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Laparoscopic Treatment of Spiegel Hernia by Total Extraperitoneal (TEP) Approach

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Rezumat

Tratamentul laparoscopic al herniei Spiegel prin abord total extraperitoneal (TEP)

Introducere: Hernia Spiegel este un tip rar de hernie abdominală ventrală. Tratamentul este chirurgical datorită riscului crescut de complicații. Abordul minimal invaziv, presupunând protezare laparoscopică intraperitoneală sau extraperitoneală, fie prin abord transperitoneal (TAPP) sau abord extraperitoneal (TEP) este preferat tehnicii pe cale deschisă. Abordul extraperitoneal (TEP) este rar prezentat ca modalitate operatorie în literatura de specialitate.
Scop: Evaluarea rezultatelor tratamentului laparoscopic prin abord total extraperitoneal (TEP) pentru hernia Spiegel.
Materiale și metodă: Am analizat prospectiv pacienții operați pentru hernie Spiegel prin abord laparoscopic total extraperitoneal, în perioada octombrie 2009-martie 2013, în Ponderas Hospital. Datele privind simptomatologia, sexul, investigațiile diagnostice, tehnica chirurgicală, spitalizarea și evoluția postoperatorie au fost analizate. Urmărirea pacienților a fost realizată la 1 săptămână, 1 lună, 6 luni și anual postoperator, fiind evaluată recurența, durerea cronică, infecția protezei, timpul până la reintegrarea la activități obișnuite și satisfacția generală a pacienților.
Rezultate: Pe perioada de studiu au fost operați patru pacienți cu hernie Spiegel prin abord laparoscopic total extraperitoneal, cu vârsta medie 55,25 de ani (50-64 de ani), sex ratio 1(2/2), toți pacienții au fost simptomatici; herniile Spiegel au fost pe partea stângă la toți pacienții, iar intervenția chirurgicală a fost programată electiv. Durata de spitalizare a fost în medie de 1,5 zile (1-2 zile). Singura complicație postoperatorie a fost reprezentată de un serom asimptomatic prezent la 1 pacient, cu remitere la 1 lună. Nu au existat recurențe, durere cronică, infecție de proteză sau altă morbiditate pe o perioadă medie de urmărire de 25 de luni (12-53 luni). Scorul de satisfacție generală a pacienților a fost maxim (5) la toți pacienții.
Concluzii: Herniile Spiegel sunt rare însă tratamentul chirurgical se impune datorită riscului de complicații de tipul încarcerării și strangulării. În experiența prezentată abordul laparoscopic total extraperitoneal s-a dovedit o tehnică eficientă, reproductibilă cu rezultate excelente pentru herniile Spigeliene tratate electiv.

Cuvinte cheie: hernie Spiegel, tratament laparoscopic, abord total extraperitoneal (TEP)

Abstract

Background: Spiegelian hernia is a rare type of ventral abdominal hernia. Surgical treatment is recommended due to the high risk of complications. Laparoscopic treatment is preferred to open repair, by means of intraperitoneal or extraperitoneal mesh placement, either by transperitoneal (TAPP) or by total extraperitoneal (TEP) approach. Total extraperitoneal approach is rarely reported in the literature.
Aim: To evaluate the results of laparoscopic repair of Spiegel hernia by total extraperitoneal approach.
Material and Method: We prospectively studied the patients operated on for Spiegel hernia between October 2009 and

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March 2013 by laparoscopic TEP approach at Ponderas Hospital. Data regarding symptoms, sex, preoperative work-up, surgical technique, hospital stay and outcome of the procedure were analysed. Follow-up of the patients was achieved at 1 week, 1 month, 6 months and yearly postoperatively and patients were evaluated for recurrence, chronic pain, mesh infection, time to reinsertion to normal activities and overall patient satisfaction score.

Results: We have treated 4 patients with Spiegel hernia by laparoscopic TEP repair, with mean age 55.25 years (range 50-64), sex ratio 1 (2/2); all patients were symptomatic, all cases had left sided hernias, the surgical intervention was elective in all cases. Mean hospital stay was 1.5 days (range 1- 2 days). There was only one postoperative complication in a patient with asymptomatic seroma, with remission in 1 month. There were no recurrences, no mesh infection, no chronic pain or other morbidity at a mean follow-up of 25 months (range 12-53 months). The overall satisfaction score was maximal (5) in all cases.

