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Osteosynthesis of ankle fractures with an intramedullary nail of the fibula: surgical technique

Abstract

Ankle fractures are common and represent approximately a quarter of all lower limb fractures. The general concepts for osteosynthesis techniques for deviated and unstable fractures have undergone little change since the 1960s. The presence of comorbidities and poor soft tissue conditions, especially in elderly patients, is associated with a higher rate of postoperative complications. Intramedullary implants have the advantage of using smaller incisions, which minimizes skin damage allowing for early loading. The present technical note describes the use of the fibular intramedullary nail with a minimally invasive approach to deviated and unstable ankle fractures.

Keywords: ankle fracture, fibula stem, internal fixation, malleolus

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Introduction

Ankle fractures are among the most common of the lower limbs, they are responsible for about 9% of all fractures,[1] and their treatment, when surgical, is one of the most common orthopedic trauma procedures performed in urgent and emergency centers throughout the world.[2] There is a bimodal prevalence, with groups of young male and middle-aged womenpresenting an increasing incidence in this latter group, especially in the older age group.[3,4] Surgical treatment is indicated for deviated and unstable fractures. The concept of open reduction and internal fixation (RAFI) using plate and screws as the gold standard, it was established in the 1960s and remains in force today.[4] However, the incidence of complications with this approach can reach 30%.[4] Among the complications observed after surgical treatment, we observed the occurrence of infection in the wound operative in up to 26.5%[5] of the cases, symptoms related to extra-medullary implants in up to 50% and mechanical failure in up to 14%.[4] Elderly patients, especially those with comorbidities such as diabetes mellitus, rheumatoid arthritis, vascular failure and peripheral neuropathy, have a higher incidence of complications after surgical treatment.[5]

Minimally invasive techniques for fracture fixation have been used and defended with good response in the prevention and reduction of serious complications of surgical wounds, especially in the most susceptible patients.[4] Intramedullary fibular nails (HIF) were developed to minimize surgical dissection, allowing an early approach, offering less subcutaneous protrusion of the implants, with less surgical time and greater biomechanical stability, especially in osteopenic bones.[6] There are already comparative records in the literature regarding the stability of this device against RAFI, demonstrating equivalence in the reduction capacity and stability of the two techniques.[1,4] HIF has demonstrated reliable percentages of consolidation, results in equivalent postoperative functional scores and a lower rate of complications when compared to RAFI in high-risk patients.[3,7,8] These factors are associated with a reduction in hospital stay and treatment costs.[4] The purpose of this technical note is to describe in detail the operative technique performed by the ankle and foot surgery team at this service, increasing the options for the surgical treatment of ankle fractures, especially in elderly patients and with multiple comorbidities.

Description of the technique

The patient is positioned supine with a pad under the ipsilateral gluteus, under general anesthesia or neuraxial block. The use of a tourniquet is not necessary. After the anti-asepsis procedures and placement of surgical drapes, the fracture is reduced through manipulation and often, using Backhaus forceps to assist and stabilize the reduction (Figure 1&2). The following is a guide wire for 2.0 mm thick, it is introduced percutaneously at the distal end of the fibula under fluoroscopic control in two perpendicular planes (anteroposterior and lateral-Figure 3). The guidewire can help reduce the fracture.

The guidewire is first introduced with the aid of a perforator and then a manual progression is made with the introducer to allow it to go into the bone marrow of the fibular shaft. The medialization of the guide entry in 1-2 mm of the fibular tip can prevent damage to the lateral wall of the fibula at the time of insertion of the nail. After radioscopic control, a small incision is made around the guidewire with subsequent divulsion of the adjacent tissues with hemostatic forceps to allow the insertion of the cutters. Milling of the distal fibula fragment begins, usually the distal 4 cm with a 5 mm thick cannulated

cutter on the guide wire. If necessary, larger cutters (6mm and 7mm) can be used in the surgical arsenal. The diaphyseal channel is manually milled with the smallest bit a few centimeters above the planned height for introducing the nail. The guide wire is then removed so that the fibula rod, which is massive, can be inserted. The rod is then mounted on the introducer coupled to the locking guides (Figure 4) and inserted manually into the fibula. The model commonly used is the semi-rigid intramedullary nail with 180.0x3 lock. 0 mm (Hexagon-Registration with ANVISA-10209780098). Adequate positioning and reduction are confirmed with fluoroscopy.

