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SURGICAL ENDOSCOPY
and Other Interventional Techniques

Open vs laparoscopic repair of secondary lumbar hernias

A prospective nonrandomized study

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Abstract
Background: Lumbar hernias are uncommon defects of the posterior abdominal wall. Surgical treatment is still controversial in these cases. The aim of this study was to compare outcome and costs of the laparoscopic approach vs the open method.
Methods: We conducted a prospective nonrandomized study of 16 patients who underwent operation for secondary lumbar hernia between January 1997 and January 2003. Hine were treated via the laparoscopic approach and seven with an open technique. The following variables were analyzed: clinical data, hospital data (operating time and length of stay), patient comfort (consumption of analgesics and time to return to normal activities), and recurrences. Hospital costs were also analyzed.
Results: There were no differences between the two groups in terms of age and history, although the defects of the patients in the laparoscopic group were smaller. Mean operating time, postoperative morbidity, mean hospital stay, consumption of analgesics, and time to return to normal activities were significantly lower in the laparoscopic group ($p < 0.01$). No were there any statistical differences between the two types of surgical procedure in terms of hospital costs. However, the final cost did show differences when expenses for readmissions and recurrences were taken into account ($p < 0.01$).
Conclusion: The laparoscopic approach to secondary lumbar hernia repair is more efficient and more profitable than the traditional open technique.

Key words: Lumbar hernia — Laparoscopy — Major ambulatory surgery — Costs

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Lumbar hernias are uncommon defects of the posterior abdominal wall, that are localized between the 12th rib and the iliac crest. Although many techniques have been described for the surgical management of such hernias, none of them can get be recommended as the preferred method for the following reasons: the rarely of their occurrence, difficulty in defining the margins of the defect, the presence of a bone that limits operative maneuvers, the frequent loss of tissue of the abdominal wall, the weakness of the adjacent tissues, concomitant paralysis of the muscles, and a lack of sufficient experience with thisentity among surgeons [2, 5, 9].

The aim of this study was to compare the laparoscopic prosthetic repair of secondary lumbar hernias vs the open technique.

Patients and methods

Patients

A prospective nonrandomized, longitudinal, analytical study was conducted between January 1997 and January 2003 of 16 patients diagnosed with lumbar hernia. The diagnosis was clinical, but a CT evaluation was always done to assess the extent of the defect, the state of the posterior muscles, and the visceral contents of the sac. Exclusion criteria included the need for emergency operation, high anesthetic risk (American Society of Anesthescologiste [ASA] IV), neoplastic involvement, acute infection, and mental incompetence. All of the patients included in the study protocol gave their informed consent. Nine patients were treated via the laparoscopic approach and seven were treated via the open approach. Assignment to each group was not randomized for reasons of hospital organization but was done at the discretion of the surgeon responsible for the patients during their first visit.

Surgical technique

Laparoscopic approach

With the patient under general anesthesia and in the lateral decubitus position, three trocars are placed along the midline: two 10-mm and

one 5-mm (subxiphoid, periumbilical, and suprapubic), but their placement and number could be modified according to the size and location of the hernia. The defect is visualized and the contents (usually colony) are removed. The colon is always mobilized sufficiently to provide an adequate margin from the posterior abdominal wall. The hernia type is assessed and the edges of the defect defined. Subsequently, a double-layer mesh is inserted and secured with four reference sutures. The mesh must be large enough to overlap the defect by 5 cm in all directions (Parietex composite, Sofradim, Villefranche-sur-Saone, France). The transabdominal reference sutures are pulled out with a Gore suture passer instrument (Gore-Tex, WL Gore & Assoc. Int., Flagstaff, AZ, USA) to extend the mesh properly, and the mesh is fixed with reabsorbable suture (Pariefix, Sofradim) to the muscle margins and with a helical suture to the bone margin (those margins of the hernias above the 12th rib and below the iliac crest). The peritoneum is not closed. The trocars are removed under direct visual guidance, the unknotted reference threads are cut, and the pneumoperitoneum is deflated.

Open prosthetic repair

All open lumbar repairs are also performed under general anesthesia with the placement of a preperitoneal polypropylene prosthesis. Via an incision over the herniary defect, the sac is dissected and its margins identified. The mesh is placed such that it overlaps the defect by >2cm on all sides and then fixed with nonreabsorbable sutures. Before the wound is closed a drain is inserted (depending on the amount of dissected tissue and the resulting dead space).

All patients were discharged from hospital when they no longer required intramuscular analgesics, regardless of whether or not they felt well enough to go home.

