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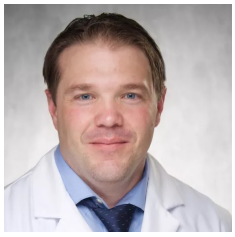
Merete® Limb Salvage Systems

CASE STUDY REPORT

OsteoBridge™ IKA

Knee fusion and rotational flap for chronic infection with extensor mechanism disruption



Dr. Jacob M Elkins, MD PhD

Assistant Professor of Orthopedics and Rehabilitation.
University of Iowa Hospitals and Clinics.
Iowa City, Iowa, USA.

Dr. Ryan S Bailey, MD

Adult Reconstruction Fellow.
University of Iowa Hospitals and Clinics.
Iowa City, Iowa, USA.

Case Information

Age:	69
Sex:	Male
Diagnosis:	Native knee joint infection and osteomyelitis, extensor mechanism disruption, non-healing chronic wound
Anatomic location:	Left Knee

Figure 1: Preoperative anterior/posterior and lateral/medial radiographs

Figure 2: Preoperative knee appearance with chronic wound

Patient History

A 69-year-old male presented for evaluation and management of his left knee. Patient history included a quadriceps tendon rupture sustained from a prior ground level fall, previously managed with open reconstruction at an outside facility. Unfortunately, this was complicated by wound breakdown and intra-articular Candida infection requiring multiple operative debridements and ultimately a patellectomy. He continued to have complete extensor mechanism disruption and a persistently non-healing wound despite negative pressure wound vac therapy and revascularization with vascular surgery.

After consideration of salvage options, including accounting for the patient's medical co-morbidities, wound healing difficulties, and functional goals, we determined that the patient was a good candidate for knee arthrodesis with the Merete® OsteoBridge™ Intramedullary Knee Arthrodesis (IKA) system. The patient was also indicated for a medial gastrocnemius rotational flap with split-thickness skin grafting for soft tissue coverage of his chronic wound.

Management

The patient was taken to the operating room and placed in the standard supine position under general anesthesia. A standard medial parapatellar approach to the knee joint was performed, with the approximately 5 cm diameter anterior chronic wound and prior proximal midline scar incorporated into the incision. Exposure included debridement of extensive scar and granulation tissue and visualization of the defects resulting in chronic complete extensor mechanism disruption. Multiple tissue cultures were obtained. Provisional distal and posterior femoral cuts were made to increase exposure.

This was followed by a provisional proximal tibial cut. Tissue was then carefully and circumferentially dissected off the femur and proximal tibia to expose and perform our planned resection levels to accommodate the 50 mm IKA spacer. We then proceeded with extensive debridement of the exposed bony and soft tissue surfaces followed by multi-modality antiseptic lavages. The femur and tibia were then reamed to accept the cemented collared straight intramedullary nails, 12 mm x 200 mm for the femur, and 12 mm x 150 mm for the tibia. These were trialed with excellent stability and fit. Leg rotation and positioning were assessed and deemed excellent utilizing the built-in 10 degrees flexion of the spacer.

Cement restrictors were placed in the femoral and tibial intramedullary canals and the final implants were placed and cemented with antibiotic-laden cement containing 2 g vancomycin and 200 mg amphotericin per batch. The cement was allowed to harden, and the tibial and femoral nails were coupled using the 50 mm spacer with 10 degrees of built-in flexion. Screws were tightened with the manufacturer's torque screwdriver in the recommended pattern. Final lavage and placement of resorbable antibiotic beads were performed. Soft tissue coverage was then achieved using a rotational medial gastrocnemius flap and placement of a split-thickness skin graft.

The patient was taken to recovery and was allowed protected full weight bearing with a walker as tolerated postoperatively.

Figure 3:
Postoperative anterior/posterior and lateral/medial radiographs

Figure 4:
Postoperative knee appearance

Outcome of management and follow-up

The patient was discharged from the hospital to an acute rehabilitation facility on postoperative day 29 after a prolonged hospitalization secondary to acute kidney injury and an upper GI bleed likely secondary to intravenous antibiotics and home anticoagulation regimen. He was evaluated at seven weeks postoperatively and was doing well and progressing expectedly with physical therapy. The wound, skin graft and flap continued to heal appropriately.

