The Use of Pediatric Flexible Intramedullary Nails for Minimally Invasive Fibular Fracture Fixation

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ABSTRACT

Traumatic fibular fractures in the setting of an unstable ankle joint require surgical fixation due to the potential for damage to soft tissues. The surgical trend has now moved away from a two stage approach of early open reduction internal fixation (ORIF) of the concomitant tibia fracture followed by percutaneous plate fixation of the fibula. While the potential for malunion and varus deformity is reduced with the use of intramedullary nail fixation, the capability for permanent adjunctional fixation option for fibular fractures associated with pilon fractures as well as patients with comorbidities that complicate open fixation. This case demonstrates the importance of minimally invasive surgical fixation when faced with potential soft tissue complications in an elderly, obese patient with limited ambulation. The use of flexible pediatric intramedullary nails has the potential to restore length to the fibula while not limiting component of the seriousness. The distal tibia possesses an increased risk of infection from an iatrogenic open fracture. Surgical fixation now focuses on minimizing soft tissue complications through percutaneous technique. This case study presents a new minimally invasive technique that provides internal fixation of a fibular fracture by the use of two flexible pediatric intramedullary nails typically used in long bone fractures of children.

INTRODUCTION

Due to potential complications, pilon fractures should be considered soft tissue injuries that involve fractured bones (1). These injuries can vary greatly in severity, as either closed or open fractures. With the patient’s soft tissue envelope as the rate limiting component of the seriousness. The distal tibia possesses inherent vulnerability to comminuted fractures, due to the lack of muscular origin (2). This predisposes the ankle to a higher propensity for damage of the surrounding thin dermal layer (3). The surgical trend has now moved away from the two stage approach of early open reduction internal fixation (ORIF) of associated fibular fractures to focus on initial minimally invasive surgical management (4). The use of intramedullary nail fixation has the potential to restore length to the fibula while not limiting component of a single rod or screw fixation while conceivably allowing for syndesmotic fixation depending on the width of the intramedullary canal. The flexibility of the nail lessens the potential for fatigue fracture associated with rigid intramedullary fixation (8). Faced with the challenging proximal fibular fracture or Maisonneuve fracture, the nail possess the length and flexibility for near anatomic reduction by distal insertion. Nail fixation greatly reduces potential incision healing complications while reducing operative time and lessening symptomatic hardware (9). Intramedullary fixation compares favorably to ORIF in union rates and bony consolidation (10). While the potential for malunion and nail migration exist, the benefit of minimal invasive fixation greatly outweighs the risk.

CASE REPORT

A case is presented of an 82 year old female whom suffered a traumatic fall resulting in a bilal plated fracture and corresponding fibular fracture. The patient whom lives alone and has difficulty ambulating unassisted was admitted for pain management following closed reduction. Due to several co-morbidities including diabetes, obesity, vascular disease and dementia, the unstable ankle fracture was fixated percutaneously utilizing two flexible pediatric intramedullary nails for the fibula following percutaneous plating osteosynthesis of the concomitant tibia fracture. The patient was taken to the operating room and placed supine on the table. Following successful induction of anesthesia, the fibial and fibular fracture were further closed reduced. The fibular fracture was fixated by cannulated screws and plate application placed supraperiosteal with percutaneous technique. Attention was then directed to the fibular fracture which was held reduced as a small incision was made below the distal fibula and a small drill is inserted into the medullary canal. The first flexible nail is threaded into the canal using a cannulated locking T-handle while rotating the tapped lip of the fibula. The nail is then impacted into place and the second nail is inserted utilizing identical technique.

The patient experienced minor delays in healing the small percutaneous stab incisions but eventually healed with local wound care. No reported infections or painful hardware has been noted. 10 months post-op, radiographs demonstrate some distal migration of the nails but were clinically unremarkable with no skin tenting noted.

DISCUSSION

The flexible nail is utilized to lessen soft tissue insult, provide intramedullary reduction of proximal fibular fractures and as an adjunctive fixation option for fibular fractures associated with pilon fractures as well as patients with comorbidities that complicate open fixation. This case demonstrates the importance of minimally invasive surgical fixation when faced with potential soft tissue complications in an elderly, obese patient with limited ambulation. The use of flexible nails for fibular fracture management has sparsely reported in the literature (7). The use of two nails eliminates the potential axial rotation component of a single rod or screw fixation while conceivably allowing for syndesmotic fixation depending on the width of the intramedullary canal. The flexibility of the nail lessens the potential for fatigue fracture associated with rigid intramedullary fixation (8). Faced with the challenging proximal fibular fracture or Maisonneuve fracture, the nail possess the length and flexibility for near anatomic reduction by distal insertion. Nail fixation greatly reduces potential incision healing complications while reducing operative time and lessening symptomatic hardware (9). Intramedullary fixation compares favorably to ORIF in union rates and bony consolidation (10). While the potential for malunion and nail migration exist, the benefit of minimal invasive fixation greatly outweighs the risk.

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