Follow-up

All of the patients were included in a follow-up protocol and examined in the consulting room of the Abdominal Wall Unit at 1 week, 1 month, and 6 months and on a yearly basis thereafter. The following parameters were evaluated: (a) clinical data (age, sex, associated diseases, previous operations, and hernia type), (b) intraoperative hospital data (bleeding, intestinal lesions), postoperative complication: (seromas, which were clinically defined as a fluid collection persisting >4 weeks or causing local discomfort; hematomas; infection; pain, etc.) operating time, and hospital stay (c) quality of life (consumption of analgesics and time to return to normal activity, which was defined as the period between the operation and the time at which the patient had resumed completely normal activities at work and during leisure time), and (d) recurrences (with clinical features confirmed by CT). The mean follow-up was 28 months (median, 32; range, 12–50).

Cost analysis

Using computer data provided by the hospital, a basic study was done of the hospital costs of each type of procedure. All expenses generated by each patient after admissions to the hospital were reviewed. These expenses were grouped into three major categories: (a) hospitalization costs (staff, operating costs, materials and medicines, radiology, intermediate services, structure, hospital stay and others), (b) prosthesis costs, and (c) surgery related costs (anesthesia and reanimation, minutes of surgical intervention per number of surgeons, total minutes of surgical intervention, and laparoscopic materials). The final cost was calculated by adding the additional expenses generated by readmissions and recurrences.

Statistical analysis

The patients data were analyzed based on type of surgical treatment. Means ± SD were used to describe quantitative variables; ratios and confidence intervals were used for qualitative variables. The Kolmogrof-Smirnoff test was used to study the normality of the quantitative variables. The Mann-Whitney U test was used for comparison of means when a quantitative variable did not follow a normal distribution, and the Student t-test was used for quantitative variables with normal distribution data and equal variance between the two groups. The chi-square test with Fisher's exact correction was used for the analysis of qualitative data. A value of $p < 0.05$ was considered to be statistically significant.

Table 1. Characteristics of patients diagnosed with lumbar hernia according to surgical approach

	Laparoscopy	Open	p value
No. of patients	9	7	
Mean age (yr)	57 ± 10.3	62 ± 11.8	0.21
Sex (male/female)	4/5	1/6	<0.05
Mean BMI: (weight/height^2)	30 ± 4.8	32 ± 2.4	0.28
Type (right/left)	6/3	3/4	0.6
Classification:			
Superior	2	4	
Inferior	4	1	
Diffuse	3	2	
Previous repair	5	3	0.32
Size of defect (cm^2)	73 ± 26.8	118 ± 60.4	<0.05
Hernia contents			
Colon	5	2	
Omentum	3	4	
None	1	1	

BMI, body mass index
Values are expressed as meant ± SD

Results

The patient characteristics are shown in Table 1. Etiologically, only one patient had a traumatic lumber hernia (road accident); the rest were postoperative incisional hernias. There were no differences between the two groups in terms of age, history, site, or hernia type, although the defects of the laparoscopically treated patients were smaller ($p < 0.05$).

Intraoperative complications occurred only in the laparoscopic group, where there were two cases of bleeding. One was due to a lesion of the omentum and required hemostasis with a clamp, and the other was due to a lesion of the inferior epigastric artery during placement of the mesh that caused a small hematoma neither complication had any repercussions in the postoperative period. Postoperative morbidity was significantly greater with the open approach ($p < 0.05$), as was mean operating time ($p < 0.001$). In three patients of the laparoscopic group, the procedure was completed as major ambulatory surgery with no-hospital admission. The other six laparoscopically treated patients had a mean hospital stay of only 2.2 days, which compares very favorably with the 7.1 days recorded in the open group ($p < 0.001$). The time to return to normal activities and the mean consumption of analgesics were both significantly lower in the laparoscopic group ($p < 0.001$). There were no recurrences during a follow-up of 1–4 years in the laparoscopic group, whereas in the patients who had open repair there were three recurrences (Table 2).

