



A Simple Technique for Less Invasive Treatment of an Acute Infection Following MIPO of the Distal Tibia: A Case Report

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Abstract

Minimally invasive plate osteosynthesis (MIPO) is a well-described technique for distal tibia fractures, allowing for plate fixation with minimal soft tissue trauma and preservation of blood supply to bone fragments and soft tissue. However, the treatment of an acute post-operative infection with incision, drainage, irrigation, and debridement might negate the advantages of minimal soft tissue trauma. We present a simple method of daily wound irrigation that increases the success of a less invasive treatment method at lower costs and greater comfort for the patient.

Keywords: Tibial Fractures; Minimally invasive; Fracture fixation; Infection; Osteomyelitis

Introduction

Minimally invasive plate osteosynthesis (MIPO) is a technique of plate fixation with the advantages of less soft tissue trauma, preservation of the fracture haematoma, and less disruption of the extra-osseous blood supply as compared to open plating [1-2]. Many authors [3-14] have published promising results of fixation of distal tibia fractures with this technique and MIPO appears to have higher rates of union and lower rates of postoperative complications than standard open reduction and internal fixation (ORIF) [12].

While a deep postoperative infection is not the most frequent complication, it is the most feared. Although it has been reported in up to 15% of cases of MIPO [3,5,7-14], the management of such an acute infection in this setting is rarely discussed in the literature [9]. Following an acute infection after any ORIF, authors generally agree that if the hardware is stable it should not be removed, and the infection should be treated by irrigation, débridement, and antibiotics [15-17]. In cases of infection following distal tibia MIPO the challenge is being effective in treating the infection without losing the advantages of the technique, thus minimizing soft tissue trauma and preserving blood supply. We discuss a case in which we used a simple and economical method to manage the infection while maintaining the advantages of MIPO.

Case Presentation

A 52 year-old man sustained a closed spiral fracture of the distal left tibia with a non-displaced posterior malleolar fracture, classified as AO/OTA 43-C1, with an associated proximal left fibula fracture. He was immobilized in a long leg splint for six days at which time the local soft tissue conditions permitted operative treatment. Using the MIPO technique, a distal tibia locking compression plate (LCP; Synthes, Oberdorf, Switzerland) was placed without difficulty (Figure 1). Intravenous Cefuroxime was administered at the induction of anaesthesia and continued for 48 hours postoperatively. The patient was begun ambulating with toe-touch weight-bearing using two crutches. The surgical wound was benign in appearance with no drainage or local inflammation, and the patient was discharged on the 14th postoperative day.

Nine days later the patient presented to the Emergency Department with a red, swollen left leg with purulent discharge. He was febrile and hypotensive. Conventional radiographs showed no change from previous postoperative films. An acute postoperative infection was diagnosed. The patient was immediately taken to the operating room where under general anaesthesia the wounds were individually re-opened, debrided, and abundantly washed with saline using jet lavage (InterPulse[®], Stryker, and Geneva, Switzerland). Attention was paid to preserve the initial length of the wounds, not extending them over the entire length of the implant. The stability of the fixation was good so all implants were preserved.

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Figure 1: Postoperative radiographs after initial osteosynthesis.



Figure 2: Top: The Jackson-Pratt drain is shown on the leg. Bottom: The drain is in place under the skin along the plate. The larger distal wound is closed.

A Jackson-Pratt drain (Securodrain®, Dispomedica, Hamburg, Germany) was introduced through the distal incision and with use of a long Kelly clamp pulled subcutaneously along the plate in a retrograde fashion (Figure 2). The flat part of the drain with multiple holes was positioned so that it faced the plate, and the drainage tube exited through the most proximal incision. The most distal incision over the medial malleolus was sutured in order to avoid later problems with wound closure. The other wounds were left open and dressed with Betadine gauze® (Mundipharma Medical Company, Basel, Switzerland) and compress bandages. At the advice of an infectious disease consultant empirical antibiotic therapy was begun with Cefepime after specimens were obtained for Gram stain and bacterial culture. All culture specimens failed to reveal any bacterial growth, which is unfortunately not a rare issue even in the presence of pus like that was the case here.

Postoperatively, the dressing was changed daily at the bedside and the wound was rinsed with 200ml of warm saline solution by injection into the drain. The multiple holes of the drain permitted good flow all along the plate, and the solution ran out through the open stab wounds. The local condition rapidly improved, the drain



Figure 3: At seven month follow-up, there are no signs of recurrent infection.

was removed eight days later, and the wounds closed under general anaesthesia at the patient's request. At the advice of the infectious disease consultant, empirical antibiotic therapy was changed to oral Doxycycline for a total of ten weeks of treatment.

At seven month follow-up, there were no signs of recurrent infection (Figure 3) and radiographs revealed the fracture to be healed. At 6 years follow-up, the patient never showed any recurrence of infection and the material is still in place.

Discussion

An acute infection following the MIPO technique for a fracture of the distal tibia may lead the surgeon to consider opening the soft tissues over the entire length of the plate in order to perform efficient surgical irrigation and débridement. However, this would not only detract from the advantages of the technique in terms of minimizing soft tissue trauma and preserving extra-osseous blood supply to the tibia, but also leave the plate and screws exposed and thus create potential problems with later closure due to skin retraction, especially in this location.

There are many benefits with the technique described in this report. Irrigation of the infected wounds and placement of the Jackson-Pratt drain are made through the previous MIPO incisions, without further dissection, thus preserving the soft tissues and the local vascular supply. The drain is made of hypo-allergenic silicone and is soft and slippery enough to be easily pulled in and out of the length of the wound without injuring the soft tissues and with little pain. The design of the drain with multiple holes allows a good flow of irrigating solution, and if correctly placed it covers the plate. It has been shown that gently but regularly irrigating a wound with saline is the most efficient way to reduce bacterial levels [18], and doing so daily through the drain reduces the need for repeated visits to the operating room for irrigation and débridement, thus reducing hospital costs. If the patient agrees then even the definitive closure of the wound can be done at the bedside.

Would the evolution be not optimal, the technique doesn't prevent a conversion to a classical treatment consisting of aggressive débridement, lavage and hardware exchange if deemed necessary.

Technical problems can arise with use of the drain. It can become blocked, and for this reason we recommend rinsing the wound with at least 200 millilitres of saline each day or even more often if possible. Although the drain could theoretically break when pulled out [19-20], the lost part of the drain should be easily retrieved in its subcutaneous location.

In conclusion, the use of a Jackson-Pratt drain in the setting of acute infection following MIPO of the distal tibia is a simple and inexpensive technique that can greatly improve the management of this complication in the least invasive way possible.

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