

# Management of Open Leg Fractures at Zinder National Hospital

Abdou Taofik Moussa<sup>1,2\*</sup>, Souleymane Adoum Fils<sup>1</sup>, Abdoulaye Idrissa Abdoul Madjid<sup>3</sup>, Magagi Ibrahim<sup>1,4</sup>, Idé Garba<sup>3</sup>, Kané Kaka Mm<sup>2</sup>, Abdoul Wahab Allasane Mohamed<sup>3</sup>, Doutchi Mahamadou<sup>1,5</sup>, Habou Oumarou<sup>1,6</sup>, Adamou Harissou<sup>1,4</sup>

<sup>1</sup>Faculty of Health Sciences, André Salifou University, Zinder, Niger

<sup>2</sup>Department of Traumatology-Orthopedics, National Hospital of Zinder, Zinder, Niger

<sup>3</sup>Department of Traumatology-Orthopedics, National Hospital of Niamey, Niamey, Niger

<sup>4</sup>Department of General Surgery, National Hospital of Zinder, Zinder, Niger

<sup>5</sup>Department of Infectious Diseases, National Hospital of Zinder, Zinder, Niger

<sup>6</sup>Department of Pediatric Surgery, National Hospital of Zinder, Zinder, Niger

Email: \*sadoumfiles2022@gmail.com

**How to cite this paper:** Moussa, A.T., Fils, S.A., Madjid, A.I.A., Ibrahim, M., Garba, I., Mm, K.K., Mohamed, A.W.A., Mahamadou, D., Oumarou, H. and Harissou, A. (2025) Management of Open Leg Fractures at Zinder National Hospital. *Surgical Science*, 16, 49-54. <https://doi.org/10.4236/ss.2025.161007>

**Received:** December 27, 2024

**Accepted:** January 23, 2025

**Published:** January 26, 2025

Copyright © 2025 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:** Open leg fracture is a diaphyseal or metaphyseal, extra-articular fracture of one or both leg bones, with communication between the fracture site and the external environment. To provide a broader context, studies conducted globally have highlighted the significance of understanding open leg fractures due to their complex management and potential complications. Previous research in Africa and Europe provides comparative data that emphasizes regional differences in fracture types, causes, and treatment outcomes. This study aims to contribute to improving the management of these fractures in Niger. **Materials and Methods:** This was a prospective, descriptive study carried out in the Traumatology-Orthopedics Department of the Zinder National Hospital, Niger, from December 8, 2020 to June 8, 2022 (18 months). We included all patients over 15 years of age in whom an open leg fracture was diagnosed and managed. Inclusion criteria focused on patients aged over 15 years with confirmed diagnoses of open leg fractures. **Results:** Over an 18-month period, the frequency of open leg fractures was 16.28%. There was a predominance of males (85.93% or n = 116). The average age of patients was 31.79 years. Road accidents were the primary circumstance of occurrence (93.33% or n = 126). The fracture line was simple in 74 patients (54.81%) and complex in 61 cases (45.19%). Surgically, the external fixator was used in 78 cases (57.80%). Postoperative follow-up was mostly straightforward. The main complications were infection (4 cases) and delayed consolidation (4 cases). **Conclusion:** Open leg fractures in adults are frequent at Zinder National Hospital. Public road accidents were the main cause of occurrence. An external

fixator osteosynthesis was the most commonly used surgical option. These findings have important implications for healthcare policy, particularly in improving trauma care infrastructure and road safety initiatives in Niger. Future studies should prioritize the development of standardized treatment protocols and investigate the long-term outcomes of different surgical approaches.

## Keywords

Open Fracture, Leg, HNZ

---

## 1. Introduction

An open leg fracture is a diaphyseal or metaphyseal, extra-articular fracture of one or both leg bones, with communication between the fracture site and the external environment present [1]. To provide a broader context, studies conducted globally have highlighted the significance of understanding open leg fractures due to their complex management and potential complications. Previous research in Africa and Europe provides comparative data that emphasizes regional differences in fracture types, causes, and treatment outcomes. This study aims to contribute to improving the management of these fractures in Niger.

