Hands-On
Cadaver Seminar
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Celebration, Florida

MIS – REARFOOT PROCEDURES

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Academy of Minimally Invasive Foot & Ankle Surgery

Conflict of Interest Disclosure

Joanne N Balkaran has no financial relationship with companies and/or products which could affect the objectivity of this lecture.

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PROCEDURES

- MIS Ankle Arthrotomy / TibioTalar Exostectomy
- MIS Calcaneal Osteotomy - MICO
- Endoscopic Gastrocnemius Recession – Baumann
- Fibula Intramedullary Nail - MIS
- Case Studies

MIS Ankle Arthrotomy / TibioTalar Exostectomy

MIS Ankle Arthrotomy / TibioTalar Exostectomy

Indications

- Anterior Ankle Impingement Syndrome
- TibioTalar Exostosis
- Mild Ankle Degenerative Joint Disease
- Previous Ankle Injury
- Bony Equinus

Portal Selection

- ❖ Use Anteromedial and Anterolateral portals as in arthroscopy
- ❖ Can be combined with ankle arthroscopy – Nanoscope ™ (Arthrex)
- ❖ Adjunct therapy – PRP – Platelet Rich Plasma

Anterior Portals

❖Anteromedial Portal

Medial to the Tibialis Anterior Tendon

At the Ankle level

❖Structures at Risk

❖Saphenous vein / Saphenous nerve/ Tibialis Anterior Tendon

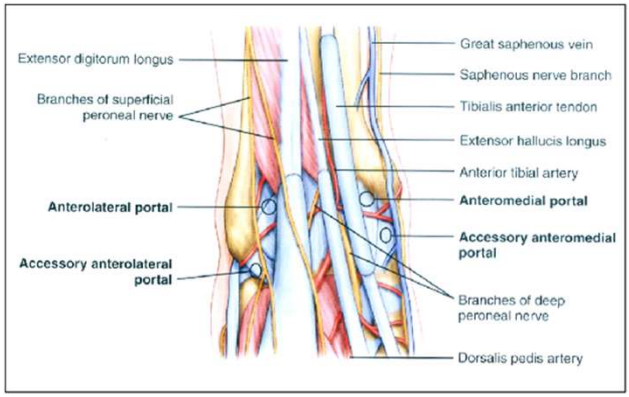
❖Anterolateral Portal

❖ Lateral to the Peroneal Tertius (90%)

(Grab the 4th digit – plantarflex and evert – mark out the IDCN)

❖Structures at Risk

❖IDCN / Peroneal Tertius tendon



Procedure – Under fluoroscopy or Arthroscopy

➢Anteromedial portal parallel to the TA

➢Make a stab incision with a 62 blade

Check location with fluoroscopy

Proceed with exostectomy w/ Isham burr under fluoro

- Insert the Nanoscope ™ into the anteromedial portal and inspect the ankle joint
- Locate the anterolateral portal and make a stab incision with an 18 gauge needle
- Switch the Nanoscope ™ to the anterolateral portal

- Rasp the exostosis site to create a rough surface
- Use the long isham burr to perform the exostectomy to the tibiotalar joint
- Start from the joint and move upwards proximally on the tibia
- Move back and forth on the talar exostosis
- Remove bone paste from the portal sites

- **An angiocath** – can be use flush the ankle joint from 1 portal across to the other
- Can use arthroscopic instrumentation to further scope the ankle joint - synovitis
- **Under Fluoroscopy** – One or two portals can be used to perform the exostectomy with removal of bone paste

NanoScope™ Camera for Foot and Ankle Arthroscopy

Adjunct Procedure – PRP – Platelet Rich Plasma

Preparation of PRP

- Patient's blood is drawn and processed to separate the platelets from the rest of the blood components.

Application of PRP during Ankle Arthrotomy

- Once the ankle arthrotomy is performed, and surgical procedures are completed, PRP can be applied directly to the surgical site.
- The PRP is injected into the joint space or applied to ligaments, tendons, or cartilage that may have been addressed during the arthrotomy.

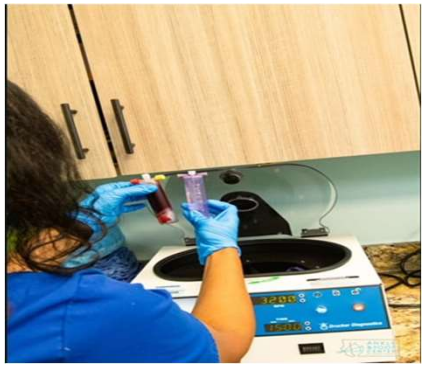
Mechanism of Action

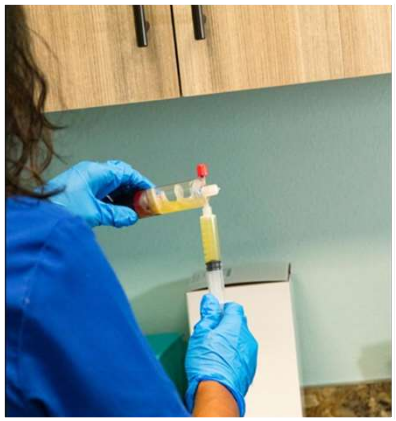
- Growth factors in PRP stimulate cell proliferation, collagen production, and tissue repair.
- The goal is to enhance the natural healing response, reduce inflammation, and potentially accelerate the recovery of damaged tissues.