Figure 1 Reducing clamp and rod+locking screws.

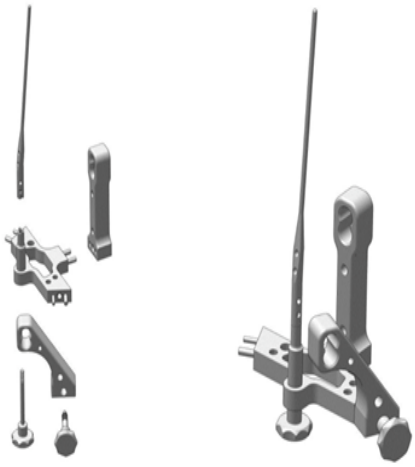

Figure 2 Reducing clamp and guide in use.

Figure 3 Introduction of the guide in the AP and Profile.

Figure 4 Diagram of mounting the rod on the locking guide.

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The next step is to proceed with the distal blocking of the nail, which is placed in the anteroposterior direction through a radiotransparent blocking guide. A small anterior incision is made and carefully dissected to the bone plane adequately protecting with the guide in order to prevent inadvertent injuries to the superficial fibular nerve. The chosen hole is drilled with the 3.0mm drill and the block is made with 13.5mm cortical screw. Then, the same procedure is used to fix the other distal lock of the nail. The nail has two more proximal blocks, with latero-medial orientation, which aim to prevent the shortening of the fracture by proximal nail migration. Based on the fracture pattern and bone quality, these blocks can be advanced towards the tibia, using two 3.5 mm tricortical screws close to the distal tibiofibular syndesmosis region. Drill the bottom hole with the 3.0mm drill and fix with a 3.5mm cortical screw, then perform the same step in the top hole. Transindesmoidal screws can be used even in the absence of syndesmosis injury in order to increase the stability of the synthesis. The initial proposal is to keep the screws indefinitely, unless other complications require their removal. Ankle stability is checked through radiographs with intraoperative stress (Figure 5). Osteosynthesis of the medial malleolus is performed depending on the fracture pattern, as well as the skin conditions at the site. The posterior malleolus is usually not directly reduced, and may be percutaneously fixed or even not fixed, if this prolongs the treatment or increases the risk of soft tissue injuries. The wounds are then abundantly irrigated and sutured with nylon without closing the subcutaneous tissue. if this prolongs the treatment or increases the risk of soft tissue injuries. The wounds are then abundantly irrigated and sutured with nylon without closing the subcutaneous tissue. if this prolongs the treatment or increases the risk of soft tissue injuries. The wounds are then abundantly irrigated and sutured with nylon without closing the subcutaneous tissue. The postoperative regimen is performed with dressing change at 1 week, removal of stitches at 2 weeks and early loading according to what is tolerated. We usually use an immobilizer boot with support for the first 4 weeks. Since they are more debilitated patients. Next, we started the physiotherapy rehabilitation process.

Figure 5 Radioscopy at the end of the procedure.

Final comments

RAFI in the treatment of unstable and deviated ankle fractures is a paradigm that has existed for decades, is and will be the method of choice for the treatment of this type of fracture. However, the understanding that each patient has its own characteristics such as age range, comorbidities and functional demand, reinforces the need for an individualized treatment to be instituted to achieve greater therapeutic success. In this sense, it is believed and the literature that minimally invasive techniques must be part of the surgeon's therapeutic arsenal. Therefore, the use of a blocked fibular nail is advocated in cases where RAFI presents a higher risk of complications, especially those related to skin coverage.

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Conflicts of interest

Authors declare that there is no conflict of interest.

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