



## Materials and Research Methods for Post-Burn Cicatricial Deformities of the Torso

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**ABSTRACT:** The work is based on the results of surgical treatment of 206 patients with post-burn defects, cicatricial deformities of the soft tissues of the body, operated on in the department of reconstructive surgery of the multidisciplinary medical center of the Andijan region from 2015 to 2022. Data were collected at initial and follow-up visits, when patients were called to the clinic for follow-up examinations, and examined using POSAS questionnaires. After the operation, the degree of functional recovery and the aesthetic effect were studied. According to the options for plastic surgery of cicatricial deformities, all patients were divided into two groups. The main group included 105 patients who underwent improved plasty options, the comparison group included 101 patients who underwent traditional plasty methods.

Clinical studies were carried out in accordance with generally accepted standards, and the comparison group and the main group of patients were completely representative both in terms of the structure and nature of burn defects, and in terms of the main indicators of body homeostasis upon admission to the hospital. This contributed to the maximum reliability of further study results when significant differences were found after the use of improved surgical tactics and new plastic methods.

**KEYWORDS:** expander plasty, skin plasty, torso burns, post-burn deformities, torso.

### INTRODUCTION

Post-burn torso deformities are devastating injuries that often lead to a deterioration in emotional well-being and quality of life. In addition to stressful emergency care, post-burn deformities often require long-term treatment with multiple outpatient visits and multiple reconstructive surgeries, as well as concomitant hospital stays. These health-related consequences of burn injuries are often accompanied by additional socioeconomic burdens for burn victims and their families [1–7].

### AIM OF THE STUDY

Optimization of methods of surgical treatment of patients with consequences of trunk burns.

### MATERIAL AND METHODS

The work is based on the results of surgical treatment of 206 patients with post-burn defects, cicatricial deformities of the soft tissues of the body, operated on in the department of reconstructive surgery of the multidisciplinary medical center of the Andijan region from 2015 to 2022. Data were collected at initial and follow-up visits, when patients were called to the clinic for follow-up examinations, and examined using POSAS questionnaires. After the operation, the degree of functional recovery and the aesthetic effect were studied. According to the options for plastic surgery of cicatricial deformities, all patients were divided into two groups. The main group included 105 patients who underwent improved plasty options, the comparison group included 101 patients who underwent traditional plasty methods. According to the size of cicatricial deformities, the improved technical aspects of plasty in the main group were divided into the following areas:

– plastic surgery with intraoperative balloon stretching of local tissues – 43 patients with small area cicatricial deformities (the comparison group included 24 patients with plastic surgery with local tissues and 36 patients with plastic surgery with pre-stretched local tissues);



– full-thickness free skin grafting – 24 patients with medium-sized cicatricial deformities (the comparison group included 22 patients who underwent free skin grafting with a split autograft);

– combined grafting (a combination of the proposed options for local and free skin grafting) – 38 patients with large area cicatricial deformities (the comparison group included 19 patients who underwent free skin grafting with a split autograft).

In table 1, cases of infection by groups and types of scar coverage are identified, it is obvious that if in the context of coverage severe forms and free skin infection are transferred, split autograft, then in the main group, diseases caused by human tissues with balloon disease, complete free infection and their combination.

**Table 1.** Distribution of patients by groups and types of elimination of cicatricial lesions of the trunk

Type of operation	Comparison group		Main group		Total	
	abs.	%	abs.	%	abs.	%
Plastic surgery with local tissues	24	23,8%	0	0,0%	24	11,7%
Plastic with pre-stretched local tissues	36	35,6%	0	0,0%	36	17,5%
Free skin grafting with a split autograft	41	40,6%	0	0,0%	41	19,9%
Plasty with local tissues with intraoperative balloon stretching	0	0,0%	43	41,0%	43	20,9%
Full-thickness free skin grafting	0	0,0%	24	22,9%	24	11,7%
Combined plastic	0	0,0%	38	36,2%	38	18,4%
Total	101	100,0%	105	100,0%	206	100,0%

When distributing patients by sex and age, there was a predominance of women both in the comparison group – 73.3%, and in the main group – 74.3%. In the age composition, the largest share was occupied by a contingent from 16 to 50 years old, that is, the most able-bodied age, which, in addition to physical and mental, also brings tangible socio-economic damage.

The main causes of cicatricial deformities, soft tissue defects of the body were burns with flames and hot liquids – n=187 (90.8%). Chemical burns were the least marked – 4 (1.9%) cases.

According to the area of the defect and the prevalence of the lesion, the patients were distributed as follows (Table 2). Unfortunately, patients with large defects up to 250 cm<sup>2</sup> or more prevailed – 40.9%.

**Table 2.** Distribution of patients according to the prevalence of the lesion

Area	Comparison group		Main group		Total	
	abs	%	abs	%	abs	%
Small defects (up to 80 cm <sup>2</sup> )	60	59,4%	43	41,0%	103	50,0%
Medium defects (up to 150 cm <sup>2</sup> )	22	21,8%	24	22,9%	46	22,3%
Large defects (up to 250 cm <sup>2</sup> )	19	18,8%	38	36,2%	57	27,7%
Total	101	100%	105	100%	206	100%

The correct choice of the method of plastic replacement is facilitated by the existing classifications of soft tissue defects of the body, taking into account the state of the tissues surrounding the defect, localization. Below is a classification of post-burn cicatricial deformities and defects, taking into account the topographic and anatomical features of the trunk area, as well as the parameters of cicatricial defects in the patients operated on by us.

