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Original Article

LAPAROSCOPIC INCISIONAL HERNIOPLASTY. EXPERIENCE OF 45 CASES

Hernioplastia incisional laparoscópica. Experiência de 45 casos

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ABSTRACT - ***Introduction*** - Incisional hernia is a frequent complication of laparotomy. Repair by simple suture has high relapse rates, and despite the use of prosthesis, risk of recurrence is still high. In the 1990s, laparoscopic repair of incisional hernia gained popularity. Benefits include reduced risk of complications, less pain and faster return to daily activities. Moreover, it can decrease the recurrence rate. ***Aim*** - To present our experience with laparoscopic treatment of incisional hernias. ***Methods*** - Between January 2007 and July 2010, 45 patients underwent laparoscopic repair of incisional hernia. Indications included sufficient space for placement of trocars and adequate overlap of the prosthesis over the hernia defect. Contraindications were severe comorbidities that limited the use of pneumoperitoneum and/or general anesthesia, as well as history of diffuse peritonitis due to high risk of intra-abdominal adhesions. ***Results*** - Mean operative time was 76 minutes. There was only one (2.2%) intraoperative complication. There was no conversion. Duration of hospitalization was equal to or less than 24 hours in 38 patients (84.4%). Fifteen patients (33%) had complications. However, 14 were minor complications (11 painless seromas and 3 prolonged pain) and only one major complication (late perforation of cecum). There was only one recurrence (2.2%) after a mean follow up of 24.6 months. ***Conclusions*** - Laparoscopic repair of incisional hernia is safe, feasible and effective. Seems to be associated with lower rates of perioperative complications and length of stay compared to open repair.

HEADINGS - Hernia, ventral.Complications.

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RESUMO – ***Introdução*** - Hérnia incisional é uma complicação freqüente da laparotomia. O reparo por sutura simples tem elevadas taxas de recorrência, e apesar do uso de prótese diminuir o risco de recidiva, ainda é elevado. Na década de 1990, o reparo laparoscópico da hérnia incisional ganhou popularidade. Os benefícios incluem redução no risco de complicações, menos dor e rápido retorno às atividades. Além disso, pode diminuir a taxa de recorrência. ***Objetivo*** - Apresentar experiência com o tratamento laparoscópico das hérnias incisionais. ***Método*** - Entre janeiro de 2007 e julho de 2010, 45 pacientes foram submetidos à reparo laparoscópico de hérnia incisional. Indicações incluíram espaço suficiente para posicionamento dos trocarteres e adequada sobreposição da prótese em relação ao defeito herniário. As contra-indicações foram: co-morbidades severas que limitavam o uso de pneumoperitônio e/ou anestesia geral, assim como histórico de peritonite difusa devido ao risco elevado de aderências intra-abdominais. **Resultados** - O tempo operatório médio foi de 76 minutos. Houve apenas uma (2,2%) complicação intra-operatória. Não houve nenhuma conversão. O tempo de internamento hospitalar foi igual ou inferior a 24 horas em 38 pacientes (84,4%). Quinze pacientes (33%) apresentaram complicações. Entretanto, 14 foram complicações menores (11 seromas indolores e 3 dor prolongada) e apenas uma complicação maior (perfuração tardia de ceco). Houve apenas uma recidiva (2,2%) após seguimento médio de 24,6 meses. ***Conclusões*** - O reparo laparoscópico das hérnia incisional é alternativa segura, viável e eficaz. Parece estar associado a menores taxas de complicações perioperatórias e tempo de internamento quando comparado ao reparo aberto.

DESCRITORES - Hérnia ventral. Complicações.

INTRODUCTION

Abdominal wall hernias are abdominal wall defects and may be congenital or acquired. Incisional hernia (IH) is a common complication of laparotomy with an incidence of 3% to 13% of patients undergoing laparotomy[12,17]. Although associated with lower risk of IH, laparoscopic operations are not exempt from this complication (0.8% to 2.8%)[21,27]. However, the true incidence is probably higher, because most are asymptomatic. In the United States, about 4 to 5 million laparotomies are performed annually, leading to at least 400,000 to 500,000 incisional hernias, of which approximately 200,000 repairs are performed annually[18]. Unfortunately, the results of correction of incisional hernias are disappointing. Repair by simple suture has high recurrence rates (12%-54%), and despite the use of prosthesis in the correction to be associated with lower risk of recurrence, is still high, 2% to 36%[1,15,28]. Moreover, the repair of incisional hernias can lead to serious complications such as intestinal obstruction and enterocutaneous fistulas besides chronic pain and cosmetic unsatisfactory results.

