



A comparative Study of open mesh plug repair through one-inch Incision versus laparoscopic TAPP technique for primary indirect inguinal Hernia

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Abstract

Background: Inguinal hernia repair is among the most commonly performed general surgical procedures. While laparoscopic trans-abdominal preperitoneal (TAPP) repair is well established, newer minimally invasive open techniques such as one-inch incision mesh plug repair are gaining interest due to potential advantages in simplicity, reduced operative time, and early recovery.

Objective: To compare the outcomes of one-inch incision mesh plug repair and laparoscopic TAPP repair in the management of primary indirect inguinal hernia with respect to operative time, postoperative pain, complications, and hospital stay.

Methods: This prospective comparative study was conducted in the Department of General Surgery, Major S. D. Singh Medical College, Farrukhabad, Uttar Pradesh, India, from Jan 2017 to December 2017. A total of 60 patients with unilateral primary indirect inguinal hernia were randomly assigned to undergo either open one-inch incision mesh plug repair (Group A, n = 30) or laparoscopic TAPP repair (Group B, n = 30). Operative details, postoperative pain scores, complications, and duration of hospital stay were recorded and analyzed.

Results: The mean operative time was significantly shorter in Group A (38 minutes) compared to Group B (64 minutes). Postoperative pain scores at 24 hours were lower in Group B. However, Group A patients had shorter hospital stays and earlier return to normal activity. Complication rates were comparable between the two groups. No recurrence was observed in either group during the follow-up period.

Conclusion: Both one-inch incision mesh plug repair and laparoscopic TAPP are safe and effective techniques for the repair of primary indirect inguinal hernia. The open approach offers advantages of shorter operative time and faster discharge, while the laparoscopic approach results in less early postoperative pain. Selection of technique should be based on surgeon expertise, patient preference, and available resources.

Keywords: Inguinal Hernia, Mesh Plug Repair, Laparoscopic TAPP, One-Inch Incision, Hernia Recurrence, Postoperative Pain, Surgical Outcomes

Introduction

Inguinal hernia is one of the most prevalent surgical conditions worldwide and accounts for a significant proportion of general surgical workload. Primary indirect inguinal hernias are particularly common in adult males, with a variety of surgical techniques available for repair [1]. The objective of any hernia repair procedure is to achieve a tension-free closure of the defect, minimize recurrence, and ensure rapid postoperative recovery with minimal complications [2].

The evolution of hernia surgery has seen a gradual shift from traditional tissue-based repairs to mesh-based tension-free techniques. The Lichtenstein repair established the efficacy of open mesh repair and reduced recurrence rates significantly [3]. In recent decades, laparoscopic techniques, particularly trans-abdominal preperitoneal (TAPP) and totally extraperitoneal (TEP) repairs, have become standard options in many surgical centers. These approaches offer advantages such as reduced postoperative pain, faster recovery, and excellent cosmetic results. However, they require general anesthesia, specialized equipment, and a steeper learning curve [4].

In contrast, open techniques continue to evolve with a focus on minimally invasive approaches that retain the simplicity

of conventional repair but reduce tissue trauma and enhance recovery. One such technique is the one-inch incision mesh plug repair, which involves a small inguinal incision through which a mesh plug is inserted into the hernia defect. This method is designed to minimize operative trauma, reduce pain, shorten operative time, and facilitate early discharge while maintaining the principles of tension-free repair [5, 6].

Despite the growing popularity of both laparoscopic and refined open methods, there is limited direct comparative data between one-inch incision mesh plug repair and laparoscopic TAPP repair for primary indirect inguinal hernia. Such a comparison is particularly relevant in settings where resources are limited, and cost-effectiveness is a consideration. Moreover, patient outcomes such as operative time, postoperative pain, complications, hospital stay, and early ambulation are critical metrics that guide the selection of surgical technique [7].

This prospective comparative study was conducted at the Department of General Surgery, Major S. D. Singh Medical College, Farrukhabad, Uttar Pradesh, India, to evaluate and compare the outcomes of one-inch incision mesh plug repair versus laparoscopic TAPP repair in patients with primary unilateral indirect inguinal hernia. A total of 60 patients

were enrolled over a Jan 2017 to December 2017. The aim was to assess and compare the operative duration, postoperative pain, complication rates, length of hospital stay, and recurrence between the two approaches.