The fracture line is limited at the top by a line that passes four centimetres below the femorotibial joint and four centimetres above the tibiotarsal joint [2] [3]. They are common (8% - 10% of all trauma to the human body), accounting for 20% - 30% of leg fractures in Europe, and 39% in Africa [2] [4]. These fractures occur mainly in road accidents, and constitute a medical and surgical emergency, with serious complications that can be life-threatening [5]. The aim of this work is to share our experience in the management of open leg fractures and their complications at Zinder National Hospital.

## 2. Materials and Methods

This was a prospective, descriptive study carried out in the Traumatology-Orthopedics Department of the National Hospital of Zinder, Niger, over the eighteen (18) month period from December 8, 2020 to June 8, 2022. All patients of both sexes, aged over 15 years, diagnosed with an open leg fracture and managed during the study period were included in the study. The parameters studied were epidemiological, clinical, paraclinical, therapeutic and evolutionary.

Data were collected prospectively from patient records, clinical examinations, and imaging studies. The sample size was determined based on an estimated prevalence of open fractures within the region, using a 95% confidence interval and an allowable margin of error of 5%. Inclusion criteria focused on patients aged over 15 years with confirmed diagnoses of open leg fractures.

## 3. Results

In the course of this study, we recorded 829 cases of fracture, including 135 cases

of open leg fractures, *i.e.* a frequency of 16.28%. There were 116 men (85.93%) and 19 women (14.07%), *i.e.* a sex ratio of 6.10. The mean age was 31.79 years, with extremes of 15 and 70 years. The 15 to 30 age group was the most represented with 93.33% (n = 83). Clinically, public road accidents were the primary circumstance in 93.33% of cases (n = 126). **Table 1** shows the circumstances in which open leg fractures occurred.

**Table 1.** Distribution of patients according to circumstances of occurrence.

Circumstances	Effectifs	Percentages (%)
Domestic accident	01	0.74
Public road accident	126	93.33
Self-inflicted wound	08	05.93
<b>Total</b>	<b>135</b>	<b>100.00</b>

Admission time was less than 6 hours in 61.48% (n = 83) of patients. Radiologically, the fracture line was simple in 54.81% (n = 74) and complex in 45.19% (n = 61) of cases, and in 39.26% (n = 53) the fracture was located in the middle third of the leg. In terms of fractured bones, fractures of both leg bones accounted for 68.89% (n = 93), followed by tibia fractures 30.37% (n = 41) and fibula fractures 0.74% (n = 1).

Therapeutic treatment was medical-surgical. Medical treatment consisted in the administration of a stage 2 analgesic (tramadol), antibiotic prophylaxis (combination of ceftriaxone and metronidazole), anticoagulant (low-molecular-weight heparin) and tetanus prevention depending on the patient's vaccination status. Surgical management consisted of careful wound trimming in all patients, fracture reduction and osteosynthesis by external fixator in 57.80% (n = 78), by screw plate in 37.80% (n = 51) and amputation in 4.44% (n = 6). Average hospital stay was 30.31 days, ranging from 8 days to 90 days. Postoperative follow-up was straightforward in 123 cases (91.11%) and complicated in 12 cases (8.89%), with delayed consolidation predominating in 2.96% (n = 4) and surgical site infection in 2.96% (n = 4).

#### 4. Discussion

The findings of this study align with regional and international trends in the epidemiology and treatment of open leg fractures. However, certain discrepancies were observed, such as the slightly higher frequency of fractures compared to neighboring regions, potentially attributable to differences in road safety measures. Limitations of the study include its single-center design and the relatively small sample size, which may affect the generalizability of the findings. Future research should explore multi-center collaborations to validate these results.

