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Transversalis Fascia Fixation to Coopers Ligament in Inguinal Hernia Tapp Repair: A Prospective Single-Center Cohort Study

Dr. Harsha Dileep[1], Prof. Dr.Affin Abdul Salim[2]*

[1]3rd Year PG Resident, Department of General Surgery, Travancore Medical College, Kollam, Kerala, India
[2]Chief, Department of General Surgery, Travancore Medical College, Kollam, Kerala, India

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***Corresponding Author**
Prof. Dr.Affin Abdul Salim

Chief, Department of General Surgery, Travancore Medical College, Kollam, Kerala, India

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A B S T R A C T

Background*:**Seroma development, also referred to as "pseudorecurrence," is a frequent postoperative issue following TAPP treatment of inguinal hernias, menace to operating surgeon answering questions to patients either be a self-limiting, asymptomatic event or a painful, long-term issue. In order to better understand incident of postoperative seroma following laparoscopic transabdominal preperitoneal hernia repair (TAPP), which involves fixing transversalis fascia to Cooper ligament, a research investigation has been done.Methods*:**For direct inguinal hernias, TAPP was incorporated from October 2022 - December 2023. After cavity created by direct reduction of hernia had been closed in each patient by transversalis fascia fixation to coopers, a lightweight mesh was inserted. Data from clinical as well as demographic studies have been obtained as well as examined.***Results*:** A total of 72 individuals that had TAPP repair during study period. Mean age of patients, who were all male, was 65.1 ± 10.7 yrs. Average hospital stay lasted between two and four days. Neither seroma nor recurrence was discovered 30 days after discharge, nor was chronic pain after 3–12 months mean follow-up.***Conclusions*:** To avoid postoperative seromas, it is safe, practical, and advised to anchor transversalis fascia to Cooper ligament while treating a direct inguinal hernia with TAPP.

Keywords: Fascia Fixation, Coopers Ligament, Inguinal Hernia.

INTRODUCTION

One of most frequent operations carried out globally was treatment of an inguinal hernia [1]. When crucial guidelines are followed correctly, laparoscopic hernia repair is a successful treatment. Effectiveness of surgery is immediately and intimately tied to surgeon's expertise, proficiency, as well as understanding of anatomy.

Patients with inguinal hernias can have a variety of treatments, such as laparoscopic repairs, which are usually done using mesh prostheses, open tension-free repairs, open primary repair, along watchful waiting.

Although bilateral as well as recurring inguinal hernias have been the main justification in utilization of laparoscopic inguinal hernia repair, laparoscopic inguinal hernia repairs are now recognized as a viable option for inguinal hernia repair. The primary/unilateral inguinal hernia was recently repaired using laparoscopic methods as a result of increased proficiency with them [2]. Faster postoperative recovery and a potential reduction in prevalence of chronic groin discomfort are two potential advantages of laparoscopic technique [2].

Currently, almost 90 percent of repairs are made using surgical mesh, a common product that significantly lowers recurrence rate when compared with pure tissue repair [2]. Using synthetic mesh could cause body ofhost to respond to foreign objects and inflammation, resulting in scar plate's creation & its associated adverse effects, including stiffness as well as persistent groin pain [3, 4]. These side effects may last a lifetime because mesh implants are permanent [5, 6].

MATERIAL AND METHODS

This research enrolled 72 consecutive unselected male patients with inguinal hernias between October 2022 - October 2023. Physical phases I through III within adults, as determined by ASA (American Society of Anesthesiologists), met inclusion requirements. Patients who had colon resection and incarcerated hernias, systemic or local infections, were receiving chemotherapy, radiotherapy, or immunosuppressive medication, were pregnant or nursing, had an allergy to pig body parts, or were non-compliant were all excluded.

1. Follow-up and outcomes

Every patient was evaluated prior to surgery, and they all returned to hospital for follow-up examinations 1 week as well as 3 months after procedure. Follow-up throughout long term was done over phone.

2. Indications

TAPP technique can theoretically be used for any hernia, including those that have been strangled or imprisoned, with very few exceptions; the indication, however, is dependent on the clinical expertise and judgment of surgeon. According to Nyhus categorization, best signs are:

- Hernias of type 3 and type 4
- Hernias on both sides
- Hernias in persons who are obese
- Hernias in people who engage in physically demanding activities (sport, hard labor)
- Hernia recurrence following open repairs.

