



Coverage of Loss of Substance from Heel : Sural Flap

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: The loss of skin tissue from the heel often poses a problem of coverage. The neurocutaneous flap of the sural nerve enriches the therapeutic arsenal in terms of management of these defects. The aim of our study is to better understand the operating technique, indications, advantages and disadvantages of this coverage process.

Materials and Methods: We carried out a retrospective study of 30 cases of loss of skin tissue from the heel collected in the plastic and burn surgery department of the Nabeul University Hospital over the last ten years .

Results: This study is composed of young adults with an average age of 32 years predominantly male, from which 9 are diabetic. The loss of tissue was located in a weight bearing area of the heel in 10 patients and in the posterior region in 20 patients. Etiology was traumatic in 20 cases dominated by bicycle spoke injuries. The average size of the skin substance loss was 40 cm² and the coverage was achieved with an average delay of 6 days, allowing to cover the Achille tendon in 15 patients and the calcaneus in 12 patients.

The results were satisfactory, taking into account the function and aesthetic aspect of the flap.

Conclusion: The sural flap is an attractive solution for heel coverage, especially the posterior unit because of its reliability, the lack of sacrifice of an important vascular axis, the ease of dissection and the low scar ransom.

Keywords: Heel; reconstruction; coverage; sural flap.

1. INTRODUCTION

The heel region poses a difficult reconstruction problem explained by the anatomical and functional particularities of this area [1].

The neuro-cutaneous flap of the sural nerve represents a coverage process that enriches the therapeutic arsenal for management of these defects.

The aim of this work is to analyze through a series of 30 patients who needed coverage of the heel area by a sural flap, collected in the plastic and burn surgery department of the Nabeul University Hospital, the anatomical particularities of the heel area, the indications, advantages and disadvantages of this coverage procedure.

2. MATERIALS AND METHODS

This is a retrospective study of 30 patients with a loss of substance from the heel region who had a coverage by a sural flap, collected in the plastic and burn surgery department of the Nabeul University Hospital over the last ten years.

Short-term results were evaluated on the vitality of the flap in the first ten days:

- The result is considered good when the flap is of good vitality.
- The result is considered average if there is venous insufficiency or partial necrosis.
- The result is considered poor when the flap is completely necrotic.

The long-term results were appreciated based on the integration of the flap on the functional and cosmetic level:

- The result is considered good in front of: a flap of good trophic quality, covering all the defect with similarity of pilosity and pigmentation; a normal walk; a normal footwear.
- The result is considered average in front of: a small ulceration, a skin bulge, scar fragility; a limp, a limitation of joint mobility; a discomfort with footwear.
- The result is considered poor when the ulceration is permanent, requiring surgery.

3. RESULTS

It is a population of young adults; the average age is 32 years with extremes from 4 to 76 years.

The male sex predominates with a ratio of 5 men to 1 woman. We treated 9 diabetic patients and one arteritic subject. The rest of the population had no other affection.

Substance losses had several origins:

- **traumatic etiology** is the most important contributor of these defects, represented by 20 cases of which a particular and specific etiology of the foot caught in the spokes of a bicycle wheels is found in 8 children. The rest of this category were injuries caused by road accidents.
- **tumoral etiology** in one case (acral melanoma of the heel)
- **diabetic puncture** in 9 cases.

Substance loss occurred at the posterior heel area in 20 patients and at the plantar area in 10 patients. The average size of the substance loss was 40 cm² (extremes from 12 to 55 cm²). We noted exposure of the Achille tendon in 15 patients and calcaneus in 12 patients. We performed Achille tendon repair in 8 patients.

The sural flap cover was carried out with an average delay of 6 days and after stabilization by a Hoffman external fixator in 5 patients.

All flaps were made on a retrograde island flow mode. We tunneled the flap in 10 patients.

The donor area was covered by thin skin grafting with an average delay of 6 days in the majority of cases; a primary closure was performed in 3 patients. After an average decline of 3 years according to the evaluation criteria described above, we obtained:

- 25 cases of good results.
- 4 cases of average results.
- 1 case of poor result.

4. DISCUSSION

The heel region poses a difficult reconstruction problem explained by the anatomical and functional particularities of this region, which is individualized into a posterior unit friction zone requiring the contribution of a thin tissue allowing the tendinous gliding and a plantar subunit ensuring support in the standing position and posing the problem of the sensitivity of the reconstruction [1]. The evolution of knowledge in vascular anatomy and microsurgery has made it

possible to describe several types of flaps for the reconstruction of these cutaneous defects whose remain a topic of discussion. Since its description by LIU in 1990 [2] its use remains infrequent and little published [3,4,5,6].

According to the published series, these losses of substances generally affect young patients especially children in the context of bicycle spoke injuries [7], for older patients it is a tissue loss within the framework of diabetic foot difficult to manage given the neurological and vascular state of the limb.

This neurovascular flap is interesting because of its reliability, the absence of sacrifice of important peripheral vascular axes, the possibility of using it in elderly subjects knowing that the peroneal

artery is the last to be affected by atherosclerosis. Finally the length of his pedicle allows him to easily reach the area to cover. This allows it to be one of the most attractive solutions and take a central place in the coverage of the skin losses of the posterior unit of the heel.

The weight bearing area requires coverage by a thick and sensitive skin so the plantar flap is a better solution.

Several other procedures have been performed [8,9,10,11]: the external supra malleolar flap which poses a problem of venous drainage ; locoregional or free perforator flaps require sophisticated technical means and aren't destined for the weight bearing area of the heel.



Fig. 1. Post traumatic skin tissue loss of te posterior unit of the heel covered by a sural flap with a good result



Fig. 2. Bicycle spoke injury exposing te Achille tendon covered by a sural flap with an average result (skin bulge)



Fig. 3. Skin tissue loss of te weight bearing area of the heel following a diabetic ulcer, covered by a sural flap with a good result



Fig. 4. Excision of an acral melanoma of the heel and reconstruction by a sural flap with a good result

5. CONCLUSION

The distally based sural flap is an attractive solution for the coverage of the posterior unit of the heel due to its reliability. For the plantar unit of the heel, it competes with the internal plantar flap.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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