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Laparoscopic Total Extra-Peritoneal Mesh Repair and Trans-Abdominal Pre-Peritoneal Mesh Repair - A Comparative Study

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Abstract: *The laparoscopic Trans Abdominal Pre-Peritoneal (TAPP) repair and Total Extra Peritoneal (TEP) approach have revolutionized the hernia management. Questions remain about their relative merits and risks. In the light of this, our study aims to compare these two methods of hernioplasty.This comparative observational study was conducted in a medical college hospital in Telangana between Aug 2012 and Aug 2016 with 37 cases aged between 18 and 60 years. Duration of surgery, conversion into open method, post-operative pain, complications, duration of hospital stay and patient satisfaction levels were studied comparatively.TEP and TAPP groups consisted of 17 and 18 patients respectively. The operative time in TAPP group was 93.33 minutes and 76.47 minutes in TEP group (p=0.01). VAS score of post-operative pain at 6 hrs after operation was 2.7±0.73in TEP group and 2.56 ± 0.7 in TAPP group (p=0.46). The mean satisfaction scores in terms of early recovery, return to normal activities and scar were 2.23 ± 0.56 in TEP group and 2.11 ± 0.47 in TAPP group (p=0.49).Though TEP appears to be superior, trials with larger sample sizes with standardized and uniform parameters accounting for confounding factors like skill levels of surgeons and infrastructures of the facilities are needed to establish the superiority of one over the other technique.*

Keywords: *TEP, TAPP, Inguinal hernia, Laparoscopic surgery.*

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I. Introduction

Inguinal hernias are the most common conditions referred to surgeons all over the world and over five lakh hernia repairs are performed annually.(1) The lifetime risk for men is 27% and for women is 3%.(2)Since Bassini published his landmark paper on the technique of tissue repair in 1887, numerous modifications have been proposed.(3) There has been a revolution in surgical procedures for groin hernia repairs after the introduction of prosthetic material by Usher in 1958.(4)Open Pre-peritoneal mesh repair by Stoppa was found to significantly reduce recurrence rate for multi-recurrent groin hernias.(5)However, it was associated with significant postoperative pain and morbidity. The concept of Tension Free Open Mesh Repair was first described by Lichtenstein in1989.(6)

Minimally invasive surgical approaches are increasingly popular because they offer the potential for less post-operative pain and a quick return to normal activities. Ger et.al reported the first laparoscopic hernia repair in1982 by approximating the internal ring with stainless steel clips.(7) The laparoscopic Trans Abdominal Pre-Peritoneal (TAPP) repair was a revolutionary concept in the hernia surgery and was introduced in the early 1990s. Laparoscopic groin hernia repair by Total Extra Peritoneal (TEP) approach was described by McKernan and Law in 1993.(8)

Lack of documentation and minimum published literature comparing the two has resulted in a conflict regarding the superiority of one over the other and hence inability to arrive at standardizing the procedure protocol. There is inconclusive data directly comparing laparoscopic TAPP and TEP and questions remain about their relative merits and risks. In the light of this, our study aims to compare these two methods of laparoscopic inguinal hernioplasty. The objectives of this study were to compare duration of operation, conversion rates to open method, post-operative pain, complications of each procedure, duration of stay in hospital, duration required to get back to normal activities, recurrence rates and patient satisfaction.

II. Material And Methods

This was a comparative observational study conducted in a tertiary care teaching hospital in Telangana state from August 2012 to August 2016. This study subjects consisted of 37 patients of inguinal hernia.

Study Design: Comparative observational study

Study Location: A tertiary care teaching hospital in Telangana state, India.

Study Duration: Aug2012 to Aug 2016.
Sample size: 37 patients
Subjects & selection method:All the patients who were admitted with diagnosis of inguinal hernia into one surgical unit formed the subjects. Alternative patients were allocated to undergo TEP and TAPP.

Inclusion criteria
1. Patients aged 18 years and above diagnosed as having unilateral or bilateral inguinal hernia giving consent.
2. Patients with recurrent inguinal hernia, following open repair in which repair is done through anterior approach (Ex: Modified Bassini's, Shouldice, Lichenstein's repair).

Exclusion criteria
1. Patients with complicated inguinal hernia and who required emergency exploration for complications of hernia like bowel obstruction, strangulation, gangrene etc.
2. Patients with previously failed laparoscopic repair of inguinal hernia.
3. Patients who are not medically fit to tolerate CO_2 insufflation.

Procedure Methodology

All the patients who were admitted with diagnosis of inguinal hernia were subjected to detailed clinical examination after taking history. 37 patients were recruited after considering inclusion and exclusion criteria. Alternative patients were chosen to undergo TEP and TAPP. Preoperatively all the patients were educated about the advantages, disadvantages, of the procedure and type of anaesthesia they were to undergo and consent was obtained.

