

5. Adetona MO, Shokunbi MT. Quantitative anthropometric and dermatoglyphic variation of the major ethnic populations in Nigeria. *Journal of Experimental and Clinical Anatomy*. 2019; 18(1):55-62. doi: 10.4103/jeca.jeca\_33\_18
6. Gunas VI, Mishalov VD, Serebrennikova OA, Klimas LA, Shayuk AV. Palmar dermatoglyphics of modern Ukrainians: regional trends. *Biomedical and biosocial anthropology*. 2018(31): 11-7. <https://doi.org/10.31393/bba31-2018-02>
7. Gutiérrez-Redomero E, Rivaldería N, Alonso-Rodríguez C, Martín LM, Dipierri, JE, et al. Are there population differences in minutiae frequencies? A comparative study of two Argentinian population samples and one Spanish sample. *Forensic science international*, 2012; 222(1-3): 266-276. <https://doi.org/10.1016/j.forsciint.2012.07.003>
8. Hussein IA, Abdullah NF. Fingerprint Angles and Patterns in the Population of Najaf Province. *Ibn AL-Haitham Journal For Pure and Applied Science*. 2017; 19(4): 21-33.
9. Kahleel SH. Palm-print patterns in population of Diwanayah City. *Al-Qadisiyah Journal of Pure Science*. 2017; 17(2): 25-32.
10. Kapoor N, Badiye A. Digital dermatoglyphics: A study on Muslim population from India. *Egyptian Journal of Forensic Sciences*. 2015 Sep 1; 5(3):90-5. <https://doi.org/10.1016/j.ejfs.2014.08.001>
11. Mbaka G, Ejiwunmi A, Alabi O, Olatayo T. Digital dermatoglyphic variation and migratory pattern of ethnic Liberians. *Egyptian Journal of Forensic Sciences*. 2016; 6(4):416-21. <https://doi.org/10.1016/j.ejfs.2016.06.005>
12. Minkov T, Boichev M, Todorov V, Paraskova N, Georgiev V, et al. Dermatoglyphic characterization of bulgarian population from some regions of southeastern Bulgaria. *Journal Scientific & Applied Research*. 2015; 8: 47-53.
13. Serebrennikova OA, Gunas VI, Klimas LA, Ocheretna NP, Shayuk AV. Predictive assessment of the association of dermatoglyphic indicators with indicators of personality traits, established by factor analysis. *Reports of Morphology*. 2019; 25(1):12-8. [https://doi.org/10.31393/morphology-journal-2019-25\(1\)-02](https://doi.org/10.31393/morphology-journal-2019-25(1)-02).
14. Tandon A, Srivastava A, Jaiswal R, Patidar M, Khare A. Estimation of gender using cheiloscopy and dermatoglyphics. *National journal of maxillofacial surgery*. 2017; 8(2):100055. <https://doi.org/10.1016/j.fsir.2020.100055>.
15. Zhang HG, Chen YF, Ding M, Jin L, Case DT, Jiao YP, Wang XP, Bai CX, Jin G, Yang JM, Wang H. Dermatoglyphics from all Chinese ethnic groups reveal geographic patterning. *PLoS One*. 2010; 5(1):e8783. <https://doi.org/10.1371/journal.pone.0008783>.

Стаття надійшла 20.02.2020 р.

DOI 10.26724/2079-8334-2021-1-75-50-54

UDC 616.555-056.232-089.844

V.S. Drabovskiy, D.S. Avetikov, D.V. Kapustianskiy, S.V. Malyk, M.V. Bezruchko, O.S. Osipov  
Ukrainian Medical Stomatological Academy, Poltava

## SURGICAL TREATMENT OF COSMETIC BODY DEFECTS IN MESOMORPHIC PATIENTS

e-mail: drabovskiy1987@gmail.com

~~~~~  
A method for improving the stage of abdominoplasty in the trunk cosmetic defects correction in patients with mesomorphic body type, which provides retension suture with traction of the lateral edges of the upper transverse skin and fat flap with the rotation angle of 51–58° in men and 54–61° in women in order to create a uniform tissue tension due to the biomechanical properties of the anterior abdominal wall tissues. This method, compared to the known ones, revealed the following advantages: formation of a normotrophic scar at the incision site, reduction of local wound complications and other adverse consequences of correction, obtaining a satisfactory cosmetic result of abdominoplasty and improving the quality of life in patients.

