

Laparoscopic Totally Extraperitoneal Inguinal Hernioplasty: An Audit of the Early Postoperative Results of 100 Consecutive Repairs

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Abstract

Introduction: With the establishment of a hernia specialist service at our medical centre in 1999, laparoscopic inguinal hernia repair was offered to all patients who presented with inguinal hernias. This is a report of our early experience of 100 consecutive laparoscopic totally extraperitoneal inguinal hernioplasties. **Materials and Methods:** Between June 1999 and January 2000, a total of 82 patients with 100 inguinal hernias underwent laparoscopic totally extraperitoneal hernioplasties. The mean age of the study population was 64 ± 16 (SD) years with a male to female ratio of 79:3. A prospective evaluation and analysis of perioperative outcomes were performed. **Results:** A total of 97 laparoscopic extraperitoneal inguinal hernioplasties were successfully performed. Three patients required conversion to transabdominal preperitoneal repair because of adhesion ($n = 1$), large peritoneal defect ($n = 1$) and the presence of bowel within hernial sac ($n = 1$). There were no other intraoperative complications. Postoperative morbidity included retention of urine ($n = 4$), asymptomatic groin collection ($n = 4$) and wound bruising ($n = 2$). All complications resolved uneventfully. The visual analogue pain score at rest was 2, 1 and 1 on postoperative days 0, 1 and 2, respectively. The mean length of hospital stay was 2 ± 1 (SD) days. Forty-seven patients (57%) returned to normal activities within one week. **Conclusions:** The early outcomes of laparoscopic extraperitoneal inguinal hernioplasties were encouraging. It confirmed the early success of laparoscopic repairs of inguinal hernias at our centre. Laparoscopic approach is a safe technique for repair of inguinal hernia in specialised centres.

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Introduction

Inguinal hernia is one of the commonest surgical pathologies in the world.¹ Laparoscopic totally extraperitoneal repair has been gaining popularity in recent years. The technique of laparoscopic extraperitoneal repair has become well-established after a decade of evolution.^{2,3} The posterior approach to inguinal hernia allows an excellent exposure of the anatomical defect, which is of particular advantage in the repair of complicated or recurrent hernias.⁴ Compared to the transabdominal preperitoneal repair, the totally extraperitoneal approach does not enter the peritoneal cavity and thus avoids the development of port site hernia and bowel adhesions.

Since the establishment of a hernia specialist service at our medical centre in July 1999, laparoscopic hernia repair has been offered as a surgical option to all patients presenting with inguinal hernias. The present study was conducted to

audit the clinical outcomes of 100 consecutive laparoscopic totally extraperitoneal inguinal hernioplasties.

Materials and Methods

Between June 1999 and January 2000, 236 inguinal hernia repairs were performed on 210 patients. A total of 82 patients with 100 inguinal hernias underwent laparoscopic totally extraperitoneal inguinal hernioplasties. Selection criteria for laparoscopic inguinal hernioplasty included reducibility of the inguinal hernia and medical fitness for general anaesthesia. Patients who opted for day case hernia repair or had a history of lower abdominal surgery were also excluded from laparoscopic inguinal hernioplasty. A prospective collection and analyses of data were performed. All the demographic features and perioperative outcomes, including operative duration, number of conversion of the procedure and intraoperative complications, were

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documented. Hernia types were determined intraoperatively according to the Nyhus classification.⁵

All the operations were performed by the same surgical team. Patients were operated in a supine Trendelenburg's position under general anaesthesia. Urinary catheter was not employed. A transverse sub-umbilical incision was made to expose the anterior rectus sheath on the side of inguinal hernia. Division of the anterior rectus sheath exposed the rectus muscle, which was retracted laterally. A 10-mm blunt-end trocar was then inserted into the preperitoneal space and insufflated with carbon dioxide to a pressure of 10 mmHg. Another 13-mm re-usable trocar port was placed at midline, about 8 cm from the pubis. Extraperitoneal space was dissected and created by endoscissors with diathermy. Balloon dissection was not utilised. A 5-mm re-usable trocar was inserted at the anterior axillary line, 4 to 6 cm proximal to the anterior superior iliac spine. The hernial sac was then dissected and reduced. For direct inguinal hernia, the attenuated transversalis fascia was routinely inverted and stapled to the Cooper's ligament. It was followed by parietalisation of the spermatic cord for a distance of 3 to 4 cm long. A prolene mesh of 10 x 14 cm² (Prolene® Mesh, Ethicon Ltd, Somerville, NJ, USA) was introduced and anchored to the Cooper's ligament, rectus muscle and transversus abdominis muscles with endo-stapler (Multifire Endo Hernia 0°, US Surgical Corporation, Norwalk, USA). All wounds were infiltrated with 10 mL of 0.5% marcaine before closure.

