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Laparoscopic Transabdominal Preperitoneal Approach with Abandon Sac Technique in Management of Large Inguinoscrotal Hernia; Randomized Clinical Trial

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ABSTRACT

Background: Inguinoscrotal hernia is the commonest type of all hernias. Although, Lichtenstein tension-free technique was the main procedure for its repair, laparoscopic transabdominal preperitoneal (TAPP) approach has been widely used, but with a great challenge for large size hernia. In this article, we described a modified laparoscopic trial in order to overcome this obstacle by transecting the large hernia sac, vice complete intra-abdominal inversion.

Objective: This study aimed to evaluate the initial results of a modified TAPP technique (abandon sac trial), in laparoscopic management of large inguinoscrotal hernia type I.

Patients and methods: Our study was conducted at Zagazig University Hospitals, on 50 cases of large inguinoscrotal hernia type I through the period from January 2021 and June 2022.

Results: As regards surgical results, both scrotal edema and hematoma were reported in 6% and seroma in 12%. While there was no detected cases of either infection, funiculitis, chronic groin pain or recurrence. Postoperative pain was mild to moderate, and the hospital stay was 1-2 days only.

Conclusion: A large inguinoscrotal hernia type I, can be managed safely with introduction of a slight modification on the TAPP laparoscopic method (abandon sac technique). With this modification, big size hernias will have a chance to be managed laparoscopically and obtained its advantages as small wound size and marked reduction of both postoperative pain, and recurrence.

Key words: Inguinoscrotal, Lichtenstein, TAPP, Seroma, Abandon sac technique, Laparoscopic, Large hernia.

INTRODUCTION

Inguinoscrotal hernia is the commonest type of all hernias. Patient's fright of surgery as well as negligence and enlarging hernia size. A large hernia simply categorized into; type I extending to mid of the thigh, type II from the last point to the level of the knee joint, while type III exceeding the last level [(1)].

Large inguinoscrotal hernia, making laparoscopic management more difficult. Although, Lichtenstein repair was the first option for its correction [(2)], laparoscopic transabdominal preperitoneal (TAPP) approach has been widely performed, but with a great challenge for large size hernia with large sac [(3)].

TAPP technique became the most widely performed laparoscopic procedure for inguinal hernia repair. It has favorable results such as short hospitalization time, minimizing the postoperative pain, and decreasing risk of wound infection. However, seroma is the most detectable complication post laparoscopic repair [(4)].

Seroma complicates (0.5%–15%) of laparoscopic groin hernia correction and increases concomitantly with the size of the hernia [(5)]. The best approach to the distal large sac in laparoscopic inguinoscrotal hernia repair is still debated up till now. Thus, in our study, we discussed a clinical trial to overcome this obstacle. We transected the hernia sac, aiming to decrease the difficulty of laparoscopic dissection and inversion of large inguinoscrotal sac and to avoid injury of cord structures. We expect that, this technique is more reasonable as well as safe.

PATIENTS AND METHODS

This prospective randomize surgical trial was conducted on 50 cases of large inguinoscrotal hernia type I. All patients were operated by a modified TAPP method with ligation and transection of the sac (abandon of the sac). The study was conducted through the period from January 2021 to July 2022, at General Surgery Department, Zagazig University, Egypt. All our patients informed and consented for surgical procedure. This study was approved by the Institutional Review Board of Faculty of Medicine, Zagazig University, Egypt.

Inclusion criteria: Both male and female patients aged from 18 to 80 years, patients with large inguinoscrotal hernia type I, uncomplicated inguinoscrotal hernia, and patients fit for surgery (ASA stage I & II).

Exclusion criteria: Patients with small direct and indirect inguinal hernia, patients with large inguinoscrotal hernia type II & III, complicated inguinoscrotal hernias, patients with disturbed coagulation profile, and patients unfit for surgery (ASA stage > II).

