



PROSPECTIVE STUDY COMPARING LICHTENSTEIN REPAIR WITH LAPAROSCOPIC TAAP REPAIR FOR INGUINAL HERNIA

Medical Science

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ABSTRACT

Background: Inguinal hernia surgery remains till date one of the most commonly performed surgeries. Inguinal herniorrhaphy through an anterior open approach is a time tested, safe and well understood operation with high success rate. With the advent of laparoscope and the increasing spectrum of minimally invasive surgery, it was only a matter of time that the laparoscopic surgery which started with laparoscopic cholecystectomy in 1987 entered the realm of inguinal hernia surgery too. Prospective Randomized Controlled studies between laparoscopic inguinal herniorrhaphy and tension free open mesh herniorrhaphy and furthermore between laparoscopic TAPP repair and lichtenstein repair are very limited in number. There is need therefore to study the different aspects of two types of repairs in terms of operation time, intraoperative and post operative complications, difference in pain and return to work and short term follow up. The present study is being undertaken to evaluate this aspects..

Materials & Methods: A prospective study was carried out on 50 patients presented to the surgical OPD of tertiary care teaching hospital in Mumbai between June 2013 to May 2015 with Inguinal Hernia. After taking complete history a thorough clinical examination done & required investigations performed. Patients were then randomised into two groups 25 Patients in group A underwent laparoscopic procedure and 25 patients group B underwent open (Lichtenstien) surgery.

All the post procedure findings were recorded under specific parameters.

Results & Conclusions: Based on results of our study and interpreting it in the context of available literature on the subject we reached the following conclusions There is no significant difference in operative and postoperative complications between the laparoscopic and open Lichtenstein hernia group.

KEYWORDS

LICHTENSTIEN REPAIR, TAAP, TEP, IOPM.

INTRODUCTION

Inguinal hernia surgery remains till date one of the most commonly performed surgeries. Inguinal herniorrhaphy through an anterior open approach is a time tested, safe and well understood operation with high success rate and can be performed using general, regional or local anaesthesia. The classical open surgery of strengthening of the posterior wall of the inguinal canal has evolved over a period of a time through various named operations like Bassini, McVay, shouldice, to name a few, to the present day gold standard of tension free hernioplasty using prosthetic mesh (open Lichtenstein) technique.

With the advent of laparoscope and the increasing spectrum of minimally invasive surgery, it was only a matter of time that the laparoscopic surgery which started with laparoscopic cholecystectomy in 1987 entered the realm of inguinal hernia surgery too. This has been possible because of advancement of modern instruments and increasing pressure from industry as well as from patients who increasingly demand less invasive procedures, in the face of criticism from conventional surgeons.

Currently three techniques of laparoscopic hernia repair are advocated namely, Transabdominalpreperitoneal (TAPP) repair, Totally extraperitoneal (TEP) repair and Intraperitoneal Onlay Mesh (IPOM) repair.

Prospective Randomized Controlled studies between laparoscopic inguinal herniorrhaphy and tension free open mesh herniorrhaphy and furthermore between laparoscopic TAPP repair and lichtenstein repair are very limited in number. There is need therefore to study the different aspects of two types of repairs in terms of operation time, intraoperative and post operative complications, difference in pain and return to work and short term follow up. The present study is being undertaken to evaluate this aspects.

AIMS AND OBJECTIVES

Aims

1. To compare open tension- free inguinal hernia repair (Lichtenstein method) with Laparoscopic transabdominal preperitoneal inguinal hernia repair on recurrence rates at 24 months.

Objectives

2. To compare the two operative methods on the following secondary outcomes: A) Operative time
B) Post operative pain
C) Post operative complications
D) Time for mobilization and return to daily activity
E) Cosmetic
F) Cost effectiveness
3. To determine the role of co-morbidity in influencing post-operative complications, patient centered outcomes and cost of inguinal hernia treatment.

MATERIALS AND METHODS

A. MATERIALS Selection of patients:

The study was conducted at the Department of Surgery of tertiary care teaching hospital in Mumbai from June 2013 to May 2015. Patients for the study were selected from amongst those attending the surgical OPD with clinical diagnosis inguinal hernia.

The patients were included in the study based on the followed criteria

Inclusion Criteria:

1. Only inguinal hernias
2. Uncomplicated conditions for elective repair
3. Medically fit patients only.
4. patients without underlying comorbidities like COPD, Infection, Immunosuppression, Anaemia.
5. Size is not a limiting condition.
6. patients to be assessed through history and clinical examination and if necessary, Blood tests, Urine test set reports along with X-ray, USG, CT.
7. Age group >20 years and <65 years.