Three cost no statistical differences in the cost of the two types of procedure. The higher costs in the laparoscopic group due to surgery-related and prosthesis ex-

Table 2. Intraoperative and postoperative morbidity

	Laparoscopy	Open	*p* value
Mean operating time (min)	43 ± 13.5	71 ±13.1	<0.001
Intraoperative morbidity	2 (22%)	0	0.11
Omental bleeding	1		
Parietal bleeding	1		
Mean hospital stay (d)	2.2 ± 1.3	7.1 ± 3.7	<0.001
Postoperative morbidity	3 (33%)	6 (86%)	<0.05
Hematoma in trocar	1	—	
Parietal hematoma	1	4	
Transient neuralgia	1	—	
Chronic pain	0	2	
Consumption of analgesics (d)	7 ± 5.1	19 ± 6.9	<0.001
Return to normal activities (d)	12 ± 4.9	25 ± 5	<0.001
Recurrences	0	3	0.4

Values are expressed as mean ± SD

Table 3. Analysis of the cost of laparoscopic vs open lumbar hernia repair

	Laparoscopy	Open	*p* value
Hospitalization	762.19 ± 288.66	5,869.94 ± 659.44	<0.001
Prosthesis	1,126.42 ± 90.39	950.25 ± 20.50	<0.001
Operation	1,415.11 ± 281.60	1,047.36 ± 309.44	<0.01
Mean total cost	3,303.72 ± 349.67	3,465.09 ± 931.47	0.33
Added costs due to			
Readmissions	1,164.63	425.64	
Recurrences	0	10,395.30	
Mean final cost	3,433.12 ± 325.72	5,010.92 ± 830.73	<0.01

Values are expressed in euros as means ± SD

penses seem to have been compensated for by the lower hospitalization costs (Table 3). However, when the final cost was calculated by adding the expenses incurred by a readmission in each group (for seroma drainage in a laparoscopic patient and for local cure of an infected wound in a patient in the open group) plus the expenses for the three recurrences (in the open group), there were statistically significant differences between the two approaches ($p < 0.01$).

Discussion

Once laparoscopic approach was shown to be efficient for ventral hernia repair, the technique was developed and extended to other defects of the abdominal wall [8, 10, 11, 13]. Lumbar hernias are rare and not well understood. There are few specific studies focussing on this type of hernia in the literature, and books devoted to this speciality offer only a few brief comments [1, 5, 6]. Lumbar hernias secondary to traumat or surgerical procedures are the most common presentation, and in our experience kidney operation is the predominant cause.

The posterior abdominal wall is difficult to approach for several reasons, including the absence of a clear definition of the musculo-aponeurotic layers (unlike hernias on the midline), the presence of a bone that limits both dissection and proper overlap and fixation of the mesh, and the weakness of the adjacent tissues. Moreover, at many hospitals in our country, the urologists treating patients who presenting with lumbar hernias have no knowledge of, or specific training in, current abdominal wall surgery and have not kept abreast of the technological advances in this area. The creation of an abdominal wall unit in our center, together with the good collaboration and liaison between our unit and the urology department (high number of interconsultations per year), has enabled many patients to be assessed jointly and benefit from personalized elective surgery. All of the conventional techniques that have been described for the repair of these defects (simple closure, imbrication of the fascia transversalis, and plastic reconstruction with muscle flaps or—currently—with a prosthesis) require a large incision to properly expose the debilitated area, extensive dissection of the musculo-aponeurotic and bone layers, and multiple sutures to repair the defect [2]. In this location, the laparoscopic approach seems to offer certain advantages, enabling identification of the whole of the lumbar area, accurate evaluation of the hernia type, complete reconstruction of the area, and the placement of a mesh that amply overlaps the margins of the defect, including the bone. Furthermore, with the laparoscopic approach, the defect can be repaired at the deepest layer of the posterior abdominal wall, thus more closely fulfilling the criteria proposed by Stoppa. Arca et al. [2], Heniford et al. [7], and Bickel et al. [3] recommend the laparoscopic technique as the method of choice for lumbar hernia repair for reasons of simplicity, safety, and quick recovery.

Our results show that the minimally invasive approach, despite the large size of these defects, is associated with minimal morbidity and a mean hospital stay of 2 days. Indeed, in some cases, no hospital admission is needed at all. By contrast, the open approach required a prolonged hospital stay to monitor drains, wound, pain, etc. Likewise, the minimal surgical aggressiveness of this approach favors an early return to normal activities, as has also been shown for its application to other hernias of the abdominal wall [4, 12]. Our results indicate that the laparoscopic approach enables the repair of lumbar hernia at a cost similar to that of the open technique, while also offering certain advantages for both the hospital (a shorter hospital stay or even no hospital admission, at all, thus leaving hospital beds unoccupied) and the patient (minimal postoperative pain, low consumption of analgesics, and an early return to daily activities). In conclusion, laparoscopic lumbar hernia repair is more efficient and more profitable than the traditional open approach and can be accomplished at the same cost.

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