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A Comparative Study Between Open Lichtenstein Mesh Repair And Laparoscopic Totally Extra Peritoneal Repair Of Inguinal Hernia.

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ABSTRACT

The first hernia terminology was defined in Erb's papyrus in 1552 BC . Since then, many techniques for IH repair have been described and many modifications have been applied to these techniques. The results of IH repair have gotten progressively better since the tension-free herniorrhaphy was performed. After the invention of biocompatible synthetic meshes, new techniques were developed, such as the Lichtenstein tension-free hernioplasty with low recurrence rates and high postoperative quality of life.The study was conducted to compare and assess the duration of procedure, complications encountered, post-operative pain and recovery, duration of hospital stay, and time taken in resumption to work between two techniques of open Lichtenstein mesh repair (OLMR) and Totally extra peritoneal (TEP) repair in the low resource settings.This cross sectional comparative study was conducted among 50 male patients admitted for surgical repair of hernia. After considering the inclusion and exclusion criteria, the subjects were randomly assigned to the groups of OLMR and TEP and were assessed for pain in the post-operative period was rated using a Visual Analogue Scale. Total duration of the procedure, complications, duration of hospital stay, and time taken in resumption to work were elicited between two techniques. A p-value of <0.05 was taken as statistically significant. The mean duration of surgery among the study participants in TEP (49.60+3.62 mins) group was significantly higher compared to OLMR (45.96+4.63 mins) group (p=0.003). The median of post-operative pain scores in TEP group was significantly lower compared to OLMR group. The mean duration of post-operative recovery time (3.08+0.4 days), for resumption to work (5.08+0.28 days) among the study participants in TEP group was significantly lower compared to OLMR (5.00+0.00 days), (10.08+0.76 days) (p<0.001) respectively. The complications were significantly higher among the OLMR group (100.0%) compared to the TEP group (p<0.05).Though the procedure of TEP repair for inguinal hernia takes a little longer time and complications of general anaesthesia cannot be ruled out, it is a better procedure compared to open type.

Keywords: Endoscopic surgeries, Inguinal Hernia, Open Lichenstein Mesh Repair, Totally Extra Peritoneal Repair, Laproscopic surgeries

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INTRODUCTION

Inguinal hernias constitute the most common form ofabdominal wall hernias. The incidence of inguinal hernia remains indefinite; however, nearly about 500,000 cases come to medical attention each year. Twenty or more years ago, international and US surveys were conducted, wherein, the non-surgically treated inguinal hernia prevailed among 5% of men and similarly, same numberof men had history of hernia repair [1]. The lifetime risk of inguinal hernia is estimated to be 27% and 3% for men and women respectively [2]. Inguinal hernia repair is one of the commonly performed general surgeries among both adults and children accounting for more than 95% of all groin hernia repairs [3]. Collective Indian data are limited [4]. However, in few of the Indian studies, the prevalence of inguinal hernias among males in a tertiary care setting in India ranged from 88.0% to 91.0% [5-7]. In an Indian study conducted by Sayanna S et al, found that the proportion of males were 87.88%≈88.0% [5]. Incidences of inguinal hernia both primary and recurrent were found to be roughly 89% in males as reported in a study by Basu I et al, 91.8% of males constituted of total patients of inguinal hernia in a study by Rao SS et al [6, 7]. Numerous repair techniques have been described since Eduardo Bassini published his first successful anatomy- based repair in 1890. During the 20th century, the repair trend has changed several times. Currently available repair options for inguinal hernias are viz., Lichenstein repair, Open type through inguinal incision, Laproscopic total extra peritoneal repair, Transabdominal pre- peritoneal repair etc. Prosthetic repairs are accepted to be superior to "non-mesh" suture repairs now days [8]. All the techniques will have both proponents as well as opponents [5]. The use of endo-laparoscopic surgery for inguinal herniasdiffers globally, constituting from 0% to 55% of repairsin some high resource countries. The average use in most countries is unknown, but then the rates recorded in Australia, Switzerland and Sweden is 55%, 45% and 28%respectively. Sweden in its national registry has noted therates of surgeries being 64% Lichtenstein, 25% TEP, 3% TAPP, 2.7% combined open and preperitoneal and 0.8% tissue repair. Other registry revealed that between 2009 and 2016 an extensive variety of hernia repair techniques were in practise, including 39.0% TAPP, 25.0% TEP, 24.0% Lichtenstein, 3.0% plug, 2.6% Shouldice, 2.5% Gilbert prolene hernia system and 0.2% Bassini. The reliable data from Asia and the United States are still deficient [9].