Potential Benefits of PRP in Ankle Arthrotomy

- Faster Healing
- Reduced Inflammation
- Tissue Regeneration

Adjunct Procedure – PRP – Platelet Rich Plasma





PRP for Achilles Tendinopathy

Post-op Protocol

- Non- weight bearing until 1st Post op visit
- Cam boot and weight bearing as tolerated in the immobilization stage
- Ice and elevate
- If PRP was injected – no NSAIDS x 6 weeks
- Early Ankle joint ROM
- Return to regular shoes in 2-3 weeks

Complications

- Stiffness
- Pain
- Infection / dehiscence (Low risk)

Case Studies (MIS Ankle Arthrotomy)

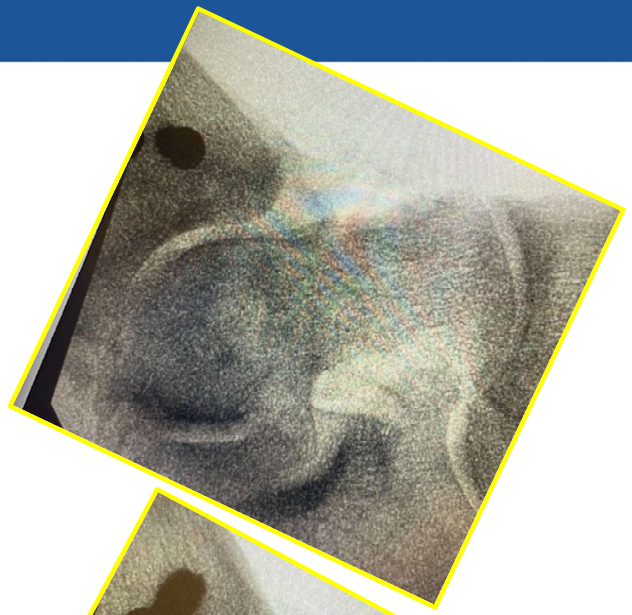
Before

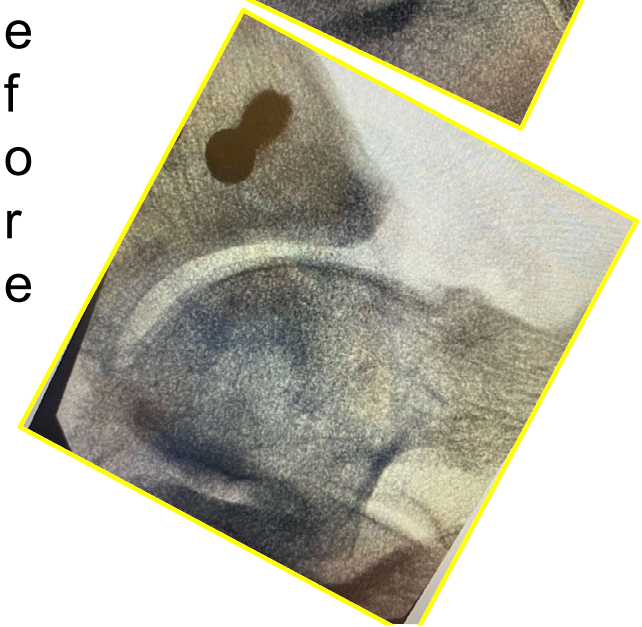
52 y/o female post-traumatic arthritis L ankle

After

Case Studies (MIS Ankle Arthrotomy)

Before





After

33 y/o male bony equinus
s/p ORIF L ankle fracture ,
Talar exostosis

Case Studies (MIS Ankle Arthrotomy)

Before

After

50 year old female s/p old ankle sprain with anterior impingement syndrome
Tibiotalar Exostosis
Right ankle

Journals Articles

Burnikel, A. P., Goodloe, J. B., Cutrone, J., McDonald, W., Guareschi, A. S., Hoch, C. P., ... & Scott, D. J. (2022). Determining the Operative Efficiency of Ankle Arthroscopy with a Standard Arthroscope vs Nanoscope. *Foot & Ankle Orthopaedics*, *7*(4), 2473011421S00601.

Conclusion: Overall, the nanoscope was significantly more efficient than the 2.7-millimeter reusable scope regarding opening time and incision to joint space time in the OR. Ankle arthroscopy utilizing a traditional arthroscope is 30.7% more expensive than with the use of a nanoscope and takes longer to set up.

Peerbooms JC, Lodder P, den Oudsten BL, Doorgeest K, Schuller HM, Gosens T. Positive Effect of Platelet-Rich Plasma on Pain in Plantar Fasciitis: A Double-Blind Multicenter Randomized Controlled Trial. Am J Sports Med. 2019 Nov;47(13):3238-3246. doi: 10.1177/0363546519877181. Epub 2019 Oct 11.

Conclusion: Treatment of patients with chronic plantar fasciitis with PRP seems to reduce pain and increase function more as compared with the effect of corticosteroid injection

Laohajaroensombat S, Prusmetikul S, Rattanasiri S, Thakkinstian A, Woratanarat P. Platelet-rich plasma injection for the treatment of ankle osteoarthritis: a systematic review and meta-analysis. J Orthop Surg Res. 2023 May 19;18(1):373. doi: 10.1186/s13018-023-03828-z

Conclusion: PRP may beneficially improve pain and functional scores for ankle OA in a short-term period. Its magnitude of improvement seems to be similar to placebo effects from the previous RCT. A large-scale RCT with proper whole blood and PRP preparation processes is required to prove treatment effects.

Xiong Y, Gong C, Peng X, Liu X, Su X, Tao X, Li Y, Wen Y, Li W. Efficacy and safety of platelet-rich plasma injections for the treatment of osteoarthritis: a systematic review and meta-analysis of randomized controlled trials. Front Med (Lausanne). 2023 Jun 27;10:1204144. doi: 10.3389/fmed.2023.