3. Contraindications

- severe problems with coagulation.
- Insensitivity to the capnoperitoneum (severe pneumopathies or cardiopathies)
- Strong intra-abdominal adherence
- Pediatric patients
- Significant scrotal hernia
- Hernia that is strangled or punctured and concurrently sepsis
- Extreme ascites
- Hernia recurrence following laparoscopic repair
- Following an extreme prostatectomy
- After second trimester of pregnancy

4. Preoperative Preparation

The procedure requires meticulous preparation of the patient. It is essential to assess comorbidities and prepare the skin appropriately. According to most recent guidelines, the patient must be informed about the specifics of the surgical treatment as well as any potential risks [6].

4.1 Evaluation of the operative risk

Score for ASA. TAPP does not have any "absolute" contraindications in relation to comorbidities. Generally carried out 12hrs or more after last LMWH dosage, procedure replaces oral anticoagulant medicine havingLMWH (low molecular weight heparins).New oral anticoagulant medications (such as Rivaroxaban (Xarelto®), Apixaban (Eliquis®), and Dabigatran etexilate (Pradaxa®) are terminated as well as swapped out for LMWH no less than five days prior to treatment. Five to seven days before surgery, aspirin is substituted for ticlopidine or clopidogrel; three - seven days prior treatment, daily aspirin dosage is lowered to 75mg [7].

4.2 Skin preparation

4.3 Urinary Catheter

To prevent bladder damage and to make dissection in Retzius area easier, always empty bladder. It is possible to keep a urinary catheter in place during procedure in certain situations (such as bilateral or recurrent hernia) [6].

4.4 Patient and Surgical Team Position

Both of patient's arms are fastened to operating table as well as placed along patient's body while they are supine. Initially, at start of surgery, lateral inclination against hernial defect leads to assignment of Trendelenburg position (15 to 20°). To repair hernia, surgical team arranges procedure on hernia opposite side, while camera operator is placed across from hernia. Standing close to patient's feet in front of surgeon is scrub nurse. The surgical team switches places after completing first hernia in a bilateral inguinal hernioplasty (Figure 1). To avoid transferring laparoscopic column across two sides during bilateral hernioplasty, utilization of columnincluding2 monitors is desirable [9].

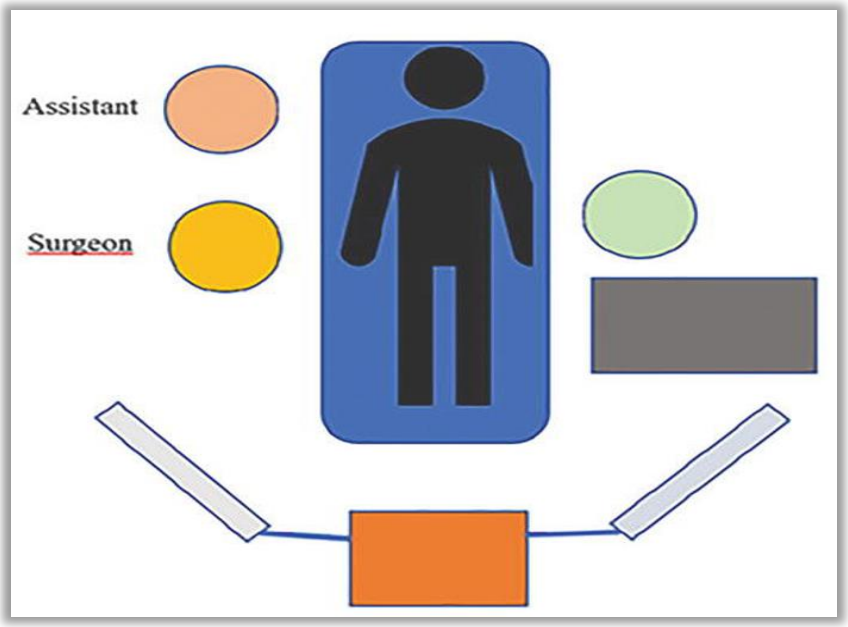


Figure 1: Surgical team position

4.5 Anesthesia

Because the relaxing of muscles makes surgical techniques easier and because orotracheal intubation protects airways from regurgitation or vomiting, which is encouraged through elevated intra-abdominal pressure, general anesthesia is preferred option for patients. When a patient has characteristics that increase likelihood of wound infection, such as advanced age, recurrence, or immunodeficiency, or when operating procedure is anticipated to takelong time or involves use of drains, Cefazoline (2g) has been designated for preoperative antibiotic prophylaxis, which will be given following induction of anesthesia [10].