Apart from the routine surgical profile of investigations, pre-operative evaluation of patient for laparoscopic TEP or TAPP repair included cardiac evaluation including 2D Echo as needed pulmonary function test and ultrasound of abdomen and pelvis. Inj. Ceftriaxone 1 gram intravenously was given 30 minutes before surgery as prophylactic antibiotic to all patients. Mean operative time was calculated from the time of incision till the time of wound closure. Patients were observed for any complications like subcutaneous emphysema, CO_2 narcosis in the immediate post-operative period.

Post-operative pain was recorded 6 hrs after operation based on a Visual Analog Scale (VAS) where 0 indicates no pain and 10 indicate the worst possible pain. It represents intensity of pain on a 10 cm plain line with two anchor points of "no pain" and "worst pain I ever felt". The patient is requested to draw a line at the point that best describes his or her pain level.

Patients were discharged between 24 to 48 hours except those which were converted to open method. At discharge they were advised to come for suture removal on 7th/8th day (1st follow up), and then after 1 month of surgery (2nd follow up), after 3 months of surgery (3rd follow up) and after 6 months after surgery (4th follow up). The presence or absence of seroma, hematoma, wound infection, pain, numbness and recurrence were recorded. Patient satisfaction score on the surgery and on the scar were done at 4^{th} follow up using Verbal Rating Scale (VRS) as follows. 0 = not satisfied, 1 = partially satisfied, 2 = satisfied, 3 = very satisfied. All the patients were followed up for 23 months after surgery.

Statistical analysis

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two groups.
p value of < 0.05 was taken statistically as significant and <0.001 as highly significant.

III. Result

Total number of patients were 37 and all were men. TEP group consisted of 17 patients aged between 23 and 60 years with mean age being 36.70 years. TAPP group consisted of 18 patients aged between 18 and 60 years with mean age being 34.56 years (Table 1).

Table 1: Age distribution of patients studied

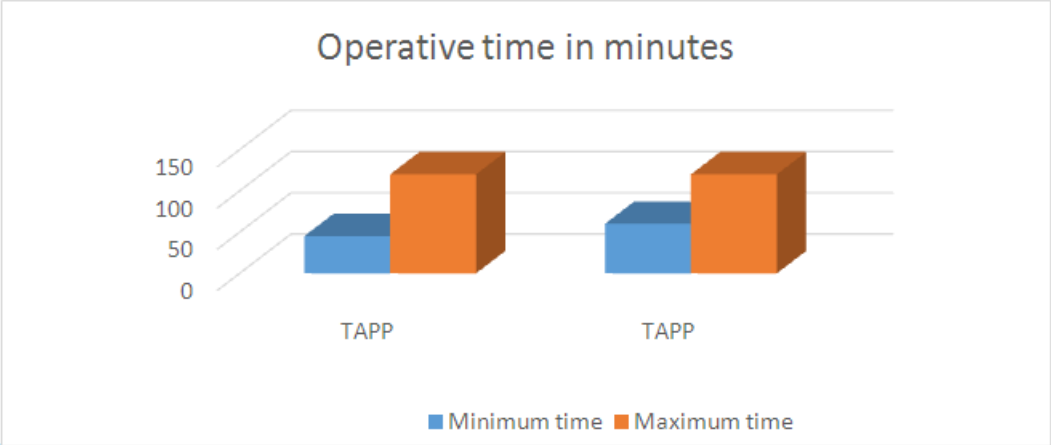
Age in years	TEP Number (%)	TAPP Number (%)
< 20	0 (0.00)	1(5.6)
31-40	4 (23.5)	4(22.2)
41-50	4 (23.5)	3(16.7)

51-60	2 (11.7)	2(11.16)
>61	0 (0.0)	0(0.0)
Total	17 (100)	18(100)
Mean	36.70±11.17	34.56±11.61

Patients recruited for laparoscopic TEP hernioplasty were 19 of whom one was converted to TAPP and one was converted to open, and the rest 17 underwent TEP. Number of patients recruited to TAPP were 18, of whom one was converted to open and as one case of TEP was converted to TAPP total TAPP cases done were 18.

One patient in each group required conversion to open method and the difference was not significant. The overall operative time was significantly more in laparoscopic TAPP group (93.33 minutes) with p= 0.01 when compared to TEP group (76.47 minutes). Mean operative time of TAPP group excluding the 'TEP converted to TAPP case' was 92.05 + 14.9 minutes (Figure 1)(Table 2).

Figure 1. Operative time in minutes.



