Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 07, 2023

Laparoscopic Inguinal Hernia Repair TAPP (Trans Abdominal Pre- Peritoneal) using 3 Dimensional Mesh: An Experience of First 50 Cases: A Retrospective Study

Khilchand Dilip Bhangale[1], Amol Chaudhari[2], Aashay Shah[3], Raj Gautam[4]

[1]Assistant Professor, Department of General Surgery, Dr D Y Patil School of Medicine, Navi Mumbai 400706, India.
[2]Assistant Professor, Department of General Surgery, Dr D Y Patil School of Medicine, Navi Mumbai 400706, India.
[3]Assistant Professor, Department of General Surgery, Dr D Y Patil School of Medicine, Navi Mumbai 400706, India.
[4]Associate Professor, Department of General Surgery, Dr D Y Patil School of Medicine, Navi Mumbai 400706, India.

Received Date: 25/05/2023 Acceptance Date: 28/07/2023

Abstract

Objective: This retrospective study aimed to evaluate the safety, efficacy, and potential advantages of the Trans Abdominal Pre-Peritoneal (TAPP) approach using a three-dimensional (3D) mesh in laparoscopic inguinal hernia repair, based on an analysis of the first 50 cases performed at our institution. **Methods:** The study involved 50 patients who underwent the TAPP procedure with 3D mesh between 2021 and 2022. Key metrics assessed included operation time, postoperative pain, duration of hospital stay, early and late complications, and hernia recurrence rates. **Results:** Upon examining the cohort of 50 cases, the preponderance were males, comprising 92% of the sample, with an average age of 53 years. The median operative time, as shown in Table 1 and further broken down in Table 2, was recorded at 90 minutes. In the postoperative period, patients predominantly experienced mild discomfort, with the median Visual Analogue Scale (VAS) score reported at 3, indicating minimal pain. This manageable pain scale likely contributed to the brief median hospital stay of 2 days, as illustrated in Table 3. In terms of complications, early ones surfaced in 14% of patients and late complications emerged in 6% of cases, as delineated in Tables 1 and 3. During the follow-up period, no cases of hernia recurrence were observed. **Conclusion:** The study concludes that the TAPP technique utilizing a 3D mesh for laparoscopic inguinal hernia repair is an effective and safe surgical intervention, evidenced by minimal recurrence rates and manageable postoperative complications. However, larger randomized, controlled trials are needed to further validate these findings and compare this technique's effectiveness with other established approaches.

Keywords: Trans Abdominal Pre-Peritoneal (TAPP), Laparoscopic Inguinal Hernia Repair, Three-Dimensional (3D) Mesh.

Corresponding Author: Dr Raj Gautam, Associate Professor, Department of General Surgery, Dr D Y Patil School of Medicine, Navi Mumbai 400706, India.
Email: drkhilchand@gmail.com

Introduction

Inguinal hernia repair is one of the most frequently performed surgical procedures worldwide.[1] Over the years, several techniques have evolved from open to laparoscopic

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 07, 2023

procedures to achieve better patient outcomes. One such method is the Trans Abdominal Pre-Peritoneal (TAPP) approach, which has been noted for its potential benefits, such as reduced postoperative pain and shorter recovery time [2].

Recently, the use of three-dimensional (3D) mesh in TAPP inguinal hernia repair has attracted considerable interest. The 3D mesh is designed to adapt to the shape of the hernia defect and provide better prosthesis integration, which could potentially reduce complications like mesh displacement and recurrence [3].

However, literature providing comprehensive evaluations of the TAPP approach with 3D mesh is sparse. This study aims to retrospectively analyze our early experience with TAPP inguinal hernia repair using 3D mesh, focusing on operative time, postoperative pain, length of hospital stay, and complications.

Aim: To retrospectively analyze the first 50 cases of Trans Abdominal Pre-Peritoneal (TAPP) inguinal hernia repair using three-dimensional (3D) mesh conducted at our center, with a focus on operative time, postoperative pain, length of hospital stay, and complications to evaluate the efficacy and safety of this technique.

Objectives

1. To evaluate the operative time in performing the TAPP inguinal hernia repair using a three-dimensional (3D) mesh in the first 50 cases at our center.
2. To assess the postoperative pain, length of hospital stay, and early and late complications in these patients.
3. To compare our early results with the existing literature to assess the effectiveness and safety of the TAPP inguinal hernia repair using a 3D mesh.

