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Case Report

An Extraordinary Case of Axillary Contracture: Trapped Healthy Skin and Its Adnexes Under Contracted Scar

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Although striking improvements have been achieved in overall management of burn injury, postburn contractures are still an ongoing challenge to burn surgeons. Axillary adduction contracture is one of the most common types of these disabling postburn complications that usually result from suboptimal treatment after acute burns. An unusual and complicated case of axillary contracture in which the unburned, healthy axillary dome skin was trapped as a cystic mass under the scarred area was reconstructed by transfer of a big (17 × 13-cm) thoracodorsal artery perforator flap after contracture release. The result was satisfactory in terms of function and acceptable cosmetically. The underlying reasons for the inadequate treatment the patient received after surviving a severe electrical injury were discussed.

Key words: Trapped skin – Axillary contracture – Thoracodorsal perforator flap

Burn patients may suffer from a multitude of early and late complications depending on the depth and size of the injury. Over the past 50 years, sophisticated improvements in the overall management of acute thermal injuries, including early excision and grafting, not only decreased mortality and morbidity due to early complications but also reduced the frequency and severity of the late complications, including contractures and hypertrophic scarring. Despite the well-known fact that postburn contractures are better prevented than treated, many patients still suffer from them, especially after suboptimal primary care or major burns. Specifically, poor treatment of axillary burns without adequate splinting and rehabilitation unavoidably results in axillary adduction contractures that impair shoulder functions.[1] Once this occurs, reconstruction to repair axillary adduction contractures may require surgical techniques varying from simple skin grafting and local flaps such as Z-plasties up to complicated pedicled fasciocutaneous, musculocutaneous, and even perforator-based flaps, depending on the severity of contracture.[2–5]

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Fig. 1 Mature burn scar involving almost the entire anterior chest and extending toward the left axillary region up to the antecubital area (left). A severe axillary adduction contracture allowing only 60° abduction of the left arm (right).

In this report, we present an unusual case of axillary adduction contracture in which the unburned, healthy skin of the axillary dome was almost totally trapped and embedded in axillary fossa without any visible symptom for many years. Additionally, our treatment rationale was also included.

Report of the Case

A 23-year-old male patient seeking treatment for an axillary adduction contracture involving his left arm was referred to our burn center. In his first interview, he narrated an incident of high-voltage electrical injury that he had sustained 13 years ago when he had climbed up a lamppost to hang a flag. Although he described a severe burn injury caused by ignition of the clothing by electrical arc, he did not mention any surgical treatment attempted during his postburn care. Because of lack of any past medical records pertaining to the patient, his anamnesis was only relying on his memories related to his current disability. We deduced from the memories he recounted that he had been treated expectantly by only several dressing changes without splinting or an associated rehabilitation program; the treatment he did get was in a rural hospital that had neither a professional burn facility nor expert medical personnel. Being a member of a low-income family out of social-insurance coverage, he had not visited any medical facility to ask for better or additional treatment and rehabilitation in the 13 years since initial treatment, even though he noted an increasing restriction in shoulder abduction within 2 years after the injury. He also described minimal serous drainage once a week through the axillary scar tissue during this initial 2-year period.

Physical examination of the patient revealed a mature burn scar involving almost the entire anterior chest and extending toward the left axillary region up to the antecubital area (Fig. 1, left). Hypopigmented areas and hypertrophic bands were noted over scarred regions. When abduction of the left shoulder was requested, a severe axillary adduction contracture allowing only 60° abduction of the left arm was apparent (Fig. 1, right). The entire axillary anatomy, including both folds and dome, was replaced by scar tissue, forming a single contracture band that extended up to the antecubital area. Neither a cyst formation nor a discharging fistula orifice through the scar tissue was observed on preoperative evaluation. Based on the Kurtzman and Stern[6] classification system, the case was assessed to be a Type 3 axillary adduction contracture.

Surgical release of the contracture and replacement of the underlying soft tissue defect with a thoracodorsal artery perforator flap (TAP Flap) was undertaken for reconstruction of axillary anatomy and for functional improvement. Following preoperative marking and induction of general anesthesia, the patient was positioned in a lateral decubitus position on the operation table, with the left arm and back involved in the surgical field. As soon as initial incision for contracture release was carried out, a mass with a cavity formation came into view under subcutaneous fatty tissue (Fig. 2, left). Upon opening the cavity wall, we were able to see the hairs and white particles inside the cavity, the inner surface of which resembled normal skin and adnexes including sebaceous secretion. The mass was excised out of the axillary fossa, where it occupied a big space and was measured to be 12×8.5 cm in size (Fig. 2, right). After contracture release was accomplished, a TAP Flap 17×13 cm in size was harvested on a

