

Laparoscopic inguinal hernia repair TEP versus TAPP

M.M.Mohammed, R.S.Ahmed, A.Ab.Abdelaziz

General surgery, Dept., Faculty of Medicine, Benha Univ., Benha, Egypt

Email: Ayman090062@fmed.bu.edu.eg

Abstract

Background: The main mechanism for the development of abdominal wall hernia is the lack of structural integrity in the musculotendine layer. The precise cause of inguinal hernia is unclear, but its causes include pre-formed congenital sac, persistent passive intra-abdominal pressure increase and thin abdominal walls. **Objective:** The objective of this analysis is to equate laparoscopic hernioplasty findings with pre-peritoneal transabdominal (TAPP) vs Totally Extraperitoneal (TEP) as techniques for inguinal hernia repair. **Methods and patients:** 50 patients have been included in our sample, split into two categories, 25 for each. Group A; underwent a laparoscopic pre-peritoneal transabdominal (TAPP) mesh repair, group B; underwent a total mesh repair laparoscopic extra-peritoneal (TEP). Patient follow-up was conducted at the Benha University Hospitals out-patient clinic 7 days after release at 3 and 6 months after surgery between August 2019 and August 2020. **Results:** Both classes have been contrasted in terms of surgical procedure, duration, intraoperative symptoms, early postoperative pain within a week, hospital stay, physical exercise limitation and recurrence and chronic pain occurrence. **Conclusion:** The interpretation of findings showed that the TEP fix proved in the first few hours to be technically harder as shown by increased operating time and postoperational discomfort. It needs a lengthy learning curve and a committed technical excellence team. However, it is preferable that fewer wound-related symptoms, shorter hospitalisation and a faster return to daily life are involved.

Keywords: Transabdominal pre-peritoneal, totally extraperitoneal. Repair of an inguinal hernia via

1.Introduction

The precise occurrence of inguinal hernias is not clear despite the fact that it is a common issue and about 75% of all abdominal hernias are known to occur. Surgical treatment is a standard procedure, with about 20 million hernia replacements each year (1).

Hernia repair went through many stages from ancient Egypt through traditional tissue repair, connected to 60% till Francic C, with an estimate of the tissue. For bridging the hernia defect and strengthening the abdominal wall without tension, Usher introduced polypropylene-driven prothesis. The recurrence rate of hernia repair was reduced with implantation of prothesis (2) surgery is the only cure for inguinal hernias, which can avoid imprisonment and strangulation. Medical professionals suggest operation for most persons with inguinal hernias and particularly for those with signs causing hernias. Research shows that men with herniated hernias that trigger little to no symptoms can easily postpone operation before their symptoms escalate. Men that postpone the operation should monitor for signs and frequently see a medical professional. Health care services generally prescribe surgery for children and babies to avoid imprisonment (3).

Conventional surgery was focused on the procedure performed by Bassini, consisting of the transversal abdomin and transversalis fascia and the inguinal ligament lateral rectal sheath.

However, it is commonly used to restore and strengthen the abdominal wall using a piece of open woven polypropylene mesh. This

is simpler to remember, offers earlier versatility and a very low repetition rate (4).

Laparoscopic procedures have been in the area of general operation since the early 1990s, with the first reports of minimally invasive reconstruction of incuinal hernia published in 1992. Transabdominal additional point is vertical, behind the iliopubic tract fastening, while the end of the system is felt on the exterior of the abdomen, with the opposite hand, to ensure the fastening happens above the iliopubic tract. It is also necessary that the preperitoneal area is totally dissected so that the mesh edge is not folded. The mesh can be positioned with a small gap in the midline such that the myopectinal opening is adequately covered (8).

Preperitoneal inguinal hernia repair (TAPP) involves laparoscopic examination of the two inguinal areas and the whole peritoneal cavity, an additional incapacity to the overlying peritoneal layer to minimise the hernia sac and to position the preperitoneal net against the inguinal wall at an adequate level of space. The technique of fully extra-peritoneal repair (TEP) enables the myopectineal orifice to be explored without touching the abdominal cavity, the dissection and reduction of the herniation sac and its material (5).

