

OUTCOME ANALYSIS BETWEEN LAPAROSCOPIC TRANSABDOMINAL PREPERITONEAL VERSUS TOTAL EXTRAPERITONEAL APPROACH IN INGUINAL HERNIA REPAIR IN A TERTIARY CARE CENTER

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Abstract

Background: The safety and efficacy of laparoscopic inguinal hernia repair have been well-established for the treatment of groin hernias. In the near future, the accessibility of laparoscopic repairs for inguinal hernias in India is expected to increase due to the availability of resources and facilities. Outcome analysis between laparoscopic transabdominal preperitoneal versus total extraperitoneal approach in inguinal hernia repair in a tertiary care center. **Materials and Methods:** This research comprised a total of 60 patients diagnosed with inguinal hernia, with 30 cases treated using the TEP technique and 30 cases treated using the TAPP technique. The study received approval from the institutional human ethics committee. All research participants were required to provide informed written agreement, and only those who were willing to sign the informed consent were included in the study. **Result:** It indicates that 43.3% of cases had the presence of postoperative complications, whereas 56.7% of cases did not exhibit any postoperative issues. A total of 6 patients in the TEP group and 7 patients in the TAPP group experienced seroma. Postoperative pain at a one-month interval in the TEP group, which was in 4 cases, and in the TAPP group, which was also in 4 cases. The average operational time in the TEP group is 140 minutes. The average duration of operation in the TEP group was 180 minutes. **Conclusion:** We concluded that the laparoscopic TEP is found to have much less operating time, postoperative complications with better patient compliance. Overall, laparoscopic inguinal hernia repair is the safest and efficacious technique once it is mastered.

INTRODUCTION

It is estimated that more than 20 million inguinal hernia surgeries are performed every year worldwide. Hence these are the most common surgery done worldwide, which explains the prevalence of the disease. Inguinal hernia repairs in men, in comparison with women are 8–10 times more common. Among them Inguinal hernias occur 9–12 times more in men, while femoral hernias are 4 times more commonly in ladies. These differences could be understood by the wider rectus abdominis muscle and larger distance between the pubic tubercle and the internal ring and in females.^[1] Treatment has continued to develop from early surgery through scrotal incision to today's laparoscopic repairs. In the olden days, this disease process was treated exclusively by open techniques,

but now there is a rapid shift towards minimally invasive techniques.^[2]

Procedures commonly used today are

1. Tension-free mesh repair
2. Laparoscopic hernioplasty - TAPP (or) TEP.

Therefore, the present research aims to conduct a comparative analysis between a cohort of 30 patients who received laparoscopic complete extraperitoneal mesh repair and another cohort of 30 patients who underwent laparoscopic transabdominal preperitoneal mesh repair. The primary objective of this investigation is to ascertain the optimal surgical treatment for inguinal hernias among these two approaches.^[3,4] The use of these two endoscopic methods has shown a reduction in early postoperative discomfort, and a substantial body of evidence supports a faster resumption of normal activities when compared to open mesh

repair. Moreover, the use of endoscopic repair techniques enables the performance of revision surgery on recurrent hernias subsequent to anterior repair, eliminating the need for scar tissue transection. This approach has shown enhanced pain ratings, however there is conflicting evidence about the occurrence of re-recurrence.^[5-8] Both endoscopic methods have become very popular among the surgical community. In spite of the rapid and extensive adoption of minimally invasive procedures, the International Endohernia Society's recent recommendations have emphasised the dearth of reliable comparison data about endoscopic and laparoscopic inguinal hernia repair.^[9-12] This comparative research was conducted on a cohort of hernia patients who sought treatment at the General Surgery Department during a one-year period.

