

A Prospective Comparison Between Laparoscopic and Open Inguinal Hernia Repair

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Abstract

Background: The standard groin hernia repair for many years is the open Lichtenstein technique which has been challenged by laparoscopic totally extraperitoneal repair (TEP) technique. In this study, the advantages, safety and efficacy of these two techniques are compared.

Method: Seventy-two (72) patients were randomized equally into the open Lichtenstein group and the laparoscopic TEP group. The early post-operative pain, recovery time, operative time, complications and recurrence during one year follow-up were recorded.

Results: The visual analog pain score (VAS) on day 1 was better in the TEP group than that in the Lichtenstein group (2.9 ± 1.4 vs. 3.9 ± 1.3 , $p = 0.004$). The TEP group had shorter time to return to light activity (3.0 ± 1.1 vs. 3.8 ± 1.2 days, $p = 0.003$). There was no significant difference in the proportion of patients who used opioid drugs (20% vs. 6%, $p = 0.085$), or hospital length of stay (1.1 ± 0.3 vs. 1.1 ± 0.3 days, $p = 0.696$). One recurrence was found in open group, with no statistical significance (1% vs. 0, $p = 0.455$). There were some minor complications in both groups, with no statistical significance except more groin numbness in Lichtenstein group (17% vs. 0, $p = 0.023$). The operative time was significantly longer in TEP group (55.4 ± 18.9 min vs. 45.1 ± 12.7 min, $p = 0.008$), but there was no open conversion.

Conclusion: TEP is a safe operation and superior to the Lichtenstein repair in terms of early post-operative recovery, and is associated with less groin numbness.

Keywords: Groin hernia, totally extraperitoneal repair (TEP), Lichtenstein repair

INTRODUCTION

Inguinal hernia is a common disease worldwide. Approximately 20 million groin hernias are repaired each year¹. The lifetime risk of having inguinal hernia repair has been estimated to be 27% for men and 3% for women². Once diagnosed, most inguinal hernias are operated on electively in order to treat symptoms or prevent complications.

Open groin hernia repair has shifted from tissue

repair (non-mesh) to a tension-free repair (mesh-based). Mesh repairs appear to have lower rates of recurrence³⁻⁵ and shorter recovery periods⁶⁻⁸. Among various techniques of mesh repair, the Lichtenstein repair is the most popular technique and is the current standard for inguinal herniorrhaphy⁹⁻¹⁰. However, the Lichtenstein repair is now being challenged by newer laparoscopic techniques.

Many published studies claim that laparoscopic techniques are superior to conventional open repairs

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in many respects¹¹⁻¹³. However, standard guidelines do not recommend which technique as being superior, especially for elective, primary unilateral hernia repair¹⁴.

After an initial experience performing 20 laparoscopic groin hernia repairs, we designed a study to compare the standard open Lichtenstein repair with laparoscopic repair (totally extraperitoneal hernioplasty, TEP) in groin hernia patients. The primary aim was to compare the postoperative pain and recovery time. The secondary aim was to compare operative results, including early recurrence and operative time, between the two groups, to inform clinical decision making in practice.

The present study was a randomized clinical trial of elective hernia repairs at Lampang Hospital performed between January 2012 and May 2013.

PATIENTS AND METHODS

We included patients with direct or indirect inguinal hernia, or both, who consented to joining our study. This study was approved by Lampang Hospital Research Ethics Committee. We excluded patients who had femoral, bilateral, incarcerated, very large hernias (more than 15 cm in size), and those with previous lower abdominal operations.

Patients were randomly allocated to the open or the laparoscopic repair groups, and operated on by the author. Prophylactic antibiotics were used in all cases. Patients were asked to empty the urinary bladder before operation in the laparoscopic group. Postoperative pain was managed by oral acetaminophen, 1,000 mg, as required, every 6 hours. Pethidine injection was given as needed if the pain score exceeded 4.

We performed the Lichtenstein technique according to Lichtenstein¹⁵, using 3-0 polypropylene sutures to secure the polypropylene mesh over the inguinal floor defect.

We performed the TEP technique according to McKernan¹⁶⁻¹⁷, in which three trocars were placed along the midline between the infraumbilical and suprapubic regions. Under CO₂ insufflation, we dissected the preperitoneal space from pubis to anterior superior iliac spine (ASIS), then reduced the hernia sac, and covered the inguinal floor defect with a polypropylene mesh. We fixed the mesh to Cooper's ligament medially and just above ASIS laterally. A

drain was placed if needed.