**Keywords:** abdominoplasty, cosmetic scar, mesomorphs.

## В.С. Драбовський, Д.С. Аветіков, Д.В. Капустянський, С.В. Малик, М.В. Безручко, О.С. Осіпов ХІРУРГІЧНЕ ЛІКУВАННЯ КОСМЕТИЧНИХ ДЕФЕКТІВ ТУЛУБА У ПАЦІЄНТІВ-МЕЗОМОРФІВ

~~~~~  
Запропоновано спосіб удосконалення етапу виконання абдомінопластики при корекції косметичних дефектів тулуба у пацієнтів з мезоморфним типом конституції, який передбачає на етапі ушивання операційної рани накладання провізорних швів із здійсненням тракції латеральних країв верхнього поперечного шкірно-жирового клаптя під діапазоном ротаційних кутів у чоловіків та 54-61° у жінок з метою створення рівномірного тканинного напруження за рахунок біомеханічних властивостей тканин передньої черевної стінки. Даний спосіб у порівнянні із відомими, виявив наступні переваги: формування на місці розрізу нормотрофічного рубця, зменшення кількості місцевих ранових ускладнень та інших небажаних наслідків корекції, отримання задовільного косметичного результату абдомінопластики та підвищення рівня якості життя пацієнтів.

**Ключові слова:** абдомінопластика, косметичний рубець, мезоморфи.

~~~~~  
*The work is a fragment of the research project "Development of scientifically substantiated principles for stratification in monitoring and forecasting of surgical diseases and injuries course", state registration No. 0120U101176.*

Postoperative scars, the consequences of pregnancy and childbirth, lipodystrophy and other factors contribute to formation of unsatisfactory cosmetic appearance of the anterior abdominal wall (AAW), deform the contours of the body and figure, cause dissatisfaction with appearance, which reduces the quality of life [1, 2]. Despite the achievements of plastic surgery and the experience gained in performing operations to correct cosmetic defects of the AAW, 18.5–28.7 % of people have early and late

complications associated with errors and mistakes in planning tactics and choice of surgical techniques [5, 9]. As a result, the patient does not get the expected shape of the abdomen and the trunk contours [6, 12].

The most popular surgery for correction of AAW cosmetic defects is abdominoplasty, the history of which dates back to the end of the XIX century [1]. Despite more than a century of experience in performing this surgery, it is still considered by surgeons from a purely technical point of view – not always taking into account the cosmetic consequences of tissue manipulation [9].

In addition, when performing abdominoplasty, the main attention of surgeons is focused on the maximum allocation and reduction of exfoliated skin and fat flap in the hope of compensating for blood circulation due to perforating vessels [7, 9]. Known technologies do not pay enough attention to create normal tissue pressure in the postoperative wound, which depends on the biomechanical characteristics of the tissue and is a necessary condition for obtaining an adequate cosmetic result [8, 14]. As a result, ischemic changes develop on the periphery of the wound, causing the deformed scars formation [11, 13].

Single works on studying the AAW surface layers biomechanics, found in the literature, do not solve the problem of correction [10, 15]. Therefore, improvement of known abdominoplasty technologies based on the AAW tissue biomechanical properties study is relevant.

**The purpose** of the study was to improve the results of surgical treatment in patients with mesomorphic body type having cosmetic defects of the anterior abdominal wall by improving the stage of abdominoplasty.

**Materials and methods.** The work is based on studying the treatment results in 19 patients with mesomorphic body type, at the clinic of the Department of Surgery No. 3 (CCH No. 1, Poltava) within 2015–2017, who underwent surgical treatment for the AAW cosmetic defects. All patients were divided into 2 groups: group 1 (comparison group) consisted of 8 patients, who underwent abdominoplasty according to traditional methods of tissue mobilization; group 2 (main) included 9 patients, who were operated by the method of skin and fat flaps mobilization, taking into account the biomechanical properties of the AAW tissue surface (Utility Model Patent of Ukraine No. 113467). The causes of AAW cosmetic defects were postoperative and postpartum deformities and defects, excessive or uneven deposits of subcutaneous adipose tissue, the consequences of rapid weight loss, AAW deformities due to a combination of factors.

