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Amputation of Necrotic Limbs in Children: About 35 Cases

A. Doumbia[1*], M. B. Daou[1], I. Amadou[1], O. Coulibaly[1], B. Kamate[1], M. K. Djire[1], Y. Coulibaly[1]

[1]Pediatric Surgery Department of Gabriel Touré University Hospital, Bamako, Mali

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***Corresponding author:** A. Doumbia
Pediatric Surgery Department of Gabriel Touré University Hospital, Bamako, Mali

Abstract **Original Research Article**

Introduction*:** Amputation is a surgical procedure that involves the removal of a limb, a segment of a limb, or a protruding part. ***Objective: To assess the clinical, etiological, and therapeutic aspects of necrotic limbs in the pediatric surgery department of Gabriel Touré University Hospital. ***Methodology*:** This was a prospective study from January 1, 2020 to December 31, 2022, involving all children aged 0-15 years who were treated for necrotic limbs in the pediatric surgery department. ***Results***: We collected 35 cases of necrotic limbs with a hospital frequency of 2.3%. The average age of the patients was 7.1 years. The sex ratio was 1.5. Limb gangrene was the most common reason for consultation in 45.7% of cases. The left side of the limbs was most affected in 65.7% of cases. The pelvic limb was the most affected site in 57.9% of cases. Open fracture with crushing was the most common etiology in 42.8% of cases followed by complications of traditional treatment in 22.9% of cases. The average time to treatment was 18 days. The leg was the most affected segment for pelvic limb amputation in 54.5% of cases. The arm was the most affected segment for thoracic limb amputation in 46.7% of cases. Anemia was present in 74.3% of cases. Standard limb radiography was performed in all our patients. Doppler ultrasound of the limbs revealed complete arterial occlusion in 48.6% of cases. The majority of patients underwent major amputation in 63% of cases followed by disarticulation in 37% of cases. Suppuration was the most common postoperative complication in 14.3% of cases. Crutches were the most commonly used device for locomotion in 45.7% of cases followed by prostheses in 5.7% and wheelchairs in 2.9%. ***Conclusion*:** Limb amputations remain an indication of last resort. The etiologies are multiple. Knowledge of the principles of producing a stump adapted to modern functional equipment is essential, in a multidisciplinary approach.

Keywords: Amputation, Necrotic limb, Child, Mali.

INTRODUCTION

Amputation is a surgical procedure that involves the removal of a limb, a segment of a limb, or a protruding part [1]. When it is performed at the level of a joint, it is called disarticulation. The stump refers to the segment of the limb that remains after amputation. In Great Britain (2022) Camila NOËL reported 7% of cases of limb amputation of traumatic origin [2]. In the United States in 2013, Alexandre QUESNEL reported 41 cases of amputation with a prevalence of 1.7% [3]. In Ivory Coast (2016), Kaoussi K Jean-Eric worked on a series of 60 cases of major limb amputations, representing a prevalence of 3.8% of surgical activities [4]. In Chad in 2017, Adam Adami Moussa carried out a series of studies on 38 cases of major limb amputations, representing 3.5% of cases [5]. A study carried out in Mali by Laye Touré in 2018 found 50 cases of limb amputations with a prevalence of 3.6% of surgical activities [6]. When the decision to amputate is taken by the surgeon in consultation with the patient and his relatives, the main concern is to succeed in the technical procedure according to the scientific principle while limiting the anatomical-physiological consequences. Amputation of the limb constitutes a major physical and psychological ordeal [7]. These ordeals significantly affect the patient's social life. From then on, a problem of dependency and autonomy emerges. Driven by a feeling of frustration, anger and bitterness, the subject feels destroyed [8]. This is a major surgery that must be completely mastered in order to meet two essential objectives:

- Amputate as low as possible without compromising the limb or the patient's life;
- Make the best possible stump, ideally in one go without going through the successive slicing of the remaining limb.

The evolution, usually favorable, however requires the collaboration between surgeons, rehabilitators, prosthetists and psychologists with support of the parents for a correct management of the amputation.

We conducted this work with the objectives of evaluating the clinical, etiological, and therapeutic aspects of necrotic limbs in the pediatric surgery department of the Gabriel Touré University Hospital.

METHODOLOGY

This was a prospective study from January 1, 2020 to December 31, 2022, involving all children aged 0-15 years who were treated for necrotic limbs in the pediatric surgery department.

