Research Article

https://doi.org/10.23934/2223-9022-2022-11-1-181-185

A New Method of Tension-Free Plasty of Giant and Large Postoperative Ventral Hernias Using a Hernia Sac

A.S. Marinochkin ✉***, S.V. Avakimyan, K.I. Popandopulo, V.A. Avakimyan***

Department of Faculty and Hospital Surgery
Kuban State Medical University
4 Mitrofana Sedina St., Krasnodar 350063, Russian Federation

✉ **Contacts:** Aleksey S. Marinochkin, Postgraduate Student of the Department of Faculty and Hospital Surgery, Kuban State Medical University. Email: alexteans89@yandex.ru

ABSTRACT We planned to develop a tension-free hernioplasty method for giant and large postoperative ventral hernias. Twenty-three patients with complicated postoperative ventral hernias were operated on using the method. Ultrasound, computed tomography, and plain radiography of the abdominal organs were performed for diagnosis.

We have developed a tension-free hernioplasty method, where we placed a mesh implant between the flaps of the hernial sac in order to isolate it from the abdominal organs and subcutaneous fat. When applying this method, positive results were obtained (this method is absolutely tension-free plasty of the anterior abdominal wall, since own tissues are not put together; the location of the mesh implant made it possible to significantly reduce or almost completely avoid local complications, such as seroma, suppuration of the postoperative wound, fistula formation.

This method can significantly reduce the percentage of local complications and completely avoid compartment syndrome in the early postoperative period. In all patients operated on by the method, no relapses were observed during the follow-up period (3 years).

Keywords: ventral hernias, tension-free plasty, compartment syndrome, seromas

For citation Marinochkin AS, Avakimyan SV, Popandopulo KI, Avakimyan VA. A New Method of Tension-Free Plasty of Giant and Large Postoperative Ventral Hernias Using a Hernia Sac. *Russian Sklifosovsky Journal of Emergency Medical Care.* 2022;11(1):181–185. https://doi.org/10.23934/2223-9022-2022-11-1-181-185 (in Russ.)

Conflict of interest Authors declare lack of the conflicts of interests

Acknowledgments, sponsorship The study has no sponsorship

Affiliations

Aleksey S. Marinochkin	Post-graduate Student of the Department of Faculty and Hospital Surgery, Kuban State Medical University; https://orcid.org/0000-0002-1848-044X, alexteans89@yandex.ru; 40%, brief description of the author's contribution: conducting research, in particular, performing operations and collecting data/evidence, analyzing and interpreting the data obtained. Application of statistical, mathematical, computational or other formal methods for the analysis and synthesis of research data
Sergey V. Avakimyan	Doctor of Medical Sciences, Associate Professor of the Department of Faculty and Hospital Surgery, Kuban State Medical University; https://orcid.org/0000-0003-4474-774X, grossArzt@mail.ru; 30%, short description of the author's contribution: concept development: idea generation; formulation, development of key aims and objectives. Methodology development and design
Konstantin I. Popandopulo	Doctor of Medical Sciences, Head of the Department Faculty and Hospital Surgery, Kuban State Medical University; https://orcid.org/0000-0002-8668-7442, kipKip59@mail.ru; 15%, short description of the author's contribution: approval of the final version: acceptance of responsibility for all aspects of the work, the integrity of all parts of the article and its final version
Vladimir A. Avakimyan	Doctor of Medical Sciences, Professor of the Department of Faculty and Hospital Surgery, Kuban State Medical University; avakimyansv@mail.ru; 15%, a brief description of the author's contribution: preparation and editing of the text: drafting the manuscript or its critical revision with a valuable comment of intellectual content; participation in scientific design; preparing, creating and/or presenting a published work

CAD – coronary artery disease
CHF – chronic heart failure
COPD – chronic obstructive pulmonary disease
CT – computed tomography

INTRODUCTION

Incisional ventral hernias account for 20 to 22% of all external abdominal hernias and are the second most common after inguinal hernias [1]. Postoperative ventral hernias are one of the complications in patients undergoing open surgery on the abdominal organs. At the moment, the incidence of ventral hernias is in the range from 2 to 20% of cases [2–5].

