APOA Foot & Ankle Council Presents..

Case of the Month

December 2025

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Presented by:

Mark Arthur M. Martinez, MD
Mariano Marcos Memorial Hospital and Medical Center, The Philippines

Title:

Use of the Masquelet Technique in 1st Metatarsophalangeal joint (MTPJ) Fusion after septic non-union of the 1st MTPJ

Key Lessons From This Case

The revision succeeded because the surgical team corrected the four major issues from the initial attempt:

- Complete infection control (confirmed clean wound bed)
- Improved stability using external fixation
- Using tricortical iliac crest graft rather than DBM alone
- Correct timing (6 weeks) for second-stage grafting

These align with established principles of the Masquelet technique and demonstrate its adaptability in the foot.
Predictors of failure that surgeons should aware based on this case:

1. inadequate debridement
2. improper fixation
3. inappropriate graft choice
4. exposed cement

A multicenter retrospective study could develop a risk model.

Upcoming Case of the Month

January 2026

Presented by:

Dr Heung Sun Wah, Edwin
Department of Orthopaedics and TraumatologyPrincess Margaret Hospital, Hong Kong, China

Title:

Long-Term Outcome of Combined Moberg's Operation and Akin Osteotomy in Hallux Rigidus: 22-Year Follow-Up

Want to present a case? Write to...

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Use of the Masquelet Technique in 1st Metatarsophalangeal joint (MTPJ) Fusion after septic non-union of the 1st MTPJ

Mark Arthur M. Martinez, MD
Mariano Marcos Memorial Hospital and Medical Center, The Philippines

Case Summary:

A 29 year old male had a road crash accident while driving his motorcycle, he presented with an open fracture of the 1st metatarsal with bone and soft tissue loss at the emergency room. Debridement was done at the ER level and given adequate antibiotics.

Due to resource limitations, definitive surgery was done at 1 month and 20 days post injury where 1st stage masquelet was done using pins and antibiotic bone cement due to findings of osteomyelitis and necrotic bone.

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At two months post 1st stage masquelet, due to the poor soft tissue condition - bone cement exposed on the medial side - the surgeons decided to use a medial plantar flap to cover the defect during the 2nd stage masquelet, using pins and Demineralized bone matrix.

On the Interim, around 6 months after the 2nd stage masquelet, there was no noted signs of fusion. Sinus formation also developed during this time.

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Due to the persistent sinus, non-union and symptoms of pain and difficulty ambulating revision arthrodesis was planned utilizing the masqulet technique once again but now avoiding the mistakes that plagued the initial surgery.

Background

Surgical Technique

The Patient underwent revision surgery at 17 months post injury. The surgeons identified the key problems that lead to the failure of the initial attempt at MTPJ arthrodesis and planned the revision surgery learning from these previous mistakes.

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Key Problems

The 1st problem was the infection, the initial surgery may not have eradicated the infection prior to the 1st stage Masquelet.

The 2nd problem identified was the issue of stability. During the initial surgery pins were selected as a means of stabilizing the construct while providing minimal disruption to the soft tissue. To increase stability and preserve the remaining soft tissue an external fixator was chosen for revision.

The 3rd problem was only using the demineralized bone matrix (DBM) during the initial surgery, ~14 months after the initial surgery the DBM was still intact and did not incorporate with the native bone. By using a Tricortical iliac bone graft in the revision we were able to provide needed stability as well as give osteoinductive and osteogenic properties.

The 4th problem was the proper timing of the 2nd stage masquelet, although in the initial surgery the 2nd stage masquelet was done at 8 weeks and 1 day after the 1st stage, during the revision surgery the 2nd stage was planned at 6 weeks to have a mature pseudomembrane with more optimal timing to avoid infection.

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Revision Surgery

Removal of the pins was done and the remaining DBM was removed. We noted intraoperatively that the DBM from the initial surgery was still intact and only a portion of DBM found at the base of the phalanx and 1st MT base consolidated. Meticulous removal of the necrotic and infected tissue was done including the sinus. A Roger Anderson external fixator was used to regain the length of the medial column and regain the foots' tripod using a flat base on the foot during positioning. Insertion of an antibiotic spacer on the defect then proceed. Lastly, we tried full skin closure of the soft tissue at this time to avoid exposed bone cement, however a portion on the dorsal had no skin coverage but with a subcutaneous covering thus no bone cement was exposed. A biological dressing was applied over the area. Soft tissue was submitted for culture for proper antibiotic coverage. A growth of E.coli and S. aureus was identified and the patient was given adequate antibiotics. This completed our 1st stage masquelet.