Conclusions: Spiegelian hernias are rare but surgery is mandatory because of the risk of complications like incarceration and strangulation. In the presented experience, laparoscopic total extraperitoneal approach proved to be an efficient technique, reproducible, with excellent results for Spiegel hernia treated electively.

Key words: Spiegel hernia, laparoscopy, total extraperitoneal, TEP

Introduction

Short History

Adriaan van den Spiegel described the linea semilunaris - linea Spiegel, a lateral convex line extending from the tip of 9th costal cartilage to the pubic spine, lateral to the rectus abdomini muscle, making the transition from muscle to aponeurosis of the transversus muscle. The part of aponeurosis that lies lateral to the rectus abdomini muscle and medial to the semilunar line represent the Spiegelian fascia.

In 1764, Klinkosch firstly diagnosed a Spiegelian hernia.

Anatomy of the Spiegelian hernia defect

Spiegelian hernia represents a defect of the transversal aponeurosis (defect of Spiegelian aponeurosis/Spiegelian fascia) and it is an anterolateral ventral hernia. Most frequently, Spiegel hernias appear in the area named Spiegelian hernia belt, where the Spiegelian fascia is widest - up to 2 cm, located 0-6 cm cranial to the interspinal plane. (1)

Spiegel hernias occur more often in the lower part of the abdomen, because supraumbilically the semilunaris line lies posterior from the rectus muscle and the fibres of the transversus and internal oblique muscles, cross one another in different angles, whereas subumbilically the fibres run parallel (1). They also develop more often near the semicircular Douglas line since above this line, the spiegelian aponeurosis consists of 2 layers - the dorsal layer becomes thinner and weaker in the vicinity of the semicircular line, and below this line, the spiegelian aponeurosis consists of 1 layer and becomes stronger. (1)

A weak triangular area is formed by the epigastric vessels, that enter the abdominal rectus sheath, medially, by the Spiegelian fascia laterally and the arcuate line at the superior side; hernias at this level are called low Spiegel hernias.

The Spiegelian hernia defect measures most frequently 0.5-2 cm, has fibrous, inelastic edges (margins of transversus aponeurosis), explaining the risk of incarceration.

In most cases, this hernia is located between the musculo-aponeurotic layers of the abdominal wall and it is a so-called "intramural/intramuscular/interparietal hernia", explaining the clinical diagnostic difficulties.

Spiegelian aponeurosis can be reinforced by the fibrous – aponeurotic part of the internal oblique muscle, but if the internal oblique is muscular - as it usually happens for the Spiegelian hernia -, the internal oblique will be lifted by the hernia or penetrated by the hernia sac. (1)

The external oblique muscle is aponeurotic in the region of the spiegelian fascia, the layer between the internal and external oblique is loose and largest laterally, therefore a hernia sac can expand into this space – clinical influence - and the hernia sac will be palpated more laterally than the hernia defect site. (1)

External oblique aponeurosis is thick and rarely penetrated by the hernia sac, and therefore the sac could rarely be palpated subcutaneously. (1)

Laparoscopic treatment of the Spiegelian Hernias is preferred to open repair, but the optimal technique - intraperitoneal or extraperitoneal mesh repair, either by transperitoneal (TAPP) or by total extraperitoneal (TEP) approach, has not been established. Total extraperitoneal approach for these hernias is rarely reported in the literature.

Our aim was to evaluate the results of laparoscopic repair of Spiegel hernia by total extraperitoneal approach.

Material and Method

We prospectively studied the patients operated on for Spiegel hernia undergoing laparoscopic TEP approach in Ponderas Hospital, between October 2009 and March 2013. Data regarding the clinical presentation, age, sex, preoperative work-up, surgical technique, associated surgical procedures, hospital stay and outcome of the procedure was analysed. The post-operative follow-up of the patients was achieved at 1 week, 1 month, 6 months and then yearly. The patients were evaluated for recurrence, presence of pain, mesh infection, time for reinsertion to usual activities and overall patient satisfaction-on a scale from 1-5 (1 not satisfied, 5 most satisfied).

