

Comparison of Laparoscopic Trans Abdominal Pre Peritoneal Mesh Hernioplasty versus Open Tension-free Lichtenstein's Hernioplasty : a non-randomized study

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Abstract

Background: Repair of inguinal hernia is one of the most frequently performed surgical procedures worldwide. Present study was performed with an aim to compare the effectiveness of Laparoscopic trans abdominal pre peritoneal (TAPP) mesh hernioplasty and Open tension-free Lichtenstein's mesh hernioplasty and to compare intra-operative and post-operative complications, safety and efficacy, duration of surgery with early recovery and postoperative morbidity and patient satisfaction.

Methods: Present study is a prospective, non-randomized comparative study. The study consisted 60 patients treated with Hernioplasty (30 cases of trans abdominal pre peritoneal hernioplasty and 30 cases of Lichtenstein's hernioplasty) in the Department of Surgery, Border Guard Hospital, Dhaka during the study period of two year. Hospital Ethical Committee approval and written informed consent from patients were obtained. Data were collected using a questionnaire.

Results: The results shows there is significant superiority of laparoscopic trans abdominal pre-peritoneal mesh hernioplasty over open Lichtenstein's hernioplasty in terms of post operative pain. (Patients after laparoscopic repair had mild pain is 73.33%, 26.67% patients with discomforting pain but no patients with distressing or horrible pain. Whereas, only 10% of the patients of open hernioplasty had mild pain with 33.33% of patients had discomforting pain and 40% of patients had distressing pain significantly. 16.67% of the patients with open hernia repair had horrible pain), quality of life with early recovery and returned to work. But a prolonged operative time in trans abdominal pre peritoneal hernioplasty (Mean operating time in TAPP was 76.53 minutes while in Open was 57.89 minutes)

Conclusions: Laparoscopic trans abdominal pre-peritoneal (TAPP) hernioplasty is safe and efficacious and offers definitive advantages over Open Lichtenstein's repair and should be an available option for all patients requiring hernioplasty.

Keywords: Hernia, Hernioplasty, Laparoscopic, prospective, Non-randomized.

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Introduction

Repair of inguinal hernia is one of the most frequently performed surgical procedures worldwide. Irrespective of country, race or socioeconomic status hernia constitutes a major health-care problem. The definitive treatment of all hernias (regardless of their origin or type) is surgical repair with approximately 20 million repairs done worldwide annually¹.

Lichtenstein's tension free open inguinal hernioplasty using a prosthetic mesh was the preferred treatment against which all

alternative modalities of treatment are evaluated. The wide use of mesh in the groin hernia repair² has gained more popularity and has almost replaced the suture repairs such as should ice or moloney darn repair.^{3,4} However, recently, many centers routinely performed laparoscopic hernia repair and there have been numerous reports describing various laparoscopic techniques [Trans Abdominal pre peritoneal (TAPP), Totally Extra Peritoneal (TEP)] rather than the traditional open approach. There is, however, a very large debate on relative merits of laparoscopic mesh placement by using two to three small abdominal incisions compared with placement of mesh by using an open approach through a standard groin incision. Studies mentioned that laparoscopic hernia repair has got added benefits of lesser pain, reduced discomfort, short hospital stay and early resumption of normal daily activities but still it is not being commonly performed due to need for general anaesthesia and long learning curve. Present study was performed with objectives to compare the effectiveness of laparoscopic trans abdominal pre peritoneal hernioplasty and open Lichtenstein's hernioplasty, to assess the intra operative and post-operative complications, safety and efficacy, duration of surgery with patients recovery and return to work post-operative morbidity and patient satisfaction.

Methods

Present study is a prospective, open labeled, non-randomized comparative study. The study consisted 60 patients treated with hernioplasty {30 cases of Laparoscopic trans-abdominal pre-peritoneal (TAPP) mesh hernioplasty (group-A) and 30 cases of open tension free Lichtenstein's mesh hernioplasty (Group-B)} in the Department of Surgery, Border Guard Hospital, Dhaka, during the study period of 02 years from January 2017 to December 2018. Written consent was taken from all the patients and clearance from ethical committee of the hospital was also taken for both laparoscopic and open hernia repairs.

