

Epidemiology and Treatment of Pseudarthrosis of Long Bones in the Service D Orthopedics-Traumatology of the University Hospital of Donka

Camara Nouhou Mangué*, Diallo Mamadou Moustapha, Barry Alhassane, Diallo Alpha Mamadou Fela, Sidimé Sory, Camara Abdoulaye, Kolié Germain, Lamah Léopold

Service d'Orthopédie-Traumatologie, Centre Hospitalier Universitaire de Donka, Conakry, Republic of Guinea

Email: *nouhoumanguecamara@gmail.com

How to cite this paper: Mangué, C.N., Moustapha, D.M., Alhassane, B., Fela, D.A.M., Sory, S., Abdoulaye, C., Germain, K. and Léopold, L. (2024) Epidemiology and Treatment of Pseudarthrosis of Long Bones in the Service D Orthopedics-Traumatology of the University Hospital of Donka. *Open Journal of Orthopedics*, **14**, 133-138. <https://doi.org/10.4236/ojo.2024.143014>

Received: December 4, 2023

Accepted: March 22, 2024

Published: March 25, 2024

Copyright © 2024 by author(s) and Scientific Research Publishing Inc.

This work is licensed under the Creative Commons Attribution International

License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Introduction: Pseudarthrosis (PSA) of the diaphysis of long bones still remains a current problem, despite improvements in the treatment of these fractures. Our study aims to study the epidemiological and therapeutic aspects of PSA of the diaphysis of long bones. **Method:** This retrospective work concerns 30 cases of non-union of the diaphysis of long bones treated in the orthopedic and trauma surgery department at Donka National Hospital, during a period of 18 months from January 1, 2019 to June 30, 2020. **Results:** We recruited 30 patients, 80% of whom were male, with an average age of 39.9 years. Public road accidents (AVP) represented the main cause of fractures of the diaphysis of long bones 87%, they were open in 25 cases or 83%. The fractures were located in the middle 1/3 of the diaphysis of the long bones in 50% of cases. Treatment of initial fractures was traditional in 21 cases, orthopedic in 2 cases and surgical in 7 cases. It was aseptic nonunion in 28 cases (93%) and septic nonunion in 2 cases. They were hypertrophic in 7 cases, slightly hypertrophic in 5 cases, oligotrophic in 11 cases, atrophic in 6 cases and with bone defect in 1 case. The treatment was based on osteosynthesis including 16 cases of screwed "PV" plate: 7 cases of centromedullary "ECM" nailing, 2 cases of external fixator, 1 case of broaching and 4 cases of Plastering. The results according to ASAMI criteria on an anatomical level were excellent in 19 cases, good in 3 cases and poor in 3 cases, with a union rate of 76%. And 5 patients undergoing consolidation. **Conclusion:** Based on the literature data and the experience of our department, the true treatment of PSA requires correct management of the initial fracture without forgetting the interest in preventing AVP which appears to be an element essential, making it

possible to reduce the incidence of fractures of the diaphysis.

Keywords

Pseudarthrosis, Aseptic-Septic-Diaphysis, Long Bones, Screwed Plate, Intramedullary Nailing, Bone Graft, Osteo-Muscular Decortication

1. Introduction

A unanimous definition of pseudarthrosis does not exist [1] [2]. However, in the literature the authors agree on the length of the consolidation; but we retain the definition of Antanova which considers pseudarthrosis as a fracture that does not consolidate without additional surgery, surgical or not, between six (6) and nine (9) months [2]. It is difficult to treat especially if it is associated with bone loss or infection [3] [4]; and varies according to whether it is hypertrophic or atrophic [5]. Poor surgical indications, infections after osteosynthesis or after an open fracture and the management of patients often by traditional medicine are the main causes. In 2004, Dossim *et al.* [6] at the Tokin University Hospital (Lomé) treated 24 cases of pseudarthrosis.

The objective of this study was to identify the most common pathological type and to evaluate the results of treatment.

2. Patients and Methods

It was a mixed study of 18 months, retrospective of 12 months (from 1 January to 31 December 2019), and prospective of 6 months (from 1 January to 30 June 2020), covering 30 patients received for pseudarthrosis of the diaphysis of long bones in the Orthopaedic Service-Traumatology of the Donka University Hospital, Conakry Republic of Guinea.

Inclusion criteria: Included all patients aged 16 years and over, treated and followed for pseudarthrosis of the diaphysis of long bones during the study period.

Exclusion criteria: Excluded those under 16 years of age, who did not accept treatment and those lost to sight. Our study variables were epidemiological, diagnostic, therapeutic and evolutionary.

Anatomical lesions were classified according to the Weber-Cech classification (**Table 1**) [8]. All patients received surgical treatment initially (nails, screw plates and external fixator); for vital pseudarthrosis: osteo-muscular decortication/osteomuscular decortication + bone grafts; for the avital pseudarthroses, they benefited from bone dissection + bone grafts systematically and for the septic cases, we carried out the Masquelet technique and realized the second time after obtaining a negative reactive protein C. Patients were assessed according to ASAMI criteria (**Table 2** and **Table 3**) after a mean follow-up of 18 months.