Patient preparation and ports insertion:

Before induction of anesthesia, 1 gram of intravenous cefazolin had been given. Under general anesthesia, the patient was placed in the supine position with his arms close to the trunk, and a Foley catheter was inserted. The surgeon stands contralateral to the hernia to be operated. Creating a small infra-umbilical incision through which,

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Veress needle was introduced and pneumoperitoneum insufflation by carbon dioxide was done. A 10 mm camera port was placed into the infra-umbilical incision. Another two 5 mm ports were inserted laterally on either side to the umbilicus.

Surgical procedure (Abandon sac technique): Once all ports were placed, meticulous observation of the hernia defect was done, and the contents of the hernia sac was completely reduced. Cutting the peritoneum by scalpel or a hook from the level of 2 cm above the anterior superior iliac spine laterally to the falciform ligament medially. Then, starting dissection downward as usual till making a space all around the proximal part of the sac, separating it from other cord structures. Ligation of the sac by polyglactin 1 or 0 **(Figure 1B)** or by clipping both edges of the sac **(Figure 3B)** and transection of the sac using harmonic, diathermy hook or scalpel, leaving the distal part of the sac inside the defect **(Figures 1B & 2C).** Then, polypropylene mesh 12 X 15 cm was put and fixed by trackers or sutures, and the upper peritoneal flap defect was reclosed.

Abandon of the sac, can be also done by: Cutting the peritoneum making a hole around the defect borders **(Figure 2B)**, incision of the peritoneum from lateral to medial and complete dissection of the flap as before. Polypropylene mesh is put and fixed covering completely the myopectineal orifice. Lowering the pneumoperitoneum pressure to 8-10 mmHg, helping peritoneal edges approximation. Closure of the upper flap defect by tackers or sutures. While the wound in the flap, which was made around the defect, reclosed by polyglactin 3/0 sutures **(Figure 2D).** Ports are extracted and their sites were closed by polypropylene 3/0 sutures or stapler.

