

The Surgical Treatment Evaluation Of Adulttibial And Fibular Diaphyseal Malunion

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Abstract

Introduction: The purpose of this work is to report the evaluation results of the surgical treatment of leg diaphyseal malunion with osteotomy and osteosynthesis performed in our department.

Patients and methods: This is a five-year retrospective descriptive study, from January 2005 to January 2010, involving 24 patients with leg diaphyseal malunion resulting from a fracture. The study population consisted of 19 men aged between 17 and 62 with an average age of 24 years. The initial injury involved 17 closed fracture cases and 7 open ones. The initial deformity consisted of 10 cases of ante-curvatum between 10 ° and 40 ° and 7 cases of recurvatum ranging from 10 ° to 25 °; 9 cases of varus from 10 ° to 20 ° and 10 cases of valgus varying between 16 ° and 20 ° 25 °. The surgery consisted of a fibular and then a tibial osteotomy followed by tibial osteosynthesis. We used: 15 times the unlocked intramedullary nail, 8 times the screwed plate and a Hoffmann external fixator.

Results: We obtained 50% (n = 12) of good results, 37.5% (n = 9) of average results and 12.5% (n = 3) of poor results. The following residual axial deviations were obtained: 1 case of valgus of 8 ° and 1 case of varus of 10 °, 1 case of recurvatum of 12 °; and 2 cases of shortening from 1 to 1.5 cm; and one case of superficial sepsis.

Conclusion: Leg diaphyseal malunion management is difficult. It will require surgical intervention after assessment of the risk-benefit ratio. However, the most effective alternative remains prevention.

INTRODUCTION

Malunion results from an initial closed reduction defect and / or a compression fracture [1]. The leg diaphyseal malunion is a common orthopedic complication which management is difficult and that is frequently encountered in our work environment following a traditional fracture treatment. Though, in medical literature and developed countries this pathology is almost irrelevant, it does raise serious therapeutic concerns in our daily surgical activities. Malunions therapeutic difficulties are related to the limb alignment restauration, the length, and the joint mobility [2].

The purpose of this work was to evaluate the results of the osteotomy and osteosynthesis surgical treatment of diaphyseal malunion in our department.

PATIENTS AND METHODS

This is a five-year retrospective descriptive study, starting January 2005 through January 2010, involving 36 patients with leg diaphyseal malunion. For patient selection, we used: patient access registers, operative reports, personal patient files and pre-established patient record forms. Any patient that has received and been treated for leg diaphyseal malunion has been included in this study. However, cases of epiphyseal malunions and those found in children have been excluded.

According to our selection criteria, we finally had a study sample of 24 patients consisting in 19 men and 5 women with a sex ratio of 3.8, an age average of 24 years standing between 17 and 62 years. The average consultation time was 6 months with extremes of 2 months and 60 months.

The initial injury was 17 cases of closed fractures and 7 cases of open fractures. The injury site was distributed as follows: 1/3 upper-union-1/3 medium: 2 cases, 1/3 medium-union-1/3 lower: 12 cases and 1/3 lower: 8 cases and the injury was bifocal in 2 cases.

Initial treatment was orthopedic in 10 cases and traditional in 14 cases. Both types of treatment resulted in coronal and sagittal axial deformities. These axial deformities could have been isolated or associated. This initial axial deformation has only been evaluated only in both planes (coronal and sagittal); we did not evaluate rotational deformities.

Thus, in the sagittal plane we found 10 cases of ante-curvatum varying between 10 ° and 40 ° (figure: 1) and 7 cases of recurvatum which angle varied between 10 ° and 25 °.

In the frontal plane we recorded 9 cases of varus whose angle varied between 10 ° and 20 ° and 10 cases of valgus varying between 16 ° and 20 °. We found a leg length shortening on all the patients from 1 to 3 cm. One patient showed knee stiffness with a flexion-extension range of 0/0/25 °.

Spinal anesthesia was systematic in all patients as they were supine, with a pillow placed under their buttocks for mechanical axis of the limb. The correction surgery consisted of the fibular then tibial osteotomy and then tibial osteosynthesis. We used: 15 times the unlocked intramedullary nail (Figure 2), 8 times the screwed plate (Figure 3) and a Hoffman external fixator (Figure 4). In addition, no bone graft has been used.

After a follow up of three and a half years between extremes of 1 year and 8 years, the patients have been reviewed and assessed according to the following functional criteria: pain, joint mobility, and anatomical criteria such as the healing, whether there is a residual axial deviation or not, or limb length discrepancy (Table I). Obtained results were ranked in good, average and poor results.

