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Case Report

Salvage of a Failed Pilon Fracture Fixation with a Retrograde Tibiotalocalcaneal Nail, Cylindrical Cage Insertion Plus Bone-Grafting: Ten Years Follow-Up

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Abstract

Pilon fractures constitute less than 10% of tibial fractures. Low energy pilon fractures generally have a good outcome. High energy type pilon fractures have a significant soft tissue injury and bony communition. They are usually caused by axial loading in which the talus is driven into the tibia. Open pilon fractures have significant morbidity and the rate of limb amputation is about 6.2%.

We present a case of open pilon fracture that had two unsuccessful surgical interventions. The last salvage procedure was a retrograde intramedullary tibiotalocalcaneal nailing plus cylindrical titanium cage and bone-grafting. He developed Methicillin Resistant *Staphylococcus aureus* infection. The infection was managed successfully with antibiotics. He has been symptom-free for six years. The patient was followed up for ten years and the functional outcome is fair.

Retrograde tibiotalocalcaneal fixation is a technique for a variety of complex hind foot pathologies like arthrosis, Charcot arthropathy, failed total ankle arthroplasty and malunited fractures. It is commonly regarded as a salvage procedure. It has a significant complication rate.

Keywords

Cage; Methicillin resistance *staphylococcus aureus*; Nailing; Pilon fracture; Tibiotalocalcaneal

Introduction

Pilon fractures constitute about 5%-7% of all tibial fractures [1]. They are difficult to treat because of a very thin soft tissue envelope plus fracture comminution. High-energy pilon fractures have a higher complication rate [2].

Open tibial pilon fractures are relatively rare. Their management is controversial because there is no standard protocol. They have a higher complication rate compared to closed fractures. The incidence of deep sepsis and amputation rate are relatively high, 6.2% and 6.0% respectively [2]. Some of the surgical techniques available for pilon fractures are; open reduction and internal fixation, external fixator using either the Ilizarov type or mono-axial type.

We report on a patient who sustained an open high-energy pilon fracture. The fracture was internally fixated with a plate and screws after debridement. The fixation failed. The limb was salvaged with a retrograde tibiotalocalcaneal nailing, cylindrical cage insertion plus bone-grafting. We present our ten-year follow-up.

Case Report

A 46-year-old male presented to the emergency room with an open right tibial plafond fracture. He fell of a table at home.

He was clinically stable and there were no any other injuries. He had no relevant medical or surgical history.

He was admitted to the orthopedic ward for further management. Initial treatment was wound debridement plus fracture stabilization with external fixator. The size of the wound was eight centimeters. The fracture was fixated with the plate and screws. The leg was shortened by three centimeters to allow wound closure. There was no infection or wound breakdown.

He presented six months later with a clinical problem of right leg deformity and pain. X-rays showed implant failure. Further management was done in two stages; the first stage was debridement of the distal tibia plus implant removal. Bone and soft tissues were sent for microbiological analysis. The limb was splinted with a plaster cast. No bacteria were isolated. The second stage was done two weeks later. Debridement was done and specimens sent for analysis. The patient declined any procedure involving the use of external fixator or limb amputation. The six centimeter defect was bridged with a titanium cylindrical cage. The inside of the cage was packed with autologous bone obtained from the ilium. Plating using the locking system was done. This technique was also unsuccessful (Figure 1).

Figure 1: Cylindrical titanium cage was used and plating was done. Autologous bone grafting was done. The procedure was unsuccessful.

The third surgical intervention was a retrograde intramedullary nail - tibiotalocalcaneal fixation cylindrical cage insertion and bone grafting. Specimen were sent for microbiological analysis. Methicillin resistance *staphylococcus aureus* was cultured. Intravenous 1.0 gram eight hourly vancomycin was administered for six weeks. Blood levels of vancomycin were determined as advised by the infection specialist. Infection was successfully suppressed.

Regular follow-up was done every six months or as necessary. Every infection episode was treated conservatively, the patient was admitted and antibiotics were administered as stated. All episodes of infection were successfully suppressed. The last review was done ten years later. X -rays showed no implant complications (Figure 2).

Figure 2: Ten-year follow up after tibiotalocalcaneal retrograde nailing cage insertion and bone grafting. No implant failure Fusion could not be confirmed from the normal x-rays or computed tomography scans.

The outcome was evaluated using the AOFAS Ankle-Hind foot Scale. The total score was 70 [70/100]. This indicated fair results. This is the longest follow-up to date using this technique.

Discussion

This patient presented a very complex clinical scenario:

1. Open communited pilon fracture.
2. Implant failure after internal fixation.
3. MRSA infection.
4. Patient's decline of external fixator as a treatment option.

Faced with such a challenging surgical situation, we chose a salvage procedure. A decision was also made to suppress rather than to eradicate infection. Eradication would have necessitated extensive bone and soft tissue debridement plus complex microsurgical operation for soft tissue coverage. Bone defect

would have required bone transport or other complex alternatives.

Retrograde tibiotalocalcaneal fixation is a salvage operation. It was the last resort to achieve a reasonable functional outcome and to avoid amputation. Recurrent episodes of infection were managed medically with acceptable outcome. He has been symptom - free for the last six years. The outcome after ten years of follow-up has been fair. There is no implant failure. Joints fusion and tibial union could not be confirmed by the Radiologists.

Intramedullary retrograde tibiotalocalcaneal arthrodesis of the hind foot is an acceptable surgical procedure for deformity and arthrosis [3,4]. The complication rate is also high. The technique can also be used in salvage operations like pseudoarthrosis, malunited fractures, failure of endoprosthetic replacement, charcot arthropathy and non re constructible pilon fractures [5-7]. The procedure is technically demanding and has a high complication rate.

In conclusion, intramedullary retrograde tibiotalocalcaneal fixation plus cylindrical titanium cage and bone-grafting is a salvage procedure in tibial plafond fractures where there is a large bone defect. Long-term follow-up shows fair functional outcome.

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