

Surgical Treatment of Complex Axillary Scar Contractures: One Case Report

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Abstract

Background: Axillary scar contracture is frequently observed after severe burn insult and is usually accompanied by scarred adjacent area. These scars result in adduction deformity, which may be severe and diffuse. The lack of adequate treatment in the acute phase leads to complex scars that require different surgical techniques depending on the clinical examination of surgeon. **Aim:** Expose the possible surgical techniques, their advantages and disadvantages in the case of burning of the entire axillary hollow. The surgical management of linear scars contractures will not be discussed in this article. **Case presentation:** This is a rare clinical case of a 12-year-old girl who was burned at the age of 5 with disabling functional sequelae of the axillary area (limitation of the abduction to 30 degrees). The patient is treated at ALGHASSANI Hospital in Fes city/Morocco. Parental consent was taken for scientific publication. **Results:** We did two surgical interventions: the first starting with excision of the scar tissue leaving a loss of skin covered by a laterothoracic IC fasciocutaneous flap. The second one was a semi-thick skin graft to cover the supero and infero external quadrants of the left breast. We obtain the abduction at 110 degrees. **Conclusion:** Early surgical management of deep lesions within 21 days of the burn associated with prolonged rehabilitation and the wearing of compression garments and splints are essential elements in the prevention of these axillary contractures.

Keywords

Contracture, Axillary, Fasiocutaneous Flap

1. Introduction

Burn sequelae are defined as any functional or aesthetic complication occurring after healing of a generally deep burn. Their severity varies according to their

location; the shoulder joint has the greatest amplitude of all the joints and remains a frequent seat of these sequelae, particularly for children.

The goal of the surgical correction of axillary scar contractures is to provide maximum release with minimum or no local anatomic distortion and the least incidence of recurrence. There are many surgical techniques to treat complex axillary scar contracture, including Z-plasty, local flaps, regional flaps, transposition flaps, rotating flaps, axial flaps, perforator flaps and free flaps [1] [2].

The decision regarding which technique to use can only be made after consideration to the individual case, as each technique has its own advantages and disadvantages which will be detailed in this article.

2. Clinical Case

This is a 12-year-old patient of low socioeconomic level who had an accidental thermal burn by scalding at the age of 5 years. The burn was deep located in the axillary region and the left arm, the patient did not have a follow-up in the acute phase of the burn in a specialized burn center given the geographical difficulty of accessibility by the parents living in a rural area, they were content to apply herbs to the wound.

This spontaneous healing has evolved into a significant limitation of shoulder movement. The parents brought her to consult in our plastic surgery department at the age of 12.

The clinical examination on admission to the plastic surgery department at ALGHASSANI hospital in Fes city (Morocco) objectified this diagnosis:

The upper left arm and the lateral aspect of the trunk are completely included in one mass of hypertrophic scar tissue. The abduction was limited to 30 degrees (**Figure 1**). The internal face of the arm and the supero and infero external quadrants of the left breast were included in the contracture which was type III according to Achauer's classification [3]. Laterothoracic skin was non-scarred.

The management of treatment was essentially surgical in two stages; the first surgery consisted of a complete debridement with meticulous excision of the scar tissue leaving a loss of skin from the axillary hollow extending to the lateral part of the left breast and the internal face of the arm. A laterothoracic IC rotation flap was harvested to cover the axillary hollow (**Figure 2**); the flap donor area as well as supero and infero external quadrants of the left breast was in controlled healing (until the second surgery). The flap was 100% viable without any complications.

The second surgery was after two weeks; the loss of substance was budding; a skin graft was harvested from the inner side of the thigh using an electric dermatome to cover it fixed with a stapler (**Figure 3**). A proinflammatory dressing was made by sterile Vaseline tulle, changed after 5 days, having noted no lysis or infection.

The recovery of the shoulder abduction was considered very satisfactory, it is

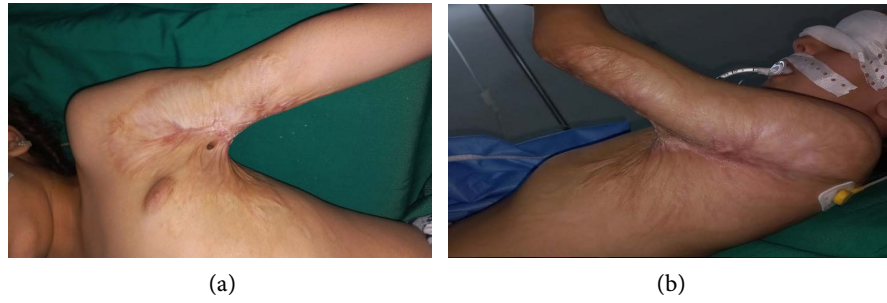


Figure 1. Axillary bride contracture type III.



Figure 2. Post-operative result.



Figure 3. Second surgery; skin graft.

at 110 degrees (**Figure 4**).

The follow-up is done by prescription of healing creams and silicone plate (for anti-inflammatory purposes) in order to avoid hypertrophic scars.

