



ORIGINAL ARTICLE

Comparison of Open Lichtenstein Repair and Laparoscopic Transabdominal Preperitoneal Repair of Inguinal Hernia: A Pragmatic Randomized Control Trial in Bangladesh

SM Iftekhar Uddeen Sagar¹, Mohammad Akram Hossain², Md. Abdullah Yusuf³, Rabeya Sultana⁴,
Md. Abul Kalam Azad⁵

¹Junior Consultant (Surgery), 300 Bed Hospital, Narayanganj, Bangladesh; ²Senior Consultant (Surgery), 300 Bed Hospital, Narayanganj, Bangladesh; ³Associate Professor, Department of Microbiology, National Institute of Neurosciences & Hospital, Dhaka, Bangladesh; ⁴Medical Officer, 300 Bedded hospitals, Narayanganj, Bangladesh; ⁵Assistant Professor, Department of Surgery, Dhaka Medical College Hospital, Dhaka, Bangladesh

Abstract

Background: Laparoscopic inguinal hernia repair has emerged as an effective alternative to open Lichtenstein mesh repair for inguinal hernias. **Objective:** The purpose of the present study was to compare the surgical outcomes of laparoscopic trans-abdominal pre-peritoneal (TAPP) and open Lichtenstein mesh repair for the treatment of inguinal hernia. **Methodology:** This single centered, pragmatic randomized controlled trial was conducted in the Department of Surgery at 300 bed hospital, Narayanganj, Bangladesh from January 2018 to June 2020 for a period of two and half year. Patients who were presented with reducible, primary/recurrent, complete/incomplete inguinal hernias among male and female in more than or equal to 18 years of age were selected as study population. Lichtenstein mesh repair was performed which was compared with the laparoscopy group. Open Lichtenstein repair was done under spinal anesthesia with lightweight poly propylene mesh. Laparoscopy was performed by trans-abdominal pre-peritoneal (TAPP) technique under general anesthesia and heavy weight mesh was used. The hospital stay, operating time, post-operative complications like superficial wound infection, seroma formation, scrotal swelling as well as early recurrence and chronic groin pain were compared among these group. **Results:** A total number of 90 patients presented with inguinal hernia were recruited for this study of which TAPP was performed in 25 cases and 65 cases were undergone Lichtenstein repair. The mean age of laparoscopy and open group of patients were 49.28±9.9 years and 55.05±14.4 years respectively (p-0.03). The mean operation time was 85±10.31 minutes and 52.1±15.36 minutes in laparoscopy and open group respectively (p-0.000). The mean post-operative hospital stay was 2.9±0.78 days and 2.9±0.71 days in laparoscopy and open group respectively (p-0.94). In this study 21 (23.3%) patients developed 25 different early and late post-operative complications, out of which 15 (23.1%) in open group and 06 (23.3%) in laparoscopy group (p-0.52). One early recurrence was reported after 6 months follow up in laparoscopy group. Chronic groin pain was reported in 7 cases of which 5 (7.7%) cases in open group and only 2 (8.0%) cases in laparoscopy group (p-0.002). **Conclusion:** In conclusion the surgical outcomes of laparoscopic TAPP performed by a young surgeon in Bangladesh has given a clinically better result than open Lichtenstein repair considering hospital stay, seroma formation, wound infection, scrotal swelling and chronic groin pain. [*Journal of Current and Advance Medical Research, January 2023;10(1):35-40*]

Keywords: TAPP; Lichtenstein repair; inguinal hernia; laparoscopic inguinal hernia repair; surgical outcomes.