Inclusion criteria

All patients of both sexes, who were 18 years of age or older with a diagnosis of uncomplicated

inguinal, small or medium sized, direct or indirect, either bilateral or unilateral hernia and were medically fit for laparoscopy and general anaesthesia were included in the study.

Exclusion criteria

Patients with age less than 18 years of age, contraindication to general anaesthesia (for laparoscopic repair) / Regional anaesthesia (for open repair) i.e. those with Cardiac diseases (MI, IHD), Respiratory diseases (Chronic Asthma, COPD), Renal and Hepatic diseases, Bleeding disorders etc. Patients with complicated inguinal hernias like irreducible, obstruction, strangulation or gangrene. Patients who have undergone previous lower abdominal surgeries were excluded from the study.

All patients were evaluated clinically. Data were collected using a questionnaire. Pre-operatively the patients were offered options of either laparoscopic (TAPP) repair or open Lichtenstein's repair for Inguinal hernia, and were educated about the advantages, disadvantages and type of anaesthesia. All patients underwent routine investigations for general anaesthesia fitness. Preoperative evaluation of patient for laparoscopic repair includes: cardiac evaluation such as ECHO (if required). Pulmonary function test (PFT) (if required) for assessment of pulmonary function in some patients, and ultrasonography to rule out prostatic enlargement.

If a patient was not fit for general anaesthesia or laparoscopic repair, patient was advised to go for open tension free Lichtenstein's repair under regional anaesthesia.

Group A operated by laparoscopic trans-abdominal pre-peritoneal mesh hernioplasty (TAPP)

Group B operated by open tension free Lichtenstein's mesh hernioplasty (Open).

Patients were admitted one day prior to surgery. They were operated as per allotted group and relevant operative findings, operative steps and per operative complications were noted in detail and tabulated.

The antibiotic protocol was peri-operative antibiotics only, consisting of three intravenous doses of inj. ceftriaxone 1 gm I/V 12 hourly and Inj. Flucloxacillin 500mg I/V 6 hourly. The analgesic used was Inj. Ketorolac 30mg I/V 12 hourly and pain was recorded on visual analogue score (VAS) at 0 min, 30 min, 1 hour, 2 hours, 4 hours, 6 hours, 12 hours and 24 hours after surgery. The need for any rescue analgesic was also noted. The patients were encouraged to move in the early postoperative period and to take liquid diet on the evening of surgery. Foley's catheter, which was inserted in patients in TAPP group and elderly patients of OH group, was removed in the evening and the patients were discharged in the morning after surgery. The patients who had drains were discharged only after removal of the drain, which in most cases was done 24 hours after surgery. Sutures were removed between 8-10 days. The wounds were checked and graded accordingly. Patients were evaluated on 1st week, 2nd week, 1 month, 2 month, 3 month for presence of any cough impulse, swelling, and signs of recurrence. Patients where recurrence was suspected both immediate and early were kept under close supervision. The scars were checked at each visit and the subjective and objective cosmetic results of scar accessed. At the end of the study comparison was made between open tension free Lichtenstein's repair and laparoscopic repair regarding safety and efficacy, duration of surgery with return to daily activities and return to work, postoperative morbidity and patient satisfaction.

Statistical analysis

Qualitative data will be expressed as percentages and proportions. Quantitative data will be expressed as mean and standard deviation. The differences between two groups with respect to continuous variables will be analysed using t-test while categorical variables will be analysed using chi-square test.

All the statistical tests will be performed in SPSS version 15 software. P value <0.05 will be considered as statistically significant while P value <0.01 will be considered as statistically highly significant.

