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Analysis of the Main Products of the Proposed Complex of Preventive Tactical and Technical Aspects of Scar Surgery

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The relevance of the problem: Despite modern advances in surgical techniques and biomedical technologies, the treatment of facial burns remains a difficult task, and the formation of post-burn scars may be inevitable. The approach to treating a burn wound begins with an accurate diagnosis of the depth and size of the burn, which is crucial for choosing the time and approach to treatment. Superficial burns (first degree) heal without surgery and, as a rule, do not lead to adverse scarring or hyperpigmentation, since the entire dermis is preserved. Superficial incomplete burns (second degree) usually heal spontaneously within a few days or weeks and can lead to scarring. Deep incomplete burns and burns of full thickness (third degree) usually require excision with reconstruction (often with skin grafting) and are more prone to the development of GTR. It is generally accepted that any burn that does not heal on its own within 3 weeks should be excised and transplanted as early as possible. This is associated with an increasing risk of GTP, which doubles from 20 to 40% between 2 and 3 weeks (Cubison T.C.S., et al. 2006). Even with precise surgical techniques, proper excision and transplantation can still lead to undesirable GTP, which may be unacceptable from a cosmetic point of view (Berman et al., 2008; Ashab Yamin, 2015; Chua et al., 2016; Zhu et al., 2016). Preventive therapy to reduce the formation of widespread GTP is fundamental for the treatment of burns and can significantly change the outcome depending on the effectiveness of treatment, the timing of treatment and the duration of treatment. Silicone plates, tapes, and gel formulations physically cover the healing area and are widely used as a general approach to scar reduction (Meier and Nanney, 2006; Blisdale et al., 2015). Over the past decade, many advanced burn dressings have been introduced, many of which contain silver compounds due to their long-term antimicrobial effects. Other topical antibiotics and therapeutic occlusive or exposure dressings are commonly used to facilitate healing and prevent scarring, although these non-molecular therapies lead to different clinical outcomes (Leon-Villapalos et al., 2008; Block et al., 2015).

Materials and methods of research. Patients of the main group 211 were also divided into subgroups depending on the type of correction performed. In the subgroup of free skin grafting (UPC) there were 60 patients, plastic surgery with counter flaps (PVL) – 111 patients and combined plastic surgery (CP) – 40 patients. Various options for local plastic surgery: Z-plastic, plastic with displaced flaps and other options, when adjacent tissues with scarring were used, were included in the PVL subgroup.

The results and their discussions. A comparative analysis of the immediate results of the proposed therapeutic and preventive measures of the frequency of postoperative complications in the near future according to the methods of plastic surgery and the field of application. In total, out of 211 patients, only 10 (4.7%) people had various complications, which is undoubtedly much less than in the comparison group. At the same time, most of the complications were suppuration of the wound - 5 (2.4%). Marginal lysis was noted in 3 (1.4%) cases, and necrosis of a part of the flap was noted in 3 (1.4%) cases.

When comparing by regions, there is no significant difference, complications in the face area are 4.2%, in the neck area 5.4%. The frequency is calculated based on the total number of patients distributed by affected areas (face, neck, all cases). If in the comparison group, in some cases, there was a partial discrepancy of the wound, then in the main group there was no such complication.

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Figure 1 shows a graph that well reflects the difference in the frequency of complications that developed in the immediate postoperative period in both groups. The best results were noted in the main group. The value – m indicates the error index of the arithmetic mean. In the comparison group, complications developed after UPC in 4 out of 35 (11.4%±5.4%) patients, while in patients of the main group in 2 out of 60 (3.3%±2.3%; t=1.38; p>0.05). After PVL, this ratio was 15.7%±2.8% (in 27 of 172 patients) versus 4.5%±2.0% (in 5 of 111 patients; t=3.29; p<0.05), respectively.