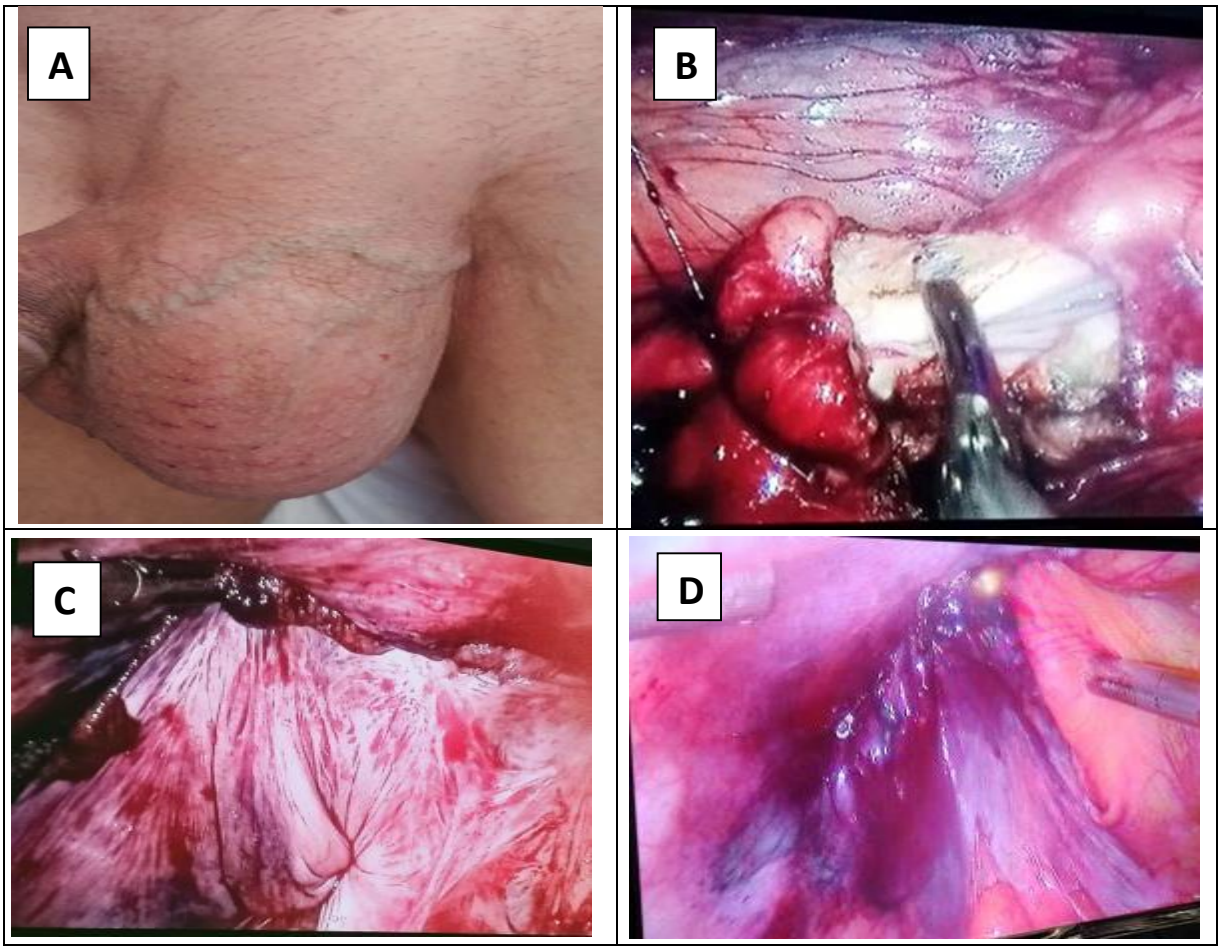

Figure (1): A: left inguinoscrotal hernia operated by TAPP approach (Abandon sac technique). **B:** Ligating and transecting the sac by a Harmonic. **C:** The mesh fixed in place and covered by the peritoneal flap. **D:** Closure of the defect in the peritoneal flap by simple sutures.

