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Original Research Article

The primary surgical treatment of inguinal hernia: a changing trend towards laparoscopic hernioplasty

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ABSTRACT

Background: Inguinal hernias are the most common conditions presenting to the surgical department, which is repaired either with open technique or laparoscopically, Total Extra Peritoneal (TEP) or Trans-Abdominal Pre-Peritoneal (TAPP). Each procedure has its own advantages and drawbacks, none of them have been declared as the gold standard.
Methods: Author did a prospective cohort study in a tertiary care hospital to assess the predictors and compare the outcomes for Open and Laparoscopic (TEP/TAPP) Inguinal hernia repair. A total of 180 patients were recruited into the study and followed up for a period of 1 year. Descriptive and inferential statistics was used to analyze the data.
Results: 131 (72.8%) underwent open hernioplasty and 49 (27.2%) underwent laparoscopic hernioplasty. There was a significant difference between the time taken to complete an open and laparoscopic inguinal hernia repair (p=0.004), with laparoscopic repair taking lesser operating time. Laparoscopy was converted to open repair in 3 (6.1%) patients. Mean pain scores at 6-hours post-operative was 5.28±1.355 with no difference in the pain among patients who underwent open and laparoscopic repair. Seroma or hematoma are known complications, which was seen more in the open technique. The reason for choosing open surgery was secondary to the higher cost of laparoscopic repair (Adjusted Odds Ratio=0.168, p=0.004).
Conclusions: The outcomes of laparoscopic inguinal hernia repair are comparable to that with the open repair.

Keywords: Inguinal hernia, Lichtenstein's repair, Trans-abdominal pre-peritoneal (TAPP), Total extra-peritoneal (TEP)

INTRODUCTION

Inguinal hernias are the most common conditions presenting for a surgical repair. Repair is done by placing a prosthetic mesh, either by open technique or laparoscopically. Earlier tissue repair, as proposed by Eduardo Bassini, was performed in the 1988s.[1] Only in 1984, was there a break in the convention as Irving Lichtenstein advocated the use of a mesh for hernia repair to perform a "tension free" repair. Real controversy started in 1990s, when laparoscopic tension free hernia repair came into practice. A lot of procedures have been described and are being practiced in institutions. Each procedure has its own advantages and drawbacks, none of them have been declared as the gold standard. Benefits that were claimed in favor of the open method were reduced chance of recurrence, easy to perform with reduced operating time, less risk of complications, shorter

learning curve and cane be performed under spinal anaesthesia. The laparoscopic approach has the advantage of less post-operative pain, faster recovery, reduced hospital stays and early return to work. Laparoscopic inguinal hernia repair, Total Extra Peritoneal (TEP) or Trans-Abdominal Pre-Peritoneal (TAPP) is a more complex procedure with a steeper learning curve and is expensive. The intraoperative and general postoperative complication rates as well as the reoperation rate for complications showed no significant difference between TEP and TAPP. There was a higher postoperative complication rate for TAPP, which is partly explained by larger defect sizes, more scrotal hernias and older age. This study aimed to assess the predictors and the outcomes of laparoscopic and open mesh repair. The objective was to compare outcomes and to assess the predictors between open and laparoscopic (TAPP/TEP) inguinal hernia repair in a Tertiary Care Hospital in South India.

METHODS

This was a prospective cohort study conducted for 1 year (2017) to follow up period of 1 year (2018), for recurrence and persistent groin pain with sample size of 180 Patients.

All patients, both males and females, who are undergoing surgical repair of inguinal hernias, after a clinical diagnosis, during the past 1 year were included. Patients who presented to emergency with obstruction or strangulation were excluded.

All patients fitting into the inclusion criteria were recruited, after taking written consent. Lichtenstein tension-free hernioplasty was done for all patients who underwent open surgery. Subjects operated laparoscopically, underwent Total Extra Peritoneal (TEP) or Trans-Abdominal Pre-Peritoneal (TAPP) repair. Demographic details, such as age, gender, occupation, comorbidities, clinical presentation, investigations, outcome measures-operating time, intra-operative complications, conversion (procedure initiated as laparoscopic but converted to open), post-operative pain score, duration of stay in the hospital, cost of stay, post-operative complications, time to return to work and number of follow ups.