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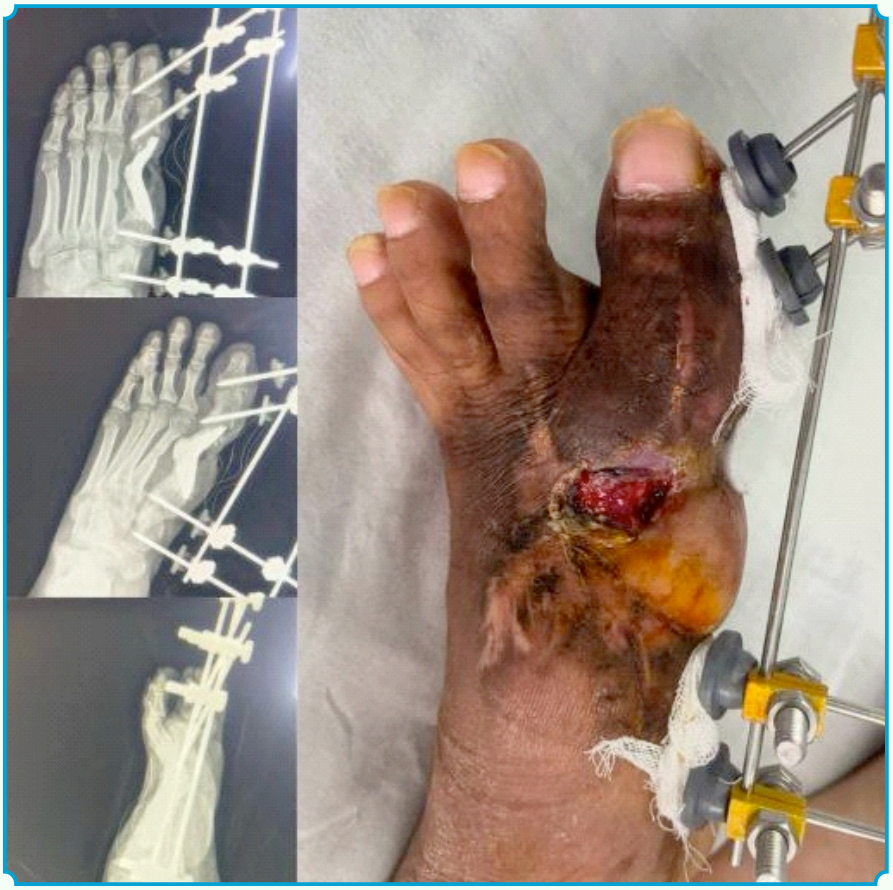
We scheduled the patient for 2nd stage masquelet vs. repeat debridement and insertion of antibiotic spacer. If we find the bed clinically infected we will only proceed with repeat debridement, we will continue doing so until we find that the infection has been controlled.



On the 6th week post op, upon finding that the wound bed was clean with no clinical signs of infection we proceed in doing the 2nd stage masquelet. The pseudomembrane was adequate and mature intraop. Harvest of a tricortical iliac bone graft was done on the ipsilateral side and shaped the graft to fit the defect. Since the graft was press-fit to the defect, no fixation was required to fix the graft, and the fixation was maintained by the external fixator. This ends our second stage masquelet.

Follow-up Outcome

At his most recent follow-up, the patient achieved a score of 90/100 on the AOFAS Hallux MTP–IP scale, with the expected zero score in the MTP joint motion domain (10 pts) due to the nature of the procedure. He reported no difficulty with ambulation, including walking on uneven terrain.

Conclusion

This case demonstrates that the Masquelet technique, when performed meticulously with proper infection control, stable fixation, adequate graft selection, and optimal timing, is a powerful tool for treating septic nonunion of the 1st MTPJ. Its versatility makes it uniquely suitable for complex forefoot reconstruction, but success depends heavily on surgical judgment and soft-tissue management.

The external fixator was then removed at 15 months after signs of union was noted on xrays with CT scan confirmation. Patient was then advised to undergo physical therapy and to wear a modified shoe.

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