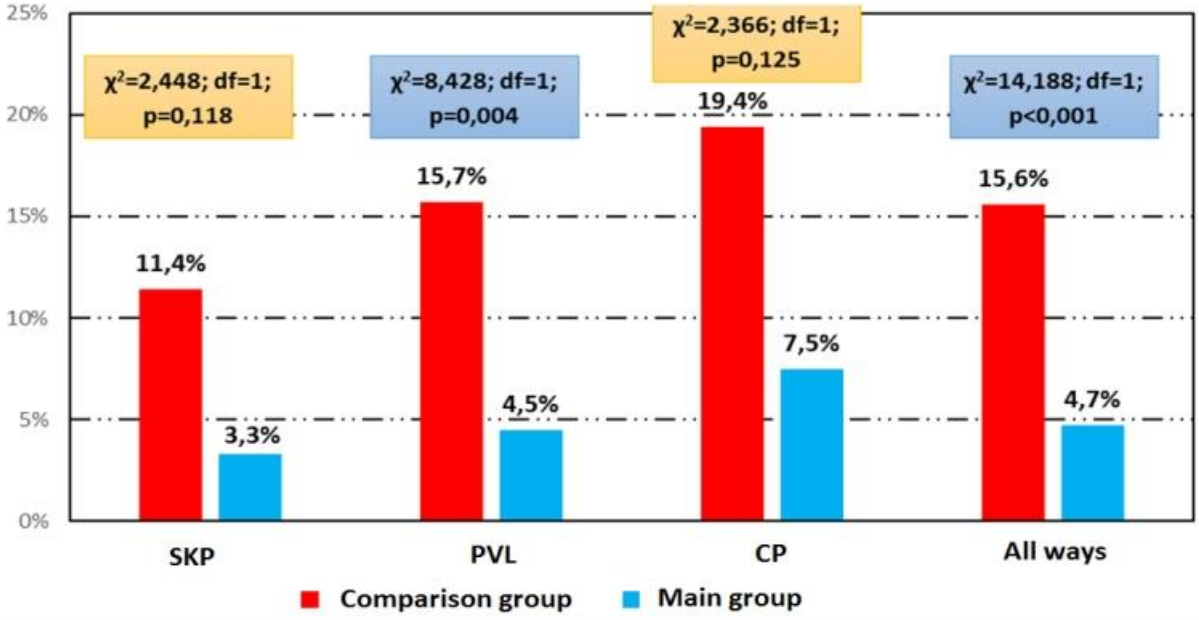

Fig. 1. Summary frequency of postoperative complications depending on the method of plastic surgery

Combined plastic surgery options were accompanied by complications in 19.4%±6.6% (in 7 out of 36 patients in the comparison group) and 7.5%±4.2% (in 3 out of 40 patients in the main group; t=1.53; p>0.05). The indicators of the t-criterion corresponded to those in determining the criterion χ2 – that is, reliable differences in the results were obtained only for PVL, whereas in UPC and KP the values obtained were unreliable, due to the small sample size, while it should still be noted that the level of complications was significantly lower in the main group.

Figure 2 shows the frequency of postoperative complications depending on the area of plastic surgery. In the comparison group, complications developed in 21 out of 145 (14.5%±2.9%) patients with facial plastic surgery, while in the main group patients in 5 out of 119 (4.2%±1.8%; t=2.98; p<0.05). After neck surgery, this ratio was 17.3%±3.8% (in 17 of 98 patients) versus 5.4%±2.4% (in 5 of 92 patients; t=2.65; p<0.05), respectively.

When comparing the two groups as a whole, including all plastic surgery options and reconstructed areas, complications were noted in 15.6%±4.6% (in 38 of 243 patients in the comparison group) and 4.7%±2.2% (in 10 of 211 patients in the main group; t=2.53; p<0.05).