Patients' general characteristics were recorded, including sex, age, comorbid disease, maximal hernia size, and body weight. The operative time, defined as the period between the beginning of the skin incision and skin closure, and the need for open conversion were recorded. The visual analog pain score (VAS), ranging from 0 (no pain) to 10 (maximum pain), was evaluated in the morning on the day after operation. The number of patients who required opioid drugs was also recorded, as were the hospital postoperative length of stay (LOS) and the day on which the patient returned to light activity. Complications occurred were assessed and recorded on days 1 and 14, and 3 months and 1 year after operation.

Data were analyzed using STATA version 11.0. Continuous variables were compared using independent sample *t*-test and categorical variables were compared using Fisher's exact test. A *p*-value less than 0.05 was considered statistically significant.

RESULTS

Of the 87 eligible cases of elective inguinal hernia repair seen between January 2012 to May 2013, 12 patients were excluded: 6 patients due to bilateral hernia, 3 patients due to incarcerated hernia, 2 patients due to previous lower abdominal incision, and 1 patient due to very large hernia. Thus 75 patients were enrolled and randomized into 2 groups. One patient from the TEP arm and two patients from the Lichtenstein arm were lost to follow-up at the end of study (May 2014; Figure 1).

Characteristics of patients were similar in both arms (see Table 1). These included gender (overwhelming male gender), age (approximately 60 years on average), comorbid disease (seen in about a third of cases), maximal hernia size (mostly between 5 to 10 cm), side (slight right-side predominance) and body weight (approximately 55 kg on average).

Postoperative pain measured using the VAS pain score were lower in the TEP group (mean 2.9 vs 3.8, *p* = 0.004). The difference in the proportion of patients who used opioid drugs was of borderline significance (20.0% vs 5.6%, *p* = 0.085), being used more frequently in the TEP group. The postoperative length of stay (LOS) was not significantly different between the two groups (see Table 2).

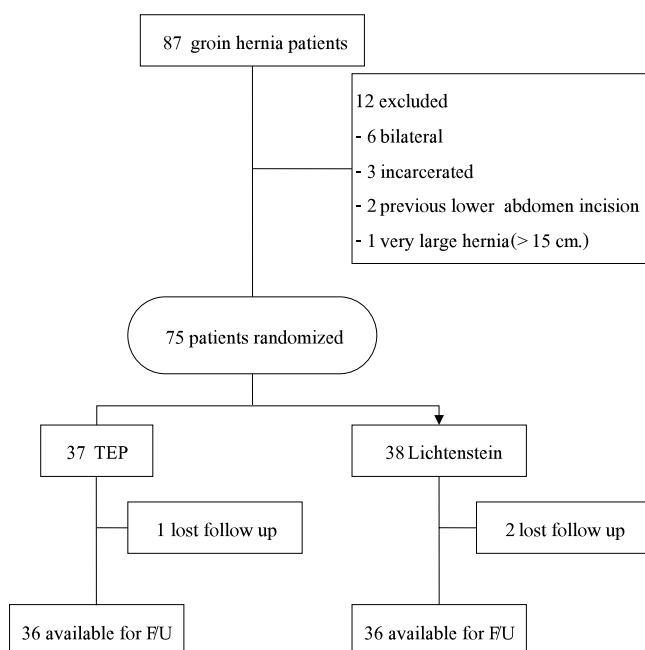


Figure 1 Flow of randomized patients

There were significantly more groin numbness in both the early phase (< 3 months after operation) and late phase (> 3 months) in Lichtenstein group (17 % vs 0%, $p = 0.023$, see Table 3). The frequency of other complications was not significantly different: these included seroma, scrotal emphysema, scrotal swelling, urinary retention requiring catheterization, persistent groin pain, and the recurrence rate at one year. There was no conversion from laparoscopic to open repair, but the operative time was significantly longer in the TEP group (mean 55.4 mins vs. 45.1 mins, $p = 0.008$)

DISCUSSION

The Lichtenstein “tension free” repair is the most effective open hernia repair in terms of recurrence rate^{3,5,18-19} and time to return to work⁶⁻⁸. Therefore, it was the most commonly performed groin hernia operation at our hospital for many years. In the era of laparoscopic surgery, the totally extraperitoneal hernia repair (TEP) seems to be superior to the transabdominal preperitoneal repair (TAPP) because of fewer complications, such as organ injury or bowel obstruction²⁰. In the present study, we compared the clinical outcomes of TEP with those of the Lichtenstein repair.