The most popular way of using non-absorbable spiral tacks is (e.g., ProtackR). In the reparation of laparoscopic inguinal hernia and for fixation of propylene mesh in rectopexy procedures for rectal prolapse, the usage of this technique in fixation is seen. Other physicians tend to use the

transabdominal suture of polypropylene knotted outside the abdomen and accessible postoperatively to the surgeon (6).

The best way of fixing the prosthesis mesh is problematic. Sutures move through both the fascial and muscular layers of the anterior abdominal wall, and tacks secure the mesh to the inside of the peritoneal cavity (7).

The fixing points are almost the same with both methods, mostly the tails of the mesh with two tails or sutures are attached to Cooper's ligament. Complications such as ischaemic orchitis and testicular atrophy are estimated to occur in around 2% to 3% of all hernia repairs, repetition occurs in 1.0% (mostly during the five years following operation), additional complications such as wound infection, bladder injury, bowel injury, and distant fluid hydrocele. The overall forecast depends on comorbidity (9).

2. Aim of the work

The goal of this study is to compare the result of laparoscopic transabdominal preperitoneal (TAPP) and completely extra peritoneal technique (TEP) laparoscopic in hernioplasty conditions with their effectiveness, postoperative complications and recurrence.

3. Patients and Methods

2.1 Patients Selection:

This is a prospective randomised comparative study between the laparoscopic preperitoneal transabdominal mesh against laparoscopic completely extraperitoneal inguinal hernia mesh repair. The report included 50 patients in the Benha University Hospitals ambulatory clinic between August 2019 and August 2020.

The study was approved by the Ethics Board of Benha University and each study participant received informed written consent.

2.2 Inclusion criteria

Both patients are males aged 18 years or over. Both patients have main or chronic inguinal hernia unilaterally.

2.3 Exclusion criteria

It is important that we adequately assess the co-morbidities of patients before the surgery. The risk/benefit calculation is also taken into account when evaluating laparoscopic patients. Therefore, patients that had co-morbidity that exceeds the likelihood of operation were removed from our research and who had a major organ malfunction, such as cardiac failure, respiratory failure and pulmonary hypertension. In addition, psychologically disturbed and outpatient patients would be removed. Patients with prior abdominal operations such as Pfannenstiel, lower midline and other abdominal incidents

on the same side of the hernia below the umbilicus, as well as patients with previous lower abdominal irradiation, were removed from this trial. Contraindications for laparoscopy in patients with complex inguinal hernia (infected, obstructed, strangled, etc). Refusal of the patient.

All the patients under the guidance of an OR team were arbitrarily split into two categories to ensure that the age fit between the two groups. Randomization schedule is generated by a single machine. This consisted of alternating blocks and was replicated in the operating theatre diligently in packed, ordered envelopes.

2.4 Preoperative assessment: History

Clinical history taking included; personal history including age, occupation, and special habits of medical importance particularly smoking; complaint and its duration; history of present illness including analysis of the complaint, and a review of other body systems specially chest complaints, bowel problems like constipation and urinary problems specially prostatism; past history of medical diseases, drug allergy, previous blood transfusion, and previous operations specially previous hernia repair and family history of the presence of inguinal hernia and other diseases in the family.

2.5 Examination

Clinical examination included general examination including vital data; chest examination for signs of chronic obstructive lung disease; abdominal examination for abdominal masses, and P/R examination for prostatic enlargement; and local examination of the inguinal region and scrotum to confirm the diagnosis of inguinal hernia and its type, and for the presence of complications.

1) Investigation

Investigations were requested for whenever required for patients including complete blood picture, coagulation profile, liver function tests, kidney function tests, fasting blood sugar, ECG for those patients over 40s or with positive cardiac history, and chest x-ray.

2) Optimization of general condition:

Co-morbidities like COPD, cardiac diseases, chest diseases, hepatic diseases and DM were controlled and optimized preoperatively.

II) Patients randomization:

The selected patients were randomized into 2 groups by the closed envelope method.

- **Group A:** 25 patients underwent laparoscopic transabdominal preperitoneal (TAPP) hernioplasty.

- **Group B:** 25 patients underwent laparoscopic total extraperitoneal (TEP) hernioplasty.

