

Release of Severe Postburn Contracture of Index Finger with Two-stage Reconstruction

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Summary: Postburn contractures are the result of deep burns that are not treated properly and promptly. Severe contractures require more than one surgery to be completely relieved. Their surgical treatment is very difficult and challenging for reconstructive surgeons. The author presents a case with severe postburn contracture of the index finger especially at the DIP joint with an angle of 110 degrees, which was released with a full skin graft in two stages of reconstruction. The application of this procedure enables the complete release of severe contractures and protects the fingers from their loss as a result of the shortening of vascular structures. (*Plast Reconstr Surg Glob Open* 2022;10:e4335; doi: 10.1097/GOX.0000000000004335; Published online 19 May 2022.)

Generally, contractures arise where adequate burn care has not been applied.¹ Moreover, the contracture does not only occur due to skin loss but also may result from the differential growth pattern between burn scar and surrounding tissues.² The presence of severe skin contracture over a prolonged period of many years can produce the shortening of musculo-tendinous units and neurovascular structures. The joints may be subluxated or dislocated, with joint capsule and ligaments becoming tight in the direction of the contracture.

Moreover, the vessels may also go into spasm with the compromise of distal limb or digit circulation due to excessive stretch.¹ When there is not sufficient adjacent tissue to allow the surgeons to release or lengthen the contracture, very diverse approaches are needed.³ Severe and old contractures of fingers usually are not possible to fully release with only one operation, but need two or more surgical interventions.

Defects created after the release of postburn contractures should be replaced with donor tissues matching texture, color, and pliability. Skin flaps (including free flaps) meet these criteria to replace scar tissues and repair the resulting defect post release, providing superior functional outcomes.⁴⁻⁶

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CASE PRESENTATION

A 19-year-old girl presented with a severe postburn flexor skin contracture of the index finger of the left hand at the level of the metacarpophalangeal (MCP), proximal interphalangeal (PIP), and distal interphalangeal (DIP) joints. The patient was burned many years ago when she was 4 years old, and because the burn was deep and had not been treated professionally, it became complicated with a severe contracture, especially at the level of the DIP joint. The patient also complained of functional and aesthetic concerns of the index finger, which she incurred when she was young. On physical examination, a severe flexor contracture of the index finger was found at the level of the MCP, PIP, and especially in the DIP joint (Fig. 1). The hand x-ray shows a flexor contracture accompanied by deformation of the articular sites in the medial and distal bone phalanges (DIP joint) with an angle of 110 degrees, but without degenerative processes of articular cartilage. (See figure 1, Supplemental Digital Content 1, which shows x-ray view of severe postburn flexor contracture of the index finger in MCP, PIP, and DIP joints. <http://links.lww.com/PRSGO/C38>.) Because it was a severe 15-year-old contracture, as well as due to the shortening of the skin and the neurovascular structures that occurred in correlation, we decided to release this contracture in two stages to prevent any vascular complications of the distal region of the finger.

During the initial stage of the operation, the skin was initially released through the transverse incision and careful preparation at the level of the finger's MCP, PIP, and DIP joints. During the preparation, the collateral ligaments and the volar plate of the DIP joint were not affected,

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Fig. 1. Severe postburn flexor contracture of the index finger in MCP, PIP, and DIP joints.

but they were preserved, and only the scar skin tissue was released. The distal phalanx was then fixed to the medial phalanx with two Kirschner wires in the DIP joint at an angle of 60 degrees, while the skin defects in MCP, PIP, and DIP joints were covered with a full-thickness skin graft, taken from the inguinal region (Fig. 2). At this stage, the contractures at the MCP and PIP joint levels were levels that relied on release because they were not severe scale contractures. The postoperative course was good, the K-wires were removed after 4 weeks, the full graft was completely accepted, and the patient underwent adequate physiotherapeutic treatment.

After 3 months, we performed the second operation stage. During the second stage, the skin was also released by a transverse incision at the level of the DIP joint, while the distal phalanx of the finger was turned at a right angle by fixing it to the medial phalanx using two K-wires. The skin defect was covered with a full-thickness skin graft taken from the inguinal region (Fig. 3). K-wires were removed postoperatively after 4 weeks, the full skin graft was completely accepted and the patient was advised to visit the physiotherapist to perform the physical exercises.

The patient was very satisfied with the result of the operation: the complete release of the contracture and the return of the distal phalanx to the physiological position (Fig. 4), which can also be seen in x-ray. [See figure 2, Supplemental Digital Content 2, which shows the



Fig. 2. First stage: release of contracture at the level of MCP, PIP, and DIP with full thickness skin graft, and fixation of the DIP joint at an angle of 60 degrees with a Kirschner wire.



Fig. 3. Second stage: a full release of the contracture at the level of the DIP joint with full thickness skin graft, and fixation of the DIP joint with the Kirschner wire.

x-ray view after the second operation stage (the current situation). <http://links.lww.com/PRSGO/C39>.] The operation also achieved a very good functional range of motion of the index finger at almost normal values at the level of PIP and DIP joints. (See Video [online], which displays the outcomes of the technique of the release of severe postburn contracture with two-stage reconstruction.)

DISCUSSION

Severe postburn contractures are difficult and not uncommon problems for the plastic surgeon, which



Fig. 4. Outcomes after contracture release with two-stages reconstruction: the position of the index finger with a full range of motion.

require a deep knowledge of the postburn consequences and reconstructive methods. The shortening of deeper structures has great clinical significance.³ It may not be possible to release the contracture completely at the time of operation because the neurovascular structures and musculotendinous units may stand out as bowstrings, limiting any further releases.² A desirable option is a flap covering. Both local flaps, including propeller flaps and free flaps, have been successfully used in burn contracture reconstruction.⁷

In this presentation, the author describes a case with a severe contracture of the index finger over 100 degrees, the release of which required two stages of surgical intervention. Therefore, the surgical approach is based on two reconstruction stages in the complete release of the skin and other soft tissues as well as the return of the finger joints to their previous function.

CONCLUSIONS

Postburn contractures are quite common in daily surgical work. Therefore, well-planned preoperative planning and programming are necessary to achieve satisfactory results, including their complete release and the best possible functional recovery. The described technique has yielded very good reconstructive results, enabling a complete release of a severe postburn contracture with a satisfactory restoration of joint function. Although this technique takes longer for the complete release of the contracture (in two surgical stages of reconstruction), it makes it impossible for the

patient to create another visible scar after the raising of a local or distal flap, which will be difficult to be predicted by the patient, especially when it comes to the female gender.

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