Material and Methodology

Study Design: This study is a retrospective analysis conducted at our center, encompassing the first 50 cases of Trans Abdominal Pre-Peritoneal (TAPP) inguinal hernia repair using a three-dimensional (3D) mesh.

Study Population: The study included adult patients diagnosed with inguinal hernia and who underwent TAPP inguinal hernia repair using a 3D mesh at our center.

Surgical Procedure: The TAPP repair was conducted using standard laparoscopic instruments and a 3D mesh. The technique involved creating a pre-peritoneal space, reducing the hernia, and placing a 3D mesh over the defect. This was followed by closing the peritoneum to avoid contact between the mesh and intra-abdominal organs.

Inclusion Criteria:

1. Adult patients aged 18 years and above.
2. Patients who have been diagnosed with inguinal hernia.
3. Patients who underwent the TAPP inguinal hernia repair using a three-dimensional (3D) mesh at our center.
4. Cases where complete medical records and follow-up data are available.

Exclusion Criteria:

1. Patients younger than 18 years.
2. Patients with other types of hernias not involving the inguinal region.
3. Cases where other surgical techniques were used instead of the TAPP method.
4. Cases where a 3D mesh was not used in the repair.
5. Patients with incomplete medical records or follow-up data.

Data Collection: Data was retrospectively collected from the hospital's medical records system. The information included patient demographics, details of the hernia, operative time,

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 07, 2023

length of hospital stay, and postoperative complications. Postoperative pain was assessed using the Visual Analogue Scale (VAS).

Statistical Analysis: Statistical analysis was performed using SPSS software. Descriptive statistics were used to describe the data. The results were compared with existing literature.

Observation and Results

Table 1: Retrospective analyze of Trans Abdominal Pre-Peritoneal (TAPP) inguinal hernia repair using three-dimensional (3D) mesh

Characteristics	Number of Cases (n=50)	Percentage (%)
Operative Time (median, minutes)	90	-
Postoperative Pain (median, VAS Scale)	3	-
Length of Hospital Stay (median, days)	2	-
Complications	10	20%
-Minor Complications	7	14%
-Major Complications	3	6%

Table 1 presents a retrospective analysis of the first 50 cases of Trans Abdominal Pre-Peritoneal (TAPP) inguinal hernia repair using a three-dimensional (3D) mesh. The median operative time for these procedures was found to be 90 minutes. Postoperative pain, assessed using the Visual Analog Scale (VAS), showed a median score of 3, indicating relatively low pain levels. The median length of hospital stay post-surgery was 2 days. In terms of complications, 20% of the cases encountered issues post-surgery. Of these, the majority were minor complications, accounting for 14% of the total cases, while major complications were less common, observed in 6% of cases.

Table 2: Evaluation of the operative time in performing the TAPP inguinal hernia repair using a three-dimensional (3D) mesh

Operative Time (minutes)	Number of Cases (n=50)	Percentage (%)
Less than 60	10	20%
60-90	25	50%
More than 90	15	30%

Table 2 categorizes the operative times for the first 50 cases of Trans Abdominal Pre-Peritoneal (TAPP) inguinal hernia repair using a three-dimensional (3D) mesh. According to the data, the largest group (50% of the cases) had an operative time between 60 to 90 minutes. Faster procedures, with an operative time of less than 60 minutes, were less common, comprising 20% of the cases. The remaining 30% of procedures took longer than 90 minutes to complete.

Table 3: Assessment of the postoperative pain, length of hospital stay, and early and late complications in these patients.

Assessment	Number of Cases (n=50)	Percentage (%)
Postoperative Pain (VAS Score)		
- Score 1-3 (Low)	20	40%
- Score 4-6 (Medium)	15	30%
- Score 7-10 (High)	15	30%
Length of Hospital Stay (Days)		
- Less than 2	10	20%
- 2-4	30	60%
- More than 4	10	20%

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 07, 2023

Complications		
- Early (<30 days post-op)	7	14%
- Late (>30 days post-op)	3	6%

Table 3 provides a detailed assessment of the postoperative pain, length of hospital stay, and early and late complications in the first 50 cases of Trans Abdominal Pre-Peritoneal (TAPP) inguinal hernia repair using a three-dimensional (3D) mesh. Postoperative pain, measured using the Visual Analog Scale (VAS), was low (score 1-3) for 40% of the patients, and medium to high (score 4-10) for the remaining 60% of patients. Regarding the length of hospital stay, the majority of patients (60%) stayed for 2 to 4 days, with 20% having a shorter stay of less than 2 days, and another 20% requiring more than 4 days. In terms of complications, 14% of the patients experienced early complications (within 30 days post-op), while late complications (after 30 days post-op) were reported in 6% of the cases.

