The Egyptian Journal of Hospital Medicine (April 2023) Vol. 91, Page 5207- 5211

The Management of Indirect Inguinal Hernia Sac in Laparoscopic Transabdominal Pre-Peritoneal Procedure Hernia Repair

Wesam M. Amr, Amr AbdelBari, Nour Alddeen Alhadi Mihedi Alfirjani *, Ahmed Shafik Mohamed El Hefnawy

Department of General Surgery, Faculty of Medicine, Zagazig University, Egypt

***Corresponding author:** Nour Alddeen Alhadi Mihedi Alfirjani, **Mobile:** (+20) 01090279830, **E-mail:** Nooralforjany**@**gmail.com

ABSTRACT

Background: Of all the hernia varieties, groin hernias are the most prevalent. A gap in the endo-abdominal fascia known as an inguinal hernia is large enough to allow the evacuation of intraperitoneal or preperitoneal contents into the groin.

Aim of study: To evaluate various hernia sac management strategies either sac transacted or sac reduction regarding feasibility and complications if both hernia repair is done laparoscopically using the Trans Abdominal Pre-Peritoneal (TAPP) surgery.

Patients and methods: A randomised controlled clinical trial was conducted for this study at Zagazig University Hospitals' General Surgery Department through the period from Jul 2022 to Jan 2023. This study included 24 adult candidates for indirect inguinal hernia repaired laparoscopically with transabdominal preperitoneal repair of inguinal hernia sac. Potential patients with indirect inguinal hernias that need laparoscopic transabdominal preperitoneal repair were classified into two groups. Group (**A**): Underwent indirect hernia sac transection and group (**B**) that underwent complete sac reduction.

Results: The post-operative problems did not alter noticeably (scrotal edoema). In terms of post-operative pain, group A had statistically significantly higher mean pain at 12 hr post-operative. In relation to postoperative hospitalisation, there was no statistically significant difference between the study groups. Scrotal edema in group A at follow-up was 24.9%, compared to 8.3% in group B without statistical significance while recurrence was reported in 16.7% of the patients among group A and 8.3% with group B.

Conclusion: Full sac reduction and hernia sac transection are both dependable and safe procedures.

Keywords: Inguinoscrotal hernia, Inguinal hernia, Groin hernia.

INTRODUCTION

Of all the hernia varieties, groin hernias are the most prevalent. A gap in the endoabdominal fascia that is large enough to allow the evacuation of intraperitoneal or preperitoneal contents into the groin is known as an inguinal hernia. Typically, inguinal hernias manifest as a lump that may be uncomfortable and hinder everyday activities and employment opportunities [(1)].

Around **98%** men are more likely to have inguinal hernias than women because of the propensity of the male anatomy to the formation of hernias in this area. When the bowel inside the peritoneal sac chokes, becomes obstructed, or both, inguinal hernias can occasionally be deadly. One of the commonest general surgical operations is the correction of inguinal hernias [(2)].

Inguinal hernias are being treated more frequently using laparoscopic hernia repair as a result of the advancement of laparoscopic procedures. Transabdominal preperitoneal **(TAPP)** resection is one of these methods of repair, which is most frequently used. **TAPP** has been shown to lessen the likelihood of postoperative discomfort, minimise hospital stays, and speed up patients' recovery. The high technical demands and higher medical expenditures of laparoscopic hernia surgery, however, may result in a rise in the frequency of inguinal hematomas and the length of the procedure during the early learning period [(3)].

With so few studies on this topic in the literature, laparoscopic repair of treatment options for hernial sacs and inguinal hernias are still up for debate. The hernial sacs should be transected in situations with difficult-to-treat indirect hernias to prevent spermatic cord damage and lower the risk of scrotal hematoma. The cord structures or testis blood flow have both been observed to be at risk when large indirect sacs are completely dissected [(4)].

