Simultaneous laparoscopic repair of Spiegelian and umbilical hernias using intraperitoneal mesh: case report and literature review

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ABSTRACT

Background: Spiegelian hernia is one of the uncommon abdominal anterior wall defects. It occurs in 0.1-2% cases of all abdominal external hernias, with the peak incidence in the fifth decade of life, more commonly in women, frequently in left-sided location (72.7%). Complicated Spiegelian hernia is recognized preoperatively in only 50% of cases. In the remaining cases, the diagnosis is made incidentally or intraoperatively. Case report: 80 y.o. male patient with diagnosis of right-sided Spiegelian hernia and umbilical hernia underwent simultaneous laparoscopic repair with dual-sided intraperitoneal Parietex Composite 20 x 25 cm (8" x 10") mesh with antiadhesive properties. Postoperative follow-up clinical examination with SF-36 questionnaire quality of life assessment, estimation of patient’s daily exercise capacity and pain measurement by visual analogue scale were performed. No hernia recurrence was observed. There were no symptoms from the gastrointestinal tract. Patient’s quality of life improved. Conclusion: Laparoscopic repair using intraperitoneal antiadhesive dual-sided Parietex Composite mesh is an effective method of Spiegelian hernia treatment and it is especially preferred in cases of umbilical hernia coincidence. It leads to quality of life improvement and reduces pain complaints. Proper evaluation of methods for Spiegelian hernia treatment still requires further research involving a larger groups of patients.
INTRODUCTION

Every year, more than 20 million hernias of the abdominal anterior wall are repaired worldwide. The most common is inguinal hernia and it is estimated to make up for about 70-75% of cases. Less frequent hernias are: femoral (6-17%), paraumbilical (3-8.5%), secondary hernias and rarer ones (1-2%). [1] Uncommon localization of the anterior abdominal wall defect is the semilunar line. It is called Spiegelian hernia, lateral ventral hernia or hernia of semilunar line. It occurs in 0.1-2% of cases of all abdominal external hernias [2], appears to peak in the fifth decade of life and is more common in women, significantly more often in the left-sided location (72.7%). [3] Semilunar line, also called the Spiegel line, extends from the costal margin to the pubic spine. It shows transitional area from muscle to aponeurosis of the transverse muscle of the abdomen. Spiegelian hernia typically appears between the semilunaris line and the lateral edge of the anterior rectus muscle. The weak area of the fascia is especially localized around the puncture of inferior epigastric vessels. Aponeurosis of the external oblique muscle prevents a disposition of the hernia contents into the subcutaneous tissue. They usually diffuse between musculo-aponeurotic layers. Due to this, the clinical assessment and diagnosis of Spiegelian hernia can be truly challenging. It must be emphasized that uncomplicated Spiegelian hernia is recognized preoperatively in only 50% of cases. In the remaining cases, the diagnosis is made incidentally or intraoperatively.

Among 8954 reports for anterior abdominal wall hernias repair published in recent years (Medline base, 2000-2014 yrs), only 102 reports refer to Spiegelian hernias. Most of them are case reports (93%). The remaining ones are short series of cases, with the largest one, of 81 patients, published by Larson et al. [4]

AIM

The aim of this study is to present the short-term outcome (including the SF-36 quality of life questionnaire assessment) of simultaneous laparoscopic repair of Spiegelian and umbilical hernias with dual-sided intraperitoneal Parietex Composite mesh implantation.

CASE REPORT

B.J., 80 y.o. male patient (Body Mass Index = 28) admitted to the surgical department with complaints of nonspecific abdominal pain located in the right lower abdominal quadrant, of one year duration. The pain increased on palpation of this region, exercise and during the Valsalva manoeuvre. Comorbidities were: ischemic heart disease, hypertension and atrioventricular dissociation. His past medical history included ischemic stroke and myocardial infarction treated by coronary artery bypass graft procedure. On physical examination, a small tender bulge was palpable in the right hypogastric area. It was appearing through the right Spiegelian line. An asymptomatic small umbilical hernia was also present. The diagnosis of umbilical and Spiegelian hernias was made and confirmed by radiological examination. Ultrasonography with a 12 MHz line-transducer revealed Spiegelian hernia sac with incarcerated contents located between abdominal wall muscles and its weak area was measured at 10 x 7 mm. (Fig. 1)