Thus, this background indicates that there is a paucity of data with respect to the endoscopic repairs is concerned in addition to the lack of data on comparing and contrasting both techniques especially in the low resourcesettings like India. Hence, the study was conducted to compare results of open Lichtenstein mesh repair and totally extra peritoneal (TEP) repair, in an effort to determine the proposed advantages of one over the other. The Objectives of the present study were to compare and assess the outcome in terms of duration of procedure, complications encountered, post-operative pain, Hospital stay and resumption to work between open Lichtenstein mesh repair and totally extra-peritoneal repair of inguinal hernia.

METHODS

A cross-sectional, comparative study was conducted atthe Department of Surgery, Government Medical College and Hospital, Kallakuruichi, Tamil Nadu, India for a period of 18 Months (August 2022 to July 2023) among 50 male patients who were willing to undergo hernia repair surgeries. Considering an average of prevalence of inguinal hernias among males as per other studies in a tertiary care setting in India5, 6, 7 as89.0% with 95% confidence interval and permissible error (L) in the estimate of 'p' as 10%, total sample size of 47.46 was calculated using the formula $n=z^2(pq/L^2)$, where, z=1.96 at 95% confidence interval, p = estimated prevalence (89.0%), q=100-p (11.0%) and L= permissibleerror (10% of p). The total sample size of 47.46 ≈ 50 was considered for the study. The sample size of 50 was divided equally among the two groups of open Lichenstein and Totally Extra-Peritoneal Repair (TEP). Male patients who are proven cases of unilateral inguinal hernia (clinical examination and abdominal ultrasound), fit for hernia repair under anaesthesia, aged between 20 to 60 years and willing to give consent for the study were included. Patients with recurrent hernia, hernia with complications (Irreducible hernia, strangulated hernia) and patients associated with co-morbid diseases were excluded. Detailed clinical history was taken from patients as per the proforma. All the patients were examined and subjected to routine blood investigations and abdominal ultrasonography and were subjected to surgery either under General Anaesthesia or Spinal Anaesthesia. Pain inthe post-operative period were rated by each patient usinga Visual Analogue Scale (from 0 to 10). All patients were administered analgesics as required in oral or injectable form. Total duration of the procedure was calculated from skin incision to skin closure. Procedure related complications like injury to bowel, bladder, vessels and nerves, post-

operative wound infection and other reasons for prolonged hospitalization were recorded and compared among both the groups. Patients were discharged fromthe hospital once they were fully mobilized and able to tolerate a normal diet. Evaluation of post-operative complications were made during OPD visits after 1 week,2 weeks, 4 weeks, 12 weeks and 24 weeks.

Statistical analysis

The collected data were entered into an excel sheet. The data were expressed in means and proportions and presented in the form of tables and graphs where ever necessary. The means and standard deviations of age,duration of procedure in minutes, days of hospital stay, and number of days taken to resumption back to workwere compared among the two groups using independent t-test. The medians of pain scores were compared among the two groups using Mann-Whitney U test. The data (complications, age groups, proportion of direct and indirect inguinal hernias) were expressed in proportions and their associations among the two groups were analysed using Fisher's Exact test.The analysis was done using standard statistical package. A P-value of <0.05 was taken as statistically significant.