Correspondence: Dr. S.M. Iftekhar Uddeen Sagar, Junior Consultant, 300 Bedded Hospital, Narayanganj, Bangladesh; Email-driftekhar.sagar@gmail.com; Cell No.: +8801711075931; ORCID: <https://orcid.org/0009-0001-2255-5133>
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Introduction

Worldwide, inguinal hernia repair is one of the most common surgeries, being performed in more than 20 million people annually. The lifetime occurrence of groin hernia viscera or adipose tissue protrusions through the inguinal or femoral canal is 27.0% to 43.0% cases in men and 3.0% to 6.0% cases in women¹. As there is risk of obstruction or strangulation, inguinal hernia should always be repaired unless there are specific contraindications². The expected rate of recurrence following inguinal hernia repair is still 11.0% cases. About 57.0% cases of all inguinal hernia recurrences occurred within 10 years after the previous operation and late recurrence may occur even after 50 years¹. So more than 100 different techniques of inguinal hernia repair were described³.

The modern era of hernia surgery was ushered by Eduardo Bassini in 1887 with his “Radical Cure of Inguinal Hernia”⁴. In the 1940s the Bassini technique was updated by Earl E. Shouldice, which currently is recognized as the best suture repair. Not before the 1970s, Irvin Lichtenstein implanted a flat mesh in an anterior position to the posterior wall of the inguinal canal to enforce the weak abdominal wall⁵. Currently, the Lichtenstein technique is the most frequently applied technique for inguinal hernia repair worldwide. For the first time, in 1975 Rene Stoppa advocated a posterior (preperitoneal) position of a large mesh for covering from inside the whole myopectoral orifice. With the advent of the minimal-invasive surgery (MIS), In 1992, Maurice Arregui published a technique which combined Stoppa with the new MIS-technique and described principal for transabdominal preperitoneal patch plasty (TAPP) to repair an inguinal hernia.

The principles are the following: Complete dissection of the pelvic floor—Implantation of a large mesh—Use of a flat mesh—No application of an intraperitoneal onlay mesh (IPOM)⁵. After that laparoscopic inguinal hernia surgery emerge as an effective alternative technique for inguinal hernia surgery. Another problem after inguinal hernia repair is chronic pain lasting more than 3 months, occurring in 10–12% of all patients⁶. The new international guidelines of the Hernia- Surge Group now only recommend the laparoscopic total extraperitoneal patch plasty (TEP) and transabdominal preperitoneal patch plasty (TAPP) techniques, open anterior Lichtenstein mesh repair³. When comparing TAPP and TEP, literature shows TAPP is safe, technically simple, provide large working space and good diagnostic tool which allow additional diagnosis to

contralateral hernia. Another advantage is short learning curve. But TAPP has risk of port site hernia. However, in general TAPP and TEP similar operating time, overall complication risk, post-operative acute and chronic pain incidence and recurrence. Hence it is recommended that choice of the technique should be based on the surgeon’s skill, education and experience⁵⁻⁷.

When comparing laparoscopic and Lichtenstein repair, no difference in the recurrence rates but in terms of postoperative pain, faster return to usual activities or work, and chronic groin pain, post-operative complications, infection rate, meta-analysis results of randomized comparative trials have found Laparoscopic repair to be superior to open mesh repair^{3,8-9}. The purpose of the present study was to compare the surgical outcomes of laparoscopic trans-abdominal pre-peritoneal (TAPP) and open Lichtenstein mesh repair for the treatment of inguinal hernia.

Methodology

Study Settings & Population: This single centered, pragmatic randomized controlled trial was conducted in the Department of Surgery at 300 bed hospital, Narayanganj, Bangladesh from January 2018 to June 2020 for a period of two and half year. Patients who were presented with reducible inguinal hernias among male and female in more than or equal to 18 years of age were selected as study population. Open Lichtenstein repair was compared with the laparoscopic TAPP group.

Allocation and Blinding: Laparoscopy and open hernioplasty were both done by the researcher himself. Laparoscopy was performed by trans-abdominal pre-peritoneal (TAPP) technique. Spinal anesthesia was applied for open Lichtenstein repair and TAPP was under general anesthesia. In Lichtenstein repair lightweight poly propylene mesh was used and heavy weight mesh was used in laparoscopy group. All patients underwent the same antibiotic and post-operative analgesia protocol.

