Acta Scientific Gastrointestinal Disorders (ISSN: 2582-1091)

Volume 3 Issue 8 August 2020

Research Article

Laparoscopic Groin Hernia Repair: A Systematic Institutional Study

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Received: June 13, 2020

Published: July 09, 2020

Abstract

Introduction: Laparoscopic inguinal hernia repair is an option for inguinal hernia repair and is emerging rapidly as more surgeons are using this method and reporting the results.It has gained a key role in inguinal hernia repair with advantages reported in many trials and guidelines.

Case Report: This is a retrospective descriptive study conducted in Surgery Department of Nepal Medical College and Teaching Hospital, Nepal from November 2017 to April 2019. All patients more than 16 years of age with inguinal hernias were given the choice of laparoscopic or open repair. Those who opted for laparoscopic repair were included in the study.

Results: A total of 47 patients were included ranging from 16 to 78 years. There was a male predominance with 40 patients; and TEP (total extraperitoneal) repair was done in 30 while TAPP (transabdominal preperitoneal) repair was done in 17 patients. In 11 patients, we did a combined procedure in the form of Pantaloon hernia in 4, umbilical hernia in 2 and cholecystectomy in 5 patients. In this study, 10 patients had surgical complications, 4 each had peritoneal tear and seroma collection and 2 had SSI. The average total hospital stay was 3.2 (range 2-6) days and we do not report any hernia recurrence in our study.

Conclusion: Laparoscopic inguinal hernia repair can be safely considered in a developing country with limited resources after attaining proper training and expertise.

Keywords: Inguinal Hernia; TEP; TAPP; Groin Hernia; Laparoscopic Inguinal Hernia Repair

Introduction

Inguinal hernia repair is a common general surgical operation with 20 million repairs performed annually. Lifetime occurrence of groin hernia is 27-43% in men and 3-6% in women[1,2]. Inguinal hernias are said to be almost always symptomatic; and surgery being the only cure[3].

Currently, a tension free mesh hernioplasty is the most common method used to treat inguinal hernia considering it can be readily performed and is easily reproducible. While, laparoscopic inguinal hernia repair is regarded as a complex surgery requiring a longer learning curve, knowledge of the anatomy of the preperitoneal space and the technical support in the form of instruments, anaesthesia and monitoring equipment's. However, laparoscopic inguinal hernia repair is becoming a valid option for repair of an inguinal hernia with a growing number of surgeons who are performing this and an increasing number of studies reporting its merits and demerits. The commonest method for laparoscopic repair are TAPP (transabdominal preperitoneal) and TEP (total extraperitoneal) approach. Also patient-driven factors such as the desire for

earlier return to activity, less postoperative pain, and better cosmetic results have promoted interest. Here we would like to share our experiences with laparoscopic hernia operations we have performed at this institute.

Methods

A review of retrospective maintained database of patients who underwent laparoscopic groin hernia repair was conducted in the form of TAPP (transabdominal preperitoneal approach) and TEP (total extraperitoneal approach) from November 2017 till April 2019, a period of 18 months. This study was done in Nepal Medical College and Teaching Hospital, Kathmandu, Nepal.

All procedures was done by trained surgeons with a prior exposure and training in minimally invasive surgery and laparoscopic hernia repair. Patient characteristics, demographic data and perioperative data and postoperative data was analyzed. Collected data included symptoms, location and type of hernia, type of repair, operative time, and surgical complication in the form of vascular and visceral injury, peritoneal tear, surgical site infection, presence of seroma, length of hospital stay and recurrence. On follow-up all the pertinent data was recorded.

The groin hernias included in the study were direct inguinal, indirect inguinal and femoral inguinal hernia. Obstructed, incarcerated and complicated inguinal hernias was excluded from the study.

Operative procedure

In brief, after induction of general anesthesia, the patient is placed in supine position with both arms tucked. We routinely placed a Foleys catheter in all patients.

