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Treatment of Bilateral Inguinal Hernia - Minimally Invasive versus Open Surgery Procedure

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Rezumat

Tratamentul minim invaziv versus clasic al herniilor inghinale bilaterale

Obiective: Scopul acestui studiu este de a evalua comparativ rezultatele tratamentului laparoscopic (total extraperitoneal) și clasic (procedeul Lichtenstein) în herniile inghinale bilaterale operate într-o singură ședință operatorie.
Material și metodă: Au fost analizate toate cazurile internate și operate într-un singur timp operator, în Clinica de Chirurgie Generală a Spitalului Sfântul Ioan din București, cu diagnosticul de hernie inghinală bilaterală în perioada 2006-2011.
Rezultate: Lotul a fost împărțit în 2 grupuri în funcție de modalitatea de abord chirurgical: grupul de studiu laparoscopic (234 cazuri) și grupul martor procedeul Lichtenstein (91 cazuri). S-a înregistrat o conversie datorită dificultăților de disecție (0,4% din cazuri). În 6 cazuri (2,5%) din grupul laparoscopic s-au înregistrat complicații, iar în grupul clasic în 25 de cazuri (27,4 %) ($p < 0,01$). Reintervenții s-au consemnat la 1,7 % din cazuri în grupul laparoscopic și la 2,1 % din cazuri în grupul clasic ($p < 0,01$). Durata medie de spitalizare postoperatorie a fost 2,1 zile în grupul laparoscopic și 4,7 zile în grupul clasic. Nu s-au înregistrat decese.
Concluzii: În departamentul nostru indicația de elecție în herniile inghinale bilaterale este chirurgia laparoscopică care are rata complicațiilor de 10 ori mai mică, durata de spitalizare de 2 ori mai scurtă și aceași rată de recidive ca și tehnica Lichtenstein.

Cuvinte cheie: laparoscopic, hernie inghinală bilaterală, total extraperitoneal, procedeu Lichtenstein, minim invaziv.

Abstract

Objectives: The aim of this study is to evaluate and compare the treatment outcomes of the bilateral inguinal hernia repair in one stage using minimally invasive tehnique (totally extraperitoneal) and conventional surgery (Lichtenstein).
Materials and methods: Records from all hospitalized cases in our institution between 2006 and 2011 that underwent surgery having the diagnosis of bilateral inguinal hernia were analysed.
Results: The study consists of two groups selected by means of the used procedure: the study arm which is laparoscopic (234 cases) and the control arm that consists of Lichtenstein procedure (91 cases). One conversion was recorded due to difficult dissection (0.4% of cases). There were complications reported in 2.5% cases in the laparoscopic group and 27.4% complications noted in the conventional group ($p < 0.01$). Reinterventions were logged in 1.7% cases in the laparoscopic group and 2.1% reinterventions in the open group ($p < 0.01$). The postoperative hospital stay was 2.1 days in the laparoscopic group and 4.7 days for the open procedure. Mortality was not recorded.
Conclusions: In our department the procedure of choice for bilateral inguinal repair is the laparoscopic approach (TEP) which has a 10 fold decrease in complications rate than

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Lichtenstein operation and also a shortening by half of the hospital stay. Hernia recurrence is the same for both procedures.

Key words: laparoscopic, totally extraperitoneal, Lichtenstein procedure, inguinal bilateral hernia, minimally invasive

Introduction

Inguinal hernia is one of the biggest challenges in surgical pathology because of its frequency, complexity as well as the socio-economic consequences. The incidence and prevalence of inguinal hernia are not precisely known (1). The chance of a person having to undergo an inguinal hernia operation during his/her life is quite high, 27% in the case of men and 3% in the case of women (2).

Surgery is the only treatment and cure for inguinal hernia. Spontaneous recovery has never been described in adults (3). Although along time many types of surgical procedures have been tried to treat inguinal hernia, the high number of recurrences couldn't be avoided (3). The rational choice of the type of procedure to achieve better surgery results was possible by studying in details the anatomy of the inguinal region.

A special entity among inguinal hernias is represented by bilateral hernia. Current research is focused on identifying the grade of particularity of this entity (is it a simple double hernia or a special type of hernia?) (4). We preferred to consider the pragmatic approach during our clinical activity, centred on the most efficient and comfortable surgical technique for the patient.

In the current study we made an analysis by comparing the most common surgical procedures used in the treatment of bilateral inguinal hernias in the General Surgery Unit of Emergency Clinical Hospital "Sfântul Ioan", Bucharest, taking in consideration the achievement of the main objectives of the treatment: the reduction of recurrence rate of inguinal hernia and the reduction of the postoperative complication rate.

