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ORIGINAL RESEARCH

Comparison of Conventional Anterior Surgery And Laparoscopic Surgery For Inguinal Hernia Repair

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ABSTRACT

Aim: The Aim of this Study to Compare the Technique for the Inguinal Hernia Repair, Comparison of Conventional Anterior Surgery and Laparoscopic Surgery. **Methods:** In this Study a randomized, multicentre trial in which 450 patients with inguinal hernias were treated by extraperitoneal laparoscopic repair and 500 patients were treated by conventional anterior repair. We recorded information about postoperative recovery and complications and examined the patients for recurrences one and seven weeks, six months, and one after surgery. **Results:** Six patients in the open-surgery group but none in the laparoscopic-surgery group had wound abscesses (P = 0.03), and the patients in the laparoscopic-surgery group had a more rapid recovery (median time to the resumption of normal daily activity, 6 vs. 10 days; time to the return to work, 14 vs. 21 days; and time to the resumption of athletic activities, 24 vs. 36 days; P<0.001 for all comparisons). With a median follow-up of 600 days, 30patients (6 percent) in the open-surgery group had recurrences, as compared with 17 patients (3 percent) in the laparoscopic-surgery group (P = 0.05). All but three of the recurrences in the latter group were within one year after surgery and were caused by surgeon-related errors. In the open-surgery group, 15 patients had recurrences during the first year, and 16 during the second year. Follow-up was complete for 97 percent of the patients. **Conclusions:** Patients with inguinal hernias who undergo laparoscopic repair recover more rapidly and have fewer recurrences than those who undergo open surgical repair.

Inguinal hernias are common, and although the results of surgical repair are often satisfactory, postoperative recovery may be slow, and the hernia may recur. Recurrence rates have ranged from less than 1 percent to more than 10 percent, with a follow-up of more than five years. These data should be viewed with some caution, however, because follow-up data are often incomplete and unreliable. Indeed, the overall recurrence rate in the Netherlands, the United Kingdom, and the United States and the results of large, prospective, controlled studies suggest higher rates (up to 15 percent after five years).

INTRODUCTION

Inguinal hernias further are subdivided into indirect inguinal hernias (also known as lateral hernias) and direct inguinal hernias (also known as medial hernias) according to the anatomical relation to the inferior epigastric vessels(i.e. laterally or medially of the vessels)[1] . The reasons why inguinal hernias develop are largely unknown, and limited epidemiologic data exist regarding the detailed occurrence of inguinal and femoral hernias. children almost exclusively develop indirect inguinal hernias , whereas a mixture of indirect inguinal hernias, direct inguinal hernias and femoral hernias occur in adults. One of the largest challenges regarding Inguinal hernia surgery is recurrence and this still remains a clinical problem, even though treatment modalities and technical aspects have improved. It has been reported that up to 13 % The definitive reason for recurrence after inguinal hernia surgery still remains unclear and it has not been possible to identify single parameters or risk factors as being responsible. The identified risk factors for recurrence range widely and include controllable technical risk factors such as surgical technical methods, methods of anaesthesia , mesh-fixation techniques , surgeon experience as well as hospital volume . Furthermore, a wide range of

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noncontrollable patient-related risk factors such as gender , hernia anatomy , hernia type , mode of admission , connective tissue composition , connective tissue degradation , smoking , and postoperative convalescence. all have been found to impact the risk of recurrence after inguinal hernia surgery in varying degrees.[2] It is possible that the underlying pathophysiology of the different inguinal hernia types could affect the overall recurrence risk as well as the risk of developing a specific type of recurrent inguinal hernia being operated on. The most often occurring complications and unfortunate implications of Inguinal hernia surgery besides recurrences, includes bleeding, post-operative infections, seromas, chronic pain, pain related sexual dysfunction and dysejaculation. Inguinal hernia repair is one of the most common surgeries, being performed in more than 20 million people annually. The lifetime occurrence of groin hernia - viscera or adipose tissue protrusions through the inguinal or femoral canal - is 27-43% in men and 3-6% in women . Inguinal hernias are almost always symptomatic, and the only cure is surgery . A minority of patients is asymptomatic; however, even a watch-and-wait approach in this group results in surgery in approximately 70% within 5 years . Surgical treatment is successful in the majority of cases . The expected rate of recurrence following inguinal hernia repair is still 11% today .[3]