The method of tissue mobilization in patients of the main group in abdominoplasty was carried out as follows. After marking the surgery zones, the surgical field treatment, anesthesia, an arciform incision of the skin and subcutaneous adipose tissue to the aponeurosis was performed according to the traditional technique with the formation of the upper and lower transverse adipo-dermal flaps. The incision vector was taken horizontally in the AAW hypogastrium, depending on the shape of the skin and fat folds, the presence of scars from previous surgery. Skin and fat flaps were separated with correction of the musculo-aponeurotic layer if needed, and the excessive tissue was excised with thorough hemostasis.

In order to adapt the skin and fat flaps and to ensure uniform tissue tension when suturing the surgical wound, the lateral edges traction of the upper transverse skin and fat flap for suturing was performed within the range of rotation angles 51–58° in men and 54–61° in women. An intradermal suture with polyamide 3.0 was applied to the skin [3].

The positive effect of the proposed technique is the formation of a normotrophic scar in the incision site, reducing the number of local wound complications and adverse correction results, satisfactory cosmetic results of abdominoplasty, reducing of the rehabilitation period duration, improving the quality of life in patients.

Cosmetic assessment of the postoperative scar was performed using the Vancouver scale in the Nedelec modification, which includes the main gradations of the clinical picture with a maximum score of 14 points at the time of sutures removal and 6 months after the surgery. In the remote period the adverse results of the correction were described.

The treatment efficacy was assessed by the quality of the postoperative period course, the presence of local complications, characteristics of the treatment cosmetic results during the hospital stay, at the time of sutures removal and 6 months after the surgery. The quality of life was compared using the EUROQuol-5S-5D questionnaire before and after the treatment.

Statistical data processing was performed using the “Statistica 10.0” application package. Verification of the sample was performed by visual evaluation of histograms and the Shapiro-Wilk W-test, which is recommended for use in samples of small and medium size. The relationship between the abnormally distributed variables was estimated using the nonparametric Spearman correlation coefficient (R). The  $\chi^2$  Pearson criteria were calculated as criteria for the significance of the relationship between categorical variables. One-factor covariance analysis was used to study the effect of various factors on

changes in the self-assessment of the physical and mental health components 6 months after the surgery. The results at  $p < 0.05$  were considered reliable.

**Results of the study and their discussion.** After analyzing the parameters of vascularization, pigmentation, scar elasticity, height of its rise above the tissues, postoperative pain syndrome and sensitivity disorders in the group using classical methods of skin and fat flaps mobilization in patients with mesomorphic body type using a modified Vancouver scale, in the comparison group it was found that the worst parameters of the scar at discharge were associated with its elasticity, which can be explained by the altered level of tissue tension, which begins to form coarse connective tissue, the presence of certain postoperative pain syndrome with impaired local sensitivity. The components of vascularization and pigmentation were almost at the same levels, due to the short period of time that has passed since the surgery.

When examining the condition of scar tissue after 6 months in patients of the same group after the treatment, the total overall score remained stable, indicating the absence of positive dynamics in the formation of normotrophic cosmetic scar. There was a decrease in postoperative pain, a decrease in the vascularization components' parameters and sensitivity. The scar's elasticity 6 months after the surgery deteriorated due to the continued formation of coarse connective tissue, which differed in its structural features from the adjacent tissues, which led to the onset of undesirable cosmetic consequences in the remote postoperative period.

Comparing the cosmetic consequences of surgical treatment for correction of AAW defects in mesomorphic patients to patients of the main group, there was a significantly better assessment of the postoperative scar ( $6.4 \pm 0.3$  vs.  $7.2 \pm 0.3$ ;  $p = 0.001$ ), due to the components of elasticity at the time of suture removal ( $1.9 \pm 0.2$  vs.  $2.8 \pm 0.2$ ;  $p = 0.001$ ) in patients operated by the modified abdominoplasty method.

These changes can be explained by the fact that normalization of stress distribution in the involved skin and fat flaps and the creation of tissue pressure values that do not exceed normal, after its slight drop during the surgery, prevent pathomorphological rearrangement of AAW tissues, stimulating reparative regeneration processes with the final obtaining of normotrophic scars.