Table 1 Characteristics of patients

Variables	TEP (n = 36)	Lichtenstein (n = 36)	p-value
Male sex: n (%)	34 (94)	32 (89)	0.674
Age (y): mean ± SD (range)	59.1 ± 14.3 (16-84)	64.1 ± 14.6 (17-88)	0.147
Comorbid disease: n (%)			
no	22 (66)	23 (64)	0.864
HT	7 (19)	5 (14)	
DM	1 (3)	0 (0)	
COPD	1 (3)	1 (3)	
Other	5 (14)	7 (19)	
Hernia size: n (%)			
≤ 3 cm.	4 (11)	6 (17)	0.899
> 3, ≤ 5 cm.	10 (28)	11 (31)	
> 5, ≤ 10 cm.	19 (53)	17 (47)	
> 10, ≤ 15 cm.	3 (8)	2 (6)	
Side: n (%)			
Right	24 (66.7)	21 (58.3)	0.627
BW (kg): mean ± SD (range)	54.6 ± 9.7 (34-76)	53.6 ± 11.2 (35-88)	0.678

Table 2 Primary outcomes

Variables	TEP (n = 36)	Lichtenstein (n = 36)	p-value
VAS pain score day one (scale from 0 to 10):			
mean ± SD (range)	2.9 ± 1.4 (1-7)	3.9 ± 1.3 (1-7)	0.004
Opioid use: n (%)	7 (20.0)	2 (5.6)	0.085
Postop. length of stay day:			
mean + SD (range)	1.1 ± 0.3 (1-2)	1.1 ± 0.3 (1-2)	0.696
Day return to light activity (day):			
mean + SD (range)	3.0 ± 1.1 (2-6)	3.8 ± 1.2 (2-7)	0.003

Table 3 Operative time, complications, and recurrence

Variables	TEP (n = 36)	Lichtenstein (n = 36)	p-value
Complication: n (%)			
Day 1 - mo 3			
Early complications: seroma, scrotal emphysema, swelling, numbness & pain	29 (81)	23 (64)	0.114
3 months - 1 year			
Groin numbness	0 (0.0)	6 (17)	0.023
Recurrence	0 (0.0)	1 (1)	0.455
Operation time (min), mean ± SD (range)	55.4 ± 18.9 (30-130)	45.1 ± 12.7 (25-80)	0.008

We focused on the early post-operative period, measuring the acute post-operative pain and time to recovery because these influenced the patient's return to work. Our results showed that patients in the TEP group had significantly less postoperative pain and earlier return to light activities. These results are consistent with previous meta-analyses of similar studies^{11-13,21,22} confirming the advantage of TEP over open surgery.

Because of concerns over the safety and efficacy of laparoscopic surgery compared with open surgery, we recorded postoperative complications, operative time and recurrence up to one year. Within the relatively short follow-up time, we found no significant difference in the recurrence rate, similar to the results of previous short term follow-up (no longer than 18 months) studies^{22,23}. These results are in contrast to those of Neumayer et al²⁴ which concluded that the recurrence was significantly more common in laparoscopic group. Recent meta-analyses including longer term (> 48 months) follow-up studies also showed no significant difference in the recurrence rates of both groups²⁵⁻²⁶. Different techniques, size of mesh used, surgeon experience, and specialization might have affected the recurrence rates. Longer follow-up is necessary in our study. Although our study did not see cases of chronic groin pain (>3 months) in any group, one advantage of TEP in our study was less groin numbness, which was also noted in previous studies^{21,27}.

No serious complications of TEP such as organ or vessel injuries were found in this study. No TEP cases required open conversion. The few minor complications associated with TEP, namely, subcutaneous emphysema and seroma, all resolved within 14 days. The only disadvantage of TEP in the present study was longer operative time, similarly seen in most studies^{7,19,28}. As this is skill-related, we expect a reduction in operative time with more experience. Other disadvantages of TEP but not examined this study included the higher operative cost, and the need for general anesthesia. Also, certain patients such as those with previous lower abdominal surgery or incarcerated hernia are not suitable for TEP.

In summary, except for the longer operative time in laparoscopic hernia repair, the TEP technique was superior to the open Lichtenstein technique with respect to early postoperative pain, faster time to return to activity, and less groin numbness.

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