In 1993, LeBlanc and Booth[14] reported the first laparoscopic repair of incisional hernias (LRIH) with the placement of an intraperitoneal prosthesis. With advances in minimally invasive surgery in the 1990s, the laparoscopic repair of IH has gained popularity[10]. Key benefits include reduced risk of wound complications, less pain, faster recovery and a rapid return to activities[30]. Furthermore, it is expected that the laparoscopic approach may decrease the recurrence rate.

The aim of this study is to present the authors' experience with laparoscopic treatment of incisional hernias.

METHODS

Between January 2007 and July 2010 a total of 45 patients underwent LRIH. All patients were followed postoperatively for at least six months. Indications for the laparoscopic approach included sufficient space for placement of trocars and optical and adequate overlap of the prosthesis (at least 3 cm) over the hernia defect. All patients signed the informed consent prior to RLIH. Contraindications included severe comorbidities that limited the use of pneumoperitoneum and / or general anesthesia, as well as historical diffuse peritonitis due to high risk of intra-abdominal adhesions in great extent.

Operative technique of LRIH

Antibiotic prophylaxis was routinely used and consisted of cefazolin 1 g IV at induction of anesthesia and for 24 hours. The patients were intubated and maintained under general anesthesia and firmly attached to the surgical table. Nasogastric tube was routinely placed. Pneumoperitoneum was established by insufflation of the peritoneal cavity (12/14 mmHg) by Verres needle inserted into the left hypochondrium for infra-umbilical hernias or at umbilical to lateral hernias. In cases of supra-umbilical hernias access was performed through direct open access in the left flank. Subsequently, a 30º optic was introduced into the abdominal cavity through an 11 mm trocar. Then two other 5 mm trocars were inserted, depending on the location of the hernia, usually in the left hypochondrium and left iliac fossa. An additional trocar was introduced when necessary.

Peritoneal cavity was inspected and adhesions released with scissors, avoiding the use of thermal energy especially near the bowel. The fatty tissue around the edges of the defect was removed. To determine the size of the parietal defect, the intra-abdominal pressure was reduced to 6 mmHg. Then, four needles (25-gauche) were placed on display inside the cavity at the edges of the hernia, the distance between the outer needles corresponded to the inner diameter of the hernia defect. In the first cases we used double-sided mesh (Bard Composix TM TM, USA), composed of a layer of expanded polytetrafluoroethylene (ePTFE) which is placed in contact with abdominal viscera and another layer of polypropylene in contact with the abdominal wall. In the latter cases was used double-sided mesh type Parietex TM Composite (Covidien, USA), composed of an absorbable layer of collagen and other nonabsorbable of polyester. Mesh size used was at least 3 to 4 cm larger than the hernia to allow overlap of the prosthesis in relation to the abdominal wall defects. Mesh was then rolled up and inserted into the cavity through the 11 mm trocar. Helical titanium staples 5 mm (TM ProTack, Covidien, USA) was used to fix the mesh to the abdominal wall every 2 cm. In ten patients, four transparietal sutures were used to assist in fixation of the prosthesis. Subsequently, pressure was further decreased to 6 mmHg and complete fixation was achieved by a double crown of tacks with a distance of 2 cm between the two crowns. In the sub-xiphoid or sub-costal defects, falciform ligament was sectioned, while dissection of the bladder was performed to fix in the suprapubic region.

The peritoneal sac was not treated. No drain was placed, whether in the abdominal cavity or subcutaneous tissue. The trocar sites > 10 mm were sutured. Pressure dressing over the site of the hernia was kept in place for 5 to 7 days. This study was approved by the Ethics Committee of the institution. Data were expressed as mean ± standard deviation.

RESULTS

From 45 patients, 23 were male and mean age was 57.1 years (between 28 and 85 years). The mean body mass index was 30.4 ± 5.3 and 19 patients were obese (BMI> 30). Of the 45 patients, five had small hernias (<4cm), 23 moderate hernias (> 4 cm and <9 cm) and 11 large defects (> 10cm). The remaining six patients (13.3%) had multiple defects, hernia type "Swiss cheese", detected only intraoperatively. The locations of the defects in the abdominal wall are presented in Table 1.