The patient was qualified for simultaneous laparoscopic repair of Spiegelian and umbilical hernias with dual-sided intraperitoneal Parietex Composite 20 x 25 cm (8” x 10") mesh with antiadhesive properties. Anesthetic risk was assessed as class 3 by ASA scale. Prior to the induction of general anaesthesia, the patient’s abdomen was palpated and the area of maximal focal tenderness was marked with a black pen. It correlated with the right Spiegelian line. In the next step, surgeons planned a mesh arrangement and marked its expected position with red lines. (Fig.2) Next, pneumoperitoneum (with carbon dioxide pressure up to 15 mmHg) was created through a Veress needle. A 10-mm optical port was placed in the midclavicular line below the costal margin on the side contralateral to the hernia. A 30-degree telescope was used. After that, two 5-mm working ports on either side of those were established under visual control. The hernia defect in the right Spigelian fascia was identified. (Fig. 3) There were no contents inside the hernia sac. Umbilical hernia was also visualized (fig. 4) and its contents were reduced by dissection using harmonic knife. All other potential weak areas in the anterior abdominal wall were examined and there were no discernible pathologies. After that, Parietex Composite intraperitoneal dual-sided mesh was rolled up and introduced through the working port into the peritoneal space. (Fig. 5, Fig. 6). The mesh was placed so as to cover the fascial defects with a margin on all sides. It was kept in position using four 2-0 polydioxanone (PDS) sutures (fig. 7, fig. 8, fig. 9) and fixed to the parietal wall by helical tacks (Sorbafix 36 cm; Absorbable Permanent Fixation System, Bard, Davol Inc.). (Fig. 10, fig. 11) Hemostasis was checked then, and there was no intraoperative bleeding. Skin was closed using nonabsorbable 3-0 Prolene sutures (fig. 12) after removal of trocarcs. Operative time was 60 minutes and general anaesthesia time was 85 minutes (See film 1).

Patient required analgesic treatment only during the first postoperative day. No postoperative complications were observed. He was discharged 48 hours postoperatively and followed at 2 weeks and 1 month. Clinical examination with SF-36 questionnaire quality of life assessment, estimation of patient’s daily exercise capacity and pain assessment by visual analogue scale were performed. Neither hernia recurrence nor ileus symptoms suggesting intraperitoneal adhesions around the mesh were observed. No analgesic treatment was required. Psychological
assessment with using SF-36 questionnaire revealed no statistical significance (p>0.05) in terms of quality of life in short-term observation, but increased results in all SF-36 questionnaire subscales showed the trend of its gradual improvement.

DISCUSSION

Both laparoscopic and classical methods are used to repair Spiegelian hernias. As it is pointed out in international reports, there is no unequivocal recommendation about superiority of one of them over another. This is probably due to the infrequency of Spiegelian hernias occurrence and inexperience of clinical centers secondary to small volume of performed procedures. Moreno-Egea et al. [3] performed a prospective, randomized controlled trial with 22 patients comparing results of open and laparoscopic repair of Spiegelian hernia. No hernia recurrence in either group was observed. There were statistically significant advantages in terms of morbidity (p<0.05) and length of hospital stay (p<0.001) in the laparoscopic group.

Although the outcomes of open hernioplasty are comparatively satisfactory in term of recurrence as in laparoscopic hernia repair procedures [5][6][7], there is a necessity of wide tissue dissection to provide adequate margin on all sides of the fascial defect to fix the mesh. This is directly associated with the risk of infectious complications. Besides, the advantages of laparoscopic procedures are better cosmetic result, less postoperative pain, faster postoperative convalescence and shorter hospital stay. During the open hernia repair procedure, the skin incision is commonly made directly over the palpable bulge. It is worth pointing out, that contents of Spigelian hernia sac are frequently located under external oblique muscle aponeurosis, not directly in subcutaneous tissue. Performing laparoscopic procedure in all those cases allows the surgeon to avoid wide tissue dissection to localize the site of fascia weakness. The advantage of laparoscopic approach is that the visceral abdominal wall surface could be visualized and assessed immediately after obtaining pneumoperitoneum. Self-separation of the organs and visceral contents from the anterior abdominal wall surface leads to simple fascial defect identification.

Nowadays, the most commonly used polypropylene meshes (e.g. Surgipro, Hermesh) may induce an inflammatory reaction. Direct contact between the mesh and abdominal viscera may lead to adhesion formation, which can induce intestinal obstruction or enterocutaneous fistulas. All of the above complications limit using polypropylene meshes in laparoscopic procedures, where direct contact with abdominal viscera is inherent and inflammatory response is easily induced. The most common complications related to using a foreign material for hernia repair are inflammation, chronic pain, paresthesia and decrease of physical mobility. It is important to realize that the results of a hernioplasty procedure depend not only on surgical technique but the type of mesh as well, especially in term of postoperative pain complaints. Although tension-free repair methods are recognized as a gold standard in abdominal hernias treatment and using a prosthetic meshes is thought to reduce the number of complications and hernia recurrence [8], there are still no conclusive arguments for or against the use of mesh for Spigelian hernia cases. Hsieh et al. [9] analyzed clinical outcomes of Spiegelian hernia with preperitoneal mesh or without mesh repair. Results of 11 cases were evaluated, in which 7 patients underwent open hernia repair without a mesh, in the other 4 cases hernioplasty using extraperitoneal prosthetic mesh was performed. There were no significant differences in terms of age, sex, body mass index and duration of symptoms between the groups. No hernia recurrence were observed in any patients. Recognizing the limitations of conclusions based on only 11 cases, one may conclude that repair of Spigelian hernia with or without prosthetic extraperitoneal mesh provides equivalent. However, it should be noted that the lack of reports for the method’s failure may result from the infrequency of the disease and a small group of patients in the study.