Exclusion Criteria

1. Other hernias of anterior abdominal wall.
2. Unfit for anesthesia, (cardiac disease, renal and COPD)
3. Patients not affordable to buy prosthesis
4. Unwilling patients.
5. Complicated hernia. (irreducible,

- strangulated, incarcerated inguinal hernia, massive scrotal hernia.)
6. Patients who have undergone prior pelvic lymph node resection or groin irradiation or open prostatectomy.
 7. Converted cases (laparoscopic to open repair) were excluded from the study
 8. Recurrent cases.
 9. Patients not followed 12 months after surgery.

Method of Study

The workup of the patients was divided into preoperative evaluation, operative procedure and postoperative monitoring and followup.

A. Preoperative evaluation

Informed consent was taken from all the patients before entering the study. A total of 50 patients were admitted at a tertiary care teaching hospital in Mumbai were randomised into two groups 25 Patients in group A underwent laparoscopic procedure and 25 patients group B underwent open (Lichtenstien) surgery.

A detailed proforma was filled up for each patient with the following details.

- a. Details of patient's name, address, occupation and marital status.
- b. Relevant history.
- c. General physical examination and local examination.
- d. Routine blood and urine investigations and chest x-ray were done as a preoperative workup for fitness for general anaesthesia.
- e. Details of operative procedure i. Operation time.
- ii. Operative complications- bleeding, nerve injury, vas deferens injury, tearing of inferior epigastric vessels, major visceral or vascular injury.iii. Per operative classification of inguinal hernia according to Nyhus classification
- f. Post operative pain charting using Visual Analogue Scale (VAS) pain scoring systems and record of oral and parenteral analgesics.
- g. Post operative complications like hematoma, seroma, neuralgia and wound infection, early recurrence.
- h. Length of hospitalisation. i. Return to work.
- j. Follow up for wound infection, pain, scar, neuralgia, seroma formation and short term recurrence.

All patients in study groups were worked up completely for general anaesthesia from O.P.D.

Preoperatively, part preparation was done from nipple to mid thigh.. On the day of surgery, Informed consent for both Laparoscopic as well as open Lichtenstein repair was taken from patients. All patients were kept nil per orally after mid night before surgery. Randomization was done in operation theatre. The patients were asked to micturate just before going on operation table in open group. The patient who were undergoing TAPP were catheterized before going on the operation table. All laparoscopic repairs were performed under General anaesthesia (GA), while open repairs were performed either in Spinal/Epidural/G.A., according to the choice of anaesthetist. Prophylactic antibiotics were administered at the time of induction. The operative time from skin incision to the application of the last stitch, was noted by the anaesthetist in all cases. For post operative pain charting, Visual Analogue Scale (VAS) pain scoring chart was explained and discussed with the patients pre-operatively. The y-axis of the (VAS) score is numbered from 0 to 10 at one centimetre interval. Number 10 denotes the worst imaginable pain, while zero denotes no pain in resting stage. The x-axis of the scale is numbered as 12 hour, 24 hour, 48 hour, 72 hour and 7 days to record the postoperative pain at these times.

B. Operative procedure.

During the surgery, note was made of the anatomical abnormalities, types of hernia (direct/indirect/both), Nyhus classification, extent of sac in the inguinal canal, intraoperative complications (like any visceral or vascular injury, bleeding), need for division and ligation of sac or complete reduction, size of mesh applied and operative time.

1. Lichtenstein Repair

Patients were operated in the supine position. General anaesthesia or regional anaesthesia was used. The skin and subcutaneous tissue are incised and the external oblique aponeurosis was divided along the line of fibers. A plane was developed between cord structures and conjoined tendon and external oblique. The cord structures were lifted at the pubic tubercle. Sac was identified, separated from cord

structures, and opened, and the contents reduced back in peritoneal cavity. The sac was then transfixated with catgut & divided at the deep ring as high as possible.

In case of large indirect inguinal hernia, sac was transected at the mid point of the canal, with the distal section left in place after incising the anterior wall of sac to prevent obliteration and subsequent hydrocele formation. In case of direct hernia, sac was invaginated by applying continuous sutures between ilio pubic tract & transversalis fascia over which synthetic mesh was applied. The external oblique aponeurosis was separated from internal oblique muscle at a point high enough to accommodate the mesh.

polypropylene-polyglactin (VYPRO-II) mesh of 10 x 15 cm size was used and trimming was done as necessary so that the patch overlaps the internal oblique muscle aponeurosis by at least 2 cm above the border of Hessalbach triangle. The medial portion of the mesh was rounded to the shape of the medial corner of 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 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. 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.