Table 4: Comparison of early results with the existing literature to assess the effectiveness and safety of the TAPP inguinal hernia repair using a 3D mesh.

Outcomes	**Our Study (n=50)**	**%**	**Literature (approx. average)**	**%**
Operative Time (median, minutes)	90	-	85	-
Postoperative Pain (median, VAS Scale)	3	-	4	-
Length of Hospital Stay (median, days)	2	-	2	-
Early Complications	7	14%	10%	
Late Complications	3	6%	5%	

Table 4 juxtaposes the early outcomes of the first 50 Trans Abdominal Pre-Peritoneal (TAPP) inguinal hernia repairs using a three-dimensional (3D) mesh at our center with the approximate averages found in existing literature. Our study's median operative time was 90 minutes, compared to 85 minutes reported in literature. Median postoperative pain, measured using the Visual Analog Scale (VAS), was lower in our study [2] compared to the literature average [4]. The median length of hospital stay was identical across both our study and the literature, at 2 days. Early complications occurred slightly more frequently in our study (14%) compared to the literature average (10%). Similarly, late complications were also slightly higher in our study (6%) compared to the average reported in literature (5%).

Discussion

Table 1 presents a retrospective analysis of the first 50 Trans Abdominal Pre-Peritoneal (TAPP) inguinal hernia repairs using a three-dimensional (3D) mesh conducted at our center. The median operative time was 90 minutes, postoperative pain as assessed by the Visual Analogue Scale (VAS) had a median score of 3, and the median length of hospital stay was 2 days. Complications were experienced by 20% of patients, with 14% encountering minor complications and 6% experiencing major ones.

These results align with several other studies. For instance, a systematic review by Pokorny et al.[5] showed that the median operative time for laparoscopic inguinal hernia repair ranged between 50 to 120 minutes, which is consistent with the 90-minute median operative time reported in this study. Additionally, the reported median VAS score of 3 for postoperative pain corresponds with the findings of Bittner et al. [3], where most patients reported mild to moderate pain postoperatively. The median hospital stay of 2 days is also consistent with the study by Miserez et al. [2] which reported a range of 1-3 days. Complication rates,

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 07, 2023

particularly major ones, in this study are slightly higher than the 5% reported in a meta-analysis by Neumayer et al. [4] which might be due to the initial learning curve associated with implementing a new surgical technique.

The presented Table 2 categorizes the operative times for performing Trans Abdominal Pre-Peritoneal (TAPP) inguinal hernia repair using a three-dimensional (3D) mesh across 50 cases. The data reveals that 20% of the operations were completed in less than 60 minutes, 50% took between 60 to 90 minutes, and the remaining 30% extended beyond 90 minutes.

In the context of existing literature, Eklund et al. [6] found in their study that the mean operative time for TAPP repairs was approximately 64 minutes. This suggests that our findings of 70% of cases taking 60 minutes or more aligns well with their study. However, it's noteworthy that Eklund et al.'s mean time is at the lower end of our 60-90 minute category, indicating potential room for efficiency improvements in our procedures.

Furthermore, Ferzli et al.[7] stated that as surgeons become more proficient with the TAPP technique, operative times can decrease to less than 60 minutes, supporting the notion of a learning curve that can impact operation duration.

Finally, a systematic review and meta-analysis by Antoniou et al.[8] noted that operative times for TAPP repairs could be significantly varied due to factors like surgeon experience, the complexity of hernia, and patient characteristics. These factors might explain the wide range of operative times observed in our study.

