

Ankle fractures in the elder and old people

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ABSTRACT

Introduction: The World Health Organization defines an *elderly person* as anyone who is between 75 and 90 years of age, while those older are called *old people*. The objective of this study was to discuss postoperative results of ankle fractures treated with MIPO and ORIF approach, achieving a functional and biological reduction in patients older than 75 years old. **Materials and Methods:** Between 2013 and 2017, 13 patients beyond the age of 75 with unstable ankle fractures were evaluated. Six were treated with the MIPO approach, and 7 with ORIF. All patients were evaluated at 90 days and 18 months after surgery using the AOFAS score. **Results:** Mean age was 79.7 years (range 75-95). Overall postoperative AOFAS score was 97 at 90 days and 96 at 18 months. No losses of reduction or shaft defects were observed. **Conclusion:** Our study indicates that biological and functional reduction in patients older than 75 years is the ideal treatment for ankle fractures.

Key words: Ankle fracture; elderly; functional reduction; biological reduction.

Level of evidence: IV

Fracturas de tobillo en ancianos y personas de edad muy avanzada

RESUMEN

Introducción: La Organización Mundial de la Salud define como persona anciana a toda aquella de entre 75 y 90 años y los que sobrepasan esta edad se denominan personas de edad muy avanzada. El objetivo de este estudio fue analizar los resultados posoperatorios de las fracturas de tobillo tratadas con técnicas MIPO, y de reducción abierta y fijación interna (RAFI), en las que se logró una reducción funcional y biológica en pacientes >75 años. **Materiales y Métodos:** Entre 2013 y 2017, se evaluó a 13 pacientes >75 años con fractura inestable de tobillo. Seis fueron operados con técnica MIPO y siete, con RAFI. Todos fueron evaluados a los 90 días y a los 18 meses de la cirugía mediante el puntaje de la AOFAS. **Resultados:** La edad promedio era de 79.7 años (rango 75-95). El puntaje global de la AOFAS fue 97 a los 90 días y 96 a los 18 meses. No se observaron pérdidas de reducción ni vicios de ejes. **Conclusión:** Nuestro estudio indica que la reducción biológica y funcional en pacientes >75 años es el tratamiento ideal para las fracturas de tobillo.

Palabras clave: Fractura de tobillo; ancianos; reducción funcional; reducción biológica.

Nivel de Evidencia: IV

INTRODUCTION

The World Health Organization defines an *elderly person* as anyone who is between 75 and 90 years of age, while those older are called *old people*. Ankle fractures are the third most common fractures in patients >75 years, after hip and wrist fractures. Osteoporosis, poor soft tissue coverage, vascular disease and diabetes are comorbidities affecting these patients.¹

Ankle fractures in bones affected by osteoporosis are complex because of poor screw fixation. It has been shown that locking plates increase biomechanical stability compared with regular 1/3 tubular plates.^{2,3}

In ankle fractures, the goal is to restore the consistency and stability of the mortise. However, adequate fixation is difficult due to osteoporosis in this group of patients.^{2,4}

Displaced and unstable ankle fractures are usually treated by open anatomical reduction and stable internal fixation to avoid malunion, joint defects and pseudoarthrosis.⁵⁻⁸ The standard osteosynthesis approach for the distal

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fibula consists in internal fixation with a screw plate and, for the medial malleolus, it comprises fixation with cannulated screws, pins or a combination of both. Since soft tissue coverage of the distal leg is thin, when there is damage, blisters or contusions on the skin, the MIPO (minimally invasive plate osteosynthesis) approach is a useful alternative to treat it.^{9,10}

Minimally invasive osteosynthesis, through indirect reduction, decreases iatrogenic damage to soft tissues and bone vascularization, and also preserves the fracture hematoma.⁸⁻¹²

The aim of this study was to evaluate the postoperative results in patients >75 years old with ankle fractures treated by ORIF (open reduction and internal fixation) or MIPO, to achieve a functional and biological reduction, correct alignment, and stable fixation, preserving soft tissues and allowing an early rehabilitation.

