=25)	Diabetic CN (N=50)	P-value
Delayed healing	52.0% (13/25)	34.0% (17/50)	0.1336
Dehiscence	36.0% (9/25)	16.0% (8/50)	0.0512
Major lower extremity amputation	16.0% (4/25)	26.0% (13/50)	0.3933
Delayed osseous union	28.0% (7/25)	4.0% (2/50)	0.0051
Recurrence of Charcot	16.0% (4/25)	12.0% (6/50)	0.7186
New Charcot location collapse	0% (0/25)	6.0% (3/50)	0.5481
Return to ambulation	85.7% (18/25)	29.8% (14/50)	<0.0001

Retrospective: Statical Analysis

- What to ask the statistician to get p-values
  - "X had statistically higher rates of Y and Z" (p=0.002)

- What to ask the statistician to get odds ratios
  - "X was 8 times more likely to develop Y than Z
    [OR 8.01 (95% CI (3.5-87.6)]

Retrospective: Statical Analysis

- P-values
  - Bivariate analysis: comparing two different groups for a factors
    - Two groups: Charcot patients **WITH** and **WITHOUT** diabetes
    - Factor 1: comparing for Age at time of reconstruction
    - Factor 2: comparing for BMI at time of reconstruction
    - Factor 3: comparing for preoperative diagnosis of renal disease
    - Etc, etc

Retrospective: Statical Analysis

- Odds ratios: Multivariate logistic regression
  - A model that is used to predict the probabilities of the different possible outcomes of a variable, given a set of independent variables
  - Need to run separate regressions for preoperative factors and postoperative outcomes
    - Comparing all statistically significant preoperative factors to see which have the biggest impact

Retrospective: Statical Analysis

Charcot Etiology: Diabetic vs non Diabetic

Comparing Charcot Neuroathropathy with Diabetic vs Non-Diabetic Etiology for pre-operative infection, anatomic location of Charcot breakdown, and outcomes

a. Pre-operative Infection
    i. Bivariate analysis comparing "CN DM" and "CN non DM" for:
        1. Pre-op ulcer (column AH)
        2. Forefoot (column AI)
        3. Midfoot (column AJ)
        4. Hindfoot (column AK)
        5. Ankle (column AL)
        6. Medial (column AM)
        7. Lateral (column AN)
        8. Soft tissue infection (column AO)
        9. Osteomyelitis (column AP)
    ii. Multivariate logistic regression for the statistically significant factors from above
b. CN by anatomic location
    i. Bivariate analysis comparing "CN DM" and "CN non DM" for
        1. Forefoot collapse (column AQ)
        2. Midfoot collapse (column AR)
        3. Hindfoot collapse (column AS)
        4. Rearfoot collapse (column AT)
    ii. Multivariate logistic regression for the statistically significant factors from above
c. Outcomes
    i. Bivariate analysis comparing "CN DM" and "CN non DM" for
        1. Delayed/non healing (column BI)
        2. Dehiscence (column BJ)
        3. Major lower extremity amputation (column BK)
        4. Non union (column BL)
        5. Recurrence of Charcot (column BM)
        6. New Charcot location collapse (column BN)
        7. Return to ambulation (column N)
    ii. Multivariate logistic regression for the statistically significant factors from above

Retrospective: Evaluating the Results

Characteristics	Non Diabetic N=25	Diabetic N=50	P value
Delayed healing	13(52.0)	17(34.0)	0.1336
Dehiscence	9(36.0)	8(16.0)	0.0512
Major lower extremity amputation	4(16.0)	13(26.0)	0.3933
Non union	7(28.0)	2(4.0)	0.0051
Recurrence of Charcot	4(16.0)	6(12.0)	0.7186
New Charcot location collapse	0(0.0)	3(6.0)	0.5481
Return to ambulation	18(85.7)	14(29.8)	<.0001

Multivariate logistic regression for the statistically significant factors from above

Effect	DF	Chi-Square	Pr > ChiSq
osseous_delayed_non	1	6.5560	0.0105
Ambulator_1_yes	1	12.2075	0.0005

		Odds Ratio	95% Confidence Limits	
Osseous_delayed_non	1 vs 0	16.4	1.9	139.6
Ambulator	1 vs 0	17.6	3.5	87.6

Retrospective: Evaluating the Results

- What values are statically significant
- What do the these values being statically significant mean?
- Understand the results and what they mean clinically

Retrospective: Writing the Manuscript

Order in which I write

1. Title page
2. Methods
3. Tables
4. Results
5. Abstract
6. Introduction
7. Discussion
8. References
9. Figures

Writing the Manuscript: Title Page

Title

- *Charcot Reconstruction: Outcomes in Patients With and Without Diabetes*

Authors

- *Nicole K. Cates, DPM[1]….Christopher E. Attinger, MD[2]*
- *First author: author who wrote majority of the manuscript*
- *Last author: most senior author*

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Corresponding author

- *Name, title, affiliation, email, Phone, Fax*

Financial disclosure statement

- *Financial disclosures of all authors*

Writing the Manuscript: Methods

- **Methods**: this helps me define my cohort, and factors
  - IRB approval board
  - How you identified patients for the study (cohort, icd-102 or CPTs, for X surgeons, time frame Y-Z)
  - Inclusion / exclusion criteria
  - Datamining: all factors evaluated: preoperative factors and postoperative outcomes (how each was defined)
  - Any study specific equation / concept (fully define)
  - Statistical analysis (Statistician typically writes this paragraph)

