

Original Research Article

Laparoscopic inguinal hernia repair: a prospective study of 120 cases

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ABSTRACT

Background: Inguinal hernias have been treated traditionally with open methods of hernioplasty. But the trends have changed in last 2 decades with the introduction of laparoscopic inguinal hernia repair by transabdominal preperitoneal (TAPP) and total extra preperitoneal (TEP) surgery.

Methods: The study was prospective type conducted from January 2010 to April 2018. 130 patients, who underwent laparoscopic inguinal hernia repair. 60 patients for TAPP and 60 patients for TEP. Preoperative, intraoperative, postoperative and follow up data was analysed.

Results: From 130 patients, 10 patient underwent open hernia repair due to anaesthetics reason. 93.3% primary hernias and 6.7% recurrent hernias. 50% was repaired by TEP and 50% by TAPP. Mean time taken for surgeries was 60-90 min. The intraoperative, postoperative complications rates were 1.2% and 7.4% respectively. Mean hospital stay was 1-5 days.

Conclusions: laparoscopic inguinal hernia repair could be contemplated safely both via totally extra peritoneal as well as transperitoneal route even in our setup of developing country with modifications.

Keywords: Hernioplasty, Inguinal hernia, Transabdominal preperitoneal, Total extra preperitoneal surgery

INTRODUCTION

Inguinal hernia repair is one of common general surgery operations. Inguinal hernia have been treated traditionally with open methods of hernioplasty but the trends have been changed in last two decade with introduction of minimal access surgery.^{1,2} The preperitoneal placement of mesh that was popularized by Nyhus and colleagues after the pioneering works of Cheatle, Henry et al and Mc Evedy has been considered as more physiological, safe and secure technique of groin hernia repair.¹ The concept of preperitoneal mesh was applied in minimally invasive surgery with advantages of decreased pain, discomfort and early return to work.^{3,4} In 1991, Arregui reported Trans Abdominal Preperitoneal (TAPP) techniques such as closure of internal ring, plug and patch and intraperitoneal onlay mesh have slowly faded away due

to their high complication and recurrence rates.³⁻⁵ In present set up transabdominal preperitoneal (TAPP) and total extraperitoneal (TEP) approach was used for hernia repair.²

Present study aims to know about laparoscopic hernia techniques and complications.⁶ In present set up transabdominal preperitoneal (TAPP) and total extraperitoneal (TEP) approach were used for hernia repair.

METHODS

This study is prospective and descriptive study in patients presenting to surgery department of SMIMER, Surat with diagnosis of inguinal hernias from January 2010 to April 2018.

Inclusion criteria

- Elective hernia repair with age >18 years and <70 years choosing laparoscopic repair.

Exclusion criteria

- Patients if they were opted for open repair
- Presence of complicated hernia like irreducible and obstructed hernia
- Patient unfit for anesthesia.

All the patients were included in the study after written consent taken. The patients presented with inguinal/inguinoscrotal swelling were assessed thoroughly by clinical examination. History was taken regarding duration of swelling, any association with pain, constipation, abdominal distention, change in size with posture. Physical examination was done and pulse, blood pressure, co-morbid conditions and inguinoscrotal examination size, shape, reducibility, cough impulse. Investigations were done regarding fitness. Authors have done ultrasonography of inguinoscrotal region for confirm diagnosis and rule out other differential diagnosis like hydrocele, funiculitis.

Preoperative

All patient received inj. ceftriaxone 1gm intravenously preoperatively. All patients were catheterized in morning on day of operation.

Postoperative

All patients were received 3 doses of antibiotic for prevention of post-operative infective complications and injection diclofenac 8 hourly for pain relief. Oral fluid was allowed after 6 hours of operation. Catheter was removed on 1st post operative day morning. Patient can mobilize. Patients were on soft diet. On 2nd postoperative day after passing stool and If no any complain patients arise then patients were discharged.

Follow up

Patients come on follow up on 5th, 10th, 30th postoperative day and 3rd, 6th, 12th months of postoperative period.

