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Bimalleolar Fractures: Management and Evaluation of Treatment Orthopaedic Traumatology Department, Conakry Military Hospital

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Abstract

Summary: The aim of this study was to improve the management of bimalleolar fractures in the orthopaedic trauma department of Conakry Military Hospital. Patients and Methods: This was a 3-year retrospective and analytical study from 1 January 2019 to 31 December 2021. Patients with a bimalleolar fracture treated and followed in the department were included. Epidemio-clinical and therapeutic aspects were studied, as well as the evaluation of results according to the modified Vidal radio-clinical grading. Result: Thirty-two patients were enrolled, with an average age of 44.56. Men accounted for 65.6% of cases, with a sex ratio of 1.9. Civil servants and patients from the defence and security forces accounted for 25% and 21.9% of cases respectively. Public road accidents accounted for 53.1% of aetiologies. Fractures were closed in 71.9% of cases, and Weber type C represented 59.4% of lesions. Treatment was surgical in 71.9% of cases, and bracing of the medial malleolus combined with a screw plate of the lateral malleolus accounted for 65.2% of surgical indications. Four patients developed complications, including 3 cases of infection and 1 case of pseudarthrosis. The average evaluation time was 17.8 months, with extremes ranging from 12 months to 29 months. Results according to the Vidal radio-clinical score were satisfactory in 96% of cases. There was a correlation between the treatment method and the Vidal score with $p = 0.01$. Conclusion: Bimalleolar fractures are serious injuries that can impair ankle function and lead to major disability in many patients. Weber type C lesions were the most common and surgery was the treatment of choice in the

management of bimalleolar fractures, which allowed the anatomy of the ankle to be restored and satisfactory results to be obtained through rehabilitation followed by patients at Conakry Military Hospital.

Keywords

Bimalleolar Fractures, Bracing, Assessment, Vidal

1. Introduction

Bimalleolar fractures are articular fractures involving the tibial and fibular malleoli, disrupting the lateral-medial stability of the tibiotalar joint, while respecting the main part of the tibial pilon and therefore its role as a support [1]. Ankle fractures are common and can account for up to 15% of patients seen in emergency departments [2]. Their main consequence is frequent disruption of the tibiofibular mortise and its adaptation of the lateral malleolus during movement of the talar tendon [3]. These fractures can interfere with ankle function and cause major disability in many patients; their study remains topical, especially in our context where traditional treatment is still claiming victims.

The diagnosis is often easy, strongly suspected by the clinic and confirmed by radiology, which also makes it possible to diagnose associated bone lesions, classify the fracture and therefore decide on the best therapeutic approach. Whether orthopaedic or surgical, treatment of bimalleolar fractures is an emergency [4]. The treatment of bimalleolar fractures has long been controversial, with both orthopaedic and surgical advocates having good arguments for their respective positions [1]. Several scores for assessing the outcome of bimalleolar fractures have been proposed in the literature, but none has been shown to be superior.

Thus, the high frequency of these fractures and the disabling sequelae that they can cause motivated us to set the general objective of improving the management of bimalleolar fractures in the orthopaedic trauma department of Conakry Military Hospital. The specific objectives were to describe the treatment modalities, evaluate the results and finally try to establish a correlation between the type of treatment and the Vidal radio-clinical score.

2. Patients and Method

This was a 3-year retrospective and analytical study from 1 January 2019 to 31 December 2021. Patients with bi-malleolar fractures treated and followed in the Orthopaedic Traumatology Department of the Conakry Military Hospital were included. Patients whose records were incomplete or lost to follow-up were excluded.

Epidemiological and clinical aspects were studied (age, gender, socio-professional category, skin opening classified according to Duparc and Cauchoix). The anatomopathological classification was carried out according to Denis and Weber,

which is based on the level of the lateral malleolar line in relation to the anterior and posterior intertibiofibular ligaments, fundamental elements of the tibiofibular syndesmosis. This classification comprises 3 types: type A (sub-ligament line), type B (inter-ligament line) and type C (supra-ligament line). We have considered type B and type C to be unstable fractures.

Orthopedic treatment, which meets the need for anatomical reconstitution of the joint in stable, minimally displaced fractures, was performed in some cases under general anaesthetic, and involved reduction by external manoeuvring, impaling the heel with one hand and pulling it downwards and then forwards (the "tire botte" manoeuvre); followed by a plaster cast, the first control X-ray is taken immediately, with assessment of the radiological criteria for good reduction (the fibula must regain its length, axis and rotation; the tibiofibular space must be of constant width from the front and the side; and the talus must be correctly centred in the malleolar clamp, as determined by the Skinner and Joy test). The patient is placed under hospital supervision, and the limb is elevated for 24 hours.