Materials and Methods

The goal of the current research is the evaluation of the incidence of inguinal hernia pathology and especially of bilateral hernia in the activity of the department, treatment and postoperative morbidity, and to compare the results obtained by simultaneous bilateral open or laparoscopic procedures.

Enrolment criteria for this study were: intraoperative diagnosis of bilateral inguinal hernia, bilateral simultaneous repair, open Lichtenstein or laparoscopic total extraperitoneal (TEP) procedure. Cases were enrolled between January 1, 2006 to December 31, 2011 and follow-up until September 1, 2012.

The data required for analysis were collected from different sources such as: a computerized database containing information about all patients, surgical records, patients' record files and by watching their surgeries' video recordings. The patients came for control after one month, three months, six month and then on a yearly basis, the follow-up period varying between 6 and 81 months.

From 2927 patients with inguinal hernia treatment (9.8 % of the surgical interventions in our department, second pathology after gallbladder lithiasis), 371 (12.6%) have had bilateral hernias. The following cases were excluded: 15 cases where surgery was performed consecutively, and those cases where the approach was different from Lichtenstein (10 cases of bilateral Rives, 10 cases of Stoppa, 3 cases of bilateral Bassini), respectively different from TEP (3 cases of bilateral TAPP), and 5 patients lost from follow up. Finally the study arm (Group 1) contains 234 laparoscopic TEP procedures, and the control arm (Group 2) contains 91 Lichtenstein bilateral procedures.

TEP procedure was performed by 14 surgeons, 94% of the interventions being above the learning curve (estimated at 50 cases) (5). All the procedures were done under general anesthesia with orotracheal intubation, using the same technique as described in detail by Tarcoveanu (6). The preperitoneal space was dissected using a balloon-trocar, subsequently replaced by a 12 mm trocar with attachment system. The carbon dioxide (CO_2) was insufflated at a pressure of 10-12 mm Hg.

As a standard 3 working torcars of 5 mm were used as following: one was situated a few cm sub-umbilical and the other two at the anterior superior iliac spines (3-4 cm superior and 2 cm medial). The hernia sac was dissected and reduced in the preperitoneal space. The parietalization of the elements of the spermatic cord was the rule. A mesh of polypropylene monofilament-heavy mesh (10 x 15 cm) was used to overlap the myopectineal defect described by Fruchaud on each side.

The Lichtenstein procedure was made under spinal anaesthesia. The polypropylene monofilament-heavy mesh with closed slit was fixed inferiorly to the inguinal ligament and medial and superior with 4-5 additional points of suture.

The following parameters were analysed: the demographic data, surgical procedure, hernia variety, intraoperative complications, immediate and late postoperative complications, postoperative duration of hospital stay and the recurrences.

Comparisons between groups of patients were made using χ^2 statistics, bivariate correlations and 2-sample test of proportions as appropriate using SPSS 20.0 (IBM SPSS Data Collection). Results are reported as mean ± SD, ranges, or percentages of the appropriate denominator. Significance was accepted at the 5% level ($p < 0.05$).

Results

There were 325 patients with bilateral inguinal hernias included in this study, with mean age of 55± 15.6 (extremes 18 - 87) years. Analysing the number of hernia undergone surgeries by age group we observed a high frequency of the decades V and VI (22.2%, and 23.1% respectively), thus the disease affects persons in socio-professional active categories.

There were positive correlations between old age and the high number of irreducible hernias (Pearson 0.620, $p < 0.01$).

The distribution of cases by sex has demonstrated a higher number of males (96.3%) in comparison with females (3.7%). The mean age was 51.5±14.9 years in Group 1 and 63.9±13.6 years in Group 2 (see *Table 1*).

The distribution of the stages of hernias (NYHUS classification) in the two groups is shown in *Table 2*. There is no statistical significant difference ($p < 0.05$).

TEP technique and variations

In 6.41% of the cases, the hernia sac was transected at the neck and abandoned in the inguinal canal. The meshes were made with slit and gate, closed medially or laterally to the spermatic cord/round ligament in 78.6% of the cases, and without slit in 21.4% of the cases. The mesh was fixed using staples in 3 or 4 points in only 39.3% of the cases.

In Group 1 other simultaneous surgical procedures were associated in 3.4% of the cases as follows: left varicocele treatment using extraperitoneal laparoscopic approach (4 cases), umbilical hernia treatment using preperitoneal mesh (2 cases), treatment of supra-umbilical incisional hernia (1 case), ectopic testicle surgery using extraperitoneal laparoscopic approach (1 case).

