Prevention of adhesion formation in acute adhesive intestinal obstruction

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Abstract. *In order to study the effectiveness of treatment in 88 patients with acute adhesive intestinal obstruction, we studied the results of surgical treatment: in the departments of surgery № 1, № 2, № 3, city clinical hospital № 2 Makhachkala for a two-year period. The age of the patients ranged from 25 to 85 years. There were 30 men (43.2%) and 50 women (56.8%).*

All studied patients were divided into 2 groups:

The first group - 48 (54.5%) patients underwent adhesiolysis with the introduction of 5-fluorouracil in the projection, where adhesiolysis was given - 15 ml and postoperative administration of sulodexide - 2 ml per day 1 time for 5-6 days.

In 40 (45.5%) of the second group, mesogel was injected intraoperatively in an amount of 350-400 ml, followed by removal with the opening of the drainage tube after 5 hours.

In the early postoperative period, the first group had no complications. All were discharged for 4-5 days. In the second group, three patients had high fever, intestinal paresis, and on the 6th day, pelvic abscess was observed in 2 patients.

Control study after 6 months in patients of the first group, no complaints. Ultrasound showed no signs of viscero-parietal battles, and in the second group, in four cases, ultrasound revealed pathological battles.

The use of 5-fluorouracil with sulodexide made it possible to develop adhesions.

Keywords: *acute adhesive intestinal obstruction, surgical treatment, laparoscopic adhesiolysis, 5-fluorouracil, sulodexide.*

Introduction

Surgery is the most common cause of peritoneal adhesions. Predisposing factors include mechanical damage to the peritoneum and local ischemia due to manipulation and retraction of abdominal tissues during surgery [1,2]. The incidence of postoperative adhesion formation ranges from 67 to 93% [3]. The recurrent nature of acute adhesive intestinal obstruction (AAIO) is a

serious clinical problem. The recurrence rate after AAIO surgery varies from 19% to 53% [4-5]. Peritoneal adhesions are a consequence of irritation of the peritoneum by infection or surgical trauma and can be considered as a pathological part of healing after any injury to the peritoneum, in particular, due to abdominal surgery [6]. The balance between fibrin deposition and degradation is critical in determining normal peritoneal healing or adhesion formation [7]. Postoperative peritoneal adhesions are the main cause of postoperative acute adhesive intestinal obstruction, leading to multiple complications, many of which may appear several years after the initial surgery. In addition to AAIO, peritoneal adhesions can cause pelvic or abdominal pain and infertility in women. Prevention of adhesive intestinal obstruction is an important task of practical surgery [8] with the development of new medical technology, minimally invasive interventions with the use of various anti-adhesive agents are being actively introduced into clinical practice. The prophylactic use of minimally invasive surgery and pharmacological agents is justified [9].

Purpose of the study

Evaluation of the effectiveness of means of prevention of adhesion of the abdominal cavity.

Materials and research methods

Analyzed the results of treatment of 88 patients with acute adhesive intestinal obstruction (AAIO) treated at the city clinical hospital № 2, Makhachkala. The age of the patients ranged from 25 to 85 years. There were 38 men (43.2%), women - 50 (56.8%). All patients were divided into 2 groups.

In the first group, 48 (54.5%) patients underwent laparoscopic adhesiolysis with 5-fluorouracil injection into the adhesiolysis projection site and postoperative administration of 2 ml sulodexide within 5-6 days from the moment of surgery.

In 40 (45.5%) patients of the second group, after laparoscopic adhesiolysis, "mesogel" of 75-400 ml was injected intraoperatively, followed by removal with the opening of the drainage tube 5-6 hours after the operation. Along with clinical, laboratory and X-ray examinations, an important place is occupied by ultrasound examination for the first time in the hours of admission of patients. In our study, there was a conversion due to the risk of damage to internal organs. Informed consent was obtained from all patients for the study. Statistical analysis was performed using GraphPad Prism version 4 (GraphPad Software Inc., San Diego CA). The Mann-Whitney test was used to compare adhesion formation between individual groups. Intergroup differences were assessed using two-way ANOVA. Linear regression and Pearson correlation were used to analyze the spike data. The criterion was considered significant ($p < 0.05$).

Research results

During adhesiolysis, the prevalence of adhesions, syntopy of fusion bowel loops, their degree of mobility, dilatation of intestinal loops, the state of the intestinal walls, the presence and nature of effusion in the abdominal cavity, the presence and severity of perifocal changes were determined. The leading goal was to determine the zone of intestinal obstruction. The laparoscopic criteria for intestinal obstruction were swollen bowel loops due to fluid and gas, effusion in the abdominal cavity. Inflammatory changes in the peritoneum, dyscirculatory changes in the intestinal walls, low mobility or fixation of welded bowel loops, low mobility or fixation of welded bowel loops, deformation due to adhesions of the small intestine segment was important for laparoscopy of the proximal and collapsed bowels.