For TEP: An incision is made along the umbilical crease inferiorly and the subcutaneous tissue dissected upto the level of anterior rectus sheath. The anterior rectus sheath is incised sharply on the same side as the hernia along the horizontal axis. The rectus abdominis muscle is retracted laterally and a small retrorectal tunnel is then created with careful blunt dissection. A gauge is gently guided in to create the space of Retzius following which the 10 mm scope with camera is introduced and insufflation established at 12-14 mmHg. Then 2 working ports of 5 mm each are placed under vision in the lower midline as per the standard system. Dissection and reduction of the inguinal hernia are performed in the typical TEP fashion and the mesh placed and fixed with tacker.

For TAPP: An infraumbilical incision is used to access the peritoneal cavity via Hassan's technique and a 10mm scope and camera is introduced and insufflation at 10-12 mmHg created. Under vision, two 5 mm ports is placed, one on either side of the abdomen in the midclavicular line as per standard system.The hernia is visualized, and the overlying peritoneum is incised 3-4 cm superiorly from the medial umbilical ligament to anterior superior iliac spine. Blunt dissection can be used to bring down the peritoneal flaps inferiorly to create the space of Retzius and the Bogros gap. The dissection and reduction of the groin hernia is performed in the typical fashion as in TAPP approach and the mesh placed and fixed with tacker. The peritoneum is then re-approximated with a running Vicryl 2-0 suture.

The pneumoperitoneum was reversed and the ports were removed under direct visualization. The fascial defect at the umbilicus is closed under direct visualization using absorbable Vicryl 1-0 suture.

Results

Forty seven patients underwent laparoscopic groin hernia repair in the study time period.

Of the 47 patients, there were 7 (14.9%) females and the remaining were males 40 (85.1%). The mean age of all patients was 41.7 (16-78) years. The patients' chief complaint was swelling in 39 (83%) patients, while pain in groin region being the presenting complain for the remaining 8 (17%) patients. The mean operative time for TEP repair was 56.2 (40-102) minutes and for TAPP repair the mean operative time was 78.8 (53-148) minutes; while the overall mean operative time was 64.1 (40-148) minutes.

In our study, we had 47 patients with 51 groin hernias. A majority of the patients had right sided inguinal hernia which was 27(57.4%), while 13 (27.7%) patients presented with left sided inguinal hernia, and 4 (8.5%) patients had bilateral inguinal hernia. We also had 3 (6.4%) patients who presented to us with left sided femoral hernia. Of these inguinal hernias, 12 (25.5%) were direct inguinal hernias while 36 (63.8%) were indirect inguinal hernias. We did TAPP repair on 17 (36.2%) patients and 30 (63.8%) patients underwent TEP repair. In our study 4 (8.5%) patients had recurrent inguinal hernia, while the remaining 43 (91.5%) had primary inguinal hernia. The patients with recurrent inguinal hernia had undergone repair in the anterior layer. Of the 47 patients, 11

(23.4%) patients has a combined procedure in the form of Pantaloon hernia in 4 (8.5%), umbilical hernia in 2 (4.3%) and cholecystectomy in 5 (10.6%). In this study, we had surgical complications in 10 (21.3%) patients.

Of these, 4 (8.5%) patients had peritoneal injury/tear during the laparoscopic groin repair which was managed intraoperatively. Two (4.3%) patients had surgical site infection (SSI), and 4 (8.5%) patients had seroma collection, all of which was managed conservatively. SSI was managed with topical antibiotics and daily dressing which resolved by 4 and 11 days. Seroma formation was managed with scrotal support and it resolved in all patients in 5 days to 2 week time. We did not have any patients with vascular or vas injury or injury to the visceras. No patients complained of chronic pain either following the procedure or during the follow-up period.

We had no conversion to open procedure for any of the patients in our study. And on 12-15 months follow-up for the patients, we do not have any recurrences or chronic postoperative inguinal pain. The above data is also summarized in **table 1**.