Conclusion: PRP injection therapy can safely and effectively improve functional activity in patients with OA and produce positive analgesic effects in patients with KOA, TMJOA, and AOA. However, PRP injection therapy did not significantly reduce pain symptoms in patients with HOA.

MI Calcaneal Osteotomy (MICO)– Medial Slide

MIS version of the Koutsgiannis calcaneal osteotomy

Minimally Invasive Calcaneal Osteotomy (MICO)– Medial Slide

Indications

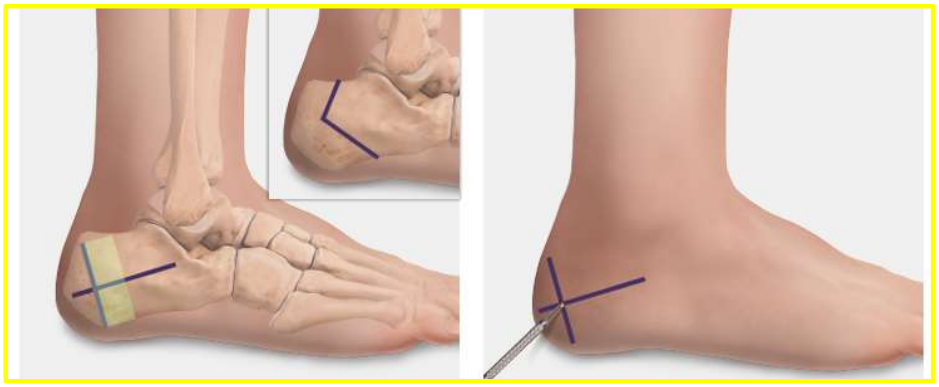
- Heel valgus deformity
- Pes planus
- Planodominance

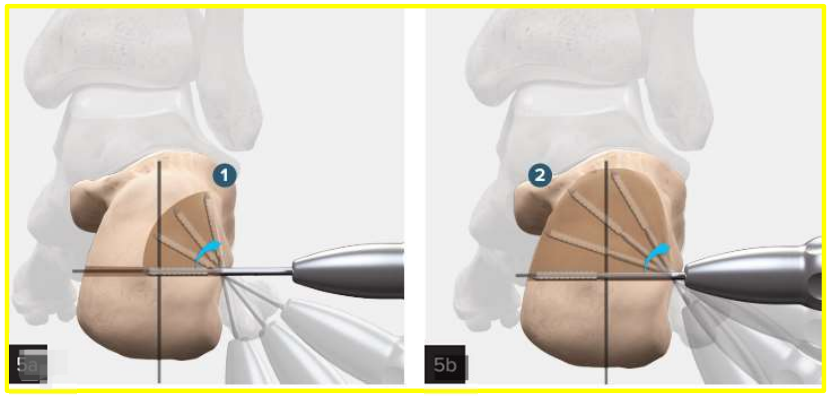
Positive Helbing sign

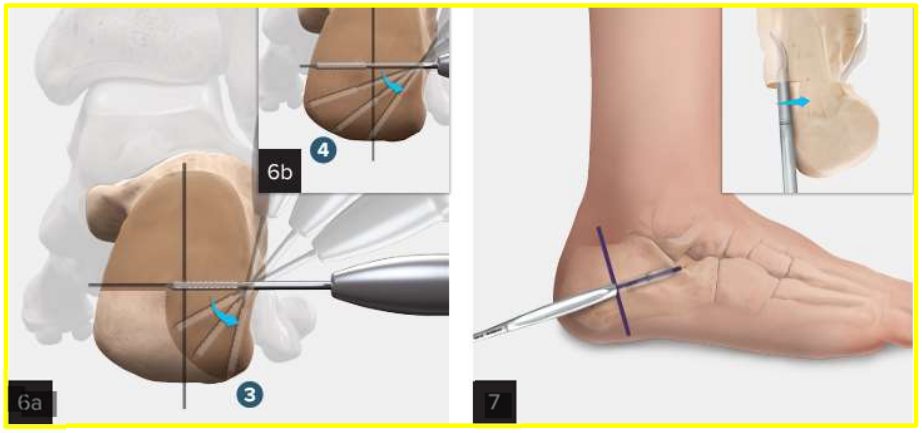
Calcaneal valgus

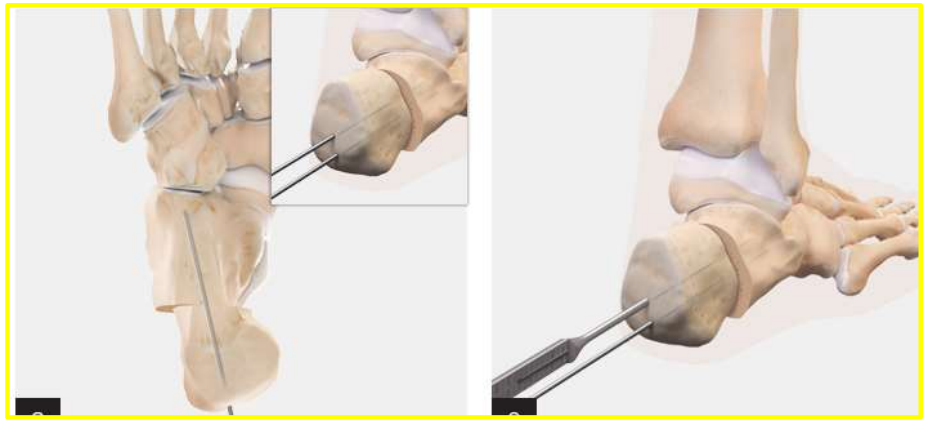
Procedure Diagram

MIS Calcaneal Osteotomy – Procedure









http://efaidnbmnnnibpcajpcglclefindmkaj/https://www.arthrex.com/resources/LT1-00139-en-US/minimally-invasive-surgery-medializing-calcaneal-osteotomy-surgical-technique?referringteam=foot_and_ankle

Journals Articles

Kheir E, Borse V, Sharpe J, Lavalette D, Farndon M. Medial displacement calcaneal osteotomy using minimally invasive technique. Foot Ankle Int. 2015 Mar;36(3):248-52. doi: 10.1177/1071100714557154. Epub 2014 Oct 20.

