

### **Transabdominal Preperitoneal (TAPP) versus Lichtenstein Hernioplasty in Inguinal hernia repair**

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#### **Abstract**

**Introduction:** Inguinal hernia repair is the most performed operation in general Surgery. There are numerous open surgical techniques and two accepted laparoscopic techniques in literature. The treatment outcome remains the same that is, reducing the herniation and prevention of recurrence. Although there are multiple studies showing the merits and demerits of open and laparoscopic hernioplasty, there is a huge difference with results of different studies from different institutions. There are no clear benefits of one type of surgical repair over the other.

**Aims And Objectives:** To compare the effectiveness of Transabdominal Preperitoneal (TAPP) approach and Lichtenstein Hernioplasty in repair of inguinal hernia considering the length of procedure, rate of seroma and hematoma formation, rate of surgical site infections,

duration of hospital stay, resumption of activities and pain at 6 weeks after surgery.

**Materials and Methods:** A prospective non-randomized controlled study was conducted from June 2021 to May 2022 on 40 patients diagnosed with inguinal hernia. The patients were divided into laparoscopic TAPP repair and open Lichtenstein repair subgroups in a non-randomised fashion. The patient’s demographic characteristics, operation time, seroma formation, hematoma formation, surgical site infection, duration of hospital stay and resumption of activities were analysed and compared. All the data were expressed as means  $\pm$ SDs. Fisher’s exact tests were used for statistical analysis, and  $p < 0.05$  was accepted as a significant statistical value.

**Results:** Patients in this study tend to be clustered around older age group. The laparoscopic (TAPP) repair took longer than open Lichtenstein repair ( $99.85 \pm 32.83$

vs  $50.50 \pm 15.64$ ). Open repair patients had more occurrence of seroma and surgical site infections. Hematoma formation shows no significant difference between the two groups. Patients with Laparoscopic repair had shorter hospital stay with early resumption of activities.

**Conclusion:** Laparoscopic repair of inguinal hernia took longer to perform than open repair but was found to be better in terms of earlier discharge from hospital and quicker resumption of activities.

**Keywords:** Transabdominal Preperitoneal approach, Lichtenstein Hernioplasty, Inguinal Hernia, Seroma, Hematoma, Surgical Site Infections

### Introduction

Inguinal Hernia repair is the most encountered operation in general surgery. Inguinal hernias account for 75% of abdominal wall hernias, with a lifetime risk of 27% in men and 3% in women.<sup>1</sup> There has been a paradigm shift in the treatment of Inguinal Hernia from pure tissue repair to the use of prosthetic mesh and from open repair to minimal access laparoscopic approach. Although there are multiple studies showing the merits and demerits of open and laparoscopic hernioplasty, there is a huge difference with results of different studies from different institutions. There are no clear benefits of one type of surgical repair over the other.

### Aims and Objectives

To compare the effectiveness of Transabdominal Preperitoneal (TAPP) approach and Lichtenstein Hernioplasty in repair of inguinal hernia considering the length of procedure, rate of seroma and hematoma formation, rate of surgical site infections, duration of hospital stay, resumption of activities and pain at 6 weeks after surgery.

### Materials and Method

**Place of study:** Assam Medical College and Hospital, Dibrugarh

**Duration of study:** June 2021 to May 2022

**Study Design:** Prospective non-randomized controlled study

**Sample size:** 20 patients in each group (1:1)

### Inclusion Criteria

Adult male patients with a clinical diagnosis of inguinal hernia for whom surgical management was judged appropriate.

### Exclusion criteria

- Patients with predisposing factors to recurrence such as chronic cough, ascites, prostatism, chronic constipation
- History of previous hernia surgery and pelvic surgery
- BMI over 30
- Patients on anticoagulants
- Female patients
- Complications of inguinal hernia (strangulation, obstruction)
- Patients unfit for general anaesthesia
- Patients not consenting for operation

**Statistical Analysis:** All the data were expressed as means  $\pm$ SDs. Fisher's exact tests were used for statistical analysis, and  $p < 0.05$  was accepted as a significant statistical value.