The safest and most effective inguinal hernia repair (laparoscopic versus open mesh) is being debated. As the authors point out, the former accounts for the minority of hernia repairs performed in the United States and around the world. The reasons for this are a demonstration in the literature of increased operative times, increased costs, and a longer learning curve. But the laparoscopic approach has clear advantages, including less acute and chronic postoperative pain, shorter convalescence, and earlier return to work. Many conventional operations have been successfully adapted for the laparoscopic approach. A laparoscopic operation is unquestionably the surgical procedure of choice for gastroesophageal reflux disease and removal of the gallbladder, spleen, or adrenal gland unless specific contraindications are present.Laparoscopic inguinal herniorrhaphy (LIH) is a case in point. Frequent reanalysis of the controversial procedures such as laparoscopic herniorrhaphy is especially important because videoscopic operations remain in their developmental stages and thus continue to evolve. With this in mind, the purpose of this review was to examine the current state of the art of laparoscopic inguinal herniorrhaphy in relationship to its conventional counterparts.[4,5]

METHODS

We selected teaching and nonteaching hospitals in rural and urban regions for this study. The surgeons in participating hospitals enrolled patients in the study. All patients gave informed consent.

Inclusive and Exclusive Criteria

Patients over 25 years old who presented with clinically diagnosed, unilateral inguinal hernias (primary hernias or first recurrences) who were scheduled to undergo surgical repair with general anaesthesia were eligible for the study. Exclusion criteria were an additional surgical intervention planned during the hernia repair; a history ofextensive lower abdominal surgery, severe local inflammation, pregnancy . Patients who were mentally incompetent or not able to speak Dutch were also excluded.

Study Model

A standardized history was obtained, and a physical examination performed. Before randomization, the patients were told both orally and in writing that they should resume normal activity after surgery, including work and sports, when they felt able to do so. It was emphasized that this recommendation applied to both surgical techniques.

The patients were randomly assigned to either conventional anterior repair or extraperitoneal laparoscopic repair, with the assignments made at a central office in groups of 25 or 50 patients; within each of these groups, the maximal allowable difference in the number of patients assigned to the two treatments was 4. To ensure an equal distribution of patients in the two treatment groups.

Surgical Techniques

All surgeons and residents who performed hernia repairs using the conventional anterior approach were experienced in this technique or were supervised by an experienced surgeon. The repair consisted of a reduction of the hernia, ligation of the hernial sac, if necessary, and reconstruction of the inguinal floor with nonabsorbable sutures, if necessary. A mesh prosthesis was not used unless adequate repair was otherwise not possible.All surgeons and residents, also performed laparoscopic repairs. They had ample experience with other laparoscopic procedures and acquired experience with this particular procedure under the supervision of experienced surgeons before they were allowed to participate in the trial.[6]

The laparoscopic technique has been described. It was usually performed with the patient under general anaesthesia. Balloon dissection was used to develop the preperitoneal space without entering the abdominal cavity. Extensive lateral dissection was performed, with isolation and manipulation of the structures of the spermatic cord. A polypropylene mesh (10 cm by 15 cm) was placed over the myopectineal orifice. The mesh was not split and was not fixed in place. Patients were catheterized only if a full bladder was suspected. Prophylactic antibiotic therapy was not commonly given in either group.[7]

Data Collection and Follow

Standardized data collection was performed by the attending resident or surgeon, and each patient was

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evaluated at the hospital monthly by a physician or data manager from the central study office. The hernia was classified as type I, II, III (subtype A, B, or C), or IV (subtype A, B, or C), according to the classification of Nyhus. The operation time was defined as the time from the first incision to the placement of the last suture.

Discontinuation of the original laparoscopic procedure in favour of either a transperitoneal laparoscopic procedure or a conventional procedure was also recorded as a complication.

Postoperatively, all potential complications, such as hematoma, seroma, chronic pain, and wound infection, were assessed and documented. A serious wound infection was defined as the presence of pus or sanguinopurulent discharge at the operative site.

The patients is instructed to follow up at one and six weeks; at six months; and at one years for a standardized history taking and Physical. The patients were asked to assess the severity of pain at the operative site every day for the first week and at two and six weeks. Chronic pain was defined as pain in the groin, scrotum, or medial part of the thigh that was serious enough for the patient to mention at six months.

End Points

The primary end point of the study was a recurrence of the hernia, defined as a clinically detectable swelling in the groin or a clearly palpable defect of the abdominal wall in the groin.