Patients were allowed to resume normal diet and normal activities immediately after operation. All patients were prescribed with oral propoxyphene 50 mg and paracetamol 325 mg 4 times daily upon request. Severity of pain at rest and on coughing was assessed by a visual analogue pain score on a scale from 0 to 10 daily after operation. Patients were discharged once they could walk comfortably. Length of hospital stay referred to the total number of nights spent in hospital after operation.

All patients had follow up at our Hernia Clinic 1 week after discharge. Length of convalescence required to return to normal activities was documented. Subsequent follow-ups were scheduled at 2 to 4 months during the first year. All complications were recorded and any clinical recurrence was documented during follow-ups. Part of the early outcomes of the first 32 patients were reported in another article.⁶

Statistical analysis was performed with the help of computer software (SPSS/PC+ 7.0, SPSS, Chicago, Illinois, USA). Values were expressed as mean $\pm$ standard deviation (SD).

Results

A total of 100 laparoscopic totally extraperitoneal inguinal

hernioplasties were performed in 82 patients. The ages of the study population ranged from 23 to 87 years with a mean age of 64 ± 13 (SD) years. There were 79 men and 3 women. The types of hernias are shown in Table I.

TABLE I: TYPES OF THE INGUINAL HERNIAS

	No. of patients (n = 82)
Unilateral	64
Bilateral	18
Hernia anatomy*	
II	32
IIIA	39
IIIB	18
IVA	4
IVB	5
IVC	1
IVD	1

* Nyhus classification⁵

There were no intraoperative complications or hospital mortality. Three procedures (3%) were converted to transabdominal preperitoneal repairs because of adhesions (n = 1), large peritoneal defect (n = 1) and the presence of bowel within the hernial sac (n = 1). None of the patients required conversion to open operation. The mean length of operation time for unilateral and bilateral inguinal hernias was 79 ± 29 (SD) minutes and 138 ± 43 (SD) minutes, respectively. With the improvement of skills and experience, the operative duration has gradually shortened to less than an hour for most unilateral laparoscopic inguinal hernioplasties.

Postoperative complications included retention of urine (n = 4), asymptomatic groin collection (n = 4) and wound bruising (n = 2), giving to a morbidity rate of 12%. Temporary urinary catheterisation was required in the 4 patients with retention of urine. All these patients (n = 4) passed urine well after removal of the Foley catheter 2 days later. Figure 1 shows the mean visual analogue pain scores at rest and on coughing after operation. Seventeen patients (20%) did not require any analgesia during the postoperative period. The mean length of hospital stay (n = 82) was 2 ± 1 (SD) days.

Follow-up ranged from 1 week to 6 months with a mean follow-up of 5 weeks. All groin collections and wound bruising resolved spontaneously. Forty-seven patients (57%) returned to normal activities within 1 week. No clinical recurrence or neuralgia was detected in any patients during follow-ups.

Discussion

Our early experience of laparoscopic totally extra-

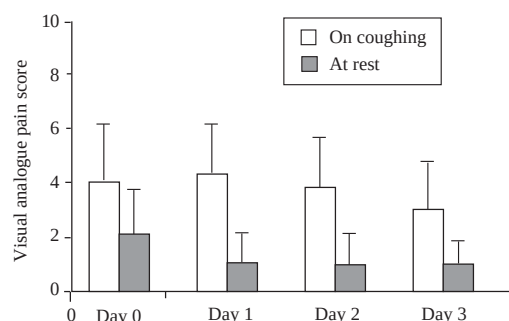


Fig. 1. Postoperative visual analogue pain scores (mean $\pm$ standard deviation) at rest and on coughing after operation.

peritoneal inguinal hernioplasties was encouraging.⁷ Our series carried a low perioperative morbidity rate and all the complications were minor. Three patients required conversion to transabdominal preperitoneal repair but none of the patients required conversion to open procedures. In the presence of adhesions or complicated hernias, a transabdominal approach allows a better delineation of anatomy and provides a greater working space.⁸⁻¹⁰

Appropriate selection of patients is a prerequisite for a successful outcome. Most reported bowel and urinary bladder perforations happened in patients with previous lower abdominal surgery.¹¹ Previous lower abdominal surgery was therefore considered a contra-indication for laparoscopic extraperitoneal repair.