Large and potentially dangerous seromas, pseudohydrocele, or hematomas may develop if the distal sacs are not completely dissected. Age, significant hernial abnormalities, hernia extension and presence of a residual distal indirect sac into the scrotum are among the clinical variables linked to seroma formation [(5)]. The most frequent early mild consequence following inguinal hernia repair is seroma, which is an accumulation of sterile serum in the limited area of tissue. Seromas often go away in a few weeks, although can occasionally cause a lot of other problems. One of the most difficult side effects, an infected seroma may necessitate mesh removal and hernia recurrence. Patients may also mistake a seroma for a persistent or recurring hernia [(6)].

PATIENTS AND METHODS

After obtaining the expressed permission of all patients, this randomized controlled trial investigation was completed at Zagazig University's General Surgery Department Hospitals through the period from July 2022 to January 2023. Including 24 adult patients for inguinal hernia sac repair with laparoscopic transabdominal preperitoneal procedure.

Received: 30/12/2022
Accepted: 03/03/2023

Inclusion criteria: Age > 18 years, adult male, those who have an indirect inguinal hernia and uncomplicated inguinoscrotal hernia.

Exclusion Criteria: Age < 18 years, patients unfit for anesthesia, patients unfit for surgery, complicated inguinoscrotal hernia and patients refused surgical procedure.

The patients were split into two groups, 12 in each group: **Group (A)** underwent indirect hernia sac transection. **Group (B)** underwent complete sac reduction.

Preoperative evaluations:

Every patient underwent a thorough history taking, standard clinical examination, including an examination of the scrotum and inguinal region to determine the kind of inguinal hernia present and whether any complications existed. Tests for the liver, kidneys, coagulation profile, complete blood count, fasting blood sugar and viral screen. Electrocardiogram (ECG) and Echocardiography was requested for patients over 40 years of age. Abdominal and scrotal ultrasound and CT abdomen and pelvis if needed.

Postoperative management and follow up:

Following surgery, 4 hours later, a liquid diet is advised and antibiotics coverage by third-generation cephalosporin after 12 hours from operation, all patients received a single dose of pethidine hydrochloride 50 mg intramuscular during early postoperative period, Elastic compression stockings and low molecular weight heparin are added if necessary, after that analgesia was maintained by nonsteroidal anti-inflammatory drugs (Diclofenac sodium 50 mg) orally upon discharge , If a urinary catheter is used, it is removed six hours following surgery and patients were discharged postoperatively with abdominal and scrotal ultra sound, careful follow up scheduled for all patients weekly for one month then every two weeks for two months to compare between the 2 groups regarding seroma formation at outpatient clinic. Patients continue to take oral analgesics (Paracetamol, Ketoprofen) at home as needed.

Ethics approval:

The protocol for this study was approved by both the Institutional Review Board [IRB] and The Local Ethics Committee at Zagazig University's Faculty of Medicine and in light of the Helsinki Declaration.

Statistical Analysis

The SPSS programme (Statistical Package for Social Science) was used. The collected data were 5208 omputerized and statistically analysed using version 22. The Shapiro Walk test was used to determine whether the data distribution was normal. To represent qualitative data, frequencies and relative percentages were used. Chi-square calculation (two) was used to determine how much the qualitative factors differed from one another. Quantitative data were expressed using the mean and standard deviation. $P \leq 0.05$ is significant.

RESULTS

The mean age was 30.4 ± 7.3 years and 34.0 ± 9.4 years among groups A and B, respectively. There was no statistically significant difference between the studied groups regarding age (Table 1).

Table (1): Sociodemographic data of the participants

Variable		Group A n= 12	Group B n= 12	P value
Age/year	**Mean ± SD**	30.4± 7.3	34.0± 9.4	0.977

Mann Whitney U test; Chi square test; *p is significant at <0.05

There were 66.7% and 75% heavy workers, while 33.3% and 25% were light workers among groups A and B, with no significant difference. Also, 16.7% and 25% were smokers, while 83.3% and 75% were non-smokers among groups A and B with no significant difference (Table 2).

