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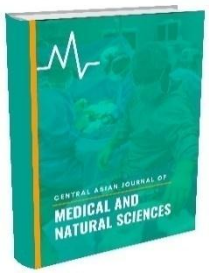

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From the Experience of Surgical Treatment of Patients with Scar Deformities of the Lower Limbs

1. Temirov P.

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[1] Department of Faculty and Hospital Surgery #1, Andijan State Medical Institute, Andijan, Uzbekistan

Abstract: The effectiveness of a comprehensive treatment and rehabilitation approach for post-burn and mechanical injuries to the lower 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.

Key words: lower extremities, post-burn deformities, torso, skin plasty.

Relevance. The issues of burns on the lower extremities remain relevant in the modern medical context. Burns on the lower limbs often occur due to various reasons such as household accidents, workplace incidents, road accidents, or even criminal activities. This leads to a constant influx of patients with burns requiring specialized medical assistance.

Burns on the lower extremities can be particularly challenging to treat due to the specific anatomy and functionality of this body region. Restoring mobility, reconstructing skin coverage, and improving cosmetic outcomes necessitate a comprehensive approach and a high level of medical expertise.

The treatment of burns demands substantial resources, including medical services, rehabilitation, as well as extended periods of disability. This creates economic and social burdens for patients, their families, and society at large.

Thus, the issue of burns on the lower extremities continues to demand the attention of the medical community, research, and the development of effective treatment methods. Additionally, enhancing preventive measures is crucial to reduce the frequency of such injuries.

Aim of the study. Improving Outcomes Following Burns and Mechanical Injuries to the Lower Extremities.

Material and methods. Since 1995, over 2000 patients with post-burn and post-traumatic scar deformities of the lower extremities have been operated on. The causes of burns in patients were as follows: hot liquids in 4%, contact burns in 4%, flame burns in 68%, and mechanical trauma in 28%.

Patients exhibited scar deformities in the hip joint area, flexor contractures of the knee joints in 236 cases, deformities and contractures in the ankle joint area in 308 patients, extensor scar contractures of the fingers in 173 patients, and flexor contractures of the toes in 274 cases.

Fifty patients presented with long-lasting non-healing trophic wounds in the scarred area of the shin and foot, and 32 patients had persistently non-healing granulating wounds after burns and trauma. (Pic. 1,2,3.)

Pic. 1

Pic. 2

Pic. 3

We developed a rehabilitation algorithm for these patients, which comprised three stages.

Stage 1: After the healing of burn wounds, patients underwent a range of physiotherapeutic procedures, including sulfur baths at the “Chimyon” Sanatorium in the Fergana Region. All patients were placed under dispensary observation.

Stage 2: This stage involved surgical correction of scar deformities and contractures using established techniques and new approaches developed by us. Surgeries were performed between 8 months and 10 years after the trauma.

Stage 3: Conducted after the healing of postoperative wounds and 10-20 days after suture removal, this stage included therapeutic exercises, physiotherapeutic procedures, and sulfur baths at the Chimyon Sanatorium.

In cases of scar lesions on the thigh without contractures, we performed a stepwise excision of scars longitudinally, mobilizing and suturing the wound edges with two-row sutures (acute dermotension). The subsequent stages of scar excision were carried out 8-12 months later.

For limited scar tissues, we applied the expander-based stretching method. An expander was implanted next to the scars, and over 2-3 months, adjacent healthy tissues were stretched on an outpatient basis. After achieving the desired growth, we removed the expander, excised the scars, and closed the resulting wound with stretched healthy tissues. During tissue stretching, pressure sores under the expander developed in two cases, prompting us to stop the stretching process.

In cases of scar contractures in joint areas, we used flap plasty methods as needed. Flaps were excised from adjacent areas, and care was taken to ensure that the flaps did not have sharp angles, which could lead to marginal tissue necrosis.

In 26 cases, flaps were used on the pedicle of the opposite lower limb when there was a need to cover the bones of the shin and foot. During this process, we conducted the "biological training" of the flap using an accelerated method developed by us. This allowed for a reduction in the engraftment time of the distal portions of the soft tissue flaps by 6-8 days.

In cases of a deficit of healthy adjacent tissues, scar contractures of the knee and ankle joints were eliminated by transverse incision of constricting scars. After limb redress, the wound edges were given a "swallow's tail" appearance, and the wound was closed with a full-thickness autodermotransplant.

For post-burn scar deformities of the dorsum of the foot and extensor contractures of the toes, we performed a transverse incision on the dorsum of the foot at the most constricting part of the scars. We carried out redressing of the toes. It was mandatory to suture the distal phalanges of the toes through the nails from the plantar surface of the foot in a hypercorrection state of flexion. A longitudinal roll of gauze was left between the threads and the tissues of the toes and foot for 10-12 days. Hypercorrection helped avoid recurrence of contractures in almost all cases by preventing the so-called "shrinking of the graft". (Pic. 4)

Pic. 4

The wound formed on the dorsum of the foot was closed with a "full-thickness" autoderm, taken from the inner surface of the thigh. The donor site wound was always sutured with two-row knot stitches after broad mobilization of the edges.

When addressing flexor contractures of the toes during the hyperredressing operation, we achieve this by suturing the nail phalanges through a longitudinal gauze onto the skin of the dorsum of the foot.

Simultaneously, we perform the removal of scar syndactyly. In this case, we consider the essential condition to be the formation of interdigital folds from skin-fat flaps, excised from healthy tissues. This approach has helped prevent the recurrence of syndactyly.

In cases of trophic ulcers on the shin, in 14 instances with the assistance of vascular surgeons, we conducted an operation involving the extensive excision of the edges and the base of the ulcer, the destruction of sub-knee venous stasis vessels, and the closure of the wound with a full-thickness autoderm graft taken from the thigh area. (Pic. 5,6,7.)

Pic. 5

Pic. 6

Pic. 7

In cases of severe scar contractures of the knee joints, the operation was conducted with the assistance of traumatologists. After the installation of the Ilizarov apparatus, gradual extension was performed. During this process, scars were transversely incised, and the resulting wound was closed with an autoderm graft.

Gypsum immobilization was applied for 23-25 days after all lower limb surgeries.

After the transplantation of full-thickness skin, local hypothermia was mandatory, achieved by applying ice packs. Hypothermia was carried out for a period of 10-12 days.

Prevention of postoperative purulent-necrotic complications was conducted through regional lymphatic therapy. This therapy was carried out through the dorsum of the foot, shin, and thigh, depending on the operative intervention zone. Lymphatic therapy reduced stagnation and improved lymphatic drainage of the operated tissues. The effectiveness of lymphatic therapy has been experimentally proven.

Conclusion. The analysis of both immediate and long-term outcomes has confirmed the high effectiveness of our treatment and rehabilitation strategy for patients with consequences of burns and mechanical injuries to the lower extremities. Clinical cases highlight positive transformations, with some patients who had experienced burns unable to walk for approximately 3 months due to scar contractures. After two stages of surgery, they regained the ability to walk independently and even engage in sports. Some patients exhibited hyper- or hypopigmentation in the transplanted skin, but these changes did not impact the functional results of the operation.

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