After 6 months, cosmetic results in the main group of patients significantly improved ( $4.6 \pm 0.3$ ;  $p = 0.001$ ) due to the components of elasticity, pigmentation, and vascularization ( $\Delta = 0.8$ ;  $\Delta = 0.7$ ;  $\Delta = 0.7$ ;  $p < 0.05$ ). However, in the comparison group, the indices remained almost constant ( $7.2 \pm 0.4$ ;  $p < 0.05$ ). Cosmetic treatment results in the study groups are shown in table 1.

In addition to the best indices of postoperative scar symmetry ( $0.019 \pm 0.004$  and  $0.171 \pm 0.014$ , respectively,  $p < 0.001$ ) in the main group, we observed more satisfactory results in terms of the AAW areas symmetry, normal distribution of subcutaneous adipose tissue and body contours. All these aspects significantly improved the cosmetic and functional effect of treatment.

Table 1

Aesthetic results of AAW cosmetic defects treatment (M±m)

| Component                  | Main group         |                    | Comparison group   |                    |
|----------------------------|--------------------|--------------------|--------------------|--------------------|
|                            | Sutures removal    | 6 міс.             | Зняття швів        | 6 міс.             |
| Vascularization (0–3)      | $1.7 \pm 0.2^*$    | $0.7 \pm 0.1^*$    | $1.7 \pm 0.2^*$    | $1.4 \pm 0.2^*$    |
| Pigmentation (0–3)         | $1.5 \pm 0.2^*$    | $1.5 \pm 0.1^*$    | $1.8 \pm 0.1^*$    | $2.4 \pm 0.2^*$    |
| Elasticity (0–5)           | $1.9 \pm 0.2^{**}$ | $1.3 \pm 0.3^*$    | $2.8 \pm 0.3^{**}$ | $2.1 \pm 0.2^*$    |
| Scar height (0–3)          | $1.3 \pm 0.1$      | $1.1 \pm 0.2$      | $1.5 \pm 0.1$      | $1.3 \pm 0.1$      |
| Pain syndrom (VAS)         | $2.4 \pm 0.1$      | $1.4 \pm 0.2$      | $2.3 \pm 0.1$      | $2.0 \pm 0.2$      |
| Itching, sensitivity (VAS) | $2.4 \pm 0.2$      | $1.2 \pm 0.1$      | $2.3 \pm 0.1$      | $1.8 \pm 0.1$      |
| Total assessment (0–14)    | $6.4 \pm 0.3^{**}$ | $4.6 \pm 0.3^{**}$ | $7.8 \pm 0.3^{**}$ | $7.0 \pm 0.4^{**}$ |

Note: \* –  $p < 0.05$ ; \*\* –  $p < 0.001$ .

Despite approximately similar intensity of postoperative pain according to VAS, in patients, who underwent correction of AAW cosmetic defects according to the proposed methods and to the usual classic ones, at discharge and examination after 6 months, in analysis of the postoperative pain mean duration during hospital stay, a weak correlation was observed between the groups with worse parameters compared to the comparison group. Slightly higher score of postoperative pain was after abdominoplasty with extensive tissue mobilization ( $6.4 \pm 0.9$ ,  $p < 0.05$ ).

Due to the maximum preservation of blood circulation in the upper transverse skin and fat flap, the proposed method of its mobilization permitted to avoid marginal skin necrosis in the main group and to reduce the number of other local postoperative complications: seroma, hematoma by 12.5 % at  $p < 0.05$  (table 2).

**Early postoperative complications and adverse effects of AAW cosmetic defects correction in the study groups**

| Results                     | Number of patients |                        |
|-----------------------------|--------------------|------------------------|
|                             | Main group (n=10)  | Comparison group (n=9) |
| Local complications (early) | -                  | 1 (12.5 %)*            |
| Adverse cosmetic results    | 1 (11.1 %)*        | 3 (37.5 %)*            |

Note: \* –  $p < 0.05$ .

The number of adverse cosmetic treatment results, along with the worse score by the Vancouver scale, was also lower in the group where traction and fixation of mobilized tissues were performed at a rotational angles blindly (table 2).