Operative methods and techniques

Patient positioning

The patient was placed in supine position with both arms tucked against the side. Skin was prepared and draped by betadine painting from nipple to knee for manipulation of hernia sac and scrotum necessary. A single video monitor was placed at the foot end of bed, directing facing patient's head. The surgeon stands on contralateral side, assistant on opposite to surgeon, the nurse stands on ipsilateral side.

Equipments

Author use 30⁰ laparoscope. 10mm and 5mm trocars were used. Authors currently used tackers for mesh fixation. In TEP, besides the equipments needed in TAPP, open technique is used to gain access to the preperitoneal space but in present set up blunt dissection is done by using scope.⁶

TEP (Total Extraperitoneal Repair^{6,7})

TEP approach avoids entry into the peritoneal cavity. The extraperitoneal approach was made possible by the making space between peritoneum and anterior abdominal wall. This space was created by 3 methods like Phillips techniques, McKernan's technique, Dulucd's method, subfacial approach. Authors enters trocar in the plane between the peritoneum and posterior rectus sheath.

Incision

10 mm subumbilical incision was kept and extending up to linea alba by making transverse incision in anterior rectus sheath. Curved hemostat was inserted, and the space was widened for introduction of trocar. The telescopic dissection with laparoscope was very effective in creation of extraperitoneal space.

Placement of trocars

First trocar cannula was inserted in subumbilical incision. 15⁰ laparoscope is introduced by 10mm trocar which moves forward and backward through cobweb areolar tissue towards the pubic symphysis. The dissection space is maintained by continuous CO₂ insufflation at 12-14mmHg, working port inserted just lateral to midline about 5cm below the level of camera port and other port inserted between the umbilicus and the anterior iliac spine.

Medial dissection

The exposure of Cooper's ligament begins with dissection of the posterior aspect of abdominal wall by gentle sweeping of the areolar tissue. The pseudo sac was peeled off and ligated with pubic tubercle.

Lateral dissection

The dissection into the lateral inguinal fossa (space of bogros) begins by dividing the transversalis fascia extension at the level of the inferior epigastric vessels. The attachment between the sling and the cord structure was divided by sharp dissection. In case of direct hernias, the peritoneal edge will be easily separated from the internal ring. In certain patients, direct hernia was associated with presence of indirect hernias. The laparoscopic approach eliminates the possibility of missed hernias by thorough dissection of all possible

hernia. Cord structure should be totally free from the peritoneum at end of posterior dissection (Perietalisation).

Placement and fixation of mesh

A 15x15 polypropylene flat mesh was trimmed to fit the pelvic floor and introduced into the dissected space. Tackers or suture was used for fixation mesh.

Initially mesh was fixed at Coopers ligament, then second site for fixation was superomedial aspect of the mesh.

Finally, the CO₂ was released slowly by opening the side channel of a 5mm port while the inferior aspect of mesh was held against the psoas muscle.

The rectus sheath was approximated, and the trocar wounds were closed with subcuticular sutures.

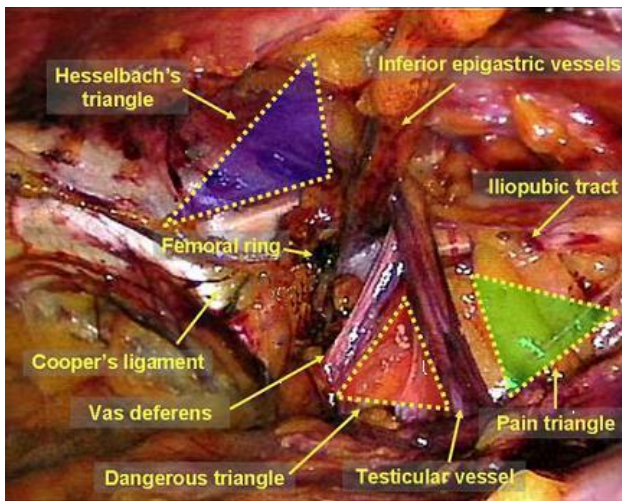


Figure 1: Anatomy of inguinal canal.