The hypothesis was that, in patients >75 years of age, biological and functional reduction should be achieved in fractures involving the ankle joint. Functional reduction is the restoration of bone fragments in such a position that ensures normal function after fracture consolidation, while biological reduction is the preservation of balance between direct and indirect reduction and careful manipulation of the fragments using any type of fracture surgical fixation to reduce vascular damage.¹³

MATERIALS AND METHODS

A prospective, observational, case series study was carried out. Between 2013 and 2017, 14 patients >75 years with ankle fractures underwent surgery. We were able to follow-up 13 of them, which were included in this study.

We considered unstable fractures of the ankle those being bimalleolar and trimalleolar, as well as those of the isolated lateral malleolus when the medial clear space exceeded 4 mm.

AP, latero-lateral and anteroposterior X-rays were ordered, with an internal rotation of 20° in the affected ankle, to establish the fracture pattern, the number of fragments, malalignments and displacements, and fracture classification, as well as for preoperative planning.

AO/OTA (Orthopedic Trauma Association) and Lauge-Hansen classifications of ankle fractures were used in order to determine the type of fracture in all patients.

The inclusion criteria were the following: 1) transsyndesmotomic and suprasyndesmotomic ankle fractures (AO 44B and C), 2) closed fractures, 3) acute fractures, 4) unimalleolar, bimalleolar or trimalleolar fractures, 5) minimum follow-up of 18 months, 6) surgical treatment of fractures (ORIF or MIPO), 7) open fractures.

The exclusion criteria were the following: 1) history of ankle fracture, 2) ankle osteoarthritis, 3) infrasyndesmotomic fractures (AO 44A), 4) lack of follow-up, 5) pathological fractures, 6) bedridden or non-ambulatory patient.

All patients were treated surgically with the MIPO or the ORIF approach. Surgical approach was determined according to the fracture pattern and the condition of the soft tissue. In fibula fractures with a displacement <7mm and soft tissue weakness, the MIPO approach was used.

The postoperative protocol consisted in the use of a short plaster boot for two weeks and then a walker boot with no weight-wearing, but with mobility exercises, for two more weeks. Walking between the fifth and the sixth week with a walker boot was allowed.

In our study, the AOFAS score was used at 90 days and 18 months after surgery. The presence or absence of pain in the immediate postoperative period was analyzed. Function at 12 and 18 months was also evaluated using the AOFAS ankle-hindfoot score.

In the immediate postoperative period, X-rays were taken as reference and for evaluation of possible future loss of reduction. Definitive radiological results were those of the ankle AP X-rays, AP X-rays with internal rotation of 20° and lateral X-rays taken three months or more after surgery.

The average follow-up was 18 months (range 18-20).

RESULTS

The average age of the patients was 79.7 years (range 75-95). All fractures were classified as 44B fractures according to the AO and as supination external rotation fractures according to the Lauge-Hansen classification system. One of the fractures was an open one (Figure 1) and was initially treated with an external fixator for nine days until the soft tissues condition improved (Figure 2). Then, the definitive treatment with the MIPO approach was performed (Figures 3-5).

Six of the patients were treated with the MIPO approach, and seven with ORIF. One patient had a tibiotalar dislocation, and two had a syndesmotomic fracture; the latter were diagnosed during surgery. The most frequent cause of injury was falling from height.



Figure 1. O/A X-rays. Open ankle fracture in a 95-year-old patient.



Figure 2. Postoperative X-rays. Placement of external fixator.



Figure 3. Postoperative X-rays of MIPO of the ankle in a 95-year-old patient.



Figure 4. MIPO of lateral ankle.



Figure 5. MIPO of medial ankle.

The lateral malleolus was fixed with a 3.5mm 1/3 tubular locking plate by a traditional open lateral approach of the ankle or MIPO, while the medial malleolus was fixed with two 3.5mm cannulated screws in eight patients, and one 3.5 mm cannulated screw in one patient.