MATERIALS AND METHODS

Both retrospective and prospective studies were conducted at the Department of General and Gastrointestinal Surgery at PSG Institute of Medical Science and Research College and Hospitals from 2020 to 2022. This research comprised a total of 60 patients diagnosed with inguinal hernia, with 30 cases treated using the TEP technique and 30 cases treated using the TAPP technique. The study received approval from the institutional human ethics committee. All research participants were required to provide informed written agreement, and only those who were willing to sign the informed consent were included in the study. The potential hazards and advantages associated with the research, as well as the voluntary aspect of participation, were clearly elucidated to the participants prior to gaining their informed permission. The researchers ensured the preservation of confidentiality for the subjects included in the study.

Inclusion Criteria

- All Patients aged over 16years.
- Patients with Indirect, Direct Inguinal Hernia.
- All Patients undergoing any one of the laparoscopic technique, Transabdominal Preperitoneal Mesh repair and Total Extraperitoneal mesh repair

Exclusion Criteria

- All Patients who had irreducible/ Obstructed/ Strangulated hernia.
- All patients with history of single or multiple previous surgeries in abdomen.
- Recurrent hernia were excluded
- Patients unfit for General anaesthesia.

Methodology

The study comprised patients who were hospitalised to the Department of General Surgery and Surgical Gastroenterology at PSG hospitals with symptoms of either unilateral or bilateral uncomplicated inguinal hernia. All individuals who met the predetermined criteria for inclusion were included in the study group, while those who did not meet the

requirements were eliminated from the research. The patient's consent was sought with regards to their involvement in the research. A comprehensive assessment including historical inquiry and clinical examination was conducted and meticulously recorded. Preoperative routine blood examinations and imaging studies were conducted and duly recorded. Blood samples were obtained from individuals who met the specified inclusion criteria. All individuals who received a diagnosis of inguinal hernia, met the specified inclusion criteria, and expressed a willingness to have a laparoscopic operation were included in the study. The data collected from both groups included the clinical features of the patients, their risk factors, the type of surgical technique used, the duration of the surgery, and postoperative complications such as seroma, cord edoema, and pain at 24 hours, 1 week, 6 weeks, and 6 months. This data was documented and recorded in a Microsoft Excel spreadsheet, and then tabulated and analysed statistically on an individual basis. The postoperative follow-up of patients was conducted for a period of six months as part of a prospective trial.

Statistical Analysis

The collected data were analysed with IBM SPSS Statistics for Windows, Version 23.0.(Armonk, NY: IBM Corp). To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significance in categorical data, Chi-Square test was used. Similarly if the expected cell frequency is less than 5 in 2x2 tables then the Fisher's Exact was used. In all the above statistical tools the probability value <0.05 is considered as significant level.

RESULTS

The study was conducted in the Department of General Surgery from January 2020 to January 2022. The study involved 60 patients who satisfied the inclusion criteria. 30 patients were subjected to TEP and another 30 subjected to TAPP.

The above table shows, cases which underwent laparoscopic TEP/TAPP and the corresponding age of patient, thus the frequency of distribution. Age distribution were <40 years is 5.0%, 41-50 years is 20.0%, 51-60 years is 36.7%, 61-70 years is 26.7%, >70 years is 11.7%, The mean \pm standard deviation of the age were 57.8 \pm 11.6 years. [Table 1]

The table shown above displays the distribution of postoperative problems. It indicates that 43.3% of cases had the presence of postoperative complications, whereas 56.7% of cases did not exhibit any postoperative issues. [Table 2]

[Table 3] presents the data on the number of TEP procedures performed for bilateral hernia repair (18 cases), TEP procedures performed for unilateral hernia repair (12 cases), TAPP procedures performed for bilateral hernia repair (11 cases), and

TAPP procedures performed for unilateral hernia repair (19 cases). The table shown above displays a comparison between unilateral and bilateral hernia cases treated with Laparoscopic TEP and TAPP procedures. The statistical analysis conducted using Pearson's Chi-Square test yielded a chi-square value of 3.270 and a p-value of 0.071, indicating that the observed differences in procedure preference between TEP and TAPP for unilateral and bilateral hernias were not statistically significant.