TAPP (Transabdominal pre-peritoneal Repair)⁶

Umbilical puncture by veress needle

Depending upon shape of umbilicus either transverse or vertical stab was made with a stab knife. Veress needle is inserted and after confirmatory test, pneumoperitoneum was created. At veress needle site 10 mm trocar was inserted for insertion of telescope.

Port placement

Two working trocars size 5mm were inserted at lateral to rectus sheath on either side of umbilicus.

Reduction of content

The content of sac was gently pulled into abdominal cavity.

Peritoneal incision and dissection

A peritoneal flap was created by a horizontal incision 2cm above the defect extending from the medial umbilical ligament to the level of anterior superior iliac spine. Medial and lateral dissections were done as describe in TEP approach.

Peritalisation

Once the hernia sac was reduced or divided, the peritoneum was separated from the vas and the gonadal vessels towards the cranial aspect. It was called as Peritalisation.

Placement of mesh

The corners of mesh were trimmed, and the lateral ends narrowed to accommodate the space beyond the internal ring. 15x15 size polypropylene mesh adequately covers the entire dissected area reinforcing the myopectineal orifice. Authors roll the mesh and tie with a suture to maintain rolled position.

Fixation of mesh

The mesh was fixed to the Cooper's ligament inferiorly and to rectus muscle on superomedial to inferior epigastric vessels.

Peritoneal closure

After the placement of mesh, the peritoneum was sutured over mesh by continuous suture using vicryl 2-0 without any gap to prevent adhesions of bowel or omentum.

Port closure

The trocars were removed, and muscle sheath was closed by vicryl port and skin was closed by ethilon 3-0. Strapping by tight Dynaplast over inguinal region was kept for prevention of seroma formation. Inguinoscrotal support was also given in case of large inguinoscrotal hernias.



Figure 2: Mesh placement.

Complications⁷⁻⁹

Intraoperative

- Tacks on triangle of doom can be injured iliac vessels that can cause excessive bleeding.
- Tacks placing over triangle of pain can cause neuralgia.
- Bladder Injury and bowel injury occur during dissection or improper use of cautery.
- Bleeding can occur from inferior epigastric vessel during peritoneal flap creation.
- Pneumoperitonum common in TEP.

Postoperative

- Seroma and Hematoma (5.25%) because of inflammatory exudate collection.
- Urinary retention (1.3% to 5.8%) because of pain.
- Neuralgia (0.5% to 5.8%) because of nerve injury.
- Testicular pain and Swelling because of excessive manipulation of scrotal swelling from outside.
- Mesh infection can occur if aseptic precaution not used for mesh handling.
- Recurrence

RESULTS

Between, January 2010 to April 2018 study were done in SMIMER hospital, Surat at department of General Surgery. Total number of patients were 120. 120 Patient were selected for laparoscopic hernia repair study. 10 patients were operated for open inguinal repair, because of 5 had complicated hernia, 4 patient preferred open surgery and 1 had previous history of abdominal surgery. Mean age of patient were 18-70 years. 118 (98.4%) were male and only 2 (1.6%) were female. 100 patients were coming with complain of swelling and 91.6% patients came with pain at local site.

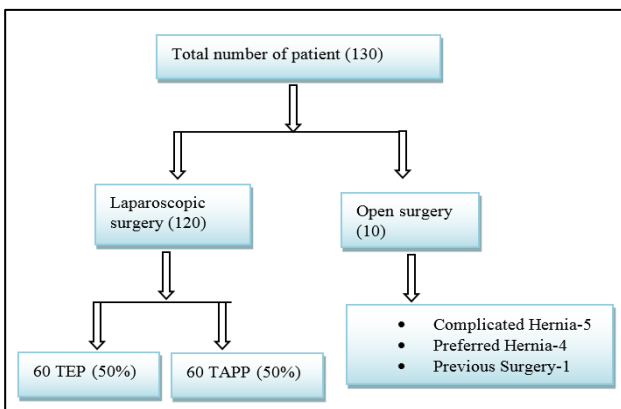


Figure 3: Study flow chart.

