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Inguinal Hernial Repair, Laparoscopic versus Open Approach

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Abstract

Background: Hernia occurs when soft tissue (usually omentum) or part of the intestine protrudes through a weak point in the abdominal muscles. In our study, comparison is between laparoscopic and open approaches in inguinal hernia repair.

Patients and Methods: Our study include a 30 patients with inguinal hernia subjected to hernioplasty in the Department of Surgery, Assiut University. Group A: 15 patients subjected to open surgery and Group B: 15 subjected to laparosopic surgery.

Results: In comparison between Group A and B the operative time is more in laparoscopic group, with more postoperative pain in open group, and more post-operative pain in laparoscopic group.

Conclusion: Assessment of laparoscopic inguinal hernia repair found that it has some advantages that make them more preferable than open repair: Less post-operative pain, less recovery time the patient returns quickly to their full activities, diagnostic laparoscopy was performed together with hernia repair, hernia sac repair at the highest possible site, more cosmotic incision with decrease in incidence of recurrent hernia. Some disadvantages may appear with laparoscopic hernia repair as: Bladder, bowel, vascular injuries, the need of general anesthesia, with increase cost of the operation. Laparoscopic hernia repair has a role in management of patients with recurrent hernia or bilateral inguinal hernia.

Key Words: *Inguinal hernia – Hernial repair – Laparoscopic – Open approach.*

Introduction

THERE are two types of inguinal hernia: Indirect and direct.

Indirect inguinal hernia occurs when tissue protrudes through the deep inguinal ring, travels into the canal and then exits at the superficial inguinal ring. Direct inguinal hernia occurs when tissue protrudes through the floor of the canal.

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We will compare between the two general types of hernia operations-open hernia repair and laparoscopic repair.

In the open type, the Lichtenstein tension-free mesh repair, is currently one of the most popular open inguinal hernia repair techniques.

In the laparoscopic type, the most common techniques are Trans Abdominal Preperitoneal (TAPP) repair and Totally Extraperitoneal (TEP) repair. In TAPP the surgeon goes into the peritoneal cavity and places a mesh through a peritoneal incision over possible hernia sites. TEP is different in that the peritoneal cavity is not entered and mesh is used to seal the hernia from outside the peritoneum. This approach is considered to be more difficult than TAPP but may have fewer complications. Laparoscopic repair is technically more difficult than open repair. Vascular injuries and mesh infections were rare and there was no obvious difference between the two techniques **[1-3]**.

Patients and Methods

Between March 2015 and March 2016, a total of 30 patients with inguinal hernia (including 3 cases direct and 27 indirect) were subjected to hernioplasty in the Department of Surgery, Assiut University. Group A: 15 patients were subjected to open surgery and Group B: 15 were subjected to laparosopic surgery. History taking in this study included personal history, history of present illness, other body system problems especially that cause straining as chest problems, constipation, pros-

Abbreviations:

TAPP : Trans Abdominal Preperitonel.
TEP : Totally Extraperitoneal.
LIHR : Laparoscopic Inguinal Hernia Repair.
OIHR : Open Inguinal Hernia Repair.
VAS : Visual Analog Scale.

tatism, past history of medical disease and previous operations.

Clinical examination included: General, chest, abdominal, PR and local examination of the inguinal region to confirm inguinal hernia diagnosis, its type and confirm presence or absence of complications.

Investigations required for the patients included complete blood count, coagulation profile, ECG, chest X-ray.

Surgical procedures:

A- Open hernioplasty:

Lechtenstein tension free mesh repair which is one of the most popular open inguinal hernioplasty was carried out in our cases through: Opening of subcutaneous fat along the line of incision, opening of Scarpas fascia, visualization of the external ring and lower border of inguinal ligament, division of external oblique appearance from external ring up to 5cm, mobilization of the spermatic cord, opening of its coverings, identification and isolation of hernial sac followed by ligation and resection of the sac then placement and fixation of the mesh to the edges of the defect or weakness in post wall.

B- Laparoscopichernioplasty:

The operation was done under general anesthesia with complete aseptic precautions. The patient was placed in supine position. Urinary catheter and Ryle's tube were inserted after anesthesia was completed. Antibiotics prophylaxis was given just before the operation.