At the present stage of surgical treatment of postoperative ventral hernias, the methods of plasty using various synthetic polymeric materials have received the greatest use [6–8]. The classical methods of "sublay" and "onlay" may not always be effective for large and especially giant postoperative ventral hernias, since conditions are created for dislocation of large volumes of the contents of the hernia sac into the abdominal cavity, and therefore, intra-abdominal hypertension syndrome may develop in the postoperative period (compartment syndrome) [9].

As a rule, in patients with large and giant hernias, it is customary to use bridge methods, which makes it possible to perform a truly non-stretch abdominal wall repair. Recently, separation repair has been used for large and giant postoperative ventral hernias [10]. Both of these methods avoid the development of compartment syndrome. According to the latest data, the frequency of unsatisfactory results in patients with large incisional ventral hernias is quite high and reaches 53% [11 , 16]. In Russia, the proportion of operations in elective surgery using a tension-free technique for ventral hernias is 43–52%, while there are isolated reports on the use of tension-free hernioplasty for strangulated hernias in the literature [17].

A direct dependence of the frequency of relapses on the width of the hernial orifice and the duration of the presence of the hernial protrusion has been proven [12]. The recurrence rate in plastic surgery using mesh implants, according to modern literature, ranges from 7.5 to 22.8% [1, 2, 6, 7, 13], and the number of postoperative complications can reach 30.5%, with 59–71% of postoperative wound seromas [3, 12, 14]. The mortality after planned hernia repair with postoperative ventral hernia is 0.2-0.3%, after emergency hernia repair – from 2 to 8%. In patients over 60 with large incisional ventral hernias and concomitant diseases, mortality and the number of postoperative complications can reach 16–20% [2].

Thus, despite the successes in the treatment of postoperative ventral hernias, many issues, such as the choice of the optimal method of hernioplasty, the material of the mesh implant remain unresolved and controversial, therefore, the development and implementation of more effective methods of hernioplasty in surgical practice are justified and necessary [15].

Aim of study: to improve the results of treatment of patients with postoperative ventral hernias using the hernioplasty method developed by us.

MATERIAL AND METHODS

In our work, we focused on the classification of G. Chevrel and A. Rath (SWR Classification), adopted in November 1999 at the XXI International Congress of Herniologists in Madrid.

Location:

a) Median:

1) M1 – under the xiphoid process (up to 3 cm below); 2) M2 – epigastric (from 3 cm below the xiphoid process to 3 cm above the umbilicus); 3) M3 – umbilical zone (from 3 cm above and up to 3 cm below the umbilicus); 4) M4 – subumbilical (from 3 cm below the umbilicus to 3 cm above the pubic bone); 5) M5 – suprapubic (3 cm above the pubic bone).

b) Lateral:

1) L1 – subcostal zone; 2) L2 – lateral zone (from 3 cm above to 3 cm below the umbilicus); 3) L3 – iliac zone (3 cm below the umbilicus to the inguinal region); 4) L4 – lumbar zone (outside of the anterior axillary line).

Hernia ring width:

W1 – width up to 4 cm; 2) W2 – width from 4 to 10 cm; 3) W3 – width is more than 10 cm.

Relapses:

Primary (R0); 2) Recurrent (R1, R2, R3, etc.).

In our work, hernias with an orifice width of 10 to 15 cm were classified as large, and giant hernias were all hernias with an orifice more than 15 cm.

For the study, patients with large and giant ventral hernias, postoperative and recurrent hernias, regardless of age and gender, were selected, who underwent hernioplasty according to the method we proposed.

The diagnosis was based on a thorough history taking, clinical symptoms and physical examination, as well as data from laboratory and instrumental research methods (ultrasound, computed tomography – CT, plain radiography of the abdominal organs).

The essence of the implemented method is as follows: the skin and subcutaneous fatty tissue are dissected up to the aponeurosis with the simultaneous release of the hernial sac. The postoperative scar, if it is a postoperative hernia, is excised. The hernial sac is released from the surrounding tissues up to the neck, while it is desirable not to damage it. In case of accidental damage to the hernial sac, the resulting defect in its wall is sutured. A site is prepared along the perimeter of the unchanged aponeurosis, separating the subcutaneous fatty tissue at least 4–5 cm from the hernial ring. Next, the hernial sac is dissected into two unequal flaps. One (smaller) flap in size should be no less than the diameter of the hernial orifice, and the second (larger) flap should extend 4–5 cm beyond the perimeter of the hernial orifice. The organs of the abdominal cavity, united to the hernial sac, are traditionally separated from its walls and immersed in the abdominal cavity (Fig. 1).).