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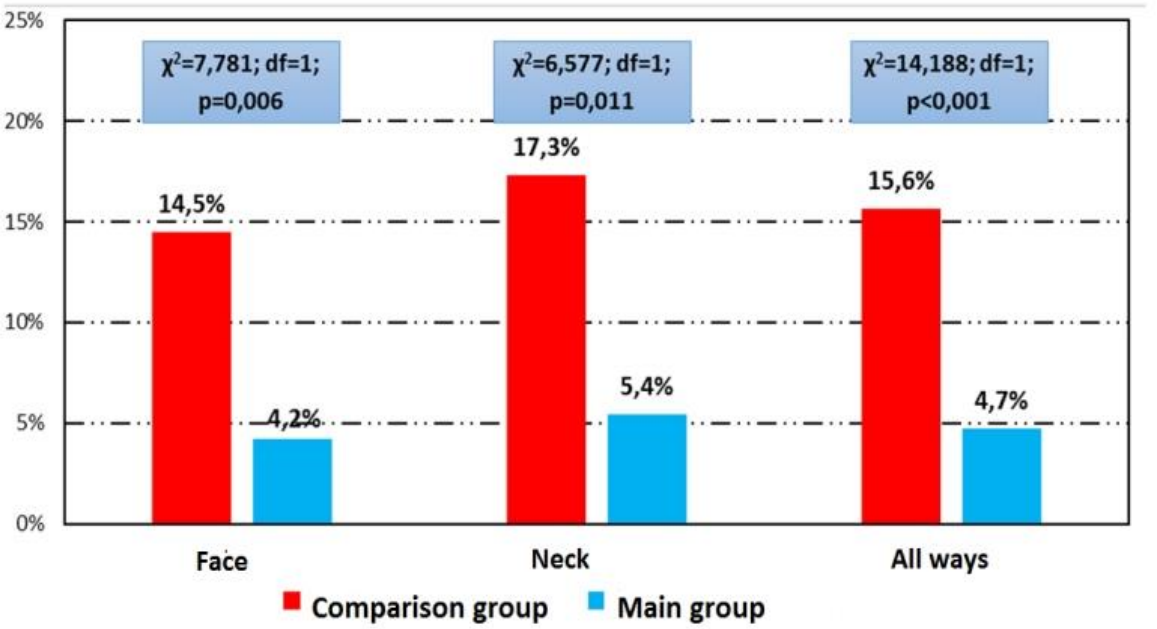

Fig. 2. The frequency of postoperative complications depending on the area of plastic surgery

In an isolated analysis of free skin grafting, depending on the area of the defect in the main group, with small and medium areas, there were no complications in either the face or neck area. With extensive lesions, complications occurred in 1 (11.1%) patient on the face and in 1 (8.3%) patient after neck surgery, in both cases suppuration of the wound was observed, which was eliminated by conservative therapy. Necrosis of a part of the flap developed only in 1 (2.9%) cases with plastic surgery in the face area of an average area. It must be said that suppuration of the wound was noted in only 2 cases, in 1 (25%) case with plastic surgery of a large facial defect and in 1(14.3%) case with plastic surgery of an average neck defect. There were no discrepancies in the wound in any case.

The frequency of complications after UPC depends on the area of the defect by group. There is a significant decrease in the immediate postoperative complications in the main group. With small areas, there were no complications in both groups. With average areas, this ratio was 12.5%±8.3% (in 2 out of 16 patients) versus 0% ($t=1.51$; $p<0.05$), respectively. With extensive plastic defects in the comparison group, it was accompanied by complications in 20.0%±12.6% (in 2 out of 10 patients), and in the main group 9.5%±6.4% (in 2 out of 21 patients; $t=0.74$; $p>0.05$).

When comparing the two groups as a whole, complications were noted in 4 out of 35 patients in the comparison group - 11.4%±5.4% and in the main group 3.3%±2.3% (in 2 out of 60 patients; $t=1.38$; $p>0.05$). The indicators of the t-criterion corresponded to those in determining the criterion $\chi 2$ – that is, significant differences in the results were obtained in the plastic of defects of an average area in the largest subgroup consisting of 46 people. But, even with a cursory glance, there is a significant decrease in complications in the main group.