Data sources were patient medical records, hospitalization and consultation records, operating report records.

Table 1. Distribution of pseudarthrosis by Weber-Cech Classification [7].

Type		Number	Percentage
VITALE	Hypertrophic	7	23
	Light hypertrophic	5	17
	Oligotrophic	11	37
AVITALE	Atrophic	6	20
	Bone defect	1	3
TOTAL		30	100

Table 2. Anatomical distribution according to ASAMI criteria.

Criteria	Number	Percentage %
Excellent	19	76
Good	3	12
Bad	3	12
Total	25	100

Table 3. Functional distribution according to ASAMI criteria.

Criteria	Number	Percentage %
Excellent	15	60
Average	7	28
Good	0	0
Bad	3	12
Total	25	100

Our data was entered with the Word software and our results were analyzed by the Epi info software version 7.2.

3. Results

We recorded 30 patients including 24 men (80%) and 06 women (20%), with a sex ratio of 4. The frequency of pseudarthrosis was 8% compared to other pathologies operated during the study period. The average age was 39.9 years with extremes of 20 and 70 years. The age group most affected was between 20 and 34 years old, or 43.4%. The etiological circumstances were dominated by road accidents with 26 cases (87%). Bone lesions predominated in the tibia with 13 cases (43.5%), followed by the femur with 11 cases (36.6%). The average third was the most frequent location with 15 cases (50%). Oligotrophic pseudarthrosis was the most encountered with 11 cases (37%), according to the Weber-Cech classification.

The initial treatment was dominated by treatment in traditional medicine with 21 cases (70%). Stabilization after the pseudarthrosis cure was the plate

screwed in 16 cases (53.4%), followed by the centromedullary confinement in 7 cases (23.3%). After eighteen (18) months of follow-up, our anatomical results were excellent in 19 cases (76%); those functional were excellent in 15 cases (60%) according to ASAMI criteria.

4. Discussion

In 18 months we hospitalized and treated 30 cases of pseudarthrosis of the diaphysis of the long bones, or 8% among the 377 cases of hospitalization. In Burkina Faso, Tall *et al.* [8] in 2014 recorded 50 patients over 3 years. This high rate can be explained by the cost of treatment, the lack of a community centre and the lack of specialists in other regions; and the first therapist consulted was most often the tradipraticians. AVP represented the main etiology in our series, 26 cases or 87% against 4 cases of falls or 13%. We find the same result in the whole literature.

In the Central African Republic, Tékpá *et al.* [9] in 2018 found 83.7% of AVPs. Tall *et al.* [8] in Burkina Faso found 90% of cases. These results would be explained by the increase of two-wheeled machines, and especially the availability of people who do not have the required training, without a driver's license, and who do not respect the rules of the road and therefore do not care about the personal injury and property that the accident can cause. However, the average age of our patients was 39.9 years with extremes of 20 and 70 years. The age group most affected was 20 to 34 years old, or 43.4%, this is consistent with data from the literature, where there is a predominance of a younger, more active population in society.

We found a male predominance with 80%; with a sex ratio of 4. This same male predominance was found in the series of Tall *et al.* [8], which was 76% in favor of men.

These results could be explained by the fact that men are more at risk of fractures than women because of their societal responsibility to arise to the needs of their families.

The tibia was reached 13 times followed by the femur 11 times.

Tibia and femur were the most affected segments with the respective values of 22 times and 14 times in the series of Tall *et al.* [8] in Burkina Faso in 2014. This result could be explained by the fact that the tibia is the bone most exposed to the slightest impact during the initial trauma especially in drivers of two (02) wheels. The average 1/3 of the shaft of the long bones was the most found seat with 15 cases or 50% and 10 were located at 1/3 lower or 33%.

These results could be explained by the fact that the 1/3 middle diaphysis is less vascularized which would favor the occurrence of pseudarthroses at this level.

In our study, the traditional treatment was found in 21 cases or 70% and 9 cases of surgical and orthopedic treatment.

On the other hand, our results are contradictory to those of the authors, such as SECONDS and GERARD [10] [11] who respectively find surgical treatment as

the largest provider of PSA 83.33% and 51.72%.

This would be explained by the fact in developing countries the majority of patients are treated first by the traditional doctor.

In our series, the vital pseudarthroses were the most frequent with 23 cases or 77% with a predominance of oligotrophic pseudarthrosis with 11 cases, or 37% against 7 cases of avital pseudarthrosis with 23% (**Table 1**).

Tépka *et al.* [8] in their series reported 69 cases of vital PSA, a rate of 66.3% with a hypertrophic predominance of 35.5%.

This could be justified by the consequence of the mechanical defect related to the initial treatment.