Characteristic	Total N (47)
Age, years	
Mean	41.7 (16 - 78)
Gender, n (%)	
Female	7 (14.9)
Male	40 (85.1)
Mean Operative time (minutes)	
All	64.1 (40 - 148)
TEP	56.2 (40 - 102)
TAPP	78.8 (53 - 148)
Laterality, n (%)	
Bilateral inguinal hernia	4 (8.5)
Right-side inguinal hernia, unilateral	27 (57.4)
Left-side inguinal hernia, unilateral	13 (27.7)
Left side femoral hernia	3 (6.4)
Right side femoral hernia	0 (0)
Direct inguinal hernias	12 (25.5)
Indirect inguinal hernias	36 (76.6)
Type of repair, n (%)	
TAPP	17 (36.2)
TEP	30 (63.8)
Recurrent inguinal hernia, n (%)	
No	43 (91.5)
Yes	4 (8.5)
Combined procedure, n (%)	
No	36 (76.6)
Yes	11 (23.4)
Combined procedure type, n (%)	
Pantaloon hernia	4 (8.5)
Umbilical hernia	2 (4.3)
Cholecystectomy	5 (10.6)
Surgical complications, n (%)	
No	37 (78.7)
Yes	10 (21.3)
Peritoneal tear/injury	4 (8.5)
SSI	2 (4.3)
Seroma	4 (8.5)
Vascular injury	0
Visceral injury	0
Extensive surgical emphysema	0
Recurrence	0
Conversion	0
Hospital stay (days)	3.2 (2 - 6)

Table 1: Characteristics and baseline operative details.

Discussion

In the inguinal region, four different types of hernias can present itself- indirect and direct inguinal, femoral and obturator hernias. The most important advantage of a posterior approach is the ability to uncover these type of hernias through one operative method. And also gives the surgeon the option to check on the opposite side; as well as to repair bilateral hernias or perform combined laparoscopic surgeries.

The advantages of laparoscopic surgery, in general, is definitely to get the benefits of lesser tissue trauma, decreased postoperative pain, lower postoperative and surgical site infection risk and faster postoperative recovery, which means earlier return to work and better functionality of the individual. Also better cosmesis is added advantage. Some disadvantages of laparoscopic inguinal hernia surgery in specific is the need for general anaesthesia, longer operative time, increased cost and longer learning curve for the surgeon and the operative team along with a higher recurrence and complication rate early in a surgeon's learning curve. Considering these benefits, the gradual shift to laparoscopic repair is looked for, and as a surgeon, one should be able to offer the procedure when inquired. The credit for which goes to Ger, in 1982, when he first described laparoscopic hernia repair by the collapse of the internal loop; followed by Schultz, in 1990, who described transperitoneal plugs and intraperitoneal onlay mesh (IPOM) technique. Transabdominal preperitoneal (TAPP) repair was performed first by Leroy in 1990; while Dulucq and McKernan in 1991 and 1992 respectively, introduced total extraperitoneal (TEP) repair[4].

During laparoscopic groin hernia repair, it is important to recognize certain important structures during the surgery which include median umbilical fold, medial umbilical fold, the lateral umbilical fold, Hesselbach's triangle, internal inguinal ring and femoral ring. Other structures in the extraperitoneal space that should be recognized while performing laparoscopic inguinal hernia repair are the pubic symphysis, Cooper's ligament, the space of Retzius, Bogros gap, corona mortis, inferior epigastric vessels, vas deferens/ round ligament of uterus, testicular vessels, iliopubic tract, triangle of doom and triangle of pain.

Our team favored the TEP approach due to our training and experience with this technique. Therefore, we cannot comment on the merits of one approach over the other. However there are various studies which have compared one to another with mixed results. In a study by Qui., *et al*. when TEP and TAPP were compared, there was no difference between the two techniques in terms of length of hospital stay, recovery time and short term recurrence rates. But the operative time duration of TEP technique was shorter than TAPP technique[5]which was also seen in our study which seems to be due to the fact that the peritoneal flap has to be created and then sutured back again in TAPP approach.