### Working Definitions

**Duration of operation** was defined as time from first incision to last suture.

**Hematoma** included wound or scrotal hematoma

**Seroma** is defined as a sterile accumulation of serum in the tissue without surrounding inflammation. It included Hydrocele.

**Surgical site infection** was defined as surgical wound related infections included pus from wound and sinus formation.

**Length of hospital stay** was defined as time from admission to discharge.

**Return to usual activities** was defined as time required for resumption of normal social activities or work where this was not available.

**Types of Anaesthesia:** Open repair – Spinal Anaesthesia

Laparoscopic repair – General Anaesthesia

**The pre-operative work-up for both groups include:**

- Haemoglobin estimation
- Clotting profile (bleeding time, clotting time and prothrombin time with INR)
- Random blood sugar
- Blood urea and serum creatinine
- Chest X-ray
- ECG

**Transabdominal Preperitoneal repair**

- Position- Supine
- Abdomen painted with 10% povidone iodine and draped
- Incision- infraumbilical incision (1cm)
- Through blunt dissection, peritoneum was reached and a 10mm port was inserted
- Gas was insufflated and capnoperitoneum was created at pressure of 12cm of H<sub>2</sub>O
- Two 5mm ports were created lateral to the rectus muscle at the level of the umbilicus
- Inspection was carried out via a camera with a 30° scope

Following structures were identified

- Median umbilical folds
- Medial umbilical folds

- Lateral umbilical folds and epigastric vessels
- Iliac vessels
- Hernia defect (Direct or Indirect)

Incision was made on the peritoneum lateral to the medial umbilical ligament, just below the umbilicus

- Incision extended laterally to the anterior superior iliac spine using scissors
- Peritoneum was bluntly dissected away from the abdominal wall
- Dissection was carried down along the medial border of the flap until the pubis was identified and then dissected laterally in same fashion
- Important structures should be identified
  - Pubis Symphysis
  - Cooper Ligament
  - Iliopubic tract
- Spermatic cord was skeletonised
- Hernial sac is dissected from cord
- Long indirect sac is transected
- After hernia reduction, mesh prosthesis was placed in the extraperitoneal space
- Mesh used was 15 X 15 cm and was trimmed as per needed
- Mesh was fixed to the abdominal wall using Tacker (Covidien © ProTack™)
- Peritoneum was closed using Covidien © V-Loc sutures™
- Ports were closed after deflating the abdomen

**Lichtenstein Repair**

- Position: Supine
- Incision: 1cm above and parallel to the inguinal ligament, from pubic tubercle extending laterally to the mid-inguinal point
- Subcutaneous fat, Scarpa Fascia were opened along the length of incision

- EOA was opened starting from external ring and extending laterally beyond the deep inguinal ring
- Ilioinguinal nerve was safe guarded
- Superior and inferior flaps were freed from the underlying contents
- Spermatic cord along with cremaster was separated from the pubic bone beyond the pubic tubercle to create space for mesh placement
- Identification and isolation of hernial sac
- Proximal sac was dissected free from cord structures and high ligation of sac was performed
- A 7 X 15cm Polypropylene mesh was used
- A slit was made in the lateral end of mesh (upper 2/3<sup>rd</sup> and lower 1/3<sup>rd</sup>)
- Mesh was fixed with suture medial to the pubic tubercle
- Upper edge was fixed to the conjoined tendon
- Lower edge was fixed to the inguinal ligament
- The split lateral end of the mesh is re-sutured beyond the spermatic cord to create a neo-deep ring
- Closure of EOA
- Skin closure

**Post-operative care**

- Post-operative analgesia provided by Injection Diclofenac 75mg IM twice daily
- Oral feeding was started once bowel sound were heard

**Results and Observations**

Age distribution

Age	TAPP repair	Lichtenstein repair
<20	0	0
21-30	2	3
31-40	4	4
41-50	7	6
>50	7	7

Duration of surgical procedure

Procedure	Mean duration in mins (±SD)	P value
TAPP repair	99.85 (±32.83)	<0.00001
Lichtenstein repair	50.50 (±15.64)	