On the other hand, surgical treatment has been the treatment of choice for unstable and/or open displaced fractures, since reduction must be anatomical and medium- and long-term results depend on it. Lateral malleolar fractures are repaired using a screw plate or, in some cases, centromedullary pins, while medial malleolar fractures are repaired using a shroud, sometimes a screw, sometimes 2 screws or pins, followed by a plaster cast for support. Healing of the surgical wound took 1 - 2 weeks. Progression was favorable when the fracture site was consolidated, with satisfactory joint mobility, and unfavorable in the case of pseudarthrosis, infection, callus or stiffness. It should be noted that all our patients benefited from ankle rehabilitation sessions. The average evaluation time was 17.8 ± 5 months, with extremes ranging from 12 months to 29 months. We classified our results according to the modified Vidal radio-clinical score (see Table 1), which consists of radio-clinical assessments of 4 items (pain, gait, mobility and radiology).

Table 1. Modified Vidal radio clinical score.

PAIN	WALK
5 = Normal (absent)	5 = Normal
4 = Barometric pain	4 = Functional Gene in rugged terrain
3 = Pain on exertion	3 = Discomfort on stairs
2 = Spontaneous daytime pain	2 = Lameness without cane
1 = Spontaneous nocturnal pain	1 = Walking with a cane
MOBILITY	**RADIOLOGY**
5 = Normal	5 = Normal
4 = Dorsal flexion between 10 and 20˚	4 = Ligament calcifying osteoporosis, condensation

Continued

3 = Dorsal flexion between 0 and 10˚	3 = Localised osteoarthritis (internal or external)
2 = No dorsal flexion	2 = Arthrose tibiotarsienne, diastasis
1 = Residual equinism	1 = Axis fault
Good	17 to 20
Acceptable	13 to 16
Bad	8 to 12
Catastrophic	0 to 7

We correlated the treatment methods with the results of the Vidal score.

3. Data Collection and Analysis

Data were collected on a pre-established form from consultation and operative report registers.

Statistical analysis of the data was performed using SPSS 28.0.10 software, and the ANOVA test was used for correlation of means between qualitative and quantitative variables, with a significance level of $p < 0.05$.

4. Results

Thirty-two (32) patients were enrolled, with a mean age of 44.56 years and extremes of 24 and 77 years.

Men accounted for 65.6% of cases, with a sex ratio of 1.9.

Civil servants and patients from the defence and security forces accounted for 25% and 21.9% respectively.

The clinical data of the 32 patients were distributed as follows (Table 2):

Road traffic accidents accounted for 25% of aetiologies.

There were 9 cases of open fractures, *i.e.* 28.1%.

The anatomopathological lesions were Weber type B and type C, respectively 15.6% and 59.4%.

Table 2. Distribution of the 32 patients according to clinical data.

	Staff	Percentage
Etiology		
AD	8	25.0
AS	4	12.5
AVP	17	53.1
Fall	3	9.4
Skin lesion		
Closed fracture	23	71.9
Open fracture	9	28.1

Continued

Classification de Weber		
A	8	25.0
B	5	15.6
C	19	59.4

Patients were divided according to treatment method and fracture type (Table 3), with 28.1% undergoing orthopaedic treatment compared with 71.9% undergoing surgical treatment.

Surgically, 15 patients underwent bracing of the medial malleolus associated with a screwed plate of the lateral malleolus (Figure 1) and 4 patients underwent screwing of the medial malleolus associated with a screwed plate of the lateral malleolus (Figure 2).

Table 3. Distribution of the 32 patients according to Weber classification and treatment.

