Three Paediatric Cases Study with Over 80% TBSA Burn Injury - Surgical Treatment by Using Skin Allografts: A Viable Option for Alternative Cover

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ABSTRACT

Introduction: In massive burn injury, skin allografts can be used as an alternative and temporary cover for the defects, when autografts are not available or limited.

Material and Methods: The material presents the case of three children between 4 and 15 years old, with 85-95% TBSA third-degree flame burn, airway burns and burn shock, who received complex surgical treatment with both allografts and autografts-allografts. (sandwich technique)

Results: The defect after early excision and escharotomy was fully covered with allografts from the skin bank, refrigerated on liquid nitrogen at -196°C, in presence of a glycerol 15% cryogenic agent. In a small area we used sandwich technique with autograft and allograft.

Conclusions: Allografts promote dermal development, prevent receptor layer desiccation, reduce evaporative fluid losses and heat loss and therefore metabolic consumption, prevent exudative protein loss, loss of erythrocytes, bacterial...
proliferation and promote healing in partial burns (biological dressing) and early rehabilitation. The major disadvantage of allografts is rejection, generally occurring between 2 and 4 weeks, which makes it a temporary therapy.

**Key word:** skin, allograft, autograft, burn, therapy, temporary, alternative, bank

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**INTRODUCTION**

Burn is the most severe type of injury that a human being may suffer which can be quantified and evaluated by surface and depth of lesions. Treatment of this kind of injuries needs complex teams, competent and devoted, consistent therapeutic principles, specific conditions of care and specific funding.

In full thickness burns, deep partial burns on important functional area (hand, foot, periarticular regions) and burns up to 40% TBSA, predominantly deep, surgical treatment consists in early excision and grafting, which improve prognosis compared to the burned area and also cosmetic and functional results.

Methods for coverage post-excisional defects use autografts for burns less then 50-60 % TBSA and allografts, as a temporary alternative cover, for burns more then 60% TBSA.

In some cases, concomitant use of autograft with allograft (sandwich technique) after early excision of deep burn area can provide permanent cover of the area where it is used.

Allografts are live tissue, most frequently used in extensive burns. They integrate and gain vascularization in 2-4 weeks, undergo the natural process of non-self tissue rejection and must be removed and gradually replaced by skin autografts when patient’s condition improves and his donor sites heal.

Allografts may be fresh, refrigerated (4 degrees C) or cryopreserved in the Skin Bank (in liquid nitrogen at -196 degrees C).

**MATERIAL AND METHODS**

We study three patient cases with 85- 95% TBSA third-degree flame burn, who received complex surgical treatment with both allografts and autografts – allografts (sandwich technique).

In all three cases, autologous skin was limited or not available and the cover treatment after excision consisted in using cryopreserved allografts from our clinic's skin bank.

**RESULTS**

First patient is a 4 year old child admitted into the emergency room with third-degree flame burn on 90% TBSA, associating airway burn, post-combustion shock and compartment syndrome on both hands and legs.

Emergency surgical treatment consisted in practicing hand and leg escharotomy, excision debridement and dressing. Next day, early excision and grafting was performed, using allografts and sandwich technique for a small area.

Second case is of a 12 years old girl, explosion victim, with second and third degree flame burn on 95%TBSA post-combustion shock, airway burns and compartment syndrome on hands, legs and trunk.

We also performed hand, leg and trunk escharotomy as emergency surgical treatment, early excision and coverage of 18% TBSA with allografts on third day from the accident.

Second excision was made on the fifth day, when we
used sandwich method on the upper leg.

The third case is about an electrocuted 15 years old boy with second and third degree burns, on 80% TBSA, associating post-combustional shock, left hand compartment syndrome and multiple trauma injuries.

As emergency care, we performed left hand and left superior trunk escharotomy and fasciotomy and found left upper limb muscle necrosis.

Second day from accident, eschar early excision, muscular necrosis excision and grafting were performed. We covered postexcisional defects with allografts on hand surface and autografts on the thorax.

**DISCUSSION AND CONCLUSION**

Temporary alternative cover in massive burn injury, use as biological dressing, promotes healing of partial burns. You can use it as temporary coverage of deep wounds after excision until autografting becomes possible. It prevents infection and further tissue loss.

In our cases analysis, we can say that using skin allograft has both advantages and disadvantages.

As advantages, skin allografts can prevent receptor
layer dessication and promote dermal development. The reduction of evaporative fluid losses, heat loss and metabolic consumption is significant, temporary improving overall patient’s condition.

From a biochemically perspective, the use of skin allografts leads to a decrease in proteins and erythrocytes loss. It also improves electrolytic levels.

The protection of exposed subdermal structures (tendons, vessels, nerves) can be seen as another advantage of this technique with major benefits for the patient, one of which being early rehabilitation.

Although the use of allografts is widely spread, one of the worsts disadvantages is that the graft undergoes natural body rejection, making this a temporary cover
solution. First signs of rejection are usually seen in between two and four weeks. To overcome this issue, skin allografts must be replaced gradually with skin autografts, cell cultures in cases of full-thickness burns exceeding 80% TBSA.

Another downside in using this type of grafts is that they are difficult to obtain. There is a constant need of donors, which implies ethical, legal and technical preparation, such as skin banks, transplant centers, qualified personnel and all other means for obtaining grafts. All above can lead to increased costs to the healthcare center or hospital.

Yet safe procedure due to proper testing and storage efforts, skin allografts can be a source of contamination when testing or storage are not performed at the highest standards.

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