Summary. Deep burns on the hand usually lead to joint and tendon exposure. A simple skin graft is insufficient to achieve healing. Soft tissue reconstruction represents a surgical challenge that ranges from the simplest to the most complex flaps. In some areas, microsurgery is not technically possible. Choice is then limited to pedicled distant flaps such as the abdominal wall flap-graft. We report a case of an acute burned hand with exposure of metacarpophalangeal joints from the second to the fourth radius as well as proximal interphalangeal joints from the second to the fifth radius and extensor tendons, treated in the burns and wound care unit of the Sylvanus Olympio Teaching Hospital in Lomé. The dorsum hand and fingers were treated with a pedicled abdominal flap-graft that was severed in two stages at 22 and 29 days. We achieved good results (sensitivity S3+, useful aesthetic hand) at two-year follow up.

Keywords: hand, burn, flap, graft, Africa

Introduction

Deep burns on the hand frequently expose both joints and tendons.1,2 A simple skin graft is insufficient to achieve healing. Soft tissue reconstruction represents a surgical challenge, requiring from the simplest to the most complex flaps.2,3,4,5 When the forearm is involved in the burn, the possibility to use local-coregional flaps is limited. Distant free or pedicled flaps may be necessary.2,3,4 In some areas, microsurgery is not technically possible and reconstruction is then restricted to pedicled distant flaps, such as the abdominal wall flap.

The abdominal wall pocket is a distant flap technique in which a subcutaneous pocket is surgically created for the injured hand, with a view to restoring skin coverage of the dorsum or palm.6,7 In 1965, Colson and Janvier described immediate and total debulking of distant flaps and called them ‘flap-grafts’. The donor site was the contralateral arm.8 To minimise donor site morbidity and improve cosmetic outcomes, the abdominal wall is now the preferred donor site.1,5,9,10

We evaluated the functional and cosmetic outcome of a deeply burned hand treated with an abdominal wall flap-graft at two-year follow up.

Case report

A 43-year-old, right-handed tailor was burned on the right forearm and hand in a domestic fire accident. The patient was initially admitted to the intensive care unit of the Sylvanus Olympic Teaching Hospital in Lomé. The dorsum hand and fingers were treated with a pedicled abdominal flap-graft that was severed in two stages at 22 and 29 days. We achieved good results (sensitivity S3+, useful aesthetic hand) at two-year follow up.

Reference

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Olympio Teaching Hospital in September 2013, then moved to the burn and wound care unit. After serial debridement and dressings, the metacarpophalangeal joints were exposed from the second to the fourth digits, and the proximal interphalangeal joints and extensor tendons were exposed from the second to the fifth digits (Fig. 1).

Patient consent was obtained for an abdominal wall flap-graft. Under general anaesthesia, debridement was completed. The second to the fifth digits were splinted with long green hypodermic needles. The abdominal area was marked to the size of the dorsum digit wounds and then infiltrated with saline water. A skin incision was made, and four separated tunnels were made on the abdominal wall skin using blunt dissection with scissors. The tunnels were totally debulked and only the dermis remained in contact with the hand wound. Thereafter, the digits and the dorsum of the hand were put inside the tunnels. The top of the tunnels were then sutured to the tips of the digits exiting the subcutaneous tunnels (Fig. 2).

The right forearm and wrist were grafted with autologous thin skin grafts harvested from the thigh (Fig. 2).

Nurses in the burn and wound care unit changed the gauze dressings and bandages every three days.

After 22 days, we divided the flap from the abdominal wall whilst keeping the fingers syndactylised (Fig. 2). The digits were then separated one week later (Fig. 2). The abdominal wall donor site was grafted with autologous thin skin graft.

Shoulder and elbow physiotherapy started after the first procedure. The wrist was mobilised after the second procedure. Hand joint mobilisation started immediately after the digits were separated. Wrist and finger exercises were continued for six months.

At two-year follow up, function was reasonable. Sensitivity of the dorsum of the hand was S3+ on the British Medical Research Council scale, and the patient recovered a useful discriminatory sensitivity.

The skin on the dorsum of the hand was aesthetically good and flexible, with no significant colour change (Fig. 3). The donor site scar was good (Fig. 3).

The patient was very satisfied and recommenced his job. He can use scissors with his right hand (Fig. 3).

**Discussion**

Many types of flap can be used to cover the dorsum of the hand after injury. Loco-regional flaps such as interosseous and radial forearm flaps may not be possible because of burn scars on the forearm. Free flaps are not technically possible in our area. The inguinal groin pedicled flap is possible, although it can be uncomfortable and often needs further surgery to thin it. The donor site scar is less conspicuous, however. Besides the inguinal groin flap, the only other possibility we have is the abdominal wall flap.

Some sophisticated materials have been used in descriptions of the procedure. In our case, long hypodermic needles were used instead of kirshner wires. They were available and less expensive. We preferred them because of their small diameter and the fact there is no need for extra equipment to place them.

The only problem we found with the procedure was the long period of immobilisation (22 days), which necessitates particular attention. In our practice, the procedure did not need any special nursing care. Physiotherapy plays an important role in this treatment, not only for the burned hand but also for the shoulder and elbow which are immobilised during the 22 days of the first part of the procedure in order to avoid shoulder.
pains, as Zhao et al. published. After the fingers are separated, exercises are focused on the hand and wrist to improve hand function. Long-term physiotherapy is important for the immobilised hand but also for the initial burn injuries. In Matsumura et al.’s study, patients had physiotherapy for six months to one year. The donor site in our patient had a good aesthetic scar appearance, as described by other authors.

We obtained good results (sensitivity S+, useful aesthetic hand) and as Prader et al. found, the recovery of sensitivity is always lower than in the opposite hand. They also found, as we did, that patients recover a functional level of sensitivity.

**Conclusion**

The abdominal wall flap-graft remains a simple procedure that permits recovery in deep acute burns on the hand with exposure of tendon or joints. This procedure can be used in low-income countries with no microsurgical equipment. It needs no special equipment or special nursing care, but physiotherapy is essential because of the long period of immobilisation and depth of the initial burn.

**BIBLIOGRAPHY**