Materials and Methods

This prospective comparative study was conducted in the Department of General Surgery at Major S. D. Singh Medical College, Farrukhabad, Uttar Pradesh, India, Jan 2017 to December 2017. The objective was to compare the surgical outcomes of two different techniques for the repair of primary unilateral indirect inguinal hernia: one-inch incision mesh plug repair and laparoscopic trans-abdominal preperitoneal (TAPP) repair.

A total of 60 adult male patients diagnosed with unilateral primary indirect inguinal hernia were included in the study. All patients were clinically evaluated and confirmed with a diagnosis based on physical examination. Routine preoperative investigations, including abdominal ultrasound and relevant blood tests, were performed. Patients with recurrent hernias, bilateral hernias, strangulated or obstructed hernias, or significant comorbidities were excluded from the study. Patients were randomly allocated into two equal groups of 30 each. Group A underwent open mesh plug repair through a one-inch groin incision, while Group B underwent laparoscopic TAPP repair under general anesthesia. Randomization was achieved using sealed envelope allocation.

In Group A, patients were operated under spinal anesthesia. A one-inch inguinal incision was made directly over the hernia site. The hernial sac was identified, dissected, and reduced, followed by the placement of a polypropylene mesh plug into the defect. A flat onlay mesh was also positioned over the posterior wall and fixed with non-absorbable sutures. The wound was closed in layers.

In Group B, standard TAPP repair was performed under general anesthesia. Pneumoperitoneum was established, and three-port access was used. The peritoneum was incised, the hernia sac reduced, and a polypropylene mesh was placed in the preperitoneal space to cover the myopectineal orifice. The peritoneum was closed over the mesh using absorbable sutures. Operative parameters such as duration of surgery, intraoperative complications, and blood loss were noted. Postoperative pain was assessed using a visual analogue scale (VAS) at 6, 12, and 24 hours after surgery. Patients were monitored for complications including wound infection, hematoma, seroma, urinary retention, and scrotal edema. Length of hospital stay and time to return to normal activity were recorded.

All patients were followed up at regular intervals for three months postoperatively to evaluate for recurrence or chronic pain. Data were collected in a predesigned proforma and analyzed using descriptive statistics. Continuous variables were expressed as mean and range, while categorical variables were presented as frequencies and percentages. Statistical comparison between groups was performed using the chi-square test and unpaired t-test, with a p-value less than 0.05 considered statistically significant.

Results

A total of 60 patients with unilateral primary indirect inguinal hernia were enrolled in the study and randomly allocated into two equal groups. Group A underwent one-inch incision mesh plug repair, and Group B underwent laparoscopic TAPP repair. The outcomes were compared

based on demographics, intraoperative variables, postoperative pain, complications, hospital stay, and recovery.

Table 1 presents the age distribution of patients in both groups, showing comparable age profiles.

Table 1: Age Distribution of Patients in Both Groups

Age Group (years)	Group A (n = 30)	Group B (n = 30)
18-30	6	5
31-40	10	9
41-50	8	7
51-60	4	5
>60	2	4
Total	30	30

Table 2 compares the mean operative time, revealing significantly shorter duration in the open group.

Table 2: Mean Operative Time

Parameter	Group A	Group B
Mean operative time (min)	38	64

Table 3 compares postoperative pain using VAS at 6, 12, and 24 hours. Group B had lower pain scores initially.

Table 3: Postoperative Pain Scores (VAS)

Time Post-op	Group A (Mean ± SD)	Group B (Mean ± SD)
6 hours	6.2 ± 1.1	4.8 ± 1.0
12 hours	5.1 ± 1.0	3.5 ± 0.9
24 hours	3.2 ± 0.8	2.6 ± 0.7

Table 4 shows the distribution of patients based on duration of hospital stay, which was shorter in Group A.

Table 4: Duration of Hospital Stay

Duration (days)	Group A (n)	Group B (n)
≤1	20	8
2-3	9	15
>3	1	7
Total	30	30

Table 5 outlines the time taken to return to normal activity. Group A had a faster return.

Table 5: Time to Resume Normal Activity

Time (days)	Group A (n)	Group B (n)
≤5	22	10
6-10	7	16
>10	1	4
Total	30	30

Table 6 presents intraoperative complications, which were minimal and comparable between groups.

Table 6: Intraoperative Complications

Complication	Group A (n)	Group B (n)
Bleeding	1	2
Peritoneal injury	0	1
None	29	27

Total	30	30
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Table 7 lists postoperative complications, with wound-related issues more common in Group A and shoulder pain in Group B.

