

Surgical Treatment of Ventral Hernia in the Obese Patients

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ABSTRACT

Obesity plays an important role in the occurrence of wound complications in the early postoperative period and relapses in the subsequent hernia repair of postoperative ventral hernias. A comparative analysis of surgical treatment of 82 patients with postoperative ventral hernias, having obesity of varying degrees, using autoplasty and alloplasty to close the hernia gate, has been carried out with the use of clinical and instrumental methods of research. For the diagnosis, the classification of ventral hernias Chevrel-Rath was used, obesity was determined by body mass index. All patients underwent herniotomy in the traditional way. Control examination was carried out after 1, 6, 12 months. Statistical analysis was performed using comparative indicators of wound complications and hernia recurrences, depending on the severity of obesity, and the type of surgical interventions. The study found that overweight in patients with postoperative ventral hernias is an important factor in the development of postoperative wound complications in 17.1% of cases and 6.1% in hernia relapses. The frequency and chances of wound complications in the surgical treatment of postoperative ventral hernias are significantly higher with the III and the IV grade of obesity, predominantly after autoplasty of the hernia gate, while maintaining the risk of hernia recurrence in the late period after surgery.

Keywords: alloplasty; autoplasty; obesity; ventral hernia.

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INTRODUCTION

With an increase in the number and complexity of operations on the organs of the abdominal cavity organs, lower pelvis, and retroperitoneal tissue, the incidence of postoperative ventral hernias continues growing in modern surgery. And it's no coincidence that postoperative ventral hernias take the second place after bubonocoeles, reaching 20-22% of the total number of abdominal hernias. Case fatality rate in postoperative ventral hernias is 7-10%, and in complicated forms; it reaches up to 25% especially in patients with impaired postoperative ventral hernias. It is noteworthy that the setback rate in giant-size hernias increases up to 64% ¹.

One of the main reasons for the occurrence of postoperative ventral hernias is wounded suppurative-inflammatory complications in the early postoperative period and setbacks of hernias after their prompt removal. This is also due to the presence of obesity in patients ². Obesity also contributes to the appearance of primary postoperative abdominal hernias after various interventions on the abdominal organs ^{3, 4}. Thus, according to some authors, purulence of the abdominal-wall wound in 50-54.5% of patients is the cause of the formation of ventral hernias ⁵, and sometimes purulence of the wound was observed in 68.9% of patients with abdominal hernias ⁶. The setback rate of postoperative hernias also doesn't decrease ⁷. Surgical treatment of postoperative abdominal hernias is one of the most common interventions on the abdominal organs. In this regard, the prevention of early postoperative wound complications in the surgical treatment of postoperative abdominal hernias, including those with obesity, remains

an acute matter of modern herniology ^{8, 9}. The results of surgical treatment of postoperative abdominal hernias remain unsatisfactory due to the high setback rate, reaching 10-45.5%. The major part accounts for the obese people ¹⁰⁻¹⁵. Dissatisfaction with the results of surgical treatment of postoperative abdominal hernias, including in the obese people, motivates surgeons to study the prevention of hernia recurrence and develop the most effective methods of surgical interventions. The priority areas for searching new approaches for postoperative abdominal hernias treatment are the improvement of prosthetic hernioplasty orifice with synthetic prosthetic implants. It seems that such tactical approaches that allow surgeons to make a differentiated choice of the method of endoprosthesis hernioplasty depending on the severity of the obesity degree are needed now.

METHODS

We studied the results of surgical treatment of 82 patients with postoperative ventral hernias with varying degrees of obesity and used clinical and hardware-instrumental research methods. Out of 82 patients with postoperative ventral hernias, 49 patients (59.8%) were admitted as planned, and 33 (40.2%) were admitted as a matter of urgency. The age of patients ranged from 29 to 79 years; the average age was 56.06±3.4 years. There were 14 men (17.1%) and 68 (82.9%) women. The duration of hernias in patients ranged from 3 months to 10 years.

The frequency of postoperative abdominal hernias development was dependent on the type and volume of primary interventions in the abdominal organs. So, postoperative ventral hernias most often developed after

obstetric-gynecological surgery in 27 patients (32.9%); biliary tract interventions in 16 (19.5%); after appendectomy in 13 (15.9%); surgery for abdominal injuries in 10 (12.2%); stomach and duodenum diseases in 7 (8.5%); acute intestinal obstruction in 5 (6.1%) and pancreas in 4 patients (4.9%).

