

## Primary Inguinal Hernia Repair: Laparoscopic Transabdominal Preperitoneal (TAPP) Repair Versus Lichtenstein Repair

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**Background:** Primary inguinal hernia (PIH) is currently treated using Lichtenstein and transabdominal preperitoneal (TAPP) techniques.

**Methodology:** This prospective randomized controlled trial compared Lichtenstein versus TAPP techniques in PIH repair. 60 patients having PIH were enrolled in this study. Patients presented to general surgery clinic in Qena University Hospital between January 2015 and December 2015. Patients were 20-70 years old and were of ASA I & II category. Patients were divided into 2 equal groups. Each group included 30 cases. One group was operated by Lichtenstein repair and the other group was operated by TAPP technique.

**Results:** Average operative time was  $38.96 \pm 9.62$  minutes for the Lichtenstein group versus  $70.73 \pm 9.72$  minutes for the TAPP group ( $p < 0.0001$ ). Both short-term and long-term complications had no statistical differences between the 2 groups. 2 patients developed hematoma in the open group versus one patient in TAPP group ( $p = 0.9$ ). One patient developed seroma in Lichtenstein group versus 2 patients in TAPP group ( $p = 0.9$ ). 3 patients developed infection of the incision site in Lichtenstein group versus 1 patient in TAPP group ( $p 0.65$ ). 2 patients suffered from urinary retention in Lichtenstein group versus 4 patients in TAPP group ( $p = 0.7$ ). TAPP patients returned to daily activities and work earlier than Lichtenstein group. In long term post-operative factors there was 1 case of hernia recurrence observed during the follow-up in Lichtenstein group versus no patients in TAPP group ( $p 0.9$ ). There was no mortality in any group 30 day after treatment. One patient in TAPP group developed port site hernia and was subsequently managed by open tissue repair. **Conclusion:** TAPP technique is recommended over open technique in management of the PIH repair.

### KEYWORDS:

Primary Inguinal hernia, Laparoscopy, Transabdominal Preperitoneal Lichtenstein,

Abstract

## **Introduction**

Inguinal hernia is the most common type of hernias; more than 70% of all hernias that occur is inguinal type [1]. Abdominal wall hernias are common (4% for those aged over 45 years) [2]. Of all the groin hernias, 96% are inguinal and 4% are femoral [3]. Inguinal hernias are the most common of all the abdominal wall hernias and constitute about 80% of cases with 800,000 inguinal hernia repairs in the USA in 2003 [4]. Inguinal herniorrhaphy is one of the most common procedures performed by surgeons. More than 20 million inguinal herniorrhaphies are performed yearly around the world [5]. The repair of groin hernias is one of the most common and important surgical procedures. It had been said that the history of groin hernias is the history of surgery itself. This is even true in Africa where groin hernias comprise a greater percentage of the surgical volume and account for more morbidity [6].

Edoardo Bassini was primarily responsible for articulating the principles of modern repair in the late 19th century, principles which lasted for one hundred years. [7]. In 1986 Lichtenstein advocated an open on-lay mesh repair applied over the internal oblique fascia. This used in the era of tension-free repairs using mesh [8]. In 1979 laparoscopic repair of groin hernia was first reported by P. Fletcher, where he closed the neck of the hernia sac [9].

With the revolution of laparoscopic surgery in 1990, the development of inguinal hernia repair started using the introduction of mesh through the laparoscope [10]. Laparoscopic inguinal herniorrhaphy was introduced in the late 1980s by Ger in 1982 [11] and he pointed out its potential advantages

like less postoperative pain, reduced recovery time allowing earlier return to full activity, easier repair of a recurrent hernia and the ability to treat bilateral hernias. Many detractors feel that these advantages are seldom met and point to the possibility of a laparoscopic accident resulting in major complications and the need for a general anesthesia. In addition, many surgeons are concerned about the expensive equipment needed.

The aim of our study is to compare the results of Transabdominal preperitoneal (TAPP) repair versus Lichtenstein repair.