Writing the Manuscript: Tables

- **Tables**: puts all the results in one area in a clean format
  - Fill in the tables with the data from the statistician
  - Need tables citations (Table 1) in the paper to appear in the order they appear at the end of the manuscript
  - Table 1: always demographics
  - Following tables: bivariate analysis, multivariate regression, etc

Writing the Manuscript: Tables

Tables:
Demographics

Tables

Table 1: Demographics of Patients Included in the CN Osseous Reconstruction Cohort

	Number % (N=75), Median
Age at repair	56 (31-86) Median: 58
Body Mass Index (BMI)	32.4 (20.7-45.6) Median: 31.6
Glycosylated hemoglobin A1c (HbA1c)	8.5 (5.0-14.6) Median: 7.4

Writing the Manuscript: Tables

Tables:
Bivariate

Table 2: Descriptive Statistics for Non-diabetic versus Diabetic Charcot Neuroarthropathy (Bivariate Analysis)

Characteristics	Non Diabetic (cases) N=25	Diabetic (Matched controls) N=50	P value
Age at repair	56 (31-82) Median: 57	56 (31-86) Median: 58	0.9886
Body Mass Index (BMI)	30.4 (20.7-41.3) Median: 29.8	33.4 (21.3-45.6) Median: 33.8	0.1098
Hypertension	64.0% (16/25)	64.0% (32/50)	1.0000

Writing the Manuscript: Tables

Tables:
Multivariate Regression

Table 4: Multivariate Logistic Regression, for risk outcome Osseous Delayed Union and Return to Ambulation

Effect	Odds Ratio	95% Wald Confidence Limits	
Return to Ambulation	17.6	3.5	87.6
Osseous Delayed Union	16.4	1.9	139.6

Writing the Manuscript: Results

- **Results**: Use the tables section to write the results section
  - List out all the demographic data
  - Bivariate analysis: solely include statistically significant results (p-values)
  - Multivariate regression solely include statistically significant results (odds ratios

Writing the Manuscript: Abstract

- **Abstract:** Helps think through the overall message of the paper
  - Primary & secondary aims of the study
  - Methods: what statistical analysis did you perform (bivariate analysis, multivariate regression)
  - Results: only statistically significant variables
  - Conclusion: summarizing clinical significance and meaning of the results

Writing the Manuscript: Abstract

Abstract

- Primary & secondary aims of the study sentence
    - *The objective of this study is to compare risk adjusted matched cohorts of Charcot neuroarthropathy patients who underwent osseous reconstruction with and without diabetes.*
- Methods sentence
    - *Bivariate analysis was performed for preoperative infection, location of Charcot breakdown, and post reconstruction outcomes, in patients with a minimum of 1 year follow-up period.*

Writing the Manuscript: Abstract

Abstract

- Results sentence
  - *Through bivariate analysis, presence of preoperative ulceration (p=0.0499) was found to be statistically more likely in the patients with diabetes; whereas, delayed osseous union (p=0.0050) and return to ambulation (p≤0.0001) was statistically more likely in patients without diabetes.*
  - *The non-diabetic Charcot patients were 17.6 folds more likely to return to ambulation [OR 17.6 (95% CI (3.5-87.6)], and 16.4 folds more likely to have delayed union [OR 16.4 (95% CI (1.9-139.6)].*

Writing the Manuscript: Abstract

Abstract

- Conclusion sentence
  - *Our results demonstrate that DM CN patients are more likely to present with preoperative ulcerations compared to non DM CN patients. Though the non DM CN patients show higher rates of delayed union after CN reconstruction, they are more likely to return to ambulation compared to patients with DM.*

Writing the Manuscript: Introduction

Introduction

- 1st paragraph: Generally introduce the topic
- 2nd paragraph: Overview of current literature on the topic
- 3rd paragraph: Why this research is relevant. Primary / secondary aims of the study

Writing the Manuscript: Discussion

Discussion

- **Overview paragraph**: General overview of the topic. Want to explain why this concept is important
- **Results Paragraph:** Paragraphs explaining each statistically significant results with literature to back up hypothesis of why it is statistically significant
- **Limitations paragraph**: review all the limitations to the study, and how future studies can improve on this study
- **Conclusion paragraph**: overview of the results with a clear take home message for the reading

Writing the Manuscript: Results

References

- Fill in as you go, even if you don't completely format the references put a skeleton list for yourself to work off later
- Within the manuscript don't number until after attending edits, keep citations as (author) or (author-year) if there are duplicates of the same author
  - After final attending edits number in order they appear in the manuscript (1)…. Blah blah (2).
  - Have reference citations match order they appear in the manuscripts

Writing the Manuscript: Figures

Figures

- Clinical or radiographic figures that highlight and demonstrate key concepts from the paper
- Can also include algorithms, decision trees, radiographic measurements, etc.
- *Need figure citations (Figure 1) in the paper to appear in the order they appear at the end of the manuscript

Thank you!

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