Using SPSS V 16, descriptive statistics such as frequencies, percentages, mean and standard deviation was used to describe the demographic details. Inferential statistics used were Chi-square and t-test for comparison of outcome between open and laparoscopic repair. Multi-variate regression analysis was performed to ascertain the influence of various predictors on the type of surgery.

RESULTS

Patients age ranged from 18 to 85 years, with the mean age being 52.43±15.64 years. 177 (98.3%) were males and 3 (1.7%) were females. 71 (39.4%) were daily wage workers with a per capita income of 4576 rupees. 93.8% of this patient had received formal education and 78 (43.3%) belonged to Class IV Socio-economic status of Modified Kuppuswamy scale (Figure 1).

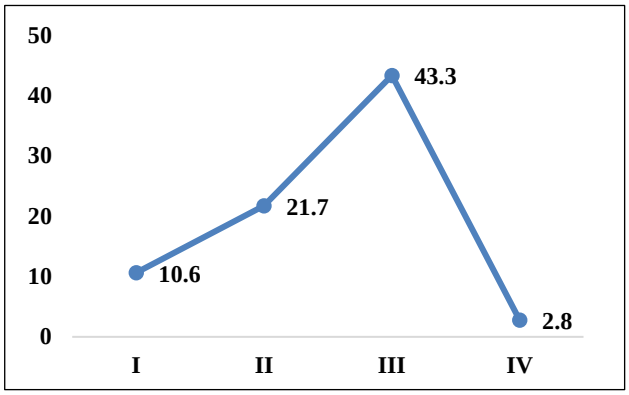

Figure 1: Socio-economic status (Modified Kuppuswamy Scale).

About 174 (96.6%) patients came with a swelling, 74 (41.1%) in the left, 71 (39.4%) in the right and 35 (19.4%) had both sides with 12 (6.7%) and having irreducible hernia. On examination, 94 (52.2%), 70 (38.9%) and 16 (8.9%) had direct, indirect and both components respectively. Among patients with comorbidities, 29 (16.1%) had diabetes mellitus, 48 (26.7%) had hypertension, 16 (8.9%) had ischemic heart disease and 4 (2.2%) had chronic kidney disease. Assessing the predisposing factors for an inguinal hernia, 48 (25%) were due to prostatism (Figure 2).

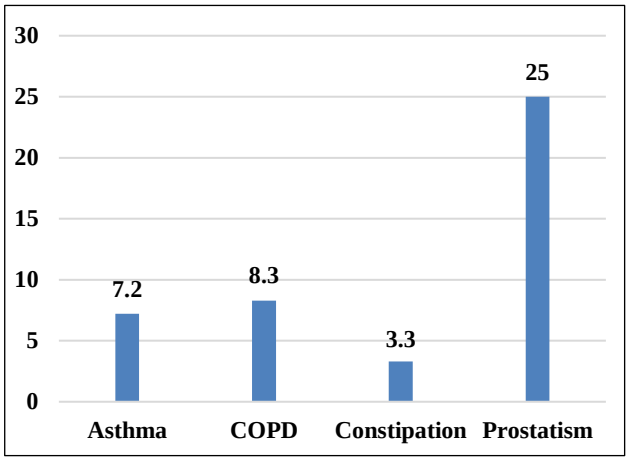

Figure 2: Predisposing factors for an inguinal hernia.

About 96 (53.3%) of the patients were physically active. 131 (72.8%) underwent open hernioplasty and 49 (27.2%) underwent laparoscopic hernioplasty. Mean time taken to complete open hernia repair was 1.31±0.89 hours and that of laparoscopic hernia repair was 0.659±1.51 hours. Out of all patients with a history of previous surgery, 10 (5.6%) had appendicectomy, 6 (3.3%) had TURP, 7 (3.9%) had laparotomy and 27 (15%) have had

a hernioplasty in the past. A chi-square test was performed to ascertain association between the type of surgery and outcomes such as operating time, post-operative pain, duration of stay in the hospital, post-operative complications, time taken to return to work and number of follow ups. There was no significant difference in the choice of open or laparoscopic repair, when the patient has had a previous abdominal or hernia surgery (Table 1).