## **Patients and Methods**

This prospective randomized controlled trial (RCT) compares Lichtenstein versus TAPP techniques in PIH repair that had been conducted on 60 patients having primary inguinal hernia (PIH) who presented to the general surgery clinic in Qena University Hospital between January 2015 and December 2015. This study enrolled 60 patients having the diagnosis of PIH who were above 20 years of age and less than 70 years. Patients had ASA I & II category. Exclusion criteria were patients with bilateral hernia, patients with BPH, Bronchial asthma and chronic constipation, history of repair with mesh, recurrent inguinal hernia and previous pelvic surgery. After applying exclusion criteria a total of 60 patients were included in the study, 30 in open repair group and 30 in TAPP group allotted randomly.

## **Therapeutic Strategy:**

The open procedure was performed according to the Lichtenstein method while laparoscopic repairs were performed by TAPP approach. All the patients were given standardized post-operative instructions that did not

restrict their activities unless the activities caused pain.

Among the intraoperative factors, the following were evaluated: anesthesia method (regional and general), and duration of the operation.

### **Post-operative follow up:**

It included clinical assessment of patients till discharge from the hospital and detection of early complications of laparoscopy or open surgery follow up of patients was done at one week, one month and 6 months for any recurrence or neurological symptoms as chronic pain or parathesia.

### **Primary outcome measures:**

Those included early post-operative pain (pain that persists on the second day of operation, post-operative analgesia, days of admission, return to work and complications e.g. hematoma, seroma, infection, urinary retention and visceral/ vascular injuries).

### **Secondary Outcome Measures:**

Those included recurrence of inguinal hernia, chronic/persistent groin pain (Inguinodynia), port-site hernia and mortality (30 day mortality).

### **Statistical Analysis:**

Data entry, processing and statistical analysis was carried out using MedCalc ver. 15.8. Tests of significance (Chi square, student's t-test, cochran's Q, ANOVA, repeated measures ANOVA, Spearman's, Pearson's correlation coefficient and ROC curve) were used. Data were presented and analyzed. p values less than 0.05 (5%) was considered to be statistically significant.

## **Results**

In this study of 60 patients, preoperative data of all of them were analyzed. Analysis of intraoperative factors and short term operative complications showed that there was a statistically significant difference ( $p < 0.0001$ ) in use of type of anesthesia as both groups had different types of anesthesia. This is explainable by the fact that 27 Lichtenstein operations were performed using regional anesthesia versus 3 by general anesthesia whereas all TAPP operations were done using general anesthesia. Average operation time was  $38.96 \pm 9.62$  minutes for the Lichtenstein group and  $70.73 \pm 9.72$

minutes for the TAPP group. TAPP operation time was higher in comparison with Lichtenstein time, and this difference was statistically significance ( $p < 0.0001$ ).

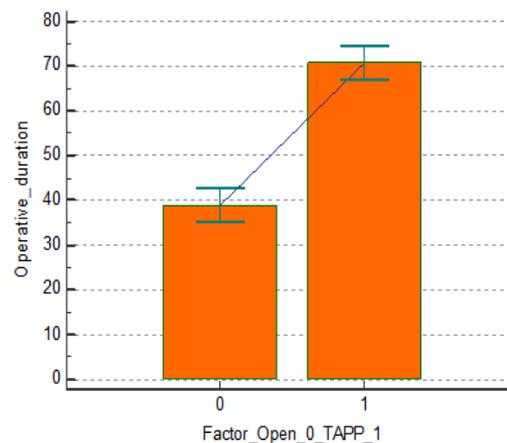


Figure (1): Comparison between open group and TAPP group as regards operative duration