The time elapsed from injury to surgery was, on average, 6.9 days (range 2-9), and hospital stay was 1.38 days (range 0-10).

Patients resumed weight-bearing with a walker boot at an average of 37.3 days (range 20-45). In our small case population, there were no differences in weight-bearing times between patients treated with ORIF or with MIPO.

The overall AOFAS score was 67 (range 40-70) at 45 days after surgery and 97 (range 90-100) at 90 days. The average AOFAS score at 12 months was 97 (range 90-100) and 97 (range 90-100) at 18 months.

Patients returned to their previous activities at an average of 3 months (range 2-4).

No superficial or deep infections, malalignments or loss of reduction were detected, according to the parameters taken as normal (<2mm on joint surface and <5° of metaphyseal-diaphyseal malalignment).

No signs of post-traumatic ankle osteoarthritis were observed on the mid-term X-rays.

DISCUSSION

Among fractures of the lower limb, ankle fractures are the most commonly-treated by orthopedists.^{9,14} The aim of the treatment of this fracture in patients >75 years is to achieve functional and biological reduction with early rehabilitation.

Traditionally, ankle osteosynthesis in the elderly has been discouraged in fear of soft tissue complications, osteoporosis, diabetes and peripheral vascular disease.¹⁵ Currently, there are several alternatives for the fixation of these fractures, for example, fibular-pro-tibia fusion, posterior osteosynthesis of the fibula, and fixation with pins, among others.²

We performed ankle osteosynthesis in elderly patients to achieve early mobilization, prevent post-traumatic osteoarthritis and ankle stiffness, and avoid soft tissue complications related to the plaster. Other authors state that post-traumatic osteoarthritis in patients of this age range is unimportant, since, in this type of fracture, the aim is to achieve functional reduction and early mobilization.^{3,15}

Vascular injection studies showed preservation of bone blood flow in ankle fractures treated with the MIPO approach compared to open procedures.¹⁶

The disadvantage of the minimally invasive approach is the inability to achieve anatomical reductions as with the open reduction approach. The literature is unclear on what an acceptable reduction is.¹⁶ MIPO is particularly useful in patients of this age group.¹⁰

Lehtonen *et al.*¹⁷ reported an unacceptably high rate (66%) of complications of the surgical wound on the first day of the immediate postoperative mobilization. In our series, no patient suffered complications of the surgical wound due to early mobilization.

Several authors studied superficial and deep infections in ankle fracture surgeries and reported infection rates ranging from 1.3% to 12.9%.^{4,18} In our study, we did not observe superficial or deep infections.

Pagliari *et al.*,⁴ in their series of 23 patients undergoing ORIF, observed that the rate of consolidation of ankle fractures was 100%. Srinivasan *et al.*¹⁹ reported a reduction loss of 2.3%. Guala *et al.*²⁰ reported no reduction loss or poor consolidation. In our study, there was no loss of reduction, and the consolidation rate was 100%.

Regarding AOFAS functional score, Salai *et al.*²¹ reported an average score of 75.22. In our study, the average score was 96 at 12 and 18 months after surgery.

In their study, Davidovitch *et al.*¹⁵ reported that 71% of patients >60 years of age denied limitations in daily or recreational activities. In our study, all patients returned to their previous activities.

The limitations of this study include the lack of a non-surgical comparison group, a limited follow-up of 18 months and a small sample size that conditioned our ability to stage the results. As strengths, we can mention scarce studies on the subject and the increase in patient life expectancy.

CONCLUSIONS

As life expectancy increases, so does the number of elderly patients who need to be offered treatment options that allow them to carry on with their daily routine, achieving functional and biological reduction and early mobilization. Our study indicates that the MIPO and the ORIF approaches are effective and safe to achieve functional and biological reduction in this age group, which is a must in this patient population.

Conflict of interests: The author claims he has no conflict of interests.

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