Table 7: Postoperative Complications

Complication	Group A (n)	Group B (n)
Wound infection	2	0
Seroma	1	2
Scrotal edema	1	1
Shoulder pain	0	4
Urinary retention	1	1
None	25	22

Table 8 compares cosmetic satisfaction, with both groups reporting high satisfaction, slightly higher in Group B.

Table 8: Cosmetic Outcome (Patient-Reported Satisfaction)

Outcome	Group A (n)	Group B (n)
Very satisfied	21	24
Satisfied	8	6
Dissatisfied	1	0
Total	30	30

Table 9 shows recurrence at 3-month follow-up. No recurrences were noted in either group.

Table 9: Hernia Recurrence at 3 Months

Recurrence Status	Group A (n)	Group B (n)
No recurrence	30	30
Recurrence	0	0

Table 10 summarizes overall outcomes, including pain, discharge timing, and complication status.

Table 10: Summary of Outcomes

Outcome Parameter	Group A	Group B
Shorter operative time	Yes	No
Less postoperative pain	No	Yes
Shorter hospital stay	Yes	No
Early return to work	Yes	No
Overall complications	Low (wound-related)	Low (seroma/shoulder pain)

Discussion

Inguinal hernia repair remains one of the most frequently performed surgical procedures worldwide, with continuous evolution in technique aiming to minimize complications, enhance recovery, and reduce recurrence [8]. This study compared two distinct approaches for primary unilateral indirect inguinal hernia: the one-inch incision mesh plug repair and the laparoscopic trans-abdominal preperitoneal (TAPP) technique. The findings provide insight into the comparative advantages and limitations of these techniques in a controlled, prospective setting [9].

The age and demographic distribution of patients in both groups were comparable, with the majority falling within the 30–50-year range, a typical demographic for primary inguinal hernia. All participants were adult males, which reflects the higher prevalence of inguinal hernia in this population due to anatomical predisposition [10].

The operative duration was significantly shorter in the open mesh plug repair group, with a mean time of 38 minutes compared to 64 minutes in the laparoscopic group. This difference is expected, as the open approach is more straightforward and does not involve pneumoperitoneum or intracorporeal suturing. Shorter operative times are especially beneficial in high-volume or resource-limited centers [11]. Postoperative pain assessment showed lower VAS scores in the TAPP group, particularly within the first 24 hours. This is consistent with literature suggesting that laparoscopic techniques are associated with less tissue trauma and hence reduced early postoperative discomfort. However, the difference in pain scores diminished by 24 hours, with both groups reporting mild discomfort [12].

Hospital stay was notably shorter in the open group, with two-thirds of patients discharged within 24 hours. The TAPP group had longer admissions, likely due to general anesthesia, port-related discomfort, or delayed bowel activity. Additionally, patients in the open group returned to normal activities earlier, a factor of relevance in socioeconomically active patients seeking early resumption of daily life or employment [13].

The complication profile was acceptable in both groups. Minor wound infections and scrotal edema were observed in the open group, whereas seroma formation and shoulder tip pain due to pneumoperitoneum were noted in the TAPP group. These were managed conservatively. No major intraoperative complications occurred. The recurrence rate in both groups was nil at three-month follow-up, although longer surveillance is necessary for definitive conclusions [14].

Cosmetic satisfaction was high in both groups, marginally higher in the TAPP group due to smaller trocar scars. However, the one-inch incision of the open method was also well-accepted cosmetically and did not appear to influence overall patient satisfaction adversely [15].

While laparoscopic hernia repair offers advantages in terms of postoperative pain and cosmesis, it requires general anesthesia, longer operative time, and specialized training. On the other hand, the one-inch incision mesh plug repair, performed under spinal anesthesia with limited dissection, proved to be an efficient and cost-effective technique with acceptable short-term outcomes.

Conclusion

Both one-inch incision mesh plug repair and laparoscopic TAPP repair are safe and effective techniques for the surgical management of primary indirect inguinal hernia. The open one-inch approach offers advantages in terms of shorter operative time, earlier discharge, and faster return to routine activities, making it particularly suitable in resource-constrained settings. The laparoscopic TAPP technique, while requiring more operative time and technical expertise, results in less early postoperative pain and slightly better cosmetic outcomes. Selection of the surgical method should be individualized, considering patient preference, surgeon experience, and institutional capabilities.

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