Table 1: Comparison between type of surgery and previous abdominal surgeries.

Previous surgery	Open	Laparoscopic	P value (<0.05)
Hernioplasty	17 (63%)	10 (37%)	0.415
Laparotomy	5 (71.4%)	2 (28.6%)	
Appendicectomy	9 (90%)	1 (90%)	

Of the 9 patients who had recurrent hernia, 5 (55.6%) underwent open and 4 (44.4%) underwent laparoscopic hernioplasty in this hospital. 3 (6.1%) patients had a conversion from laparoscopic to open repair. The mean time taken to complete the surgery was 1.97±0.76 hours. There was a significant difference between the time taken to complete an open and laparoscopic inguinal hernia repair (p=0.004) (Table 2).

Table 2: Comparison between type of surgery and time taken for the surgery.

Time for surgery	Open	Laparoscopic	P value (<0.05)
≤ 2	100 (82.6%)	21 (17.4%)	0.004
>2	31 (52.5%)	28 (47.5%)	

Among all patients who underwent surgery in ≤2 hours, a majority, 100 (82.6%) had undergone open repair. Based on the Visual Analog scale for pain, the mean pain score in this patient was 5.28±1.355 and there was no difference in the pain among patients who underwent open and laparoscopic repair at 6 hours post-operative (Table 3).

Table 3: Comparison between type of surgery and Post-operative pain score.

Post-op pain score	Open	Laparoscopic	P value (<0.05)
≤5	50 (77.1%)	25 (22.9%)	0.130
>5	81 (66.7%)	24 (33.3%)	

Open or laparoscopic repair did not influence the number of days of stay in the hospital (Table 4) with the minimum average stay in the hospital being 3.87±2.03 days for all the patients. The maximum duration of stay in the hospital was 7 days. 57 (31.6%) patients had post-operative complications, most common being post-operative pain 47 (26.11%), rarely hematoma and surgical site infection and these were not significantly different between patients undergoing open and laparoscopic repair (Table 5).

Table 4: Comparison between type of surgery and duration of stay in the hospital.

Duration of stay	Open	Laparoscopic	P value (<0.05)
≤ 5	90 (69.2%)	40 (30.8%)	0.095
> 5	41 (82%)	9 (18%)	

Table 5: Comparison between type of surgery and post-operative complications.

Post-op complications	Open	Laparoscopic	P value (<0.05)
Pain	34 (72.3%)	13 (27.7%)	0.858
Hematoma	1 (0.01%)	0	
Surgical site infection	2 (90%)	0	

Of the 120 (66.7%) who were catheterized prior to the surgery, 45 (37.5%) had post-op urinary retention, which was managed conservatively. 4 (2.2%) had UTI due to *Escherichia coli* (2), *Klebsiella* (1) and *Pseudomonas* (1) and were treated according to the culture and sensitivity of the micro-organism. A large proportion, 116 (64.4%) and 151 (83.8%) resumed their work in ≤3 weeks post-operative period, with precautionary measures explained to them. 29 patients had a follow up in the OPD for >2 weeks post-operative period, in view of persistent groin pain or complications in the hospital (Table 6 and 7).

Table 6: Comparison between type of surgery and duration taken to return to work.

Return to work	Open	Laparoscopic	P value (<0.05)
≤3 weeks	84 (72.4%)	32 (27.6%)	1.000
>3 weeks	47 (73.4%)	17 (26.6%)	

Table 7: Comparison between type of surgery and number of follow ups in the OPD.

No. of follow ups	Open	Laparoscopic	P value (<0.05)
≤2	112 (74.2%)	39 (25.8%)	1.000
>2	19 (65.5%)	10 (34.5%)	

At 1 year follow up, none of the patients reported recurrence or had complaints of chronic groin pain. A logistic regression was performed to ascertain predictors for choosing a laparoscopic hernia repair over open repair. All predictors for choosing a laparoscopic hernia repair, such as younger age, female gender, higher SES, lower BMI, no previous abdominal surgeries and cost of surgery, was considered for univariate analysis. Variables with a p value of <0.2 were included for multivariate

analysis. On doing a univariate analysis, author found that patients choose open surgery due to the higher cost of laparoscopic repair (Adjusted Odds Ratio=0.168, p=0.004) (Table 8). Multivariate analysis could not be performed for the remaining factors as the p values in univariate analysis was not <0.2.

