Surg Endosc (1999) 13: 807–810

Surgical Endoscopy
Ultrasound and
Interventional Techniques

Laparoscopic repair of recurrent hernias

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Received: 1 October 1998/Accepted: 19 November 1998

Abstract
Background: Recurrence after primary conventional inguinal herniorrhaphy occurs in approximately 10% of patients depending on the type of repair and expertise of the surgeon. The repair of the resulting recurrent hernia is a daunting task because of already weakened tissues and obscured and distorted anatomy. The failure rate of these repairs using an open anterior approach may reach as high as 36%. Because of such a high failure rate, a number of investigators have focused on repairing these difficult recurrent hernias laparoscopically using a tension-free approach. Some of the earlier reports suggested a low recurrence rate of 0.5% to 5% when a laparoscopic approach was used to repair these hernias. The purpose of this study was to evaluate the efficacy of laparoscopic treatment for recurrent hernias in our institutions.
Methods: Between February 1991 and February 1995, 96 recurrent hernias were repaired in 85 patients (78 men and 7 women). There were 48 right, 26 left, and 11 bilateral hernias. The mean age of the patients was 59 years (range, 18–86 years); the mean height was 69 in. (range, 54–77 in.); and the mean weight was 176 pounds (range, 109–280 pounds). A total of 68 herniorrhaphies were performed using the transabdominal preperitoneal (TAPP) method: 19 using intraperitoneal on-lay mesh (IPOM) repair and 8 using the total extraperitoneal (TEP) method. The method of repair in one patient was not recorded. The mean operating time was 76 min (range, 47–172 min). Thirteen patients underwent additional procedures.
Results: Long-term follow-up was performed by questionnaire, examination, or both in 76 patients (85 hernias). Median follow-up time was 27 months (range, 2–56 months). There were four recurrences (2 in IPOM and 2 in TAPP). Three of these were repaired laparoscopically and one conventionally. There were 20 minor and 14 major complications and no mortality. One conversion occurred in the TAPP group. Mean postoperative stay was 1.4 days (range, 0–4 days). It was felt by 92% of the patients that their symptoms were completely relieved, whereas 4% of the patients continued to exhibit symptoms for which their hernia was repaired, and 3.6% failed to answer. As reported, 86% of the patients preferred their laparoscopic repair; 1% preferred the conventional repair; and 13% failed to reply. Afterward, 77% of the patients returned to normal activity, and 35% returned to vigorous activity within 4 weeks of surgery. Satisfaction with laparoscopic repair was expressed by 92% of the patients, whereas 8% either were dissatisfied or did not answer. In the end, 95% of the patients stated that they would recommend laparoscopic hernia surgery to their family and friends.
Conclusions: These preliminary data show that laparoscopic repair of recurrent inguinal hernia is a safe alternative procedure with acceptable rates of recurrence and complications.

Key words: Groin—Recurrence—Hernia, inguinal prevention and control—Hernia, inguinal surgery—Surgery, laparoscopic methods

According to data from the National Center for Health Statistics, Hyattsville, Maryland, the most common surgical operation performed by general surgeons in the United States in 1991 was groin herniorrhaphy [13]. Approximately 700,000 herniorrhaphies are performed in the United States each year. This number would probably be even greater were it not that an estimated 800,000 patients decline the surgical intervention [13].

Contemporary surgical thinking dealing with inguinal herniorrhaphy has been dominated by the principles first set forth by Bassini [1], which included high ligation of the sac and reinforcement of the inguinal floor by approximating the conjoined tendon to the inguinal ligament. This ap-

Presented at the Annual Meeting of the Association of Surgeons of Great Britain and Ireland, Bournemouth, UK, April 1997; and the Sixth World Congress of Endoscopic Surgery, Rome, Italy, June 1998. Published in abstract form in the British Journal of Surgery 1997; 84 (Suppl 1): 51 (P019) and Surgical Endoscopy 1998; 12: 595 (0.472)
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Table 1. Type of hernia

Type of hernia	Number (%)
Direct	47 (49%)
Indirect	42 (44%)
Direct + indirect	4 (04%)
Direct + femoral	1 (01%)
Femoral	1 (01%)
Not recorded	1 (01%)
Total	96

Table 2. Type of herniorrhaphy

Type of repair	Right	Left	Total
TAPP	34	33	67 (70%)
TEP	4	4	8 (8%)
IPOM	10	9	19 (20%)
Converted to open	1	0	1 (1%)
Not recorded	1	0	1 (1%)
Grand total	50 (52%)	46 (48%)	96

TAPP, transabdominal preperitoneal; TEP, total extraperitoneal; IPOM, intraperitoneal onlay mesh

Table 3. Patients and operative characteristics

Patients and operative characteristics	Mean	Range
Age (year)	59	18–86
Height (in.)	69	54–77
Weight (pounds)	176	109–280
Pneumoperitoneum pressure (mmHg)	11	9–15
Blood loss (ml)	50	5–256
Operative time (min)	76	47–172

proach, however, creates a tension repair. Lichtenstein [8] popularized the concept of tension-free herniorrhaphy, which involves suturing a large polypropylene mesh to Poupart's ligament and the internal oblique muscle without tension. This mesh covers the entire myopectineal orifice. Lichtenstein's procedure resulted in a very low recurrence rate of 0.7% in his personal series [7].