93.3% patients had primary hernia, from them 88.3% patients were operated by TEP and 11.6% by TAPP, 6.7% patient had recurrent hernia. 110 patients had

unilateral hernia from them right side hernia is more common. 80 patients have right inguinal hernia, 10 patients had bilateral hernia, from them 6 were operated by TEP and 4 by TAPP.

Table 1: Patient characteristics.

Total no. of patients	120
Age	18-70 years
Sex	
Male	118 (98.4%)
Female	2 (1.6%)
Presenting complications	
Swelling	100 (83.3%)
Pain	110 (91.6%)

In present study out of 120, 50 % operated by TEP and other 50% operated by TAPP. Mean operative time was 70 minutes. 40 patients had direct hernia, 2 patients had Right side direct hernia and left side indirect hernia and 1 patient with small umbilical hernia.

During intraoperative observation, 0.8% had injury to inferior epigastric vessels. 6% patient had bleeding venous plexus around pubic bone.

Table 2: Characteristics of hernia.

	Total	TEP	TAPP
Total no. of patients	120	60	60
Primary hernia	112 (93.3%)	99 (88.8%)	13 (11.6%)
Recurrent hernia	8 (6.7%)	8 (100%)	0
Unilateral hernia (N=110(91.6%))			
Right	80 (72.7%)	74 (92.5%)	6 (7.5%)
Left	30 (27.2%)	28 (93.3%)	2 (6.6%)
Bilateral hernia	10 (8.4%)	6 (60%)	4 (40%)

Table 3: Intra operative factors and complications.

Total no. of Patient	120
Mean operative time(min.)	70 min.
Unilateral Hernia (110)	
Direct	38 (34.3%)
Indirect	72 (65.4%)
Bilateral Hernia (10)	
Direct	2 (20%)
Indirect	8(80%)
Peritoneal breach in TEP	NIL
Injury to viscera	NIL
Injury to Vas deferens	NIL
Injury to testicular vessels	1 (0.8%)
Injury to epigastric vessel	1 (0.8%)
Injury to major vessels	NIL
Extensive Surgical empysema	NIL
Bowel injury	NIL
Bladder injury	1 (0.8%)
Bleeding of venous plexus around pubic bone	6 (5%)

But it was cauterized no major injury to viscera, vas deferens, bowel. In post-operative periods, in present set up urinary retention not occur because of pre-op catheterization. bladder injury has not been reported. On 1st post operative day, 6.6% patient had developed seroma, but it can be prevented by inguinoscrotal support, it may resolve in 5-7 days. 0.8% patient had developed funiculitis because of manipulation of spermatic cord 0.8 had ecchymosis over skin because of excessive use of cautery.

Table 4: Post-operative factors and complications.

Total no. of patients	120
Seroma	08 (6.6%)
Funiculitis	01 (0.8%)
Ischemic orchitis	NIL
Ecchymosis	01 (0.8%)
Wound infection	NIL
intestinal obstruction	NIL
Median hospital stays	1-5 days

Mean hospital stay time was 1-5 days. Patients may return to routine work on 2nd post-operative day. Authors take follow up on 5th, 10th, 30th postoperative days 3rd month and after 1 year. 80% patient came in follow up, 0.8% patient complain of small scrotal swelling called pneumoscrotum. One patient complains numbness over inguinal region because of injury 1.6% patient had complain of groin pain on 1st month follow up period. From them 0.8% had chronic groin pain after 3 months. 2.4% patient had recurrent hernia at same operative site hernia. 1.6% patient had developed contralateral side hernia. After 1 year, 0.8% patient had chronic pain and 0.8% patient had remain numbness.

Table 5: Follow up for long term outcomes.

