

Remedying The Consequences of Burn Injuries to The Upper Limbs

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Abstract. The effectiveness of a comprehensive treatment and rehabilitation approach for post-burn and mechanical injuries to the upper extremities has been confirmed through the analysis of both immediate and long-term outcomes. The strategy, involving scar correction surgeries, autodermotransplantation, and physiotherapy, has yielded successful and sustainable results. Patients facing scar contractures and trophic impairments have regained mobility and improved their quality of life, underscoring the efficacy of our treatment approach.

Keywords: Upper Extremities, Post-Burn Deformities, Torso, Skin Plasty.

Relevance. Burns to the upper limbs can cause various issues. Firstly, they can damage the skin, muscles, and even bones. This can lead to the formation of scars, which can pose both cosmetic and functional problems, especially if they are located around joints or other moving parts. Additionally, burns can restrict the mobility of the limbs, which may require physiotherapy to restore mobility and strength.

The consequences of burns can also include impairment of sensitivity and motor functions. In the case of burns to the hands, this can affect the ability to hold objects or perform daily tasks. Finally, it is important to consider the psychological consequences of burns. They can induce stress, anxiety, depression, or post-traumatic stress disorder.

After burns to the upper limbs, it is important to seek medical assistance and rehabilitation to prevent or minimize potential consequences and restore functionality and quality of life.

Thus, the issue of burns to the upper limbs continues to require attention from the medical community, research, and the development of effective treatment methods, as well as improvements in preventive measures to reduce the frequency of such injuries.

Aim of the study. Improving Outcomes After Burn and Mechanical Injuries to the Upper Limbs.

Material and methods. In the Department of Reconstructive Surgery of Andijan City General Hospital (from 1998 to 2008) and the Multidisciplinary Regional Medical Center of Andijan (from 2008 to 2022), over 3000 patients with post-burn scar deformities and contractures of the upper limbs were operated on.

All patients who were hospitalized in burn units in the Fergana Valley (Andijan, Fergana, Namangan) were placed under dispensary observation after discharge from the hospitals.

Immediately after the burns had healed, patients were recommended, along with physiotherapeutic procedures, to undergo baths with hydrogen sulfide irrigation at the "Chimgan" sanatorium (Fergana region).

After a period of 6-7 months, a preliminary examination was conducted, and in cases of scar contractures of the fingers, surgical correction was performed. For minor finger contractures, Z-plasty and plasty with opposing rectangular skin-fat flaps were performed, without compromising blood circulation from the lateral surfaces of the fingers.

For grade II-III contractures, scars were excised transversely and redressed in the distal phalanges. The resulting wounds were covered with full-thickness autodermotransplantations taken from the inner surface of the shoulder (42%) or from the anterior-inner surface of the thigh (50%). In children under 7 years of age who had not undergone circumcision previously, the skin of the foreskin was used to cover the wounds after finger redressal. The study of long-term results showed the effectiveness of this technique. These children achieved good functional and aesthetic results, with the main point being the absence of scars in the donor areas.

In cases of flexor-extensor contractures of the fingers, it was considered expedient to first correct the extensor contractures, followed by the flexor contractures of the fingers. In the presence of scar syndactylies,

interdigital gaps were created during the operation using rectangular flaps of soft tissues from the back or palm, and the wounds on the lateral surfaces of the fingers were covered with autodermotransplantations.

For scar contractures of the radiocarpal, elbow, and shoulder joints, surgery was performed on average 12-15 months after the burn. In the absence of healthy adjacent tissues, after transverse excision of the scars, joint redressal was performed. The medial and lateral edges of the wounds were given a swallowtail shape, and the wounds were covered with full-thickness autodermotransplantations.

In the presence of healthy adjacent tissues, after excising the scars and redressing the joints, the wounds were covered with excised skin-fascial trapezoid and biconvex flaps. The joints were immobilized with plaster splints for 28-30 days.

We have developed a technique for simultaneous correction of scar deformities of the dorsum of the hand and fingers with simultaneous correction of scar syndactylies and extensor contractures with deviation, for wound closure after excision of scars with a completely intact full-thickness graft. In this case, the donor site on the thigh was tightly closed after wide mobilization of its edges. As a result, there were no visible scars on the dorsum of the hand and fingers (Pic. 1, 2). For comparison, we presented a patient operated on with multiple grafts, which yielded an unsatisfactory result (Pic. 3).



Pic. 1.



Pic. 2.



Pic. 3.

During the transplantation of full-thickness skin to the axillary region or the elbow fossa, "Pelot" dressings were applied over the grafts to ensure secure contact of the skin with the wound.

In cases of soft tissue defects on the dorsum of the hand with exposure of tendons and bones, closure of the wounds with skin-fascial flaps from the anterior abdominal wall was performed in 896 cases. We conducted accelerated biological training on the flap, allowing for pedicle excision in 14-16 days. After 6-8 months, liposuction of the transferred flaps on the dorsum of the hand was performed.

For small-sized scars on the shoulder and forearm, staged scar excision was performed using the "Sharp Dermotension" method.

In cases of limited scar tissues, the tissue expansion method was applied, where an expander was implanted adjacent to healthy tissues next to the scars, and healthy tissues were stretched on an outpatient basis for 2-3 months. After achieving the desired expansion, the expander was removed, scars were excised, and the resulting wound was covered with stretched healthy tissues. During tissue expansion, pressure sores formed under the expander in two cases, leading to cessation of expansion.

We also perform simultaneous correction of scar syndactylies. We consider it essential to form interdigital folds from skin-fat flaps harvested from healthy tissues. This helped prevent syndactyly recurrence.

On the 10th-12th day after suture removal, patients were recommended hydrogen sulfide baths, along with other physiotherapeutic procedures.

Conclusion. Analysis of short-term and long-term outcomes has shown the high effectiveness of our treatment and rehabilitation approach for patients with sequelae of burn and mechanical injuries to the upper limbs.

Some patients experienced hyper- and hypopigmentation of the transplanted skin, but this did not affect the functional outcome of the surgery.

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