

When Masquelet Around the Knee or Distal Tibia Is No Longer a Good Option: Advanced Limb Salvage Strategies for Challenging Defects

Introduction:

Segmental bone defects around the knee represent one of the most complex reconstructive challenges in limb salvage surgery. Traditional approaches, such as the induced membrane (Masquelet) technique, may fail in this region due to limited soft-tissue envelopes, compromised vascularity, and difficulty maintaining mechanical stability near the joint. Here we present advanced strategies used for limb salvage in three patients with periarticular tibial bone loss in whom repeated Masquelet reconstruction failed. These cases demonstrate the role of magnetically driven internal transport and compression techniques as viable salvage options when conventional membrane-based reconstruction is no longer effective.

Methods:

We retrospectively reviewed three consecutive patients (aged 18 - 57 years) with large post-traumatic bone defects around the knee and distal tibia who experienced failure of one or more Masquelet stages. Salvage strategies included conversion to internal bone transport using a magnetically controlled intramedullary nail (PRECICE system) following spacer removal and osteotomy. In each case, fixation stability and soft-tissue coverage were optimized prior to definitive reconstruction. Patients were followed radiographically and clinically for evidence of union, alignment, and infection recurrence.

Results:

All three patients achieved radiographic and clinical union at an average of 10 months after conversion. No recurrent infections or mechanical failures were observed. One patient experienced a superficial pin-site infection before internalization, which resolved with oral antibiotics. All limbs were salvaged, and patients returned to full weight-bearing without further reconstructive procedures. Compared with their initial Masquelet attempts, the advanced internal transport or compression constructs provided improved mechanical stability, reduced risk of membrane collapse, and allowed controlled compression or distraction without external fixation.

Conclusions:

Around the knee and distal tibia, the Masquelet technique may fail when joint proximity limits fixation and soft-tissue stability. In these settings, internal bone transport or magnetic compression nails provide reliable alternatives that can achieve union while minimizing external fixation time. Surgeons should consider early conversion to these advanced methods when repeat Masquelet attempts are unlikely to succeed. This experience highlights evolving strategies for complex limb salvage in the knee and periarticular tibia.