Patients permission and education (informed consent):

All patients had given permission to take part in the study. Patients were educated about the procedure to be performed, the possible complications and their management and schedule of follow up. In addition, patients were specially educated about how to describe their pain level at rest in the first post operative day. Pain is expressed as: no pain, mild pain,

discomforting pain (analgesia is preferred), distressing pain (analgesia is a must) and

4.Results

horrible pain not responding to usual analgesics.

Data recorded:

Descriptive data about patients characteristics including age, sex, occupation, physical activity, smoking, relevant medications, body mass index, ASA score, and type of hernia according to *Nyhus* classification.

Table 1: Intraoperative complications in Group A and B.

Intra operative. Complications	Group A No. = 25	Group B No. = 25	Test value*	P value	Sig.
Peritoneal tears	2 (8%)	4 (16%)	0.370	0.543	NS
Vascular injuries	2 (8%)	4 (16%)	0.370	0.543	NS
Bowel injuries	0 (0.0%)	0 (0.0%)	0.000	1.000	NS
Conversion	0 (0.0%)	0 (0.0%)	0.000	1.000	NS
Bladder injury	0 (0.0%)	0 (0.0%)	0.000	1.000	NS
Total	4 (16%)	8 (32%)	0.833	0.361	NS

P-value >0.05: Non significant (NS); P-value <0.05: Significant (S); P-value < 0.01: highly significant (HS)

*:Chi-square test

Table 2: Early postoperative complications in GroupA and GroupB: **Fisher exact test

Postoperative complications	Group A No. = 25	Group B No. = 25	Test value	P-value	Sig.
Wound serama	2 (8%)	2 (8%)	0.000	1.000	NS
Wound infection	0 (0.0%)	0 (0.0%)	0.000	1.000	NS
Ing-scrotal edema	2 (8%)	2 (8%)	0.000	1.000	NS
Delayed bowel movements	3 (12%)	0 (0.0%)	2.143	0.143	NS
Nausea and vomiting	0(0.0%)	0 (0.0%)	0.000	1.000	NS
Urine retention	0 (0.0%)	0 (0.0%)	0.000	1.000	NS
Subcut. Emphysema	0 (0.0%)	3 (12%)	2.143	0.143	NS
Inject able analgesic 16 hrs	3 (12%)	0 (0.0%)	2.143	0.143	NS
16-24	5 (20.0%)	15 (60.0%)	5.000	0.025	S
24 – 32	15 (60.0%)	10 (40.0%)	1.200	0.273	NS
> 32	2 (8%)	0 (0.0%)	1.034	0.309	NS

P-value >0.05: Non significant (NS); P-value <0.05: Significant (S); P-value < 0.01: highly significant (HS) still widely used, the laparoscopic

5.Discussion

Hernioplastic treatment is now the most popular operation in the Western world. Around 800,000 repairs are carried out annually in the USA (10).

The correct hernioplastic method is still controversial. Although the open voltage free mesh repair is available

Technical benefits provide an improved aesthetic look since the fix can be performed at just 3 ports (10,10 and 5 mm) (11).

The absence of systematic procedures for minimally invasive repair of inguinal hernia is pragmatic and reflected in the vast range of scientific information provided in contemporary literature. Change and standardisation of operating measures, such as the entry method and the construction of

operational room, degree of dissection, size and mesh sort and mesh fixation, can reduce operating times in TEP repair. Similarly, the site of the peritoneal incision, the duration of preperitoneal dissection, the treatment of the hernia sac, the fixation of the mesh, and the form of peritoneal closure are topics for further examination with respect to their therapeutic impact on patient-oriented results and the length of operation in the case of laparoscopic hernia repair (12). (12).

Laparoscopic procedures, on the other side, have more drawbacks, including: bowel perforation, severe vascular damage, possibility for adhesion to areas that have crossed the peritoneum, the requirement for general anaesthetic and higher costs due to costly instruments. The procedure of tension-free

opening may be performed on an outpatient basis with local anaesthesia, with a minimum chance of intra-abdominal damage and the costs are lower. Furthermore, it is the best choice for strangulation where sutures are the best repair through open technique and mesh counterindicated. The majority of randomised studies in laparoscopic herniorrhaphy centres show a recurrence risk equivalent to traditional tension-free procedure (11).