However, no marginal necrosis of the wound and its burst were detected in any of the groups, which could lead to an AAW defect and to wound healing by its secondary intention with the formation, in the remote postoperative period, of an unaesthetic deforming scar.

Transient ischemic changes of the "working" skin and fat flap, disappeared against the background of conservative therapy for several days after the surgery, or were difficult to correct by medicated methods, which led, due to decompensation of bleeding, to the onset of persistent irreversible changes in connective tissue.

Dissatisfaction with the treatment results was most frequently caused by the presence of a "dog ear" on the abdominal flanks, residual overhang of the abdomen, asymmetry of the scar and other problems with its aesthetic appearance.

The quality of life study using the EUROQoL-5S-5D questionnaire showed a significant reduction in the overall assessment of the mental health component before the surgery in all patients, who underwent cosmetic surgery for AAW, and in the subgroup with  $BMI \geq 25 \text{ kg / m}^2$  – also physical one. The study of long-term results showed a significant increase in the quality of life after six months. During the year, the result remained stable. Within six months, self-esteem improved in 92.3 % of respondents. Six months after the surgery in the main group there was an increase in the physical component – "daily activities" ( $r=0.56$ ;  $p=0.001$ ) and psychological – "depression" ( $r=0.41$ ;  $p=0.09$ ) In the six months term of the survey, the mean score of the expert assessment for the entire main group was reliably higher than the self-esteem level of patients in the comparison group.

In order to identify the factors that influenced the patients' positive assessment of the treatment consequences by a visual analog scale, a regression one-factor covariance analysis was performed. The models included as independent continuous covariates: age of patients, body mass index before the surgery, length of the bed-day period in hospital, postoperative scar assessment by a modified Vancouver scale, difference between preoperative body mass index and the similar index six months after, presence of local complications of the wound process, as well as a categorical variable - the type of surgery performed (according to the author's tissue mobilization methods or to traditional ones). Subordinate variables were changes in the self-esteem of the physical and psychological components of health after 6 months compared to the preoperative period and the data on the quality of life assessment by a visual analog scale of the questionnaire.

The first model showed that only a change in body mass index affected a change in the physical component of health assessment over a six-month period. The second model found that the psychological component of health depends on the aesthetic effect of surgery, fewer postoperative complications, and the type of surgery - the use of biomechanically sound methods.

The obtained data generally coincide with the results of the ISAPS study, which showed that more than two thirds of those operated on were satisfied with the results of cosmetic operations on the AAW [5].

Surgical correction of cosmetic defects of the heart creates psycho-emotional and physiological prerequisites for improving the physical activity of patients, and after 6 months - and self-assessment of health [6]. The revealed improvement in the quality of life after six months on the scale of physical activity and the psychosomatic component of health is due to two factors, in our opinion. First, starting from the stage of preparation for the surgery, as well as in the postoperative period, the patient was instilled with the idea that the surgery is an important component in the comprehensive treatment of the AAW cosmetic defects. Secondly, the obtained positive psychosomatic status contributed to greater physical activity of patients.

We fully support the opinion of Avelar JM that at the planning stage of the cosmetic defects correction it is advisable to discuss with the patient the possibility of a two-stage intervention [7].

The analysis shows that the use of modified methods for skin and fat flaps mobilization in the correction of AAW cosmetic defects, taking into account the direction of their biomechanical stress vectors, do not significantly affect on the surgery duration, contributes to a reliable reduction in local postoperative complications and adverse results due to the best tension distribution in tissues. [3, 15].

Taking into account the results of the analysis by Nikolskiy et al., – the peak of dissatisfaction with cosmetic results occurs 3–5 years after surgery; we consider it appropriate to continue studying the results in the more distant postoperative period [4].

Our proposed methods comply with the principles of the Fast Track Surgery program and are aimed at accelerated surgery and rehabilitation, reduction of perioperative stress, contribute to the quality of the postoperative period course, fewer adverse effects and local complications. Thus, corrective operations on AAW dramatically improve the self-esteem of patients, especially their appearance perception.

### Conclusion

The proposed method of improving the abdominoplasty stage in patients with mesomorphic body type has the following advantages: improvement of cosmetic treatment results due to the formation of a normotrophic scar in the surgical access site and normalization of its quality characteristics, reducing the incidence of local postoperative complications and other adverse treatment consequences, raising the quality of life level.