Table (2): Occupation and smoking among the participants

Variable		Group A n= 12	Group B n= 12	P value
Occupation	**Heavy work, n (%)**	**8 (66.7)**	**9 (75)**	**>0.999**
	Light work, n (%)	**4 (33.3)**	**3 (25)**	
Smoking	**Positive**	**2 (16.7)**	**3 (25)**	**>0.999**
	Negative	**10 (83.3)**	**9 (75)**	

Fisher Exact test; *p is significant at <0.05

Regarding types of hernia, 50% and 41.7% were funicular among groups A and B, respectively. Bubonocele was found in 33.3% and 25% of the patients, and complete was found in 16.7% and 33.3% of the patients respectively with no significant difference (Table 3).

Table (3): Types of hernia among the participants

Variable	Group A NO (%)	Group B NO (%)	P value
Funicular	**6 (50%)**	**5 (41.7%)**	**0.638**
Bubonocele	**4 (33.3%)**	**3 (25%)**	
Complete	**2 (16.7%)**	**4 (33.3%)**	

Fisher Exact test; *p is significant at <0.05

All 24 patients had indirect inguinal hernia with herniated organ was omentocele among 91.7% and 83.3% while enterocele 8.3% and 16.7% among groups A and B respectively (Table 4).

Table (4): Clinical status among the participants

Variable		Group A NO (%)	Group B NO (%)	P value
Conant of hernia sac	**Omentocele**	**11 (91.7)**	**10 (83.3)**	**>0.999**
	Enterocele	**1 (8.3)**	**2 (16.7)**	

Chi-square test; Fisher Exact test; *p is significant at <0.05

All patients were subjected to the operation under general anesthesia, with mean operative time (min) ensuring matching of the groups (p>0.05) was 70 ± 13.52 minutes among group A and 55 ± 12.91 minutes among group B with significant difference where the higher mean duration was in group A . No patient in both groups had bladder or bowel injury. Urine retention occurred in one patient in group A (Table 5).

Table (5): Operative data of the participants

Variable		Group A NO (%)	Group B NO (%)	P value
Operative time(min)	**Mean ± SD**	**70 ± 13.52**	**55 ± 12.91**	**0.009***
Bladder and bowel injury	**No**	**12 (100)**	**12 (100)**	**-**
	Yes	**0**	**0**	
Urine retention	**No**	**11 (91.7)**	**12 (100)**	**>0.999**
	Yes	**1 (8.3)**	**0**	

Student t-test; Fisher Exact test; *p is significant at <0.05

Three individuals with scrotal swelling were recorded; one was in group B, and two were in group A, with no discernible difference between the two groups. According to postoperative pain (VAS) score between study groups, in (group A) was 7.2 ± 0.9, 4.3 ± 1, 1.4 ± 0.8 and 0 at 12hr, 24hr, 1 weak and one month respectively, while in (group B) was 6.2 ± 1.3, 3.7 ± 1.5, 1.1 ± 0.9 and 0 at 12hr, 24hr, 1 weak and one month respectively, with a statistical significant higher mean pain in group A at 12hr post-operative (Table 6).

Table (6): Postoperative complications of the participants

Variable		Group A NO (%)	Group B NO (%)	P value
Scrotal swelling	**No**	9 (75.1)	11 (91.7)	0.140
	Yes	3 (24.9)	1 (8.3)	
Pain VAS score	12 Hr	7.2 ± 0.9	6.2 ± 1.3	0.009*
	24 Hr	4.3 ± 1	3.7 ± 1.5	0.16
	1 weak	1.4 ± 0.8	1.1 ± 0.9	0.263
	1 month	0	0	

Fisher Exact test; *p is significant at <0.05

No statistically significant difference was found between the two studied groups regarding post-operative hospital stay (Table 7).