Results

This study included total 60 patients among which 30 patients (50%) were placed in group A [laparoscopic trans abdominal pre peritoneal (TAPP) mesh hernioplasty] and 30 patients (50%) were placed in group B [Open tension free Lichtenstein's mesh hernioplasty]. There was no major post operative complications or mortality in any groups.

Table-I Compares the distribution of patients according to gender, It shows that the number of male patients were significantly higher in each group.

Table-I

Gender	Group-A %		Group-B %		Total %	
	(TAPP)		(Open)			
Male	29	96.67	30	100	59	98.33
Female	01	3.33	00	00	01	1.66
Total	30	100	30	100	60	100

In this study Table II shows the associated disorders of patients, In group-A 10% had associated disorders, whereas in group B 20% had associated disorders.

Table-II

Gender	Group-A %		Group-B %		Total %	
	(TAPP)		(Open)			
DM	01	3.33	02	6.67	03	5
Hypertension	02	6.67	03	10	05	8.33
IHD	00	00	01	3.33	01	1.67
No disorder	27	90	24	80	05	85
Total	30	100	30	100	60	100

The distribution of hernias based on side was compared between the groups. The number of bilateral hernias was found to be more in TAPP group but this difference was not statistically significant as given in Table III.

Table-III

Laterality	TAPP	%	Open	%	Total	%
Right	14	46.67	17	56.67	31	51.67
Left	10	50.00	12	26.67	22	38.33
Bilateral	06	03.33	01	16.66	07	10.00
Total	30	100	30	100	60	100

Table IV describes the types of hernia in both the groups and reveals that in either group percentage of indirect hernias was more. The difference was not statistically

significant and hence the two groups were equally well matched for type of hernia.

Table-IV

Types	TAPP		Open		Total	
	No	%	No	%	No	%
Direct	12	40	09	3.0	21	35
Indirect	16	53.33	18	6.0	34	56.67
Direct + Indirect	02	6.67	03	1.0	05	8.33
Total	30	100	30	100	60	100

Table V shows, The mean operative time for TAPP group was 76.53min and that for open group was 57.89 min. Thus the mean time taken to complete a laparoscopic hernia repair was significantly higher than the time to complete the open procedure. On comparing the time needed for unilateral or bilateral variety, the time for TAPP is shown to be significantly higher than the open group. On comparing the direct and indirect variety the time for each shown to be higher in TAPP group than Open group. In Open or TAPP also the time taken to complete unilateral direct hernia was shown to be less than that of unilateral indirect and bilateral hernias.

Table-V

Mean operative time	TAPP	Open
Unilateral(Direct/Indirect)	69.50	56.90
Direct	67.67	49.66
Indirect	78.30	50.00
Bilateral	90.66	75.00

There was no major life threatening complication in either group. The only complication encountered intra-operatively in the TAPP group was peritoneal breach in V patients, and the difference found to be significant as shown in Table-6. Post-operative wound drainage was not required in any of the cases in open group but in case of TAPP need of drainage in case of 4 patients out of 30. Usually a no- 14-16 romovac suction drain was kept in the pelvis. In most cases the drain reduced to minimum on 1st post-operative day and drain was removed. There were no drain related major complications

Table-VI

Complications	TAPP		Open		Total	
	No	%	No	%	No	%
Nil	25	83.33	30	100	45	91.67
Peritoneal Breach	05	16.67	00	00	05	8.33
Total	30	100	30	100	60	100

The VAS (Visual Analogue Scale) score for pain values for TAPP were always lower than that of Open group at the same hour and this difference was shown to be statistically significant. The pain scores were obtained using visual analogue scale at 0 min, 30 min, 1 hour, 2 hours, 4 hours, 6hours,12 hours and 24 hours after surgery showed that the percent of patients after laparoscopic repair who had mild pain is 73.33%, 26.67% patients with discomforting pain but no patients with distressing or horrible pain. Whereas, only 10% of the patients of open hernioplasty had mild pain with 33.33% of patients had discomforting pain and 40% of patients had distressing pain significantly. 16.67% of the patients with open hernia repair had horrible pain (pain score 7-8). Thus laparoscopic TAPP caused significantly less pain and hence was less morbidity as given in Table VII

Table-VII

Post operative pain Score VAS among the study group.