4.6 Laparoscopic instruments

In addition to standard laparoscopic tools (monopolar scissors, needle holder, two atraumatic fenestrated graspers, monopolar hook, and 5mm disposable absorbable screw brand stapler device), three trocars are required: two of 5mm (for instruments) and one of 10 mm (optical). Additionally, "open surgery" tools include 2 Halsted, 2 Kelly, scissors, Farabeuf retractors, as well as Hegar needle holder. Additionally, suction-irrigation device & bipolar grasper may be required. Although a 0° laparoscope is certainly possible, we often utilize a 30° one.

5. Surgical procedure

5.1 Pneumoperitoneum and trocar placement

Our preferred open approach involves making an upper horizontal paraumbilical incision with a 10mm Hasson trocar, even though many surgeons use Verres needle to produce pneumoperitoneum. This incision provides us with outstanding aesthetic outcomes. In each flank, two extra 5mm operative trocars are positioned in a horizontal plane with umbilicus for direct vision. Recall that some patients do not have a contralateral hernia diagnosed prior to surgery, but they do arrive with one. Both bilateral as well as unilateral hernias can be easily treated with this trocar configuration (Figure 2).

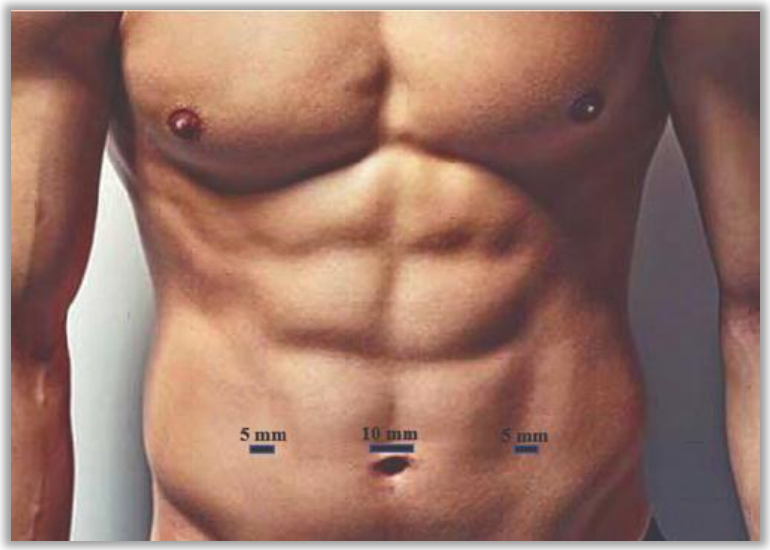


Figure 2: Trocar's position

5.2 Abdominal Exploration

Laparoscopic exploration's goal aims at determining site and kind of hernia as well as superficial anatomical markers (such as uterus, vas deferens, spermatic vessels, umbilical folds, epigastric vessels, or uterine round ligament). Vascular as well as pain triangles are two "dangerous triangles" that need to be properly recognized [2]. Maintaining operating surface at 15° Trendelenburg angle while rotating it 15° laterally to side against hernia in order to conduct exploration as well as assure fair exposure of the inguinal region (Figure 3).