[Table 4] presents a comparative analysis between Seroma and Procedure. A total of 6 patients in the TEP group and 7 patients in the TAPP group experienced seroma. The table shown above displays the results of a comparison between Seroma and Procedure using Pearson's Chi-Square test. The calculated chi-square value is 0.098, with a p-value of 0.754, indicating that the observed data does not exhibit statistical significance in relation to the association between Seroma and Procedure. Although the occurrence of seroma is higher in the TAPP approach, the findings of this research indicate that the observed differences are not statistically significant.

[Table 5] presents the findings of postoperative pain at a one-month interval in the TEP group, which

was in 4 cases, and in the TAPP group, which was also in 4 cases. The table shown above displays the results of a statistical analysis comparing Pain and Procedure using Fisher's Exact test. The obtained value of χ^2 was found to be 0.000, with a p-value of 1.000, indicating that there is no statistically significant relationship between Pain and Procedure. [Table 6] show that the patient who developed edema among TEP group- 0 and Patient who developed edema among TAPP group- 3. The above table shows comparison of Edema with Procedure by Fisher's Exact test were $\chi^2=3.158$, $p=0.237>0.05$ which shows no statistical significance with Edema and Procedure.

According to [Table 7], the average operational time in the TEP group is 140 minutes. The average duration of operation in the TEP group was 180 minutes. The table shown above displays a comparison of the operating time with the procedure using an independent sample t-test. The results indicate a t-value of 4.072 and a p-value of 0.0005, which is less than the significance threshold of 0.01. This suggests a highly statistically significant difference between the two variables at a p-value of less than 0.01.

Table 1: Age distribution

Age distribution	Frequency	Percent
Upto 40 yrs	3	5.0
41 - 50 yrs	12	20.0
51 - 60 yrs	22	36.7
61 - 70 yrs	16	26.7
Above 70 yrs	7	11.7
Total	60	100.0

Table 2: Postop Complications distribution

Postop Complications	Frequency	Percent
Present	26	43.3
Absent	34	56.7
Total	60	100.0

Table 3: Comparison of Hernia with Procedure by Pearson's Chi-Square test

			Procedure		Total	χ^2 - value	p-value
			TEP	TAPP			
Hernia	Bilateral	Count	18	11	29	3.270	0.071 #
		%	60.0%	36.7%	48.3%		
	Unilateral	Count	12	19	31		
		%	40.0%	63.3%	51.7%		
Total		Count	30	30	60		
		%	100.0%	100.0%	100.0%		

No Statistical Significance at $p > 0.05$ level

Table 4: Comparison of Seroma with Procedure by Pearson's Chi-Square test

			Procedure		Total	χ^2 - value	p-value
			TEP	TAPP			
Seroma	Present	Count	6	7	13	0.098	0.754 #
		%	20.0%	23.3%	21.7%		
	Absent	Count	24	23	47		
		%	80.0%	76.7%	78.3%		
Total		Count	30	30	60		
		%	100.0%	100.0%	100.0%		

No Statistical Significance at $p > 0.05$ level

Table 5: Comparison of Pain with Procedure by Fisher's Exact test

			Procedure		Total	□ 2 - value	p-value
			TEP	TAPP			
Pain	Present	Count	4	4	8	0.000	1.000 #
		%	13.3%	13.3%	13.3%		
	Absent	Count	26	26	52		
		%	86.7%	86.7%	86.7%		
Total		Count	30	30	60		
		%	100.0%	100.0%	100.0%		

No Statistical Significance at $p > 0.05$ level**Table 6: Comparison of Edema with Procedure by Fisher's Exact test**

			Procedure		Total	□ 2 - value	p-value
			TEP	TAPP			
Edema	Present	Count	0	3	3	3.158	0.237 #
		%	0.0%	10.0%	5.0%		
	Absent	Count	30	27	57		
		%	100.0%	90.0%	95.0%		
Total		Count	30	30	60		
		%	100.0%	100.0%	100.0%		

No Statistical Significance at $p > 0.05$ level**Table 7: Comparison of Operating time with Procedure by Independent sample t-test**