The clinical outcome of hernia repair appears to be surgeon dependent.^{12,13} Adequate training with a sound knowledge of the inguinal anatomy from the inside is pivotal to the safe performance of laparoscopic repair. In the present series, we have not encountered any major vascular or visceral injuries. Placement of all trocar ports were achieved by open dissection techniques. Sharp instruments were avoided whenever feasible.

Expensive equipment has been an obstacle to the early development of laparoscopic hernia repair.¹⁴ To reduce the cost of the operation, we have modified our technique with the utilisation of re-usable trocars. The current cost of a disposable trocar is US\$100. Ferzli et al¹⁵ reported comparable recurrence rates in 100 laparoscopic extraperitoneal inguinal hernioplasties with stapled and unstapled mesh at 1 year. This proved that stapling might not be necessary if the mesh was large enough with adequate overlap of the musculo-aponeurotic defect in selected patients. A significant savings of US\$120 was achieved in each patient without the use of hernia stapler. However, we are still anchoring the mesh with staples to prevent migration.

Our findings showed that the postoperative pain scores of patients following laparoscopic repair were low. It was

remarkable that about 20% of our patients did not consume any analgesics after operation. Most patients, even after bilateral inguinal hernia repairs, could ambulate comfortably soon after operation.¹⁶ A number of prospective randomised studies had shown a faster recovery in patients following laparoscopic repairs compared with those after conventional open repairs.¹⁷⁻¹⁹ Reduced postoperative pain and a short period of convalescence are the main benefits of minimally invasive repair of hernia. As a result of the large volume of hernia repairs, early return to work also carries significant economic implication to the society. Both Heikkinen et al²⁰ and Liem et al²¹ demonstrated a lower cost for the society with the endoscopic repairs compared to conventional open herniorrhaphies in working patients.

Owing to the short follow-up period, the long-term outcome of our patients, with regard to recurrence rate, remains to be established. Liem et al¹⁷ reported a lower recurrence rate in patients after laparoscopic repairs (3%) than those following open repairs (6%) with a median follow-up of 607 days. Most recurrences of laparoscopic repair occurred within the first year of operation and were mainly due to technical errors. In contrast, recurrence in open repair often happens later within the first 5 years after repair. However, in a recent meta-analysis of 14 randomised controlled trials of laparoscopic and open repairs of inguinal hernias, the recurrence rates of both operative techniques were similar.²²

Laparoscopic repair of inguinal hernia has been successfully implemented in the day care setting in a number of overseas centres.^{23,24} With acquisition of experience and technical skills, we anticipate the introduction of laparoscopic hernioplasty in our ambulatory surgery service in the near future.

In conclusion, our findings confirmed the early success of laparoscopic totally extraperitoneal repair of inguinal hernias at our centre. Laparoscopic totally extraperitoneal inguinal hernioplasty is a safe alternative to conventional inguinal herniorrhaphy.

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REFERENCES

1. Rutkow I M. Epidemiologic, economic, and sociologic aspects of hernia surgery in the United States in the 1990s. *Surg Clin North Am* 1998; 78:941-51.
2. Ferzli G, Kiel T. Evolving techniques in endoscopic extraperitoneal herniorrhaphy. *Surg Endosc* 1995; 9:928-30.