Short-term complications exhibited no statistical differences between the groups. 2 patients developed hematoma in the open group while one patient developed hematoma in TAPP group ( $p = 0.9$ ). One patient developed seroma in Lichtenstein group while 2

patients developed seroma in the TAPP group ( $p= 0.9$ ). 3 patients developed infection of the incision site in Lichtenstein group while one patient developed infection of port site in TAPP ( $p= 0.65$ ). 2 patients suffered from urinary retention in Lichtenstein group while 4 patients had retention in TAPP group ( $p= 0.7$ ). Regarding the post-operative factors, pain score was  $4.2 \pm 1.58$  in Lichtenstein group as compared to  $3.26 \pm 1.36$  in TAPP group. The difference was statistically significant ( $p= 0.017$ ). TAPP patients needed significantly fewer admission days than Lichtenstein patients ( $1.43 \pm 0.5$  versus  $1.1 \pm 0.3$  days, respectively;  $p= 0.003$ ). TAPP patients returned to daily activities and returned to work earlier as compared to Lichtenstein

group. Regarding long- term post-operative factors, there was one case of hernia recurrence observed during the follow-up in Lichtenstein group while no patient had recurrence in TAPP group ( $p= 0.9$ ). After 6 months, 9 patients from the Lichtenstein group developed chronic pain of variable intensity (2 severe, 5 moderate and 2 mild).

At that time point, chronic pain had developed in 2 patients from the TAPP group ( $p= 0.1$ ). There was no mortality in any group 30 days after surgery. One patient in TAPP group developed port site hernia and was subsequently managed by open surgical repair.

Table (1): Comparison between open group and TAPP group as regards immediate post-operative complications using Chi square test

Variable		Open group (N= 30)	TAPP group (N= 30)	p value	Sig.
<b>Immediate post-operative complications</b>	Seroma (N=3)	1 (3.3%)	2 (6.6%)	= 0.9775	NS
	Hematoma (N=3)	2 (6.6%)	1 (3.3%)	= 0.9775	NS
	Wound infection (N=4)	3 (10%)	1 (3.3%)	= 0.6512	NS
	Respiratory complications (N=2)	0 (0%)	2 (6.6%)	= 0.5011	NS
	Urine retention (N=6)	2 (6.6%)	4 (13.3%)	= 0.7260	NS

Table (2): Comparison between open group and TAPP group as regards some immediate post-operative variables using Student's t test:

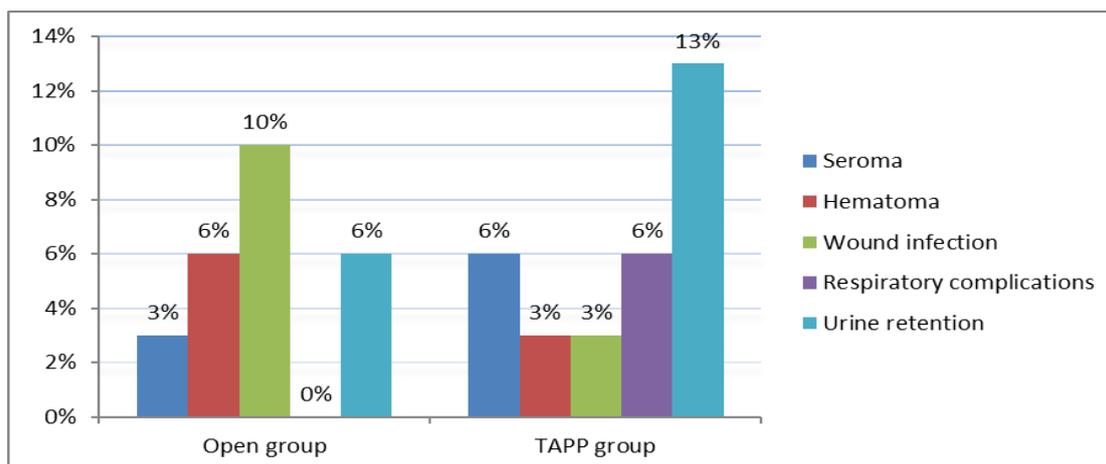


Figure (2): Comparison between open group and TAPP group as regards immediate post-operative complications.