In general surgical practice, however, a recurrence rate of primary inguinal herniorrhaphy requiring reoperation remains approximately 10% [16]. The repair of the resulting recurrent hernia is a daunting task because of already weakened tissues and obscured and distorted anatomy. The failure rate of these repairs using the open anterior tension-creating approach (such as that of Bassini or its modification) may reach as high as 36% [14]. Thus it is not surprising that a variety of different surgical procedures and their modifications [5, 11, 15, 26, 27, 29, 33] continue to evolve for the treatment of this common condition.

Laparoscopic herniorrhaphy [13], therefore, appears to be a logical choice for patients in whom an anterior tension-creating hernia repair has failed. This method repairs the recurrence via a virgin posterior approach that eliminates going through the anterior scarred tissue and distorted anatomy. Moreover, this approach uses the principle of tensionless repair, overlaying the entire myopectineal orifice with a large piece of mesh and thereby covering all of the potential sites of recurrences (direct, indirect, and femoral) [32].

Materials and methods

Between February 1991 and February 1995, 96 recurrent hernias were repaired in 85 patients (78 men and 7 women). There were 48 right, 26 left, and 11 bilateral hernias. Tables 1 and 2 summarize the types of hernias encountered and the types of herniorrhaphies performed. Table 3 describes the salient features of the patients and operative procedures. Thirteen patients underwent additional procedures, which included hysterectomy, tubal ligation, banding of hemorrhoids, vasectomy, hydrocelectomies, excision of bilateral gynecomastia, trocar-site hernia repairs, laparoscopic cholecystectomy, adhesiolysis, and repair of umbilical herniorrhaphy.

Results

Long-term follow-up was available by questionnaire, examination, or both in 76 patients (85 hernias). Median follow-up was 27 months (range, 2–56 months). There were four recurrences: two with the intraperitoneal on-lay mesh (IPOM) technique and two with the transperitoneal (TAPP) method. Three of these recurrences were rapaired laparoscopically and one conventionally. There were 20 minor and 14 major complications (Table 4), one conversion (in the TAPP group), and no mortality. It was felt by 92% of the patients that their symptoms were completely relieved after the laparoscopic repair. However, 4% of patients had no relief of symptoms (such as groin pain, dragging sensation, and neuralgia, which may have been caused by previous open surgery) after their laparoscopic repair, and 3.6% failed to answer this question. As reported, 86% of the patients preferred their laparoscopic repair; 1% preferred the conventional method of repair; and 13% failed to answer. Afterward, 77% of the patients returned to normal activity, and 35% returned to vigorous activity within 4 weeks of surgery, which according to the patients was much faster than with their previous open repair. Satisfaction with their laparoscopic repair was expressed by 92% of the patients, whereas 8% either were dissatisfied or did not answer. In the end, 95% of the patients stated that they would recommend laparoscopic hernia surgery to their family and friends.

Discussion

A national study in 1983 by the Rand Corporation [24] and recent data from the National Center for Health Statistics, Hyattsville, Maryland [13] revealed that approximately 10% to 15% of all the inguinal herniorrhaphies (i.e., between 50,000 and 110,000) are performed to treat recurrent hernias. According to Lichtenstein et al. [9], the actual number of recurrences may be underestimated because of (a) inadequate length of follow-up; (b) lost patients; (c) unreliable follow-up methods, especially the use of questionnaires or telephone interviews in which patients are not actually examined by the physician; (d) financial constrains for repeated physician follow-up; (e) great mobility of the population in the United States, and (f) the false assumption that patients lost to follow-up will represent the same success ratio as those described in the statistics.

Although the actual recurrence rate of recurrent hernia is

largely unknown, it is undoubtedly much higher than the rate for repair of primary hernia because of (a) distorted anatomy; (b) unsatisfactory and complicated repairs; and (c) repairs performed outside of specialist centers. The results are increasingly more difficult recurrences and worsening complications [25].

The mechanism for recurrences after conventional inguinal herniorrhaphy are numerous including (a) suture pull-through in tension-creating repairs [13]; (b) tension repairs leading to creation of new defects [28]; (c) missed hernia at the time of primary closure [4]; (d) technical errors in the repair [4, 21]; and (e) intrinsically weak floor caused by a disorder of collagen metabolism leading to delayed recurrences [6, 17–21, 31]. Therefore, to prevent recurrent hernias, the following five cardinal principles need to be followed [9]:

1. Do not depend on fascial structures to close or reinforce the defect.
2. Reinforce the entire inguinal floor irrespective of the type of hernia.
3. Avoid all tension on suture lines.
4. Avoid the use of scarred or devascularized tissue in the repair of recurrent hernias.
5. Use a large prosthetic material to reinforce the entire inguinal floor permanently.