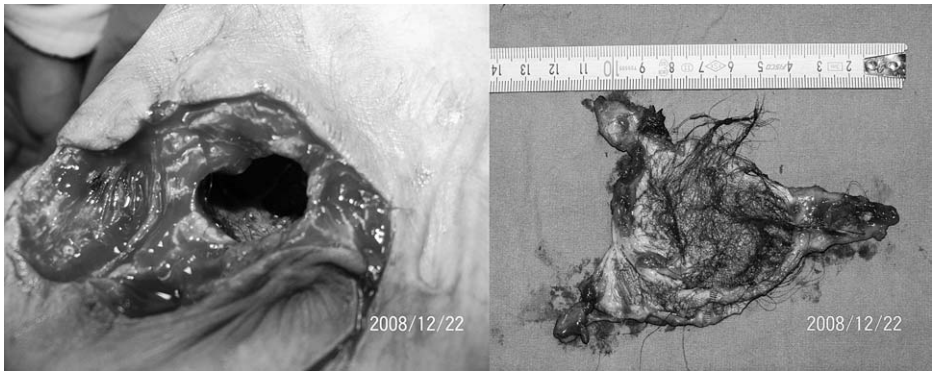

Fig. 2 A mass with a cavity formation came into view under subcutaneous fatty tissue immediately after the initial incision (left); the mass was excised out of the axillary fossa, where it occupied a big space and was measured to be 12 × 8.5 cm in size.

single perforator from the lateral thoracic area in the usual manner and transposed over the axillary defect (Fig. 3, left, right). Donor area was replaced with a split-thickness skin graft harvested from the lateral thigh.

The postoperative period was uneventful. The TAP Flap survived completely, and the graft grew well without any loss. Pathological examination of the excised specimen confirmed that it consisted of only normal skin and its appendages. Seven-month follow-up with the patient revealed that excellent functional and optimal cosmetic results were achieved, and the patient was satisfied with the result (Fig. 4, left, right).

Discussion

Disabling sequels may be the inevitable outcome after a burn if the patient doesn't get the correct treatment associated with a proper rehabilitation program. Contractures are the most common type of postburn sequels leading to functional impairment. Although the majority of them are preventable, postburn contractures are still common and severe in developing nations and are significant problem in developed countries as well. Especially when the joints are involved, they may cause serious restrictions or even loss in the functions of the extremities.[7]

In cases of burns involving the axillary region, disabling outcomes such as axillary adduction contracture can be prevented by correct treatment, including early excision and grafting followed by adequate postoperative splinting and rehabilitation. Occasionally, however, one still encounters patients who were treated expectantly, with disastrous results, like the one we are presenting. Moreover, severe axillary burns are not uncommon, especially after high-voltage electrical injuries due to the arc of a current through this moisture area, as it happened to our patient. Though we have encountered many severe and complicated axillary contractures during our practice, this is the first time we have ever

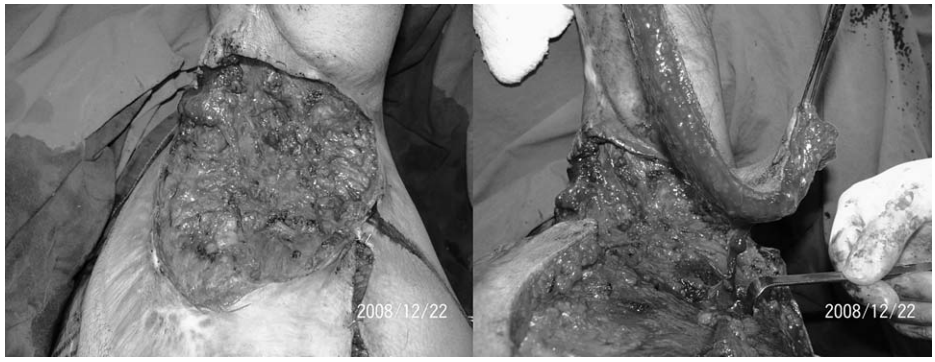

Fig. 3 Axillary defect after the extirpation of the mass (left). After contracture release was accomplished, the 17 × 13-cm TAP Flap was harvested on a single perforator and transposed over the axillary defect (right). The donor area was replaced with a split-thickness skin graft.

Fig. 4 Appearance of the flap at the end of the operation (left); 7-month follow-up of the patient revealed that excellent functional and optimal cosmetic results were achieved (right).

encountered such a big, intact skin island that was entirely and completely buried in axillary fossa. Our judgment, which relied on intraoperative observation, was confirmed by postoperative pathological investigation of the excised specimen.