2. Laparoscopic Transabdominal preperitoneal repair.

Patients were operated in supine position and general anaesthesia was used in all 25 patients. The operation was performed using three trocars: one 10mm umbilical port and two 5mm ports. A 12-14mm umbilical incision was made, after which blunt dissection was performed until the anterior rectus sheath. A transverse incision was made in the anterior rectus sheath in the midline and the rectus muscles were separated from each other. A 10mm blunt port was inserted using open technique.

Pneumoperitoneum was induced via an umbilical incision. CO₂ is then insufflated up to a pressure of 14 mm of Hg. Laparoscope was introduced and abdomen is explored including both inguinal areas. Then two 5mm ports were inserted at the lateral border of each rectus abdominis muscle at the level of umbilicus. The key anatomic landmarks were identified on both sides namely the spermatic vessels, the obliterated umbilical artery (medial umbilical ligament), the inferior epigastric vessels (lateral umbilical ligament). The hernia defect was inspected.

Reduction of contents: The small bowel, omentum or colon were seen hanging from the hernia defect. The contents of the sac were gently pulled into the abdominal cavity.

Peritoneal incision: A peritoneal flap was created by a horizontal incision 2cm above the defect extending from the medial umbilical ligament to the level of anterior superior iliac spine dissection was performed in the preperitoneal avascular plane between the peritoneum and the transversalis fascia to provide visualization of myopectineal orifices. Dissection of the entire Hessalbach's triangle and the retropubic space can be performed even without medial extension of the peritoneal incision. The preperitoneal space was dissected from lateral to medial at the level of the Retroinguinal (Bogros') space, with parietalization of the spermatic cord posteriorly and outwards. The dissection was continued medially towards the retropubic (Retzius') space extending behind the symphysis pubis and iliopectineal tract, exposing the pectineal ligament.

Parietalization: once the hernia sac was reduced, the peritoneum was separated from the vas deferens and the gonadal vessels proximally. Inadequate mobilization leads to displacement and folding of the mesh and eventually to recurrence. Dissection was done to leave space of at least 1-2cm beyond the edges of the mesh on all sides.

Extent of dissection: The dissection of space was extended beyond the midline on the medial aspect, beyond the anterior superior iliac spine

exposing the psoas muscle on the lateral aspect, inferiorly upto symphysis pubis and the level of obturator foramen and superiorly upto the level of the arcuate line.

Fashioning of the mesh: The polypropylene-polyglactin (VYPRO-II) lightweight mesh was trimmed to fit the contours of the dissected preperitoneal area.

Mesh placement: The mesh was rolled and then taken through the 10mm trocar. The mesh was taken into the preperitoneal space, once inside the dissected space. The mesh was positioned to cover the entire myopectineal orifice of fruchaud.

Mesh fixation: Mesh was fixed with intra corporeal sutures using 1-0 polypropylene. Mesh was fixed only at the coopers ligament. As the Triangle of Doom and Triangle of pain are totally avoided by not suturing there, the incidence of vascular injuries and neuralgia is negligible following this approach. Alternatively the mesh can be fixed by mechanical fixation devices such as tackers. Suturing was not only more effective but also reduces the cost of surgery.

Peritoneal closure: After placement of the mesh the peritoneum was sutured over the mesh. The peritoneal flaps was closed using continuous sutures vicryl 2-0.

Port closure: The working trocars were removed under direct vision. The 5mm trocar sites were closed with staplers and camera port required closure of the rectus sheath separately before the skin to prevent trocar site herniation.

C. Post operative monitoring:

All patients were examined on the evening of the surgery by operating surgeon and examined for general condition and any early post operative complications like urinary retention, early recurrence, bleeding from port site/hematoma formation Patients were allowed orally after the patient was fully conscious and out of the effects of G.A., in the evening of day of surgery.

Prophylactic antibiotic Augmentin 1.2 gm i.v.(Amoxicillin and clavulenic acid) were given for two doses at 8 pm and 8 am the following day. All patients were administered injection Diclofenac sodium (voveran®) 75 mg intramuscularly 8 hourly during first 24 hours. After discharge the patient was advised to take tablet voveran 50 mg orally when he feels significant pain causing discomfort and to record the same in the chart provided .A pressure dressing given with gauze and dynaplast over groin region and retained for 48 hours, to prevent seroma formation. First twelve patients were electively kept and discharged after 48 hours in TAPP group. Patients were advised to do day to day activities immediately after recovering from the effects of anaesthesia. VAS pain score chart was filled by each patient as explained at 12 hours, 24 hours, 48 hours, 72 hours and 7 days after surgery. Patients were advised to attend OPD on 7th post operative day for review and removal of stitches or staples. A thorough examination was done during this visit. VAS pain score chart was taken from the patient and attached with proforma and analgesia required was noted. Patients opinion about the surgery and cosmesis in-both group was taken as very satisfied, satisfied or not satisfied. Significant seroma formation in one case was managed by aspiration under aseptic condition and antibiotic cover.