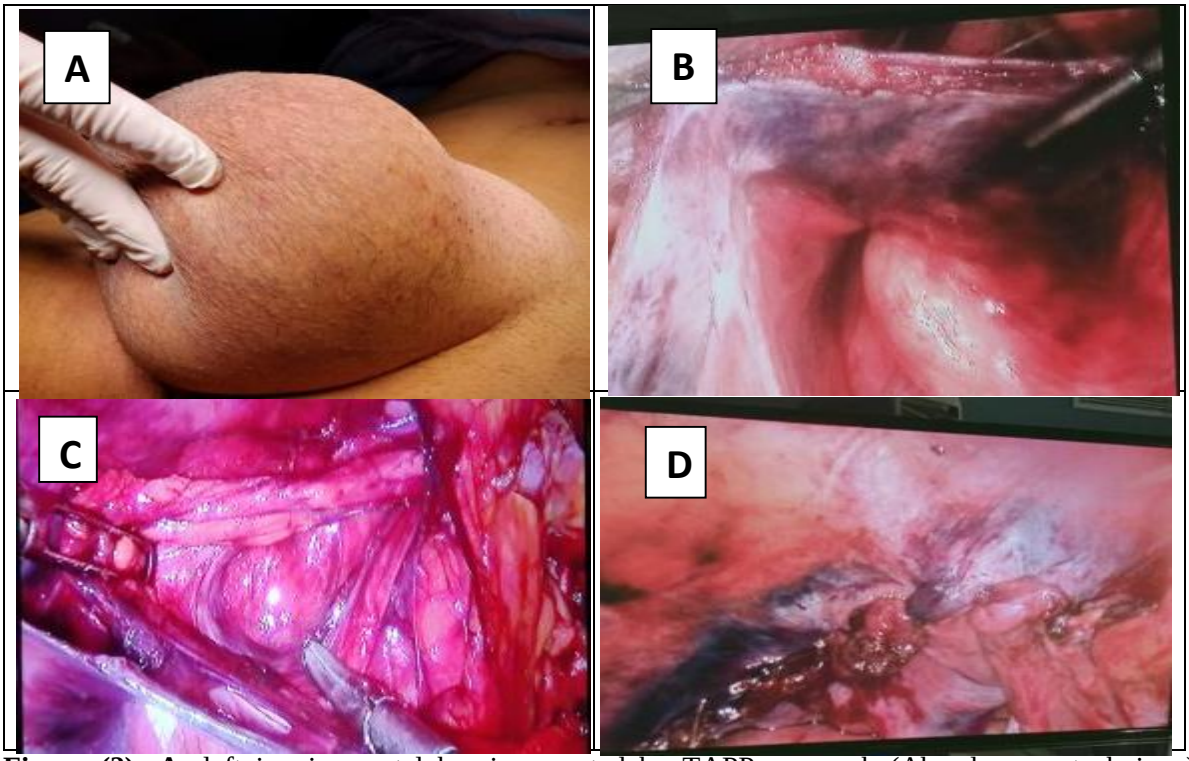

Figure (2): A: left inguinoscrotal hernia operated by TAPP approach (Abandon sac technique). **B:** Cutting the peritoneum around defect. **C:** The cut edge of the sac with distal part of the sac in the inguinal canal. **D:** Closure of the defect in the peritoneal flap by simple sutures.