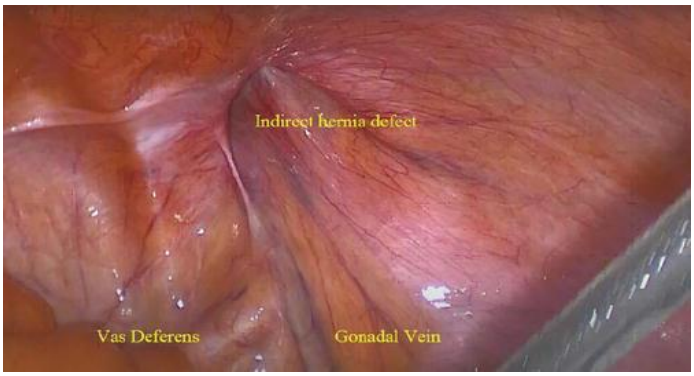


Figure 3: The intra-abdominal view

5.3 Peritoneal incision

Starting with a peritoneal cut 2cm above along with 1cm medial from anterior superior iliac spine, TAPP procedure proceeds horizontally and medially to lateral umbilical ligament (umbilical artery). Using a monopolar hook or scissors, incision then continues vertically along the umbilical ligament (Figure 4). A curvilinear incision is produced as a result. The dissection is made easier by the CO_2 pneumoperitoneum entering preperitoneal area following initial peritoneal cut [11].

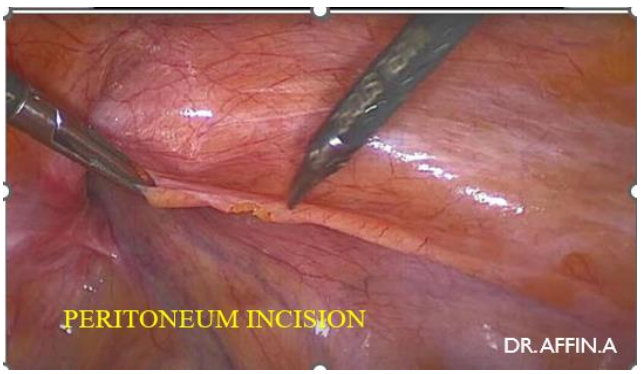


Figure 4: Peritoneum incision

5.4 Dissection of lower Peritoneal Flap

Creating a preperitoneal pocket was aim of this stage so that mesh can be positioned optimally. Three stages make up this step: Three dissections are performed: 1) Retzius space, 2) Bogros space, and 3) hernia site along with associated hernial sac. To protect bladder from harm, we start by dissecting medial region (Retzius space). which separates conjunctive fibers that come into touch with abdominal rectus muscles. This allows bladder to be separated from abdominal rectus muscles. Dissecting 1cm medial as well as 1cm inferior to origin of deep epigastric arteries nearly often reveals Cooper's ligament (Figure 5, 6), which is exposed during dissection of pubis. Many tiny veins that originate in coronamortis typically come into contact with the pubic bone. To prevent more bleeding, we would rather coagulate them. The peritoneum is then pulled medially from epigastric vessels to spermatic vessels during the laterally performed dissection on region of Bogros (Figure 7). Using precise coagulation and traction contra-traction procedures, sac is dissected. As seen in Figure 8,9, sac dissection always begins anteriorly to prevent damage to the ductus deferens and spermatic arteries. In accordance with literature, for hernia lipoma, we always check [6]. When identifying occult obturator hernias, particularly in women, vital to carry on dissecting obturator fossa caudally. Onceanatomic features previously described are clearly visible &2 dangerous triangles (pain as well as vascular) are discernible, the preperitoneal dissection is complete (Figure 10). An inverted transversalis fascia must be stapled to Cooper ligament in cases of extensive parietal defects. This straightforward technique appears to lower rate of postoperative seroma [12].