Follow up and Outcome Measures: All patients were followed up after 1 month, 6 months and 1 year. The hospital stay, operating time, post-operative complications like superficial wound infection seroma formation, scrotal swelling, mesh infection as well as early recurrence and chronic groin pain were observed.

Statistical Analysis: Statistical analysis was performed by Statistical Package for Social Sciences

(SPSS) version 22.0. Qualitative data were expressed as frequency and percent. The quantitative data were expressed as mean with standard deviation.

Ethical Clearance: All procedures of the present study were carried out in accordance with the principles for human investigations (i.e., Helsinki Declaration) and also with the ethical guidelines of the Institutional research ethics. Formal ethics approval was granted by the local ethics committee.

Results

A total number of 90 patients presented with inguinal hernia were recruited for this study of which TAPP was performed in 25 cases and 65 cases were undergone Lichtenstein repair. In laparoscopy group, out of 25 cases, majority were in the age group of 30 to 60 years which was 22(88.0%) cases; however, in open group, it was 35(53.8%) cases out of 65 cases in the age group of 30 to 60 years (p-0.009). The mean with SD of the age among the study population

was 53.44±13.5 years. The age range was 23 to 80 years. The mean age of laparoscopy and open group of patients were 49.28±9.88 years and 55.05±14.36 years respectively (p-0.03). Male was predominant than female in both laparoscopy and open group which was 24(96.0%) cases and 64(98.5%) cases respectively (p-0.5). In both laparoscopy and open group majority were presented with right sided inguinal hernia which was 19(76.0%) cases and 44(67.7%) respectively (p-1.5). Considering clinical type in laparoscopy group majority were direct variant which was 19(76.0%) cases; however, in open group mostly were indirect hernia 46(70.8%) cases (p-16.1). In laparoscopy group mostly were primary types of inguinal hernia which was 23(92.0%) cases. On the other hand, 62(95.4%) cases were primary types of hernia in open group (p-0.39). The mean operation time was 85.00±10.31 minutes and 52.11±15.36 minutes in laparoscopy and open group respectively (p-0.00). The mean post-operative hospital stay was 2.88±0.78 days and 2.89±0.71 days in laparoscopy and open group respectively (p-0.94) (Table 1).

Table 1: Baseline Characteristics of Two Groups

Variable	Open (65 cases)		TAPP (25 cases)		P value	
Mean Age (Years)	55.05±14.36		49.28±9.88		0.03	
Male: Female	64:1	98.5:1.5	24:1	96:4	0.5	
Side	Right	44	67.7%	19	76.0%	1.5
	Left	18	27.7%	4	16.0%	
	Bilateral	3	4.6%	2	8.0%	
Clinical Type	Direct	19	29.2%	19	76.0%	16.1
	Indirect	46	70.8%	6	24.0%	
Type	Primary	62	95.4%	23	92%	0.39
	Recurrent	3	4.6%	2	8.0%	
Mean operation time (Min)	52.11±15.36		85.00±10.31		0.00	
Mean post-operative hospital stay (Days)	2.89±0.71		2.88±0.78		0.94	

In this study 21 (23.3%) patients developed 25 different early and late post-operative complications out of which 15 (23.1%) in open group and 06 (23.3%) in laparoscopy group (p-0.52). Out of 25 complications, 18 in open group and 07 in laparoscopy group. Most common, 09 (10.0%) post-operative complication in this study was scrotal swelling, 08 (12.3%) cases in open group and 01 (4.0%) case in laparoscopy group (p-1.3). Seroma formation was found 4 (80.0%) cases in open group and 02 (8.0%) case in laparoscopy group (p=0.09).

Superficial wound infection was present in only 1(1.5%) case in open group (p=0.3). Mesh infection was reported in 01 (4.0%) cases in laparoscopy group (p=2.6). After 6 months of follow up early recurrence was reported in one case in laparoscopy group. Chronic groin pain was reported in 7 cases of which 5 (7.7%) in open group and only 2 (8.0%) in laparoscopy group (p=0.002). After 1 year and 2 year follow up recurrence or chronic groin pain was not reported in any group (Table 2).