In Group 2 other simultaneous surgical procedures were associated in 3.2% of the cases as follows: umbilical hernia treatment using preperitoneal mesh (3 cases).

In one case (0.4%), conversion from laparoscopic to open procedure (Stoppa) was necessary because of the preperitoneal fibrosis.

In Group 1 intraoperatively no important haemorrhagic accident was encountered. There were some minor incidents like:

- pneumoperitoneum which required the introduction of a Veress needle - 13 (5.5%) cases;
- the efraction of the peritoneum when approaching the preperitoneal space - 5 (2.1%) cases;
- the testicle was accidentally pulled into the preperitoneal space - 3(1.2%) cases.

Immediate complications were local: haematoma, seroma, wound infection, transient neuralgia, haematocel, haemoperitoneum, and general: acute retention of urine, secondary haematuria after urinary catheterization, resuscitable cardiopulmonary arrest, as presented in *Table 3* and *Table 4*.

Among late complications, there was one recurrence at 1 year after the laparoscopic procedure, and another recurrence at 8 months after the open procedure, in both cases the recurrence being unilateral. There were no complications related to associated surgery.

Four cases (1.7%) in Group 1 required reintervention. The case of haemoperitoneum was treated using laparoscopic approach. It is a case of a young patient, with a good recovery, being discharged the 2nd day after surgery without medication. He returned to the hospital in the 6th day with dyspnoea at effort and marked physical extenuation. Through laparoscopic diagnostic a relevant haemoperitoneum was discovered without having an active source at the moment of the surgical procedure. The procedure implied peritoneum washing and drainage. The recovery was good.

Two haematomas were identified in the scrotum (both of them after difficult dissection of the inguino-scrotal hernias) that needed surgical drainage. Twelve hours after surgery, one patient had a cardiopulmonary arrest which responded favourably to the ALS manoeuvres, the recovery being good.

One of the recurrence hernia cases, 1 year after the laparoscopic procedure, was treated with Lichtenstein procedure.

Among the Group 2 complications we mention a transitory neuralgia of the genitofemoral nerve, which was treated with AINS and two immediate haematomas, which needed surgical drainage. In Group 2 the treatment of the singular case of recurrence was postponed, according to the patient's decision.

Table 1. *Demographic data and associated surgeries*

	Group 1 (Laparoscopic)	Group 2 (Lichtenstein)	p
Number of patients	234	91	ns
Age (years)	51.5±14.9	63.9±13.6	ns
M/F	32/1	17/1	ns
Associated with other type of surgery	8	3	ns

Table 2. *Hernias distribution using NYHUS classification*

	I	II	III	IV	Total
Group 1	5	8	434	21	468
Group 2	0	3	169	10	182
Total	5	11	603	31	650

$p > 0.05$

Table 3. *Postoperative complications*

	Group 1 (Laparoscopic)	Group 2 (Open)	p
Haematoma	2 (0.9%)	9 (9.9%)	$p < 0.05$
Infection	0	5 (5.5%)	
Acute urinary retention	0	4 (4.4%)	
Haematocel	0	2 (2.2%)	
Seroma	0	2 (2.2%)	
Haematuria	1 (0.4%)	1 (1.1%)	p - NS
Transient neuralgia	0	1 (1.1%)	
Haemoperitoneum	1 (0.4%)	0	

Table 4. *Complications and reinterventions*

	Group 1 (Laparoscopic)	Group 2 (Open)	Total
Reinterventions	4	2	7
Recurrences	1	1	2
Cardiopulmonary arrest	1	0	1
Deaths	0	0	0

$p > 0.05$

The Lichtenstein approach was preferred for the elderly people (Pearson=0.335, $p<0.01$), and in cases with irreducible hernias (Pearson=0.652, $p<0.01$).

The average duration of postoperative stay was 2.1± 1.2 (extremes 1-8) in Group 1, significantly shorter than in Group 2, mean: 4.7±2 (extremes 1-10) days ($p<0.05$).

Discussions

Bilateral inguinal hernia can be operated simultaneously in the same session or successively at an interval of a few days, weeks or months. There is no consensus in regards of the treatment of the bilateral inguinal hernia, and medical research does not offer sufficient data (rate of recurrence, post-operative infection) to sustain simultaneous or interval surgery (4).

The method of treatment (one or two stage surgery) in open procedures is chosen based on the decision taken by the surgical and anaesthesia team, based on patient compliance. Although the clinical examination of the patient together with the parietal ultrasound can sustain a diagnosis of the bilateral inguinal hernia, sometimes the diagnosis is revealed during laparoscopic surgery.