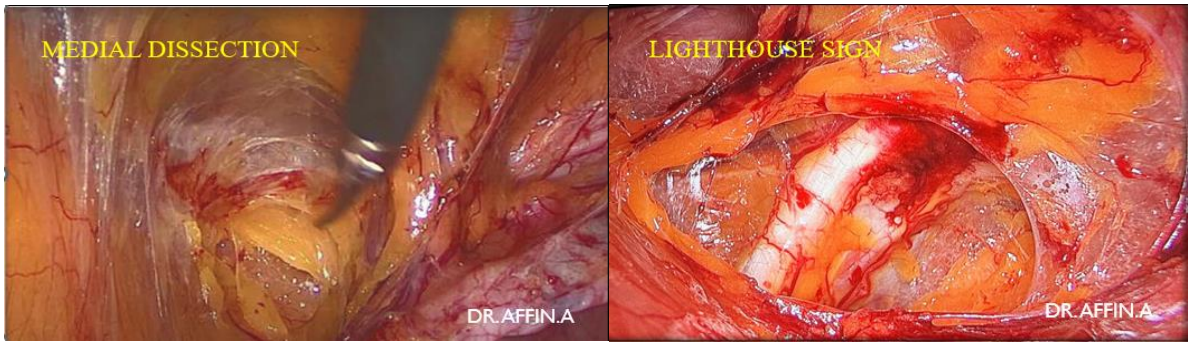


Figure 5: Medial dissection

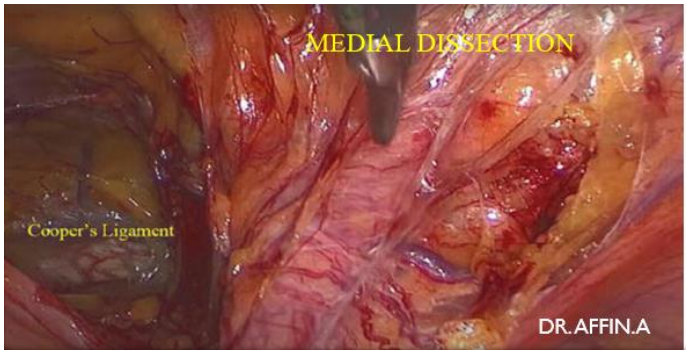


Figure 6: Medial dissection

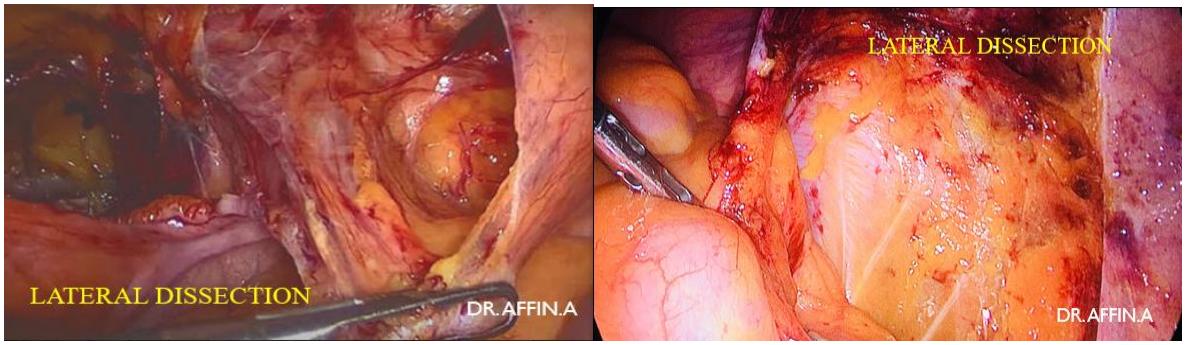


Figure 7: Lateral dissection

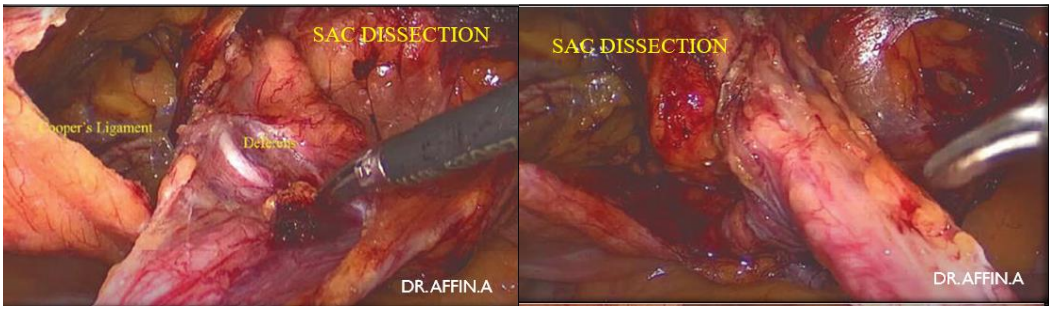


Figure 8: Sac dissection

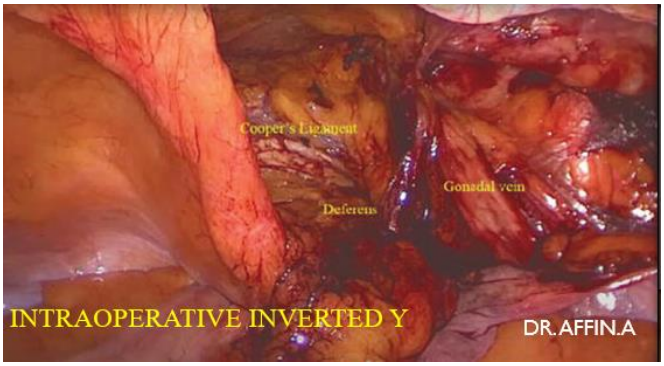


Figure 9: Sac dissection

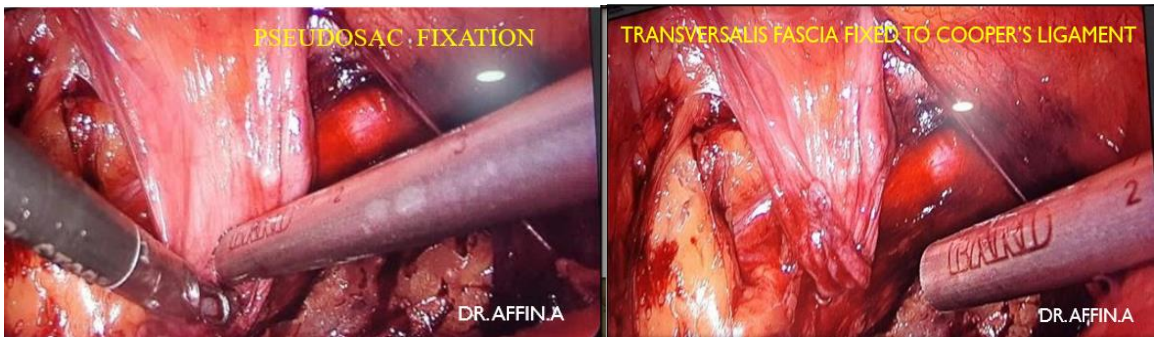


Figure 10: Intraoperative inverted Y

5.5 Mesh placement

Iliopsoas muscle should be laterally and the pubic symphysis medially reached by the mesh. It should cover the anterior abdominal wall superiorly and extend 4-6 cm beyond the hernial defect inferiorly, reaching 1-2 cm below the pubis. A big "anatomical pre-shaped" (12×15 cm) polypropylene mesh was utilized, when optical trocar inserts it. Using grasper at medial end, the prosthesis can be effortlessly inserted via Hasson into belly after being rolled up on its long side. The prosthesis's medial end is brought over Cooper. With care to avoid damaging "corona mortis vessels," medial head has been subsequently attached to Cooper with absorbable tacking staples after prosthesis has been unrolled (Figure 11). This first tack