In the comparison group, complications developed in 2 out of 19 (10.5%±7.0%) patients with facial plastic surgery, while in 1 out of 33 patients in the main group (3.0%±3.0%; $t=0.98$; $p>0.05$). After neck surgery, this ratio was 12.5%±8.3% (in 2 out of 16 patients) versus 3.7%±3.6% (in 1 out of 27 patients; $t=0.97$; $p>0.05$), respectively. When comparing the two groups as a whole, including all plastic surgery options and reconstructed areas, complications were noted in 11.4%±5.4% (in 4 out of 35 patients in the comparison group) and 3.3%±2.3% (in 2 out of 60 patients in the main group; $t=1.38$; $p>0.05$).

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When determining the criterion χ2, there were also no reliable statistical differences in the results of UPC plastic surgery, this is due to the fact that the majority of samples were less than 30 units, reducing complications in the main group.

When analyzing PVL, depending on the area of the defect, it was noted that complications occurred only in 5 (4.5%) of 111 patients, and with small defects there were no complications at all. With medium and extensive lesions, there was a dependence of an increase in the percentage of complications to 4.4% and 9.7%, respectively. There were slightly fewer complications in the plastic surgery of extensive defects in the face area – 5.9%, than in the neck area – 14.3%. Necrosis of a part of the flap developed in only 3 cases, but it also accounted for only 2.7% of the total number of patients. There was even less marginal lysis of the flap in the neck area - in 1 (0.9%) case, suppuration of the wound on the face was also noted in 1 (0.9%) case.

The frequency of complications after PVL depends on the area of the defect by group. There is a significant decrease in the immediate postoperative complications in the main group. In the comparison group with small areas, complications developed in 3 out of 48 (6.3%±3.5%) patients, whereas in the patients of the main group there were no complications. With average areas, this ratio was 17.5%±4.2% (in 14 out of 80 patients) versus 4.4±3.1% (in 2 out of 45 patients; $t=2.49$; $p<0.05$), respectively. With extensive plastic defects in the comparison group, complications were accompanied in 22.7%±6.3% (in 10 out of 44 patients), and in the main group 9.7%±5.3% (in 3 out of 31 patients; $t=1.58$; $p>0.05$).

When comparing the two groups, complications were noted in 27 out of 172 patients in the comparison group - 15.7%±2.8% and in the main group 4.5%±2.0% (in 5 of 111 patients; $t=3.29$; $p<0.05$). The indicators of the t-criterion corresponded to those in determining the criterion χ2 – that is, in general, significant differences in the results were obtained in the form of a three-fold decrease in complications in the main group.

The frequency of postoperative complications depends on the area of plastic surgery after PVL. In the comparison group, complications developed in 15 out of 105 (14.3%±3.4%) patients with facial plastic surgery, whereas in 2 out of 63 patients in the main group (3.2%±2.2%; $t=2.73$; $p<0.05$). After neck surgery, this ratio was 17.9%±4.7% (in 12 of 67 patients) versus 6.3%±3.5% (in 3 of 48 patients; $t=2.0$; $p>0.05$), respectively. When comparing the two groups as a whole after PVL, complications were noted in 15.7%±2.8% (in 27 of 172 patients in the comparison group) and 4.5%±2.0% (in 5 of 111 patients in the main group; $t=3.29$; $p<0.05$). The indicators of the t-criterion and the criterion χ2 were similar to the results obtained in the analysis of areas in the case of plastic surgery with counter flaps, significant differences in the results were obtained in the form of a decrease in complications in the main group ($\chi2=8,428$; $df=1$; $p=0.004$).

When analyzing CP, depending on the area of the defect, it was noted that complications occurred only in 3 (7.5%) of 40 patients, with defects of a small area, complications were not noted. With medium and extensive lesions, there was a dependence of an increase in the percentage of complications to 5.6% and 15.4%, respectively. In contrast to PVL, with CP, extensive defects in the face area had slightly more complications – 16.7% than in the neck area – 14.3%. Necrosis of a part of the flap developed only in 1 (2.5%) case. Marginal lysis of the flap and suppuration of the wound in the neck area – 1 (0.9%) case each, the same situation with CP in the face area.