Table 2: Post-operative complications

Variable	Open (65 cases)	TAPP (25 cases)	Total (90 cases)	P value
Overall ^a (n)	15(23.1%)	6(24.0%)	21(23.3%)	0.52
Seroma Formation	4(6.2%)	2(8.0%)	6(6.7%)	0.09
Scrotal Swelling	8(12.3%)	1(4.0%)	9(10.0%)	1.3
Wound Infection	1(1.5%)	0(0.0%)	1(1.1%)	0.3
Mesh Infection	0(0.0%)	1(4.0%)	1(1.1%)	2.6
Early Recurrence	0(0.0%)	1(4.0%)	1(1.1%)	2.6
Chronic Groin Pain	5(7.7%)	2(8.0%)	7(7.8%)	0.002
Overall ^b (event)	18(27.7%)	7(28.0%)	25(27.8%)	

^a Number of patient with complications; ^b Number of event of all post-operative complications

Discussion

Inguinal hernia is common problem in general surgical practice. Due to recurrence, post-operative morbidities related to inguinal hernia surgery demand different technique of inguinal hernia surgery. With the advent of laparoscopic surgery, laparoscopic inguinal hernia surgery is now a better alternative to open surgery⁸. Advantage of laparoscopic inguinal hernia surgery is small wound size, far from the implanted mesh, infection rate close to zero, less post-operative pain, short hospital stay, early return to normal activity, lower risk of chronic groin pain^{7,8}. Also laparoscopic surgery has fewer operative complications and recurrence rate is less or equal to open surgery^{7,8}. Laparoscopic surgery has two approach TAPP and TEP. TAPP repair is safe, produce better understanding of preperitoneal anatomy, short learning curve and safe option for beginner⁸. The indication ranges for laparo-endoscopic repair of groin hernias grew over the past years. Being aware of the technical difficulty of TAPP, the technique was first reserved for recurrences after anterior repairs and for bilateral hernias. Latter in patients with constipation, chronic cough, in sportsmen and heavy labor became the next candidates⁷. Now many author prefer TAPP in primary, uncomplicated, unilateral hernia also^{5,7}.

In this study mean age of study population was, 55.05±14.35 in open group and 49.28±9.88 in laparoscopy group. Mean operating time in laparoscopy group is much more (85±10.31) in comparison to open group (52.11±15.35). In study of Wang et al¹⁰ also shows more operating time in TAPP group but not as much as our study (TAPP: 47.22±16.59 and Open: 46.21±4.47). In systemic review and meta-analysis of RCT by Uwe Scheuermann et al¹¹ and Pisanu et al¹² shows operating time is shorter in Lichtenstein group than TAPP group. Though operating time may more in

case of complicated, giant inguinal hernia in an article of Fujinaka et al¹³. In this study 21 patient (23.3%) had developed different type of complication (p=0.52). Overall number of complications 25 (27.8%). In TAPP group rate of complications and number of patient developed complications is more than open group. This may be due to operating surgeon is in early learning curve. In early era of laparoscopic inguinal hernia surgery, literature shows, there was no significant difference in recurrence rate and complication rate between open and laparoscopic group¹⁴. After development of expertise of surgeon rate of complication were significantly reduced in laparoscopic group than open surgery but there is no change of recurrence rate^{15,16-22}. In this study one patient in laparoscopic group developed mesh infection from infected seroma which was managed by removal of mesh. Another patient in laparoscopic group developed recurrence at 6th month follow up which was then repaired Liechtenstein technique. Only in this patient we use light weight mesh and it developed meshoma and recurrence. The probable cause of this event is light weight mesh have large pore then heavy weight mesh. We always fixed the mesh with tacker. In that case tacker was not properly fixed with large pore mesh. Other than this case no recurrence has developed in the both group. So it is our observation better to avoid use of light weight mesh in laparoscopic surgery.