The amount of 51 patients (62.2%) suffered intercurrent diseases. In 32 patients (62.7%), pathologies of the cardiovascular system were detected; chronic obstructive pulmonary disease was diagnosed in 6 patients (11.8%); gastrointestinal diseases were found in 7 patients (13.7%) and diabetes were detected in 6 patients (11.8%).

The Chevrel-Rath (1999) classification, which we used in ¹⁶, is the most acceptable for postoperative ventral hernias. It is mainly based on the determination of the three main parameters of hernias. In particular, according to the anatomical localization of hernias on the abdominal wall, the median (M): above the umbilical (M1), near the umbilical (M2), under the umbilical (M3), M4 - in the xiphoid appendix or pubis (M4); the lateral (L): hypochondrium (L1), transverse (L2), iliac (L3), lumbar (L4). By the width of the hernia orifice, there are distinguished the following (W): W1 - up to 5 cm (small-size hernia), W2 - 5-10 cm (medium-size hernia), W3 - 10-15 cm (large-size hernia), W4 - more than 15 cm (giant-size hernia), as well as the presence and number of hernia setbacks after hernioplasty (R): R0, R1, R2, R3, etc. The sizes of hernial orifices in patients with reducible hernias were determined clinically and using ultrasound (sonography) in case of irreducible hernias. Finally, the size of the hernia orifice was recorded during surgical interventions.

To determine the presence of obesity, a body mass index (BMI) was used, according to WHO (World Health Organization) recommendations.

All patients underwent the technique of herniotomy in the traditional way. The closure of the hernia orifice in 39 patients (47.6%) was performed by autoplasty with local tissues. The autoplasmic closure of the hernia orifice was based on the formation of a longitudinal or transverse muscular aponeurotic duplicate from the tissues around the hernia defect of the abdominal wall. The remaining 43 patients (52.4%) underwent alloplasty using cellular synthetic endoprostheses. Depending on the state of the hernia orifice, the alloplasty with a cellular endoprosthesis is made in one of three options that differ with the location of the endoprosthesis. Thus, the first group of patients used "Onlay" method, where the hernial orifice was sutured edge to edge and a cellular was sewn on top, protruding 2-3 cm beyond the suture line on the aponeurosis. The second group, plasty was applied by the patch method, similar to the "Inlay" method, where the edges of the hernial orifice weren't compared and the latter were closed on top with a cellular projecting 2-3 cm beyond the edges of the defect. The cellular was also fixed with interrupted sutures to the aponeurosis along the perimeter of the hernia orifice. The third group, the "Sublay" method was used when subgaleal implant explant was carried out, followed by matching over the edges of the hernial orifice by the type edge to edge. After hospital discharge, a follow-up appointment and observation were carried out after 1, 6, 12 months.

Statistical analysis of the test material was carried out using comparative indicators of wound complications and setbacks of hernias, depending on the severity of obesity

and the type of surgical intervention. Material recording, processing of statistical data was performed using the Biostatic computer program. Differences between the indicators were evaluated using the Pearson square criterion and Fisher's exact test. Patients of the study groups were compared by the frequency of detection of a specific risk factor using the odds ratio (OR). Differences between the compared mean values were estimated using standard deviation values and were considered reliable by the Student criterion at $p < 0.05$.

RESULTS

Median hernias (M) were observed in 63 patients (76.8%): M1 in 9 patients (14.3%); M2 in 33 patients (52.4%); M3 in 13 patients (20.6%); M4 in 8 patients (12.7%); lateral hernias (L) in 19 patients (23.2%). The width of the hernia orifice was within W1 in 11 patients (13.4%); W2 in 45 (54.9%); W3 in 16 (19.5%); W4 in 10 patients (12.2%). Setback hernias were observed: R0 in 72 patients (87.8%), R1 in 5 (6.1%), R4 in 3 patients (4.9%), R3 in 1 patient (1.2%).

Among 82 patients, the I degree of obesity was found in 18 patients (22%), the II degree of obesity in 42 patients (51.2%), the III degree of obesity in 17 patients (20.7%), the IV degree of obesity in 5 patients (6.1%).

Out of 18 patients with postoperative abdominal hernias and the I degree obesity, autoplasty of hernia was performed mainly in 15 cases (83.3%) and 3 of alloplasty (16.7%); out of 42 patients with the II degree obesity, autoplasty was performed in 15 patients (35.7%) and 27 patients (64.3%) had different types of alloplasty; out of 17 patients with the III degree obesity, autoplasty was used in 9 (52.9%) patients and alloplasty in 8 (47.1%), and in patients with the IV degree obesity in all 5 cases alloplasty of hernial orifice was performed.