Table (7): Postoperative hospital stay between the participants

Variable		Group A NO (%)	Group B NO (%)	P value
Postoperative hospital stay	**Mean ± SD**	**1.4± 1.2**	**1.1± 0.5**	**0.114**

Mann Whitney U test; *p is significant at <0.05

Scrotal edema in follow up was 24.9% among group A and 8.3% in group B without statistical significance while recurrence was reported in 16.7% of the patients among group A and 8.3% in group B (Table 8).

Table (8): Follow up [of the participants

Variable		Group A NO (%)	Group B NO (%)	P value
Scrotal edema	**No**	**9 (75.1)**	**11 (91.7)**	**0.140**
	Yes	**3(24.9)**	**1(8.3)**	
Recurrence during 6 months	**No**	**10 (83.3)**	**11 (91.7%)**	**0.309**
	Yes	**2 (16.7)**	**1 (8.3%)**	

Fisher Exact test; *p is significant at <0.05

DISCUSSION

Among the most common operations in the general surgical service, accounting for around one-third of all interventions, is inguinal hernia surgery. In comparison with open mesh surgery, the laparoscopic inguinal

hernia repair considerably reduced pain in the early postoperative period, allowing for earlier mobilisation and quicker goes back to work. The manual labourers who underwent laparoscopic surgery demonstrated this [7].

Regarding the demographic data in our study, age, occupation, and smoking status between the study groups, there was no statistically significant difference. In a similar study by **Li *et al.*** [8], **Chai *et al.*** [9] and **Lau *et al.*** [10] the analysis of the demographic data of their participants demonstrated that there are agreement with our findings. There was no statistically significant difference in the ages, jobs, or smoking habits of the groups studied habits or chronic illnesses.

Patients in both groups had indirect inguinal hernias, the form of hernia seen in this study was funicular hernias accounting for 50% and 41.7% of cases in groupings A and B respectively. Bubonocele was found in 33.3% and 25% of the patients, and complete was found in 16.7% and 33.3% of the patients respectively with no significant difference. These results are non-compatible with **Hassan *et al.*** [11] who reported that in terms of hernia type, 16 (80%) patients in both groups had indirect hernias while 4 (20%) patients had direct hernias.

In relation to the hernia site described in this report were 25% and 16.7% bilateral among groups A and B respectively. A right hernia was discovered in 50% and 41.7% of the patients, and left was found in 25% and 41.7% of the patients respectively with no significant difference ($p>0.05$). The study resembles that of **Wasim *et al.*** [12].

All 24 patients had indirect inguinal hernia; the herniated organ was omentocele in 91.7% and 83.3% while enterocele was 8.3% and 16.7% among groups A and B respectively during ultrasonography, which is in agreement with **Hassan *et al.*** [11] .

General anaesthesia was used during the procedure on all patients. no patient in our groups had bladder or bowel injury. Urine retention occurred among one patient in group A with no discernible difference between the two groups,

The difference in intraoperative complications between the two groups in this study was statistically insignificant. In all groups, there were no intraoperative problems, which is a similar outcome to **Gelebeševa *et al.*** [13] and **Hassan *et al.*** [11].

In group A, the distribution of operative time (min) was 70 ±13.52 (min) and 55 ± 12.91 (min) in group B with (P value 0.0009), which was ways, guaranteeing that the groups were matched ($p<0.05$) where group A had a longer mean duration, while group B had a shorter mean duration. In alignment with our findings, the results of **Zein Elden *et al.*** [7] which was less time than ours, with operative times of 50 minutes for group A and 45 minutes for group B. As opposed to that, **Hassan *et al.*** [11] reported that the length of the operation was similar for both groups [14].

No statistically significant differences were found in the current investigation variations in scrotal edema between the analysed groups, guaranteeing that the groups were matched ($p > 0.05$). This outcome is consistent with that of **Wasim *et al.*** [12]. In contrast **Mohammad *et al.*** [15] demonstrated that there were no hematoma differences between the two groups. During the postoperative follow-up, we recorded no instances of scrotal edema in either group.