Totally Extra peritoneal hernioplasty (TEP) was done through the following steps: Creation of preperitoneal space with patient in Trendelebing position, infraumblical Hasson's trocar was inserted by open technique then other trocars were added, exposure of abdomen was done by pneumoperitoneum which is adjusted at 14mm/Hg, wide dissection of preperitoneal space with blunt grasps, then placement of polypropylene mesh to inguinal region.

Transabdominal preperitoneal (TAPP) is done through the following steps: Pneumoperitoneum is established through a small infraumblical incision, creartion of peritoneal flap with extreme care to avoid inf-epigastric vessels, identification of spermatic vessels, medial umbilical ligament, inferior epigastric vessels and external iliac vessels, creation of peritoneal flap through a transverse inscision in the peritoneum, dissection of hernia sac from spermatic cord, Hasselbech's triangle surrounding structures, then Placement of polypropylene mesh into the posterior inguinal wall **[4-10]**.

The two groups are compared for:

1- Type of anesthesia.
2- Operative time.
3- Operative blood loss.
4- Post-operative pain and use of analgesics.
5- Post-operative hospital stay.
6- Post-operative recovery.
7- Post-operative complications.

Follow-up:

- Post-operative analgesia.
- Half liter of fluid as supportive.
- Discharge after 24-48 hours if possible.
- Patients are advised to resume their usual activates as they see fit.

Then follow-up at outpatient clinic after one week, one month, then every 3 months.

Results

In this study, 30 patients underwent inguinal hernioplasty including open Lichtenstien (15 cases) and laparoscopic TEP (4 cases) and TAPP (11 cases).

Gender: 28 patients were males (93.3%) with only 2 patients were females (6.7%) who underwent laparoscopic TAPP hernioplasty.

Socio-demographic variables:

Age: The mean age of open method was 38, while the mean age of laparoscopic group was 39.6 years.

BMI: The mean BMI of open method was 26.07, while mean BMI of laparoscopic group was 25.3.

Smoking: 17 patients (56.6%) in this strudy were smokers.

Work: Most of our patients were farmers (15 cases).

Comorbitidies:

In the open group there was one patient has fatty liver, in the laparoscopic group one patient had fatty liver, one patient was diabetic and hypertensive, and one patient had ischemic heart disease.

Site of hernia:

In patients with the open method thirteen patients (86.6%) from Group A had indirect inguinal

hernia and two patients (13.3%) had direct inguinal hernia. Eight patients were right sided hernia, four patients were left sided hernia, two patients had bilateral hernia and one patient had recurrent hernia.

In Group B fourteen patients (93.3%) had indirect inguinal hernia and one patient (6.7%) had direct inguinal hernia. Seven patients were right sided hernia, four patients were left sided hernia, two patients had bilateral hernia and two patients had recurrent hernia.

Type of anesthesia:

All open cases are done under Spinal Anesthesia (SA), and all laparoscopic cases are done under General Anesthesia (GA).

Procedures:

All open cases were done using Lechnetien procedure.

11 cases (73.3%) of laparoscopic methods are done using TAPP procedure and 4 cases (26.6%) were done using TEP procedure.

Operative time:

The mean operative time for the open method was 51 minutes (with range from 25-110).

The mean operative time for the laparoscopic methods was 89 minutes (with range from 35-175).

There is a significant *p*-value between two groups 0.01.

Intraoperative blood loss:

For the open method the average blood loss was 20cc (range from 0-50cc).

For the laparoscopic method the average blood loss was 16cc (range from 0-45cc).

Post-operative pain:

According to patient's need to pain killer post-operativly, there were significant *p*-value (0.00) between the two groups with less doses of analgesics (ketolac) in the laparoscopic group.

For the open method the average need of ketolac ampoules was 4 amp (range from 2-6).

For the laparoscopic method the average need of ketolac ampoules was 2 amp (range from 1-4).

Post-operative complications:

All post-operative complications resolved spontaneously without need for surgical intervention.

For the open method seroma was found in 2 cases (13.3%), wound infection in 2 cases (13.3%), urinary retention in 2 cases (13.3%) and scrotal edema in 4 cases (26.7%)

For the laparoscopic method seroma was found in 1case (6.7%), no cases of wound infection was found, pneumoperitoneum was found in 1 case (6.7%), urinary retention in 2 cases (13.3%) and scrotal edema in 2 cases (13.3%).