Revision of the small intestine was performed using two clamps from the ileocecal part of the intestine in the proximal direction to the bowel deformity zone with signs of enlargement of the bowel loops (laparoscopic retrograde bowel revision) with the direction of the examined area of the intestine relative to the instruments was about 45°.

In case of widespread adhesions in the abdominal cavity with bowel loops deformities, stage-by-stage laparoscopic adhesiolysis was used in order to reach the bowel deformation zone with adhesions that caused intestinal obstruction.

At the pharmacological stage, intraoperatively for the prevention of adhesions, it is necessary to use the cytostatic 5-fluorouracil.

The action of 5-fluorouracil is based on blocking the cell-cytolkine transmission at the stage of changing the nonrophilic and macrophage phases to fibroblastic 5-fluorouracil has a direct suppressive effect on a wide range of cellular elements in the abdominal cavity, disrupting the main process of synthesis of collagen fibers and glycosaminoglycans necessary for the formation adhesive process [6]. Before using 5-fluorouracil, we remove as much as possible all blood clots from the abdominal cavity and the pelvic cavity. In the postoperative period, 250-300 ml - 5% glucose with 12 g / c of the patient's body surface is kept through the established drainage. The administration of 5-fluorouracil was performed in 21 patients according to indications.

In the postoperative period, sulodexide - 2 ml/1 time per day for 5-6 days.

At the pharmacological stage of intraoperative prevention of adhesions, anti-adhesion gels ("Mesogel") were used to prevent the formation of adhesions.

We used the anti-adhesive agent Mesogel in 20 patients. The number of interventions that we initially performed laparoscopic operations without the use of mesogel was - 20 patients, due to the refusal and counterpunishment of the use.

When using mesogel during laparoscopic adhesiolysis, the drug was poured into the abdominal cavity through a 10 mm trocar.

The postoperative period in patients to whom we applied the anti-adhesion agent mesogel was uneventful in 15 patients. From the first postoperative day, the drainage was periodically opened, releasing 20–30 ml of fluid and its character was assessed, after which the drainage was closed. Ultrasound monitoring of the content and nature of the fluid in the abdominal cavity was carried out from the second postoperative day, followed by monitoring every second day. The drug creates the effect of hydroflotation in the abdominal cavity for at least 3-4 days, for the entire critical period of formation of interorgan adhesions. According to our data, the maximum amount of the drug is contained in the abdominal cavity within 3-4 days after administration. Subsequently, the remains of free fluid are determined by ultrasound for another 7 days. Elimination of the drug was noted in patients after laparoscopic adhesiolysis, in 5 (20%) patients there was a complication in 3 patients with a high temperature, and in 2 patients with pelvic abscess.

The use of mesogel can be carried out both with laparoscopic and open interventions, practically not in all patients due to the development of complications after the operation.

Laparoscopic decompression of the small intestine was used only in 4 patients of the second group. There was no fatal outcome in the postoperative period in both groups. The average bed-day was (7.6 ± 1.9) days.

The postoperative period in patients to whom we applied 5-fluorouracil was uneventful. Starting from the first day, the trapping drainage was opened for a short time to determine the nature of the discharge from the abdominal cavity.

Starting from day 2, ultrasound control of the abdominal cavity was performed for the presence of free fluid and the state of the intestine. In 3 patients of dynamic laparoscopy, pneumoperitoneum was applied through a previously installed trapping drain. The first port was installed through the wound after removal of the drainage, the second - in the area as free as possible from postoperative scars. After the introduction of the optics, the abdominal cavity was revised, the drainage was removed, and additional ports were installed if necessary. Free liquid was aspirated. The small intestine was revised throughout. In 14 patients after the introduction of the mesogel, newly formed loose visceroparietal adhesions of the small intestine in the area of the postoperative scar were revealed, which corresponded to the adhesion process of the I-II degree. The adhesions were bluntly separated, while the intestine was easily separated from the anterior abdominal wall, no patient had bleeding in the adhesiolysis zone. After dissection of adhesions, 5-fluorouracil was injected into the abdominal cavity in 3 cases.

The postoperative period in patients after staged adhesiolysis was uneventful. The passage was restored on days 2–3. The average postoperative bed-day in the hospital after staged laparoscopic adhesiolysis using 5-fluorouracil was (12.3 ± 2) days.

Control examination, within 6 months passed - 39 (81.3%) patients. Ultrasound showed no signs of viscero-parietal adhesions. In 4 patients, after the application of mesogel for ultrasound, there were signs of visceroparietal battles.

Thus, the use of the developed techniques aimed at reducing the risk of recurrence of adhesions of the peritoneum made it possible to reduce the cases of violation of the passage through the gastrointestinal tract from 11.3 to 4.2%, acute adhesive intestinal obstruction from 4.8 to 1.3%.