Conclusion: This series suggests that minimally invasive calcaneal osteotomy surgery can achieve excellent union rates aiding correction of deformity with no observed neurovascular or soft tissue complications. For surgeons experienced in open surgery, there is a short learning curve after appropriate training.

Waizy, H., Jowett, C., & Andric, V. (2018). Minimally invasive versus open calcaneal osteotomies—Comparing the intraoperative parameters. *The Foot*, *37*, 113-118.

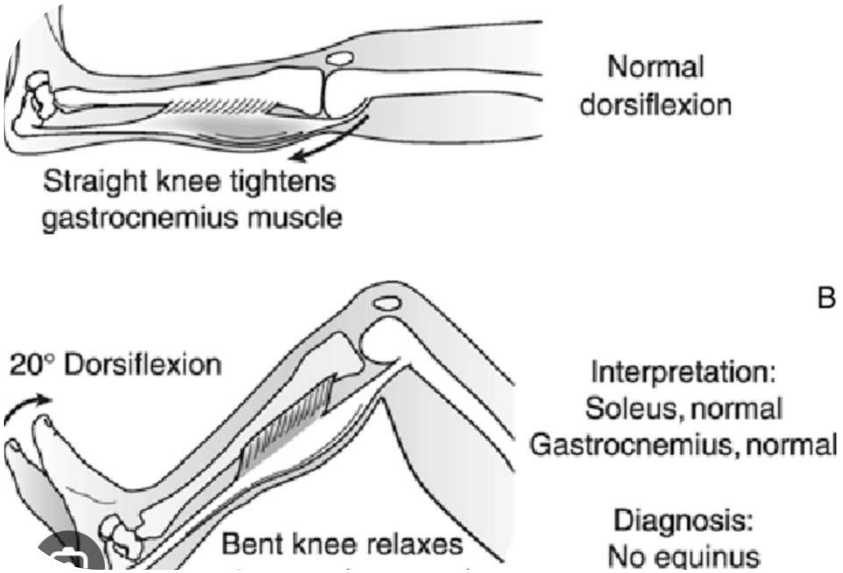
Conclusions: This study reports a significantly shorter operating time and a shorter incision in the MICO group. The radiation exposition was not significantly different between the two groups. A clinical difference could not be shown in our study.

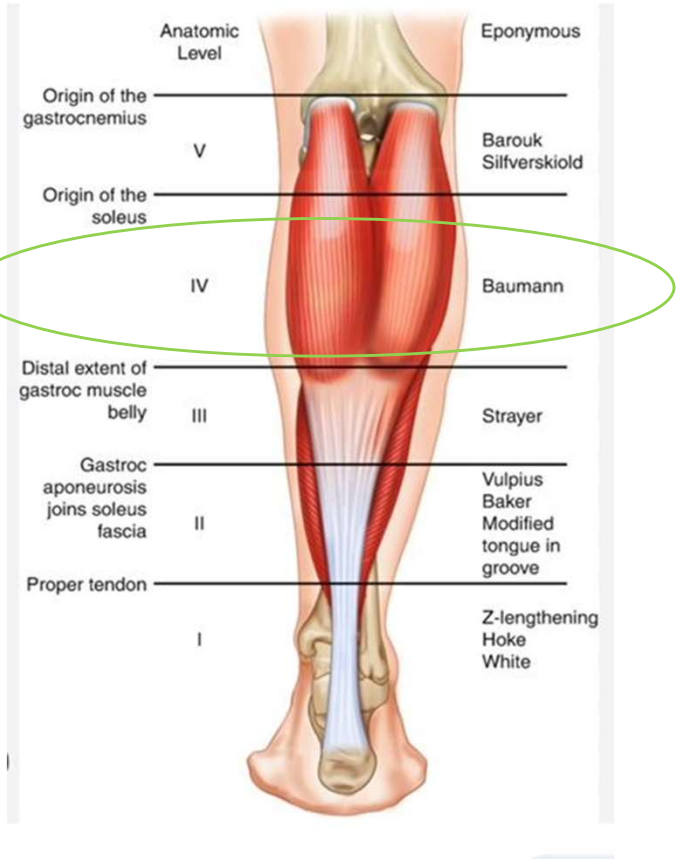
Endoscopic Gastrocnemius Recession - Baumann

Endoscopic Gastrocnemius Recession - Baumann

Indications for the procedure

- Gastrocnemius Equinus Deformity < 10 degrees
- Recession - releases the fascial portion of the gastrocnemius muscle to increase its length