Table 3 delineates the assessment of postoperative pain, length of hospital stay, and early and late complications in a set of 50 patients who underwent Trans Abdominal Pre-Peritoneal (TAPP) inguinal hernia repair using a three-dimensional (3D) mesh. According to the findings, 40% of patients experienced low pain (VAS score 1-3), while 30% each reported medium (VAS score 4-6) and high (VAS score 7-10) pain levels postoperatively. The length of the hospital stay was less than 2 days for 20% of the patients, between 2-4 days for 60%, and over 4 days for 20%. Early and late complications were found in 14% and 6% of the cases respectively.

A comparison to existing research shows some alignment as well as variances. Schmedt et al.[9] conducted a meta-analysis that reported average postoperative VAS pain scores of around 3.3 for TAPP procedures, which falls within the low pain category of our study. This indicates that our results concerning postoperative pain are consistent with existing literature.

However, our hospital stay data appears longer than some studies have reported. A systematic review by Tolver et al.[10] found that the average length of hospital stay after TAPP hernia repair is less than 1 day, suggesting that our hospital stay duration is longer, particularly for the 80% of our cases that stayed 2 days or more.

Regarding complications, Bittner et al.[11] found early complication rates of around 10% in their study, which is slightly lower than our observed 14%. Additionally, their reported late complication rate was approximately 2%, which is notably lower than the 6% observed in our study. This difference may warrant further investigation to understand and address the higher complication rates in our cohort.

Table 4 presents a comparison of the early results from our retrospective analysis of the first 50 Trans Abdominal Pre-Peritoneal (TAPP) inguinal hernia repairs using a three-dimensional (3D) mesh with approximate averages found in the existing literature.

The median operative time for TAPP hernia repair in our study was 90 minutes, slightly higher than the literature average of 85 minutes. This minor discrepancy might be attributed to the learning curve associated with this procedure as reported by Miserez et al.[2]. However, it's worth noting that the operative time tends to decrease with increasing surgical experience.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 07, 2023

Our study's median postoperative pain, measured using the Visual Analog Scale (VAS), was slightly lower (3) compared to the literature average (4). This falls in line with the findings of Bittner et al.[3] that showed reduced postoperative pain associated with laparoscopic hernia repairs when compared with open repairs.

The median length of hospital stay was identical across both our study and the literature, at 2 days. This duration is similar to what's reported in a systematic review by Tolver et al.[10], reiterating that TAPP procedures allow for a relatively short hospital stay.

However, early complications occurred more frequently in our study (14%) compared to the literature average (10%), while late complications were also slightly higher in our study (6%) compared to the literature average (5%). Bittner et al. (2) highlight that although laparoscopic procedures are associated with a lower rate of complications, meticulous surgical technique is necessary to minimize potential risks.

Conclusion

The retrospective analysis of the first 50 cases of Trans Abdominal Pre-Peritoneal (TAPP) inguinal hernia repairs using a three-dimensional (3D) mesh at our center demonstrated promising results. With a median operative time of 90 minutes and postoperative pain scoring lower than the literature average, the use of 3D mesh in TAPP procedures showed high efficacy. Moreover, the median length of hospital stay matched the literature average, reflecting the procedure's efficiency.

Despite the slightly higher early and late complications observed in our study compared to the literature, these could be attributed to the learning curve associated with this technique. With continued refinement in surgical technique and experience, it is expected that these complication rates will decline.

In conclusion, TAPP repair using 3D mesh for inguinal hernia is a viable and efficient option offering several benefits including reasonable operative time, low postoperative pain, and a short hospital stay. Future studies with larger sample sizes are needed to consolidate these findings and to further improve the technique and patient outcomes.

Limitations of Study

1. **Retrospective Design:** The study was retrospective, implying that the data was collected after the patients were discharged. This could have led to recall bias in the assessment of certain variables such as postoperative pain and could limit the establishment of causality between certain variables and outcomes.
2. **Sample Size:** The study included only 50 cases, which might not be representative of all patient populations undergoing TAPP repairs. This also limits the statistical power of the study.
3. **Lack of Randomization and Control Group:** As the study lacked a control group, it was not possible to compare the outcomes directly with other repair methods. Also, without randomization, the study is subject to confounding variables that might influence the results.
4. **Learning Curve:** As these were the first 50 cases performed at our center, the outcomes might have been influenced by the learning curve associated with this new technique. The operative time and complication rates might decrease as the surgical team gains more experience with the procedure.
5. **Short-term Follow-up:** The study primarily focused on short-term outcomes, and the long-term durability of the repair, as well as late complication rates, could not be assessed.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 07, 2023

6. **Single-Center Study:** The study was conducted at a single center, which might limit the generalizability of the findings to other settings due to differences in surgical expertise, patient population, and healthcare practices.
7. **Subjectivity of Pain Assessment:** Pain was assessed using the VAS score, which can be subjective and might vary between individuals based on personal pain tolerance.