makes it easier to unroll the prosthesis further, insert it within preperitoneal pocket, as well as fasten it with absorbable tacking staples on medial and upper edges as well as at the iliac spine level (Figure 12, 13). Literature lists a few substitutes for staple fixation, including fibrin glue [13], self-gripping mesh [14], trans parietal sutures [15], and more contemporary no fixation method [16]. When treating bilateral hernias, we employ two distinct meshes that overlap and are joined at the median line using staples; method might simpler than using single, huge mesh.

Figure 11: Mesh fixation to Cooper's ligament

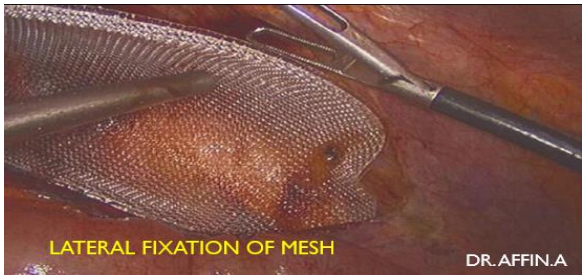


Figure 12: Lateral fixation

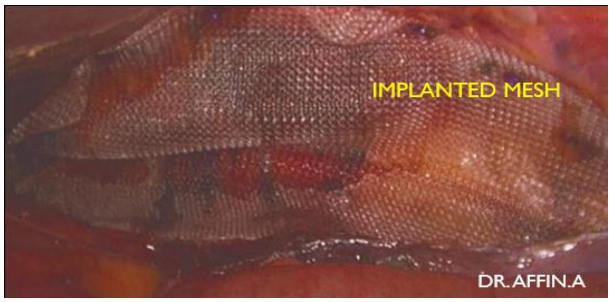


Figure 13: Implanted mesh

5.6 Drainage

Writers highlight how suction-draining can lower the rates of postoperative seroma and hematoma because capillary bleeding occurs when carbon dioxide pressure is released. They employ 24-hour suction-drainage for specific patients, such as partial hernial sac resection, intraoperative hemorrage, anticoagulant or antiplatelet medication, and difficult dissection [17]. Most of the time, we won't.

