

## Interest of Fasciocutaneous and Muscular Flaps in the Management of Open Fractures of the Leg in Adults in the Orthopedics-Traumatology Department of the Ignace Deen University Hospital in Conakry

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### Abstract

**Introduction:** The reconstruction of substance loss in open fractures of the leg represents a challenge in Traumatology and has motivated the introduction of plastic recovery surgery. The objective of this work was to report the results of the management of open leg fractures in adults by providing fasciocutaneous and muscular flaps in our department.

**Patients and methods:** This was an observational, descriptive study, running from January 2018 to December 2020. It focused on adult patients seen for an open fracture of the leg with loss of cutaneous-muscular substance in whom a flap fascio-cutaneous or muscular was performed.

**Results:** We collected 15 patients with extensive losses of cutaneous-muscular substances, i.e. 1.2%. The average age was 35.2 years with a male predominance and a sex ratio of 2.75. The etiologies were dominated by road traffic accidents in 93.3%. Muscle flaps were performed in 66.7% and fascio-cutaneous flaps in 33.3%. The healing of the flap was obtained in 14 cases (93.3%) and we found 1 case of superficial necrosis of the flap.

**Conclusion:** Muscle and fascio-cutaneous flaps remain the best alternative in the management of extensive loss of cutaneous-muscular substance in open fractures of the leg.

### Keywords

Muscle flaps; Fasciocutaneous; Open fracture; Leg.

## Introduction

The open fracture of the leg is a solution of bone continuity associated with lesions of the soft tissues linking this bone and the ambient external environment [1]. It testifies to a brutal trauma, often responsible for multi-tissue lesions that can affect the function of the limb; whatever the stage of opening, it remains a surgical emergency [2]. Indeed, the treatment of open fractures of the leg requires the respect of certain unanimously recognized basic principles which are early antibiotic prophylaxis, adequate trimming, fixation, and early coverage of the fracture site [3]. The reconstruction of substance loss in open fractures of the leg represents a challenge in Traumatology and has motivated the introduction of plastic surgery of recovery [4]. Flap surgery consists in transposing tissues with autonomous vascularization from one anatomical region to another. She was born more than 2000 years ago, in India with Susruta [5].

The current therapeutic strategy gives priority to the secondarily grafted muscle flap which can be pedicled or free, depending on the configuration of the loss of substance. Fasciocutaneous flaps are structures that respect the anastomotic vascular networks located on either side of the fascia [6]. The main problem lies in the indication of the type of flap. This decision-making is based on many arguments: the location and size of the loss of substance, the condition of the vessels, the patient's background, the surgeon's experience and the reconstruction time [7]. In our Guinean context, this flap surgery is practiced more and more, however no previous study has yet been carried out in our department. Thus, the objective of this work was to report the results of the management of open fractures of the leg in adults by providing fasciocutaneous and muscular flaps in our department.

## Patients and Methods

This was an observational, descriptive study lasting 36 months from January 2018 to December 2020. We targeted adult patients seen for an open leg fracture. The study population consisted of adult patients with an open fracture of the leg with loss of cutaneous-muscular substance. We included adult patients seen for an open fracture of the leg with loss of cutaneous-muscular substance in whom a fascio-cutaneous or muscular flap was performed. The data collected concerned: frequency, age, sex, etiologies, time to admission, Gustilo-Anderson classification, type of flap used and complications. Clinically, all the patients underwent a clinical examination to determine the etiology of the trauma, the time to admission

and to assess the degree of skin opening (Figure 1). The Gustilo-Anderson classification [8-9] was used to type the soft tissue lesion.



**Figure 1:** Clinical image of the left leg showing Gustilo-Anderson open fracture type IIIB.

The digital X-ray of the leg concerned (face and profile) (Figure 2) was performed in all the patients, allowing the bone lesions to be described.



**Figure 2:** Initial X-ray of the left leg (F/P).

Therapeutically, all patients received spinal anesthesia. For cases of recent open fracture, we performed surgical debridement followed by reduction of the fracture site and placement of external fixators followed by initial coverage of the fracture site by adding a flap (Figure 3). Open fracture cases with significant deterioration, reducing the possibility of flap contribution, benefited from surgical debridement followed by reduction of the fracture site and placement of external fixators. The coverage of the hearth was made secondarily in these last cases. Fasciocutaneous flaps have been used in cases of open fracture of the lower third of the leg. As for muscle flaps, they were performed in cases of open fracture of the upper and middle thirds of the leg, exceptionally in cases of open fracture of the lower third with risk of infection. The skin graft was performed as a second intention after contribution of muscle

flap. The healing of the flap (Figure 4) was obtained except in one case where we observed partial necrosis of the flap immediately postoperatively.



**Figure 3:** Intraoperative images : surgical trimming, reduction, placement of external fixators and fasciocutaneous flap.



