

Research Article

Laparoscopic anterior abdominal wall hernia repair during the learning curve

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Abstract: Learning curve in minimally invasive procedures is initially steep and reaches a plateau only after a while. A Cohort study was conducted in National Ribat University Hospital, Khartoum, Sudan (May 2013 — April 2015), to determine the learning curve (number of operations required) for laparoscopic anterior abdominal wall hernia repair. It included all consecutive patients with anterior abdominal wall hernia that treated laparoscopically. Outcome measures included the number of operations required to decrease operative time to a steady level and to lessen complication rates. Twenty patients were included; inguinal, and ventral hernias in 14 (70%) and 6 (30%) patients respectively. Study showed that the mean operative time and hospital stay were 72.8 ± 27.02 minutes and 20.7 ± 12.9 hours respectively. Operative time was decreased gradually and became steady after 13 cases ($P=0.007$), and not affected by the type of operation ($P=0.01$). No postoperative complications were detected. In conclusion the learning curve for laparoscopic anterior abdominal wall hernia repair in the hands of a general surgeon who is experienced in open herniorrhaphy and laparoscopic cholecystectomy is around 20 operations.

Keywords: Laparoscopic repair; Ventral hernia; Inguinal hernia; Outcome; Learning curve.

INTRODUCTION

Learning curve in minimally invasive surgical procedures may be defined by the number of operations required for operating time and complication rates to become stable, but to date there are no published data confirming the length of the learning curve for this procedure [1].

Inguinal hernia repair is one of the most common operations around the world [2]. Laparoscopic hernia repair rapidly gained popularity [3] and has become an alternative to the conventional open procedure [4]. More studies validated its feasibility, safety, and efficacy. Similarly, incisional hernias are common that can occur with 2% to 20% of abdominal procedures. In addition, 5% of the general population has an umbilical or epigastric hernia, making ventral hernia repair one of the most commonly performed surgical procedures [3].

Transabdominal preperitoneal repair (TAPP) for groin hernia using a synthetic mesh was introduced by Arregui and Dulucq in 1991 [5]. As well, laparoscopic ventral hernia repair (LVHR) with intra-peritoneal mesh was first described by LeBlanc and Booth in 1993 [6,7].

Some surgeons prefer to fix the mesh with only tackers without any transfacial sutures. These

surgeons found reduction of operative time, avoidance of parietal vascular injuries, decreased post-operative pain and maintained a similar recurrence rate [6]. On the other hand, TAPP repair is a technically demanding laparoscopic technique but, once mastered, is safe and effective with a high degree of patient satisfaction [8].

The study aimed to present our two year experience with laparoscopic abdominal wall hernia repair (LAWH) and to obtain a more exact measure of the learning curve for such procedure.

PATIENTS AND METHODS

Study design

This was COHORT study with follow-up 1 to 6, and 12 months from hernia repair.

Setting

The study was conducted in National Ribat University hospital, Khartoum, Sudan, between May 2013 – April 2015. The participating surgeon had a new experience with the laparoscopic hernia repair (practice is not limited to anterior abdominal wall hernia repair or laparoscopy).

Participants

Eligibility criteria were patients with their age equal or greater than 12 years with anterior abdominal wall hernia without contraindication for laparoscopic

surgery were given the choice of laparoscopic repair or open repair. Those opted for laparoscopic repair were included in the study.

Hernias were obvious on physical examination; no operations were done for groin pain in the absence of a palpable hernia. Exclusion criteria were: patients with hernia other than anterior abdominal wall, and non-residents due to expected difficulty in follow-up.

Surgical technique

Laparoscopic technique

All patients lie in a supine position, and under general anesthesia. Prophylactic second generation cephalosporin was given on induction for anesthesia. Operative table was adjusted in appropriate way after positioning the ports. A pneumoperitoneum with the intra-abdominal pressure of 13 mm Hg was reached by using a Verres needle through the umbilical in all groin hernias and with a lateral opening (Hasson technique-10 mm port) in ventral hernias, then the intraabdominal cavity explored after insertion of the 30⁰ telescope.

Inguinal hernia

After pneumoperitoneum, 10 mm trocar in the supraumbilical position was inserted for camera. Two trocars (5 and 10mm) are inserted lateral to the camera port following diamond base triangle rule basic, peritoneum was opened at line joining the anterior superior iliac spine and pubic tubercle. Cavity underneath peritoneum was undermined, and mesh placed posterior to the peritoneum and anterior to the internal ring of the inguinal canal. Finally mesh fixed in place using tucker at the upper margin only leaving the lower part supported by placement of the peritoneum back to its original position using suture material.

Ventral hernias

After pneumoperitoneum, two 5 mm trocars were inserted proximally and distally at the same level as the lateral trocar. Hernia content was reduced. In case of incarcerated, sac content was reduced, and lysis of adhesions undertaken to clear the hernia ring. Prosthetic dual mesh is then secured in an intraperitoneal fashion with transfascial fixation sutures placed at 3, 6, 9, and 12 O'clock positions and tacks were arranged in two circular rows at 2 cm distance between each tow tacks forming outer crown with the edge of the mesh and inner midway between the edge of the mesh and the edge of the hernia ring. Tacks are then placed in between the sutures at 1-cm intervals. If a large hernia was encountered, further transfascial sutures were placed in order to secure the mesh.

Outcome measures

- The duration of surgery was considered to be the time from skin incision to skin closure.