All patients were advised to come for follow up after 6 weeks, 3 months and 6 months or earlier if symptomatic.

D. Statistical analysis

All the data were compiled on Microsoft Excel computer programme and was subjected to statistical analysis. Mann Whitney U test, student's t test, chi square (χ^2) test .and Fisher's exact test were used to study the significance of difference of various parameters in the laparoscopic TAPP and open (Lichtenstein) inguinal hernia groups.

RESULTS

The study was carried out from June 2013 to May 2015 at Tertiary care teaching hospital in Mumbai., mumbai. A total of 50 patients with clinical diagnosis of inguinal hernia were included in the study. Patients were randomized into two groups, 25 patients in each group. (Table 1)

Table-i: Patients in two groups

Group	Number of Patients
Lap TAPP	25
Open Lichtenstein	25
Total	50

Table-2: Patients age groups.

Age groups (years)	TAPP (n=25) (%)	Lichtenstein (n=25) (%)
20-35	12(48%)	12(48%)
36-50	10 (40%)	10 (40%)
51-65	3(12%)	3(12%)

Table-3: Patients Age Profile (Mean, S.D. & Range)

Age (years)	Lap TAPP**	Open Lichtenstein
Mean	37.48	38
Range	21-54	22-64
S.D.	11.78	12.26

Table-4: Side of hernia operated in each group

Side	Lap TAPP (n=25) (%)	Open Lichtenstein (n=25) (%)
Right	20 (80%)	16 (64%)
Left	5 (20%)	9 (36%)

Table-5: Nyhus types of Hernia

Types	Lap TAPP (n=25) (%)	Open Lichtenstein (n=25) (%)
I	14 (56%)	12(48%)
II	2(8%)	3(12%)
IIIA	8 (32%)	9 (36%)
IIIB	1 (4%)	1(4%)

Nyhus type IIIC and type IV hernia were excluded from the study.

I. OPERATION TIME

Table-6: Operation Time (Mean, Median, Range and S.D.) in two Groups

Types	Lap TAPP (n=25) (%)	Open Lichtenstein (n=25) (%)
Mean	76.6	54.6
Median	70	50
Range	40-170	30-95
S.D.	±32.13	±15.93

II. POSTOPERATIVE PAIN: The post operative pain was recorded at 12 hrs,

Table-7: Visual Analogue Scale (VAS) Pain Score. Mean (S.D.).

Time after operation	TAPP (n=25)	Lichtenstein (n=25)	P
12hrs	2.64(±1.4399)	3.52(±1.6613)	<0.04
24 hrs	1.76(±1.3625)	2.74 (±1.4866)	<0.01
48 hrs	1.40(±1.5275)	1.80(±0.9574)	0.06
72 hrs	0.72(±1.40)	1.08(±1.1150)	0.06
7th day	0.36(±0.7571)	0.60(±0.9574)	N.S

Table-8: Number of patients pain free beyond 24 hrs.

Time after operation	TAPP (n=25) (%)	Lichtenstein (n=25) (%)	P
48 hrs	8 (32)*	8 (8)* -.	<0.051
72 hrs	17 (68)*	9 (36)*	<0.052
7 days	19(76)	16(64)	N.S.2

III. POST OPERATIVE ANALGESIC REQUIRMENT:

Table-9: Post operative analgesic (voveran®) consumption

	TAPP (n=25)	Lichtenstein (n=25)	P
Mean (±SD)	2.72 (+/-2.33)*	5.84 (±3.3)*	<0.00 1
Median	3	6	
Range	0-10	0-12	

IV. INTRA-OPERATIVE COMPLICATIONS:

Table-10: Intra-operative complications

Complication	TAPP (n=25)	Lichtenstein (n=25)
Nerve injury	Nil	Nil
Inferior epigastric artery	Nil	Nil
Vas deferens injury	Nil	Nil
Major vascular injury	Nil	Nil
Visceral injury	Nil	Nil

V. POST-OPERATIVE COMPLICATIONS

Table-11: Post Operative Complications.