RESULTS

We collected 35 cases of necrotic limbs with a hospital frequency of 2.3%. The average age of the patients was 7.1 years. The sex ratio was 1.5. Limb gangrene was the most common reason for consultation in 45.7% of cases. The left side of the limbs was most affected in 65.7% of cases. The pelvic limb was the most affected site in 57.9% of cases. Open fracture with crushing was the most common etiology in 42.8% of cases followed by complications of traditional treatment in 22.9% of cases. The average time to treatment was 18 days. The leg was the most affected segment for pelvic limb amputation in 54.5% of cases. The arm was the most affected segment for thoracic limb amputation in 46.7% of cases. Anemia was present in 74.3% of cases. Standard limb radiography was performed in all our patients. Doppler ultrasound of the limbs revealed complete arterial occlusion in 48.6% of cases. The majority of patients underwent major amputation in 63% of cases followed by disarticulation in 37% of cases. Suppuration was the most common postoperative complication in 14.3% of cases. Crutches were the most commonly used device for locomotion in 45.7% of cases followed by prostheses in 5.7% and wheelchairs in 2.9%.

Trans tibial amputation of the upper third of the right leg post-traumatic following a road accident in a 14-year-old child

Left transhumeral amputation in a 13-year-old girl following complications of traditional treatment for fracture of the middle third of the left humerus

DISCUSSION

Our frequency 3.8% is statistically comparable to that found by KOUMA. J.K Cote d'Ivoire, 2016 [5], and differs from that of KEITA. A. N [9], this difference could be explained by the age group.

Our study objectified a male predominance with a sex ratio of 1.5. Our result is consistent with that of TRAORE. T in Mali in 2017 [10] and that of Mohamed. N.A in Chad in 2017 [11]. This male predominance could be explained by the turbulence and great liveliness of the boys.

The average age of our patients was 7.1 years with extremes of 3 days and 15 years. TRAORE. T in Mali [10] and MOHAMED. N.A in 2017 [11] respectively reported an average age of 7 and 14.1 years. This could be explained by the carelessness, the lack of mastery of the highway code by users who are largely motorcyclists and the presence of schools on the side of the roads.

In our study, road accidents (RAA) were the leading cause of limb amputation, with 42.9% of cases, which is comparable to those found by TRAORE. T in Mali in 2017 [10] and Mohamed N.A in Chad in 2017 [11] who respectively reported a value of 41.1% of cases (P = 0.43) and 65.5% of cases (P = 0.11), this high frequency could be explained by the lack of support for children and the rapid increase in road traffic.

The leg was the most affected segment with 54.6%, which is similar to those found by MAIGA A in Mali in 2016 [12] and DIENTA. F.C in Mali in 2008 [13] who respectively reported a value of 53.3% (P = 0.21) of cases and 55.6% of cases (P = 0.13). AVP is the most common etiology, which explains why the leg is the most exposed part in the event of trauma.

In our study, the most affected side was the left side with a frequency of 65.7% against 28.6% for the right side and 5.7% bilateral. For DIENTA. F.C in Mali in 2008 [13] the most affected was the left side with a frequency of 63.9% against 36.1% for the right side. For DIARRA. E in Mali in 2018 [14] the left side predominated with a frequency of 53% against 46.2% for the right side. We did not find a scientific explanation for the left-sided involvement.

Our study found 13 cases of disarticulation with 37% and 22 cases of amputation, or 63%. MAIGA. A in Mali in 2016 [12] had 6 cases of disarticulation (13.3%), for 39 cases of major amputation (86.6%). DIARRA. E in Mali in 2018 [14] found 16.9% of disarticulation and 83.1% of major amputation. These studies agree with that of our study because the preservation of the amputated stump will allow a good fitting.

Suppuration was the most common postoperative complication in our series, accounting for 14.3% of cases. Our results are comparable to those of MIERET. J.C [15] found 26.7% of suppurated stumps (p=0.13). This suppuration could be explained by the resistance of germs to prophylactic antibiotics before the results of the antibiogram.

During our study, only 5.7% of amputees were able to have a prosthesis. MIERET. J.C [15] and DIARRA. Y [16] respectively found one of 4.43% (p = 0.40) and 10% (p = 0.29) of cases of prosthesis. Our result is statistically comparable to those of these authors. This could be explained by the lack of financial means.

CONCLUSION

Limb amputations remain an indication of last resort. The etiologies are multiple. Knowledge of the principles of producing a stump adapted to modern functional equipment is essential, in a multidisciplinary approach.

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