The main secondary end point was time off from work, defined as the number of days between the day of surgery and the first day a patient returned to work. All deaths were assessed in terms of immediate cause and the relation of the death to the hernia operation.

Statistical Analysis

In the main analyses, we compared conventional open surgery and laparoscopic surgery with respect to the interval between surgery and the diagnosis of a recurrence or the return to work. Data for all patients who were randomly assigned to a treatment group and underwent surgery were analysed on an intention-to-treat basis.

RESULTS

We enrolled 955 patients ,During this time, 110 eligible patients were not enrolled: 80 refused to participate, 30 could not understand the protocol, and 13 were not enrolled for a variety of reasons. Of the 955 enrolled patients, 30(14 assigned to the open-surgery group and 16 assigned to the laparoscopic-surgery group) decided not to undergo surgery, in most cases because of the absence of serious symptoms. Only three of these patients have subsequently undergone surgery.

Eighteen patients (8 in the open-surgery group and 10 in the laparoscopic-surgery group) were excluded. Three of these patients had bilateral repairs, four were considered to be poor candidates for general anaesthesia, and three were found not to have inguinal hernias at surgery. An additional eight withdrew informed consent: two wanted open repairs, three wanted laparoscopic repairs, two refused annual follow-up, and one underwent surgery at another hospital. In addition, eight patients did not undergo the assigned procedure because of a misunderstanding between the central office and the surgeon, with six of the patients undergoing unplanned open repairs and two undergoing unplanned laparoscopic repairs.

Hence, our main analysis is based on data from 450 patients who underwent laparoscopic repairs and 505 who underwent open repairs. Randomization was successful, and the two groups were similar at base line (Table 1).

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CHARTERSTICS	OPEN SURGERY (N-505)	LAPROSCOPIC SURGERY (N-450)
Age – Yr	50+/- 15	50+/-17
Sex- No.(%)		
Male	480(95%)	450(92%)
Female	20(5%)	25(6%)
Higeht	M 1.76+/-0.06	.76+/-0.06
Weight -Kg	76.0+/-10.2	76.9+/-10.8
Adl Score†		
Median	92	92
Interquartile Range	82-100	82-100
Paid Work — No. (%)	276(55)	260(55)
Primary Hernia — No. (%)	445 (85)	430 (86)
First Recurrent Hernia — No. (%)	62 (10)	54 (10)
History Of Contralateral Hernia — No. (%)	18(3)	30 (6)
Clinical Presentation — No. (%)		
Swelling In The Groin	475 (94)	454 (93)
Discomfort Or Pain	420 (82)	416 (82)
Potential Risk Factors For Recurrence — No. (%)	50 (10)	46(10)
Chronic Obstructive Pulmonary Disease		
Benign Hyperplasia Of The Prostate	25 (5)	35(8)
Constipation		
Characteristics Of Hernia — No. (%)	25 (5)	26 (5)
Left-Sided	244(48)	240 (50)
Right-Sided	260 (52)	242 (50)
Medial	265 (53)	259 (53)
Lateral	230 (45)	213 (44)

A second analysis of recurrence rates included the 8 patients who did not undergo the assigned operation (for a total of 450 patients in the laparoscopic-surgery group and 505 in the open-surgery group).

Perioperative and Early Postoperative Results

The mean time from randomization to surgery was 33±36 days in the open surgery group and 35±33 days in the laparoscopic-surgery group. In the open-surgery group, a herniotomy with a high ligation of the hernial sac was performed in 20 patients (4 percent). This procedure was combined with a narrowing of the internal ring with sutures in 40 (8 percent), and a mesh prosthesis was inserted and a so-called tension-free repair performed in 14 (2percent).

The Nyhus classification of the hernias and the operative and early postoperative complications in the two groups are shown in Table 2. In the laparoscopic-surgery group, an open procedure was used in 20 patients .During laparoscopic surgery, 110 patients (25 percent) had peritoneal tears, but in only 8 of these patients (6 percent) did the tear result in loss of pneumoperitoneum, requiring a switch to another technique. In 15 patients (3 percent), the epigastric vessels were ligated because they blocked the view of the surgeon; in 2 patients, these vessels were ligated after being injured during the insertion of a trocar. After surgery, 65patients had a pneumoscrotum (12 percent), which disappeared within one day in all but 3 patients (Table 2). The most severe postoperative complications were serious wound infections in six patients in the open-surgery group (Table 2); two of these patients had to be re-hospitalized.