The "Onlay" technique was used in 20 (46.5%) patients in alloplasty; the "Inlay" technique was used in 8 patients (18.6%), and the "Sublay" technique was used in 15 patients (34.9%) (Table 1).

In the early postoperative period, wound complications were observed in 14 patients (17.1%) (Table 2). In 10 patients (71.4%) wound complications were noted after autoplasty of hernial orifice (purulence of a postoperative wound in 6 patients, infiltrate of a postoperative wound in 4 patients) and in 4 patients (28.6%) after an alloplasty with a cellular endoprosthesis in the form of serous fluid collection. All cases of serous fluid collection were observed with plastic hernia orifice cellular endoprosthesis according to the "Inlay" technique.

Out of the 14 cases, the development of wound complications was noted in 9 patients (64.3%) in the group of patients with obesity of the III and the IV degree and in 5 obese patients (35.7%) of the I and II degree. The differences between the indicators evaluated using the Pearson's chi-squared test criterion and the Fisher's exact test were statistically significant ($p < 0.001$, $p < 0.05$, respectively). The chances of developing (OR) wound complications in the presence of the III and the IV degrees obesity are 7.6 times higher than in the I and the II degree obesity (95% CI: 2.2-26.6) (Table 3).

In the long-term period, hernia setback was observed in 5 cases (6.1%) (Table 4). The setback after autoplasty occurred in 3 cases (60%) and in 2 cases (40%) after alloplasty. Differences between the indicators evaluated

using the Pearson's chi-squared test criterion and the Fisher's exact test were not statistically significant ($p>0.05$). The odds ratio (OR) of developing hernia setback in patients with autoplasty are 1.7 times higher than with alloplasty (95% CI: 0.3-10.8).

In this case, setbacks of hernias were noted in patients with obesity of the II and the III degree after autoplasmic operations. After alloplasty of the hernia orifice with a cellular endoprosthesis according to the "Inlay" technique, there were 2 cases of setback in a patient with the IV degree of obesity (Table 5).

As we can see from Table 5, hernia setback was more often observed mainly in patients with the III and the IV degree obesity in 4 cases out of 5 cases of setback. Setback was noted in 3 cases after autoplasty, and in 2 cases after alloplasty. Differences between the indicators evaluated using the Pearson's chi-square criterion and the Fisher's exact test were statistically significant ($p<0.05$). The odds ratio (OR) of the development of hernia setback in patients with obesity of the III and the IV degree are 13.1 times higher than in patients with obesity of the I and the II degree (95% CI: 1.37-124.89).

DISCUSSION

Data obtained from references indicate that setback develops in the first year after surgery when performing prosthetic plastic, including in patients with obesity¹⁷. Metabolic disorders in the CT around the hernia orifice may be due to genetic characteristics and the long-term existence of the abdominal wall defect itself¹⁸. They don't contradict the data of morphological studies.

Leading scientists-surgeons share all prosthetic techniques for closing abdominal wall defects into abdominal wall reconstruction and bridging repair¹⁹⁻²². In particular, the reconstruction technique includes a set of technical methods, the result of which is the complete restoration of the anatomy of the abdominal wall using a cellular endoprosthesis. The second category of techniques includes options for operations when a defect in the abdominal wall is prosthetic, but the latter does not undergo significant changes. It should be noted that the proposed terms help to clearly differentiate the various options for surgical technique. The placement of the endoprosthesis relative to the hernia orifice during herniotomy is indicated by the terms of "Onlay", "Sublay" and "Inlay"²³⁻²⁷.

Modern researchers support this point of view, because it allows surgeons from different countries and clinics to accurately and flawlessly name the operations performed, clearly stratify patients, adequately evaluate and describe the results²⁸. All of those methods of prosthetics have the right to daily use, including those with obesity²⁹. It should be understood that only non-tensioned methods of operations are safe for the patient, including with obesity. This technique is preferred abroad as well as in many Russian clinics^{30,31}.

It must be admitted that currently used synthetic materials of a foreign body contribute to the maintenance of an inflammatory reaction in a wound due to insufficient biological inactivity or inadequate structure^{32,33}.