Table 1

Functional and anatomical assessment criteria

Functional criteria	anatomical	Good	Average	Bad
Pain		-	+/-	++
Joint mobility		+++	++	+/-
Healing		+	+	-
Axial deviation		< 5°	< 10°	< 15°
Shortening		-	< 1 cm	> 1cm

Figure 1

initial axial deformation in ante-curvatum of 40°



Figure 2

Intramedullary nail after osteotomy



Figure 3

Plate and screws

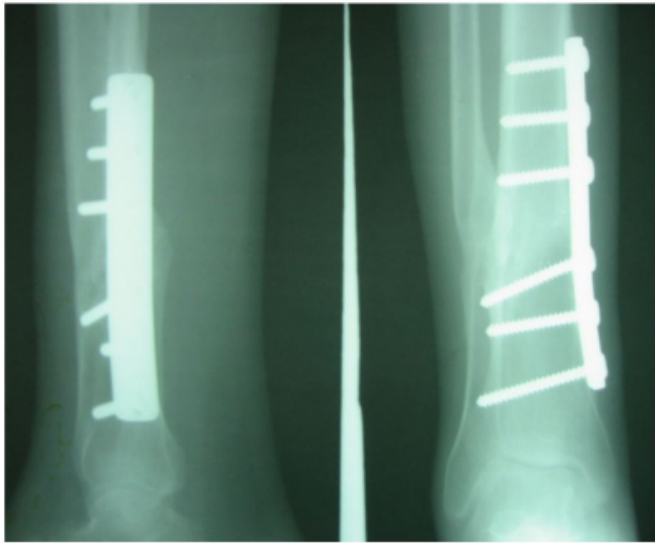


Figure 4

External fixation



Figure 5

Reduction after osteotomy



RESULTS

The average hospitalization time was 7 days with extremes of 4 days and 21 days. After a three year retrospective, with the extremes of 1 year and 7 years, we obtained the following results: 50% (n = 12) of good results, 37.5% (n = 9) of the results and 12.5% (n = 3) of poor results. The following residual axial deviations have been identified: - Thus, on the coronal plane 1 case of valgus of 8 ° and 1 case of varus of 10 °; - And on the sagittal plane 1 case of recurvatum of 12 °; Postoperative length discrepancy was noted in two of our patients (1cm and 1.5cm). The average consolidation time was 120 days with extremes of 90 days and 180 days. This consolidation was systematic in all our patients. Unfortunately, we experienced a case of superficial sepsis induced by the Staphylococcus aureus bacteria.

DISCUSSION

This study shows that traditional surgery treatment remains the major cause of malunion-related leg fracture complications. It would mainly occur among the young male population (average age of 24 years). The initial maximal axial deformities found was the ante-curvatum with an 40° angle (Figure: 1). This type of deformity has never been found in the medical literature, though Lamah et al [3] have described axial deformities resulting from traditional fracture complication treatment that were far less severe than the ones we faced.

The surgical treatment of recent diaphyseal leg fractures is well codified. In neglected forms of complicated malunions, open osteotomy is a must. Such cases have been described to occur in developing countries [4,5]. We performed our osteotomy using bone scissors and a hammer after stamp trephination of the malunion starting from the fibula to the tibia. Unlike Gérard R et al. [6] who described in their series a de-rotation osteotomy using an intramedullary saw. The treatment of a leg diaphyseal malunion with deformity correction (limb length shortening) is difficult since it is performed in a one-time procedure. Indeed, the traction applied to the limb gets transmitted to the soft tissues which can consequently lead to several vascular and nervous disorders [7]. Our shortening technique was performed after the osteotomy by a hyper angulation of both fragments (Figure: 5) assembled, followed by a reduction of the fracture site by gradual extension; this explain why we did not have any case of post-operative vasculo-nervous complications in our study. The residual coronal and sagittal axial deformities were perfectly tolerable by the patients and did not require any additional surgery. The residual leg

shortening found in two of our patients was corrected by a heel piece. The postoperative case of sepsis observed, caused by the Staphylococcus aureus according to the bacteriological examination, necessitated debridement, the removal of the screwed plate and the placement of an external triangular Hoffmann tibial-type fixator

Proper antibiotic therapy helped us contain the infection at 21 days post-surgery. The fixator has been maintained until fracture site healing. We did not find any compartment syndromes or vasculo-nervous disorders unlike Breda R et al. [8] who reported cases of compartment syndrome in the deep posterior compartment of the leg after an inter-tibiofibular graft (ITFG).

CONCLUSION

Leg diaphyseal malunion management is difficult. It requires surgical intervention after assessment of the risk-benefit ratio. Prevention remains the most effective alternative along with a properly indicated and well followed orthopedic treatment. Preventive methods such as information, education and communication campaigns can hinder the intrusion of traditional practitioners in the management of traumatic leg injuries.

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