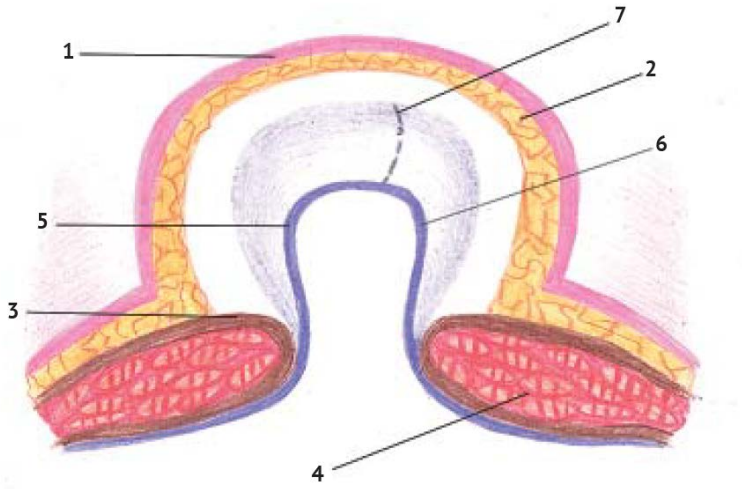

Fig. 1. Hernial sac, divided into two unequal flaps. 1 — skin; 2 — subcutaneous fatty tissue; 3 — aponeurosis; 4 — muscle tissue; 5 — flap of the hernial sac of a larger size; 6 — flap of the hernial sac of a smaller size; 7 — line of dissection of the hernial sac

A smaller hernial sac flap is fixed along the edge of the hernia orifice with separate interrupted sutures (polypropylene), thereby completely isolating the abdominal cavity from the surrounding tissues and the mesh implant itself. The mesh implant is cut out in such a way that it extends at least 2 (for large hernias) – 3 (for giant hernias) cm beyond the hernia orifice, then it is fixed with interrupted sutures (polypropylene) around the perimeter to the prepared area with unchanged aponeurosis (Fig. 2).

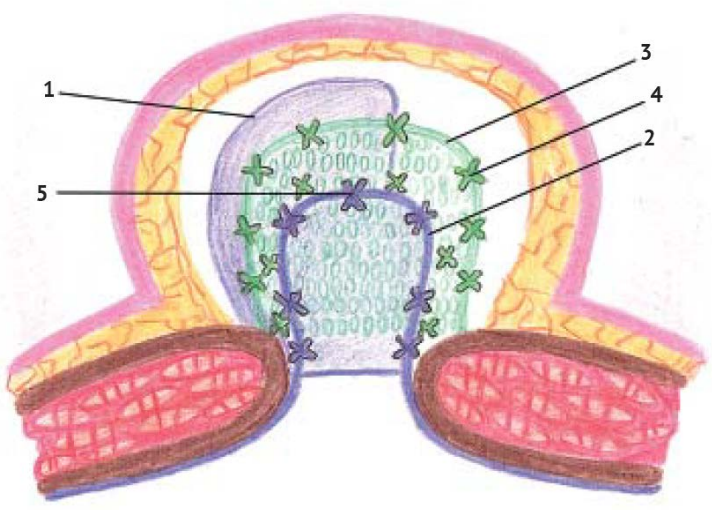

Fig. 2. Location of the mesh implant. 1 — flap of the hernial sac of a larger size; 2 — a flap of a hernial bag of the smaller size; 3 — mesh implant; 4 — knots that fix the mesh implant; 5 — knots fixing the flap of the hernial sac of a smaller size

Prior to fixation of the mesh implant, particular care must be taken to achieve nice hemostasis. Next, we cover the mesh implant with a large flap of the hernial sac and fix it to the unchanged aponeurosis with interrupted sutures (polypropylene), completely covering the latter along its perimeter by 1–2 cm, thereby completely eliminating the contact of the mesh implant with subcutaneous fat. Redon drain is installed in the subcutaneous fatty tissue and fixed to the skin. The subcutaneous fatty tissue and skin are sutured separately (Fig. 3).