All of our patients received surgery, and the screw plate was the most used implant, in 16 cases or 53.4%; this was due to the type of lesions, the technical platform, the means of the patients but also the need to cause compression at the level of fracture focus. The advantages of surgery are not only to promote stability at the level of the fractured hearth, and osteogenesis but also to dry the infection locally in septic cases; so avoid the infections and recurrent pseudarthroses that have been our main complications. Ali Akhtar [12] and Al Shahrani [13] performed pure compression for simple pseudarthroses especially hypertrophic without shortening and the external fixative was maintained until healing.

The limitations of our work were the poor quality of some X-ray images, with regard to the retrospective study; some patients were lost in the evaluation of the results.

5. Conclusion

Treatment in traditional medicine was the main cause of pseudarthrosis of the diaphysis of long bones and surgical treatment by dissection osteo-muscle with or without bone grafts or the Masquelet technique has resulted in bone consolidation.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Bhandari, M., Fong, K., Sprague, S., Williams, D. and Petrisor, D. (2012) Variability in the Definition and Perceived Causes of Delayed Unions and Nonunions: A Crosssectional, Multinational Survey of Orthopaedic Surgeons. *The Journal of Bone and Joint Surgery*, **94**, 1091-1096. <https://doi.org/10.2106/JBJS.K.01344>
- [2] Antonova, E., Le, T.K., Burge, R. and Mershon, J. (2013) Tibia Shaft Fractures: Costly Burden of Nonunions. *BMC Musculoskelet*, **14**, 42-51. <https://doi.org/10.1186/1471-2474-14-42>
- [3] Zile, K.S., Vinay, G., Sukhbir, S.S. and Pardeep, K. (2012) Gap Nonunion of Tibia Treated by Huntington's Procedure. *International Journal of Clinical and Experimental Medicine*, **46**, 653-658. <https://doi.org/10.4103/0019-5413.104197>

- [4] Gupta, G., Ahmad, S., Zahid, M., Khan, A.H., Sherwani, M.K. and Khan, A.Q. (2016) Management of Traumatic Tibialdiaphyseal Bone Defect by “Induced Membrane Technique”. *Indian Journal of Orthopaedics*, **50**, 290-296. <https://doi.org/10.4103/0019-5413.181780>
- [5] Judet, R., Judet, J., Orlandini, J. and Patel, A. (1967) The Bone and Muscle Dissection. *Revue de Chirurgie Orthopédique et Traumatologique*, **53**, 43-63.
- [6] Dossim, A. (2004) Profil epidmiologique et clinique des lésions traumatiques compliqué par untraitement traditionnelle. *SOMACOT 1st Congress 2004*, Lomé, 50-51.
- [7] Weber, B.G. and Cech, O. (1973) Pseudarthrosen-Pathophysiologie, Biomechanik, Therapie, Ergebnisse.
- [8] Tall, M., Bonkougou, D., Sawadogo, M., Da, S.C. and Toe, M.F. (2014) Study Group Bone and Joint Trauma. Treatment of Non-Union in Neglected Long Bone Shaft Fractures by Osteoperiosteal Decortications. *Orthopaedics & Traumatology: Surgery & Research*, **100**, 145-150. <https://doi.org/10.1016/j.otsr.2014.07.005>
- [9] Tekpa, B.J.D., Doui-Doumbga, A., Feigoudozoui, H.V., Nghario, L., Issa-Mapouka, P.A. and Nali, M.N. (2018) Epidemiology and Treatment of Diaphyseal Leg Pseudarthrosis: About 104 Cases Treated According to a Precise Algorithm in a Precarious Environment. *Journal of Orthopedic and Trauma Surgery*, **104**, 193-197. <https://doi.org/10.1016/j.rcot.2017.11.001>
- [10] Seconds, J.M., Alnot, J.Y. and Masmajejan, E. (2003) Altern Shaft Aseptic Consolidation Delays (About 30 Cases Treated with Plaque and Bone Autograft). *Revue de Chirurgie Orthopédique et Traumatologique*, **89**, 107-114.
- [11] Gerard, Y. (1991) Pseudarthroses of the Humeral Shaft about 58 Observations. *Revue de Chirurgie Orthopédique et Traumatologique*, **117**, 263-269.
- [12] Trigui, M., Ayadi, K., Ellouze, Z., et al. (2008) Treatment of Limb Bone Loss by Segmental Bone Transport. *Revue de Chirurgie Orthopédique et Traumatologique*, **94**, 628-634. <https://doi.org/10.1016/j.rco.2008.02.007>
- [13] Al Shahrani, A.A., Tedla, J.C. and Ahmad, I. (2015) Effectiveness of Ilizarov Frame Fixation on Functional Outcome in Aseptic Tibial Non-Union Cases at Abha, Kingdom of Saudi Arabia: An Experimental Study. *Journal of Taibah University Medical Sciences*, **10**, 216-221. <https://doi.org/10.1016/j.jtumed.2014.09.002>