Gastrocnemius Recession - Bauman

1st incision

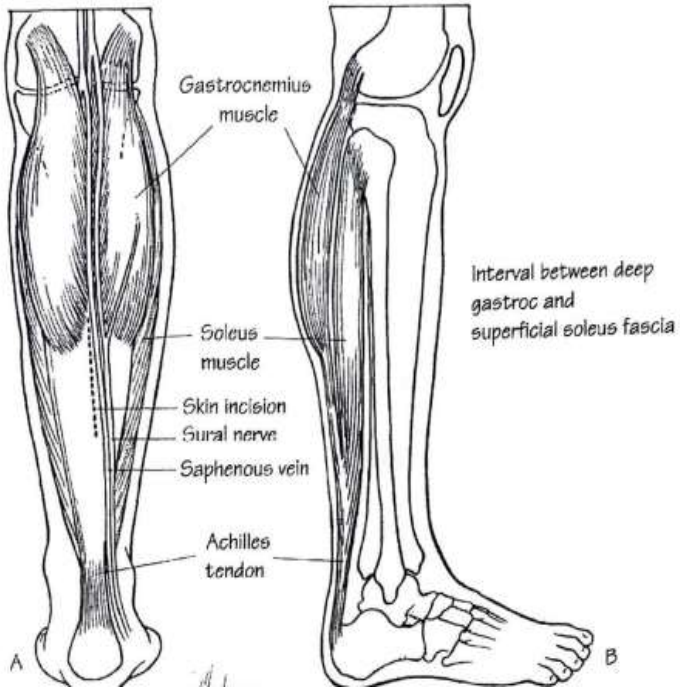
Medial edge of the medial band of the gastroc muscle

EGR(Endoscopic Gastroc Recession)

Finger dissection separating the interval between the gastroc and soleus fascia from medial-lateral and placing the canula / trocar along the plane

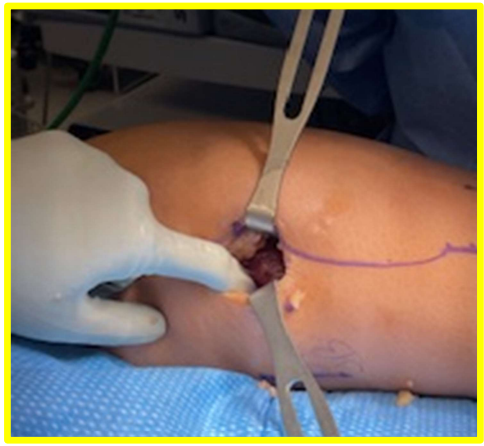
2nd incision

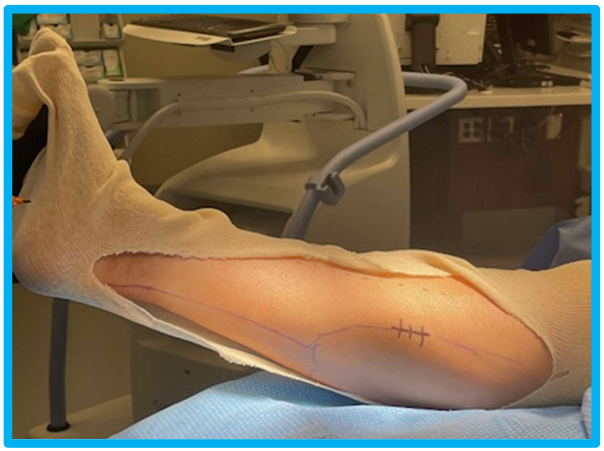
Lateral edge of the lateral band of the gastroc muscle

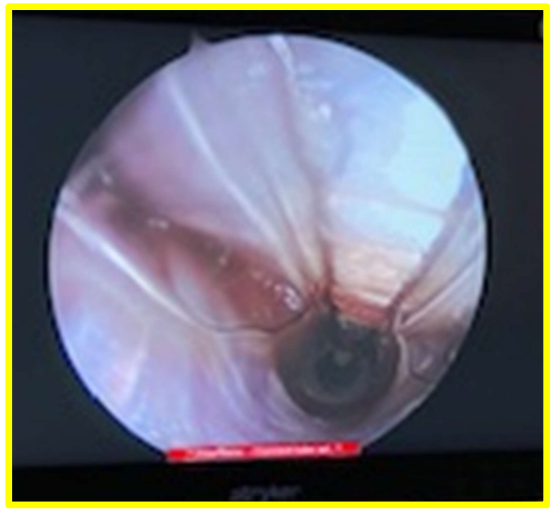


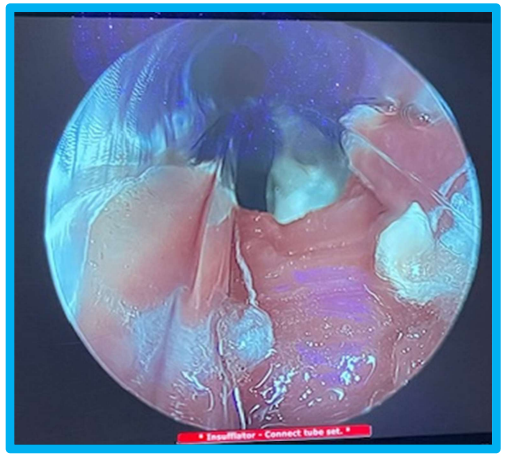
Prone

Supine










Device Control
Insufflator - Connect tube set.
stryker

Post-op Protocol

- PWB with assistance x 1-2 weeks – then start FWB in CAM boot
- Early ROM
- Suture removal x 2 weeks

Advantages

- Avoids sural nerve injury
- No deformation or weakness of the gastroc muscle compared to Strayer
- Good adjunct to any MIS procedure

Complications

- Hematoma
- Higher recurrence rate compared to Strayer and TAL
- If equinus is not fully resolved, can also perform a soleus recession

Journals Articles

DeHeer PA. Equinus and Lengthening Techniques. Clin Podiatr Med Surg. 2017 Apr;34(2):207-227. doi: 10.1016/j.cpm.2016.10.008. Epub 2017 Jan 19.

Conclusion: Surgical treatment of equinus offers multiple procedures but the Baumann gastrocnemius recession is preferred based on deformity correction without weakness.

Tennant JN, Amendola A, Phisitkul P. Endoscopic gastrocnemius release. Foot Ankle Clin. 2014 Dec;19(4):787-93. doi: 10.1016/j.fcl.2014.08.009. Epub 2014 Sep 18.

