



Polypropylene Prosthesis: An Optional Approach for Skin Loss in Severe Foot and Ankle Soft Tissue Injuries

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Keywords

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Introduction

Treatment of severe cutaneous injuries in the lower extremity represents a real challenge for surgeons, particularly those involving large areas of substance loss. The long-term goal is restoration of function but in the short-term we often focus on obtaining adequate soft tissue coverage.

These injuries, when untreated or poorly managed, lead to sequela and limitations that are often irreparable, causing great harm to the economically active population.

There are many techniques described in the literature for wound coverage and normally, the most common options are free flaps, skin grafts, Vacuum-Assisted Closure (VAC) dressings and “second intention healing”. Different factors must be considered when choosing one surgical technique over another, especially the pattern of lesion, patient, surgeon and institution. However, many techniques are not reproducible in other locations due to the cost and population type.

On our case report, we describe a fairly cheap and effective treatment used on a patient with a severe soft tissue injury on the dorsum of the foot.

Case Presentation

In January 2022, 21 years-old male was involved in a motorcycle accident with an important soft tissue injury on the dorsum of the left foot, associated with an open dislocation of the Chopart (midtarsal) joint. He was first treated at another institution to approach the open dislocation 14 days before admission in our institution.

At our facility we observed a 14 cm × 8 cm wound covered by dry necrosis and important exudate, in addition to medial and plantar wounds, sutured in the previous hospital (Figure 1). After the X-ray trauma series for foot and ankle, we identified a remaining dislocation of the midtarsal joint which was confirmed with a CT scan. Urgent surgical treatment was performed on the same day in order to restore articular congruence.

Due to the severity of the soft tissue lesion, a closed reduction of the Chopart articulation was performed and fixed with two 1.5 mm Kirschner wires in talonavicular joint and one 1.5 mm Kirschner wire in calcaneocuboid joint. In addition to the bone procedure, we surgically debrided and washed the wound with 6 liters of 0.9% saline solution. The vast soft tissue loss didn't allow for primary wound suture and we chose to close the injury with a sterile polyethylene prosthesis (Figure 2). Patient remained hospitalized for 5 days to monitor wound healing.

Weekly visits were made for 60 days, followed by fortnightly follow-ups for another 60 days.

Forty-eight days after the operation, the patient was admitted to our emergency room due to leakage of secretion in the dressing, and partial loosening of the polyethylene prosthesis was observed. Suture of the distal component of the dressing was performed with nylon thread, under local anesthesia.

Weight bearing was planned to start six weeks after surgery, but due to this minor episode of dressing loosening it was postponed to eight weeks after major healing of the injury was visualized through the prosthesis. Full weight bearing on the operated limb was allowed 70 days after surgery [1-7].

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Figure 1: Plantar wounds, sutured in the previous hospital.



Figure 3: Minimal skin graft coverage.



Figure 2: Vast soft tissue loss didn't allow for primary wound suture and we chose to close the injury with a sterile polyethylene prosthesis.



Figure 4: Prosthesis the injury was completely granulated and no additional procedure was necessary.

Four months after the first procedure, although the excellent aspect of the wound, a minor lesion remained on the central area of the wound and surgeons proposed another intervention with removal of the dressing and a minimal skin graft coverage (Figure 3). He was readmitted for operative treatment on May 2022 but after removal of the prosthesis the injury was completely granulated and no additional procedure was necessary (Figure 4).

Last follow-up visit was on June 2022, 30 days after removal of the prosthesis and five months after the surgery. Patient remained with excellent outcome, with minimal complaints regarding residual edema and paresthesia. The wound on the dorsum was completely healed and patient was allowed to return to work as tolerated.

Surgical Technique

The technique used in this case report consists of an adaptation of the technique proposed by Figueiredo [7], initially for cutaneous losses from the fingertips and later expanded for greater cutaneous losses, both in the hand and in other parts of the limbs.

The original technique consists of using a synthetic polypropylene cover that is flexible and resistant to cover the entire bloody area, to contain all the inflammatory exudate, preventing its extravasation. This exudate is later progressively converted into fibrinous tissue and this later replaced by granulation tissue. In the original initial

technique, coverage was maintained for a period of 6 weeks.

Considering that the technique was adapted for larger lesions, this coverage maintenance period will be influenced according to the location and size of the lesion to be treated. It is common during the treatment that some stitches may become loose over the weeks. When this loosening occurs, the patient should be submitted to a partial revision and a new suture, on an outpatient basis, to avoid leakage of secretions and contamination of the wound. The suture used must be adapted to the lesion site as well as the thickness of suture thread. In general, simple, or U-shaped stitches are suitable and facilitate revision in case of loosening.

In very large wounds, complete or partial healing may occur, leaving small, but already granulated areas that can be supplemented with grafting. In general, coverage with a propylene orthosis restores a very close to natural shape and appearance, with good sensitivity to the area.

In the case presented, the patient was taken first to the operating room for debridement of the wound and bone fixation. Coverage with polypropylene was performed at the same time. In the first week, it is likely for that the dressing to become slightly moist due to a slight extravasation of secretion. After the first week, a weekly dressing change was performed with a superficial cleaning of the covering with 70% alcohol. It is common for the patient to be anxious with the appearance of fibrinous over the weeks, mistaking it for pus. It is important to reassure the patient to maintain adherence to treatment. Over the weeks, some areas take on a darkened color due to the differentiation of the granulation tissue.

At approximately 6 weeks, the patient underwent revision of the sutured covering due to loosening of some stitches.

At approximately 12 weeks, the removal of the coverage and grafting of an area that had not yet been epithelialized was programmed. By the dressing appearance it seemed to be considerable. After removing the cover it was observed that the epithelialized tissue was larger than estimated, leaving only a discrete central area fully granulated.

Antibiotics were not used for prophylaxis or treatment during the patient's follow-up.

Discussion

The foot and ankle area is a common site of traumatic injuries that generate a loss of skin coverage and possible exposure to deep structures. These lesions will require coverage methods that may need a variety of reconstruction procedures to reduce the risk of infection, necrosis of noble structures and specially to avoid other undesirable outcomes such as amputations [5].

Autologous grafts and flaps require a trained team, not always available in treatment centers, in addition to generating an additional damage to the donor site, which increases treatment morbidity [6]. Negative pressure therapy is a relative expensive treatment, not always covered by the healthcare insurance, whether public or private.

The use of polypropylene prosthesis is a technique of low complexity of execution, besides being accessible and low cost, making it viable and reproducible [7], regardless of the level of technical capacity of the surgeon and the structure of the center where the treatment is being instituted.

Therefore, it is believed that the technique in question should be part of the arsenal of alternatives for the treatment of skin lesions followed by traumatic events, especially at the level of the foot and ankle, given the good result that can be obtained, as well as exemplified in the reported case.

The application of this technique on foot and ankle area transcends the indications primarily described by Figueiredo [7] and some details should be considered due to its weight bearing characteristics. First, we recommend at least six weeks non weight bearing on the operated limb but this period could be extended according to the severity and the progression of the wound. Second, we suggest that suture of the prosthesis should be performed with very close stitches to avoid leakage of the secretion.

Respecting these instructions, we believe that excellent outcomes could be achieved with very little expenses, and we recommend that the technique should be widespread to other surgeons especially in areas with budget limitations.

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