The most often employed are two laparoscopic techniques: preperitoneal transabdominal repair (TAPP) and endoscopic repair (TEP).

The reparations of TAPP inguinal hernia include a laparoscope examination of both the inguinal regions and a further incision in the surrounding peritoneum in order to examine myopectineal hernia and, until a mesh is placed across the inguinal wall, to reduce the hernia material. The TEP technique enables the discovery and positioning of myopectineal holes

mesh without touching the cavity mesh (13).

Adequate spatial development is essential to the effectiveness of laparoscopic inguinal hernia surgery. As the main distinction between TAPP and TEP is the approach of preperitoneal space formation, it is a significant differentiating parameter for comparing these two methods. In order to provide room in TEP, we did not use separate balloon dissectors, which did not cause any extra costs owing to advanced devices. Assessment of the complexity of creating room for laparoscopic hernia is generally a subjective criterion without a well-defined scoring method, so an indigenous scoring system is used to evaluate the development of space. Proper spatial development is closely linked to structural recognition during surgery (14).

In all TAPP cases, space construction was defined as simple while in only 13.33% TEP cases they were classified as easy.

TEP is higher than TAPP when administered beyond the peritoneal cavity, contributing to less problems inside the abdomen. Less peritoneal access-related injury, including port-site hernias, lower incidences of pneumoperitoneum-related problems, less mesh-related adhesions to the intestine, lower requirement for mesh fixation (intact peritoneum), potential spinal anaesthesia and viability of interabdominal attachments are the theoretical benefits. In cases with various intrabdominal operations and in ambiguous diagnosis, TAPP can be preferable to TEP. It also makes it possible to identify the reverse

hernia better and is a much easier treatment with steeper learning curve (15).

This thesis aims to equate two of the better and least intrusive TAPP and TEP laparoscopic techniques.

The research was conducted at university hospitals in Benha and involved 50 male patients, all representing the high sex predominance of this condition. The survey community age ranged from 18 to 60 years with an average of 42.5 ± 12.3 years.

The patients are randomised into two classes using the screened envelope method, resulting in approximately identical patient characteristic groups

In the TAPP party, bleeding was mild and did not adversely influence their haemodynamics. The preperitoneal space was developed, and one of the branches of the lower epigastric vessels was the source. The vessel was quickly found and diathermed. Bleeding in the TEP community was also not relevant and was effectively monitored using diathermy.

Bleeding from lower epigastric vessels is one of the more frequent causes. The inferiorepigastric vessels behind rectal muscles must be identified and these vessels can be ideally left to be held during preperitoneal dissection. This is a central feature of the groyne, which distinguishes the inguinal hernia defects directly and indirectly. Dissecting the lower epigastric arteries from the rectal muscles can lead to further bleeding throughout the operation and finds it impossible to place the mesh (16).

In the third case, irregular sealing vessels crossing the pubis which created an extensive ecchymotic bleeding range across the pubis covered by a thin layer of transversal fascism are thought to be the cause. The bleeder was not evident and was considered a vein partly squeezed by the insufflation gas strain. The strain of insufflation was minimised to recognise the bleeding vessel.

However, bleeding stopped spontaneously and after gas pressure correction the procedure was resumed.

Around 25% of the cases have aberrant shutter vessels that can contribute to unexpected bleeding if not adequately identified (17).

These vessels are branches of the lower pigastrian vessels which move over the upper pubic ramus through the shutter foramen, which separates anatomy from the harmful vessels (14).

Our analysis failed to experience any major vessel wounds, including outside iliac and deep circumflex iliac vessels, as the doom

triangle and the job surgeons were properly identified in our hospitals.

The peritoneal tear was more frequent in the TEP population in 6/50 patients (12 percent).

The pneumoperitoneum culminating in (TEP) caused the operating room to be lost. The condition was controlled by inserting a Veress needle to decompress the peritoneal cavity, and increase the breath pressure to 15 mmHg to preserve the preperitoneal space. This occurrence considerably improved the duration of operation.

Some surgeons like to suture peritoneal tears, but we did not do this in our research.

The conversion rate is estimated to be between 0.5% which 5%, and is normally attributable to significant tears, bad bleeding or visceral injury management (18). Fortunately, there was no case of conversion in our research. In our research, visceral damage was not caused by better learning curve and abilities.

