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COMPARATIVE STUDY ON LAPAROSCOPIC HERNIA REPAIR: TOTALLY EXTRA PERITONEAL REPAIR (TEP) AND TRANSABDOMINAL PREPERITONEAL (TAPP) AT A TERTIARY CARE CENTRE

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ABSTRACT

Background

Minimal invasive surgery (MIS) procedures in the early 90's as laparoscopic transabdominal preperitoneal repair (TAPP) and totally extra peritoneal repair (TEP), have gained popularity worldwide over open hernia mesh repair with low recurrences, complications and early return to work and activities. This retrospective study aims to compare the two laparoscopic procedures regarding various parameters like duration of surgery, postoperative complications and duration of hospital stay in various ages and different sexes as described in the methodology.

Methods

This is a retrospective study for over 2 years which included patients with unilateral inguinal hernia both direct and indirect using either (TAAP) or (TEP) technique.

Results

Among sixty patients with an inguinal hernia, 30 patients had undergone (TAPP) and 30 had undergone (TEP). The duration of surgery for (TAPP) was observed 111.03±13.71 minutes which was significantly higher than that of (TEP) (92.80±8.24 minutes) at P<0.001. The pain score at 6 hours for (TEP) was 6.97±1.01 in comparison to 8±0.00 for (TAPP) (P<0.001). The pain score at 24 hours for (TAPP) was 5.18±1.00 in contrast to 4.27±0.70 for (TEP) (P<0.001).

Conclusion

Both (TAPP) and (TEP) are feasible surgical options to treat an inguinal hernia. (TAPP) had significantly longer operating time and more early post-operative pain as compared to (TEP). However, there was no significant difference in hospital stay, post-operative complications in both the group.

Keywords: Inguinal hernia, Laparoscopic hernia repair, Totally extra peritoneal (TEP), Transabdominal preperitoneal (TAPP)

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INTRODUCTION

Every year 20 million people worldwide suffer from inguinal hernias and undergo hernia repair surgery (2). With the beginning of Marcy repair and the milestone Bassini repair upto the era of laparoscopic inguinal hernia repair, there have been a number of techniques innovated for the repair of inguinal hernias, yet, there have been no universal consensus on ideal repair to which of them would overcome the problems of wound infection, chronic groin pain and recurrences(1). With the advent of minimal invasive surgeries in the early 90s in 1992 and 1993, as described by Arregui for (TAPP) and by McKernan and laws for (TEP) respectively over open Lichtenstein hernia mesh repair, there have been several advantages like less postoperative pain and less need of narcotic and nonnarcotic analgesics, less postoperative complications, better cosmesis and early return to work and have added to the ongoing debate over the "best groin hernia repair"(1,2,3). Both the laparoscopic techniques is being practiced now routinely worldwide by experienced laparoscopic surgeon (3,8). (TEP) repair deals with the non-violation of the peritoneal cavity, with the procedure performed in the extra peritoneal space while (TAPP) deals with the advantage of adequate dissection in the preperitoneal space with a view of myopectineal orifice and at times identification of unsuspected contralateral hernia(2). Many studies have been published comparing the two laparoscopic procedures but the findings are contradictory, the various systematic reviews and meta-analysis results were similar to (TEP) and (TAPP) and the superiority of one over the other could not be demonstrated and remains unsettled(2,3).

This retrospective study compares the two procedures using various parameters;

1) duration of surgery
2) post-operative use of analgesics and pain
3) post-operative complications like seroma / hematoma formation
4) formation of subcutaneous emphysema
5) Duration of hospital stays and hernia recurrences.

METHODS

This retrospective study was conducted in a single surgical unit of the Department of Surgical Disciplines at B & C Medical College Teaching Hospital and Research Center, Jhapa, Nepal. Patients who had undergone laparoscopic repair of inguinal hernia between February 2018 and August 2021 were divided into either (TEP) or (TAPP) repair. The repairs were done by a single surgeon in a single surgical unit. The patients were divided into two groups: group I as (TEP) and group II as (TAPP). The patients with uncomplicated primary inguinal hernias were selected for the study. The overall mean age for the study was 47.7 ± 16.8 years (range = 15–74 years). The mean age for group I was 48.3 ± 14.9 years (range = 18–70 years) and that of group II was 47.1 ± 18.78 years (range = 15-74 years). There were only two female patients with inguinal hernia and they were included in group II. There was no statistically significant difference between the two groups in terms of age and sex distribution (p = 0.077).

Visual analogue score was used for pain score with 0 as no pain and 10 as the worst.

Complicated inguinal hernias (i.e; irreducible, obstructed and strangulated) and medically unfit patients for laparoscopy and general anaesthesia like coagulopathies and heart diseases were not included in the study.