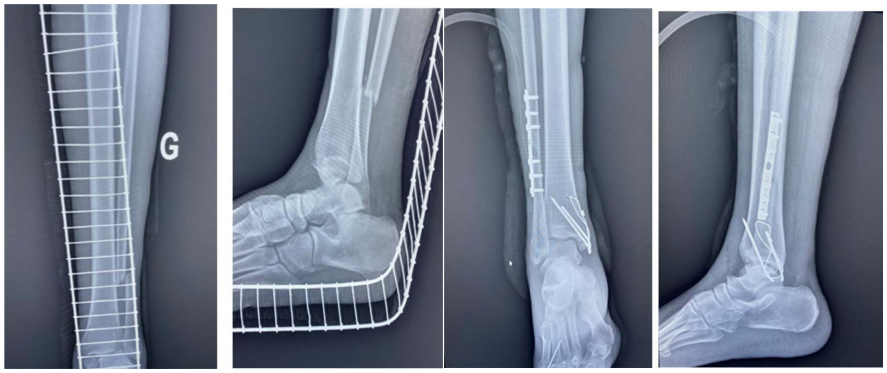
Weber	Orthopedic treatment (28.1%)	Surgical treatment (71.9%)			
		FE	*HAU + PV*	*SCREW + EM*	*SCREW + PV*
A	5	0	0	3	0
B	1	0	2	0	2
C	3	1	13	1	1

(A) (B)

Figure 1. Initial X-ray of the ankle (F/P) which shows a bimalleolar fracture type c of Weber and the follow-up X-ray [B] after 45 days which shows osteosynthesis of the lateral malleolus by screwed plate third of the tube and the medial malleolus by a screw.

Complications were reported by 4 patients (12.5%), including 3 cases of infection and 1 case of pseudarthrosis (Figure 3).

The results of treatment according to the Vidal score were good in 19 patients (59.4%), satisfactory in 37.5% of cases and 3.1% poor (Table 4).



(A) (B)

Figure 2. Initial X-ray of the ankle (F/P) [A] showing a weber type c bimalleolar fracture and the postoperative control X-ray [B] showing osteosynthesis of the lateral malleolus using a screwed plate with a third of a tube and of the medial malleolus using a shroud.

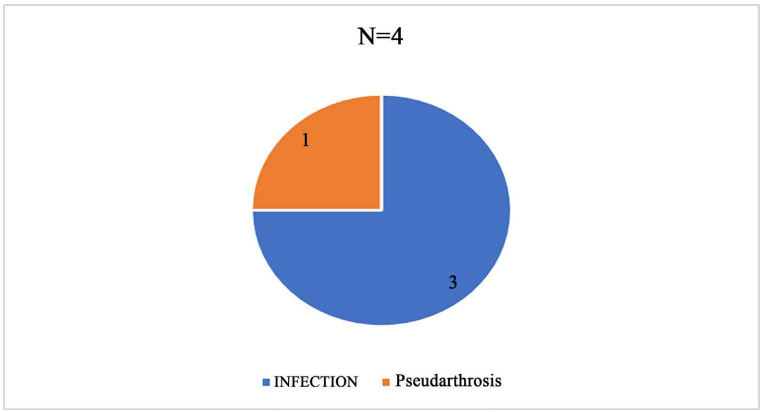


Figure 3. Distribution of complications.

Table 4. Distribution of the 32 patients according to the Vidal score.

	Workforce	Percentage
Vidal score		
[17-20]	19	59.4
[13-16]	12	37.5
[8-12]	1	3.1
[4-7]	0	0.0

Average assessment time 17.8 months [Min: 12; Max: 29].

The results of the evaluation of the treatment of bimalleolar fractures according to the treatment method and the Vidal score with a correlation p = 0.01 (Table 5).

5. Discussion

We enrolled 32 patients with an average age of 44.56 years, ranging from 24 to 77 years; men accounted for 65.6% of cases, with a sex ratio of 1.9. Civil servants and patients from the defence and security forces accounted for 25% and 21.9% of

Table 5. Distribution of the 32 patients according to treatment and Vidal score.

	Vidal score					
	Good	Acceptable	Bad	Catastrophic	Total	P
Orthopaedic	3	6	0	0	9	
Surgical						
FE	0	0	1	0	1	0.01
HAU + PV	11	4	0	0	15	
SCREW + EM	2	2	0	0	4	
SCREW + PV	3	0	0	0	3	
Total	19	12	1	0	32	

cases respectively. Public road accidents accounted for 53.1% of cases. Fractures were predominantly closed, accounting for 71.9% of cases, and Weber type C represented 59.4% of anatomopathological lesions. These results corroborate those found by Mba Mba C *et al.* [5], *i.e.* 85.5% of fractures were closed, and are contrary to those found by Diallo A [6], *i.e.* open fractures predominated in 72.73% of cases.

