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A Prospective Study of Laparoscopic Transabdominal Preperitoneal Inguinal Repair versus Open Lichtenstein Repair in Maheshwara Medical College and Hospital

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Abstract
Introduction: *Since the advent of laparoscopic technique of surgery majority of hernioplasties are performed laparoscopically. The purpose of this surgery is to compare laparoscopic hernia repair with the open repair. There is less postoperative pain and early mobilization of the patient in laparoscopic hernioplasty than the open technique.*
Materials and Methods: *this study is carried out in Department of General Surgery, Maheshwara Medical College and Hospital, Isnapur, Hyderabad. A total of 80 patients were included, who were then divided into two study groups containing 40 patients in each group. each patient was included into respective group of their choice after explaining both techniques to the patients. Group A patients under went laparoscopic transabdominal preperitoneal inguinal repair while in group b open lichtenstein repair was performed.*
Results: *The open Lichtenstein procedure was found to have a significantly less operative time compared to TAPP procedure (100±15 minutes vs. 75.7±31.6 minutes; p=0.001; CI=95%; Mann Whitney 'U' test). TAPP group had a significantly low pain at 12hrs and 24hrs postoperatively. There was no difference between the TAPP group and Lichtenstein group regarding the mean hospital stay (37.2±12.1 hours vs. 38.2±13.6 hours; p=0.7; CI=95%; Mann Whitney 'U' test). The mean time to return to work was 12.1±11.8 days in TAPP group, which was significantly lesser than the Lichtenstein group (20.9±4 days; p= 0.04; CI=95%; student 't' test). No recurrence was found.*
Conclusion: *Laparoscopic TAPP was a safe and effective procedure for inguinal hernia repair. Laparoscopic TAPP was superior to open Lichtenstein procedure regarding preoperative and postoperative complications, postoperative pain, analgesic requirement, recurrence, and return to work. The laparoscopic TAPP can replace open Lichtenstein repair for inguinal hernias.*
Key Words: *TAPP, open repair, open Lichtenstein.*

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I. Introduction

Inguinal hernia repair is one of the most frequently performed operations in general surgery. Among these repair operations, the frequency of surgical intervention performed for recurrent hernia varies between 8% and 16%.[1] Despite achievements in the field of treating hernias, the problem remains in the failure to master the appropriate surgical technique, leading to the high rate of recurrence. Repair of recurrent inguinal hernia is frequently associated with increased technical difficulty, higher morbidity, and greater risk for further recurrence.[2] Nowadays there is no doubt that recurrent inguinal hernia should be treated only by the application of meshes.[3] Although it is still disputable which approach, open or endoscopic, is more preferable, both methods have positive and negative characteristics. The aim of our prospective randomized trial was the comparison of the results of two methods of treatment of recurrent inguinal hernia: tension-free repair by the Lichtenstein technique, and one of the two most widely used laparoscopic methods- transabdominal preperitoneal (TAPP) repair.[4,5]

II. Materials And Methods

A prospective, open labeled, randomized, comparative, two armed study was conducted in Department of surgery, Maheshwara Medical College and Hospital, Hyderabad, India during a period of three years from January 2016 to December 2018. A total of 80 patients were studied.

Inclusion criteria: All adults with uncomplicated inguinal hernias were included in the study.
Exclusion criteria: Patients with immunosuppression, anemia, infection, associated with other abdominal hernias, unfit for anesthesia, recurrent hernia, and intra-operative laparoscopy to open conversion were excluded.

Patients with Nyhus type IIIc and type IV were excluded from the study.4 Patients with previous groin irradiation, pelvic lymph node dissection, and open prostatectomy were also excluded. All patients underwent either open Lichtenstein repair or laparoscopic transabdominal preperitoneal repair (TAPP). After obtaining consent from the patient, he/she was allocated randomly to one of the groups by using a sealed envelope, opened by a person other than the operative team. All the surgeries were performed in a single surgical unit under controlled conditions.

Both the procedures included a recording of operative time, operative complications such as bleeding, injury to vas, inferior epigastric vessels, nerve, and major visceral vascular injury. All the hernias were classified intra-operatively according to Nyhus classification.4

TAPP was performed under general anesthesia while open Lichtenstein procedure was done under the spino-arachnoid block. Each patient received 1gm Cefotaxime intravenously as a prophylaxis at the time of induction.5 Polypropylene (Prolene®) mesh was used in both the groups.

