LAPAROSCOPIC TREATMENT OF ABDOMINAL HERNIA – 5 YEARS OF EXPERIENCE

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Laparoscopic surgery has become a well approved method of abdominal hernias treatment in recent years. Due to the advancement of laparoscopy and the use of improved synthetic materials laparoscopic surgery is characterized not only by low complication but also by a short period of recovery after surgery.

The aim of the study was a retrospective analysis of the results of laparoscopic abdominal hernia surgeries (IPOM).

Material and methods. Between year 2007 and 2012, 65 patients aged between 29 to 76 underwent laproscopic abdominal hernia surgeries due to either primary or postoperative abdominal hernias. All patients were examined in perioperative period, after 12 and 24 months after surgery in search of complications, pain and recurrence. Recovery period was also estimated.

Results. In most cases postoperative pain was estimated from 1 to 4 on VAS scale. The most frequent complications were seromas that occurred in 3 patients. The other complications were pneumothorax, wound hematoma and wound infection that occured once each. One patient required reoperation due to wound hematoma. Chronic postoperative pain was diagnosed in 3 patients and 4 recurrences were stated.

Conclusions. Laparoscopic therapy of abdominal hernias is a safe operative method characterized by low recurrence and complication rates as well as short hospital stay and quick recovery. This technique is restricted by high material costs and the lack of full refund for the procedure.

Key words: abdominal hernia repair, laparoscopy, complications

Abdominal hernia repair, alongside cholecystectomy and appendectomy, are the most common procedures performed in surgical wards. Nearly 90,000 incisional abdominal hernia repair operations are performed in the USA with the cost of each surgery estimated at approximately 6,000 USD (1). In Poland, around 5,500 patients undergo surgery for umbilical hernia, over 2,500 for linea alba hernia and around 5,300 for postoperative wound hernia (2). Abdominal hernia can be treated by means of classical methods with or without the use of synthetic materials and by means of laparoscopic methods with the use of alloplastic implants. The type of hernia repair depends on the extent of damage to the fascia and muscles of the abdomen wall, the presence of inflammatory foci, possibility of using prosthetic materials and the patient’s condition. The high recurrence rate, reaching up to 20-50%, of hernias
treated by classical hernioplasty has lead to the increasingly common use of tension-free methods with the use of synthetic implants (3, 4).

The dynamic development of laparoscopic skills and the use of novel synthetic materials has enabled the introduction of videoscopic techniques in the treatment of abdominal hernia. The technique of placing a mesh intraperitoneally and fixing it to the parietal peritoneum (Intraperitoneal Onlay Mesh or IPOM) was introduced by LeBlanc and Booth in 1991 and has since become a recognised way of abdominal hernia repair (5, 6). Initially, uncoated meshes were used for this type of hernia coverage which led to the formation of multiple adhesions to the organs of the abdominal cavity and potentially to the formation of intestinal fistulas. It was not until synthetic materials with an anti-adhesive surface were introduced that the occurrence of this type of complications was effectively eliminated and the results of treatment improved (1, 6). IPOM is currently an acknowledged and safe method used in the treatment of abdominal hernia, however the high cost of the procedure greatly limits its use.

The aim of this study is a retrospective analysis of the results of laparoscopic abdominal hernia repair (IPOM).

MATERIAL AND METHODS

In the years 2007-2012, 65 patients underwent laparoscopic surgery for primary and incisional abdominal hernia at the Surgical Clinic of the 4th Military Teaching Hospital with Polyclinic. This group included 28 men aged 29-73 years and 37 women aged 36-76 years. There were 25 cases of patients with primary hernia, mostly hernia in the umbilical and linea alba areas. Forty patients were operated on for incisional hernia, 18 of whom due to recurrent abdominal hernia. In most cases, the opening of the hernia did not exceed 10 cm.

Surgical procedure

Abdominal CO₂ emphysema was induced under general anaesthesia following the introduction of a 10/12 mm trocar through micro-laparotomy under the left costal arch. Subsequently, two further trocars 10 and 5 mm in diameter were inserted under laparoscopic guidance along the left front groin line, below the first incision. Once adhesions were dissected free and the content of the hernia sac was drained to the abdominal cavity, the opening of the hernia was exposed. The next step was to choose the right size of material so that its margins extended about 5 cm beyond the opening of the hernia. Synthetic meshes with anti-adhesive coating to prevent the adhesion of abdominal organs to its surface were used for hernia coverage.