Why this patient was a candidate for Merete® OsteoBridge IKA™

Alternative management options in this patient's case included a staged spacer placement followed by a later revision with extensor mechanism reconstruction, above-knee amputation, or nonoperative treatment with antibiotic suppression and local wound care[1-4]. The patient had previously failed extensor mechanism reconstruction secondary to infection and continued to experience pain, persistent infection, and a chronic wound despite multiple attempts to eradicate the infection.

Though previous case series[1,5-6] had demonstrated good results with a reconstructive approach, this case was unlikely to be successful due to persistent infection, wound healing difficulties, and patient co-morbidities. Above-knee amputation was considered as an option due to its simplicity and potentially definitive control of chronic infection. However, wound healing is a frequent concern in amputation, particularly for this patient. Additionally, there was concern for his ability to tolerate the physical demands of lower limb amputation or later prosthetic fitting. These patients often experience inferior functional and ambulatory outcomes after amputation, as compared to maintenance of the limb through arthrodesis[7-9]. Furthermore, many never go on to achieve effective prosthesis fit or use[10].

Ultimately, patient goals were focused on limb preservation and functional weight bearing without amputation or need for staged procedures. In this case, the Merete® OsteoBridge™ IKA System allowed for preservation of the limb and early return to functional ambulation, while also providing stabilization of the local soft tissue to support healing of the rotational flap and resolution of the prior chronic wound[11-13].

Figure 5:
Follow-up anterior/posterior and lateral/medial radiographs

Figure 6:
Follow up knee appearance

References

1 Mishra AS, Kumar S, Singh HK, Panda I, Cockshott S, Tambe A. Two-stage primary arthroplasty in the infected native knee: a systematic review and pooled analysis. Indian J Orthop. 2021;55(5):1256-1266.

2 Mahmoud et al "Salvage Procedures for Management of Prosthetic Joint Infection After Hip and Knee Replacements"

3 Rodriguez-Merchan EC. Knee fusion or above-the-knee amputation after failed two-stage reimplantation total knee arthroplasty. Arch Bone Jt Surg. 2015;3(4):241-243.

4 Mayes et al "Management of Periprosthetic Joint Infection and Extensor Mechanism Disruption with Modular Knee Fusion: Clinical and Biomechanical Outcomes"

5 Abdel MP, Salib CG, Mara KC, Pagnano MW, Perry KI, Hanssen AD. Extensor mechanism reconstruction with use of marlex mesh: a series study of 77 total knee arthroplasties. J Bone Joint Surg Am. 2018;100(15):1309-1318.

6 Perry KI, Salib CG, Larson DR, Pagnano MW, Abdel MP, Hanssen AD. Two-stage exchange and marlex-mesh reconstruction for infection with extensor mechanism disruption after total knee arthroplasty. J Bone Joint Surg Am. 2018;100(17):1482-1489.

7 Chen AF, Kinback NC, Heyl AE, McClain EJ, Klatt BA. Better function for fusions versus above-the-knee amputations for recurrent peri-prosthetic knee infection. Clin Orthop Relat Res. 2012;470(10):2737-2745.

8 Watanabe K, Minowa T, Takeda S, et al. Outcomes of knee arthrodesis following infected total knee arthroplasty: a retrospective analysis of 8 cases. Mod Rheumatol. 2014;24(2):243-249.

9 Fedorka CJ, Chen AF, McGarry WM, Parvizi J, Klatt BA. Functional ability after above-the-knee amputation for infected total knee arthro-plasty. Clin Orthop Relat Res. 2011;469(4):1024-1032.

10 Sierra RJ, Trousdale RT, Pagnano MW. Above-the-knee amputation after a total knee replacement: prevalence, etiology, and functional outcome. J Bone Joint Surg Am. 2003;85(6):1000-1004.

11 Begkas, D., A. Pastroudis, D. L. Katsenis and S. Tsamados (2015). „Management of a distal femoral non-union with coexisting failure of the knee extensor mechanism using OsteoBridge knee-arthrodesis system -- A case report." Med Pregl 68 (11- 12): 405-409.

12 OsteoBridge™ IKA Clinical Brochure. https://mereteusa.com/details/osteobridge-ika-sales-sheet-01/

13 OsteoBridge™ IKA Intramedullary Knee Arthrodesis Surgical Technique and Ordering Information. https://mereteusa.com/details/osteobridge-ika-surgical-technique/

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Merete Technologies, Inc.
One Lincoln Centre, 18W140 Butterfield Road, Oakbrook Terrace, IL 60181
630-869-1091 | service@merete-medical.com

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