In TAPP, the sac was reduced; the peritoneum was separated from vas and gonadal vessels. Preperitoneal space was dissected beyond the midline on the medial aspect, beyond the anterior superior iliac spine exposing the psoas muscle on the lateral aspect, inferiorly up to symphysis pubis and the level of obturator foramen and superiorly up to the level of the arcuate line. The polypropylene mesh was trimmed to fit the contours of the dissected preperitoneal area. Mesh was fixed with intracorporeal sutures using 1-0 polypropylene. Care was taken to avoid suturing in the triangle of Doom and the triangle of pain. Mesh was fixed only at the Cooper's ligament.

In open Lichtenstein procedure, the medial portion of the mesh was rounded to the shape of the medial corner of the inguinal canal. A slit was made at the lateral end of the mesh, creating a wider tail above the cord and narrow one below and the cord positioned between the two tails of the mesh. The mesh was sutured to the aponeurotic tissue over the pubic bone overlapping the bone with 2-0 polypropylene suture medially, with inguinal ligament inferiorly and to the conjoined tendon above. Laterally, two tails of the mesh were sutured to inguinal ligament thus creating a new internal ring. The excess mesh was trimmed laterally leaving 3-4 cm beyond the internal ring. Perfect hemostasis was ensured. External oblique aponeurosis was sutured with 2-0 prolene. The subcutaneous fat was sutured with 2-0 catgut and skin was approximated using staples/sutures.

Oral feeds were resumed once the patient recovered from anesthesia. All patients received intramuscular Diclofenac sodium (Voveran®) 75mg intramuscularly 8 hourly during first 24 hours, followed by oral Diclofenac (Voveran) 50mg sos for pain. The pain was assessed using the Visual Analogue Scale (VAS).6 The continuum of pain was represented by a straight line, with no pain at one end and intolerable pain at the other end. The length of the line was 10cm. All patients received intramuscular diclofenac as analgesic every eight hours.

Surgical site infection (SSI) was defined as per CDC (Center for Disease Control) guidelines.5 Infection occurring in an operative site within 90 days after the surgery having one of the following criteria was considered as SSI: A purulent drainage from the incision or aseptically obtained culture from the incision showed growth of a micro-organism or if the incision was dehisced or deliberately opened by the surgeon or attending physician or other designee and was culture positive or not cultured and patient had at least one of the following symptoms or signs: erythema; localized swelling; pain or tenderness; or heat.

Patients were evaluated for postoperative complications such as hematoma, seroma, wound infection, neuralgia, and recurrence. The total length of hospitalization, cost, and return to work were documented. All patients were discharged in 24 to 72hours. VAS pain score chart was filled by each patient as explained at 12hours, 24hours, 48hours, 72hours and seven days after surgery. Patients were advised to attend OPD on the 7th postoperative day for review. The subsequent visits were at six weeks, three months, nine months, and at two years post-operative. They were also instructed to visit earlier in case of symptoms. Every patient was followed up for an at least 2-year period.

Statistical analysis*:* All the data were compiled in Microsoft Excel and was subjected to statistical analysis. Outcome assessor and analysts were kept blinded. Mann Whitney U test, student 't' test and Fisher's exact test were used to study the significance of the difference of various parameters in the laparoscopic TAPP and open (Lichtenstein) inguinal hernia groups. A p-value less than 0.05 was considered significant.

III. Results

A total of 80 out of 94 patients met eligibility criteria. They were randomized into TAPP group and open Lichtenstein group, with 40 patients in each group. The youngest person was aged 21 years whereas the elder most was aged 65 years. Majority of the patients belonged to 21-35 years age group (44%). The mean age of study population was 37.1±12.3 years. Male to female ratio was 3:1.

No intra-operative complication was noted in both the groups. TAPP group had one (4%) postoperative complication while the Lichtenstein group had six (24%) complications. But the difference wasn't statistically significant (p=0.1; CI=95%; Fischer's exact test). The open Lichtenstein group had three (12%) seroma formation while TAPP group had no cases of seroma formation, but the difference wasn't significant (p=0.2; CI=95%; Fischer's exact test). There were two cases of wound infection (both were superficial), one in each group. The Lichtenstein group had two (8%) cases of hematoma, and the TAPP group had no case of hematoma, but the difference wasn't statistically significant (p= 0.5; CI=95%; Fischer's exact test). All the complications were managed conservatively. No recurrence or any other complication was found in either of the groups at two years postoperative follow-up.