Table 8: Predictors for choosing laparoscopic surgery.

Factors	Odds ratio	95% CI	P value
Lesser age	1.012	0.991-1.034	0.129
Female	1.141	0.835-1.796	0.285
Higher SES	1.020	0.976-1.066	0.379
Lower BMI	1.000	0.919-1.089	0.992
No multiple comorbidities	0.106	0.467-1.743	0.745
No previous abdominal surgery	0.900	0.588-1.379	0.629
Cost of surgery	0.168	0.035-0.796	0.004

DISCUSSION

A large proportion, 71 (39.4%) of the patients were daily wage workers belonging to the Upper Lower (IV) class, which is similar to that seen in other parts of India.[2] They are occupationally predisposed to hernia by virtue of their work. Bronchial asthma, COPD and constipation were other predisposing factors in this study. Prostatism, which includes increased frequency, urgency, narrow stream, nocturia and straining to micturate, dominated as the predisposing factor in this study. This was because there was a male predominance with many being elderly. Patients with comorbidities like hypertension, airway diseases are contraindicated laparoscopic surgery but this did not affect the choice of surgery in present study, which was like the one conducted by Singh V et al.[3] Laparoscopic repair is generally not advocated for recurrent hernia in patients who have undergone a previous abdominal surgery or previous hernioplasty, due to the high chance of adhesions. In this study, there was no significant difference in the choice of open or laparoscopic repair. Out of 9 patients who had come with recurrent hernia, 4 underwent laparoscopic repair, requiring no conversion. The operating time was found to be longer in the open group (p=0.004), which contrasts with the other studies.[4] The average time taken for TAPP/TEP (65.7 min) was significantly longer than that for the Lichtenstein repair (55.5 min) in a metanalysis published by Schmedt CG et al.[5] Immediate post-op complications were more frequent in the open repair group than the laparoscopic group, although long term pain and discomfort were similar in both the groups. Popular belief is that laparoscopic repair gives less post-op pain but in contrary to this, author found that the pain was comparable in open and laparoscopic repair. Chronic persisting inguinal pain, defined as inguinal pain lasting for 12 months after the surgery, provided it started after 3 months.[6] The proportion of patients with reported testicular pain was higher in the TEP group (P =0.003) in a study reported by Eklund et al, in a randomized control trial comparing TEP with open mesh inguinal repair but permanent impaired inguinal sensibility was more common in the open group (P=0.004).[7] Seroma or hematoma are known complications, which was seen in the open technique and none in laparoscopic, as quoted by Amid PK et al, which is similar to the results found in this study.[8] The duration of hospital stay was also lower in the laparoscopic group compared to the open. The criteria to return to work or daily activities varies in different studies and depends on the social setting. Type of work or socio-economic status greatly influence how long the person needs to return to work, in this setting. Most of the patients were elderly and required longer time to rehabilitate which explains the longer duration to do daily activities, irrespective of the type of surgery.

Many studies indicate the recurrence as associated with the type of approach, prosthetic mesh, suture material, patient related issues. Incidence of serious visceral and vascular complications was found to be higher in laparoscopic group in most of the studies and randomized controlled trials comparing laparoscopic versus open mesh repair. VA trial showed recurrence was found to be 10.1% in the laparoscopic group and 4.1% for open group in the repair of primary inguinal hernias.[9] In open type of repairs, in India, some studies found recurrence rates ranging from 0.8% to 1.6%.[10,11] In present study, there was no recurrence in the patients who underwent open and laparoscopic repair. In this set up, the greatest hindrance to laparoscopic surgery is the added cost. This has been the focus of all the published reports.[1,12] This becomes the limiting factor for laparoscopic surgery as this is a developing country with many in the lower SES.

CONCLUSION

From the results of present study, author found that the outcomes of laparoscopic inguinal hernia repair are comparable to that with the open repair. Every technique has its share of proponents and opponents. The total cost of surgery was the main predictor for choosing open over laparoscopic in this setting.

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