Feleshtynskyi Y. P., Marshtupa O. S., Antoniv V. R. Optimization of the posterior method of dissection of the anatomical components of the abdominal wall for postoperative ventral hernias of giant sizes. Journal of Education, Health and Sport. 2023;42(1):124-129. eISSN 2391-8306. DOI http://dx.doi.org/10.12775/JEHS.2023.42.01.011
https://apcz.umk.pl/JEHS/article/view/45493
https://zenodo.org/record/8212299

The journal has had 40 points in Ministry of Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Education and Science of December 1, 2021. No. 32343. Has a Journal's Unique Identifier: 201159. Scientific disciplines assigned: Physical Culture Sciences (Field of Medical sciences and health sciences); Health Sciences (Field of Medical Sciences and Health Sciences).

Punkty Ministerialne z 2019 - aktualny rok 40 punktów. Załącznik do komunikatu Ministra Edukacji i Nauki z dnia 1 grudnia 2021 r. Lp. 32343. Posiada Unikatowy Identyfikator Czasopisma: 201159. Przypisane dyscypliny naukowe: Nauki o kulturze fizycznej (Dziedzina nauk medycznych i nauk o zdrowiu); Nauki o zdrowiu (Dziedzina nauk medycznych i nauk o zdrowiu).

Received: 10.07.2023. Revised: 19.07.2023. Accepted: .31.07.2023.

Optimization of the posterior method of dissection of the anatomical components of the abdominal wall for postoperative ventral hernias of giant sizes

Y. P. Feleshtynskyi, O. S. Marshtupa, V. R. Antoniv

Shupyk National Healthcare University of Ukraine

Abstract

The aim of the work - to increase the effectiveness of surgical treatment of PVH of giant size by using the improved TAR technique.

Materials and methods. An analysis of the surgical treatment of 150 patients with post-operative abdominal hernias of giant size, who underwent posterior techniques of disconnection of the anatomical components of the abdominal wall TAR in combination with alloplasty, was performed in the period from 2016 to 2022. The main group consisted of 74 patients with post-operative ventral hernias of giant size who underwent advanced TAR technique in combination with IPOM alloplasty. The comparison group consisted of 76 patients with giant PVH who underwent the classic posterior technique of component separation TAR in combination with retromuscular alloplasty.

Results of the studies and their discussion The results of ICP measurement in patients of the main group showed that after 6-24 hours after the operation in 73 (98.6%) patients, ICP was within 7.1 ± 1.3 mmHg and only 1 (1.4%) patient had IAH of the first degree, which was caused by intestinal paresis. After conservative treatment and elimination of intestinal paresis, after 48 hours ICP was 5.7 mmHg which was normal.

In 76 patients of the comparison group who underwent classic TAR with retromuscular alloplasty, IAH of varying degrees of severity was diagnosed in 6 (7.9%) patients. Among them, 3 (3.9%) patients developed IAH of the I degree, 2 (2.6%) had IAH of the II degree and 1 (1.3%) patient had IAH of the III degree.

Key words: **Intra-abdominal pressure; hernia; alloplasty; intra-abdominal hypertension.**

Surgical treatment of postoperative giant ventral hernias (PVH), despite the introduction of modern methods of separation of anatomical components (component separation) in combination with alloplasty, is an actual problem, since the recurrence rate after performing such operations ranges from 10-25%, and the frequency of local wound complications in the form of seroma reaches 60%, purulent inflammation of the postoperative wound - 1.5-4.8%, fistula of the abdominal wall - 3%, and the occurrence of chronic postoperative pain 4.5-6% [1, 2]. Intra-abdominal hypertension (IAH), which according to literature sources reaches 50%, is dominant among common complications in the treatment of giant PVH [3, 4, 5].

The main causes of these complications are wide dissection of the tissues of the abdominal wall, their tension during suturing, which reduces the volume of the abdominal cavity and leads to an increase in intra-abdominal pressure and intra-abdominal hypertension [6, 7].

In our opinion, the improvement of the posterior technique of separation of the anatomical components of the abdominal wall Transversus abdominis muscle release (TAR) by combining it with intraperitoneal onlay mesh (IPOM) will reduce tissue tension, create an optimal volume of the abdominal cavity and improve the results of the treatment of giant PVH.

The aim

To increase the effectiveness of surgical treatment of PVH of giant size by using the improved TAR technique.

Materials and methods

An analysis of the surgical treatment of 150 patients with post-operative abdominal hernias of giant size, who underwent posterior techniques of disconnection of the anatomical components of the abdominal wall TAR in combination with alloplasty, was performed in the period from 2016 to 2022. The age of patients is from 39 to 77 years (average age 54.2±1.3). There were 85 (56.7%) women, 65 (43.3%) men.

According to the classification of the European Hernia Society (EHS), the patients were distributed as follows: M1-4W3R0 - for 55 (36.6%), M1-4W3R1 - for 24 (16%), M1-5W3R0 - for 49 (32.6%), M1-5W3R1 – for 22 (14.8%) [8].

The main group consisted of 74 patients with post-operative ventral hernias of giant size who underwent advanced TAR technique in combination with IPOM alloplasty.