	After 1 month	After 3 months
Follow up patients	100%	100%
Pneumoscrotum	1 (0.8%)	NIL
Mesh infection	NIL	NIL
Numbness itching	1 (0.8%)	1 (0.8%)
Chronic groin pain	2 (1.6%)	1 (0.8%)
Port site hernia	NIL	NIL
Recurrent hernia	NIL	3 (2.4%)
Metachromous contralateral hernia	0	0

DISCUSSION

The first laparoscopic hernia repair was described by Ger et al.¹⁰ Many studies have shown that laparoscopic repair has similar results in terms of recurrence compared with open repair but with the added advantage of reduced post-operative pain and wound infection and early return to activity. Due to these advantages, the time tested open hernia repair has been slowly replaced by the laparoscopic method. Mostly complications were same in

both techniques. In Eastern Nepal study, urinary retention occurs in 7% patients but in present set up, authors catheterized the patient preoperatively which prevent urinary retention as well as intra op bladder injury.¹⁰ The incidence of the chronic groin pain was major issue in Armed Forces 5 years study, but in present study there was only 2% patients have mild groin pain.¹¹ Proper use of tackers or sutures at correct site can prevent chronic groin pain. Peritoneal breach was one of frequent complication in TEP but in present set-up, there were no incidence of peritoneal breach. It was one of frequent complications which often happen due to a thin sac, which is often opened while dissecting it from the cord structures. If that happens, CO₂ starts leaking into the peritoneal cavity and it further compromises the extra-peritoneal space. In such a situation, a veress needle should be introduced above the umbilicus to remove the peritoneal CO₂. One case had to be converted for to open repair for this reason only in Eastern Nepal study.¹² The 8% to 67% incidence of peritoneal breach has been reported previously also by Lal et al.¹³ They also reported pneumoperitoneum in 5 TEP cases, managed in the similar fashion; transient pneumoscrotum was seen in four cases (16%), which resolved within 3 hours, whereas subcutaneous emphysema was seen in six cases (24%).¹⁴ Andersson et al also required the laparoscopic operation to be converted to an open repair for one of the patients in the TEP group because of the bleeding from injured inferior epigastric vessel.¹⁴ In the present study, there was no hematoma or visceral injury. In some study, 13-22% incidence of contralateral hernia due to previous inadvertent dissection but in present study, contralateral hernia has not reported.¹¹ In Stanely hospital study, 12% patients have shoulder pain but in present study there was no incident of shoulder pain was reported.¹⁵

Testicular pain and swelling occur due to excessive dissection of sac from the cord structures, especially a complete sac, reported incidence is of 0.9% to 1.5%, but in present study, there was no incidence of testicular pain and swelling noted.⁷⁻⁹

Heikkinen et al in 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.¹³ Butters in a 52 months follow-up after tension-free and laparoscopic hernioplasties found recurrence rates to be low and similar.¹³ One meta-analysis conducted by Schmidt et al comparing open and laparoscopic hernia repair states a recurrence rate of 2.7% for open repair and 5.5% for laparoscopic repair after a follow-up of 28 months.¹⁴

In inexperience hands, complications in laparoscopic inguinal hernia surgery are most dangerous and more frequent than those of open surgery but it is to avoid most of complications if one follows a set of well-defined steps and principles of laparoscopic surgery. The incidence of complications has fallen as the experience has grown and

it has proven itself to be a safe procedure in the hands of experienced surgeons.¹⁰

Overall the complications were within acceptable limits and comparable to other series.¹⁰

CONCLUSION

Authors here by conclude that laparoscopic repair of inguinal hernias could be contemplated safely both via totally extra peritoneal as well as trans peritoneal route even in present set-up though authors are at the beginning of this transition. The shortcomings of present study were few. The sample size was small, follow up period was small, and this is descriptive study. Nevertheless, this was authors initial efforts in future, this study may form a basis for further such studies. In present set up, for small inguinal hernia, TEP will be planned and for large inguinoscrotal hernia, TAPP will be planned. Laparoscopic inguinal hernia repair is advanced laparoscopic technique, it required training for surgeon. Authors could even manage recurrence after laparoscopic repair laparoscopically in absence of complication on the basis of these early experiences, laparoscopic inguinal hernia repair can be concluded to be good alternative procedure to open repair especially in term of post-operative pain, return to work and cosmesis.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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