RESULTS

The mean age of the study subjects was 43.62+10.51years with a range from 20 to 60 years. The mean age of the 50 participants in open mesh repair group and TEP group were 45.24+10.05 years and 42.00+10.92 yearsrespectively. Majority i.e., 56.0% and 40.0% of the study subjects in Open mesh repair and in Total Extra Peritoneal repair (TEP) groups were having right indirect inguinal hernia respectively. All the subjects in the open type were given Spinal anaesthesia and all the subjects in TEP were given General Anaesthesia. The groups were comparable in terms of distribution of study subjects according to age, gender, type of hernia (P>0.05) (Table 1).

Table 1: Characteristics Of Participants.

Patient Characteristic	Mean ± SD OR Frequency/Percentage	
	Open Mesh Repair group	TEP group
Age (Years)	45.24±10.05	42.00±10.92
Gender (Males)	25 (100.0%)	25 (100.0%)
Type of hernia (RightIndirect Inguinal)	14.0 (56.0%)	10 (40.0%)
Type of Anaesthesia		
General	0 (0.0%)	25 (100.0%)
Spinal	25 (100.0%)	0 (0.0%)

The mean duration of surgery among the study participants in TEP (49.60+3.62 mins) group was significantly higher compared to open mesh repair(45.96+4.63 mins) group (t=-3.097, P=0.003).

Table 2: Comparison Of Outcomes Of Two Techniques.

Particulars	Open Lichtenstein Mesh Repair (Mean ± SD)	Total Extra-peritoneal Repair (Mean ± SD)	t-value [95% C.I]	P-value
Duration of procedure (Mins)	45.96±4.63	49.60±3.62	-3.097 (-6.003-1.277)	0.003*
Duration of hospital stay in the post-operative period (Days)	5.0±0.0	3.08±0.4	24.00 (1.76-2.08)	<0.001*
Time taken for resumption to work (Days)	10.08±0.76	5.08±0.28	30.93 (4.67-5.33)	<0.001*

*Indicates a significant statistical difference between the groups with P<0.05.

The mean duration of post-operative recovery time among the study participants in TEP (3.08+0.4 days) group was significantly lower compared to open mesh repair (5.00+0.00 days) group (t=24.00, P<0.001).The mean duration of time taken for resumption to work among the study participants in TEP (5.08+0.28 days)group was significantly lower compared to open mesh repair (10.08+0.76 days) group (t=30.93, P<0.001) (Table2).Among the study subjects with inguinal hernia who

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underwent Open Lichtenstein Mesh Repair, 6/25, 24.0% had complications and none suffered any complicationsin the other group.

Table 3: Comparison Of Rated Post-Operative Pain Scores Between Two Techniques.

Variable	Type of Hernial Repair	No. of people (N)	Median[IQR]	Mean Rank	U	P-Value
Pain scores	Open Lichtenstein Mesh Repair	25	7 [2]	37.68	8.00	<0.001*
	Total Extra-Peritoneal Repair	25	4 [2]	13.32		

*Indicates a significant statistical difference between the groups with P<0.05 (Mann Whitney U test)

The median of post-operative pain scores in TEP group was significantly lower (4) compared to open mesh repair group (7) (P<0.001) (Table 3). Among the study population, who developed complications, everybody belonged to open mesh repair group and the complications were significantly higher among the open mesh repair group compared to the TEP group (P<0.05) (Table 4).

TABLE 4: ASSOCIATION OF COMPLICATIONS OF PER-OPERATIVE AND POST-OPERATIVE COMPLICATIONS AMONG THE TWO DIFFERENTTYPES OF HERNIA REPAIRS.