Rate of seroma formation

Procedure	Present	Absent	P value
TAPP repair	2	18	0.0648
Lichtenstein repair	8	12	

Rate of hematoma formation

Procedure	Present	Absent	P value
TAPP repair	0	20	1
Lichtenstein repair	1	19	

Rate of surgical site infection

Procedure	Present	Absent	P value
TAPP repair	0	20	0.49
Lichtenstein repair	2	18	

Duration of hospital stay

Procedure	Mean duration in days (±SD)	P value
TAPP repair	2.20 (±0.70)	<0.00001
Lichtenstein repair	4.15 (±1.50)	

Resumption of activities

Procedure	Mean duration in days (±SD)	P value
TAPP repair	4.15 (±1.35)	<0.00001
Lichtenstein repair	7.45 (±2.93)	

**Discussion**

**Age distribution:** In our study, we observed that most of the inguinal hernia cases tends to cluster in older age group. Inguinal hernia is more frequent in elderly than in younger patients because of loss of strength of the

abdominal wall and conditions which increase intraabdominal pressure.<sup>2</sup> conditions such as constipation, prostatism, bronchitis or abdominal fat deposit that may affect old patients, furthermore the loss of strength of the abdominal wall is caused by alteration in collagen (collagen becomes more rigid and crystalline and its tension diminished) typical of elderly.<sup>2</sup> A study by D. A. Jacob et. al.<sup>3</sup> and Kai Xiong Cheong et. al.<sup>4</sup> also found the mean age to be clustering in elderly age groups. As the population of elderly people increases, the need for improved surgical care continues to grow and this current study among others help to elucidate the same.

**Duration of surgery**

Laparoscopic Inguinal hernia repair is technically challenging and requires advanced laparoscopic skills. This becomes evident from studies done by McCormack et. al.<sup>5</sup> Pereira et. al. 2021<sup>6</sup> and Akhtar M. S. et. al. 2016<sup>7</sup> where laparoscopic repair was found to take more time compared Lichtenstein repair. In present study, Laparoscopic repair took longer time with mean duration of 98.85 (SD=32.83) minutes compared to Lichtenstein repair where mean time was 50.50 (SD=15.64) minutes. The result is significant at p<0.05.

This has got an important implications as longer the procedure lasts, the higher are the post-operative complications.<sup>8</sup> Elderly patients are physiologically depleted and the capability to undergo surgical stress might be low.

**Rate of Seroma formation**

Study	TAPP repair	Lichtenstein repair
Maastricht 1999 <sup>9</sup>	7/37 (18.92%)	15/38 (39.47)
KargarS et. al	6/60 (10%)	8/60 (13.3%)

2014 <sup>10</sup>		
Akhtar M.S> et. al. 2016 <sup>7</sup>	2/26 (7.69%)	1/47 (2.13%)
Current study	2/20 (20%)	8/20 (40%)

Seroma is a frequent complication after open repair of inguinal hernia, with a variable incidence reported by different groups due to it being underreported.<sup>11</sup> In Maastricht 1999 study<sup>9</sup> and KargarS et. al<sup>10</sup> open repair was found to have seroma formation more than laparoscopic repair. Akhtar M.S. et. al 2016<sup>7</sup> found no significant difference with regards to seroma formation. In Cochrane review 2003<sup>5</sup> McCormack et. al. concluded “overall, there were more seromas in the laparoscopic groups”. In present study, open arm has more seroma formation then laparoscopic arm.

Despite its benign appearance, seroma persistence can become a major problem for patients, impairing their quality of life during the weeks until its complete resolution. Literature currently does not provide evidence on superiority of TAPP on Lichtenstein repair or vice versa.