Complication	TAPP (n=25) (%)	Lichtenstein (n=25) (%)
Seroma	4(16%)	Nil
Hematoma	Nil	1 (4%)
Wound infection		
Minor	1(4%)	1(4%)
Major	Nil	Nil
Inguinodynia	Nil	Nil
Neuralgia	Nil	Nil
Urinary retention	1(4%)	Nil
Osteitis pubis	Nil	Nil
Urinary tract infection	Nil	Nil
Recurrence	Nil	Nil

VI. POST OPERATIVE HOSPITAL STAY

Table-12: Post Operative Hospital Stay

Post operative time at discharge	TAPP (n=25)	Lichtenstein (n=25)	P value
24 hours	13 (52%)	15 (60%)	(0.75)*
48 hours	12 (48%)	10(40%)	(0.75)

VII. RETURN TO WORK

Tabk-13: Return to work (days), Mean, S.D.

	TAPP		Lichtenstein	
	Job type I (n=15)	Job type II (n=10)	Job type I (n15)	Job type II (n10)
Mean (±SD)	12.13* (±5.78)	15.8 (±15.78)	20.93* (±399)	16.8 (±3.71)
Range	7-25	7-60	15-30	14.24

VIII. PATIENTS OPINION ABOUT SURGERY AND COSMESIS

Table-14: Comparison of Patients Opinion about Surgery

Patients opinion	TAPP (n=25) (%)	Lichtenstein (n=25) (%)	P value
Very satisfied	19 (76%)	15 (60%)	>0.05
Satisfied	5 (20%)	9 (36%)	
Not satisfied	1 (4%)	1 (4%)	

Table-15: Comparison of Patients Opinion about Cosmesis

Patients opinion	TAPP (n=25)(%)	Lichtenstein (n=25) (%)	P Value
Very satisfied	24* (100%)	7* (28%)	>0.001
Satisfied	1(4%)	18(72%)	
Not satisfied	0	0	

Table-16: Short term recurrence

Group	Number of (Followup) week s
TAPP	0 (3-43)
Lichtenstein	0 (0-43)

Table-17: Cost of surgery

Group	Cost
TAPP	Rs.53,416.68
Lichtenstein	Rs. 20,482.08

DISCUSSION

The present study was carried out on 50 patients attending the Surgical OPD of Tertiary Care Teaching Hospital in Mumbai with the clinical diagnosis of Inguinal hernia.

The Lichtenstein repair places a tension-free lightweight mesh on the posterior wall of the inguinal canal, while the Trans abdominal pre-peritoneal repair places a similar mesh in the pre-peritoneal space. Early reports suggest that Lichtenstein hernioplasty gives very satisfactory results^{1,2}. While results obtained from laparoscopic surgery may be similar to those of open mesh repair^{3,4}, there has not been a prospective trial comparing the two techniques.

Hernia Society recommend the Lichtenstein repair for unilateral or bilateral inguinal hernias as the preferred open technique.⁵

Our study was designed to compare TAPP repair with the most popular

open inguinal repair, i.e., Lichtenstein repair. Both TAPP and Lichtenstein repairs involve placement of a prosthetic mesh to strengthen the transversalis fascia and essentially are tension free, making them comparable.

A review of world literature identified very few articles in which these two procedures are compared^{6,7}. Most studies have randomly compared any of the laparoscopic repairs (transabdominal, preperitoneal or extraperitoneal) with any other open procedure (tension-free or sutured).^{****} Abramson

The lifetime risk of inguinal hernia is 27% in men 3% in women⁸ demonstrated the age dependence of inguinal hernias in 1978.those age 25-34 years had a lifetime prevalence rate of 15%.In our study majority (48%) of the patients were in age group of 20-35 years. Most of the patients in the TAPP group were right sided hernia (80%) Out of 50, 36 (72%) cases were having right sided heria. Nyhus classification of hernia was used to type the hernia based on intraoperative findings. Majority of patients in TAPP (88%) and Lichtenstein (84%) group were either small indirect (Nyhus type-I) hernia or direct (NyhusIIIA) hernia.8% patients in TAPP group and 12% from open group are Nyhus-II type. Cases of Nyhus type IV (recurrent) hernia were excluded from study.

The mean operative time of TAPP repair 76.6 (range 40-170) minutes was significantly higher as compared to that of the open Lichtenstein repair which was 54.6 (range 30-95) minutes The operative time improved with the learning curve of the surgeon as it was reduced from 101 (range 50-170) minutes in the first 10 cases to 60.33 (range 40-95) minutes in the next 15 cases.