Discussion

The goal of adhesion prevention is to reverse or reduce the frequency, severity, severity, and sequelae of adhesions while maintaining normal healing and preventing infection [10]. Several strategies have been proposed over the years to prevent postoperative adhesion formation based on what has been studied in the field of underlying pathophysiology. Unfortunately, while numerous different strategies have been evaluated, few have been successful and some have been harmful. To this day, there are no means that completely prevent the formation of postoperative adhesion. The only available treatment for already formed adhesions is surgical adhesiolysis. Adhesion lysis is usually performed only in patients who develop complications from adhesions such as AAIO pain, infertility, since most adhesions that are surgically removed are simply reformed [5, 9].

Strict adherence to careful surgical technique has been promoted for many years by surgeons and surgical texts as a means of reducing adhesive formation after transperitoneal surgery [4], such efforts rarely prevent adhesions in most patients, the principle of good surgical technique to reduce peritoneal injury should not be discounted, since this practice may also influence the risk of complications associated with surgical procedures [6]. Measures described and recommended to reduce adhesion formation include minimizing exposure of the peritoneum to foreign bodies (for example, using suture material only as needed, removing glove powder by washing gloved hands before surgery), careful tissue handling, economical use of coagulators and retractors, ensuring thorough hemostasis to avoid drying out and ischemia, preventing infection and preventing the use of overheated irrigation fluids [4, 8].

Given that strict adherence to careful surgery does not eliminate or prevent adhesion formation, there are some surgical adjuvants that have been developed and evaluated to reduce postoperative adhesion formation. An in-depth, in-depth discussion of each agent is beyond the scope of this study. There are 6 main mechanisms that prevent the formation of adhesion: they reduce damage to the peritoneum, reduce the initial inflammatory response, prevent the formation of fibrin, increase fibrinolysis, prevent collagen deposition, and barrier drugs [10].

We have found that the use of the drug mesogel leads to significant side effects. Apparently, these side effects of the mesogel are due to the potentiation of the infectious process, the absence of substances in the preparation that can prevent the agiziogenic process in the abdominal cavity.

The use of 5-fluorouracil with sulodexide has shown encouraging results. The experience of laparoscopic adhesiolysis with the use of 5-fluorouracil in many authors is small and this tactic has not yet found wide application. However, the tactics of administering such patients with the use of 5-fluoro-ruracil with sulodexide with an indication and a contraindication is of particular interest.

Conclusions:

1. Laparoscopic adhesiolysis can be considered an effective AAIO treatment with 5-fluorouracil with sulodexide.
2. The use of mesogel in clinical practice requires further experimental and clinical research.

References

1. *Andreev A.A., Ostroushko A.P., Kiryanova D.V., Sotnikova E.S., Britikov V.N.* Adhesive diseases of the abdominal cavity // Bulletin of experimental and clinical surgery. 2017; 10:4:320-326. Doi: 10.18499/2070–478X-2017–10–4–320–326.
2. *Zhakinbekov S.T.* The effect of the use of 5-fluorouracil in the treatment of adhesions in colorectal cancer // Bulletin of the KRSU. 2016;7:80-82.
3. *Kondratovich L.M.* Fundamentals of understanding the formation of adhesions in the abdominal cavity. Intraoperative prophylaxis with anti-adhesion barrier drugs (literature review). Herald of new medical technologies. 2014;21:3:169-172.
4. *Magomedov M.M., Aligadzhiev D.M., Magomedova P.M.* Comparative characteristics of surgical treatment of acute adhesive intestinal obstruction // Siberian medical journal. 2007. – P. 21-24.
5. *Tamm T.N., Nepomnyashchy V.V., Belov S.G., Bardyuk A.Ya.* Improvement of the method of prevention of acute adhesive intestinal obstruction (experimental and clinical // Shpitalnaya surgery. 2020;2:5-9.
6. *Aquina C.T., Becerra A.Z., Probst C.P., et al.* Patients with adhesive small bowel obstruction should be primarily managed by a surgicaUeam. Ann Surg. 2016; 264 (3): 437-47. doi. org/1097.

7. *Gokcelli U., Ercan U.K., Ilhan E., Argon A., Cukur E., Ureyen O.* Prevention of Peritoneal Adhesions by Non-Thermal Dielectric Barrier Discharge Plasma Treatment on Mouse Model: A Proof of Concept Study. J Invest Surg. 2019:1-10.

8. *Hazebroek E.J., Schreve M.A, Visser P, De Bruin R.W., Marquet R.L., and Bonjer H.J.* Impact of temperature and humidity of carbon dioxide pneumoperitoneum on body temperature and peritoneal morphology. J Laparoendosc Adv Surg Tech A. 2002; 12: 355-364.

9. *Karaca G., Aydin O., Pehlivanli F. et al*. Effect of ankaferd blood stopper in experimental peritoneal adhesion model. Ann Surg Treat Res. 2016;90:213-7.

10. *Ott D.E.* Laparoscopy and tribology: the effect of laparoscopic gas on peritoneal fluid. J Am Assoc Qynecol Laparosc. 2001; 8:117-123.