5.7 Peritoneal closure

Our standard procedure is to use continuous suture (2–0 vicryl) to seal peritoneal flap (Figure 14). To make the peritoneum's borders easier to approximate under less stress, we reduce the capnoperitoneum pressure to 8mmHg prior to beginning the peritoneal closure [6, 11, 16].

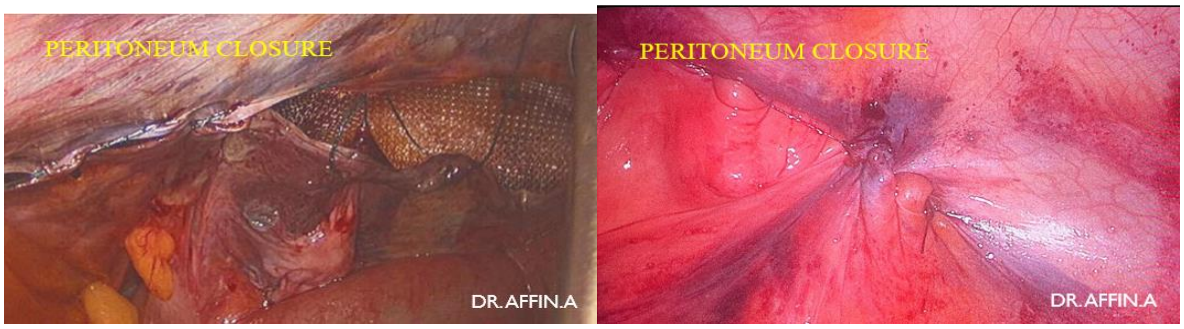


Figure 14: Peritoneum closure

5.8 Abdominal closure:

Under laparoscopic management, trocars are removed following a thorough inspection of peritoneal closure. An absorbable suture and purse string suture are used to seal the aponeurosis at the umbilical location. To improve

postoperative pain management, long-acting anesthetics (Levobupivacaine) are injected into the surgical wounds. Another option is to perform a laparoscopic TAP Block. Using staples or inverted rapid absorbable sutures, the skin is sealed.

5.9 Intraoperative complications:

One of TAPP's potential adverse effects is intraoperative hemorrhage. Damage to gonadal veins, deep epigastric vessels, testicular artery, corona mortis may also result in severe bleeding that needs to be converted to an open procedure right away if laparoscopy is not an option. For vascular management as well ascomparative restoration of damaged, it is evident that the iliac vessel lesion necessitates an instant conversion to laparotomy.

6. Postoperative management:

The immediate postoperative analgesic regimen comprises of 30 mg IV × 2/day of ketoralac and 1000 mg × 3/day of paracetamol. If a urinary catheter is inserted, it is taken out six hours following surgery. They move patient and invite them to stroll as soon as their general health permits (Day Surgery). The in-hospital stay is 24 hours. For four hours following surgery, a liquid diet is recommended.