Conclusion: Comfort with endoscopic equipment and surgical anatomy, especially the sural nerve, is of paramount importance for performing the procedure safely, effectively, and efficiently. The primary advantage of the procedure is improved cosmesis and decreased wound complications of the smaller surgical scars.

Brandão RA, So E, Steriovski J, Hyer CF, Prissel MA. Outcomes and Incidence of Complications Following Endoscopic Gastrocnemius Recession: A Systematic Review. Foot Ankle Spec. 2021 Feb;14(1):55-63. doi: 10.1177/1938640019892767. Epub 2020 Jan 12.

Conclusion: The endoscopic approach has satisfactory outcomes including low incidence of plantarflexion weakness and sural neuritis. Patients should be counseled on these risks preoperatively. Compared with previously reported systematic review of the open technique, the endoscopic approach has a lower overall incidence of complications.

Fibula Intramedullary Nail – MIS
- Distal Lateral Malleolar Fractures

Intended Use & Contraindications

Intended Use

The Flex-Thread Distal Fibula Intramedullary Nail System is intended for use in the fixation of fibula fractures and osteotomies.

Contraindications

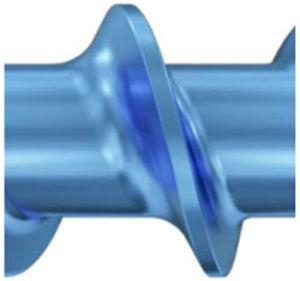
Do not use the Flex-Thread Distal Fibula Intramedullary Nail System in cases of:

- Inadequate bone quantity and/or bone quality
- Foreign body sensitivity to implant material
- Acute localized infections
- Patients with limited blood supply
- Patients who are unwilling or incapable of complying with post-operative care instructions

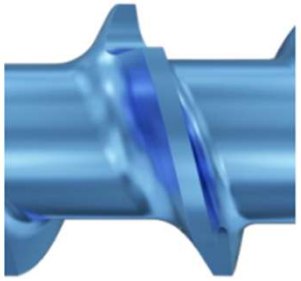
Flex-Thread Distal Fibula Design Rationale

Atraumatic Blunt Tip Nose
- Guides nail across fracture site
- Minimizes cortical disruption

Self-Cutting & Self-Tapping Flutes
- No Tapping Required
- May Decrease Procedure Time



Reverse Cutting Flutes
- Precision Cut Design
- Facilitates Nail Removal



3.8mm Elongated Holes

Accept:
- 3.5mm ZERO Profile Interlocking Screws
- 3.5mm Cortex Screws
- Flexible Syndesmosis (Rope) Fixation Devices

2.7mm Threaded Holes
- Accept 2.7mm ZERO Profile Interlocking Screws
- Allows Screws to Lock into Nail
- Provides Improved Fixation

Steps to Implant the Flex-Thread Fibula


GENE

Case Study 1
MIS Plantar Exostectomy for Charcot Deformity

Case 1

64 y/o morbidly obese male

- PMHx of DM w/ neuropathy, retinopathy, charcot foot deformity, HTN, hyperlipidemia, renal disease, GERD

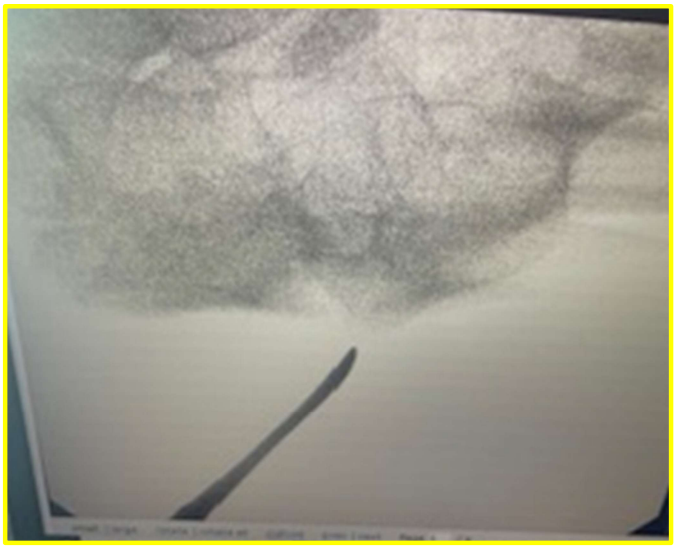
- Hx of osteo of the 5th met with 5th met head resection