Pain Scale	Group-A		Group-B	
	(TAPP)	%	(Open)	%
Mild pain	22	73.33	3	10
Discomforting pain	8	26.67	10	33.33
Distressing pain	0	0	12	40
Horrible pain	0	0	5	16.67
Persisting pain	0	0	0	0

The postoperative surgical site infection rate was found to be very less in TAPP group. There was no major wound related complication in either group. The difference in the two groups was not statistically significant.

The mean time taken by patients to execute their daily activities was 4-5days in TAPP group as compared to Open group 7-8 days and the difference was statistically significant. The mean time to return to work also was significantly lower in the TAPP group 12-15days vs. 30-35days in Open group. Thus patients in TAPP group returned to their work early as shown in Table VIII.

Table-VIII

Group	TAPP	Open
Resumption of daily activities	4-5 days	7-8 days
Resumption of work	12-15 days	30-35 days

The subjective and objective cosmetic results were assessed by the patients. Most of the patients who underwent TAPP exhibited satisfactory cosmetic results compared to open group and this difference is statistically significant as in Table IX.

Table-IX

Subjective Cosmetic results	TAPP	OPEN
Does not matter	02	12
Not satisfied	02	10
Satisfied	26	08
-	-	-
Total	30 (100%)	30 (100%)
Objective Cosmetic results	TAPP	OPEN
Barely Visible	24	00
Small well Healed	06	18
Large well Healed	00	10
Complicated Scar	00	02
-	30 (100%)	30 (100%)

Discussion

Laparoscopic surgery has significantly reduced the morbidity associated with open surgical procedures and has led to many changes in management of surgical patients. Successful hernia treatment should offer low cost, low recurrence rate, high patients satisfaction and rapid return to work⁵. Laparoscopic hernia repair has fulfilled all this criteria⁶. However, the question about the most appropriate technique still confuses the community of surgeons. Several studies have compared the laparoscopic and open techniques for inguinal hernia repair. The advantages of laparoscopic hernia repair over traditional open repair in terms of limited post-operative pain, shorter hospitalization, early resumption of activity and improved cosmetic outcome have been readily apparent and accepted. Recently, laparoscopic repair of inguinal hernias gained clinical importance in management of bilateral and recurrent hernias also. Despite excellent long-term outcome after TAPP repair, the use of laparoscopy in hernia repair is still limited⁷.

In our study, most of the patients were male in both group A and group B. Only one females was operated in group A. This indicates the low incidence of inguinal hernia in females in general population. Majority of the patients

operated were having right sided inguinal hernia in both groups. No significant variations were noted between the females operated in the two groups.

The mean operative time was 76.53 minutes for laparoscopic trans abdominal pre peritoneal mesh hernioplasty and 57.89 minutes for open Lichtenstein's hernia repair, which was extremely significant. The overall mean operative time was significantly more in laparoscopic hernia repair than open repair. Operating times of surgical techniques varies between surgeon to surgeon and also vary considerably between centre to centres. It reduces with experience and comparison between laparoscopic and open surgery is subject to bias due to pre-existing familiarity with open techniques⁸. It is less important to the patient than a successful operation; although the time taken to perform the surgery can have cost implications. National Institute for clinical excellence stated that the laparoscopic surgery was associated with a statistically significant increase in operation time compared with open methods of hernia repair¹⁰. Meta-analysis of sixteen randomized control trials of laparoscopic repair demonstrated on overall increase of 13.33 minutes compared with open repair, which coincides with our study.

The operative time to perform unilateral primary inguinal repair has frequently been reported as longer for laparoscopic compared to open repair, however the mean difference in 36 of 37 randomized trials is 14.81 minutes¹¹.