Another point is that laparoscopic procedures require the usage of specially designed innovative meshes, that will not result in adhesion formation in contact with abdominal organs. The rapid development of implantable materials has led to the availability of several types of meshes, which can be successfully used intraperitoneally. The differences between them lie in the material used for manufacturing, additional presence of a protective layer having antiaggregative properties to minimize the risk of adhesions formation, as well as the addition of a chemicals reducing inflammatory response. Burger et al. [10] evaluated an experimental rat study of different intraperitoneal meshes available on the market. The following products were tested: polypropylene (Prolene), e-PTFE (Dualmesh), polypropylene – polyglycaprone composite (Ultrapro), tytanium-polypropylene composite (Timesh), polypropylene with carboxymethylcellulose sodium hyaluronate coating (Sepramesh), polyester with collagen-polyethylene glycol-glycerol coating (Parietex Composite), polypropylene-polidioxanone with oxidized cellulose coating (Proceed) and bovine pericardium (Tutomesh). According to the authors, the Parietex Composite, Sepramesh and Tutomesh meshes combine beneficial properties (such as tissue incorporation, tensile strength and mesh shrinkage) with decreased adhesion formation in comparison with other meshes. No infectious complications were observed in the study.

In spite of its obvious advantages for the patient, the main issue in the development of laparoscopic ventral hernias repair procedures, is still seen in the increased costs. Lobato et al. [11] performed a prospective study of 140 patients who underwent...
abdominal wall hernia repair and compared the clinical results and economic costs of the laparoscopic and open techniques in order to determine the more efficient procedure. Clinical data, morbidity, cost of surgical procedure and length of hospital stay were analyzed. The results of the study revealed that the cost of disposable surgical supplies was higher with laparoscopic procedure, but the average length of hospital stay was shortened (p<0.001) and patient morbidity was reduced (p<0.001). Therefore, total cost of the laparoscopic repair was less than initially estimated and carried for savings of 1,260 € per patient (2,865 € vs. 4,125 €). It can be concluded that laparoscopic repair is not only more beneficial for the patient but is also a cost-effective approach.

Among the laparoscopic semilunar line hernia repair techniques, intraperitoneal onlay mesh (IPOM) procedure, transabdominal preperitoneal (TAPP) and total extraperitoneal (TEP) approaches should be considered as possible methods of treatment. Although intraperitoneal mesh placement allows for simple and effective fascial weakness area repair, it is associated with increased risk of intraperitoneal organ damage during procedure and postoperative ileus due to adhesion formation in a longterm outcomes. According to the authors, preperitoneal laparoscopic repair is the most appropriate method of treatment of uncomplicated Spiegelian hernia, while laparoscopic intraperitoneal procedure should be preferred as a method of choice in all those cases with other abdominal comorbidities with indications for a simultaneous surgical procedure. Open hernioplasty, therefore, remains a technique dedicated to complicated or emergency cases.

CONCLUSIONS

Laparoscopic repair using intraperitoneal antiadhesive dual-sided Parietex Composite mesh is an effective method of Spiegelian hernia treatment and it is especially preferred in cases of umbilical hernia coincidence. It leads to quality of life improvement, reduces postoperative pain and gives satisfactory cosmetic results in 30-day follow-up. Based on the presented data and review, the use of laparoscopic procedures for Spiegelian hernia repair should be recognized as clinically and economically justified. Nevertheless, there are still no clear recommendations for using any one of available techniques and the advantages of one over others. The repair to be performed needs to be selected individually in each case. The decision is often based on individual surgeon’s preferences and experience. Proper evaluation of these methods requires further research involving a larger group of patients.

FIGURES

Fig. 1 Ultrasound scan of fascial defect.
Fig. 2 Patient’s abdomen with the area of maximal focal tenderness marked with black pen. The expected position of the mesh is preoperatively marked with red lines.
Fig. 3 The hernial defect in right Spiegelian fascia.
Fig. 4 Umbilical hernia with its contents.
Fig. 5 Intraperitoneal dual-sided mesh (Parietex Composite 8” x 10”, Covidien) with fixing sutures.
Fig. 6 Rolled mesh before putting into the peritoneum space through the working port.
Fig. 7 The mesh inside the peritoneal cavity with Spiegelian hernia visualized in the bottom left corner.
Fig. 8 The biomaterial must be unrolled and fixed to the anterior abdominal wall with.
Fig. 9 Putting the transfascial fixation sutures.
Fig. 10 The mesh fixation to the parietal wall by helical tacks (Sorbafix 36 cm, Davol Inc.).
Fig. 11 Putting the helical tacks along the periphery of the mesh to maintain adequate fixation.
Fig. 12 Postoperative cosmetic result.

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