The study had the approval of the Ethical Committee of the Hospital.

The surgical technique of laparoscopic total extraperitoneal approach:

The properitoneal access is obtained via a 2 cm subumbilical incision, entering into the rectus sheath, progressing posteriorly to the rectus muscle toward the Retzius space. The properitoneal working space is then developed by a blunt dissection of a balloon trocar.

Insertion of the trocars. A 12 mm optical trocar is introduced through the subumbilical access; CO2 is insufflated into the properitoneal space created before, and two other 5 mm trocars are introduced under visual control.

Dissection. After entering the properitoneal space the anatomic landmarks are identified by gentle blunt dissection: inferior epigastric vessels, arcuate line, and pubic bone, round ligament or spermatic cord. The properitoneal space will be further dissected, the Spiegelian hernia sac will be identified, dissected and reduced. A large properitoneal working space has to be developed to allow the polypropylene mesh proper placement. The mesh has to overlap for at least 5 cm the borders of the defect in all directions. We usually check if other inguinal or femoral hernias are present too, in order to achieve a simultaneous repair. (*Fig. 1, 2, 3*)

Mesh selection. In this retro muscular and properitoneal plane a polypropylene mesh may be used. After measuring the defect the appropriate mesh size will be chosen to overlap the borders of the defect with minimum 5 cm in all directions. The mesh is rolled and then introduced through the 12 mm optical trocar into the previously created properitoneal space where it will be properly orientated to cover the Spiegelian defect with the desired 5 cm overlap. (*Fig. 4*)

The *mesh fixation* to the muscular wall and pubic bone is performed by tacks; non-resorbable (Titanium) tacks are preferred in our practice. The mesh also entirely covers the dissected inguino-femural area. (*Fig. 5*)

Results

Between October 2009 - March 2013, four patients with Spiegelian hernia, with a mean age of 55.25 years (range 50-64), two male/female, ratio 1 (2/2), underwent laparoscopic total extraperitoneal repair at Ponderas Hospital. A total number of 552 hernias were treated by the same approach

Figure 2. *Reducing the incarcerated peritoneal sac from the musculo-aponeurotic Spiegelian defect*