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CHARACTERISTICS	OPEN SURGERY (N505)	LAPAROSCOPIC SURGERY (N450)	P VALUE
			Operation time- min
Median	40	45	> 0.0001
Interquartile range	30-45	55-60	
no. of patients (%)			
Anaesthesia General	201(40)	480(6)	----
Anaesthesia Spinal	306(60)	8(1)	-----
Prophylactic antibiotics	15 (3)	7(1)	----
Nyhus classification*			
Type I	45(8)	25(5)	
Type II	130(25)	200(40)	
Type III			
A1	20(23)	90(20)	
B 1	50(30)	110 (24)	
C 1	(<1)	0	
Type IV			
A	35(5)	25(5)	
B	21(3)	23(4)	
C1	(<1)	0	
Operative complications			
Switch to another surgical technique	--- ------		25(5)
Cardiovascular complications	1(<1)	2(<1)	0.62
Arterial bleeding (clips or ligatures required)	2(<1)	5(1)	0.10
Serious wound infection (abscess)	5(1)	0	0.02
Wound infection requiring rehospitalization	2(<1)	0	0.04
Chronic pain	70(15)	10(2)	<0.0001
Broken instruments	2(<1)	0	0.21
Hematoma	14 (5)	24(7)	0.7
Urinary tract infection	2(<1)	5(1)	0.28
Postoperative complications	0	0	--
Related death			

TABLE 2. CHARACTERISTICS OF SURGERY AND OPERATIVE AND EARLY POSTOPERATIVE COMPLICATIONS.

Postoperative Recovery

The visual-analogue pain scores after surgery were lower in the laparoscopic-surgery group than in the open-surgery group (P<0.001), although the difference diminished with time (Figure 1). Seventeen patients in the laparoscopic-surgery group and 25 in the open-surgery group did not record pain scores; complete data were available for 90 percent of the patients. On the day of surgery, 285 patients (60 percent) in the laparoscopic-surgery group did not require any analgesic drugs for postoperative pain, as compared with 160 patients (30 percent) in the open-surgery group. The proportions of patients not requiring analgesia were 85 and 80 percent, respectively, at week.

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Mean (±SE) Visual-Analogue Scores for Postoperative Pain on the Day of Surgery, during the First 7 Days after Surgery, and at 14 and 42 Days in Patients with Inguinal Hernias Repaired with Open or Laparoscopic Surgery.

The patients in the laparoscopic-surgery group were able to resume normal activity sooner than the patients in the open-surgery group (Table 3). Scores on the activities-of-daily-living questionnaire, which were available for 98 percent of the patients, were higher in the laparoscopic-surgery group at all times.

Table 3

Post Operative Recovery in the Two Treatment Groups

Valuable	Open Surgery (Median Quartile Range)	Laparoscopic Surgery (Median Quartile Range)
Post Operative Hospital Stay (days)	2(1-2)	1 (1-2)
Time to Resumption of normal Activity (days)	10(6-16)	6(4-10)
Time to Back to Return (days)	21(12-33)	14(7-21)
ADL Score		
At 1 day	39(22-56)	50(33-67)
At 1 week	72(56-83)	83(72-94)
At 2 week	83(72-94)	94(83-100)
At 6 week	83(72-94)	94(83-100)

P<0.0001 for all comparison
ADL Denotes Activities of daily living

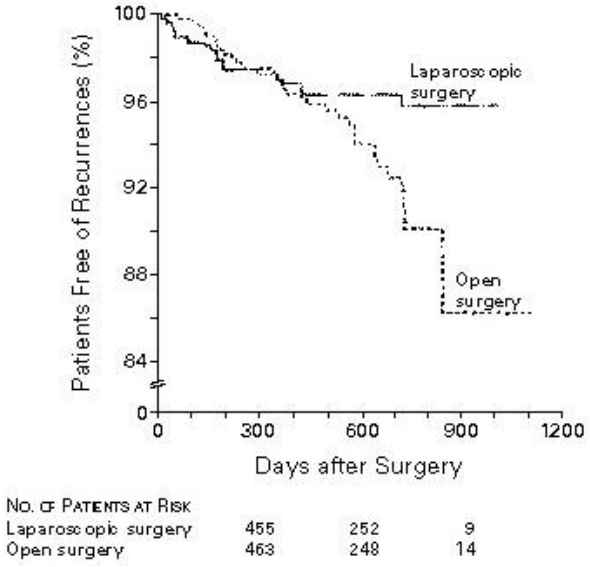
Complications and Recurrences

The median follow-up was 605 days (interquartile range, 360 to 730). Recurrences were diagnosed in 30 patients (6 percent) in the open-surgery group and 17 (3 percent) in the laparoscopic-surgery group (P = 0.05) (Figure 2). There were 11 deaths in the open-surgery group and 6 in the laparoscopic-surgery group, all of which were unrelated to the hernia operation