TABLE 1 - Location of abdominal hernias

Local	n	%
Median supra-umbilical	18	40
Median infra-umbilical	9	20
Lateral	11	24
Umbilical	5	11
Phaenestiel incision	2	4

Mean operative time was 76 ± 30.12 minutes (between 40-180). In all cases we used double-sided prosthesis (Composix TM in first 25 and Composite Parietex TM in last 20 cases) with a nonstick surface of the abdominal viscera. Mesh fixation was performed only with tackers (ProTack TM stapler) in 35 patients (78%) while transfascial additional stitches were made in the remaining 10 patients (22%). There was only one (2.2%) intraoperative complication, small bowel perforation without leakage of intestinal contents, which was corrected by laparoscopy at the same time. No conversion was necessary in any case. Drain was not used in any case. Duration of hospitalization was equal to or less than 24 hours in 38 patients (84.4%) (Table 2).

TABLE 2 - Length of hospital stay of patients undergoing LRIH time

Time	n	%
12 hours	9	20
1 day	29	64,4
2 day	6	13,3
72 hours	1	2,2

Postoperative complications are presented in Table 3. Fifteen patients (33%) had complications. However, of the 15 complications, 14 were minors (11 painless seromas and three prolonged pain) and only one major complication, perforation of cecum diagnosed on the 7th postoperative day, requiring laparotomy with colonic resection and removal of the prosthesis. At 12 weeks postoperatively, eight seromas had shown complete remission while three patients received only an aspiration, not complicated by infection or encapsulation, and showing progressive reabsorption. In this same period, no patient had pain. Obese and nonobese patients had comparable length of hospitalization and showed no significant difference in short-term results. No wall hematoma was recorded. No mesh migration was observed in any case. There was no postoperative mortality. The complications were not related to the type of fixation.

TABLE 3 - Postoperative complications

Complications	n	%
Majors	1	2,2
- Perforation of the cecum		
Minors	14	31
- Seroma	11	24,4
73 % reabsorbed		
- Pain after 30 days	3	6,6
No cases of pain after 12 weeks		

With regard to late morbidity, only one recurrence was observed 15 months after laparoscopic repair (recurrence rate 2.2%) in a mean follow-up of 24.6 ± 11.7 months (6-48 months).

DISCUSSION

Incisional hernias result from premature separation of the fascia in the postoperative period, usually sub-clinical[20]. During the first days after surgery (0-30 days), wound tensile strength is lower, resulting in strong dependence on the integrity of the suture[8]. Several studies have compared different techniques of fascial closure and showed no difference between interrupted versus continuous suture[22,25]. As for the suture material, absorbable sutures are recommended, as it reduces infectious complications and avoids the effect of section on the fascia, which could predispose to muscular dehiscence[5,22]. About 50% of all IH develop in the first two years and three quarters occur within three years after surgery[20,24].

Use of prosthesis to ensure the strength of the abdominal wall without tension, significantly decreased the recurrence rate of IH[26,30]. The traditional operation ("open") with mesh is considered the gold standard in the treatment of IH[24]. However, a major disadvantage of open repair is the need for extensive dissection of soft tissue around the hernia, performed for proper placement of the prosthesis, resulting in devascularization, dead space and predisposes to hematoma and infection. Laparoscopic approach uses intraperitoneal space for placing the prosthesis, directly into the peritoneum of the anterior abdominal wall, minimizing the amount of soft tissue dissection necessary to achieve proper

overlap of the mesh. In addition, reduces contact with bacteria possibly remaining in the skin of the abdominal wall and presumably reduces the risk of infection[24,30]. Several studies have compared the postoperative complications between laparoscopic and conventional repair, and show a lower rate of complications after laparoscopic repair, mainly related to infectious complications[4,16,19,26]. In this series, no patient developed infectious complications of wound or prosthesis, according to most studies that report less than 1% of infectious complications related to wound 22.23. The infection rate after laparoscopic repair is significantly less than conventional repair (up to 15% of wound infectious to the conventional repair)[6,13,23].

Another advantage of the laparoscopic approach is to identify small fascial defects, known as "swiss cheese" defects, which can go unnoticed during open repair 17. These small defects are cause of hernia "recurrence". In this study six patients (13.3%) had swiss cheese hernia, detected only intraoperatively. Furthermore, by placing the mesh intraperitoneally the natural intra-abdominal pressure helps to keep prosthesis in place. Some basic techniques should be followed in LRIH for optimum results, as listed in Figure 1.