For the patient, a successful inguinal hernia repair means a lower risk of complications, a quick postoperative recovery and a minimal risk of persistent pain symptoms or recurrent hernias (3). Regarding young patients we search for bilateral hernias as a rule not only clinically but also during laparoscopy because most of those patients have congenital hernias.

Guidelines for the Treatment of Inguinal Hernia in Adult Patients were elaborated by the European Hernia Society (EHS) and updated in 2009. These guidelines relay on a consensus reached among the experts and on evidence-based medicine. EHS recommends one stage (Lichtenstein or endoscopic) procedure for the treatment of bilateral inguinal hernia (3).

The Stoppa procedure represents another option for bilateral hernia treatment, but only for the surgeons familiar with it (4,7).

The EHS Committee sustains that, except for the Lichtenstein and endoscopic techniques, none of the alternative mesh techniques have sufficient scientific evaluation to be given a place in these guidelines (3).

The EHS Committee sustains that a totally extraperitoneal (TEP) repair is to be preferred to a transabdominal preperitoneal (TAPP) approach in the case of endoscopic surgery (3).

A preperitoneal (endoscopic) approach should be considered in female hernia repair (3).

The most important challenge is the implementation of the Guidelines in daily surgical practice, and this remains an important task for the EHS.

Between the three laparoscopic techniques, conceptually, TEP is the one that follows the principles of the Stoppa procedure and is preferred by more and more surgeons (8). It presents a series of advantages: the peritoneum is not open, the mesh has no contact with intraperitoneal organs, the dimensions of the meshes are large (at least 10 x 15 cm), the mesh does not require fixation, it can be done under spinal anaesthesia. Comparing laparoscopic procedures with Lichtenstein the socioprofessional reinsertion is faster (9, 10,11).

The Lichtenstein technique introduced in 1984 is simple, safe and reproducible. It has very good results: rate of recurrence less than 4%, 90% of the patients return to work within the first 2 weeks after the procedure and it can be done under local anaesthesia, being eligible for one day surgery. If we take into account all these things the technique could be considered a "gold standard" in hernia surgery (12,13).

At the Lichtenstein Institute the procedure is done simultaneously, with local anaesthesia for the majority of bilateral hernias (99% of patients) (4).

In the General Surgery Department of the „Sfântul Ioan" Emergency Hospital from Bucharest, even if the laparoscopic TEP technique has been used since 1994 (over 800 procedures performed until now), the preferred treatment for unilateral hernias is the Lichtenstein technique.

Conceptually, the advantages of the miniinvasive techniques will be more pronounced when approaching bilateral hernias. In *Fig. 1* an increase of the acceptance of laparoscopic procedure is shown, but in 2011, 34% of all bilateral inguinal hernias were done by open approach. It seems that the simplicity of the Lichtenstein technique prevails over the patient quick recovery after the endoscopic procedure.

Conversions

The rate of conversion in our study was 0.4%. The decision of conversion represents a responsible surgical attitude and with no doubts, it is towards the wellness of the patient, although it cancels all the advantages of laparoscopy, maintaining its disadvantages: the duration of the surgery and its high costs. Among endoscopic inguinal hernia techniques, TAPP seems to be associated with higher rates of port-site hernias and visceral injuries, whilst there appear to be more conversions with TEP (14).

The following were performed in order to reduce the

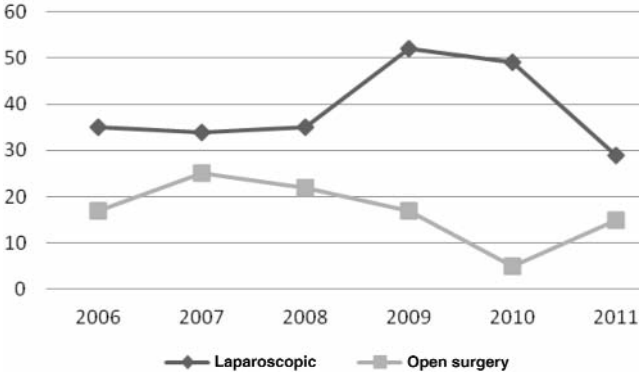

Figure 1.

number of conversions: 1. careful selection of the cases; we eliminated patients with old hernias, users of hernia support belt, and patients with large inguino-scrotal hernias; 2. gain of experience through a continuous laparoscopic education.

The learning curve for performing endoscopic inguinal hernia repair (especially TEP) is longer than that for open Lichtenstein repair, and ranges between 50 and 100 procedures, with the first 30–50 being most critical (5).