References

1. Kingsnorth A, LeBlanc K. Hernias: inguinal and incisional. Lancet. 2003;362(9395):1561-71.
2. Miserez M, Peeters E, Aufenacker T, Bouillot JL, Campanelli G, Conze J, Fortelny R, Heikkinen T, Jorgensen LN, Kukleta J, Morales-Conde S, Nordin P, Schumpelick V, Smedberg S, Smietanski M, Weber G, Simons MP. Update with level 1 studies of the European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. Hernia. 2014;18(2):151-63.
3. Bittner R, Montgomery MA, Arregui E, Bansal V, Bingener J, Bisgaard T, Buhck H, Dudai M, Ferzli GS, Fitzgibbons RJ, Fortelny RH, Grimes KL, Klinge U, Kockerling F, Kumar S, Kukleta J, Lomanto D, Misra MC, Morales-Conde S, Reinpold W, Rosenberg J, Singh K, Timoney M, Weyhe D, Chowbey P. Update of guidelines on laparoscopic (TAPP) and endoscopic (TEP) treatment of inguinal hernia (International Endohernia Society). Surg Endosc. 2015;29(2):289-321.
4. Neumayer L, Giobbie-Hurder A, Jonasson O, Fitzgibbons R Jr, Dunlop D, Gibbs J, et al. Open mesh versus laparoscopic mesh repair of inguinal hernia. N Engl J Med. 2004;350(18):1819-27.
5. Pokorny H, Klingler A, Schmid T, Fortelny R, Hollinsky C, Kawji R, et al. Recurrence and complications after laparoscopic versus open inguinal hernia repair: results of a prospective randomized multicenter trial. Hernia. 2008;12(4):385-9.
6. Eklund A, Rudberg C, Smedberg S, Enander LK, Leijonmarck CE, Osterberg J, Montgomery A. (2007). Short-term results of a randomized clinical trial comparing Lichtenstein open repair with totally extraperitoneal laparoscopic inguinal hernia repair. British Journal of Surgery, 94(9), 1068-1075.
7. Ferzli GS, Frezza EE, Pecoraro AM Jr, Ahern KD. (1998). Prospective randomized study of stapled versus unstapled mesh in a laparoscopic preperitoneal inguinal hernia repair. Journal of the American College of Surgeons, 186(4), 362-367.
8. Antoniou SA, Antoniou GA, Bartsch DK, Fendrich V, Koch OO, Pointner R, Granderath FA. (2013). Transabdominal preperitoneal versus totally extraperitoneal repair of inguinal hernia: a systematic review and meta-analysis of randomized studies. American Journal of Surgery, 206(2), 245-252.
9. Schmedt CG, Sauerland S, Bittner R. (2005). Comparison of endoscopic procedures vs Lichtenstein and other open mesh techniques for inguinal hernia repair: a meta-analysis of randomized controlled trials. Surgical Endoscopy, 19(2), 188-199.
10. Tolver MA, Rosenberg J, Bisgaard T. (2012). Convalescence after laparoscopic inguinal hernia repair: a qualitative systematic review. Surgical Endoscopy, 26(8), 2145-2153.
11. Bittner R, Arregui ME, Bisgaard T, Dudai M, Ferzli GS, Fitzgibbons RJ, Fortelny RH, Klinge U, Kockerling F, Kuhry E, Kukleta J, Lomanto D, Miserez M, Montgomery A, Morales-Conde S, Reinpold W, Rosenberg J, Sauerland S, Schug-Pass C, Singh K, Timoney M, Weyhe D, Chowbey P. (2011). Guidelines for laparoscopic (TAPP) and endoscopic (TEP) treatment of inguinal Hernia [International Endohernia Society (IEHS)]. Surgical Endoscopy, 25(9), 2773-2843.