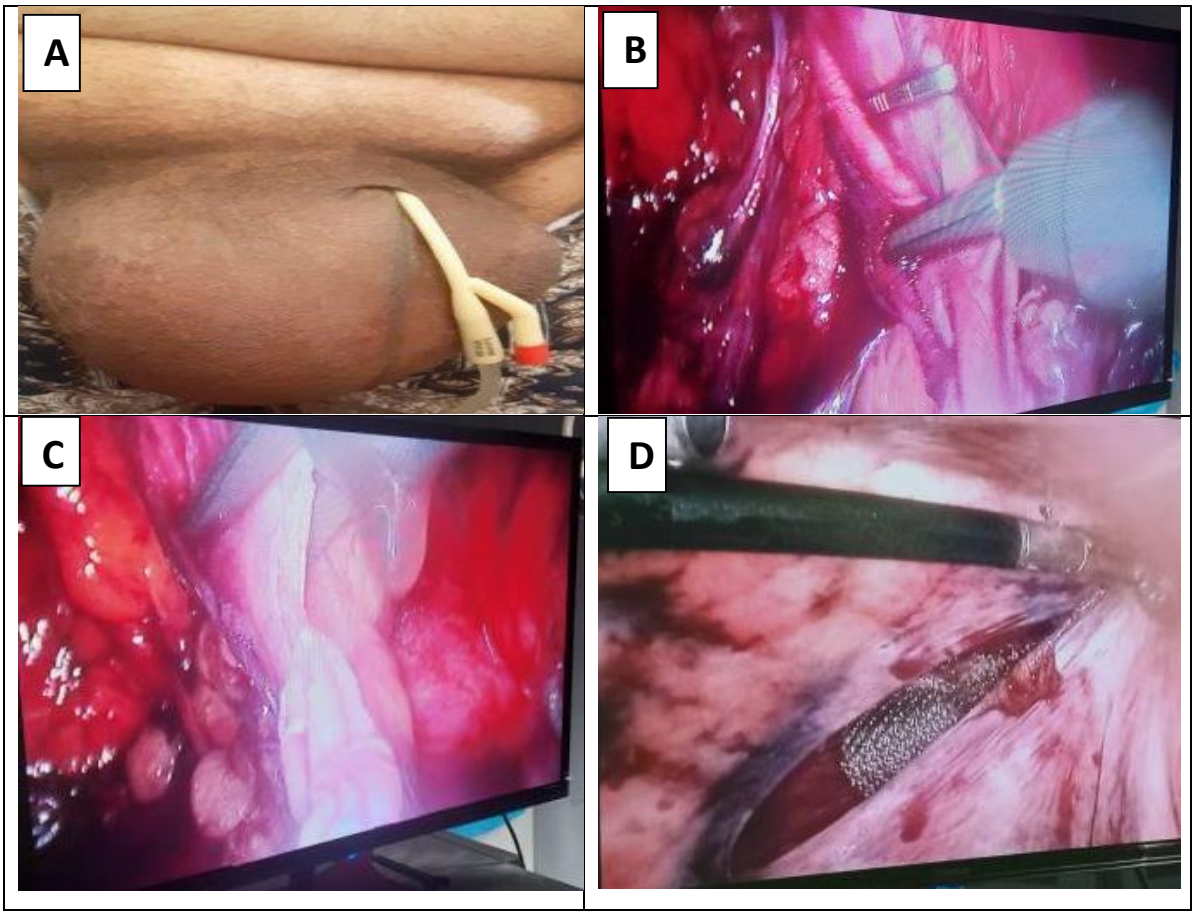

Figure (3): A: Right inguinoscrotal hernia operated by TAPP approach (Abandon sac technique). **B:** Clipping both edges of the sac. **C:** Scalpel transection of the sac. **D:** Closure of the upper peritoneal flap defect.

Ethical consent:

An approval of the study was obtained from Zagazig University Academic and Ethical Committee. Every patient signed an informed written consent for acceptance of participation in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

The collected data were coded, processed and analyzed using the SPSS (Statistical Package for Social Sciences) version 22 for Windows® (IBM SPSS Inc, Chicago, IL, USA). P value ≤ 0.05 was considered significant.

RESULTS

Between, January 2021 to June 2022, study was done in the department of General Surgery, Zagazig University Hospitals. Total number of our patients selected for laparoscopic hernia repair were 50. Mean age of patient was 53.8 with a range from 34 to 77 years. All were males, 45 patients were complaining of swelling and only 5 patients came with groin pain. 12 (24%) had comorbid diseases, but our all patients were stage I & II ASA. All had a primary hernia, and all were operated by TAPP, with abandon sac technique.

Table (1): Patient characteristics

Total no. of patients	**50 (100%)**
Age (Years)	Range (34 to 77) years Mean: 53.8
Sex . Male . Female	 50 (100%) 0 (0 %)
BMI (kg/m^2)	Mean: 26.8 Range: 20.8 to 34.2
ASA score : . I&II . III . IV&V	 50 (100%) 0 (0%) 0 (0%)
Presenting Symptoms: . Swelling . Pain	 45 (90%) 5 (10%)
Comorbidities : . Hypertension . Diabetes . Obesity . Coronary artery disease	12/50 (24%) 3 (6%) 6 (12%) 2 (4%) 1 (2%)

All patients had primary inguinoscrotal hernia 60% on the right and 30% on the left side and 10% were bilateral hernia (Table 2).

Table (2): Characteristics of hernia

Total no. of patients	**50 (100%)**
Primary hernia	50 (100%)
Recurrent hernia	0 (0%)
Unilateral hernia N=45 (90%)	
Right	30 (60%)
Left	15 (30%)
Bilateral hernia N= 5 (10%)	

Table (3) showed that, the mean operative time ranged between 60-120 min. 45 (90%) of the patients had unilateral hernia, 30 (60%) of them were on the right and 15 (30%) were on the left side. 5 (10%) patients had bilateral inguinoscrotal hernia. No intraoperative complications were detected.

Table (3): Intra operative findings

Total No. of Patients	**50 (100%)**
Mean operative time /min.	60-120 (90 min).
Unilateral Hernia: -Direct -Indirect	**45 (90%)** 0 (0%) 45 (90%)
Bilateral Hernia: -Direct -Indirect	**5 (10%)** 0 (0%) 5(10%)
Injury to Vas deferens	**NIL**
Injury of testicular vessels	**NIL**
Injury of epigastric vessels	**NIL**
Injury of major blood vessels	**NIL**
Surgical emphysema	**NIL**
Bowel injury	**NIL**
Bladder injury	**NIL**
Bleeding of the venous plexus around the pubis	**NIL**

The time of mean hospital stay was, 1-2 days. Patients can return to his daily work on 3rd or fourth postoperative day. 6% of patients came in follow-up complaining of slight scrotal edema and ecchymosis. 74% had a mild groin pain, while 26% had a moderate pain, with no cases of severe or chronic groin pain. No patients had recurrent hernia at the follow-up period (6 months). Seroma (12%) was the most common complication early detected postoperatively.