Table (3): Comparison between open group and TAPP group as regards some immediate post-operative variables using Student's t test:

Variable	Open group (N= 30)	TAPP group (N= 30)	t test	
	Mean $\pm$ SD	Mean $\pm$ SD	t value	p value
Pain score	4.2 $\pm$ 1.58	3.26 $\pm$ 1.36	-2.446	= 0.017*
Analgesia use (number of ampoules)	3.2 $\pm$ 0.61	2.4 $\pm$ 0.49	-5.562	< 0.0001**
Post-operative hospital stay (days)	1.1 $\pm$ 0.3	1.43 $\pm$ 0.5	3.099	= 0.003**
Time to return to daily activity (days)	3.66 $\pm$ 0.47	2.13 $\pm$ 0.77	-9.206	< 0.0001**
Time to return to work (days)	11.46 $\pm$ 1.77	7.03 $\pm$ 1.09	-11.629	< 0.0001**

Table (4): Comparison between open group and TAPP group as regards delayed post-operative complications using Chi square test:

Variable	Open group (N= 30)	TAPP group (N= 30)	p value	Sig.	
<b>Delayed post-operative complications</b>	Recurrence (N=1)	1 (3.3%)	0 (0%)	= 0.9868	NS
	Chronic pain & Parasthesia (N=11)	9 (30%)	2 (6.6 %)	= 0.1052	NS
	Port-site hernia (N=1)	0 (0%)	1 (3.3%)	= 0.9868	NS

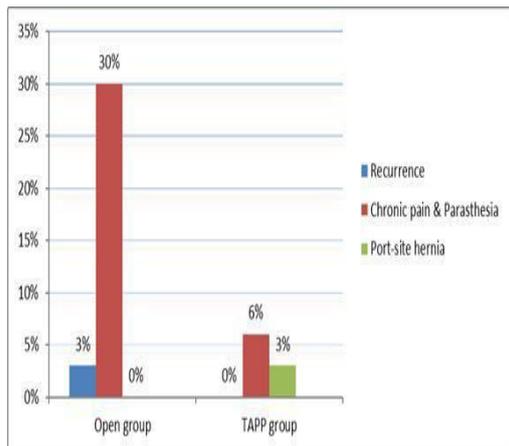


Figure (3): Comparison between open group and TAPP group as regards delayed post-operative complications.

### Discussion:

Until a few decades ago, the standard method for inguinal hernia repair were tissue repairs done by suturing fascial structures around the hernia defect, until Lichtenstein et al introduced tension-free repair. It rapidly gained widespread recognition worldwide and surgeons mastered the technique in a short span of time [12].

Laparoscopic inguinal herniorrhaphy was first described by Ger et al. in the early 1990s and burst upon the surgical scene just after laparoscopic cholecystectomy [10]. With advances in minimal access surgery, the laparoscopic repair of inguinal hernia has been described using either a totally extraperitoneal or TAPP approach [13].

Many RCTs and meta-analyses have been performed to date. According to studies comparing laparoscopic herniorrhaphy with open herniorrhaphy (both mesh free and mesh methods), laparoscopic herniorrhaphy requires more surgical time but results in less post-operative pain, hematoma, nerve damage, and chronic pain [14].

Our study had shown that operative time is shorter in the Lichtenstein group than in the TAPP group ( $38.96 \pm 9.62$  vs  $70.73 \pm 9.72$  respectively),

although sample size of our study is small but this difference rose to significant level ( $p < 0.0001$ ). Our data is similar to the data from previous other investigations [15, 16, 17] although Eklund et al. found no differences in the operative time between laparoscopic and Lichtenstein methods [18].