The essence of the improved technique was that after the hernial sac was isolated, the sheaths of the rectus abdominis muscles were cut along the edge of the defects. The back walls of the aponeurotic sheaths were mobilized from the rectus muscles. After that, along the lateral edge of the mobilized aponeurotic sheaths of the rectus muscles, the aponeurosis of the internal oblique muscle of the abdomen was cut and the internal oblique muscle was mobilized from the transverse muscle.

After cutting the transversus muscle along the edge of the aponeurotic sheath of the rectus muscle and mobilizing it, a mesh with an anti-adhesive coating of appropriate size was placed intra-abdominally and fixed along the perimeter of the defect. The musculo-aponeurotic edges of the defect above the mesh were dosed and sutured to the mesh so that IAP did not exceed 5 mmHg. Art. This made it possible to close the hernial defect without tissue tension and without increasing IAP [9, 10].

The comparison group consisted of 76 patients with giant PVH who underwent the classic posterior technique of component separation TAR in combination with retromuscular alloplasty [11, 12, 13].

The results of surgical treatment in patients of the main group and the comparison group were performed taking into account the frequency and level of IAH, the frequency of general and local wound complications, as well as recurrences in the distant postoperative period.

Results and discussion

The results of ICP measurement in patients of the main group showed that after 6-24 hours after the operation in 73 (98.6%) patients, ICP was within 7.1 ± 1.3 mmHg and only 1 (1.4%) patient had IAH of the first degree, which was caused by intestinal paresis. After conservative treatment and elimination of intestinal paresis, after 48 hours ICP was 5.7 mmHg which was normal.

In 76 patients of the comparison group who underwent classic TAR with retromuscular alloplasty, IAH of varying degrees of severity was diagnosed in 6 (7.9%) patients. Among them, 3 (3.9%) patients developed IAH of the I degree, 2 (2.6%) had IAH of the II degree and 1 (1.3%) patient had IAH of the III degree. These patients underwent

prolonged artificial lung ventilation, epidural anesthesia, nasogastric decompression of the stomach, stimulation of intestinal function (metoclopramide, neostigmine, hypertonic enemas), infusion therapy with crystalloid solutions, etc. Thanks to these measures, intestinal passage was restored and ICP decreased to 8.1±2.1 mm Hg.

The results obtained in the postoperative period regarding the occurrence of IAH confirm the higher efficiency of the improved TAR, compared to the classical one, due to the increase in the area of the abdominal wall.

The frequency of postoperative wound complications was studied and compared among patients of the main group and the comparison group. In the main group seroma in the area of the postoperative wound was observed in 6 (8.1%), infection of the postoperative wound - in 1 (1.3%), necrosis of the skin edges of the wound - in 3 (4.0%), infiltrate of the postoperative wound - in 4 (5.4%).

In the comparison group: seroma - in 10 (13.1), infection of the postoperative wound - in 3 (3.9), necrosis of the skin edges of the wound - in 5 (6.5), infiltrate of the postoperative wound - in 6 (7 .8%). The occurrence of a higher frequency of local wound complications in patients of the comparison group was due to a wider mobilization of the subcutaneous base from aponeurotic tissues, and a significant tension of tissues during suturing of the abdominal wall.

Long-term results were studied in 51 (68.9%) patients of the main group and in 76 patients of the comparison group.

Recurrences of postoperative hernias were not observed in patients of the main group. Among the comparison group, relapses were detected in 5 (6.5%) patients, which is statistically significantly higher than the frequency of relapses in the main group ($p=0.033$).

The reason for recurrences of PVH in patients was infection of the postoperative wound and detachment and migration of the mesh implant.

The obtained results demonstrate a statistically significant ($p<0.05$) reduction in the relative risk of relapse in the main group compared to the comparison group. According to other indicators of postoperative complications, the decrease in the relative risk of complications is not statistically significant, but it shows a tendency to decrease the probability of complications in the main group.

Conclusions

1. The use of the improved posterior component separation TAR technique in combination with IPOM significantly reduces the tension of abdominal wall tissues and ensures the creation of an optimal volume of the abdominal cavity, which reduces the

probability of an increase in ICP and the occurrence of intra-abdominal hypertension to 1.4% versus 7.9% of the comparison group.

2. The combination of the improved TAR technique with IPOM alloplasty using a mesh with an anti-adhesive coating contributes to the improvement of treatment results, namely, the frequency of seroma decreases - up to 8.1% versus 13.1%, postoperative wound infection - up to 1.3% versus 3.9%, necrosis of skin edges - up to 4.0% versus 6.5%, recurrences of PVH - up to 0% versus 6.5%.

Author Contributions

Conceptualization, F.Y.P. and M.O.S.; methodology: F.Y.P., M.O.S.; formal analysis F.Y.P., O.S.M and A.V.R.; data curation F.Y.P., M.O.S.; writing—I F.Y.P., O.S.M and A.V.R.; supervision F.Y.P. and M.O.S. All authors have read and agreed to the published version of the manuscript.

Funding

This research received no external funding.

Institutional Review Board Statement

This case report did not require IRB approval, patient provided verbal and written consent for publication of this report.

Informed Consent Statement

Written informed consent has been obtained from the patient to publish this paper.

Data Availability Statement

All information is publicly available and data regarding this particular patient can be obtained upon request from corresponding senior author.

Conflicts of Interest

The authors declare no conflict of interest.

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