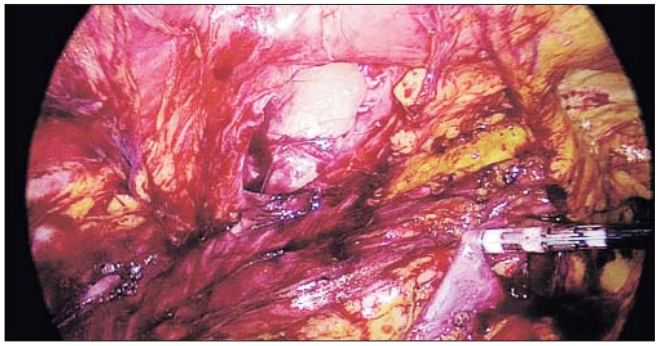

Figure 3. *Spiegelian defect*

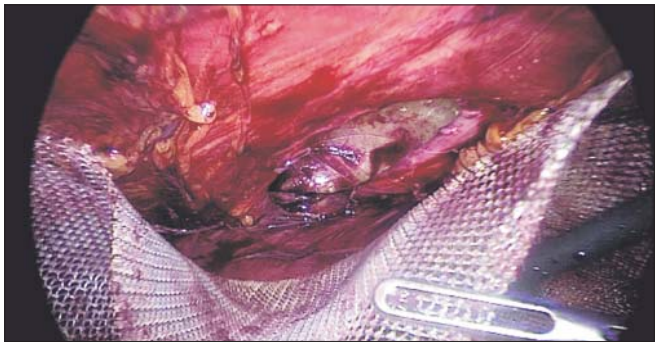

Figure 4. *Mesh orientation*

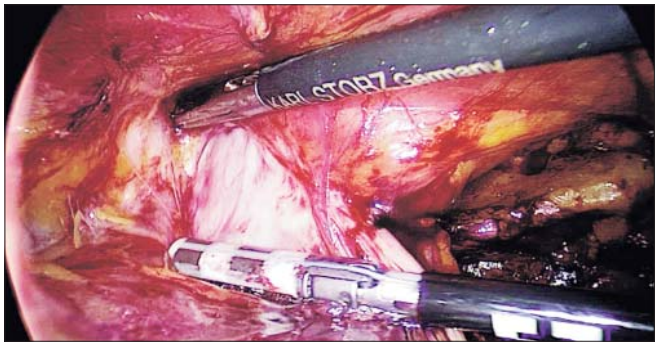

Figure 1. *Peritoneal sac dissection from the Spiegelian defect*

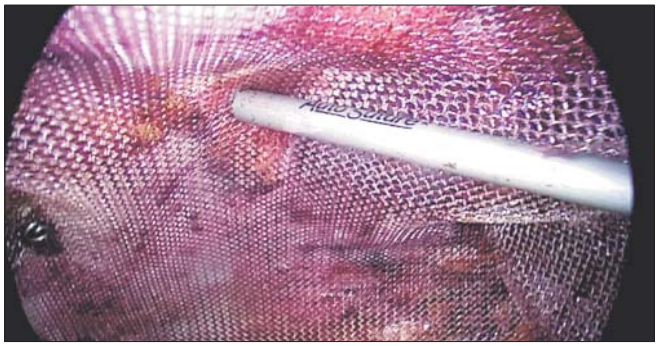

Figure 5. *Mesh fixation with tacks*

(TEP) within the same period of study, in the same institution.

All four patients presented for pain and a palpable lump along the Spiegelian aponeurosis on the left side of the abdomen. One patient presented incarcerated hernia. The diagnosis of Spiegelian hernia was clinically considered and confirmed by ultrasonography.

The surgical intervention was elective in all cases. In all four patients the laparoscopic total extraperitoneal mesh repair of the Spiegel hernia was performed. Three out of the four patients had simultaneous laparoscopic repairs for other hernias: one patient for bilateral inguinal hernia treated also by TEP, one patient with umbilical hernia treated by laparoscopic intraperitoneal approach, and the third patient with hiatal hernia. The mean time of surgery was 65 min (range 50-85 min), including the time for all associated procedures.

All the defects were intraoperatively measured and the mean area of the defect was 11.75 cm^2 (9 cm^2 in 2 cases both with properitoneal adipose tissue herniated through the defect, 4 cm^2 and 25 cm^2 in the other two cases with incarcerated peritoneal sac). We used polypropylene mesh 15/12 cm in three cases and 15/16 cm in the fourth case, which covered the defect with a 5 cm overlap. The mesh was fixed with tacks to the muscular abdominal wall and Cooper ligament, covering widely the dissected inguino-femural area. (*Table 1*)

The postoperative outcome was favorable in all cases and the mean hospital stay was 1. 5 days (1 day for two patients and 2 days for the other two patients); one patient developed asymptomatic seroma with remission in 1 month by conservative treatment.

There were no recurrences, no mesh infection, no chronic pain or other morbidity at a mean follow-up of 25 months (range 12-53 months). Reinsertion to normal activities occurred in 7.75 days (range 3-14 days).

The overall satisfaction score of all patients was 5 on a scale from 1-5 (1 not satisfied, 5 most satisfied). (*Table 2*)

Discussions

Spiegelian hernias represent 0.12-2% of all abdominal hernias (2,3). They occur more frequently in the 4th to 7th decades and the female/male ratio is 1.18/1. (1) As in the literature, in our study, the Spiegel hernia represented a rare disease and it occurred in patients in the 6th and 7th decade of life, with an equal sex prevalence (sex ratio 1/1).

The diagnosis of Spiegelian hernia is difficult because no characteristic symptoms are identified and often there is no palpable mass, therefore only 50 % of cases are diagnosed preoperatively (3). The most frequent symptom is pain but there is no typical or characteristic pain; patients may have a history of hernia incarceration, with or without intestinal obstruction.

In the cases with palpable mass or lump in upright position, the clinical diagnosis may be evident. When only pain without any lump is detected, imagistic investigations - ultrasound, CT, MRI are indicated. Sometimes, the clinical examination and the imagistic work-up are not relevant for the Spiegelian hernia; in these cases, the last option is diagnostic laparoscopy (3). There are reports of cases with incidentally found Spiegelian hernia discovered during surgery intended for other disease (2).

