

Laparoscopic recurrent inguinal hernia repair during the learning curve: it can be done?



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Umberto Bracale^{*/***}, Antonio Sciuto^{**}, Jacopo Andreuccetti^{***}, Giovanni Merola^{*/***}, Leandro Pecchia[°], Paolo Melillo^{°°}, Giusto Pignata^{***}

^{*}Department of Surgical Specialities and Nefrology, University Federico II, Naples, Italy

^{**}Department of General Surgery, Monaldi Hospital A.O.R.N. dei Colli, Naples, Italy

^{***}General and Laparoscopic Surgical Unit, San Camillo Hospital, Trento, Italy

[°]School of Engineering University of Warwick, UK

^{°°}Multidisciplinary Department of Medical, Surgical and Dental Sciences, Second University of Naples, Italy

Laparoscopic recurrent inguinal hernia repair during the learning curve: it can be done?

AIM: Trans-Abdominal Preperitoneal Patch (TAPP) repairs for Recurrent Hernia (RH) is a technically demanding procedure. It has to be performed only by surgeons with extensive experience in the laparoscopic approach. The purpose of this study is to evaluate the surgical safety and the efficacy of TAPP for RH performed in a tutoring program by surgeons in practice (SP).

MATERIAL AND STUDY: All TAPP repairs for RH performed by the same surgical team have been included in the study. We have evaluated the results of three SP during their learning curve in a tutoring program. Then these results have been compared to those of a highly experienced laparoscopic surgeon (Benchmark). Results: A total of 530 TAPP repairs have been performed. Among these, 83 TAPP have been executed for RH, of which 43 by the Benchmark and 40 by the SP. When we have compared the outcomes of the Benchmark with those of SP, no significant difference has been observed about morbidity and recurrence while the operative time has been significantly longer for the SP. No intraoperative complications have occurred.

DISCUSSION: International guidelines urge that TAPP repair for RH has to be performed only by surgeons with extensive experience in the laparoscopic approach. The results of the present study demonstrate that TAPP for RH could be performed also by surgeons in training during a learning program.

CONCLUSIONS: We retain that an adequate tutoring program could lead a surgeon in practice to perform more complex hernia procedures without jeopardizing patient safety throughout the learning curve period.

KEY WORDS: Laparoscopy, Learning Curve, Recurrent Hernia

Introduction

Inguinal hernia repair is one of the top three operations in most western countries ^{1,2}. Laparoscopic hernia repair (LHR) may offer significant benefits in terms of postoperative pain and recovery compared to open hernia repair (OHR) ³.

LHR is recommended if a quick postoperative recovery is required, especially, for bilateral hernias.

Several studies have demonstrated the advantage of laparoscopic approach for recurrent hernia (RH) repair after a primary anterior approach, and LHR is currently recommended by International Societies to treat these hernias ⁴.

However LHR is still considered a difficult surgical procedure and endoscopic repair of RH is even more technically demanding and time-consuming. Consequently, it is generally recommended that LHR for RH should only be performed by surgeons with extensive experience in the laparoscopic approach ^{3,4}.

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Correspondence to: Umberto Bracale MD Ph.D, Department of Surgical Specialities and Nefrology, University "Federico II", Via Pansini 5, 80131 Naples, Italy (e-mail: umbertobracale@gmail.com)

TAPP: Transabdominal Preperitoneal Repair
 TEP: Totally Extraperitoneal Repair
 LHR: Laparoscopic hernia repair
 OHR: Open Hernia Repair
 EHS: European Hernia Society
 BMI: Body Mass Index
 SP: Surgeon in Practice

The purpose of this study is to evaluate the surgical safety and the efficacy of LHR for RH performed in a tutoring program by surgeons in practice (SP) in a general surgical department of a community hospital.

Material and Method

All the Trans-Abdominal Preperitoneal Patch (TAPP) repairs for RH performed by the same surgical team at the General and Laparoscopic Surgical Unit between June 2007 and June 2012 have been included in the present study. The surgical unit was not focused on hernia repair, but on performing all types of abdominal surgery except transplantation.

Details of all the patients admitted and relative procedures were entered prospectively into a database. Intraoperative and postoperative data were recorded. Patient follow-up was conducted through outpatient visits at 1 week, 30 days, 1 year and then annually after surgery. We evaluated the results of three SP during their learning curve in a tutoring program. These results were compared to those of a highly experienced laparoscopic surgeon (Benchmark). Before the inclusion of cases in the study, all the SP had the same experience of 25 camera assistances at TAPP procedures. Moreover, they completed at least 10 times each of the following surgical steps: medial compartment dissection, mesh placement and fixation, peritoneal flap closure and dissecting of hernia sac. Finally, they had performed 10 TAPP repair for not-complex primary inguinal hernias (PM1 - PM2 and PL1 - PL2 according to European Hernia Society Classification ⁵). A video session was weekly programmed to analyze the surgical procedures. All the TAPP repairs were performed with a standardized surgical technique

under the supervision of the Benchmark who had an experience of more than 1000 LHR procedures.