Post-operative hospital stay:

For the open method the average hospital stay was 2 days (range from 1-3 days).

For the laparoscopic method the average hospital stay was 3 days (range from 2-4 days).

According to post-operative hospital stay there was a significant *p*-value between 2 groups.

Post-operative recovery:

For the open method return to work ranged from 1-2 weeks.

For the laparoscopic cases return to work ranged from 3 days-1 week.

Recurrence:

There is no recurrence in both open and laparoscopic methods during the follow-up period of 1 year.

Table (1): Gender of patients, socio-demographic variables, comorbidities.

	Open method N (%)	Laparoscpic N (%)	Total N (%)	*p*-value
Sex:				
Male	15 (100%)	13 (86.7%)	28 (93.3%)	
Female	0 (0%)	2 (13.3%)	2 (6.7%)	0.5
Occupation:				
Farmer	7 (46.7%)	8 (53.3%)	15 (50%)	
Students	3 (20%)	4 (26.7%)	7 (23.3%)	
Solders	3 (20%)	2 (13.3%)	5 (16.7%)	
Employments	2 (13.3%)	1 (6.7%)	3 (10%)	
Habitat:				
Smoker	3 (20%)	4 (26.7%)	7 (23.3%)	
Non smoker	12 (80%)	11 (73.3%)	23 (76.6%)	
Age:				
Mean ± SD	38±	39.6±	38.8±	0.7
Comorbidities:				
Fatty liver	1 (6.7%)	1 (6.7%)	2 (6.7%)	
Diabeties	0 (0%)	1 (6.7%)	1 (3.3%)	0.7
Ischemic heart	0 (0%)	1 (6.7%)	1 (3.3%)	
Site of hernia:				
Right	11 (53.3%)	11 (46.7%)	15 (50%)	
Left	6 (26.7%)	6 (26.7%)	8 (26.7%)	
Bilateral	2 (13.3%)	2 (13.3%)	4 (13.3%)	
Recurrent	1 (6.7%) (R)	2 (13.3%) (R)	3 (10%)	
Direct	2 (13.3%)	1 (6.7%)	3 (10%)	0.8
Indirect	13 (86.7%)	14 (93.3%)	27 (90%)	

Table (2): Operative and post-operative outcomes (type of anesthesia, procedure, mesh size, operative time, operative blood loss, hospital stay, post-operative pain, post-operative recovery and return to work, recurrence).

	Open method N (%)	Laparoscpic N (%)	Total N (%)	*p*-value
Type of anasethesia:				
Spinal	15 (100%)	0 (0%)	15 (50%)	
General	0 (0%)	15 (100%)	15 (50%)	
Procedures:				
Lechtenstein	15 (100%)	0 (0%)	15 (50%)	
TAPP	0 (0%)	11 (73.3%)	11 (36.6%)	
TEP	0 (0%)	4 (26.6%)	4 (13.3%)	
Operative time:				
Mean	51min	89min		0.01*
Intraoperative blood loss:				
Average blood loss	22cc (0-50)	16cc (0-45)		0.4
Post-operative pain:				
Average number of NSAID amp	4 amp	2 amp		0.00*
• Post-operative hospital stay in days	2	3		0.00*
• Return to work	1-2 week	3 days-1 week		

Table (3): Post-operative complications.

	Open method N (%)	Laparoscpic N (%)	Total N (%)	*p*-value
Post-operative complications:				
• Seroma	2 (13.3)	1 (6.7)	3 (10)	0.5
• Wound infection	2 (13.3)	0 (00)	2 (6.6)	
• Pneumoperitonium	0 (0)	1 (6.7)	1 (3.3)	
• Urinary retention	2 (13.3)	2 (13.3)	4 (13.3)	
• Mild scrotal Oedema	4 (26.7)	2 (13.3)	6 (20)	

Discussion

Tension free repair of inguinal hernia with non-absorbable mesh insertion was popularized instead of another old techniques which include approximation of non anatomically opposed tissues under tension as McVay, Bassini, Shouldice due to high rate of recurrence.