Mean time for TEP was 76.47±20.44 minutes and for TAPP was 93.33±15.43 minutes (p=0.016)

Table 2: Over all comparison of procedures

Criteria	TEP (n=17)	TAPP (n=18)
Operative time (minutes)	76.47 + 20.44	93.33 + 15.43
Post-op pain (VAS)	2.35 + 0.73	2.56 + 0.7
Minor complications	11.7%	16.6%
Post-op hospital stay (days)	2.33 + 0.46	2.66 + 1.49
Return to normal work (days)	11.59 + 2.21	12.17 + 3.01
Patient satisfaction (VRS)	2.23 + 0.56	2.11 + 0.47

VAS score of post-operative pain at 6 hrs after operation was 2.7±0.73in TEP group and 2.56 ± 0.7 in TAPP group difference of which was not statistically significant (Table 2).

The mean length of post-operative hospital stay in TEP group and TAPP group were 2.33 days and 2.66 days respectively with p=0.32 (Table 2).

There were no major complications in both the procedures. Minor complications were 2 in TEP group (port site infection, transient groin pain) and 3 in TAPP group (Right shoulder pain, scrotal hematoma and transient groin pain) the difference was statistically insignificant p>0.99 (Table 2). The recurrence rate was zero in both the groups during the followed up period of 23 months.

Satisfaction levels with the procedure in terms of early recovery, return to normal activities and scar were analysed. The mean satisfaction scores were 2.23 ± 0.56 in TEP group and 2.11 ± 0.47 in TAPP group and the difference was statistically not significant (p=0.49) (Table 2).

IV. Discussion

Since all our patients were men, gender wise differences were not be studied.

There was one conversion each from TEP and TAPP to open method as the contents were adherent to sac and were difficult to reduce laparoscopically. There was one conversion from TEP to TAPP as there was a peritoneal breach while doing TEP. Peritoneal breach is known to occur in 10% to 47% of extra peritoneal repairs, making it imperative to master TAPP repair in order to avoid conversion to open method.[(9)] There were no visceral or vascular injuries in our study similar to the study by Asuri Krishna, et al.[(10)] The average operative

time in their study was higher in TAPP group though not statistically significant (p= 0.209). Operative time for TAPP was more than TEP in our study which was statistically significant in our study (p= 0.01) (Table 3)

Table 3: Operative time of different studies

STUDY	Laparoscopic TEP hernia repair (in minutes)		Laparoscopic TAPP hernia repair (in minutes)	
Our study	n = 17	76.47± 47	n = 18	93.33± 15.43
Asuri Krishna, et al.[10].	n = 53	62.1 ± 20.6	n = 47	72.3 ± 25.9
YassarHamza, et al[14].	n = 25	77.4 ± 43.2	n = 25	96.1 ± 22.5

Difference in post-operative pain in two groups after 6 hours of surgery was statistically not significant (p=0.46) in our study though it was more in TAPP. Samir UshakantRambhiaet. al have studied 56 patients and found statistically significant difference in pain at 24hrs which was more in TAPP group but no significant differences in duration of hospital stay, operative site complications and recurrence in their one year follow-up.[11]

There were no major complications but minor complications were 11.7% in TEP group and 16.6% in TAPP group in our study. One case of inguinoscrotal hematoma following TEP required evacuation under local anaesthesia. Tetik et.al and others found a high incidence of hematoma in TAPP and TEP repairs.[12,13] Seroma formation rate was significantly higher in TEP group(37.9%) compared to TAPP (17%) in the study of Asuri Krishna et.al.

The duration of hospital stay in our study was 11.59 for TEP group and 12.17 for TAPP group. This observation is similar to Yassar Hamza et.al study.[14] (Table 4).

Table 4: Duration of post- operative hospital stay in days

STUDY	TEP	TAPP
Yassar Hamza.[14]	1	1
Asuri Krishna, et al.[10]	24.4 ± 3.2 h	25.2 ± 5.1 h
Our Study	2.33±0.46	2.66±1.49

Nikithawadhwani et al studied quality of life after both the procedures using EuraHS – QOL scale and found that statistically significantly higher scores at 1 month followup in patients who underwent TAPP (p= 0.011).[15]

Our study adds data to the pool of existing data regarding the differences in different parameters of TEP and TAPP. We found only increased duration of surgery in TAPP over TEP which was statistically significant (p=0.01). However, post-operative pain, hospital stay and post-operative complications were more and patient satisfaction was less in TAPP though not statistically significant.

Though TEP appears to be superior, trials with larger sample sizes with standardized and uniform parameters accounting for confounding factors like skill levels of surgeons and infrastructures of the facilities are needed to establish the superiority of one over the other technique.

V. Conclusion

Our study adds to the pool of existing data regarding the differences in different parameters of TEP and TAPP. We found only increased duration of surgery in TAPP over TEP which was statistically significant (p=0.01). However, post-operative pain, hospital stay and post-operative complications were more and patient satisfaction was less in TAPP though not statistically significant.Though TEP appears to be superior, trials with larger sample sizes with standardized and uniform parameters accounting for confounding factors like skill levels of surgeons and infrastructures of the facilities are needed to establish the superiority of one over the other technique.

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