According to postoperative pain **(VAS)** score between study groups, in group (A) was 7.2 ± 0.9, 4.3 ± 1, 1.4 ± 0.8 and 0 at 12hr, 24hr, 1 weak and one month respectively, while in group (B) was 6.2 ± 1.3, 3.7 ± 1.5, 1.1 ± 0.9 and 0 at 12hr, 24hr, 1 weak and one month respectively, with statistically significant higher mean pain in group A at 12hr post-operative.

A challenging and debatable issue that affects both open and laparoscopic operations is the post-hernia surgery pain. There are three different types of pain syndromes: somatic, neuropathic, and visceral pain. The most frequently cited mechanism is stapling of the mesh, which is followed by mechanical and/or inflammatory reactions to the mesh, nerve damage from dissection, thermal injury from electrocautery, and nerve damage from dissection. The prevalence of surgical persistent pain varies significantly [12]. Additionally, a VAS pain score of greater than 5 was used in one study's definition of considerable pain, which may not be perceptive enough to distinguish between the two groups' differences [9]. Between their groups, pain revealed a substantial difference and this is in accordance with us [16, 17].

The mean hospital stay after laparoscopic TAPP was 1.4 ± 1.2 day in group A and 1.1 ± 0.5 group B. There was no statistically significant difference between the two groups. For the number of cases that returned to work within 7 days, reflecting the outcome of group A return to daily activities and return to work. This agrees with the findings of **Zein Elden *et al.*** [7] and **Ferrarese *et al.*** [18] who showed that there was no statistically significant difference between the two groups in the length of postoperative hospitalisation.

The distinction in this study, the difference between the two groups in terms of postoperative scrotal edema during the follow-up was 24.9% for group A and 8.3% for group B without statistical significance.

Seroma, a sterile deposit of serum, is the most frequent early moderate side effect following inguinal hernia repair in a limited area of tissue. Seromas often go away in a few weeks, although can occasionally cause a lot of other problems. One of the most difficult side effects, an infected seroma may necessitate mesh removal and hernia recurrence. Patients may also mistake a seroma for a persistent or recurring hernia [19]. The findings of the meta-analysis by **Chai *et al.*** [9] demonstrated that among various complications, only the group with sac transection experienced considerably more seroma development. Although a subgroup study between the RCTs found that a comparative study of the

two studies found that the incidence of complications, particularly seromas, was comparable. However, none of the included trials reported any seromas that were infected.

As postoperative recurrence was recorded in 16.7% in group A and 8.3% in group B during follow up period (6 months). There was no statistically significant difference between the two groups in this investigation. This is agreeing with the result of **Hassan *et al.*** [(11)] and **Li *et al.*** [(8)] where, after accounting for postoperative recurrence, there was no difference between groups.

Conclusion: Our study's findings led us to the conclusion that full sac reduction and hernia sac transection are both dependable and safe procedures. It is rapid and effective hernia sac transection procedure way to treat hernia sacs, and it has the advantage of being widely used.

Sources of funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of interest: There are no conflicts of interest, according to the authors.