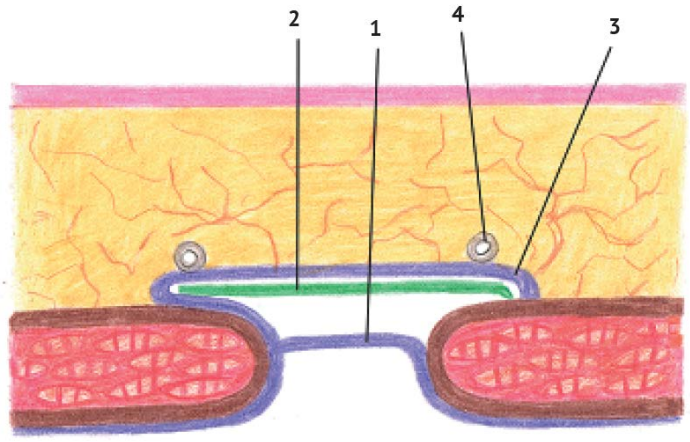

Fig. 3. The final form of plastic surgery. 1 — flap of the hernial sac of a smaller size; 2 — flap of the hernial sac of a larger size; 3 — mesh implant; 4 — drain tube

The plasty method proposed and patented by us (patent No. 2685636 dated April 18, 2018) was performed in 23 patients with complicated extensive and giant incisional ventral hernias with their personal permission. Before the operation, the essence of the operation was explained to the patients in detail. Of all patients operated by this method, 17 patients were female, 5 were male. The mean age of the patients was 72±1.55 years. All operated patients had one or more concomitant somatic pathologies (coronary artery disease – CAD, chronic heart failure – CHF, chronic obstructive pulmonary disease – COPD, obesity, diabetes mellitus, oncology).

RESULTS

None of the 23 patients who were operated on according to the hernioplasty method developed by us had early postoperative complications. In one patient in the postoperative period, on the 4th day after removal of the drainage from the subcutaneous fat, a seroma was diagnosed, which was eliminated by a single puncture under ultrasound guidance. The average time of a patient's stay in the hospital corresponds to 11.18±0.35 beds/days. There were no deaths. During two years of outpatient follow-up, late postoperative complications (suppuration and rejection of the mesh implant, ligature fistulas, intestinal fistulas), as well as relapses, were not detected.

CONCLUSION

The use of the method of anterior abdominal wall plasty proposed by us is possible in any age range. The developed plasty method is truly non-tension, which allowed to reduce the risk of developing compartment syndrome and the duration of pain in the early postoperative period. The developed method can significantly reduce the number of local complications by isolating the mesh implant with a hernial sac, both from the abdominal organs and subcutaneous fat. The above advantages of the described method, in our opinion, contribute to a decrease in the number of bed-days of inpatient treatment, rapid rehabilitation of patients, and their earlier return to work and active life. The use of our method makes it possible to refuse the use of expensive non-adhesive mesh implants, which in turn creates the opportunity to reduce the economic costs of providing the treatment process.