Checks will be done every 3 months until the end of puberty (breast growth) and a program to improve the scars will be contemplated.

3. Discussion

Severe burns are more commonly seen in the developing world, a result of both the widespread use of open fires and the inadequacy of primary health care.



Figure 4. One month after the second surgery.

When deep burns are healed spontaneously, patients develop hypertrophic scarring and contractures of the burned areas. It was the case for our patient.

These contractures are both a devastating functional and cosmetic deformity for patients [4]. Inappropriate treatment of axillary burns frequently results in adduction contractures. They create a virtual loss of skin, highlighted during surgical debridement. A classification of burn sequelae in the axillary region is useful for standardizing therapeutic proposals.

There are several classifications of axillary burn sequelae [5], Achauer's classification [3], taken up by Mojallal. [6] is the most detailed.

- Type I: anterior or posterior axillary fold is involved. Slightly restricted shoulder mobility.
- Type II: Both the anterior and the posterior axillary folds are involved, leaving the normal skin in the hair-bearing area. A web is formed during abduction.
- Type III: The upper arm and the lateral aspect of the trunk are completely included in one mass of hypertrophic scar tissue.
- Type IV: Extrinsic impairment, scars in surrounding areas causing reduced joint mobility.

Thus, Hudson and Renshaw recommend the use of autoplasties when the limitation of articular amplitude is less than 50% of the normal amplitude. Beyond that, they recommend complete debridement, paying attention to the noble axillary elements, followed using:

- Total skin grafts: Total skin grafts provide the best cosmetic and functional result. The thickness of the total skin reduces the amount of retraction. However, the taking of total skin grafts is more difficult to obtain, particularly at the mobile articular zones. Postoperative immobilization of total skin grafts is therefore essential and complicates postoperative management. The surface area of total skin donor sites is limited. Prior cutaneous expansion of these sites makes it possible to obtain larger grafts and closure of the donor sites by direct suture. Semi-thick skin grafts are an alternative to full skin grafts.

Their retraction is slightly greater and increases the scar ransom. Thin skin grafts are not suitable for reconstructing burn sequelae because they cause recurrence of skin retraction.

- Artificial dermis: Artificial dermis are intended to reproduce the properties of the dermal extracellular matrix which is a skin structure responsible for the elasticity of normal skin. In deep burns, this structure is damaged and replaced by granulation tissue, causing skin retraction and pathological scars. The major advantage of artificial dermis lies in the availability of the matrix itself, as well as the thin skin grafts necessary for its covering. This procedure showed 75% improvement in joint mobility without recurrence of the contracture 11 months after surgery [7].
- Or flaps [8]: The use of a flap provides thicker and more elastic tissue than a skin graft. Free flaps have been used, but are technically more difficult, require longer anesthesia time, and require a trained microvascular surgeon [9]. IC fasciocutaneous flaps derived from Z plastic is a reliable technique in the treatment of these sequelae of axillary, inguinal and popliteal burns. However, there are limits. First, the absolute necessity that the flap be raised in healthy skin. It is necessary to study the adjacent scarred skin well. It is also necessary, despite their relative success, to be wary of giant flaps [10]. Using IC fasciocutaneous flaps was indicated for our clinical case; the latérothoacic skin was not scarred, it provided a thick and elastic tissue. Among the alternative local flap donor sites, the scapular area seems to be the best owing to its localization being relatively far from the regions generally involved in burn victims with axillary contractures. Additionally, in comparison to the other techniques, the scapular flap offers satisfactory functional and aesthetic improvement with its remarkable dimensions and acceptable thickness for the axillary region. Depending on the three cutaneous branches of the circumflex scapular artery, flaps can be designed horizontally (classical scapular flap), obliquely (parascapular flap) and superiorly (ascending scapular flap) [11] [12].

Musculocutaneous flaps such as latissimus dorsi or pectoralis major can be used, but because of their bulkiness in the axillary hollow they will inevitably result in a poor cosmetic appearance and limit the adduction of the arm.

Tan described a technique based on the dorsal scapular artery that incorporates an extension of the flap that runs obliquely from the tip of the scapula toward the midaxillary line. He named this flap the extended lower trapezius island myocutaneous flap. In moderate to severe postburn contractures of the axillary area, this flap offers some advantages, including the following [13]; the pedicle of this flap is away from the region of the scarred and distorted axilla with constant anatomical landmarks [14]; the skin island is usually spared in burns around the axilla [15]; the resulting donor site is well hidden, is easily closed with safe undermining on non-burned skin, and is not continuous with the axillary release incision [16].

The feasibility of a particular procedure depends on a set of local anatomical conditions, as the shape or extent of the scar is not unique in all patients. The decision regarding which technique to use can only be made after careful consideration given to each individual case.

4. Conclusion

Treating burn scar contracture remains a challenging problem for reconstructive surgeons. At present, no consensus exists on when to use what kind of technique [17]. Surgical treatment cannot be efficient without rehabilitation and immobilization [18]. The ultimate goal of the treatment of burn sequelae is the socio-professional reintegration of the burnt victim.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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