As regard to complications, our study reported no differences in between both surgical treatments regarding short-term operative complications e.g. hematoma, seroma, infection and urinary retention. All were similar in both groups and there were no differences found. All post-operative morbidities resolved spontaneously without the need for surgical intervention. Our data is in agreement with the previous 2 reports by Kragar et al. and Akhtar et al. who reported that post-operative complications (frequencies of wound complications, infection, hematoma, seroma) were almost equal in both groups) [19, 20]. Moreover, some previous studies had shown that laparoscopic methods are characterized by fewer post-operative complications than Lichtenstein operations [17,18] while Neumayer et al, came to the conclusion that open surgical interventions have fewer post-operative complications than laparoscopy [20].

In our study, pain score was  $4.2 \pm 1.58$  in Lichtenstein group versus  $3.26 \pm 1.36$  in TAPP group. Comparative study between the 2 groups revealed a highly significant decrease in post-operative pain score and analgesia use in TAPP group compared to open group; with highly significant statistical difference ( $p = 0.01$ ,  $p < 0.0001$ , respectively). The same advantages of the laparoscopic method in comparison with the Lichtenstein approach are documented also by other authors [15-18, 20-23].

As regard to the length of the duration of hospital stay in our study, TAPP patients needed significantly fewer admission days than Lichtenstein patients ( $1.43 \pm 0.5$  versus  $1.1 \pm 0.3$  days, respectively;  $p < 0.001$ ). This was because TAPP technique is relatively new in our hospital and we were caring to discharge the patient after being sure that there was no complication of the laparoscopic procedure. Literature search showed that there were many trials which have reported same results for example [20, 24-25]. On the contrary, The study by Umme Salama et al. showed that there was no significant statistical differences regarding the post-operative hospital stay in either open or laparoscopic hernia repair [23].

As regard to return to daily activity in our study, the mean time to return to daily activity (using open method) was  $3.66 \pm 0.47$  versus  $2.13 \pm 0.77$  days in TAPP group.

Comparative study between the 2 groups also revealed that TAPP group patients had highly significant shorter time to return to daily activities and shorter time to return to work; compared to open group patients; with a highly significant statistical difference ( $p < 0.0001$ ,  $p < 0.0001$ , respectively). Our results are similar to the studies by Nawaz et al. and Akhtar et al. in which patients returned to daily activity at 5th day in TAPP group [20, 26].

As regard to return to work in our study, open group patients returned to work in  $11.46 \pm 1.77$  days while TAPP group patients returned in  $7.03 \pm 1.09$  days ( $p < 0.0001$ ). There is a general consensus in the literature that patients who underwent laparoscopic inguinal hernia repair returned to work and normal activities more rapidly than those who underwent open repair [15, 27-28].

In our study, only 1 patient had a recurrence in Lichtenstein group while no recurrences occurred in TAPP group which was not a significant difference as regards prevalence of recurrence ( $p = 0.9$ ).

Finally as regard to reported chronic pain in our study within 6 – 9, patients from the Lichtenstein group developed chronic pain (2 severe, 5 moderate, and 2 mild). At that time point, chronic pain had developed in 2 patients (1 mild and one moderate) from the TAPP group which was not a significant difference as regards prevalence of chronic pain ( $p > 0.05$ ). Our results were consistent with the meta-analysis published in the *British Journal of Surgery* in 2010 that used chronic pain as a primary outcome and found no significant difference between the laparoscopic and open cohorts [29].

However, these results differ from many other reports including the 2003 *Cochrane Database Systematic Review*, which reported less persisting pain (overall 290/2101 versus 459/2399,  $p < 0.0001$ ) in the laparoscopic groups. Similar results were reported by Eklund et al, in 2010.

Bignell et al, in 2012 reported a similar higher incidence in chronic groin pain in open versus laparoscopic inguinal hernia repair [18, 30].

### Conclusion

We conclude that laparoscopic hernia surgery is better than Lichtenstein repair in terms of less post-operative pain, less analgesia needed during recovery, earlier discharge and return to daily work hence higher patient satisfaction.

Based on the study results, it is possible to recommend TAPP technique over open technique in the management of PIH repair.

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### Conflict of interest

The authors declare that there is no conflict of interest and there are no competing interests whether financial or non-financial competing interests.

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