There was a predominance of Weber type C, which could be explained by high-energy lesions with displacement and syndesmotic lesions, especially as most of the patients in this study were young, This result is superposable with several series in the literature, including those reported respectively by Lamgari G. [7] in 65.57%; Bangoura I. S. [8] in 63.33%; Mba Mba C *et al.* [5] in 58%. These results are contrary to those found by Ayouba G *et al.* [9] 35% of type C and that reported by Saliha K. [10] who found a predominance of type B in 82% of cases.

Orthopaedic treatment was performed in 9 cases, including 5 patients with Weber type A lesions, 1 with Weber type B lesions, and 3 patients with type C lesions who were placed in plaster casts because of unfavourable socio-economic conditions. Surgical treatment was performed in 71.9% of cases, including bracing of the medial malleolus combined with a screw plate of the lateral malleolus, representing 65.2% of surgical indications. In this study, we consider that the technique of bracing the medial malleolus, although restrictive, provides good stability and compression of the medial malleolus.Our results concur with those of Diallo A. [6] with a predominance of surgical treatment (screw fixation of the medial malleolus 87.87%, plate screw fixation of the lateral malleolus in 54.55% followed by bracing in 30.30%) Mba Mba C [5] 85.5% of cases treated surgically and higher than that of Nasri. R *et al.* [11] in 2015 who performed screw fixation of the medial malleolus in 36.86% of cases and bracing of the medial malleolus in 21% of cases, screw plate in 15% on the lateral malleolus.

For a number of reasons, surgical treatment is now the treatment of choice for malleolar pincer fractures, and it must not suffer from any imperfections [4], since poor surgical treatment is more serious than poor orthopaedic treatment. This was clearly established at the SOFCOT teaching conference after long-term anal-

ysis of 275 bimalleolar fractures from several French centres [12]. Surgical treatment, which is now systematically applied, must respect two precepts: the imperative of flawless anatomical reduction and the essential role of the skin cover plane and its management at all stages of management [4].

Complications arose in 4 patients, three of whom developed an infection and one of whom developed aseptic pseudarthrosis of the medial malleolus. We believe that the complications mentioned in this study are largely due to the delay in the management of open fractures, as two of our patients had been referred to second-line care after having passed through traditional medicine because of unfavourable socio-economic conditions, and the other case of infection was a dehiscence of the surgical scar by skin necrosis on skin maintained by the use of dermocorticoids observed in one patient; these results are comparable to those of many authors in the literature [13]-[15]. The evolution was favourable in the majority of cases, these good results obtained could be explained by the anatomical reductions during the various treatments and that the re-education instructions weré well followed. The mean time to evaluation was 17.8 ± 5 months with extremes ranging from 12 months to 29 months; thus results may vary according to the mode of treatment. For the 9 patients treated orthopaedically in our series, the results were good in 3 cases and satisfactory in 6 patients. This could be explained because the fractures were simple with little or no displacement. We recorded 95.65% satisfactory results and 4.34% poor results for surgical treatment.

Overall, in our series, 96.9% of patients had satisfactory results, similar to those found by Mba Mba C *et al.* [5] (91.3%) and Raherinantenaina *et al.* [16] (90%) In a series of 116 patients, 80% of whom were treated surgically with an average follow-up of 8 years, Joz *et al.* [17] found 51% good results, 29% satisfactory results and 20% poor results; these results are better than those found by Ayouba G *et al.* [9] (78% of cases). According to BIGA N [12], many factors affect long-term results, some of which are related to the terrain, others to the type of fracture and its treatment. The good results of this study may be explained by the fact that our patients were treated with blood reduction using anatomical techniques, a treatment favoured by several authors [18]-[21], who rightly believe that orthopaedic treatment, even for fractures that are not very displaced, is associated with sequelae (joint stiffness, osteoarthritis, callus). In our series, we established a correlation between the type of treatment carried out and the result of the Vidal radio-clinical assessment, which was $p = 0.01$. Although this correlation was significant, it did not allow us to conclude that the type of treatment and the results obtained were interdependent, given the small size of the sample. On the other hand, it did allow us to approach the methodical analysis of the lesion mechanism and the radiography.

6. Conclusion

Bimalleolar fractures are serious injuries that can impair ankle function and cause major disability in many patients. Weber's type C lesions were the most common

and surgery was the treatment of choice for bimalleolar fractures, restoring the anatomy of the ankle and achieving satisfactory results with good follow-up rehabilitation by patients at Conakry Military Hospital. A prospective study would be indicated to evaluate the results given the small size of the enchantions and with sufficient hindsight to correlate the treatment methods and the results obtained.

Conflicts of Interest

The authors declare that they have no links of interest.

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