- I. According to the localization of scars:
  - 1. Anterior chest wall;



2. Anterior abdominal wall, lumbar and sacral regions;

3. Combination of chest and abdominal walls.

II. Scar size:

1. Small defects – up to 80 cm<sup>2</sup>;

2. Medium defects – up to 150 cm<sup>2</sup>;

3. Large defects – more than 250 cm<sup>2</sup>.

The volume of preoperative examination of patients included:

– the generally accepted scheme of preoperative examination;

– assessment of scars by color, thickness, displacement, density, the ability to take them into a fold to determine indications

for surgery;

– assessment of the location and extent of scars, depth and damage to deep tissues, the presence of intact skin in adjacent areas, the size and depth of the soft tissue defect;

– skin thermometry;

– measurement of oxygen tension in tissues;

– measurement of pressure inside the Foley catheter after the introduction of fluid in a swollen state.

To assess the state of blood supply in tissues during intraoperative, preliminary expander stretchable and displaced tissues, patients at the stages of surgical treatment, the dynamics of percutaneous partial oxygen pressure (tcPO<sub>2</sub>) was studied with a closed Clark-type electrode under conditions of skin heating under it to 43° C, to maximize the expansion of the vascular network and creating standard measurement conditions. To do this, we used the TCM-3/20/200 system from Radiometr, Denmark.

Skin temperature was measured in all groups of patients in order to determine the most optimal timing for the next injection of saline into the Foley catheter during plastic surgery using the method of intraoperative tissue stretching, to assess the condition of the flaps in the postoperative period. Transcutaneous thermometry was performed using an electronic thermometer Microlife NC 200 from Microlife, Switzerland.

The criteria for evaluating the long-term (functional and cosmetic) results of plastic surgery of post-burn cicatricial deformities of the body were distributed as follows:

Good results were those in which it was possible to completely eliminate cicatricial deformities, restore normal skin, tissues were mobile, elastic, their color did not differ from the color of surrounding tissues and retained sensitivity.

Satisfactory results include those cases when defects and deformities were partially eliminated due to complications (retraction, pigmentation of grafts, expansion of the postoperative scar), there were areas of the skin that differed in color and elasticity from the surrounding tissues.

Unsatisfactory results are when, due to the recurrence of the deformity, plastic surgery had to be abandoned, and the functional and cosmetic effect was not achieved.

Plastic surgery with local tissues:

Indications: It is used for small defects and the presence of healthy tissues around the scars of the torso area.

Operation technique: on the border between the scar and healthy tissues, a part of the scar is excised, hemostasis is performed. The wound is closed with adjacent tissues by suturing the resulting wound with nodal atraumatic sutures.

Plastic with pre-stretched local tissues:

Indications: Cicatricial deformities of the anterior chest wall, back and lumbar region.

Operation technique: the required flap and the location of the dilator balloon and injection port are marked. Surgical access for implantation of the balloon is made taking into account the location of the incision for the formation of the final flaps. An incision is made at the border of the scar and healthy tissues, a pocket is mobilized in a blunt way and a pocket is formed for the implantation of the expander. After layer-by-layer suturing of the wound, a small pumping of the balloon is performed to close the “dead” space and provide additional hemostasis of the pocket walls, without tension on the sutured wound. After 2 weeks, the expander is sequentially filled through the injection port under sterile conditions. Sterile saline solution is administered 2 times a week. The total length of the tissue stretching period depended on the area of the tissue tensile defect, as well as on the size and number of expanders used. On average, this period varied from 1 to 3 months.



At the second stage of the plasty, the expander is removed, the final flap is exposed and the defect is closed after obtaining an adequate amount of tissue. namely, 3 months after implantation of the expander.

Operation technique: The incision was made on the border between the scar and unaffected skin. In a sharp and blunt way, protecting the expander from damage, the wound expands. The expander is removed. Scars are excised, the resulting wound is closed with stretched tissues.

Free skin grafting with a split autodermal graft:

Indications: used for medium and large defects and the presence of healthy tissues around the scars of the trunk area.

Operation technique: produced in one stage. After dissection of the tightening scars to healthy tissues, redressing of the mammary gland is performed. Careful hemostasis is performed. The resulting wound is closed with a split skin graft taken in the thigh area, up to 0.6 mm thick, using a special device – a dermatome. The edges of the graft are sutured to the edges of the wound with interrupted atraumatic sutures. A furatsilin bandage is applied over the graft. A wet–drying bandage is applied to the donor wound.

## CONCLUSION

Clinical studies were carried out in accordance with generally accepted standards, and the comparison group and the main group of patients were completely representative both in terms of the structure and nature of burn defects, and in terms of the main indicators of body homeostasis upon admission to the hospital. This contributed to the maximum reliability of further study results when significant differences were found after the use of improved surgical tactics and new plastic methods.

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*Cite this Article: Madazimov M.M., Temirov Ch.P., Nazirov U.S., Madazimov M.K. (2022). Materials and Research Methods for Post-Burn Cicatricial Deformities of the Torso. International Journal of Current Science Research and Review, 5(12), 4729-4732*