REFERENCES

1. Timerbulatov MV, Timerbulatov ShV, Gataullina EZ, Valitova ER. Postoperative Ventral Hernias: Current State of the Problem. *Bashkortostan Medical Journal*. 2013;8(5):101–107. (in Russ.)
2. Charyshkin AL, Frolov AA. Gernioplasty Comparative Results at Patients with Big Postoperative Ventral Hernias. *Ulyanovsk Medico-biological Journal*. 2014;(1):55–63. (in Russ.)
3. Styazhkina SN, Abdullina EF, Samigullina AI. Izuchenie problemy posleoperatsionnykh gryzh. In.: *XLI international scientific and practical conference «international scientific review of the problems and prospects of modern science and education» (Boston. USA. January 29–30, 2018)*. Boston: Problems of Science; 2018: 143–144.
4. Cherednikov EF, Polubkova GV, Skorobogatov SA, Kalashnikov IV, Kirik VG, Kashko VV. Khirurgicheskoe lechenie posleoperatsionnykh ventral'nykh gryzh. *Mnogoprofil'nyy statsionar*. 2017:4(2):115–119 (in Russ.)
5. Inyutin AS, Fedoseev AV, Krymov OV, Muravyov SYu, Rustamov VI. Application of Combined Technique for Laparotomy Wound Closure in Urgent Surgery. *Perm Medical Journal*. 2019;36(2):36–43. (in Russ.) https://doi.org/10.17816/pmj36236-43
6. Malkov IS, Mukhtarov ZM, Malkova MI. Methods of improving treatment results for patients with postoperative ventral hernia. *Kazan medical journal*. 2014;95(4):543–548. (in Russ.) https://doi.org/10.17816/KMJ1840
7. Mamedov RA, Mamedov AM. Comparative Estimation of Application of Synthetic Prostheses in Endoprosthesis of Anterior Abdominal Wall in Patients with Postoperative Ventral Hernias. *Siberian Medical Journal (Irkutsk)*. 2012;110(3):76–79. (in Russ.)
8. Gumenyuk SE, Gubish AV, Popov AYu, Petrovsky AN, Grigoriev AG, Sidelnikov AYu, et al. Long-Term Results of Various Treatment Options for Ventral Hernias. *Kuban Scientific Medical Bulletin*. 2017;1(2):61–65. (in Russ.) https://doi.org/10.25207/1608-6228-2017-2-61-65
9. Parshikov VV, Loginov VI, Baburin AB, Romanov RV. Posterior Components Separation: Indications, Surgical Technique and Outcomes. *Modern Problems of Science and Education*. 2018;(5):198. (in Russ.)
10. Shestakov AL, Inakov AG, Tskhovrebov AT. The Results of Various Options for the Plasty of the Anterior Abdominal Wall in Patients with Ventral Hernias and the Factors Influencing Them. *Belgorod State University Scientific Bulletin: Medicine Pharmacy*. 2017;19(268):98–108. (in Russ.)
11. Eriksson A, Rosenberg J, Bisgaard T. Surgical treatment for giant incisional hernia: a qualitative systematic review. *Hernia*. 2014;18(1):3138. PMID: 23456151 https://doi.org/10.1007/s10029-013-1066-y
12. Deerenberg EB, Timmermans L, Hogerzeil DP, Slieker JC, Eilers PH, Jeekel J, et al. A systematic review of the surgical treatment of large incisional hernia. *Hernia*. 2015;19(1):89–101. PMID: 25380560 https://doi.org/10.1007/s10029-014-1321-x
13. Hauters P, Desmet J, Gherardi D, Dewaele S, Poilvache H, Malvaux P. Assessment of predictive factors for recurence in laparoscopic ventral hernia repair using a bridging technique. *Surg Endosc*. 2017;31(9):3656–3663. PMID: 28078462 https://doi.org/10.1007/s00464-016-5401-0
14. Parshakov AA, Gavrilov VA, Samartsev VA. Prevention of Complications of Incisional Hernia Repair: Current Problem State (Review). *Sovremennye tehnologii v medicine*. 2018;10(2):175–186. (in Russ.) https://doi.org/10.17691/stm2018.10.2.21
15. Bogdan VG. Incisional Ventral Hernias of the Small and Medium Sizes: New Way of Repair. *Vestnik of Saint Petersburg University. Medicine*. 2013;(3):132–138. (in Russ.)
16. Minnullin MM, Krasilnikov DM, Zaynullin IV, Tolstikov AP. Surgical Tactics in Strangulated Postoperative Ventral Hernias Complicated with Intestinal Obstruction. *Practical Medicine*. 2016;4–1(96):130–133. (in Russ.)
17. Sazhin VP, Klimov DE, Sazhin IV, Nuzhdikhin AV, Gareski R. Non-Tension Abdominal Wall Plasty by Incarcerated Postoperative Ventral Hernias. *Pirogov Russian Journal of Surgery*. 2009;7:4–6. (in Russ.)

Received on 01.06.2021
Review completed on 11.10.2021
Accepted on 27.12.2021