Open leg fractures in adults are frequent, accounting for 16.28% of all fractures treated in this department. This frequency is higher than that found by Idé [6] in Niamey (Niger) and lower than that found by Touré [7] in Mali. In this series, the

mean age was 31.79 years, with extremes of 15 and 70 years. The 15 to 30 age group was the most represented, with 93.33% (n = 83). The same observation was made by several African authors [7]-[9]. Male predominance was found. The same result was found by Mertens [10] and Batchom [11]. This result could be explained by the fact that in countries such as Niger, men are responsible for providing all the family's needs, and motorcycles are the main means of transport for these men, making them more exposed to road accidents. Road accidents were the primary circumstance for the occurrence of open leg fractures in this population, as demonstrated by other authors [12] [13]. Simultaneous involvement of both leg bones was the most common, accounting for 68.89% of cases. This result is comparable to the 80.2% reported by Diallo [14]. This could be explained by the violence of the trauma in public road accidents.

In this study, fracture lines in the middle 1/3 of the leg predominated, accounting for 39.26% of cases. This result is similar to those of Banza [12] and Keita [15] in 2022. This could be explained by the fact that not only is this area the most exposed during trauma, but also by its anatomical peculiarity of being covered only by the skin. In contrast, Myriem [16] found a predominance of open fractures in the lower third of the leg. In this study, external fixator osteosynthesis was the most commonly used method of bone fixation. For Bombah [12], the external fixator is the method of choice for stabilizing open leg fractures, due to the subcutaneous location of the tibia. In contrast, Touré's team [7] used the Ender nail exclusively, as the external fixator would increase the risk of infectious complications. In this study, bone consolidation was achieved in 91.11% of cases (n = 123), while the 7-month follow-up revealed 4 cases of delayed consolidation and 4 cases of surgical site infection.

## 5. Conclusion

Open leg fractures in adults are frequent at Zinder National Hospital, with a large predominance of young male subjects. Public road accidents were the main cause of these injuries. External fixation was the most frequently used surgical modality. In the majority of cases, the outcome was favorable. These findings have important implications for healthcare policy, particularly in improving trauma care infrastructure and road safety initiatives in Niger. Future studies should prioritize the development of standardized treatment protocols and investigate the long-term outcomes of different surgical approaches.

## Conflicts of Interest

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

## References

- [1] Kouassi, K.J., Manon, J., Fonkoue, L., Kodo, M., Detrembleur, C. and Cornu, O. (2019) La prise en charge des fractures ouvertes de jambe dans une structure hospitalière en Côte d'Ivoire pose-t-elle problème et pourquoi? *Revue de Chirurgie*