Statistical Package for Social Science (SPSS) version 20 was used for statistical analysis. Both descriptive and inferential analysis was used during the process. The descriptive analysis included mean, standard deviation, frequency and percentage. Moreover, the inferential analysis included Fisher Exact test, chi-square test, independent sample t-test and Pearson's correlation. The level of significance was observed at P=0.05. The analyzed data are presented in tables and graphs.

RESULTS

Sixty consecutive patients with uncomplicated primary inguinal hernia were retrospectively studied and divided into two groups: group I was totally extraperitoneal (TEP) and group II was transabdominal preperitoneal (TAPP). Thirty patients were included in each group.

Table 1: Site of hernia:

	(TEP)%	(TAPP)%
Left	17(56.7)	14(46.7)
Right	13(43.3)	16(53.3)
Chi-square	0.63ns	

Out of total (TEP), 56.7% was performed on the left while 43.3% was done on the right side. Similarly, for (TAPP), 46.7% was performed on the left side and 53.3% was done on the right side. However, the association was not significantly different.

Table 2: Duration of surgery and pain score (6 hours, 24 hours and 48 hours).

	(TEP) Group I (n=30) (Mean ±SD)	(TAPP) Group II (n=30) (Mean ±SD)	P value
Duration (minutes)	92.80±8.24	111.03±13.71	0.000
Pain score at 6 hrs	6.97±1.01	8±0.00	0.000
Pain score at 24 hrs	4.27±0.70	5.18±1.00	0.000
Pain score at 48 hrs	2	2	---

The duration of surgery for (TAPP) was 111.03±13.71 minutes which was significantly higher than that of (TEP) (92.80±8.24 minutes) at P<0.001. Moreover, the pain score at 6 hours for (TEP) was 6.97±1.01 in comparison to 8±0.00 for (TAPP) (P<0.001). The pain score at 24 hours for (TAPP) was 5.18±1.00 in contrast to 4.27±0.70 for (TEP) (P<0.001). However, the pain score was the same for both groups at 48 hours.

Table 3: choice of (TEP) and (TAPP) among male and female patients.

	Male	Female
(TEP)	30(51.7)	0(0)
(TAPP)	28(48.3)	2(100)
Fisher Exact Test		Ns

*NS=Not Significant. The figure in the parenthesis includes the percentage.

Out of 58 male patients, 51.7% underwent (TEP) while 48.3% had undergone (TAPP). Only 2 female patients underwent (TAPP) while none of them had undergone (TEP0. However, Fisher Exact test revealed that the association was not significantly different.

Table 4: Correlation between operation time (minutes) and hospital stay (days) with pain score

	Pain score@ 6 hrs	Pain score @24 hrs	Pain score @ 48 hrs
Operation time	0.31*	0.45***	NA
Hospital stay	0.32*	-0.08NS	NA

*ns=not significant, NA=Not applicable, *=P<0.05, ***=P<0.001

The increase in operation time was significantly increasing the pain score at 6 hours and 24 hours. Moreover, an increase in pain scores at 6 hrs. was significantly correlated with the increase in the hospital stay

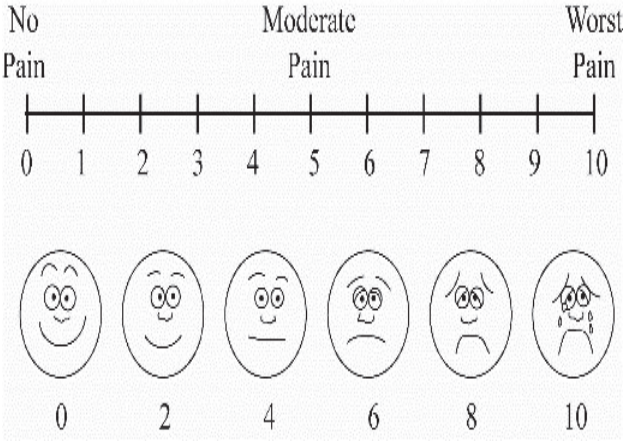

Figure 1: Visual Analogue Scale

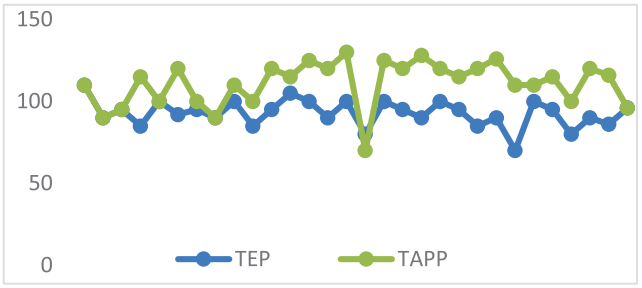

Figure 2: Duration for surgery.