Three types of implants were used in the presented material. In 35 cases the material used was Dualmesh (WL Gore&Asc.), a mesh made of polytetrafluoroethylene (ePTFE) with two distinct surfaces: textured to enable incorporation into the surrounding tissues and smooth to prevent adhesion to the viscera. Surgimesh (Apside Medical) was used in 24 patients: a mesh made of polypropylene with a silicone anti-adhesive layer. In the remaining 6 cases, the Proceed mesh (Johnson&Johnson) was used for hernia repair: a mesh containing polypropylene, absorbable monocril and oxidised regenerated cellulose. After choosing the material of appropriate size, directional stitches were placed in its four corners which later enabled fixing to the parietal peritoneum. The material was inserted into the abdominal cavity through the opening of the 12 mm trocar and spread with the anti-adhesive surface facing the abdominal organs. Subsequently, small incisions were made in the abdominal wall to bring the directional stitches out using a special crocket hook and these were tied subcutaneously. The last step was fixing the implant to the parietal peritoneum using tackers (Protack) placed in two rows: the “double crown” technique (fig. 1). No drains were used in the peritoneal cavity. All patients were advised to wear a hernia belt in the postoperative period. All patients were assessed for complications, pain, return to normal activity and recurrence in the perioperative period and within 12 and 24 months from surgery. Pain intensity was determined using the visual analogue scale (VAS).

RESULTS

Among the group presented here, complications within 24 months from surgery were observed in 7 patients. Three patients were
diagnosed with seroma which required a puncture several times in one patient. The remaining two absorbed after being pressed with a hernia belt. One patient developed pneumothorax due to slight damage to the diaphragm during the preparation of intra-abdominal adhesions. The injury was covered with a single stitch and a suction drain was placed in the pleural cavity. Slight suppuration around the upper trocar wound was observed in one patient which disappeared after local treatment. One patient required reoperation due to abdominal wall haematoma which was likely caused by damage to inferior epigastric vessels during manipulation with the crocket hook during laparoscopy. The haematoma was evacuated and the injured vessels were underpinned achieving good haemostasis. Furthermore, one patient experienced severe pain caused by implant detachment. The synthetic mesh was removed in this patient and the hernia was covered using the classical method (fig. 2).

After 2 years of observation, abdominal hernia recurrence was observed in four patients i.e. 6% of cases. In two patients hernia recurred in the treated umbilical hernia, in linea alba hernia in one patient and in the upper trocar wound in one patient. Two patients were reoperated for hernia recurrence: through open surgery in one case and using laparoscopy in the other case. The patient who developed hernia in the scar after microlaparotomy required classical surgery. The opening of the hernia was covered with a polypropylene mesh. In the second patient who required reoperation, the hernia developed above the upper edge of the placed implant, probably due to an insufficient mesh margin at the implantation site. An additional implant was placed during laparoscopy and an appropriate margin was kept.

In most patients (80% of cases), pain intensity following surgery was low: 1 to 4 in the visual analogue scale (VAS). Pain usually persisted 1-2 months following surgery, 43 days on average. Two patients experienced pain recurrence within several months of surgery. One patient developed severe pain following surgery due to the detachment of the hernia mesh. The other patient linked the recurrence of pain with hernia recurrence. Moreover, two patients experienced periodic episodes of moderate pain for up to 9 months which did not limit their normal activity (tab. 1).

<table>
<thead>
<tr>
<th>Type of complication</th>
<th>Number</th>
<th>Type of coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seroma</td>
<td>3</td>
<td>1) puncture of reservoir 2) conservative treatment (hernia belt)</td>
</tr>
<tr>
<td>Wound infection</td>
<td>1</td>
<td>local treatment (Octenisept)</td>
</tr>
<tr>
<td>Pneumothorax, diaphragm injury</td>
<td>1</td>
<td>drainage of the pleural space, suture of diaphragm</td>
</tr>
<tr>
<td>Abdominal wall haematoma</td>
<td>1</td>
<td>evacuation of haematoma, underpinning of inferior epigastric vessels</td>
</tr>
<tr>
<td>Implant detachment, severe pain VAS 8-9</td>
<td>1</td>
<td>implant removal, classical hernioplasty</td>
</tr>
</tbody>
</table>

Fig. 1. Umbilical hernia covered by ePTFE mesh in Double Crown technique

Fig. 2. The intensity of pain measured with visual analogue scale (VAS)
The average duration of surgery was 96 minutes and decreased systematically as surgeons gained experience.

The average hospitalisation period was 4 days. The average time of return to regular physical activity was 2 weeks (4 days to 5 weeks). Within 2 years of the procedure, 80% of patients declared satisfaction and only one patient reported that it resulted in worse quality of life.

**DISCUSSION**

The dynamic development of laparoscopic skills and the use of novel synthetic materials has enabled the introduction of videoscopic techniques in the treatment of abdominal hernia. At present, laparoscopic treatment of hernia is an acknowledged surgical procedure characterised by low numbers of complications and quick return to full activity. The technique of placing a mesh intraperitoneally and fixing it to the parietal peritoneum was introduced by LeBlanc and Booth in 1991 (5, 6). Initially, uncoated meshes were used which strongly adhered to the intestines, leading to obstruction and the formation of intestinal fistulas. The introduction of better materials coated with an anti-adhesive layer has effectively reduced the number of such complications but has failed to eliminate the formation of adhesions (1, 7). Research in animal material has shown 9 to 50% implant coverage by adhesions to the greater omentum or bowel loops (8, 9, 10).