This trivial visceral injury and lack of urinary bladder injury is consistent with several studies which consider laparoscopic approach to be healthy (19) and the earlier disappointing findings which are assumed to have been linked to the early phase of the study curve.

In our sample, 14/50 (28%) of patients experienced postoperative complications. Our patients have all experienced postoperative symptoms well monitored and accepted. A second operational interference was not essential since most problems were handled in a cautious way that reflected the overall protection of the procedures.

Postoperative problems in both groups were around 28 percent equal, with no major differences between our sample groups.

The most frequent post-op complication was inguinoscrotal inflammation due to the seroma development affecting 4/50 (8%) of our patients, distributed equivalent ((8%) in TAPP and 1 (8%) in TEP) among all the research classes. This occurred mostly in patients with massive hernial sacks, like inguinal hernia. It was also obvious in severe liver disorder situations.

Our procedure in these patients is to restrict hernia separation from the cord by ligation and transaction of the hernia and to reduce the proximal portion when the distal part is open. Operating blood and discharge collected at the distal level.

Such patients were treated conservatively without bags, obsolete fascia transversalis at its bulging peak may be grabbed, invaginated and then the anterior abdominal wall or Cooper's ligament was brought to its apex. The use of the redundant fascia transversalis may also be

attempted by placing the end loop PDS at its foundation. On the opposite, some surgeons felt that this was not appropriate and that after ingestion of fluids the dead space fell naturally (20).

The inguinoscrotal seroma looked like recurrent hernia and needed ultrasound in two patients to exclude recurrence. Three days followed by postoperative dressing and scrotal help along with "α- chemotrypsin" injection

6. Conclusion

Both the TAPP and TEP procedures are deemed effective because patients had tolerated all peri-operative problems and a second operative procedure was not essential. Intraoperational problems for the TAPP community had comparable findings when both procedures had more vascular and visceral injury whereas the TEP group had more peritoneal tears and transfer. The repair of TAPP with steeper learning curves in our sample is even simpler than the repair of TEP, which was physically harder shown by increased operation, conversion, and secondary bleeding. TEP repair patients had more severe post-operative discomfort in comparison with TAPP repairs expressed as a result of reduced pain and analgesic intakes. TEP repair involves shorter hospital stays and quick return to daily life. Our data show that TEP is a comparatively stable peritoneal repair, while TAPP provides a strong visualisation and a simple learning curve.

7. References

- [1] AM.Mark, JR.Michael. Hernias. In: Townsend CM, Beauchamp RD, Evers BM, eds: Sabiston textbook of Surgery, 20th ed. Philadelphia: Elsevier.vol.8,pp.1092-1119,2017.
- [2] DA. Sherwinter. (Laparoscopic Inguinal Hernia Repair, Medscape Reference, <http://emedicine.medscape.com/article/1534321-overview>. 2013.
- [3] RM.Kleigman , BF. Stanton , JW. Geme . Nelson Textbook of Pediatrics, Philadelphia, 19th edition.vol.8,pp.77-98,2011.
- [4] A.Currie, H.Andrew, A.Tonsi . Lightweight versus heavyweight mesh in laparoscopic inguinal hernia repair: a meta-analysis, Surg Endosc., 8th edition..vol.7,pp.1-48,2012.
- [5] ME.Arregui, CJ.Davis, O.Yucel and R.Nagan. (Laparoscopic mesh repair of inguinalhernia using a preperitoneal approach : apreliminary report. Surg Laparosc Endosc.vol.2(1),pp.53-8,1992.