Most surgeons do not adhere to these principles because they use the classic tension-creating anterior reparative herniorrhaphy such as Bassini's repair or its modifications, requiring the use of sutures to approximate various structures under tension such as the conjoint tendon, inguinal ligament, transversalis fascia or the like [1, 5, 11, 15, 26, 27, 29, 33]. These procedures lead to an unacceptably higher recurrence rate.

A number of surgeons recognized the poor outcome of the anterior approach and therefore introduced open tensionless posterior prosthetic hernioplasty, which requires the open preperitoneal approach of placing a large piece of mesh to cover the entire myopectineal orifice [22, 23, 29, 30, 32]. These repairs, based on the aforementioned five principles, led to a dramatic decrease in the recurrence rate to less than 3% [25]. However, the use of large incisions (inguinal, midline, or Pfannenstiel) remains a major source of morbidity in patients treated with this approach.

The contemporary laparoscopic inguinal herniorrhaphy combines the advantages of tensionless posterior prosthetic hernioplasty with the rapid rehabilitation afforded by laparoscopy because it avoids large skin incisions. Laparoscopy leads to less postoperative pain and discomfort, decreased postoperative analgesia requirements, decreased convalescence time, and earlier return to day-to-day and strenuous activity [13]. The laparoscopic method, therefore, provides an ideal way of repairing the recurrent hernias because it is associated with better patient satisfaction and cost effectiveness by virtue of earlier hospital discharge, decreased recurrence rate, and reduction in sick leave and worker's compensation that result in significant cost savings [12].

The current survey clearly showed this trend. The overwhelming majority of the patients were satisfied with their laparoscopic repairs, and a great majority of patients returned to normal activity faster than with their previous open repair. A number of factors could help to explain why patients had a shorter convalescence after their laparoscopic herniorrhaphy: (a) physician's advice (physician bias), (b) patient's perception of laparoscopic repair (patient's bias), and (c) tension-free laparoscopic repair vs. tensioned repair for the previous open herniorrhaphy (technique bias).

Table 4. Postoperative complications

	No.
Minor	
Hematoma	7 (8%)
Seroma requiring treatment	4 (5%)
Transient leg and groin neuralgia	4 (5%)
Hydrocele	2 (2%)
Swelling at umbilical and lateral port	1 (1%)
Testicular pain	1 (1%)
Urinary retention	1 (1%)
Major	
Trocar-site hernia	1 (1%)
Small bowel obstruction	1 (1%)
Leg and groin neuralgia (long term)	8 (9%)
Recurrence	4 (5%)
Total	34 (40%)

One of the most feared postoperative complications in the repair of recurrent inguinal hernias via the anterior approach is ischemic orchitis, the reported incidence of which is approximately 6% [2]. This complication occurs because of the difficulties in dissecting the hernia sac from the cord, leading to disruption of the blood and collateral supply to the testicle and cord. Therefore, anterior repairs in recurrent hernias are to be avoided, and patients should be advised to undergo the posterior approach for the repair of their recurrent hernia.

Laparoscopic (posterior) repair, therefore, represents an ideal method for these patients. In the current study, we did not encounter this complication, perhaps because of less traumatic separation of the hernia sac from the cord using laparoscopic herniorrhaphy. Furthermore, large indirect sacs were simply divided in the preperitoneal space, eliminating unnecessary and excessive dissection and thereby averting damage to the blood supply of the testicle and cord [10].

We did encounter some major complications earlier in our series (Table 4), which represent the learning curve. However, these complications now are totally eliminated because of (a) routine use of the open method of laparoscopy, (b) methodical closure of all trocar sites, and (c) better understanding of the posterior abdominal wall anatomy, especially the course of sensory nerves in the groin region [3, 12, 13].

Conclusions

Our preliminary data show that laparoscopic herniorrhaphy is a highly effective method of repairing recurrent inguinal hernias with acceptable recurrence and complication rates. Furthermore, the majority of patients prefer this repair and are satisfied with the outcome. Despite our short follow-up, however, assuming that half of all the recurrences occur in the first 2 years of repair, the projected recurrence rate at 10 years will not exceed the 5% to 7% mark. These results compare with those achieved by posterior invasive open

hernioplasty without its added morbidity of a large incision. However, multicenter prospective randomized trials are necessary to compare the merits of conventional and laparoscopic methods of herniorrhaphy for the treatment of recurrent hernias in predicting both the short- and long-term outcomes.

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