Open anterior tension free mesh hernia repairs (Lichtenstein, patch and plug, Prolene hernia system) are the most commonly employed methods of hernia repair today. These repairs which are technically straight forward, have low risk. However, Laparoscopic Inguinal Hernia Repair (LIHR) may have advantages in certain groups of patients, especially those with bilateral or recurrent hernias. Despite evidence from numerous prospective, randomized trails demonstrating that LIHR results in reduced pain and a faster recovery when compared to open inguinal hernia repair. Only 13% of inguinal hernia repairs done are carried out laparoscopically. A number of reasons are present for the lack of more widespred penetration of LIHR, including the more technically demanding nature of the procedure, increased operative cost due to laparoscopic supplies, the need for general anesthesia, and longer operative times.

Our study was more centered on other outcomes of interest such as operative time, post-operative pain, post-operative complications, post-operative hospital stay, time to return to normal daily activities, and recurrence.

Our weakness in this study is the fact that while patients were matched on as many factors as possible, the process resulted in moderately smaller samples. A large sample would likely provide stronger results in this measure.

In our study all open cases were done by spinal anesthesia, and all laparoscopic cases were done by general anesthesia with no affection of anesthesia in the speed of recovery. Consultation with the patient about benefits and risks of anesthesia was done.

The main disadvantage of laparoscopy is the duration of the operation as the mean operative time was significantly longer in laparoscopic than in Lichtenstein group. The longer duration of laparoscopy is related to the need of completing the learning curve (the average time for an experienced attending surgeon to perform the procedure was almost half that of less experienced surgeons).

This result is consistent with our study which showed significant longer duration of laparoscopic group which was 1.75 times greater than open group.

Prolonged post-operative groin pain following hernia surgery is a potentially difficult problem for both the patient and the surgeon. Fleix El et al., [11] showed that 5.3% of patients had some degree of residual pain after open mesh repair at 3 months or more postoperatively, compared to 1.4% after TEP repair. In most cases the pain resolved with time and conservative management. Similarly low rates of post-operative pain after TEP repair have been showen by others as well. Other recent trials showed asignificantly reduced rate of prolonged post-operative groin pain with TEP repair compared to open repair.

Dedemadi G et al., **[12]** reported the results about post-operative pain evaluation by VAS score. In this study the laparoscopic approach showed better results in terms of post-operative pain and reduced consumption of pain relievers, which is an expected outcome of laparoscopy over the open technique.

European Hernia Trialists Collaboration **[13]** reported that laparoscopic inguinal hernia repair was associated with less early post-operative pain and disability and earlier return to full activities than open repair, but there were no benefits regarding post-operative hospital stay and return to work; laparoscopic repair was also more costly.

Our study found that post-operative pain was less with laparoscopic hernioplasty, with less disability and early return to work.

Few intraoperative complications with no visceral injuries and no port site hernia in our study showed the feasibility and safety of the laparoscopic procedure when compared with anterior open one.

In Memon M et al., **[14]** it was observed that the odds of complication for OIHR were 1.76 times greater than LIHR. With more than 3% of OIHR patients having complication compared to 1.8% of those having LIHR, the outcomes clearly favor the laparoscopic technique. It is important for the physician and patient to understand the benefits of surgery in the light of surgery cost differences.

Nordin P **[15]** showed that post-operative urinary infection/retension was similar in both laparoscopic and anterior open group, but this complication was generally related to type of anesthesia general and spinal rather than to different surgical approaches.

In our study urinary retention was found in 20% of all cases with no significant difference which is attributed as mentioned in other studies to anesthesia not to difference in surgical approaches.

Sarli L et al., **[16]** reported that wound infection and post-operative hematomas were more frequent in the anterior open group. The prevalence of post-operative hematoma/seroma was 15.3% in the laparoscopic versus 28.1% in the anterior open group, and this difference was statistically significant. Moreover, just few hematomas needed surgical evacuation.

In our study post-operative wound infection and seroma was found in 20% of the open group versus 13.3% of the laparoscopic group with no statistical difference between the two groups.

European Hernia Trialists Collaboration **[13]** found that laparoscopic hernioplasty was associated with increased risk of rare, but serious, complications.

In our study Peritoneal tear and pneumoperitonium was reported in one case with TEP with no significant difference between two groups in other complications.

No recurrence in both open and laparoscopic groupsoccured in our study, McCormack K et al., **[17]** reported that there is no apparent difference in recurrence between laparoscopic and open mesh methods of hernia repair. Return to usual activities is faster however, operation times were longer and this appear to be a higher risk for serious complication rate in respect of visceral (especially bladder) and vascular injuries.