Variable	Procedure	N	Mean	SD	t-value	p-value
Operating time	TEP	30	140.00	40.0	4.072	0.0001 **
	TAPP	30	180.00	30.0		

** Highly Statistical Significance at $p < 0.01$ level**Table 8: Comparison of operative time in between TAPP and TEP.**

Study	TAPP; unilateral (min)	TEP; unilateral (min)	P value
Krishna et al. ^[16]	72.3±25.9	61.6±27.4	0.343
Choksi D et al. ^[17]	87	72	<0.05
Abd Al- Rahman et al. ^[18]	74.2±8.6	57.5±9.4	0.045
Bansal et al. ^[19]	62.6±19.2	54.8±14	0.002
Gong et al. ^[20]	76±16	79±13	0.258
More et al. ^[21]	121±4.3	50.5±3.7	<0.0001
Güenal et al. ^[22]	104.49±8.1	57.37±3.8	<0.001
Feng et al. ^[23]	29.9±11.2	27.7±10.1	<0.0001
Hamza et al. ^[24]	96.12±22.5	77.40±43.21	< 0.001
Kumar et al. ^[25]	97.11±12.72	116.60±13.27	< 0.0001
Zeineldin1. ^[26]	43	57.3	<0.05
Rambhia et al. ^[27]	68.28±22.33	73.89±14.76	0.276

DISCUSSION

The objective of this research is to determine the optimal approach between Laparoscopic Transabdominal Preperitoneal mesh repair and Total Extraperitoneal mesh repair for the treatment of Inguinal Hernia, as well as to assess the occurrence of postoperative problems associated with each technique. This research had a total of 60 individuals, with 30 patients undergoing Lap TEP and another 30 patients undergoing Lap TAPP. Following the surgical procedure, patients were monitored for a duration of one year, after which an analysis was conducted. It is well acknowledged among surgeons that laparoscopic inguinal tension-free hernia repair offers a mechanical advantage compared to the open tension-free approach. This is primarily due to the ability to install a big mesh that covers the whole myopectineal orifice. The inherent intra-abdominal pressure contributes to the stabilisation of the massive mesh inside the abdominal cavity. However, there seems to be a division among surgeons about the validity of the

laparoscopic technique compared to the open tension-free procedure. Surgeons that specialise in laparoscopic inguinal hernia repair assert that this technique offers many advantages, including expedited recovery, enhanced intraoperative visualisation of the anatomical area, the ability to address all groyne hernial abnormalities simultaneously, and less postoperative discomfort. Conversely, opponents have raised concerns over the challenges associated with acquiring the necessary skills, extended duration of the treatment, and the financial implications.^[13]

In the medical field, it is often recommended that surgeons acquire proficiency in TAPP repair prior to doing TEP surgery. This is particularly important when faced with the challenge of a significant peritoneal rip that hampers visibility of the possible working preperitoneal region. Numerous studies have been conducted globally to compare the TAPP and TEP repairs; however, no definitive advantage of one procedure over the other has been shown so far. The table shown above displays the cases that had laparoscopic TEP/TAPP procedures, together

with the associated age of each patient. Consequently, it provides a frequency distribution of these instances. The age distribution of the sample population was as follows: individuals below 40 years constituted 5.0% of the sample, those between 41-50 years accounted for 20.0%, those aged 51-60 years included 36.7%, those aged 61-70 years constituted 26.7%, and individuals beyond 70 years accounted for 11.7%. The mean age of the sample population was 57.8 years, with a standard deviation of 11.6 years. Gurung KB et colleagues noticed that the patient cohort consisted mostly of males, with the exception of a 32-year-old female who had TAPP repair. This statement highlights the gender-specific prevalence of inguinal hernias among the general population. The age range of patients who had TAPP repair surgery varied from 21 to 70 years, with a mean age of 43.93 ± 15.52 years. In a similar vein, the age distribution pertaining to TEP repairs included individuals aged 20 to 68 years, with a mean age of 41.42 ± 12.15 years. The presence of somewhat younger patients in the research sample may be attributed to the deliberate selection of unilateral, uncomplicated, primary inguinal hernia cases for inclusion.^[14] Complications such as scrotal cord edema or hematoma are recognised in both open and laparoscopic hernia surgeries. Several variables contribute to the occurrence of problems, including hernia with a big sac, reoperation for a recurrent hernia, and the level of surgical competence.