SURGICAL TECHNIQUES

All the procedures were carried out under general anesthesia and with urinary catheter. All patients received an intraoperative antibiotic dose. Trans-umbilical incision was carried out and three trocars (10 and 5 mm) were used with a 30° scope. After trocars placement, in the Trendelenburg position, all the defects were evaluated according to the EHS classification ⁵. All the anatomic landmarks (urinary bladder, pubis, umbilical artery, ductus deferens, spermatic and iliac vessels, triangles of pain and doom) were identified. The preperitoneal space was opened incising the peritoneum transversely from the region of the umbilical artery laterally to the hernia defect. The dissection was conducted into the Retzius and Bogros (retroinguinal) spaces. The anatomical landmarks (epigastric vessels, Cooper and Gimbernat ligaments, the corona mortis and external iliac vessels) had to be identified and well exposed. The sac dissection was carried out carefully safeguarding the spermatic fascia and protecting the fragile parietal structures. A complete peritoneal dissection of the medial compartment as well as of the peritoneum cranially to mid-psoas was carried out. An unsplitted 15 x 10 cm semiresorbable mesh (Ultrapro Ethicon, a Johnson & Johnson company, Amersfoort, The Netherlands) was fixed with 2 ml of fibrin glue (Tisseel/Tissucol, Baxter Healthcare, Deerfield, IL, USA). The peritoneum was closed with a running suture. All patients started to drink in the evening after catheter removal. Normally they were discharged between the first and the second postoperative days.

STATISTICS

Statistical analysis was performed using the SPSS® statistical software program (SPSS version 20; Chicago, IL, USA). The Chi-square test for categorical variables and Student's test for continuous variables were used to test significance or differences between the groups. A *p-value* ≤ 0.05 was considered statistically significant.

TABLE I - Study group characteristics

	Benchmark	SP	<i>p-value</i>
Patients, n	39	37	
Recurrent Hernias, n	43	40	
Hernias operated in Men, n	39	37	
Hernias operated in Women, n	4	3	
Age, years, mean ± <i>sd</i> (Range)	61.2 ± 12.3 (32-78)	58.0 ± 11.8 (22-78)	0.255
Body mass index, kg/m ² , mean ± <i>sd</i> (Range)	28.8 ± 3.2 (23-40)	29.8 ± 4.1 (22-40)	0.247

Results

A total of 530 TAPP repairs were performed on 341 patients from June 2007 to June 2012.

Among these, 83 TAPP were conducted for RH, of which 43 by the Benchmark and 40 by the SP. The median follow-up was 46 months (range 24 - 72). Two patients were lost at 2-year follow-up (2.4%). Patient characteristics are listed in Table 1. No significant differences were observed between the two groups about age, sex, body mass index (BMI). The distribution of hernia types according to the EHS classification is reported in Table II⁵.

In the 43 TAPP procedures performed by the Benchmark, the mean operation time was 54.2 min. The postoperative morbidity rate was 7% and the recurrence rate was 2.3%. When we compared these results to those of SP (Table III), no significant difference was observed between the Benchmark and SP in morbidity (7% versus 7.5%, $p = 0.927$) and recurrence (2.3% versus 2.5%, $p = 0.959$). In contrast, the operative time was significantly longer for the SP ($p = 0.003$). No intraoperative complications occurred. Postoperative complications were four seromas, one scrotal haematoma and one umbilical scar infection.

TABLE II - Distribution of recurrent hernias according to the EHS² classification

Type	Benchmark	SP	Total
RL0M1F0	2	3	5
RL0M2F0	24	10	34
RL0M2F1	1	1	2
RL0M3F0	6	0	6
RL1M0F0	1	7	8
RL2M0F0	9	15	24
RL2M1F0	0	1	1
RL2M2F0	0	1	1
RL3M0F0	0	2	2
TOTAL	43	40	83

¹European Hernia Society

TABLE III - Comparison of the overall results

	Benchmark n = 43	SP n = 40	p-value
Recurrence, n (%)	1 (2.3%)	1 (2.5%)	0.959
Morbidity, n (%)	3 (7.0%)	3 (7.5%)	0.927
Operation time, min, mean $\pm$ sd (range)	54.2 $\pm$ 14.1 (24-85)	67.3 $\pm$ 23.7 (23-122)	0.003

Discussion and Comments

LHR has shown significant benefits in comparison with OHR, such as less postoperative pain, shorter postoperative course and lower incidence of wound infection and chronic pain^{1, 6-8}. According to the EHS guidelines, LHR is recommended for the treatment of bilateral and recurrent hernias, especially in women and in those patients who require an earlier return to normal activities¹. Concerning the type of laparoscopic approach, both TAPP and TEP have achieved similar outcomes⁹. Another approach for inguinal hernia repair could be the laparoscopic IPOM repair¹⁰. However, despite the lower procedure time, IPOM technique is not recommended as burdened by a high recurrence rate.