Although recent meta-analysis did not demonstrate statistically significant difference in terms of surgical time, the conventional repair seems to be associated with longer time[26]. However, for laparoscopic repair, the incidence of intestinal lesions described is up 3.5%, slightly higher than the conventional repair[7,11]. A late perforation of cecum represented the most significant complication in this series (2.2%). On 7th day after surgery, although the procedure was uneventful, the patient developed signs of peritonitis. As is known, the extent of thermal injury is often underestimated, and is the probable cause of late intestinal perforations in laparoscopic, as in this case[6].

Furthermore, laparoscopic technique requires special prosthesis, which does not adhere to the abdominal organs, significantly more expensive than conventional prosthesis[30]. The direct costs of operation are higher for the laparoscopic repair, however, the shorter hospital stay and complications cause the total hospital costs are equal to or smaller than the open repair[9,13,30]. The length of hospital stay after laparoscopic is less than after open surgery, mainly because of the disadvantages of the open technique, including the need for dissection of soft tissues, the need for drains, and increased morbidity and prolonged convalescence[4,16,19,26].

Formation of seromas was the most frequent complication in this study (24.4%), comparable

Item	Technical basis
1	Minilaparotomy access is recommended as safer access to the peritoneal cavity. Lower quadrants are indicated in cases of supra-umbilical median IH. For the repair of IH in the lower abdomen is recommended to use a Veress needle in the sub-costal space in the left anterior axillary line.
2	To perform wide adhesiolysis to allow any detection of multiple defects
3	Adhesions around the intestine must be sectioned with scissors without any source of energy to prevent thermal injury.
4	Preperitoneal adipose tissue excess should be routinely removed, and the falciform ligament must be divided in cases of upper abdominal hernias, to allow secure fixation of the prosthesis to the muscle fascia.
5	If there is injury of the intestine, prosthesis should not be placed, as well as in cases of significant contamination by contents of the small intestine. These patients should be definitively treated after 3 to 6 months for laparoscopy. If there is only slight contamination by contents of the small intestine, it can perform prosthesis implant.
6	Mesh that do not adhere to abdominal viscera must always be the choice
7	It is recommended overlap of 3 to 5 cm of the prosthesis over the hernia defect
8	Fixing a symmetrical side, followed by the other side. The reduction in intra-abdominal pressure of 13 mmHg to 8 / 7 mmHg helps correct and symmetrical fixation.
9	Transfascial sutures are used only for the advance fixing of the prosthesis and are not essential, and can be associated with prolonged postoperative pain.
10	Intercostal sutures and staples are used only caudally to avoid pleural injury.
11	Hernias in the holes of trocars have been described. Holes ≥ 10 mm must be carefully closed and 5 mm instruments should be used whenever possible.

FIGURE 1 - Key technical points to LRIH

with other studies that report up to one third of patients[2,16]. However, as is often asymptomatic, are generally not classified as a true complication. Most seromas resolved spontaneously after 8 to 12 weeks, as in this series, 73% of seromas reabsorbed within 12 weeks.

The best technique for fixation of the prosthesis, ie, only staples or transfascial sutures plus staples, is up for debate in the literature. The main advantage of transfascial sutures is the added strength to affix the prosthesis in the abdominal wall. Van't Riet et al.[29] demonstrated that the tensile strength of transfascial sutures was 2.5 times higher than the tackers alone. The disadvantage of using the transfascial stitches is persistent pain at sites of suture. It is estimated that the suture site pain occurs in about 1% to 3%, although the majority resolves within 6 to 8 weeks[3,6,7,11]. In this study, no difference in the rate of recurrence or chronic pain among patients who were used transfascial sutures or staples only. Three patients complained of pain 30 days PO, however after 12 weeks were asymptomatic. After a mean follow-up of 24 months, recurrence occurred in only one patient (2.2%).

If the laparoscopic repair is associated with lower recurrence, it is still unclear due to the limited number of studies, relatively short follow-up time, and heterogeneity between the studies. However, the possibility of allowing the detection of Swiss-cheese defects, fixation of the prosthesis well beyond the margins of fascial defect without the need of extensive subcutaneous flaps can be considered factors that may contribute to very low recurrence rates. Despite

a growing number of studies that evaluate LRIH, there are no randomized controlled multicenter studies comparing laparoscopic to open repair, making a definitive conclusion difficult.

CONCLUSION

Laparoscopic repair of IH is safe alternative, viable and effective. Seems to be associated with lower rates of perioperative complications and length of stay compared to open repair.

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