Table (4): Post-operative complications

Total No. of Patients	**50 (100%)**
Seroma	**6 (12%)**
Funiculitis	**NIL**
Scrotal edema	**3 (6%)**
Hematoma	**3 (6%)**
Wound infection	**NIL**
Early postoperative pain (VAS 1-10) -Mild (1-3) -Moderate (4-6) -Severe (7-10)	 37 (74%) 13 (26%) 0 (0%)
Chronic groin pain	**NIL**
Median hospital stay	**Mean 1.05** **Range (1-2) days**

DISCUSSION

Inguinal hernia correction is the commonest operation in general surgery field all over the world. Laparoscopy, has an important benefits for having small size wound, minimal postoperative pain and less complications, as well as fast recovery. TAPP is one of minimally invasive procedures that, have been recently developed as an ideal therapeutic option in management of inguinoscrotal hernias [6]**.** It allows clear direct observation of internal hernia orifice and its contents.

The present study discussed a new modification technique that, facilitates laparoscopic management of inguinoscrotal hernia, even if it has large size. Large size sac, can be ligated and transected, instead of difficult complete inversion inside the abdomen.

Our study included 50 male patients, with large inguinoscrotal hernia type I, they were only primary groin hernia. Their BMI ranged from 20.8 to 34.2 and the mean was 26.8. Their ages ranged between 34 to 77 years, with a mean of 53.8 years. **Weiming *et al.*** [7] reported that the mean age of the patients was 62.30 years ± 8.56 in the TS group and 61.50 years (SD, 7.30) in the RS group, all their 60 patients were male.

The present study showed that 12 (24%) patients had comorbid diseases, in the form of hypertension, diabetes, obesity, and coronary artery disease. While, the study of **Morrella *et al.*** [8] showed 14 (53.8%) comorbid patients with hypertension, diabetes, obesity, COPD, and coronary artery disease.

The mean operative time in the present study ranged from 60-120 min, with a mean of 90 min. This goes with the study **Junsheng *et al.*** [5] where they reported that, the median operation time was 67 min (35 to 120 min).

Our patients stayed for 1-2 days at hospital, with the mean of one day. However, study of **Fujinaka *et al.*** [9] reported that, all patients could walk at the first postoperative day, their mean hospital stay was 4.75 days.

As regards postoperative complications, both hematoma and scrotal edema developed in 3 (6%) patients, which resolved conservatively with no need for re-intervention. While, in study of **Favela and Huerta** [10]**,** the incidence of scrotal hematomas was 4 % (1 out of 25), that were treated conservatively**.**

In the present study, we detected no infected cases, which matches with **Fujinaka *et al.*** [9] who also reported no cases of infection, and even if there is an infection on the skin of scrotum, the TAPP approach can be done.

The present study detected no cases of recurrence within the follow-up period (6 months), which is contrary to **Yaguchi *et al.*** [11]**,** as they reported recurrence rate after TAPP that was 1.8-3 %.

Our study detected 6 (12%) cases of seroma that resolved by conservative measures as; repeated aspiration and compression with no need for surgical intervention.

The optimal management of the distal sac is still debated. Although some studies have supported the complete dissection of the sac to avoid seroma formation, others, found that, complete dissection may be difficult in certain cases and carry the risk of injury to adjacent vasculature, and this may increase incidence of seroma [12, 13].

All our patients showed mild to moderate postoperative pain that relieved within two to three days with no detected cases of chronic groin pain in the follow up period. This correlates with **Daes** [14] who reported no cases with severe pain, however 10 % of patients experienced chronic groin pain.

CONCLUSION

A large inguinoscrotal hernia type I, can be managed safely with introduction of a small modification (abandon of the sac) on the TAPP laparoscopic approach. A large hernia can be managed laparoscopically and obtains its advantages as small wound size and marked reduction of both, postoperative pain and recurrence, and more secure on the cord structures.

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Author contribution: Authors contributed equally in the study.

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