



Ideas and Innovations ●●●●

Techniques for removal of primary grafts from traumatic skin flaps in areas with degloving injuries

Técnicas para retirada de enxertos primários de retalhos traumáticos em áreas de desenlramento

DANIEL FRANCISCO MELLO¹
LUIZ ANTONIO DEMÁRIO²
AMÉRICO HELENE JÚNIOR³

■ ABSTRACT

Primary grafting using skin from traumatic flaps is essential in the correct and early treatment of patients with degloving injuries. Split- or full-thickness grafts can be used; however, the literature does not yet provide any indication of the best option. Moreover, this skin also can be used immediately or after tissue bank storage. This report describes the main techniques for graft removal from traumatic flaps.

Keywords: Skin transplantation; Soft tissue injuries; Wound closure techniques; Skin/Surgery; Fascia/Surgery

■ RESUMO

No tratamento dos pacientes vítimas de desenlramento atendidos de maneira correta e precoce, a enxertia primária, com utilização da pele proveniente dos retalhos traumáticos é fundamental. Podem ser utilizados enxertos em ambas as espessuras, parcial ou total, não existindo na literatura uma definição em relação à melhor opção. Esta pele, também, pode ser utilizada de maneira imediata ou após conservação em banco de tecidos. Descrevemos neste artigo as principais técnicas para retirada de enxertos dos retalhos traumáticos.

Descritores: Transplante de pele; Lesões dos tecidos moles; Técnicas de fechamento de ferimentos; Pele/Cirurgia; Fáschia/Cirurgia.

Institution: Irmandade da Santa Casa de Misericórdia de São Paulo – ISCMSP

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INTRODUCTION

Degloving injuries are characterized by avulsion of the skin and subcutaneous tissue from the muscle fascia plane, and these injuries involve lesions of fasciocutaneous perforators and musculocutaneous segmental vessels. They result from the application of sudden and high intensity forces with tangential vectors, promoting compression, stretching, twisting, and friction¹⁻⁴.

The most critical point in the initial evaluation of degloved injuries is to determine blood supply and viability of the traumatized tissue, which is not always a straightforward procedure. As such, a detailed clinical evaluation by an experienced professional is essential. Considering the occurrence of lesions in the perforating vessels, the blood supply of the degloved segment depends on the dermal and subdermal plexus, capable of keeping limited length segments from the degloved area^{1,5,6}.

1 – Master in Surgery – Plastic and Cranio-Maxillo-Facial Surgeon. Assistant Physician at the Plastic Surgery Service of the Irmandade da Santa Casa de Misericórdia de São Paulo (ISCMSP).

2 – Plastic Surgeon – Assistant Physician at the Plastic Surgery Service of ISCMSP.

3 – PhD in Surgery – Head of the Plastic Surgery Service of ISCMSP.

In the initial evaluation and resuscitation phase, patients are usually under the care of the general surgery, pediatric surgery, and orthopedics teams. The assessment by the plastic surgeon is essential and should be performed as early as possible, preferably during the resuscitation phase in combination with assessments by other experts, facilitating therapeutic decisions¹.

Specialists may make errors during primary procedures or cause delays in assessment requests. The main issue is indication of a simple resuture of traumatic flaps to the bed of origin, with a high incidence of necrosis and infection²⁻⁸.

The use of traumatized skin with and without blood supply, prepared for primary grafting (full- or split-thickness) was originally described by Farmer^{9,10} in 1939; this method is considered the optimal management procedure for covering skin of the affected area, with high efficiency and low morbidity.

There is still debate as to the best option regarding grafts withdrawn from traumatic flaps^{3,6,7,8,11,12}. In principle, all available skin should be used, even from areas with signs of friction burns (Figure 1). If there are no appropriate conditions for the integration, this skin will still function temporarily as a biological dressing; the skin of amputated limbs may also be used^{1,2,13} (Figure 2).

This report aims to review and describe the main techniques used to remove primary grafts from traumatic flaps of patients with degloving injuries.



Figure 1. Case 1 – shows a hit and run victim with the buttocks being caught under moving tires. The degloved segment is marked with a surgical pen (approximately 13% of the body surface). Note the central area with friction burns



Figure 2. Case 2 – shows an amputated segment subjected to the removal of split-thickness skin grafts.

Temporary preservation of grafts

In the presence of large muscle injuries or fractures, hemodynamic instability, coagulopathy, long surgical procedures, and/or large local contamination, one can opt for the traumatic flap skin preservation at a tissue bank^{1-3,6}.

Described by Hueston and Gunter¹⁴, this option allows for the skin to be stored for later use when the wound bed is in the best condition, that is, when it presents with less exudation and devitalized/contaminated tissue and more of the granulation tissue, in addition to the stability of critically ill patients^{1,3,5,6,15}.

The skin is withdrawn and prepared, both in full- as well as split-thickness procedures, and can be stored under conventional refrigeration (4°C) and used within a few days, usually with good integration indices. The skin is preserved in saline solution and antibiotics for a period of 7 to 14 days, and preferably is used within the first 2 days^{2-4,6,15}.