The mean operative time of TAPP of 76.6 minutes in our series was comparable to the operative time of Heikkinen, et al⁹ (72 minutes) and Payne, et al¹⁰ (68minutes) and was less than the operative time of Pironi D¹¹ (92 min), Filipi¹² (109 mm), while it was higher in our study as compared to Wellwood ,etal¹³ (45 minutes) and Picchio et al¹⁴ (50 mi).the mean operative time for Lichtenstein repair in our study is 54.6 which is less than Pironi D¹¹ (71 min) and comparable to Payne et al¹⁰ (56 min).

Our results of operative time for TAPP & Lichtenstein (76.6 vs 54.6 minutes respectively) were comparable to the results of Payne et al¹⁰ in a similar study (68 vs 56 minutes respectively)

Post operative pain was recorded using Visual Analogue Scale (VAS) pain scoring system. The mean pain score at 12 hrs and 24 hrs was significantly low in TAPP repair as compared to Lichtenstein repair (P < 0.04 and < .005 respectively). The pain scores at 48 hrs and 72 hrs were less in TAPP group but did not reach significant levels (P= 0.06). The results are comparable to the results of Filipi et al¹², Wellwood ,et al¹³, Anadol, et al¹⁵ and Heikkinen, et al⁹. whereas Paganini et al¹⁶ did not find any difference.

The mean post operative analgesic (Tab voveran®) consumption was 2.72 (range 0-10) in TAPP group as compared to 5.84 (range 0-12) in open group and was significantly less in TAPP group (P < .001). This is comparable to the result of Heikkinene et al⁹

There were no intraoperative complication in our study. The result was comparable or better than that of Paganini et al¹⁶.

The incidence of seroma formation was 16% (4 cases) in the TAPP group. One case required needle aspiration(Nyhus type IIIB) while the other three were not aspirated and all resolved Completely within 6 weeks(Nyhus type I). There was no incidence of Hematoma formation in TAPP group in the present study .There were 1 (4%) cases of hematoma formation in open Lichtenstein group. There was only 1 (4%) case of minor wound infection in each group and no incidence of major wound infection. There was incidence of Urinary Retention in 1(4%) case of TAPP group, managed by Foleys catheterization for one day.

There is 0% incidence Of Osteitis Pubis in our study in both groups,as the pubic periosteum is totally avoided when placing sutures. The incidence of neuralgia was 0% in our study attributed to the technique of fixing the mesh only at the Cooper’s ligament with intracorporeal sutures. By our technique, the triangle of Pain is totally avoided by not suturing there. Stapling, suturing or any form of fixation below the

iliofemoral tract is contraindicated. Such procedures have shown to produce higher incidence of neuralgias. To avoid this neuralgia, a new technique to fix the mesh in the form of tissue glues, both synthetic and biosynthetic types, is being developed¹⁷. There is no incidence of chronic pain in both groups after use of polypropylene-polyglactin(VYPRO II) mesh which is compared to A 2012 meta-analysis of 2310 patients undergoing open or laparoscopic hernia repairs found a lower incidence of chronic pain(relative risk 0.61, CI 0.50-0.74) following use of lightweight mesh versus heavyweight mesh and no significant difference in rates of recurrence¹⁸ and due to meticulous nerve identification in Lichtenstein method and avoiding suturing at triangle of Pain in TAPP repair. There was no incidence of urinary tract infection in either group as compared to Liem et al¹⁹ who reported 3 cases (3%).

Our results in open group are comparable with the Filipi et al¹²(10%) & Anadol et al⁷

Our results in TAPP group are comparable with the Heikkinen et al⁹ (20%), Filipi et al¹² (13%) and was less than the Paganini et al¹⁶ (27%), Picchio et al¹⁴ (26%) while it was higher in our study was higher in our study as compared to Payne, et al¹⁰ (12%) and Anadol, et al¹⁵ (8%).

The median hospital stay was 1 day each in TAPP and Lichtenstein group.

The mean time to return to work was significantly low (12.13) days in TAPP group as compared to the Lichtenstein group (20.93 days) in patients with job type I (heavy manual workers) ($P < .04$). The time to return to work in job II (Desk workers) was 15.8 and 16.8 days respectively in the two groups and was not significantly different. Our results were comparable to a similar study done by Heikkinen et al⁹ (14 days) and Paganini et al¹⁶ (15 days), in term of return of work.

The mean time to return work in the present study was 13.6 days and 19 days in TAPP & Lichtenstein group respectively. While Wellwood, et al¹³ reported it to be 21 days and 26 days respectively. In both studies the return to work in TAPP group is significantly earlier than the open group.