Our patient survived a high-voltage electrical injury that usually causes deep burns. Doubtlessly, all deep second- and third-degree burns result in open wounds that finally heal by contraction and epithelialization. Although it is always present to some degree, contraction may be decreased by early excision and grafting followed by preventive postoperative measures such as splinting and physiotherapy. What we inferred from the patient's anamnesis is that he did not undergo any surgical treatment or axillary splinting procedure during the early burn-care period. Later, during the recovery period, no preventive measure was taken against contractile evolution of the scar tissue. The ultimate outcome became a severe axillary contracture that extremely impaired shoulder function.

Being a member of a poor family living in a rural part of the country lies behind his having been deprived better acute burn treatment followed by a professional rehabilitation. Even though the governments assert that they are following a social political policy offering social security for every family, including the deprived ones who cannot afford health insurance, this does not mean that these families, the majority of which are living in rural areas, are provided with proper medical service by qualified experts. Especially in circumstances that require special expertise, such as burn injury, the problem is ensuring that every patient in the country has access to the required professional medical care equally. In rural areas, the first-line medical services are usually provided by general practitioners in the cottage hospitals or village clinics. Inadequate training in the medical facilities concerning burn injuries usually leads to false triage of the burn victims and sometimes improper treatment of the local burns. This may be one reason why burn victims from rural areas usually get suboptimal treatment in our country. Additionally, the nationwide number of professional burn care facilities and burn surgeons should be addressed as another possible contributing factor. On the other hand, it is not cost effective to establish many burn centers and burn units all over the country and then train burn surgeons to work in these facilities because burn injury is not a common type of injury, unless a big fire disaster takes place. It would make more sense to transport the burn victims to burn centers or burn units of the big government hospitals. In our opinion, the problem is that the the long-term treatment of these patients usually requires many follow-ups and revision surgeries performed by professional rehabilitation programs. After survival of their children following acute thermal injury, these low-income families are usually reluctant to take them to these professional burn facilities for follow-up visits. Although the social security system provided by the government allows for coverage of treatment expenses, the cost of travel to the cities where these professional burn facilities are located for follow-up and rehabilitation is not included and becomes a financial problem for these poor families. This is what we were told by our patient as a justification for his family's attitude that caused his disabling deformity. Unfortunately, this

detail that might have been ignored by the healthcare system will probably lead to depriving many innocent, burned children of proper treatment and rehabilitation at a specialized burn care facility. As a matter of fact, paying for the transportation of burn patients during their long-term treatment and rehabilitation period is much wiser for the government because the cost would actually be less than the cost of reconstruction when disabling deformities remain.

Once the need for surgical correction of axillary contracture is determined, the choice of procedure must be individualized for each patient, depending on the severity of the deformity and availability of healthy local tissues. Proper choice of treatment may be based on the classification of axillary contractures proposed by Kurtzman and Stern in 1990.[6] They classified axillary contractures as type 1, those limited to the anterior axillary fold (type 1A) or posterior axillary fold (type 1B); type 2, those involving both folds but sparing the axillary dome; and type 3, those involving the axillary dome in addition to the type 2 contracture. Simple local flaps, including V-Y plasties, five-flap release, local transposition flaps, and seven-flap plasty, were reported to be usually sufficient[2,3] for type 1 or 2 contractures, whereas more complex procedures, including scapular-, parascapular-, medial arm-, ascending scapular-, or thoracodorsal perforator-based flaps, are required for type 3 or broader contractures with complete obliteration of axilla.[5,8–10] Availability of unburned local tissues must be considered as another determinative factor in selection of a proper flap for coverage of the defect that is to be disclosed after contracture release. Our case was deemed to be type 3 contracture with spared skin over the dorsolateral thoracic area. Hence, replacement of the huge defect that remained after contracture release was carried out by transfer of a big thoracodorsal artery perforator flap harvested from the lateral thoracic area. As a result, satisfactory reconstruction of the disabling deformity was achieved at the expense of a big grafted donor area that looks unsightly. Unfortunately, if our patient had received proper treatment, his axillary contracture, if it had occurred at all, would have been type 2, leaving the axillarry dome skin intact at worst, which could have been treated with easier methods that do not leave such unsightly scars.

In conclusion, our current case may be considered as a demonstrative postburn deformity representing the final outcome of burn patients who receive suboptimal treatment. Both improper acute burn treatment and lack of preventive measures resulted in that otherwise avoidable adduction contracture in which healthy axillary dome skin was trapped. Professional medical service to burn patients can inherently be given only at specialized burn centers or units. Although social healthcare insurance provided by the government covers the cost of burn treatment, disregarding the cost of transportation to burn care facilities in cases that also require long-term ambulatory treatment and follow-ups may still cause poor families living in rural areas to receive inadequate treatment, with resultant disabling postburn deformities.

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