This research examines the occurrence of seroma in patients within the TEP group, with a total of 6 individuals experiencing this complication. A total of seven patients in the TAPP group had the development of seroma. The table shown above displays the results of a comparison between Seroma and Procedure using Pearson's Chi-Square test. The obtained values for χ^2 and p were 0.098 and 0.754, respectively. These results indicate that there is no statistically significant relationship between Seroma and Procedure, since the p-value of 0.754 is greater than the predetermined significance level of 0.05. Although the occurrence of seroma is higher in the TAPP approach, the statistical analysis conducted in this research indicates that the findings are not statistically significant. One patient within the TEP group had the manifestation of edema. One patient from the TAPP group had the development of edema. The table shown above displays the results of a comparison between edema and Procedure using Fisher's Exact test. The statistical analysis yielded a chi-square value of 3.158 and a p-value of 0.237, indicating that the observed relationship between edema and Procedure is not statistically significant. One patient within the TEP group had the manifestation of edema. One patient from the TAPP group had the manifestation of edema. The table shown above displays the results of a comparison between Edema and Procedure using Fisher's Exact test. The statistical analysis yielded a chi-square value of 3.158 and a p-value of

0.237, indicating that there is no statistically significant relationship between Edema and Procedure.

Gurung et al. discovered that scrotal edema occurred in six out of the 30 patients (20%) who were part of the TAPP group. Within the TEP group, a total of three individuals, accounting for 11.5% of the sample, had symptoms of scrotal edema. Although the incidence of this consequence was greater in the TAPP group, the difference did not reach statistical significance ($P = 0.24$). Additionally, the researchers documented a single patient (3.3%) who had cord hematoma. The aforementioned problem was not documented within the TEP group. The cord hematoma was managed with therapeutic needle aspiration, resulting in the extraction of about 3 ml of fluid with a black coloration. The prevalence of scrotal edema has been documented at 12.8% in a previous study.^[15] This research reports a mean operation time of 140 minutes in the TEP group. The average duration of operation in the TEP group was found to be 180 minutes. The table shown above displays a comparison of the operating time with the procedure using an independent sample t-test. The t-value obtained was 4.072, and the corresponding p-value was 0.0005, which is less than the predetermined significance level of 0.01. This indicates a highly statistically significant difference between the two groups at a significance level of $p < 0.01$. A comparable investigation was conducted by other researchers.

Numerous studies have shown similar durations for the resumption of regular physical activity. In their study on unilateral TAPP repairs, Gurung et al. found that the duration for individuals to resume regular employment varied between 3 and 15 days, with an average of 6 days.^[15] No instances of recurrence were seen in either TAPP or TEP repairs over the two-year follow-up period. Other recent investigations have not identified any instances of recurrence. The reduction or lack of recurrence after laparoscopic inguinal hernia repair indicates advancements in surgical methods and the increasing skill and competency of surgeons. In order to mitigate morbidity and mortality resulting from the treatment, it is important to evaluate a substantial population over an extended duration to thoroughly record additional issues. This will enable the implementation of preventive measures for patients in the future. In order to establish this strategy as an optimal approach, it is necessary to gather further experience with a substantial number of cases and extend the duration of follow-up.

CONCLUSION

Hence we came to conclusion from this study that though the learning curve for TEP procedure is more, with experience and standard training, laparoscopic TEP is found to have much less operating time, postoperative complications with

better patient compliance. Overall, laparoscopic inguinal hernia repair is the safest and efficacious technique once it is mastered. Large sample of randomized controlled trials were necessary in order to document other complications so that in future lot of patients can be saved from morbidity and mortality.

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