Figure 6.7 shows the summary frequency of postoperative complications after CP, depending on the area of the defect by group. In the main group, immediate postoperative complications occurred only with extensive defects and an average area. In the comparison group, complications developed in 1 out of 10 (10.0%±9.5%) patients with small areas. With average areas, this ratio was 18.2%±11.6% (in 2 out of 11 patients) versus 5.6±5.4% (in 1 out of 18 patients; $t=0.98$; $p>0.05$), respectively. With extensive defects, CP in the comparison group was accompanied by complications in 26.7%±11.4% (in 4 out of 15 patients), and in the main group 15.4%±10.0% (in 2 out of 13 patients; $t=0.74$; $p>0.05$). When comparing the two groups as a whole, complications after CP were noted in 7 out of 36 patients in the comparison group - 19.4%±6.6% and in the main group 7.5%±4.2% (in 3 out of 40 patients;

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t=1.53; p>0.05). The indicators of the t-criterion corresponded to those in determining the criterion χ2 – that is, there were no significant differences in the results, since all subgroups were less than 30 people. Although, the decrease in complications in the main group from 19.4% to 7.5% by 2.58 times certainly reflects a positive trend in improving the results of plastic surgery due to the introduction of new technologies.

Figure 6.8 shows the frequency of postoperative complications depending on the area of plastic surgery after CP. In the comparison group, complications developed in 4 out of 21 (19.0%±8.6%) patients with facial plastic surgery, whereas in 2 out of 23 patients in the main group (8.7%±5.9%; t=1.0; p>0.05). After neck surgery, this ratio was 20.0%±10.3% (in 3 out of 15 patients) versus 5.9%±5.7% (in 1 out of 17 patients; t=1.2; p>0.05), respectively. When comparing the two groups as a whole after CP, complications were noted in 19.4%±6.6% (in 7 out of 36 patients in the comparison group) and 7.5%±4.2% (in 3 out of 40 patients in the main group; t=1.53; p>0.05).

The frequency of postoperative complications depending on the method of plastic surgery and the initial area of the defect. The general pattern is that, regardless of the type of plastic surgery, there is an increase in the frequency of complications as the lesion area increases. In addition, if all patients are taken into account, the minimum percentage of complications in UPC is 3.3%, it increases with PVL – 4.5% and the maximum of complications is 7.5% for CP.

Conclusion. Thus, improving the preventive tactical and technical aspects of surgical treatment of post-burn scar deformities made it possible to reduce the incidence of specific complications in the immediate period after all types of plastic surgery from 15.6%±2.3% (in 38 out of 243 patients in the comparison group) to 4.7%±1.5% (in 10 out of 211 patients in the main group; t=3.96; p<0.001), including during facial surgery from 14.5%±2.9% (in 21 of 145 patients in the comparison group) to 4.2%±1.8% (in 5 of 119 patients in the main group; t=2.98; p<0.001) and on the neck from 17.3%±3.8% (in 17 of 98 patients in the comparison group) to 5.4%±2.4% (in 5 of 92 patients in the main group; t=2.65; p<0.01). In turn, taking into account the type of plastic surgery, the incidence of complications was reduced after UPC from 11.4%±5.4% (in 4 out of 35 patients in the comparison group) to 3.3%±2.3% (in 2 out of 60 patients in the main group; t=1.38; p>0.05), after PVL from 15.7%±2.8% (in 27 out of 172 patients in the comparison group) to 4.5%±2.0% (in 5 out of 111 patients in the main group; t=3.29; p<0.001), and after CP from 19.4%±6.6% (in 7 out of 36 patients in the comparison group) to 7.5%±4.2% (in 3 out of 40 patients in the main group; t=1.53; p>0.05).

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