Withdrawal of partial skin grafts

Both a Blair knife and an electric dermatome can be used for this procedure, with the latter allowing for the removal of skin slices that are uniform in length and thickness. For example, one can take into account the irregularities in thickness, particularly at the margins of traumatic flaps.

Skin graft removal can be done in situ, with the traumatic flap resutured^{7,8} or temporarily reattached³ (Figures 3 and 4). Another option is to pull using tongs, held by an assistant, for better placement. During the removal of the grafts, the dermis of degloved segments that do not present perfusion/bleeding is an optimal reference for guiding the extent of tissue resection^{7,8} (Figure 5).

In the ex situ option, the segment should be initially sectioned, and to reveal skin perfusion definition, a shaving test can be used, that is, initial incisions can be made to evaluate the presence of blood flow and bleeding. The removed segments are positioned (under tension, pulled using tweezers¹⁶ by an



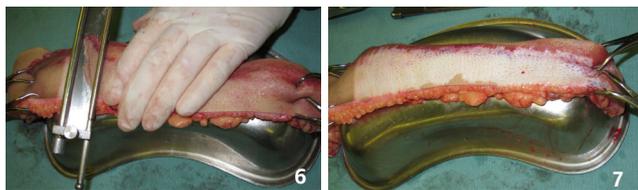
Figures 3 and 4. Case 3 – shows a degloved segment in the anterior/lateral region of the left thigh (approximately 10% of the body surface). Note the preparation for withdrawal of in situ grafts and the temporary fixation with Backhaus tweezers.



Figure 5. Case 3 – shows in situ withdrawal of split-thickness grafts with a Blair knife. Note the absence of dermal blood flow in the degloved segment.

assistant¹⁷) on a supporting surface such as a kidney dish or a 1,000 mL saline flask, on an auxiliary table¹⁷ (Figures 6 and 7). The ex situ option is most appropriate in cases of poly-traumatized patients who are being subjected to other priority operations (for example, general surgery, neurosurgery, or orthopedic surgery). This is also the case in patients with hemodynamic instability, in situations that hinder the efficiency of the plastic surgeon, and in situations where preparation and positioning for in situ graft removal are required.

Partial skin graft may be indicated for very critical situations, considering the higher possibility of integration. This is the preferred procedure in the literature^{5,7,8,12,18,19}. Unfortunately, the aesthetic results are often poorer, mainly under expansion or prior slitting (mesh graft).



Figures 6 and 7. Case 4 – shows an ex situ withdrawal of split-thickness grafts with a Blair knife, held on an auxiliary table with a segment fixed and pulled using tweezers, supported on a kidney dish.

Withdrawal of full-thickness skin grafts

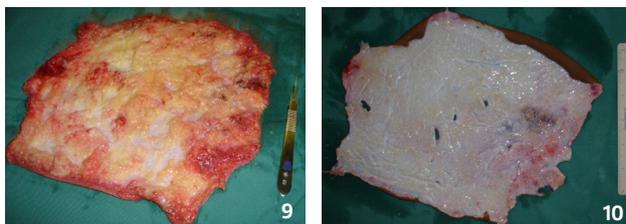
When opting for full-thickness graft removal, the most common method is ex-situ preparation, whereby the flap must be completely degreased after sectioning, either with a blade or curved scissors^{2,4,6,10} (Figures 8, 9 and 10). It is also possible to remove grafts in situ with a Blair knife or suitably regulated dermatome, which is normally necessary to complement degreasing.

Under these conditions, the standards for clinical assessment of dermal blood flow is identical compared to the aforementioned parameters. In addition, the conduct of the plastic surgeon regarding hemodynamic instability and/or priority operations is also identical to that mentioned above, in relation to the removal of partial skin grafts.

Full-thickness skin grafting entails delayed preparation, but is technically simple, and thus, suitable for bedridden receivers in better condition. These procedures have better functional and aesthetic results because of the lower secondary contracture, and are the preferred methods, as indicated in several reports^{2,4,6,10,11,20,21}.



Figure 8. Case 5 – shows a circumferential degloved segment in the left leg (approximately 7% of the body surface) and resection of the traumatic flap for ex situ preparation in a hemodynamically unstable patient with abdominal trauma.



Figures 9 and 10. Case 5 – shows an ex situ full-thickness graft preparation; degreasing is performed with scissors and a razor.

CONCLUSIONS

Importantly, raw areas secondary to degloving that lack the possibility of using the traumatic flap as the donor area (primary grafting) owing to delays or incorrectly performed procedures require the removal of untraumatized skin from other donor sites. These sites may not be of sufficient size, and may require multiple surgical recovery periods and/or longer hospital stays. With these considerations in mind, we highlight the importance of initial care to degloving injuries and the different technical options for performing primary grafting.

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Corresponding author:**Daniel Francisco Mello**

Rua Nanuque, 335, Apto 84 - Vila Leopoldina - 05302-031 - São Paulo/SP - E-mail: mello.plastica@gmail.com