As a result of the research, it was found that in the obese patients with postoperative ventral hernias, complications were mainly observed in the early

postoperative period after autoplasty. We associate the development of wound complications when using stretch technology with microcirculatory disorders. Obesity exacerbates these changes in the tissues. The use of polypropylene cellular endoprotheses in the obese patients with postoperative ventral hernias showed that the use of explants allows tissue suturing without significant tension, providing optimal conditions for wound healing. The disadvantages of using endoprotheses include the formation of slowly eliminated serous fluid collection due to tissue reaction to the implant.

CONCLUSION

Obesity is one of the risk factors for the development of wound complications in the early postoperative period after herniotomy for postoperative ventral hernias and subsequent hernia setback. Overweight in patients with postoperative ventral hernias is an important factor in the development of postoperative wound complications in 17.1% of cases and hernia setback in 6.1% of cases.

The frequency and chances of developing wound complications in the surgical treatment of postoperative ventral hernias are significantly higher in the III and the IV degree obesity. The setback rate of postoperative ventral hernias remains after autoplasty of the hernia orifice.

The method of choosing hernioplasty for postoperative ventral hernias in patients with obesity is the methods of non-tension alloplasty with cellular endoprotheses.

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CONFLICT OF INTEREST

The authors confirm that there are no conflicts of interest.

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Table 1: The distribution of patients by the methods of alloplasty of hernial orifice in postoperative ventral hernias with obesity

| Obesity degree | Type of alloplasty (n=43) | | | Total; n (%) |
|----------------|---------------------------|----------------|-----------------|--------------|
| | "Onlay"; n (%) | "Inlay"; n (%) | "Sublay"; n (%) | |
| I degree | 3 (15%) | - | - | 3 (7%) |
| II degree | 17 (85%) | - | 10 (66.7%) | 27 (62.8%) |
| III degree | - | 3 (37.5%) | 5 (33.3%) | 8 (18.6%) |
| IV degree | - | 5 (62.5%) | - | 5 (11.6%) |
| Total; n (%) | 20 (46.5%) | 8 (18.6%) | 15 (34.9) | 43 (100%) |

Table 2: Distribution of wound complications depending on the type of hernioplasty of postoperative abdominal hernias during obesity

| Types of wound complications | Number of complications (n=14) | Out of them with: | |
|------------------------------|--------------------------------|-------------------|-------------------|
| | | Autoplasty (n=39) | Alloplasty (n=43) |
| Wound abscess | 6 | 6 | - |
| Wound infiltrate | 4 | 4 | - |
| Serous fluid collection | 4 | - | 4 |
| Total; n | 14 | 10 | 4 |

Table 3: The distribution of wound complications in hernioplasty postoperative abdominal hernias depending on the degree of obesity

| Obesity degree | Number of complications (n=14) | Out of them with: | |
|-------------------|--------------------------------|-------------------|-------------------|
| | | Autoplasty (n=39) | Alloplasty (n=43) |
| I degree (n=18) | 2 | 2 | - |
| II degree (n=42) | 3 | 3 | - |
| III degree (n=17) | 4 | 4 | - |
| IV degree (n=5) | 5 | - | 5 |
| Total; n | 14 | 9 | 5 |

Table 4: The setback rate of postoperative ventral hernias in obese patients

| Examination period | Type of plasty of hernia orifice | |
|--------------------|----------------------------------|--------------------------|
| | autoplasty (n=39); n (%) | alloplasty (n=43); n (%) |
| 1 month | - | - |
| 6 months | - | 1 (2.3%) |

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| | | |
|--------------|----------|----------|
| 12 months | 3 (7.7%) | 1 (2.3%) |
| Total; n (%) | 3 (7.7%) | 2 (4.6%) |

Table 5: The setback rate of postoperative ventral hernias depending on the stage of obesity

| Obesity degree | Type of plasty: | | | Autoplasty (n=39); n (%) |
|-------------------|-------------------|----------------|-----------------|--------------------------|
| | Alloplasty (n=43) | | | |
| | “Onlay”; n (%) | “Inlay”; n (%) | “Sublay”; n (%) | |
| I degree (n=18) | - | - | - | - |
| II degree (n=42) | - | - | - | 1 (2.6%) |
| III degree (n=17) | - | - | - | 2 (5.1%) |
| IV degree (n=5) | - | 2 (4.6%) | - | - |
| Total (n=82) | - | 2 (4.6%) | - | 3 (7.7%) |