### References

1. Galich SP, Pinchuk VD, Belyanskiy LS. Rekonstruktivnaya i esteticheskaya khirurgiya peredney bryushnoy stenki: rukovodstvo dlya vrachey. Kyiv: Kniga-plyus; 2013. 246 s. [in Russian]
2. Malyk SV, Drabovskiy VS. Shliakhy udoskonalennia rezultativ plastychno-rekonstruktyvnykh operatsii na peredniy cherevnyi stintsii. Svit medytsyny ta biolohii. 2016; 2(56):146–151. [in Ukrainian]
3. Malyk SV, Avetikov DS, Stavitskiy SO, Drabovskiy VS, vunahidniki; Ukrainska medychna stomatolohichna akademiia, patentovlasnik. Sposib mobilizatsii verkhnoho poperechnoho shkirno-zhyrovoho klaptia v liudey z mezomorfnoiu budovoyu tuluba. Patent Ukrainu. N. 113468. 2017 Sich. 25. [in Ukrainian]
4. Nikolskiy VI, Titova EV, Samorodova AA. Izuchenie kachestva zhizni patsientov posle proteziruyushchey gernioplastiki. Novosti khirurgii. 2016; 24(1):19–25. [in Russian]
5. Press reliz “Dvukhgodichnoe mirovoe issledovanie ISAPS”. International Society of Aesthetic Plastic Surgery [Internet]. 2010. Dostupno na: [http://www.isaps.org/uploads/news\\_pdf/BIENIAL\\_GLOBAL\\_SURVEY\\_press\\_release\\_Russian.pdf](http://www.isaps.org/uploads/news_pdf/BIENIAL_GLOBAL_SURVEY_press_release_Russian.pdf). Date of access: 02.03.2011 [in Russian]
6. Symulyk YeV. Abdominoplastyka: khirurhichna korektsiia ta profilaktyka uskladnen [dysertatsiya]. Kyiv: Nats.inst. khirurgii ta transplantolohiyi im O.O. Shalimova»; 2016. 22 s. [in Ukrainian]
7. Avelar JM. New concepts on Abdominoplasty and further applications. Springer International Publishin; 2016. 688 p.
8. Barreiro G, De Lima VS, Cavazzola LT. Abdominal skin tensile strength in aesthetic and massive weight loss patients and its role in ventral hernia repair. BMC Surgery. 2019; 19(68):1–6.
9. Bozola AR. Abdominoplasty: same classification and a new treatment concept 20 years later. Aesthetic Plast. Surg. 2010; 34(2):181–192.
10. Diaz-Siso JR, Bueno EM, Pomahac B. Abdominal wall reconstruction using a non-cross-linked porcine dermal scaffold: a follow-up study. Hernia. 2013; 17(1):37–44.
11. Goh KL, Listrat A, Bechet D. Hierarchical mechanics of connective tissues: integrating insights from nano to macroscopic studies. J. Biomed. Nanotechnol. 2014; 10:2464–507.
12. Lynch B, Bonod-Bidaud C, Ducourthial G, Affagard J-S, Bancelin S, Psilodimitrakopoulos S, et al. How aging impacts skin biomechanics: a multiscale study in mice Scientific reports [Internet]. 2017 Oct [cited 2021 Sep 1]; 7:1–10. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5653787/> DOI:10.1038/s41598-017-13150-4.
13. Lynch B, Bancelin S, Bonod-Bidaud C, Guesquin J-B, Ruggiero F, Schanne-Klein M-C. et al. A novel microstructural interpretation for the biomechanics of mouse skin derived from multiscale characterization. Acta Biomateriala. 2017; 50:302–11.
14. Phillip JM, Aifuwa I, Walston J, Wirtz D. The mechanobiology of aging. Annu. Rev. Biomed. Eng. 2015; 17:113–41.
15. Sharad PP. Biodynamic Excisional Skin Tension (BEST) Lines: Revisiting Langer’s Lines, Skin Biomechanics, Current Concepts in Cutaneous Surgery, and the (lack of) Science behind Skin Lines used for Surgical Excisions. J. of Dermatological Res. 2017; 2(1):77–87.

Стаття надійшла 12.01.2020 р.