- Orthopédique et Traumatologique*, **105**, 654-658.  
<https://doi.org/10.1016/j.rcot.2019.05.015>
- [2] Aguératou, K. (2016) Traitement des fractures ouvertes de jambe par enclouage centro médullaire par clou UTN: Indications et résultats à propos de 23 cas au Centre Hospitalier Universitaire Souro Sanou. Thèses de Médecine, INSSA-Burkina Faso.
  - [3] Jirani, M.A. (2019) Fractures ouvertes de jambe: Etude épidémiologique rétrospective allant de 2013-2018 (à propos de 178 cas). Thèses de Médecine, FSS-Rabat-Maroc.
  - [4] Maiga, O. (2006) Etude épidémiologique et clinique des fractures ouvertes des os de la jambe dans le service de Chirurgie Orthopédique et Traumatologique de l'Hôpital Gabriel Touré. Thèses de Médecine, FSS-Bamako-Mali.
  - [5] Dubrana, F., Genestet, M., Moineau, G., Gérard, R., Le Nen, D. and Lefèvre, C. (2007) Fractures ouvertes de jambe. *EMC-Appareil locomoteur*, **2**, 1-18.  
[https://doi.org/10.1016/s0246-0521\(07\)41018-x](https://doi.org/10.1016/s0246-0521(07)41018-x)
  - [6] Idé, G., Dalatou, M.H., Abdoulwahab, M., Hamsatou, N. and Illé, S. (2023) Prise en Charge des Fractures Ouvertes de Jambe chez l'Adulte dans un Hôpital Sahélien: À Propos de 114 Cas. *Health Sciences and Disease*, **24**, 50-53.  
<https://www.hsd-fmsb.org/index.php/hsd/article/view/4560>
  - [7] Toure, L., Terna, T., Kalifa, C., Sidy, H.D.B., Sidiki, S.A., Mahamadou, T.D., *et al.* (2020) Traitement des Fractures Ouvertes Diaphysaires de Jambe par des Clous d'Ender dans un Hôpital de Seconde Référence. *Health Sciences and Disease*, **21**, 47-51. <http://www.hsd-fmsb.org/index.php/hsd/article/view/2125>
  - [8] Ifesanya, A.O., Alonge, T.O., Ogunlade, S.O., Omololu, A.B., Nottidge, T.E. and Ayorinde, R.O. (2008) Changing Trends in the Pattern of Tibial Fractures in Nigeria: A Review of 70 Cases. *Journal of Orthopedics*, **5**, 1-6.
  - [9] Madougou, S., Chigblo, P., Lawson, E., Tella, G., Padonou, A., Nour, M., *et al.* (2017) Facteurs épidémiologiques et résultats de la prise en charge des fractures ouvertes de jambe de l'adulte à Cotonou. *Revue Marocaine de chirurgie orthopédique et traumatologique*, **69**, 26-33.
  - [10] Mertens, B.F., Alban, B.S., Yannick, E.B., Enrique, Z.N. and Daniel, H.E. (2023) Surgical Management of Open Fractures at the Yaounde Central Hospital: Indications and Methods of Fixation: Fractures Ouvertes de jambe de l'adulte à l'Hôpital Central de Yaoundé. *Health Sciences and Disease*, **24**, 77-80.  
<http://hsd-fmsb.org/index.php/hsd/article/view/4303>
  - [11] Batchom, A.D., Arabo, S., Freddy, B., Ngo, A., Marie, Y., Efang, F., *et al.* (2023) Fractures de la jambe chez l'adulte: A Aspects épidémiologiques, diagnostiques, thérapeutiques et évolutifs à l'hôpital Laquintinie de Douala. *Revue Marocaine de Chirurgie Orthopédique et Traumatologique*, **102**, 76-83.
  - [12] Banza, M., Mujinga, I., Nafatalewa, D., Mukakala, A., Kasanga, T., Ngoie, S., *et al.* (2022) Fractures ouvertes des os de la jambes. *International Journal of Applied Research and Studies*, **8**, 274-282.
  - [13] Fioravanti, M., Maman, P., Curvale, G., Rochwerger, A. and Mattei, J.-C. (2018) Conserver ou amputer une fracture ouverte de jambe avec délabrement en première intention? Évaluation fonctionnelle et de la qualité de la vie. *Revue de Chirurgie Orthopédique et Traumatologique*, **104**, 188-192.  
<https://doi.org/10.1016/j.rcot.2018.01.010>
  - [14] Diallo, M., Soulama, M., Valéan, D., Sidibé, A., Ouédraogo, S., Cissé, A.R., *et al.* (2020) Résultats du traitement des fractures ouvertes de jambe par le clou tibial (UTN). *Revue Marocaine de Chirurgie Orthopédique et Traumatologique*, **86**, 19-25.
  - [15] Keita, D., de l'Escalopier, N., Lamah, L., Diakite, S., Keita, F.I.K., Koulemou, P., *et*

*al.* (2022) Intérêt de l'appareil de fixation externe et de traction du Service de Santé des Armées de Guinée dans le traitement des fractures de jambe. *Revue de Chirurgie Orthopédique et Traumatologique*, **108**, 934-940.

<https://doi.org/10.1016/j.rcot.2022.07.018>

- [16] Myriem El, H. (2013) Fractures ouvertes de jambe traitée par fixateurs externes. Thèse de Médecine, Au service de traumatologie-orthopédie CHU-IBN SINA Rabat (Maroc).