Port placement in (TAPP)

Mesh placement in (TAPP)

Port placement in (TEP)

Figure 3: skin incisions and mesh placement

DISCUSSION

For laparoscopic inguinal hernia repair, it is controversial whether (TAPP) or (TEP) method is better. Both techniques are similar in the way that the mesh is placed in the pre-peritoneal area, but with different access methods. The complications and technical difficulties arise from this fundamental difference. In the literatures, it is seen that with both the techniques the recurrence rates decreased from the 90s to the 2000s because of the developed technology and increasing experience over time (4,5). Patel V. et al. reported that (TAPP) repair was associated with higher recurrence than (TEP) (3.16% vs. 0.61%, p=0.03) but only 24% of the cases (TAPP) n=140, (TEP) (n=22) consisted of unilateral hernias, where it was observed that no significant difference was found in terms of recurrences (6). In our study, there was no recurrence during the study period. In recurrent inguinal hernia repair, if the first operation is open, laparoscopic repair is recommended (7).The risk of visceral injury during trans-

abdominal access is higher in the (TAPP) method, while vascular injury are higher in the (TEP) method (8). Studies comparing both techniques reported different results in terms of complication rates. Köckerling F. et al. (9) reported that both the mean operative time (52.6 min vs. 48.5 min) and postoperative complication rates (3.97% vs. 1.7%) were higher in the (TAPP) while Gass M. et al. (7) reported that the (TEP) was associated with longer operative time (66.6 min vs. 59 min) and more complication rates (1.9% vs. 2.3%). In our study, the mean operative time was longer in the (TAPP) than in (TEP) (111 min vs. 93 min). The time spent during the opening and closing of the peritoneum in (TAPP) is the main reason for the longer operation time. Both the (TAPP) and (TEP) patients were discharged on the third postoperative day. In the study conducted by the Hernia aimed Study Group, in which a total of 17,587 patients were evaluated, the (TAPP) method was found to be associated with more postoperative seroma compared to (TEP) (3% vs. 0.5%, $p<0.001$(9). However, in our study only one case developed seroma in the (TEP) group which was managed with repeated aspirations in few weeks' time.In a recent study, chronic pain was detected in 6% of cases after laparoscopic hernia repair, and many predictive factors (female gender, young age, multifilament polyester mesh, etc.) were identified for the cause of pain (10). A systematic qualitative review of (TAPP) and (TEP) studies in which a total of 14,023 patients were included showed that there was no difference between the two techniques in terms of pain in the early postoperative period (11). Previous studies reported that pain felt in the early postoperative period in the (TEP) method may be a predictor of chronic pain, but no such relationship was observed in the (TAPP) method (12, 13). In a randomized controlled study, it was reported that there was more pain in the early postoperative period in the (TEP) method compared to (TAPP) (14), however, no comments have been made on the cause of this situation. In our study, the severity of pain was more in the early postoperative period in patients who underwent (TAPP), while the later postoperative pain rates were similar in both the methods.The possible reasons for (TAPP) might be intraoperative gas insufflation causing diaphragmatic irritation and more surgical manipulation due to the longer operation time. The mesh fixation techniques and the number and size of the incision (one 10mm and two 5mm trocars) are same in both procedures. For this reason, the difference in pain seen in the early period in our study might be due to pneumoperitoneum, but the current situation needs to be examined further because pain classification is not performed. In previous studies, more conversions were reported in the (TEP) method(4, 15), especially during the learning curve period as the anatomy, that the surgeons may not be familiar with and the narrow working area. In our study, the conversion to open was encountered in one case during (TEP) and one case was converted to (TAPP) from (TEP) due to the presence of severe pneumoperitoneum and loss of vision. The peritoneal rupture causes pneumoperitoneum and if effective control cannot be achieved this makes it difficult to dissect and lay the mesh because of narrow working area in (TEP). Initially, the insufflation of subcutaneous tissue with CO2 may cause the working area to shrink even more. In addition, excess adipose tissue can cause more bleeding during insertion and dissection, thus preventing working in the correct plane(16).The (TEP) is sometimes complicated by subcutaneous emphysema with acute rise of FETCO2 causing hypercarbia as insufflated CO2 can diffuse into the surrounding tissues. High insufflation pressures will increase the chance of this occurring and is the most likely cause of this complication (17-19). In our study we had 4 cases with (TEP) that developed subcutaneous emphysema, diagnosed with chest wall examination and palpation but none with (TAPP), so no comparative study was done. Because of this, it encouraged us to make recommendations for the management of (TEP) that included: monitoring of CO2 insufflation pressure, routine examination, palpation of chest wall, use of N2O with caution, adjusting ventilation to physiological FETCO2 and excluding other cause of subcutaneous emphysema and hypercarbia which needs further studies.

CONCLUSION

In our study, less early postoperative pain and shorter operation time were detected in patients who underwent (TEP). However, when both techniques are applied correctly, they appear to be acceptable and safe with similar clinical results. In studies comparing surgical techniques in surgery, the most critical reason affecting the results is the experience and technical skill among the surgeons performing the procedures. The choice of surgical technique should be personalized according to the patient, and the surgeons should apply the method they are accustomed to, that is, the one they know best.

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