Only meshes with anti-adhesive properties were used in this paper. Implants made of ePTFE (Dualmesh) have a smooth non-adhesive surface, Surgimesh meshes have a silicone surface while the surface of Proceed meshes is coated with oxidised regenerated cellulose. It is difficult to assess which of these implants generates less adhesions in the abdominal cavity. A laparoscopic reoperation was performed in one patient where adhesions to the greater omentum were found to cover around 30% of the implant surface.

The use of laparoscopy in the treatment of abdominal hernia has significantly reduced the number of complications and improved the postoperative course in comparison with classical methods (5, 11, 12). The smaller size of the postoperative wound, limiting the extended preparation of the abdominal wall and eliminating the need for drain placement have greatly reduced the number of wound infections. According to different authors, the rate of complications for open surgery is around 10%, and up to 2.5% for laparoscopic surgery (5, 8, 13). Mesh infections may require their removal and consequently lead to the recurrence of hernia and further repair surgery. In the presented material, slight wound suppuration at the site of the upper trocar was observed in one patient which was effectively treated with dressings with Octenisept. None of the patients required drainage of the surgical opening, possibly also contributing to the low perioperative and postoperative infection rates.

Another common complication associated with abdominal hernia repair is the formation of seroma which can affect between 2 and 90% of patients undergoing laparoscopic surgery. The formation of fluid reservoirs is associated with the low permeability of the inserted implant and leaving the hernia sac in its natural location (2, 7, 14, 15). In the presented study, only three patients were diagnosed with seroma. One patient required repeated punctures while the remaining two fluid reservoirs absorbed after being pressed with a hernia belt. All patients who were operated on were advised to wear a hernia belt from the first day following surgery in order to effectively reduce the risk of this complication.

Two of the patients under observation experienced chronic pain of moderate intensity (VAS 3-4). One patient associated the pain with the presence of non-absorbable fixation devices and another patient located the pain at the site of the introduced directional stitches. However, the pain did not limit their regular activity and gradually subsided within 9 months. Only one patient reported pain of severe intensity (VAS 8-9) which appeared a month after the surgery and was associated with the partial detachment of the implant. The remaining patients indicated postoperative pain intensity at VAS 1-5 which allowed a quick return to normal activity.

The high recurrence rate is a significant problem in the treatment of abdominal hernia, especially following surgery without the use of synthetic implants. It is estimated that while the repair of primary hernia openings is associated with a 10-20% recurrence rate, this
proportion reaches even 50% in the case of recurrent incisional hernia (2, 4, 16). The introduction of tension-free repair techniques with the use of meshes has significantly improved the results of treatment and the rate of recurrence dropped to 2-10%. According to different authors, 5-10% of patients undergoing laparoscopic surgery for abdominal hernia experience hernia recurrence (5, 17, 18). In the presented material, hernia recurrence was observed in 4 patients i.e. 6% of cases. In two of these patients hernia recurred in the treated umbilical hernia, in linea alba hernia in one patient and in the scar after the upper trocar in one patient. In three patients hernia recurrence was likely caused by insufficient mesh margins at the hernia opening. In one patient the fascial stitch failed to provide sufficient coverage of the wound after microlaparotomy. Additionally, the implant detached partially in one patient which possibly resulted from poor material implantation in the parietal peritoneum. As mentioned earlier, two patients opted for reoperation while hernia recurrence did not hinder everyday activity in the remaining two. The patient whose implant detached required reoperation due to severe abdominal pain.

None of the patients described here required conversion surgery. The only reported intraoperative complication was slight damage to the diaphragm and development of pneumothorax which was effectively treated with a suction drain. In another patient, a large haematoma was found in the abdominal wall on the first day post surgery which required reoperation. This complication was associated with damage to inferior epigastric vessels by the crochet hook used to bring out directional stitches during laparoscopy. The proportion of conversion surgery found in literature varies from 1-5% of cases (15, 19, 20). The lack of conversion surgery in the presented material proves the safety of the surgical procedure and the appropriate selection of patients for this type of procedure.

Despite the good results of laparoscopic repair of abdominal hernia the procedure is not commonly performed in Poland. The limitations of the procedure include the high costs of the implanted material and equipment needed for mesh implantation. In the material described here, the average cost of the procedure was 6,500 PLN. The lack of possibilities to fully reimburse the costs of the procedure effectively hinders the development of laparoscopy in abdominal hernia repair and only few centres in Poland take on this task.

CONCLUSIONS

1. Laparoscopic treatment of abdominal hernia is a safe surgical procedure and a good alternative for classical surgery.
2. IPOM repair is characterised by a low incidence of hernia recurrence and complications as well as a short hospitalisation period and quick return to previous physical activity.
3. The limitations of this technique in Poland include the high cost of prosthetic material and no possibilities of full reimbursement of the costs of surgery.

REFERENCES


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