Post-operative pain scores were obtained using Visual Analogue Scale (VAS)¹². In this study post-operative pain is significantly less in TAPP group. when compared with open group. A 2003 Cochrane database systematic review demonstrated less persisting pain, and less persisting numbness in the laparoscopic groups. Similarly, another meta-analysis study from the EU Hernia Trialists Collaboration reported decreased post-operative pain with the employment of laparoscopic methods¹³. Therefore, there is ample evidence that laparoscopic hernia repair produces less postoperative pain and is associated with

similar or less risk of persisting pain than open mesh repair.

In our study post-operative pain is significantly less in laparoscopic (TAPP) group than open Lichtenstein's group. The difference between the two groups was statistically significant. This is in accordance with the last two studies described above. The postoperative pain can further be reduced with the help of newer analgesic techniques like TAPP block, peri-peritoneal infiltration of bupivacaine and advances in fixation devices like glue and self-retaining meshes. The overall incidence of morbidity after laparoscopic groin hernia repair has been quite variable. It is quite possible that complications do occur in any surgical procedure as in the case with laparoscopic hernioplasty, but it is possible to reduce their incidence. Serious complications specific to the laparoscopic technique, although reduced in parallel with training and experience, seen especially in the early stages of hernia surgery and mostly associated with TAPP, have been reported. Complication rates vary from 3% to 25%^{14,15}.

The complications regarding wound infection are almost similar in both groups which were managed conservatively.

None of the patients in either group had serious vascular or visceral injuries. A thorough knowledge of the anatomy and the operative approach, along with advanced laparoscopic skills will reduce the possibility of significant complications. With experience and technical improvements, the complications are now minimal in the laparoscopic repair and studies indicate similar complication rates between open and laparoscopic repairs.

Studies state that patients have a shorter convalescence and a faster return to work and activities after laparoscopic repair compared to open mesh repair. Data regarding time to return to activity are rather subjective. Type of employment or profession, to which patient is returning will influence how long he needs to be away from work. Patient who is doing desk job in office will return to work earlier than a patient with a job that entails heavy lifting.

In the present study patients who underwent laparoscopic hernia repair were able to return to their normal daily activities earlier in a mean period of 12-15 days than those patients who underwent open repair returned to their normal work in a mean period of 30-35 days which is extremely significant. This is a great advantage for Bangladeshi patients particularly who earn livelihood on a day to day basis. Most studies mentioned early return to normal work as an advantage of laparoscopic hernia repair, which has been repeated in this study. However, as mentioned, there might not be any difference between the two groups in the level of activity on long-term follow up.

One of the major criticisms of laparoscopic hernia repair was that it is more expensive to perform than open hernia repair. The primary reason for this relates to the cost of extra equipment used for the laparoscopic repair with secondary costs attributed to perceived increases in operating time for the laparoscopic procedure¹⁶.

Conclusion

Inguinal hernia is a common problem, which can be treated only by surgery. The results support the view that laparoscopic trans abdominal pre-peritoneal mesh repair is safe and efficient when compared to open mesh repair of inguinal hernia. There is definitive learning curve for surgeons who are newly exposed. The complication rate reduces as the surgeons become more experienced in this procedure comparable with that of open repair. Laparoscopic pre-peritoneal mesh repair is safe with less post-operative morbidity associated with faster recovery and satisfaction as documented by less post-operative pain, earlier mobilization and discharge from the hospital, as well as early return to work. The hard working below poverty people of Bangladesh should be given best treatment, which should allow them to go for their regular work at the earliest and with complete integrity.

As it is costly in private hospitals, the faculty of government hospitals should cater the best treatment at free of cost for poor. To achieve this goal the surgeons should improvise their

technical skills in laparoscopic repair of inguinal hernia (TAPP and TEP) with short learning curve. The present study supports the view that laparoscopic pre-peritoneal mesh repair of inguinal hernia is safe and efficacious and offers definitive advantages over open mesh repair and should be an available option for all patients requiring elective hernioplasty.

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