Also LHR has some drawbacks such as longer operation time, higher hospital costs^{11,12} and the need for general anesthesia. LHR requires experienced laparoscopic skill and an adequate knowledge of anatomic landmarks, which are totally different from those of the anterior approach. For this reason, specific training and longer learning curve are required for LHR^{3,13}. The learning curve has been defined according to the number of procedures required to stabilize operative time and complication rates¹⁴. Some studies have evaluated the learning curve also by studying the conversion rate or the incidence of recurrence. A learning curve of at least 50 TAPP procedures has been reported for a general surgeon in a community practice¹⁴. The number of 250 procedures, reported in the VA trial, has been criticised because of several reasons (learning curve effect, size of the mesh)³.

Several factors are thought to influence the learning curve for LHR. First, the institutional experience in laparoscopic surgery is important. In our department, LHR is well established into daily routine practice, although the unit is not dedicated to abdominal wall surgery. Second, the performance of LHR requires a sound knowledge of the pelvic anatomy and the operative steps. Standardization of technique, experience as camera assistant in LHR as well as a stepwise learning are essential for this purpose¹⁵. Third, the presence, the quality and the extent of the supervision have been reported to influence the outcome during the learning curve period. The supervision has a great importance in laparoscopic procedures, since the attending surgeon and trainee see the same operative field in the same perspective. Moreover, the guidance of an experienced surgeon may anticipate many pitfalls or preventing intraoperative complications. Moreover, the tutor can supervise whether the technique follows the standardized protocol, contributing to reduce postoperative morbidity and recurrence rate^{16,17}. Bokeler et al.¹⁵ have demonstrated that, given these preconditions, the TAPP learning curve of young trainees is not related to higher complications and the recurrence rate, but only to the operative time.

Our study is focused on the effects of training and supervision on the clinical outcomes of LHR for RH. This

is generally considered as a more complex procedure than a primary hernia repair. Consequently, international guidelines have recommended that LHR for RH have only to be performed by surgeons with extensive experience in the laparoscopic approach³. However, the results of the present series demonstrate that LHR for RH could be performed also by surgeons in training during a learning program. Indeed the high institutional experience, the standardization of technique and an adequate supervision have allowed satisfactory clinical outcomes in our series.

In terms of surgical morbidity, SP have had similar rate compared to the Benchmark. The most frequent complication has been the seroma, which represents a common problem after LHR. Also the recurrence rate has been similar between the two groups and consistent with that reported in the literature^{4,18}. In the same way, no intraoperative complications and conversion to open surgery have occurred.

In contrast, our results would show that LHR for RH during the learning curve, despite the supervision, represents a time consuming procedure. This should not lead to conclude that the procedure is not still safe and effective. For the learning curve of other complex procedures, some authors have reported that the operative time failed to decrease with experience and a shorter time was not associated to better results¹⁹. Moreover, the use of operative time as the only indicator for surgical performance might be inadequate²⁰⁻²³.

There are some limitations in our study. First, the number of surgeons involved in this retrospective analysis is small. Second, it should be proved that equally laparoscopy-skilled surgeons are not able to achieve similar results without supervision.

Conclusions

In conclusion, we retain that an adequate tutoring program could lead a surgeon in practice to perform more complex hernia procedures without jeopardizing patient safety throughout the learning curve period.

Riassunto

INTRODUZIONE: L'ernioplastica laparoscopica trans-addominale preperitoneale (TAPP) per ernia recidiva (RH) è una procedura tecnicamente impegnativa. Le Linee Guida Internazionali raccomandano che questa procedura sia eseguita solo da chirurghi con elevata esperienza nell'approccio laparoscopico. Lo scopo di questo studio è quello di valutare la sicurezza chirurgica e l'efficacia della TAPP per RH eseguita nell'ambito di un programma di tutoraggio da chirurghi non esperti (CnE). **MATERIALE E METODO:** Tutte le procedure TAPP per RH effettuate dalla stessa équipe chirurgica sono state incluse

nello studio. Abbiamo valutato i risultati di tre CnE durante la loro curva di apprendimento nell'ambito di un programma di tutoraggio. Questi risultati sono stati confrontati con quelli di un chirurgo laparoscopico con elevata esperienza in chirurgia laparoscopica (benchmark). **RISULTATI:** Sono state eseguite in totale 530 TAPP. Di queste, 83 sono state eseguite per RH, di cui 43 da parte del Benchmark e 40 dai CnE. Quando abbiamo confrontato i risultati del benchmark con quelli dei CnE, nessuna differenza significativa è stata riscontrata in termini di morbidità e recidiva. Al contrario, il tempo operatorio è risultato significativamente aumentato per i CnE. Non si sono verificate complicanze intraoperatorie.

DISCUSSIONE: Le linee guida internazionali raccomandano che la TAPP per RH debba essere eseguita solo da chirurghi con una vasta esperienza nell'approccio laparoscopico. I risultati del presente studio dimostrerebbero che la TAPP per RH può essere eseguita anche da chirurghi non esperti nella procedura, durante un programma di tutoraggio ben strutturato.

In conclusione, riteniamo che un adeguato programma di tutoraggio e supervisione potrebbe permettere ad un chirurgo privo di una elevata esperienza in chirurgia laparoscopica, di eseguire TAPP più complesse (come sono quelle per ernia recidiva) senza compromettere la sicurezza del paziente durante tutto il periodo di apprendimento.

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