REFERENCES

1. **Wake L, McCormack K, Fraser C *et al.* (2005):** Transabdominal pre-peritoneal (TAPP) vs totally extraperitoneal (TEP) laparoscopic techniques for inguinal hernia repair. **DOI:** 10.1002/14651858.CD004703.pub2
2. **McCormack K, Wake B, Perez J *et al.* (2005):** Laparoscopic surgery for inguinal hernia repair: systematic review of effectiveness and economic evaluation. Health Technology Assessment, 9 (14): 1-11.
3. **Schmedt G, Sauerland S, Bittner R (2005):** Comparison of endoscopic procedures vs Lichtenstein and other open mesh techniques for inguinal hernia repair: a meta-analysis of randomized controlled trials. Surg Endosc., 19 (2): 188–199.
4. **Aiolfi A, Cavalli M, Ferraro D *et al.* (2021):** Treatment of inguinal hernia: systematic review and updated network meta-analysis of randomized controlled trials. Annals of surgery, 274 (6): 954-961.
5. **Lu Y, Chen C, MacQueen T (2021):** General Surgery: Management of Postoperative Complications Following Ventral Hernia Repair and Inguinal Hernia Repair. Surgical Clinics, 101 (5): 755-766.
6. **Beckers L, Spoelders F, Berrevoet F (2021):** Association between surgical hernia repair techniques and the incidence of seroma: a systematic review and meta-analysis of randomized controlled trials. Hernia, 26 (5): 1-13.
7. **Zein Elden A, Moustafa F, Nassar S *et al.* (2018):** Use of human fibrin glue versus staples for mesh fixation in laparoscopic transabdominal preperitoneal hernioplasty hernia. Menoufia Medical Journal, 31 (1): 140-149.
8. **Li W, Li Y, Ding L *et al.* (2020):** A randomized study on laparoscopic total extraperitoneal inguinal hernia repair with hernia sac transection vs complete sac reduction. Surgical Endoscopy, 34 (4): 1882-1886.
9. **Chai Z, Zhang G, Ling X *et al.* (2022):** Low-level and combined exposure to environmental metal elements affects male reproductive outcomes: Prospective MARHCS study in population of college students in Chongqing, China. Science of The Total Environment, 828: 513-519.
10. **Lau H, Lee F (2002):** Lessons learned from ligation of indirect hernia sac: an alternative to reduction during endoscopic extraperitoneal inguinal hernioplasty. Journal of Laparoendoscopic & Advanced Surgical Techniques, 12 (6): 419-423.
11. **Hassan M, Abo El-Yazeed M, Ali A (2022):** Fibrin Glue versus Staple for Mesh Fixation in Laparoscopic Transabdominal Preperitoneal Repair of Inguinal Hernia. Al- Azhar International Medical Journal, 3 (4): 133-137.
12. **Wasim R, Mela A, Hanief R *et al.* (2015):** Comparative study of fibrin sealent versus use of tackers in inguinal hernia repair. Cukurova Medical Journal, 40 (3): 457-465.
13. **Gelebeševa T, Omejc M, Kunst G *et al.* (2018):** A comparison study of the efficacy of tacker mesh fixation,glue mesh fixation and no mesh fixation in transabdom preperitoneal inguinal hernia repair. Collegium antropologicum, 42 (4): 271-276.
14. **Altintoprak F, Akim E, Gundagdu K *et al.* (2018):** Laparoscopic inguinal hernia repair: Technical details, pitfalls and current results. https://www.researchgate.net/publication/326500186_Laparoscopic...
15. **Mohammad H, Fiad A, Nour H *et al.* (2020):** Short term outcome of laparoscopic trans-abdominal preperitoneal (TAPP) ingal hernia repair without mesh fixation, a comparative study. The Egyptian Journal of Hospital Medicine, 81 (3): 1644-1647.
16. **Choi Y, Kim Z, Hur Y (2011):** Transection of the hernia sac during laparoscopic totally extraperitoneal inguinal hernioplasty: is it safe and feasible? Journal of Laparoendoscopic & Advanced Surgical Techniques, 21 (2): 149-152.
17. **Ruze R, Yan Z, Wu Q *et al.* (2019):** Correlation between laparoscopic transection of an indirect inguinal hernial sac and postoperative seroma formation: a prospective randomized controlled study. Surgical Endoscopy, 33 (4): 1147-1154.
18. **Ferrarese A, Marola S, Surace A *et al.* (2014):** Fibrin glue versus stapler fixation in laparoscopic transabdominal inguinal hernia repair: a single center 5-year experience and analysis of the results in the elderly. International Journal of Surgery, 12 (2): 94-98.
19. **Fang H, Lin R, Lin X *et al.* (2021):** Drainage decreases the seroma incidence in laparoscopic transabdominal preperitoneal (TAPP) hernia repair for large inguinoscrotal hernias. Asian Journal of Surgery, 44 (3): 544-548.