- The length of stay in hospital was defined as the total number of hours spent in hospital after the operation.
- The patients were followed up regularly for detection of chronic pain, port site infection, and recurrence at the outpatient hernia clinic. We attempted to contact patients that lost to follow-up by telephone, but if we were unable to reach them, we excluded them from the analysis.

Ethics and informed consent

The final protocol was approved by the Ethics Committees of SMSB. Informed written consent was obtained from all patients before inclusion in the study.

Statistical analysis

We compared the demographic characteristics and postoperative data using the independent Student t tests. Continuous data were reported as means (and standard deviations [SD]). All data collected were analyzed using SPSS version 21.0. We considered results to be significant at $p < 0.05$.

RESULTS

Demographic

A single surgeon performed 26 laparoscopic anterior abdominal wall hernia repairs. Six patients were lost follow up, so were excluded from the study.

A total of 20 patients with anterior abdominal wall hernias were reminded for final assessment. Candidates were submitted to TAPP (70%) and LVHR (30%). Nineteen patients (95%) were males and one was females (5%) with male to female ratio of 19:1. Their mean age was 42.3 ± 14.06 years (Range, 17 — 65 years). Fourteen patients (70%) had Inguinal hernia (11 right, 2 left, 1 bilateral), and 4 patients (20%) had Para-umbilical hernia.

Operative Data

The mean operative time was 72.8 ± 27.02 minutes (Range, 43 — 130 minutes), it was decreased gradually and became steady after 13 cases ($P=0.007$), and not affected by the type of operation ($P=0.01$) (Figure 1). There were no detectable intra-operative complications, so all the cases were successfully completed laparoscopically except in only one case there was need for conversion to open surgery, because of his medical comorbidity.

Postoperative outcome

All patients were given postoperative analgesics in the form of single dose of intramuscular Pethidine and 2 doses of intramuscular Diclofenac sodium. Only 3 patients were received oral Diclofenac sodium at home as required in the first week. Length of hospital stay ranged between 10 to 72 hours with a mean of 20.7 ± 12.9 hours. During the follow-up period neither wound infection nor hernia recurrence were recorded in any patient during the follow-up period that

ranged between 6 and 12 months. Our study group had no mortalities (Table 1).

Table 1: Patient's characteristics in the study group (n=20)

<i>Demography</i>		
	Mean	Std. Deviation
Age/ year	42.2500	14.06330
Male/female ratio	19/1	
<i>Type of anterior abdominal wall hernia</i>		
Rt Inguinal	11 (55%)	
Lt inguinal	2 (10%)	
Bilateral inguinal	1 (5%)	
Paraumbilical	4 (20%)	
Epigastric	1 (5%)	
Incisional	1 (5%)	
<i>Operative data</i>		
Mean operative time	72.8± 27.02 minutes	
Mean hospital stay	20.7± 12.9 hours	
<i>Postoperative complications</i>		
Neuralgia	—	
Port site infection	—	
Recurrence	—	
Mortality	—	

DISCUSSION

In the literature, we found several articles that described education and how to overcome the learning curve in anterior abdominal wall hernia repair. Some studies evaluated the learning curve by studying the operation time, conversion rate, or number of recurrences [9].

Even though the exact definition of the learning curve is unclear, it has been defined previously as the number of operations required for the stabilization of the duration of surgery and complication rates [10].

In many studies between 20 and 40 procedures are required for the learning curve to reduce operation time, morbidity, and recurrence rate to a stable level in line with experienced surgeons. The cause for the large differences in the number of operations necessary to become familiar with the new technique lies in the remarkable heterogeneity of these studies [9].

Accumulating evidence suggests that LVHR is at least as safe as the open repair not only with the same or even less risk of perioperative complications and recurrence but also with less wound infection rates and shorter hospital stay [6].

Avoidance of skin incision, hernia sac dissection, and drainage (all risk factors for infection) probably accounts for the decreased risk of parietal infection [11].

Indication for preoperative antibiotics is also handled incongruently; so far, there are only minimal rates of infection reported, however, so that a general recommendation for a prophylactic antibiotics cannot be deduced according to the guidelines of evidence-based medicine [12]. In our practice we adopted the use of antibiotic prophylaxis.

The incidence of surgical site infection seems to be much lesser after LVHR if compared to the open approach because LVHR, unlike the open approach, involved almost no dissection of the subcutaneous tissue, and the incisions are smaller, making bacterial migration to the subcutaneous space less likely [13].

Mechanisms of recurrence may be related to technical difficulties and the use of inadequate mesh size and positioning. Reliable laparoscopic fixation of meshes prior to their fibrous incorporation is intended to minimize recurrence following TAPP [8].

In this study neither wound infection nor recurrence were reported, that is comparable with other when the incidence of SSI and recurrence ranged between 0 – 4% and 0- 4.3% in their laparoscopic ventral hernia repair [3,6,14-16].

Serious and persistent post-operative pain persisting beyond 30 days has been reported in 3.2% of patients [11]. None of the patients had complained of neuralgias in the follow-up.

During laparoscopic hernia repair, mesh manipulation and placement can be time consuming

and, if not performed properly, can result in recurrence [3].

CONCLUSION

According to our study, the learning curve for laparoscopic anterior abdominal wall hernia repair is around 20 cases. The conversion rates and recurrence rates were acceptably negligible. The present results show that the anterior abdominal wall hernia repair has a significant learning curve. However, they also show that, as a surgeon's experience grows, hernia repair can be performed increasingly quickly, safely and with a low recurrence rate for all hernia types.

In this study, the trend in favor of laparoscopic treatment for abdominal wall hernias is remarkable. Shorter hospital stay with similar operative time may balance the higher costs associated with the technique.

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