- High cardiac risk for general anesthesia

- Recurrent plantar DFU left foot
- Wore a CROW boot

IMMEDIATE POST OP

1 MONTH POST-OP



PLANTAR FOOT EXOSTECTOMY – 2 YEARS LATER

- Lost 30 lbs
- walking with DM shoes w/ custom inserts

Case Study 2

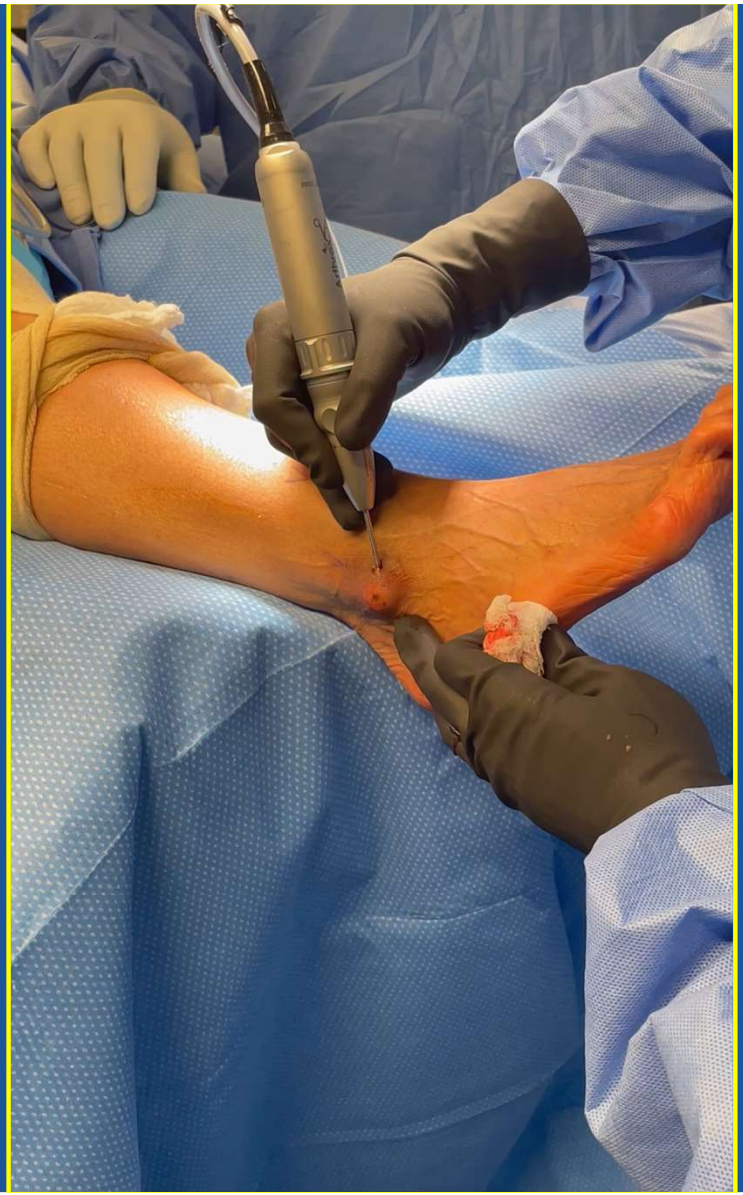
Fibula exostectomy to prevent re-ulceration

Case Study 2

59 y/o female with a PMHX of DM Type 1 w/ neuropathy, HTN, renal disease, SLE(Lupus)

- Chronic recurrent DFU Rt lateral ankle
- Does not probe to bone
- Multiple infections and abx treatment

- MRI – no osteomyelitis , hypertrophy of the lateral malleolus tubercle and does not involve the ATF



Case Study 3

5th metatarsal osteotomy with de-rotational skin plasty / flap

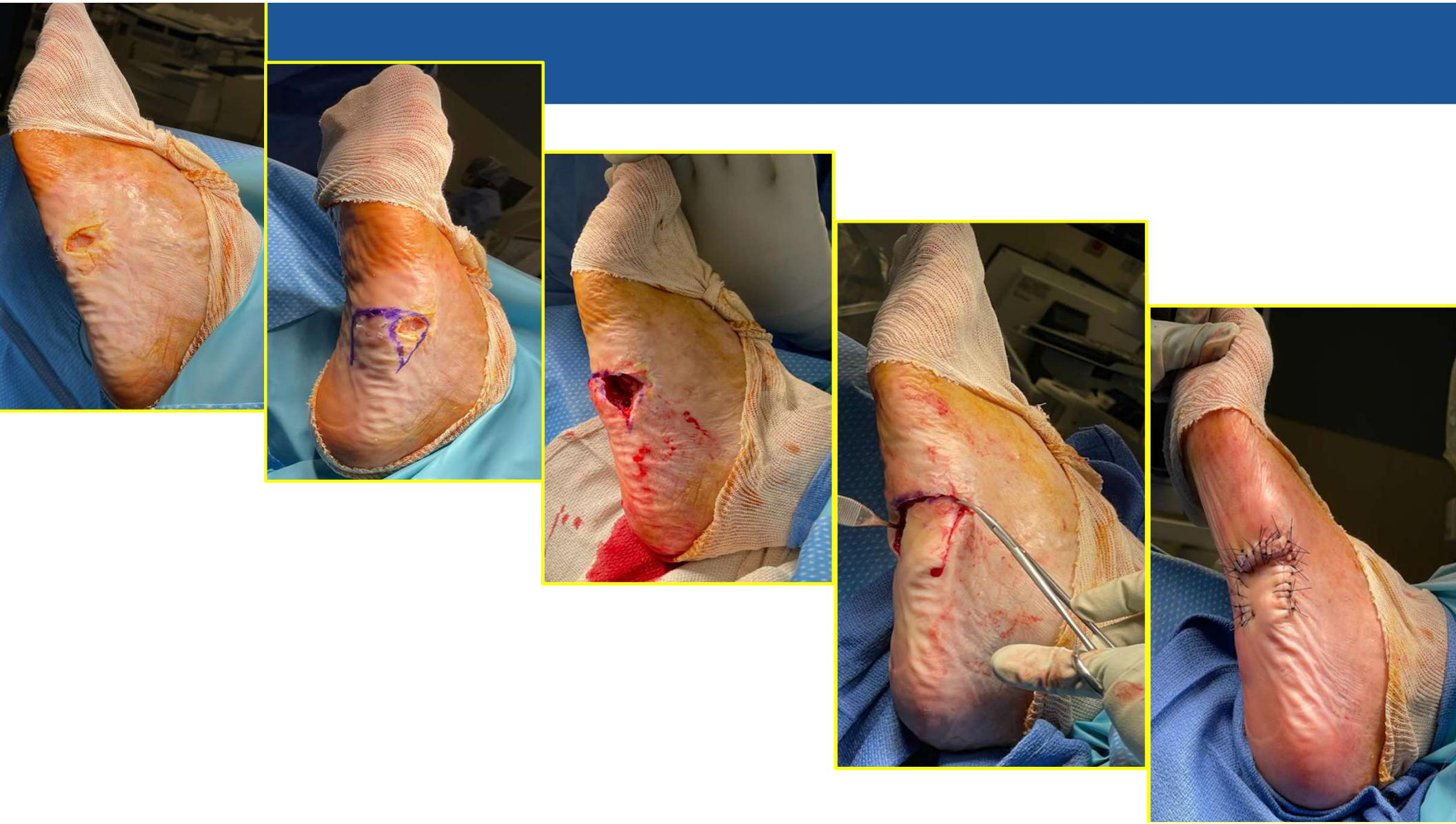
Osteomyelitis – 5th met base near the PB tendon