Table 1: VAS pain score. TAPP group had a significantly low pain at 12hrs and 24hrs postoperatively.

Time After Operation	Laparoscopic Transabdominal Preperitoneal Inguinal Repair (N= 40)	Open Lichtenstein Repair (N=40)	P Value
12 hours	2.50±1.40	3.50±1.65	0.04
24 Hours	1.75±1.32	2.67±1.48	0.01
48 hours	1.39±1.20	1.80±0.95	0.06
72 hours	0.75±1.20	1.06±1.15	0.06
7 th day	0.32±0.73	0.70±0.91	0.5

Table 2: Number of patients pain-free in the postoperative period.

Time After Operation	Laparoscopic Transabdominal Preperitoneal Inguinal Repair (N= 40)	Open Lichtenstein Repair (N=40)	P Value
12 hours	10(25)	3(7.5)	0.03
48 hours	12(30)	6(15)	0.02
72 hours	21(52.5)	14(35)	0.01
7 th day	23(57.5)	24(60)	0.02

IV. Discussion

An inguinal hernia is one of the most common surgical afflictions worldwide. The repair of an inguinal hernia has evolved through various stages, and the current standard method is to repair with a synthetic mesh.2 Mesh placement can be done either using an open approach or a minimal access approach. The standard landmark surgeries in this regard are tension-free repair invented by Irving Lichtenstein and transabdominal preperitoneal inguinal hernia repair proposed.7 But the better among these two is still a debate. A Cochrane meta-analysis favoured TAPP procedure, but a multicentre trial contradicted it soon.2.3 There were a few more studies, but it was inconclusive whether to opt for an open Lichtenstein or a laparoscopic TAPP. Hence, we conducted a study to compare open Lichtenstein and laparoscopic TAPP procedure.

Present study had two groups, open Lichtenstein and laparoscopic TAPP. Both groups were matched regarding the number, age, and age group. The open Lichtenstein group was found to have lesser operating time compared to TAPP group (54±15 minutes vs. 75.7±31.6 minutes; p=0.001; CI= 95%; Mann Whitney 'U' test). The finding was consistent with other studies.3,8 A few studies found no difference between the open Lichtenstein and TAPP groups regarding operative time.9-11 Found laparoscopic TAPP was quicker than the open Lichtenstein procedure.12,13 Hence, it is not the type of procedure but the learning curve in laparoscopy which decides the operative time.

The intra-operative complications include hemorrhage, technical failure, conversion, injury to vas deferens, injury to vessels, injury to viscus, and major vascular injury. None of our patients had any intra-operative complication. Found no difference between the two groups in terms intra-operative complications.10,12,13 But a multicentre trial found intra-operative complications were more in a laparoscopic procedure.3 Again, it's the surgeon's laparoscopic skill which makes a difference. Also found that the injury to spermatic cord structures was low in TAPP compared to the open group, possibly due to the magnified view of laparoscopy.3

TAPP being a minimal access procedure, the amount of tissue injury was less, hence lesser post-operative pain. Our patients with TAPP had a lesser pain score at 12hrs and 24hrs postoperatively, while there was no significant difference between the groups regarding pain at 48hrs, 72hrs and 7th day postoperatively

(Table 1). The finding was universal as almost every study had the same findings concluding TAPP as a less painful procedure.3

The TAPP group had significantly more number of patients who were pain-free (VAS score= 0) compared to the open Lichtenstein group at 24hrs, 48hrs, and 72hrs postoperative period (Table 2). This was a unique finding regarding our study. To the best of our knowledge, none of the studies have mentioned this.

V. Conclusion

Laparoscopic TAPP was a safe and effective procedure for inguinal hernia repair. Laparoscopic TAPP was superior to open Lichtenstein procedure regarding preoperative and postoperative complications, postoperative pain, analgesic requirement, recurrence, and return to work. The laparoscopic TAPP can replace open Lichtenstein repair for inguinal hernias. TAPP is technically difficult in beginners when compared with open Lichtenstein. But results and duration of the procedure can improve with experienced laparoscopic surgeon.

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