In this study recurrence rate is 1.1% and 0.0% in TAPP and open group respectively. Recurrence rate is different in different study. Tzovaras et al¹⁷ described 4.3% recurrence rate in their study. Ielpo et al¹⁶ described in case of bilateral laparoscopic inguinal hernia surgery (TAPP) recurrence rate was much more than open surgery (TAPP: 6.6%, Open: 5.5%, p=0.7). One meta-analysis conducted by Schmedt et al²² comparing open and laparoscopic hernia surgery states a recurrence rate was 2.7% for

open and 5.5% in laparoscopic surgery group. Shakya et al¹⁸ found in a 52 months follow up recurrence rate to be low or similar. In this study mean hospital stay is almost similar (open 2.89 ± 0.7 , TAPP 2.88 ± 0.78 , $p=0.94$), though it is not statistically significant. In study of Salma et al¹⁹ described reduced hospital stay in both open (35.1 ± 12.5 hour) and laparoscopic group (38.7 ± 34.36 hour).

Chronic groin pain plays a vital role regarding long term outcome of inguinal hernia surgery. Groin pain affect the quality of life after surgery. There are several factors causing chronic groin pain like use of mesh, nerve injury and excessive of dissection in inguinal canal. Risk of nerve injury and dissection in inguinal canal is more in open surgery than laparoscopic surgery. Studies have shown that laparoscopic surgery are characterized by fewer chronic groin pain incidence²⁰.

Though Demetrashvili et al²¹ had been observed no significant difference between open and laparoscopic group. In this study, we found there was statistically significant difference between open and laparoscopic group ($p=0.002$). Other post-operative complications are seroma formation, wound infection and scrotal swelling. All are found more in open group than TAPP group. Seroma formation is common after mesh repair as a foreign body is kept inside the body. In addition, excessive dissection in inguinal canal also produce seroma formation which is also commonly happened in open surgery. Studies also showed seroma and wound infection is more in open surgery than TAPP group^{20,22}.

In this study most common post-operative complication was scrotal swelling following surgery, though it is not statistically significant; but clinically significant. All of the scrotal swelling was managed conservatively by elevation of scrotum. Our country is a developing, low medium income nation. Most of the patient seek surgical treatment lately. Therefore, most patient present as funicular and complete variety, which need more extensive dissection of the cord and produce scrotal swelling.

This study was conducted in developing nation by young surgeons. So, there were some limitations in this study like retrospectively/ pragmatic controlled study, small sample size, short study period, surgeons are in early learning curve and poor patient compliance at follow up. As Bangladesh is a developing, low medium income country and most patient don't have medical insurance, so patient want cost effective surgery. But medical cost of

laparoscopic surgery and general anesthesia is much than open surgery. Therefore, the patient who want economical, was choose open surgery. In addition, the patient in open group were older age than laparoscopic surgery. So, both surgeon and patient prefer spinal anesthesia to avoid risk of general anesthesia.

Conclusion

In conclusion the surgical outcomes of laparoscopic TAPP performed by a young surgeon in Bangladesh has given a clinically better result than open group considering hospital stay, seroma formation, wound infection, scrotal swelling and chronic groin pain. However, recurrence rate is more in laparoscopy group, and use of light weight mesh in TAPP may causes the recurrence. Further large scale multicenter study should be conducted to see the real scenario.

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None

Conflict of Interest

The authors have no conflicts of interest to disclose

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Data Availability

Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate

Ethical approval for the study was obtained from the Institutional Review Board. As this was a prospective study the written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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ORCID

SM Iftekhar Uddeen Sagar: <https://orcid.org/0009-0001-2255-5133>

Mohammad Akram Hossain:

<https://orcid.org/0009-0000-6437-2880>

Md. Abdullah Yusuf: <https://orcid.org/0000-0002-8551-7185>

Rabeya Sultana: <https://orcid.org/0009-0003-6141-0265>

Md. Abul Kalam Azad: <https://orcid.org/0009-0004-9196-7547>

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