Morbidity

The immediate complications were 10 times less frequent in Group 1 than in Group 2 (CI=0.03 at 0.2). Also in the medical literature, complications after laparoscopy are around 5% while complications after Lichtenstein are around 16% (15).

McCormack et al. (16) showed that the risk of serious vascular and visceral (especially bladder) complications appears to be higher for endoscopic techniques compared with open repair. Most of these lesions were seen with TAPP (0.65 vs. 0–0.17% for TEP and open mesh repair). The transabdominal route of TAPP might also cause more adhesions, leading to intestinal obstruction in a small number of cases. It is recommended that, due to the risk of intestinal adhesion and the risk of bowel obstruction, the extraperitoneal approach (TEP) be used for endoscopic inguinal hernia operations.

Recurrences

The rate of recurrences in the study was 0.4% after laparoscopy vs. 1.1% after Lichtenstein procedure, with no statistical significance, slightly lower than Feliu et al. (15) who reported a recurrence rate of 1.3% for TEP and 3.8% for Lichtenstein after bilateral procedure. Establishing the recurrence rate meets difficulties without a national register to track the information about the patients with inguinal hernia.

Endoscopic inguinal hernia techniques with a small mesh ($\leq 8 \times 12$ cm) result in a higher incidence of recurrence compared with the Lichtenstein technique (3,17,18). In endoscopic repair, a mesh of at least 10×15 cm should be considered (3). With training and an adequate surgical technique, the recurrence rate after endoscopic operations can be reduced significantly (3).

The use of synthetic mesh substantially reduces the risk of hernia recurrence irrespective of the placement method. Mesh repair appears to reduce the chance of persisting pain rather than increase it (19). A recurrence after a mesh technique is frequently demonstrated early in the follow-up, and is due to a technical failure.

Regarding the need for a mesh fixation, there were no significant differences between cases with stapler fixation and the cases with no fixation regarding morbidity, recurrences or postoperative hospital stay. Also, there were no significant differences among the cases with simple mesh and those made with slit and gate.

The recurrence after TEP procedure was due to a technical error, the mesh was displaced through the fascia transversalis defect that was not properly approximated.

Postoperative hospital stay

The average duration of postoperative hospitalization: 2.1 ± 1.2 days for minimally invasive interventions, respectively 4.7 ± 2 days for interventions performed using open procedure, is higher than the given data by the literature: 0.6 ± 0.8 days for TEP, and 1.3 ± 1.3 days for Lichtenstein respectively (15). Even so the difference between groups is statistically significant. The duration of hospitalization was positively correlated with older age (Pearson 0,332 with $p < 0.01$), with the open procedure (Pearson 0,586 $p < 0.01$) and with the complication rate (Pearson 0,393 $p < 0.01$).

Factors that contributed to the prolongation of the hospital stay were: poor management of postoperative pain, social factors (cases from low medical assisted communities), educational factors (patient's reluctance to leave the hospital early after the procedure) and conceptual factors (surgeon's low confidence in patient's compliance).

Inguinal hernia surgery can easily be performed as day surgery, irrespective of the technique used (3). An operation in day surgery should be considered for every patient (20,21). On a worldwide basis, there is a clear increase in the percentage of inguinal hernia repairs that are being carried out as day surgery (22,23). Only the extensive open preperitoneal approach (Stoppa technique) has not been described in the context of day surgery (3).

In our clinic, both procedures are performed as inpatient surgery. In order to implement one day surgery, patients and surgeons perspective should be optimised. The medical literature emphasizes that the variations in the mean length of stay are different between hospitals rather than between different operative techniques, possibly reflecting differences in health care systems versus differences due to types of endoscopic repair (24). Also, there is considerable variation between different countries, which cannot be clarified solely by the degree of acceptability of day surgery among patients and surgeons but, to a significant extent, is also determined by the healthcare financing system (3).

From a socio-economic perspective, an endoscopic procedure is probably the most cost-effective approach for patients who participate in the labour market, especially for bilateral hernia. In cost–utility analyses including quality of life (QALYs), endoscopic techniques (TEP) may be preferable since they cause less numbness and chronic pain (3).

Conclusions

In the specific setup from "Sf. Ioan" Hospital the results of laparoscopic (TEP) simultaneous repair of bilateral inguinal hernias were better than the results of simultaneous Lichtenstein procedure.

The morbidity and the length of the postoperative hospital stay were significant lower, and there was no significant difference in recurrence rate.

A complication rate 10 times lower, the reduction of more than 50% of the hospital stay and the shortening of the period of postoperative recovery and professional reinsertion, compensate the main disadvantage of the laparoscopic technique (TEP) that is the long learning curve.

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