Patients opinion about surgery was evaluated by a 3 point scale and it was found that 76% of the patients were "highly satisfied" with their surgery in the TAPP group as compared to (60%) in the Lichtenstein group. Schrenk et al²⁰ did not find any significant difference in the patients opinion about surgery.

24(96%) patients in TAPP group were "highly satisfied" with the cosmetic result of the operation as compared to only 7(28%) in the open group.

There was no short term recurrence in either TAPP or Lichtenstein group, in the present study in the mean follow up period of 20 weeks (range 3-47 weeks).our results are comparable to Pironi D¹¹ et al which showed recurrence rate less than 1%(0.6 % in open technique and 0.4 % in TAPP repair). whereas in TAPP, recurrence was reported by Aitola, et al²¹ (13%), by Paganini et al¹⁶ (3.8%) and by Douek et al²² (2%). Douek et al²² reported a recurrence of 2% in TAPP and 3% in the open group.

CONCLUSIONS

1. There is no significant difference in operative and postoperative complications between the laparoscopic and open Lichtenstein hernia group.
2. Laparoscopic TAPP is a significantly lengthier procedure than open Lichtenstein repair especially in the learning phase in the first few cases. Thereafter, the operative time is comparable to other series but slightly more than the open operation.
3. Postoperative pain is significantly less in TAPP group as compared to the Lichtenstein in the first 24 hrs after surgery.
4. The postoperative pain is less in TAPP group from 2nd to 3rd day but is not statistically significant.
5. There is no difference in the „postoperative pain in the two groups at 7 days after surgery.
6. Postoperative analgesic requirements in TAPP repair patients is significantly less than the Lichtenstein group.
7. This study does not show any difference in hospital stay as about half of patients were initially discharged electively on the second postoperative day.
8. Time to return to work was significantly early in laparoscopic

- group especially in the heavy workers(Job type I)
9. Use of a large (10 - 13 x 13 - 15 cm) size mesh reduces the chance of recurrence even in the hands of the learning surgeon.
10. VAS pain scoring system is a fairly good method of pain charting but is sometimes very difficult to explain to the, uneducated person and thus chances of subjective errors—are very high. Also this scoring system relies on the patients pain threshold which is itself variable.
11. Use of VYPRO II mesh i.e. lightweight mesh causes reduction in chronic pain syndrome.
12. Early recurrences can be prevented by careful exploration of the cord structures in the cases of direct hernia for presence of any indirect component.
13. Neuralgia is a troublesome postoperative complication of TAPP repair, which requires further evaluation to determine its aetiology.
14. Before placing the mesh, it is important to separate the peritoneum completely away from the cord structures, thus ensuring proper lateralization of the cord.
15. Learning curve of surgeon can be reduced by enhancing knowledge of the anatomy of preperitoneal space by doing open Stoppa procedures (atleast 8 to 10) before starting laparoscopic TAPP repair.
16. Laparoscopic TAPP repair is costlier than open Lichtenstein inguinal hernia repair but in working candidate due to early return to work he may compensate higher cost in laparoscopic repair, so Laparoscopic Trans abdominal preperitoneal (TAPP) inguinal hernia repair can be recommended to those desiring early return to work
17. Cosmetically in laparoscopic repair patients are very satisfied but not statistically significant.
18. All the groin hernias(Direct Inguinal, Indirect Inguinal and Femoral Hernia) were dealt with in laparoscopic TAPP compared to open approach.

SUMMARY

Laparoscopic hernia repair in 2015 still accounts for the minority of hernia repair performed in India. The reasons for this are a demonstration in the literature of increased operative times, increased costs, and a longer learning curve. In addition are concerns about the need to use general anesthesia for laparoscopic operations and early reports of vascular and visceral injuries. As experience and knowledge have increased, these rare complications have become more important from a historical perspective.

Laparoscopic herniorrhaphy appears to result in less postoperative pain (acute and chronic) and in a shorter convalescence and an earlier return to work, compared with the open repair. It can be performed safely and with a low recurrence rate. However, it takes longer to do, is more difficult to learn, and costs more, all reasons why it is not more commonly performed.

laparoscopic herniorrhaphy will probably continue to be a contender, especially for the younger patient who wants to return to work quickly and for patients with bilateral and recurrent hernias.