Table 1. *Patient, defect and treatment characteristics*

Characteristic	Value
age years, mean (range)	55.25 (50-64)
male/ female ratio (no. male/ no. female patients)	1 (2/2)
symptomatic hernia - no. patients (total no. of patients)	4 (4)
incarcerated hernia - no. patients (total no. of patients)	1 (4)
area of hernia, cm^2, mean (range)	11.75 (4-25)
mesh size, cm^2, mean (range)	195 (180-240)
simultaneous surgery - no. patients (total no. of patients)	3 (4)
time of surgery min, mean (range)	65 (50-85)
hospital stay, days, mean (range)	1.5 (1-2)

no. = number

Table 2. *Surgical complications and patient outcome*

Complication/ outcome	Value
seroma - no. patients (total no. of patients)	1 (4)
hematoma - no. patients (total no. of patients)	0 (4)
infection - no. patients (total no. of patients)	0 (4)
recurrence - no. patients (total no. of patients)	0 (4)
chronic pain - no. patients (total no. of patients)	0 (4)
reinsertion to normal activities days, mean (range)	7.75 (3-14)
overall satisfaction score (1- not satisfied, 5- most satisfied), mean (range)	5 (5)
follow-up months, mean (range)	25 (12-53)

no. = number

In our small study, all the Spiegelian hernias were clinically diagnosed due to the palpable mass and pain in the left side of the abdomen. Although the diagnosis was evident in our cases, we have confirmed the Spiegelian hernia by ultrasonography.

Surgery must be indicated in all patients with Spiegelian hernia, because of the high risk of incarceration and strangulation of the hernia content - the defect of Spiegelian hernias is usually small and has sharp fibrotic margins, predisposing to these complications. In the four cases studied one patient (1/4) presented incarcerated hernia.

Because of the infrequent occurrence of Spiegelian hernia, the optimal surgical repair technique is not well established (4).

In the literature there are reports of open approach – primary fascia repair with on lay mesh (2) and laparoscopic approach - by intraperitoneal mesh repair (5) transabdominal preperitoneal mesh repair TAPP (2,4,6-8) total extraperitoneal mesh repair TEP (9). All the reports include good results for any method, with low morbidity rate (2.3%) and no recurrence rates. (10) The four cases with Spiegel hernia we have operated by laparoscopic TEP approach recorded a very low morbidity and no recurrences at a mean follow-up period of 25 months. No open approach or conversion to open surgery was recorded in our Spiegelian hernia repair study.

In a prospective randomized controlled trial comparing open versus laparoscopic surgical treatment of Spiegelian hernia (22 patients, 11 treated by open approach and 11 laparoscopically), laparoscopy revealed better results in terms of morbidity and length of hospital stay. (11)

Of all laparoscopic methods - extraperitoneal placement of the mesh (TEP and TAPP), compared to intraperitoneal mesh, reduces the cost by using a polypropylene mesh and reduces the rate of intraperitoneal mesh and sutures/tacks related complications (adhesions, intestinal obstruction, bowel fistula). TEP approach shows advantages over the TAPP approach by avoiding the complications related to the dissection of the peritoneal flap and reducing the operating time spent to close the peritoneal flap (12).

Our study is a limited one due to the low incidence of Spiegelian hernia. The surgical technique used for the laparoscopic TEP repair of Spiegelian hernias is a modified laparoscopic TEP hernia repair we routinely apply for all inguinofemoral hernias. This experience, consisting of 552 laparoscopic TEP hernia repairs operated on within the same period is to be considered for the good outcomes of the surgical treatment in our study (reduced time of surgery, low complications' rate). Thus, we consider that the minimally invasive Spiegelian hernia repair should be chosen in respect with the experience of the surgical team in performing TAPP or TEP inguinal hernias repairs. Our large experience in laparoscopic TEP allowed us to use an efficient and reproducible surgical treatment for Spiegelian hernias as was presented.

Conclusion

Spiegelian hernias are rare and difficult to diagnose. Surgery is mandatory because of the risk of complications - incarceration and strangulation.

In the presented experience, laparoscopic total extraperitoneal approach proved to be an efficient, reproducible technique, with excellent results for the Spiegel hernias electively treated.

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