While, Wei., *et al*. concluded that TEP was a more complicated procedure than TAPP and advices to first start laparoscopic hernia surgery with TAPP to inexperienced surgeons[6].Similarly, the International Endohernia Association also advices that surgeons should apply the TEP technique after learning the TAPP technique[7]. But TEP repairs have shown to have a lower incidence of port-site incisional hernias or bowel related complications and are associated with less pain and greater patient satisfaction[8].A study shows that despite having a steeper learning curve and unfamiliar visualization of the inguinal anatomy in TEP, it is advantageous because it allows direct access to the myopectineal orifice without entering the abdominal cavity and disrupting the peritoneum[9], hence avoiding chances of inadvertent intraabdominal injury and postoperative adhesions when TAPP is performed.

The common complications after laparoscopic hernia repair are serous fluid deposits in the distal hernia sac (seroma) and bleeding (hematoma).Postoperative seroma usually resorbs itself spontaneously within 2 weeks and do not require any intervention. Therapeutic drainage is needed only when the seroma persists for longer and is increasing in size or if the seroma is causing clinical symptoms. Hematoma also usually resolves over time and needs no active intervention, but one should be cautious in patients who are using anticoagulants or antiplatelet agents and even certain traditional Chinese medicines which have the evidence of potential interaction with prescribed medicines[10].

Peritoneal breech is one of the other frequent complications which may occur due to a thin sac. If this happens, CO_2 starts leaking into the peritoneal cavity and it further compromises the extra-peritoneal space. In such a situation, a number of options can be useful. Patient repositioning with a head down position may be helpful or prompt closure of the peritoneal tear using an endoloop, suture or hemoclips can be tried. Alternately introducing a Veress needle above the umbilicus to remove the peritoneal CO_2 is another option. Also converting a TEP procedure to TAPP can be

practical in such a situation. There is a study from eastern Nepal where the procedure was converted to open technique due to tear in the pneumoperitoneum and lack of space[11],which is always an available option when others have exhausted, which also explains the necessity to have proper and adequate training and expertise in the open hernia repair.

In our study we had a total of 10 (21.3%) patients with some form of complications, which included peritoneal tear during TEP repair and seroma formation in 4 (8.5%) patients each and SSI in 2 (4.3%) patients. The peritoneal tear during TEP was closed using endoloop in all 4 patients. Peritoneal tear occurred during the initial phase of study, which we take it as a part of the learning curve. The seroma formation in the postoperative period resolved spontaneously within 2 weeks' time for all 4 patients with scrotal support. Superficial SSI was managed with regular dressing and it healed in 4 and 11 days in the two patients. This was seen at the umbilical port site for the 2 patients, which seems to be due to poor hygienic care. We do not report any recurrences in our patients during the study period.

Another uncommon but notorious complication is the chronic groin pain post-operatively, which we did not have in our series. However, the treatment of chronic pain syndromes after laparoscopic hernia surgery is difficult and time taking. The cause of the pain is said to be multifactorial which includes the operative technique, nerve injury, degree of mesh innervation among others[12]. This pain is usually said to be of neuropathic origin, due to the damage or entrapment of the lateral femoral cutaneous nerve or femoral branch of genitofemoral nerve[13].Antoniuo., *et al*. has reported in a study that there is an increased likelihood of postoperative pain beyond 3 months with the use of penetrating mesh fixation techniques when compared with bioglue fixation[14].

A meta-analysis conducted by Schmedt., *et al*. comparing open and laparoscopic hernia repair reported a recurrence rate of 2.7% for open repair and 5.5% for laparoscopic repair after a follow-up of 28 months[15].While in another study with a 5-year outcome of laparoscopic and Lichtenstein hernioplasties found both laparoscopic and Lichtenstein hernioplasties to have a low risk for hernia recurrence if proper mesh size is used[16]. A systemic review of RCTstates that the overall recurrences did not differ between the laparoscopic and open mesh repair groups and laparoscopic repair was associated with lesser postoperative pain and quicker return to normal activities[17].