- [6] A.Bangash and N.Khan. Fixation in laparoscopic incisional hernia repair: Suture versus tacks, *J Sci Soc*.vol.40,pp.84-9,2013.
- [7] L.W. Lee. Sutures and Tacks Show Similar Results in Ventral Hernia Repair, *Medscape Reference*, <http://www.medscape.com/viewarticle/555587>.vol.2,pp.9-33,2007.
- [8] M.Carter and J.Duh. Prospective randomized controlled trial of laparoscopic versus open inguinal hernia mesh repair, *BMJ*.vol.326,pp.1012–1013,2011.
- [9] H.Kulacoglu. Current options in inguinal hernia repair in adult patients. *Hippokratia*.vol.15(3),pp.223–31,2011.
- [10] A.Eklund, P.Carlsson, A.Rosenblad . Long-term cost- minimization analysis comparing laparoscopic with open (Lichtenstein) inguinal hernia repair. *The British Journal of Surgery*.vol.97(5),pp.765–71,2010.
- [11] Veterans Affairs Cooperative Studies Program 456 Investigators. Open mesh versus laparoscopic mesh repair of inguinal hernia. *N Engl J Med*.vol. 350(18),pp. 1819–27,2011.
- [12] A.Stavros, A.George, K.Detlef . Transabdominal preperitoneal versus totally extraperitoneal repair of inguinal hernia: a meta-analysis of randomized studies. *The American Journal of Surgery*.vol. (206),pp. 245-252,2013.
- [13] SA.Antoniou, GA.Antoniou, DK.Bartsch . Transabdominal preperitoneal versus totally extraperitoneal repair of inguinal hernia: a meta-analysis of randomized studies. *American Journal of Surgery*.vol. 206,pp. 245–252,2013.
- [14] RV.Cohen, CA.Schiavon, S.Roll . Complications and their management. In: *Laparoscopic hernia surgery an operative guide*. First edition. Edited by Karl A. LeBlanc.vol. 12,pp.89-95,2003.
- [15] EL.Felix, CA.Michas, MH.Gonzalez. Laparoscopic hernioplasty. TAPP vs TEP. *Surgical endoscopy*.vol. (9),pp. 984–989,1995.
- [16] B.Kim and QY.Duh. Surgical pitfalls Laparoscopic Inguinal Hernia Repair.vol.(51),pp.514-521,2009.
- [17] S.Putnis And C.Berney. Totally extraperitoneal repair of inguinal hernia: techniques and pitfalls of a challenging procedure. *Langenbecks Arch Surg*.vol.397,pp.1343–1351 ,2012.
- [18] MS. Liem , van CJ. Steensel , RU. Boelhouwer. The learning curve for totally extraperitoneal laparoscopic inguinal hernia repair. *The American Journal of Surgery*.vol.171(2),pp. 281-285. ,1996.
- [19] WJ .Wang, JZ. Chen, Q. Fang . Comparison of the effects of laparoscopic hernia repair and lichtenstein tension- free hernia repair. *J Laparoendosc Adv Surg Tech A*.vol. 23(4),pp. 301–5,2013.
- [20] G.Voeller . Inguinal Hernia Repair. In: *Management of Laparoscopic Surgical Complications*, first edition. Edited by Leblanc K.A., Marcel Dekker.vol.15,pp. 277-284,2004.
- [21] TJ.Aufenacker , MJ.Koelemay , DJ.Gouma. Systematic review and metaanalysis of the effectiveness of antibiotic prophylaxis in prevention of wound infection after mesh repair of abdominal wall hernia. *Br J Surg*.vol. 93,pp. 5-10,2006.
- [22] MV.Sivasankaran, T.Pharm, C.Divino. Incidence and risk factors for urinary retention following laparoscopic inguinal hernia repair. *Am J Surg*.vol. (13),pp. 505-9,2013.
- [23] M.Lepere, S.Benchetrit, M.Debaert . Multicentric comparison of transabdominal versus totally extraperitoneal laparoscopic hernia repair using PARIETEX meshes. *Journal of the Society of Laparoendoscopic Surgeons*.vol.4(2),pp.147-53,2000.
- [24] I.Baca, C.Schultz, V.Gotzen . Laparoscopic inguinalherniarepair. A review of2500 cases. *Proceedings of the 7th World Congress of Endoscopic Surgery*.vol.9,pp. 425-30,2000.
- [25] K.McCormack, NW.Scott, PM. Go . Laparoscopic techniques versus open techniques for inguinal hernia repair. *Cochrane Database Syst Rev*.vol. 1,pp. 777-785,2003.
- [26] S.Nienhuijs, E. taal, L. Strobbe . Chronic pain after mesh repair of inguinal hernia: a systematic review. *Am J Surg*.vol. 194(3),pp. 394-400,2017.