Among the 17 patients in the laparoscopic-surgery group who had recurrences, 10 (60 percent) were operated on by surgeons who had just begun to perform the operation independently. Six of these 10 patients were operated on by one surgeon, and 3 of his subsequent patients had recurrences. Fourteen of the 17 recurrences (80 percent) in this group occurred within the first year after surgery, whereas in the open-surgery group 15 recurrences were diagnosed during the first year after surgery, and 16 during the second year. All but 12 of the 48 patients with recurrences subsequently underwent additional surgery, at which time the recurrence was confirmed.

The difference in the rates of recurrence between the two groups was similar (P = 0.05) when the eight patients who did not undergo the assigned operation were included in the analysis.

Figure 2



Kaplan–Meier Curves for Recurrence-free Survival in the Open-Surgery and Laparoscopic-Surgery Groups.

Among the 17 patients in the laparoscopic-surgery group who had recurrences, 10 (59 percent) were

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operated on by surgeons who had just begun to perform the operation independently. Six of these 10 patients were operated on by one surgeon, and 3 of his subsequent patients had recurrences. Fourteen of the 17 recurrences (82 percent) in this group occurred within the first year after surgery, whereas in the open-surgery group 15 recurrences were diagnosed during the first year after surgery, and 16 during the second year. All but 12 of the 48 patients with recurrences subsequently underwent additional surgery, at which time the recurrence was confirmed.

The difference in the rates of recurrence between the two groups was similar (P = 0.05) when the eight patients who did not undergo the assigned operation were included in the analysis.

DISCUSSION

The results of this study indicate that patients with inguinal hernias recover more rapidly and have fewer recurrences after laparoscopic repair than after open repair. The duration of surgery was only slightly longer (five minutes) with laparoscopic repair, providing little support for the widespread belief that this procedure is more time-consuming than open surgery. Nearly all the laparoscopic operations were performed with general anaesthesia, whereas 60 percent of the open operations were performed with spinal anaesthesia. The use of general anaesthesia might be considered a disadvantage of laparoscopic repair. Nevertheless, the patients in the laparoscopic-surgery group were discharged from the hospital sooner and had less early and late postoperative pain than the patients in the open-surgery group.[8,9]

The difference in the rates of recurrence in the two groups would appear to be clinically important. With prolonged follow-up, more recurrences may be expected in the open-surgery group,and these late recurrences may be prevented only by reinforcing the groin region with additional support.A late recurrence after laparoscopic surgery may be uncommon because mesh is used routinely to reinforce the groin region from inside. The rationale for covering the defect in the abdominal wall with mesh from inside is that the repair can better withstand the pressure to which it is subjected, which originates inside the abdomen. The difference in recurrence rates in the two groups can therefore be expected to increase over time.[10]

Early recurrences in general may be caused by technical errors.All but three recurrences in the laparoscopic-surgery group occurred within one year after surgery, and in most cases, the patients had lateral hernias that had been overlooked. Insufficient lateral preperitoneal dissection, resulting in furled mesh, was another common mistake.Ten of the recurrences were in patients operated on by surgeons who had limited experience with the laparoscopic procedure, and a single surgeon was responsible for 9 of the 17 recurrences. These findings clearly illustrate the danger of underestimating the skill and experience required to master this technique.

The patients returned to work sooner after laparoscopic repair than after open repair, as reported in several smaller trials. In our study, the difference was appreciable (a median of seven days). This difference may be explained by the absence of an inguinal incision, the absence of dissection of muscle in the groin during laparoscopic repair, and the tension-free repair, as well as by the lower complication rate.[11,12]

The results of our Study laparoscopic repair of inguinal hernias should be included as a reimbursable procedure in our health care system. Given the superior results of laparoscopic repair in terms of recovery and recurrence rates over time, and with the lessons of the learning curve kept in mind, a gradual introduction of laparoscopic hernia repair on a large scale seems warranted, but only if the procedure is supervised by experienced surgeons.[13,14]

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