Technical factors that may play a role in the development of recurrence include inadequate patch, stress or incorrect detection, lack of experience, tissue ischemia and infections. Other complications include urinary retention, which can be prevented by urination immediately before surgery or by preoperative urinary catheterization. Paralytic ileus, visceral and vascular injuries, intestinal obstruction or injury, hypercapnia, pneumothorax and gas embolism are other infrequent complications[13]. Insufficient medial coverage may lead to rolling up of the prosthesis from the medial side and uncovering the hernial region[18].which is the commonest cause and site of recurrence. The lateral part of a mesh should be fixed above the level of the iliopubic tract. The simplest method to identify this is to touch and press the projected spot of the stapler head on the body surface when using a stapler to fix the lateral part of a mesh; the feel of the stapler head indicates that the stapler head is located above the iliopubic tract. Otherwise, the stapler head is likely located below the iliopubic tract, and stapling may cause nerve damage[19]. While another study says fixation of the mesh to the abdominal wall has been associated with various postoperative complications for no additional benefit in lowering recurrence rates[20].

The avoidance of mesh fixation is an attempt to reduce chronic groin pain, but it may increase the chance of hernia recurrence as non-fixation may lead to displacement of mesh. Though there are various meta-analyses which show that non-fixation of mesh does not necessarily lead to increased recurrences[21-23]. Other surgical options for mesh fixation include sutures, tacks or staples, self-fixing meshes and fibrin, or other glues, among others[24].

In inexperienced hands, complications in laparoscopic inguinal hernia surgery are most dangerous and frequent. The incidence of complications has fallen as the experience has grown and it is proving itself to be a safe procedure in the hands of experienced surgeons[25].

Another factor which comes to play while performing laparoscopic surgeries is the cost especially when operating in developing countries but it was seen in a study conducted by Stylopoulos., *et al*. in 2003 that laparoscopically performed operations have reduced long term costs when compared to open surgery when factors like salary, health insurance costs, reduced job quality, delayed work shifts and the salary of the working individual looking after the patient are taken into consideration[26].Wilson., *et al*. also

found that rehabilitation to normal activity and return to work was shorter in patients receiving laparoscopic repair (median 7 and 10 days, respectively) than Lichtenstein repair (14 and 21 days)[27].

Conclusion

Hernia repair is one of the common surgeries performed worldwide. With the recent advances and developments in the field of surgery, laparoscopic hernia repair is making good progress with multiple studies being conducted on a regular basis. But we need more literature to support and help laparoscopic hernia surgery grow. Laparoscopic procedures is said to be specially suitable for recurrent and bilateral inguinal hernia[28]. According to the International Endohernia Group's 2011 Guidelines, which was revised in 2015, TAPP and TEP repair are the preferred techniques over the Lichtenstein technique after a hernia recurs by open repair[29]. As surgeons we need more expertise and training to learn and perform laparoscopic hernia surgery safely to produce good results.

Funding

None.

Conflict of Interest

Tuhin Shah, Ashish Prasad Rajbhandari, Bhuban Rijal, Rabin Koirala, Arjana Shakya declare that they have no conflict of interest.

Informed Consent

Informed consent was taken from all participants and their legal guardian who were included in the study.

Author Contributions

Authors contributing to the study conception and design by Tuhin Shah, Ashish Prasad Rajbhandari, Arjana Shakya

Material preparation, data collection and analysis were performed by Tuhin Shah, Ashish Prasad Rajbhandari, Bhuban Rijal, Rabin Koirala

The analysis, first draft of the manuscript was written by Tuhin Shah, Arjana Shakya. All authors read and approved the final manuscript.

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