76 y/o male with a PMHx HTN, hyperlipidemia, GERD
- Seen as a 2nd opinion

- Developed a wound/abscess to the 5th Met base.
- Had I&D by a previous Dr. 3 months prior and was also treated by ID

- MRI – neg for osteo – (ulcer probed to bone)
- Treated with a VAC and IV abx – no improvement
- Bone Biopsy – Pos Acute Osteo

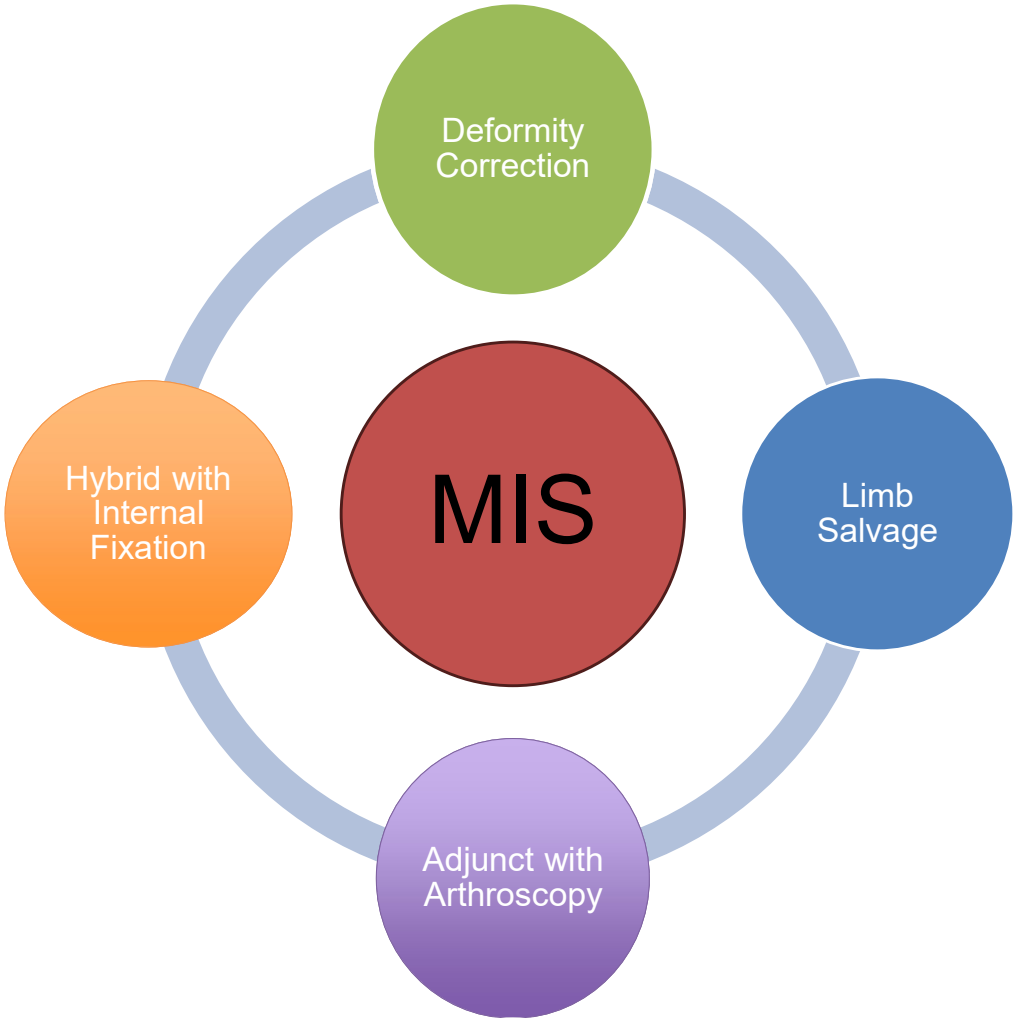
- Goal : resect the infected bone w/ clean margins without violating the PB tendon and create a flap closure



1 month Post-op

6 months Post-op

Multi-faceted Approach with MIS



MIS Skillset

Another Tool in your Toolbox for

Better surgical decisions and patient care

Hands-On Cadaver Seminar

February 21-23, 2024

Celebration, Florida

THANK YOU

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Academy of Minimally Invasive Foot & Ankle Surgery

Calcaneal Exostectomy- Markewych with a Bauman Gastrocnemius Recession

INTRODUCTION

- The Markewych procedure, also known as the calcaneal exostectomy, is a surgical intervention designed to address Haglund's deformity or prominence of the posterior superior aspect of the calcaneus (heel bone) (Guan et al., 2021).

INCISION

- The incision for the Markewych procedure is typically made on the lateral (outer) aspect of the foot, specifically over the prominence of the calcaneus. The incision is placed to provide direct access to the area of the bony prominence that needs to be removed.