3. Ferzli G, Sayad P, Huie F, Hallak A, Usal H. Endoscopic extra-peritoneal herniorrhaphy. A 5-year experience. *Surg Endosc* 1998; 12:1311-3.
4. Patino J F, Garcia Herreros L G, Zundel N. Inguinal hernia repair. The Nyhus posterior preperitoneal operation. *Surg Clin North Am* 1998; 78:1063-74.
5. Nyhus L M. Individualization of hernia repair: a new era. *Surgery* 1993; 114:1-2.
6. Lau H, Lee F, Patil N G, Yuen W K. Early outcomes of laparoscopic totally extraperitoneal hernia repair versus open tension-free mesh hernioplasty. *Asian J Surg* 2000; 23:244-8.
7. Aeberhard P, Klaiber C, Meyenberg A, Osterwalder A, Tschudi J. Prospective audit of laparoscopic totally extraperitoneal inguinal hernia repair: a multicenter study of the Swiss Association for Laparoscopic and Thoracoscopic Surgery (SALTC). *Surg Endosc* 1999; 13:1115-20.
8. Felix E L, Harbertson N, Vartanian S. Laparoscopic hernioplasty: significant complications. *Surg Endosc* 1999; 13:328-31.
9. Cohen R V, Alvarez G, Roll S, Garcia M E, Kawahara N, Schiavon C A, et al. Transabdominal or totally extraperitoneal laparoscopic repair? *Surg Laparosc Endosc* 1998; 4:264-8.
10. Felix E L, Michas C A, Gonzalez, M H Jr. Laparoscopic hernioplasty. TAPP vs TEP. *Surg Endosc* 1995; 9:984-9.
11. Heithold D L, Ramshaw B J, Mason E M, Duncan T D, White J, Dozier A F, et al. 500 total extraperitoneal approach laparoscopic herniorrhaphies: a single institution review. *Am Surg* 1997; 63: 299-301.
12. Rattner D W. Inguinal herniorrhaphy: for surgical specialists only? *Lancet* 1999; 354:175-6.
13. Brooks D C. Laparoscopic herniorrhaphy: where are we now? *Surg Endosc* 1999; 13:321-2.
14. Ooi L L, Koh J, Mack P O P. Laparoscopic hernia repair in Singapore—views from a cross-section of surgeons. *Ann Acad Med Singapore* 1995; 25:643-5.
15. Ferzli G S, Frezza E E, Pecoraro A A, Ahern K D. Prospective randomized study of stapled versus unstapled mesh in a laparoscopic preperitoneal inguinal hernia repair. *J Am Coll Surg* 1999; 5:461-5.
16. Knook M T, Weidema W F, Stassen L P, Boelhouwer R U, van Steensel C J. Endoscopic totally extraperitoneal repair of bilateral inguinal hernias. *Br J Surg* 1999; 86:1312-6.
17. Liem M S, van der Graaf Y, van Steensel C J, Boelhouwer R U, Clevers G J, Meijer W S, et al. Comparison of conventional anterior surgery and laparoscopic surgery for inguinal-hernia repair. *N Engl J Med* 1997; 336:1541-7.
18. The MRC Laparoscopic Groin Hernia Trial Group. Laparoscopic versus open repair of groin hernia: a randomised comparison. *Lancet* 1999; 354:185-90.
19. Juul P, Christensen K. Randomized clinical trial of laparoscopic versus open inguinal hernia repair. *Br J Surg* 1999; 86:316-9.
20. Heikkinen T J, Haukipuro K, Hulkko A. A cost and outcome comparison between laparoscopic and Lichtensein hernia operations in a day-case unit. A randomized prospective study. *Surg Endosc* 1998; 12:1199-203.
21. Liem M S, Halsema J A, van der Graaf Y, Schrijvers A J, van Vroonhoven T J. Cost-effectiveness of extraperitoneal laparoscopic inguinal hernia repair: a randomized comparison with conventional herniorrhaphy. Coala trial group. *Ann Surg* 1997; 226:668-76.
22. Chung R S, Rowland D Y. Meta-analyses of randomized controlled trials of laparoscopic vs conventional inguinal hernia repairs. *Surg Endosc* 1999; 13:689-94.
23. Fitzgibbons R J, Camps J, Cornet D A, Nguyen N X, Litke B S, Annibali R, et al. Laparoscopic inguinal herniorrhaphy. Results of a multicenter trial. *Ann Surg* 1995; 221:3-13.
24. O'Riordain D S, Kelly P, Horgan P G, Keane F B, Tanner W A. Laparoscopic extraperitoneal inguinal hernia repair in the day-care setting. *Surg Endosc* 1999; 13:914-7.