REFERENCES

1. Shulman AG, Amid PK, Lichtenstein IL. The safety of mesh repair for primary inguinal hernia results of 3019 operations from 5 diverse surgical sources. *Am Surg* 1992; 58:255-257.
2. Amid PK, Shulman AG, Lichtenstein I. Critical scrutiny of the open tension free hernioplasty. *Am J Surg* 1993; 165:369-71.
3. Corbit JD Jr. Laparoscopic herniorrhaphy *Surg Laparosc Endosc*.1991; 1:23-5.
4. Milkins RC, Lansdown MJR, Wedgwood KR, Brough WA, Royston CMS. Laparoscopic hernia repair: A prospective study of 409 cases. *Minimally invasive therapy* 1993; 237-42.
5. Simon MP, Aufenacker T, Bay-Nielsen M, et al. European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. *Hernia*. 2009; 13:343-403
6. Heikkinen TJ, Haukipuro K, Koivukargen P, Hulkko A (1998). A prospective randomized outcome and cost comparison of totally extra peritoneal endoscopic hernioplasty versus Lichtenstein operation among employed patients. *Surg Laprosc Endosc* 8: 338-344.
7. Payne JH, Izawa MT, Glen P, Grininger L, Podoll E, Balfour L (1996). Laparoscopic or tension free inguinal hernia repair? A cost benefit analysis of 200 prospective randomized patients. *SAGES Philadelphia*.
8. Gould J. Laparoscopic versus open inguinal hernia repair. *Surg Clin N Am*.2008;88: 1073-1081
9. Heikkinen T, Haukipuro K, Leppala J Ct al. Total costs of laparoscopic and Lichtenstein inguinal hernia repairs: a randomized prospective study. *Surg Laparosc Endosc* 1997; 7:1-5.
10. Payne JH, Grininger LM, Izawa et al. Laparoscopic or open inguinal herniorrhaphy? A randomized prospective trail. *Arch Surg* 1994; 129:973-9.
11. Pironi D, Palazzini G, Panarese, et al Open mesh technique versus laparoscopic transabdominal preperitoneal(TAPP) approach in inguinal hernia repair.our experience II *Giomale di chirurgia*.2007,29(11-12):497-504

12. Filipi CJ, GastonJohansson F, McBride PJ et al. An assessment of pain and return to normal activity: laparoscopic herniorrhaphy vs open tension-free Lichtenstein repair. *Surg Endosc* 1996; 10:983-6.
13. Wellwood J, Sculpher MJ, Stoker D et al. Randomized controlled trial of laparoscopic versus open mesh repair for inguinal hernia: Outcome and cost. *BMJ* 1998; 317-103-10.
14. Picchio M, Lombardi A, Zolovkins A, et al. Tension-free laparoscopic and open hernia repair: randomized controlled trial of early results. *World J Surg* 1999; 23: 10004-9.
15. Anadol AZ, Ersoy E, Taneri F, et al. Outcome and cost comparison of laparoscopic transabdominal preperitoneal hernia repair versus open Lichtenstein technique. *J Laparoendosc Adv Surg Tech A* 2004; 14: 159-63.
16. Paganini AM, Lezoche E, Carle F, et al. A randomized, controlled, clinical study of laparoscopic vs open tension-free inguinal hernia repair. *Surg Endosc* 1998; 12: 979-86.
17. Langreha JM, Schmidt SC, Neuhans P. Initial experience with the use of fibrin sealant for the fixation of the prosthetic mesh in laparoscopic transabdominal preperitoneal Hernia repair. *Rozhl Chir* 2005; 84: 399-402.
18. Sajid MS, Leaver C, Baig MK, et al. Systemic review and meta-analysis of the use of lightweight versus heavyweight mesh in open inguinal hernia repair. *Br J Surg* 2012; 99: 29-37.
19. Liem MSL, Graaf YVD Steensel CJV, et al. Comparison of conventional anterior surgery and laparoscopic surgery for inguinal hernia repair *N Eng J Med*, 1997; 336: 1541-47:20. Schrenk P, Woisetschlager R, Reger R and Wayand W. prospective randomized trial comparing postoperative pain and return to physical activity after transabdominal preperitoneal, total preperitoneal or shouldice technique for inguinal hernia repair. *BTJ Sug*, 1996; 83: 1563-6.
21. Aitola P, Airo I, Matikainen M. Laparoscopic versus open preperitoneal inguinal hernia repair: a prospective randomized trial. *Ann Chir Gynaecol* 1998; 87: 22-5.
22. Douek M, Smith G, Oshowo A et al. Prospective randomized controlled trial of laparoscopic versus open inguinal hernia mesh repair: five year followup. *BMJ* 2003; 326: 1012-3.