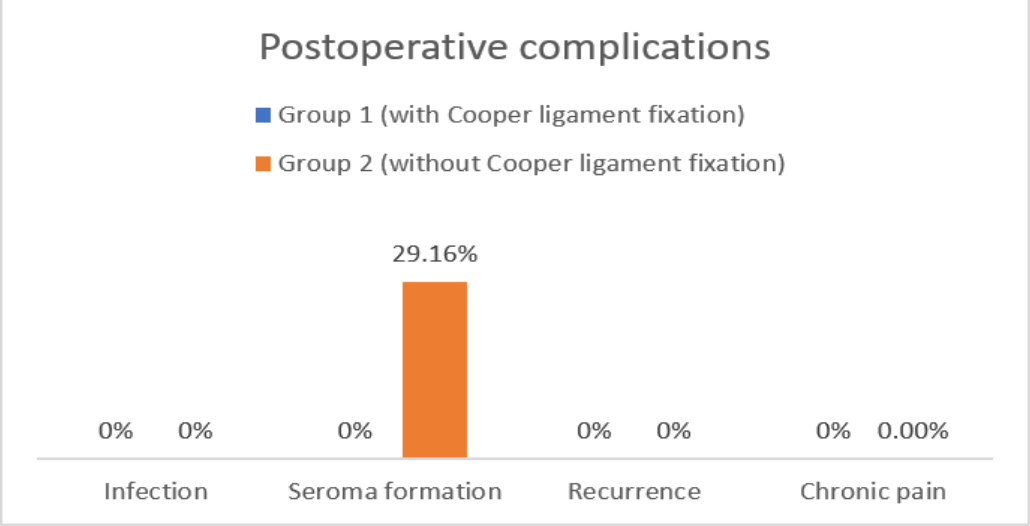
For long-term follow-up, we examine patients in the consulting room approximately seven days following surgery, one month later, and then every six months.

RESULTS

72 patients who had TAPP repair were found during the study period. Male patients' average age has been 65.1 ±10.7yrs.The average hospital stay lasted between two and four days. In group 1, where we employed the innovative technique of fixing the pseudosac to the Cooper's ligament, no seroma incidences or occurrence at 30 days or persistent discomfort at average follow-up 3 to 12 months were found after discharge. In contrast, we observed seroma in 21 individuals (29.16 percent) in group 2, where the transversalis fascia was not fixed to the Cooper's ligament.

Table 1: Comparison of characteristics among patients who had TAPP with transversalis fascia fixation to Cooper's ligament) and those without transversalis fascia fixation to Cooper's ligament)

	Group 1 (with transversalis fascia fixation to Cooper's ligament)	Group 2 (without transversalis fascia fixation to Cooper's ligament)
Mean age	65.1 ± 10.7 years	68.3 ± 9.3 years
Gender (M/F)	M = 72(100%)	M = 72(100%)
Operative duration		
Intraoperative complications	Nil	Nil
Postoperative complications • Infection • Seroma formation • Recurrence • Chronic pain	 Nil Nil Nil Nil	 Nil 21(29.16%) Nil Nil



Graph 1: Comparison of postoperative complications among patients who had TAPP with transversalis fascia fixation to Cooper's ligament) and those withouttransversalis fascia fixation to Cooper's ligament)

DISCUSSION

Seromas, hematomas (which our process modification nearly controlled), persistent pain following surgery, wound infection, mesh rejection or infection, testicular atrophy, recurrences, postoperative adherential syndrome, as well as infertility are among postoperative consequences.

With a rate of roughly 8 percent, hematomas are less common during laparoscopic hernia repair than during open procedures, and they hardly ever call for drainage or transfusions.

After TAPP, Pain that lasts for three months following treatment is referred to as persistent pain, is less common and is linked to damage to the tack stapled nerve. We have not yet encountered any instances of chronic discomfort.

The recurrence rate, which ranges from 0.4 to 4.8%, is correlated with the surgeon's level of experience. The risk factor for relapses seems to be a considerable and recurring rise in intra-abdominal pressure. Although open repair is advised by recommendations in cases of recurrence, many skilled surgeons can successfully treat relapses laparoscopically.

CONCLUSION

TAPP has been associated with reduced chronic pain as well as numbness, improved immediate postoperative comfort, fewer mesh infections, along faster return to regular activities. There was no incidence of postoperative seroma with this new, simple approach.An additional benefit of the laparoscopic approach is ability to diagnose and repair occult hernias in the same procedure. In addition to longer learning curve and increased complications risk during first 30-50 procedures, laparoscopic procedures have more direct expenses (laparoscopic equipment, general anesthesia, staples); These expenses are recoupable, which lowers indirect expenses (shorter hospital stay as well as faster return to work).

LIMITATIONS OF THE STUDY

The research's limited sample size, single-center design, as well as short follow-up time were its primary drawbacks. Addressing electrospun nanoscale P(LLA-CL)/Fg biological mesh's performance profile within inguinal hernia repair in more detail large randomized controlled trials that have longer follow-up times and reflect real-world clinical practice are required. These trials should even analyze results using rapidly developing artificial intelligence techniques in surgery [26].

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