Pokorny H et al., **[18]** reported that in multicenter study, no significant difference in the recurrence rate and complications between laparoscopic and open methods of hernia repair was revealed.

Conflicts of interest:

No conflict of interest has been declared.

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إصلاح الفتق الإربى عن طريق الجراحة أو عن طريق المنظار

توجد الكثير من الأسباب التى تؤدى لحدوث أو تزيد قابلية الإصابة بالفتق الإربى، ومن أهم هذه الأسباب: زيادة الضغط داخل البطين، ضعف آليات المسئولة عن وقاية القناة الإربية، المجهود العضلى الزائد، التدخين، التأثير الجينى، التقدم فى السن وغيرها، ويعتبر إصلاح الفتق الإربى ضرورى لمنع حدوث مضاعفات.

قديما كانت العمليات الجراحية الخاصة بإصلاح الفتق الإربى تعتمد على إصلاح الفتق بإستخدام أنسجة القناة الإربية ومن عيوبها أنها تحمل نسبة كبيرة لتكرار الفتق مما دفع الجراحين لمحاولة إبتكار طرق جديدة لإصلاح الفتق الإربى.

توصل الجراحين لطرق جديدة إصلاح الفتق الإربى تعتمد فى أساسها على إستخدام شبكة صناعية إصلاح الفتق بدون شد عضلات القناة الإربية، ويمكن إجراء هذه العملية عن طريق الفتح الجراحى أو عن طريق المنظار، ويتميز هذا النوع عن النوع الأول أن نسبة حدوث تكرار الفتق بعد إصلاحه قلت بشكل كبير مما يجعل الكل يفضلها الآن.

من هذه الطرق إصلاح الفتق بإستخدام شبكة صناعية طريقة ليخنشتاين المستخدمة فى هذه الدراسة فى حالات الفتح الجراحى، والتى تعتمد على تثبيت شبكية برولين على الجدار الخلفى للقناة الإربية، وتتميز طريقة ليخنشتاين ببساطة التقنية المستخدمة وقلة تكاليفها مع وجود قبول من المرضى لنتائج هذه العملية ومع وجود نسبة ضئيلة جدا لتكرار الفتق بعد إصلاحه.

كما توجد أيضا طرق أخرى لإصلاح الفتق الإربى عن طريق المنظار الجراحى مثل إصلاح الفتق الإربى بالكامل من خارج التجويف البريتونى، وإصلاح الفتق الإربى بالمنظار من خلال التجويف البريتونى.

تم إجراء دراسات عديدة تقارن بين طريقة ليخنشتاين لإصلاح الفتق الإربى وبين إصلاح الفتق الإربى عن طريق المنظار وتبين من خلال هذه الدراسات أن كلا الطريقتين مكافئتين لبعضهما فى إصلاح الفتق الإربى على ناحية واحدة مع وجود بعض الإختلافات مثل قلة الألم بعد العملية وسرعة عودة المريض لممارسة عمله فى فترة قصيرة بعد المنظار ولكن تبين أن إستخدام المنظار الجراحى يستغرق وقتا أطول ويتطلب تدريبا مكثفا لإتقان العملية.

وتبين أيضا من خلال الدراسات أن إصلاح الفتق الإربى عن طريق المنظار بالكامل من خارج التجويف البريتونى أفضل من طريقة ليخنشتاين فى حالة الفتق الإربى على ناحيتين أو فى حالة الفتق الإربى المرتجع.

فى هذا البحث تم إجراء مقارنة بين عملية إصلاح الفتق الإربى بطريقة ليخنشتاين على ١٥ مريض وإصلاح الفتق الإربى بالمنظار الجراحى على ١٥ مريض آخر وتبين الآتى:

- أنها تسبب آلاما أقل بعد العملية.
- قصر فترة النقاهة مما يسمح للمريض بممارسة نشاطاته خلال فترة قصيرة.
- شكل الجرح أفضل.

وبالنظر إلى عيوب إصلاح النفق الإربى بالمنظار:

- تكلفة أعلى من إصلاح الفتق الإربى بطريقة ليخنشتاين.
- إستخدام التخدير العام بينما يمكن إستخدام التخدير النصفى أو الموضعى فى حالة الفتح الجراحى.