**Rate of Hematoma formation**

Study	TAPP repair	Lichtenstein repair
Pironi D et. al. 2008 <sup>12</sup>	1/252 (0.4%)	5/332 (1.5%)
KargarS et. al. 2015 <sup>10</sup>	4/60 (6.66%)	8/60 (13.33%)
Roy S et. al. 2016 <sup>13</sup>	1/25 (4%)	2/25 (8%)
Present study	0/20 (0%)	1/20 (5%)

In a study conducted by KargarS et. al 2015<sup>10</sup> and Roy S et. al. 2016,<sup>13</sup> Lichtenstein repair group was found to developed hematoma more than TAPP repair group. Present study observes similar findings where 0% laparoscopically treated patients developed hematoma in

open group. There is no statistical difference between the two group. McCormack et. al. 2003<sup>5</sup> concluded that overall there appeared to be fewer hematoma in laparoscopic groups but this reflected Total Extraperitoneal repair (TEP). There were no clear differences when TAPP trials were considered.

**Rate of Surgical site infection**

Study	TAPP repair	Lichtenstein repair
Maastricht 1998 <sup>9</sup>	2/88	1/87
Kargar S et.al. 2015 <sup>10</sup>	0/60	1/60
Roy S et. al. 2016 <sup>13</sup>	1/25	4/25
Present study	0/20	2/20

Rate of surgical site infection were found to be uniformly low in all the studies. Improvement in peri-operative care has reduced this dreaded occurrence. Most studies however have found that a laparoscopic repair leads to lower rate of surgical site infections. A study conducted by Kargar S et. al. 2015<sup>10</sup> and Roy S. et. al. 2016<sup>13</sup> open Lichtenstein repair was found to have surgical site infection more than TAPP repair group. In present study, Lichtenstein and TAPP repair group did not differ statistically with respect to surgical site infection.

**Length of hospital stay**

Study	TAPP repair (in days)	Lichtenstein repair (in days)
Aarberg 1996 <sup>14</sup>	4.84 (SD=1.58)	6.16 (SD=2.49)
Salma U et. al. 2015 <sup>15</sup>	1.46	1.61
Kargar S et. al. 2015 <sup>10</sup>	8.13 (SD=2.19)	13.15 (SD=1.5)
Present study	2.20 (SD=0.70)	4.15 (SD=1.50)

Patients with inguinal hernia who undergo laparoscopic repair recover more rapidly and have fewer recurrences than those who undergo open surgical repair.<sup>16</sup>

Salma Uet. Al. 2015<sup>15</sup> found no differences between mean hospital stay with open group and laparoscopic group. In present study, significant statistical differences were seen in the two groups. Patients undergoing open repair had mean stay of 4.15 (SD=1.50) days. Laparoscopic group had mean stay of 2.20 (SD=0.70) days.

**Resumption of activity**

Study	TAPP repair (in days)	Lichtenstein repair (in days)
Liem MS et. al. 1997 <sup>17</sup>	6	10
Eklund A et. al. 2006 <sup>18</sup>	20	31
Present study	4.15 (SD=1.35)	7.45 (SD=2.93)

As seen in the above table, a study conducted by Liem MS et. al. 1997<sup>17</sup> and Eklund A et. al. 2006<sup>18</sup> shows remarkably long interval for resumption of activity which favours Laparoscopic repair over Open repair. Roy S et. al. 2016,<sup>13</sup> found that within 7 days most of the patients (76%) in laparoscopic group returned to their normal activity, but in the open group 92% patient required more than 7 days to return to normal activity. The present study found statistically significant differences between laparoscopically treated patients and patients treated via an open approach. Attesting the fact that laparoscopic repair enables patients to resume daily functions sooner.

**Conclusion**

In conclusion, Laparoscopic TAAP repair was found to be better than Lichtenstein repair in terms of earlier discharge from hospital and quicker resumption of activities. Laparoscopic repair is an advanced technique and requires longer duration to complete however, as the surgeon gains more experience time required for completion of the procedure is expected to come

down. There is no significant difference with seroma, hematoma and surgical site infections between the two groups. Intraoperative and life-threatening complications were more frequent with laparoscopic than open repair group. As for any successful operation, a careful patient selection, good understanding of the anatomy, adequate surgical technique and surgeon's experience are very important key factors to achieve a good clinical outcome.

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