**Figure 4:** Flap healing.

## Results

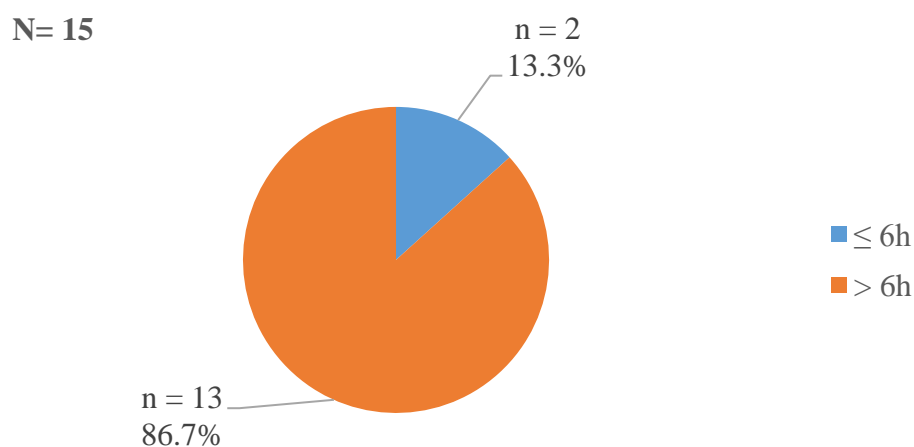
During the study period, out of 1246 patients hospitalized in our department, 15 benefited from a muscle or fasciocutaneous flap, a frequency of 1.2%. The age group of 16-25 years was the most affected in 33.3% with an average age of 32.5 years, the extremes of 16 and 83 years.

Age groups	Number	Percentage
16 – 25 years old	5	33.3
26 – 35 years old	3	20

36 – 45 years old	4	26.7
46 – 55 years old	2	13.3
≥ 56 years old	1	6.7
Total	15	100

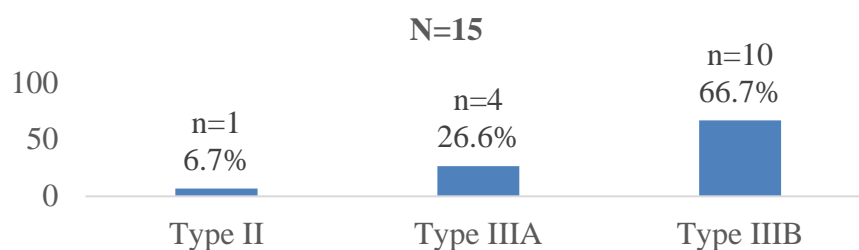
**Table I:** Distribution of patients by age.

The male sex was the most represented in 73.3% of cases with a sex ratio of 2.75. Road traffic accidents and aggression were the main etiologies found in 93.3% and 6.7% respectively. The reception time was greater than 6 hours in 86.7% of cases.



**Figure 5:** Distribution of patients according to reception time.

According to the Gustilo-Anderson classification, type IIIB was the most represented in 66.7% followed by type IIIA in 26.6% of cases.



**Figure 6:** Distribution of patients according to the classification of Gustilo and Anderson.

The surgical trimming associated with the initial cover was performed in 11 patients, i.e. 73.3%. Four (4) patients benefited from secondary coverage, ie 26.7%. Muscle flaps were the most used in 10 cases, i.e. 66.7% against 33.3% of fascio-cutaneous flaps. Among the muscle flaps, 8 involved the vastus medialis of the gastrocnemius.

Muscle flap	Number	Percentage
Vastus medialis gastrocnemius	8	80
Soleus	1	10
Tibialis anterior	1	10
Total	10	100

**Table I:** Distribution of patients according to the type of muscle flap used.

The postoperative course was simple in 11 patients, we recorded 4 cases of postoperative complications.

Post-operative follow-up	Number	Percentage
simple	11	73.3
Pseudarthrosis	2	13.3
Osteitis	1	6.7
Partial flap necrosis	1	6.7
Total	15	100

**Table II:** Distribution of patients according to postoperative course.

## Discussion

We conducted an observational study with the aim of collecting data on the management of open leg fractures using flaps (fascio-cutaneous and muscular). We took care of 15 cases of open fracture of the leg by contribution of flap, that is to say a frequency of 1.2% [10] in Finland reported a frequency of 2%. This frequency could be explained by the lack of experience of some of our surgeons and the absence of a plastic surgeon in our establishment. The average age of the patients was 35.2 years with extremes of

16 and 83 years. This result is similar to that of [11] in Madagascar in 2016 who found an average age of 34 years with extremes of 18 to 38 years. The high incidence of young adults in this series could be explained not only by their hyperactivity but also by their recklessness on the road.

This study showed a male predominance of 73.3% and a sex ratio of 2.75. [4] in the Central African Republic, [12] in Morocco and [13] in Senegal also noted a male predominance of 87.5 %, 89 % and 92.3% respectively. This male predominance could explain the risk taking of men in road traffic. In this series, the type IIIB open fracture of Gustilo-Anderson was the most frequently encountered in 66.7%. The same observation was made by [12] [14] reporting 81.8% and 67.8% Gustilo-Anderson type IIIB respectively. This would be explained by the violence of trauma during road traffic accidents and the superficial situation of the tibia under a particularly vulnerable anterior skin covering.

Trimming, fracture reduction, fixation and flap recovery were performed during the same operation in 73.3%. Unlike [6] who reported that coverage was secondary in 100% of patients after initial trimming. In our series, 66.7% of patients benefited from muscle flap recovery [12] has Madagascar achieved 72% recovery by muscle flap against 28% by fascio-cutaneous flap. Classically, we believe that the best cover for open leg fractures is the muscle flap; especially since the seat was in the middle third. The muscle is supposed to reduce the rate of infection due to its rich vascularization, which should lead to better consolidation of the fracture.

The healing of the flap was obtained in 14 cases, one case partial necrosis of the flap was found [12] in Madagascar reported 2 cases of partial necrosis, one of which had undergone revision surgery. The precarious vascularization of the lower third of the leg could justify the occurrence of this necrosis.

## Conclusion

The reconstruction of defects in open leg fractures represents a challenge in our department. Many possibilities of more or less reliable reconstruction are described in the literature. Muscle flaps retain their full indication in the management of substance loss in the middle third of the leg and reduce the hospitalization time for patients with open leg fractures.

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