Type of Hernial Repair	Complications		Fisher's Exact(P-Value)
	Present (Column %)	Absent (Column %)	
Open Lichtenstein Mesh Repair	6 (100.0)	19 (43.2)	
Total Extra-Peritoneal Repair	0 (0.0)	25 (56.8)	(0.02) *
Total	06 (100.0)	44 (100.0)	

*Indicates a significant statistical association between the type of hernia repair and the complications at P<0.05

DISCUSSION

Inguinal hernia is commonly encountered pathological problem by the surgeon in the surgical practice. There arevarious methods for inguinal hernia repair, but 'Tension- free repair' is the procedure of choice. These tension-free repair procedures can be roughly categorized into two groups; laparoscopic and open anterior approach [10]. Ideal technique for effective inguinal hernia repair is still controversial. Although open tension free mesh techniques of inguinal hernia repair offers good results but the superiority of laparoscopic technique was reported for postoperative pain, discomfort and earlierreturn back to work [11]. Neumayer L et al, has reported the mean age of the patients in open mesh repair group and laparoscopic repair groups as 58.4+12.7 years and 58.6+12.8 years respectively and are in parallel to the current study [12]. Hamza Y et al., noted no significant difference in age between the two groups indicating that the two groups are comparable and are similar to our study [13]. Gokalp A et al., also noted all the study subjects as males similar to this study [11]. Momin RS et al., noted right sided Inguinal Hernia in 72.0%, Indirect Inguinal Hernia in 82% and the findings are in convergence to this study.[14] In the present study, all the subjects in the open type were given Spinal anaesthesia and all the subjects in TEP were given General Anaesthesia which is similar to the study by Momin RS et al [14]. The mean duration of surgery among the study participants in TEP (49.60+3.62 mins) group was significantly higher compared to open mesh repair(45.96+4.63 mins) group (t=-3.097, P=0.003) similarly Bringman S et al., recorded mean operative time of 50 minutes which was significantly higher in TEP group as compared to 45 minutes in the Lichtenstein group (P < 0.0001) [15]. Gokalp A et al., also noted that operating time for totally extraperitoneal hernia repair was 16 minutes longer than Lichtenstein open tension free technique [11]. All the study subjects in Open mesh repair group had higher (5 days) duration of hospital stay post-operatively

However, majority (96.0%) in TEP group had lesser duration (3 days) of hospital stay post-operatively which is similar to the findings of Momin RS et al., where the average duration of hospital stay in Open Hernioplasty was 3.5 days (1 to 15 days) which is higher than the TEP group which was 1.5 days (1 to 7 days) [14]. The mean duration of time taken for resumption to work among the study participants in TEP (5.08+0.28 days) group was significantly lower compared to open mesh repair (10.08+0.76 days) group (t = 30.93, P<0.001) which is similar to study by Kouhia ST et al., who found that postoperatively, the TEP group returned to work earlier (14.8 versus 17.9 days, respectively, P=0.05) compared to

Lichtenstein group [16]. In another study by Andersson B et al., patients in the TEP group returned to work earlier (P<0.01), and had a shorter time to full recovery (P<0.01) [17]. median of post-operative pain scores in TEP group was significantly lower compared to open mesh repair group (P<0.001). Similarly, Neumayer L et al., noted that laparoscopic-surgery group had less pain initially than the open-surgery group on the day of surgery [12]. Kouhia ST et al., found chronic pain to be more prevalent in the Lichtenstein group compared with the TEP [16]. The mean duration of post-operative recovery time among the study participants in TEP (3.08+0.4 days) group was significantly lower compared to open mesh repair (5.00+0.00 days) group (t=24.00, P<0.001) which is similar to the findings by Bringman S et al [15]. The complications were significantly higher among the open mesh repair group compared to the TEP group (P<0.05). According to the meta-analysis conducted by Karthikesalingam A et al, there was no significant difference in the rate of seroma or haematoma formation between the two groups [18]. Similarly in a study by Sharma A and Chelawat P noted no difference in the intra- operative or post-operative complications between the groups of endo-laparoscopic procedure and open mesh repair type for primary inguinal hernias in men. The observed difference may be due to the different study settings and demography constituting the population [19].

CONCLUSION

Though the procedure of totally extra peritoneal repair for inguinal hernia takes a little longer time and complications of general anaesthesia cannot be ruled out, it is a better procedure in all other parameters viz., lesser rated pain scores, minimal post-operative recovery time, and early resumption to work with no recorded per- operative or post-operative complications.

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