

Comparative study of open onlay mesh repair versus laparoscopic intraperitoneal dual mesh repair for ventral hernia



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ABSTRACT

Background: Ventral abdominal wall hernia surgery is a common procedure in the armamentarium of surgeons. The most common forms of these surgical procedures in adults are the repair of incisional hernias and surgery for paraumbilical hernias. **Aims and Objectives:** Open onlay mesh repair versus laparoscopic intraperitoneal dual mesh repair (intraperitoneal onlay mesh [IPOM]) for ventral hernia compared to the duration of surgery, post-operative pain, post-operative complications, post-operative hospital stay, return to normal activity, recurrence, and cosmesis. **Materials and Methods:** The prospective non-randomized study was done in the Maharani Laxmi Bai Medical College, Jhansi, between January 2021 and June 2022 including 100 patients was applied for treatment of ventral hernia repair. Fifty patients were subjected to Group A (open onlay mesh repair) and 50 patients were subjected to Group B (laparoscopic intraperitoneal dual mesh repair). **Results:** The mean surgery durations were significantly lower in laparoscopic repair when compared to open repair ($P < 0.001$). The mean post-operative stay in the hospital was shorter for the laparoscopic group than for the open hernia group (10.28 ± 2.100 vs. 8.02 ± 1.378 days; $P \leq 0.001$). Return to activity or normal daily work is significantly lower in the laparoscopic group as compared to open repair of hernia (5.12 ± 0.659 vs. 2.94 ± 0.550 days; $P < 0.001$). There were fewer post-operative complications with laparoscopy. **Conclusion:** Laparoscopic intraperitoneal dual mesh repair (IPOM) for ventral hernia in our experience was safe and resulted in fewer complications, shorter hospital stays, and better cosmesis results. Hence, it should be considered the better choice for ventral hernia repair.

Key words: Laparoscopic ventral hernia repair; Incisional hernia; PPOM; IPOM-plus

INTRODUCTION

Ventral abdominal wall hernia surgery is a common procedure in the armamentarium of surgeons. The most common forms of these surgical procedures in adults are the repair of incisional hernias and surgery for paraumbilical hernias. Incisional hernias after previous abdominal surgeries occur in a varying range, reported from 11% to 20%.¹

Laparoscopic repair of such hernias has the advantage of shorter hospital stay, lower wound infection, earlier recovery, and recurrence rates $< 5\%$.² Paraumbilical

hernias compromise 10–12% of abdominal wall hernias. As compared to open repair, laparoscopic repair of adult paraumbilical hernias has also shown favorable outcomes.³

Since its first description in 1993, laparoscopic repair of ventral hernias is gaining acceptance and becoming more popular by the day worldwide.⁴

However, the standard laparoscopic repair of ventral hernias consisted of bridging the defect from the peritoneal side with a composite mesh, known as the intra-peritoneal onlay mesh (IPOM) repair, which is the placement of the mesh in the underlay position through the laparoscopic

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intraperitoneal approach. Such repair is associated with a significant incidence of post-operative bulging or eventration of mesh, seromas, recurrences, and non-restoration of abdominal muscle function.⁵

Aims and objectives

- Open onlay mesh repair versus laparoscopic intraperitoneal dual mesh repair (IPOM) for ventral hernia compared to the duration of surgery, post-operative pain, post-operative complications, post-operative hospital stay, return to normal activity, recurrence, and cosmesis.

MATERIALS AND METHODS

Ethical

Ethical committee approval will be duly taken. Data were collected in the department of general surgery from the bedside tickets of the patients after taking a short history and informed consent from the patient.

Source of data

The prospective non-randomized study was done in Maharani Laxmi Bai Medical College, Jhansi, between January 2021 and June 2022 including that 100 patients were applied for treatment of ventral hernia repair. Fifty patients were subjected to Group A (open onlay mesh repair) and 50 patients were subjected to Group B (laparoscopic intraperitoneal dual mesh repair [IPOM]).

Inclusion criteria

Patients presenting with midline ventral hernias who will be managed in our hospital with mesh repair were included after obtaining written consent.

Exclusion criteria

- Not given written consent
- Hernia after cesarean section
- Hernia after open appendicectomy
- Spigelian hernia
- Lumbar hernia
- Obstructed hernia.

Procedure for open onlay mesh repair

All patients are operated under spinal/general anesthesia. Foley catheterization and a nasogastric tube were occasionally used. In onlay repair, polypropylene mesh was sutured over the anterior rectus sheath, whereas in the inlay technique, the mesh was placed in the preperitoneal space. The mesh was fixed with non-absorbable sutures. The anterior rectus sheath was closed over the mesh by non-absorbable sutures. A suction drain was placed in a few cases based on the surgeon's choice.

Procedure for laparoscopic intraperitoneal dual mesh repair (IPOM)

All the patients were operated under general anesthesia. The nasogastric tube was placed for the upper abdominal hernia and a Foley catheter for the lower abdominal hernias. Both were removed after the procedure on the operating table. The operating surgeon stands to the left of the patient with the cameraman on his right or left depending on the location of the hernia. Pneumoperitoneum established by veres needle in palmer's point. Adhesiolysis was done using sharp dissection or monopolar diathermy. The defect delineated and size was measured intracorporeally. The size of the mesh required was also assessed. The area to be covered by the mesh was marked after the pneumoperitoneum was released and the sites for transfacial sutures were marked with the defect at its center. The mesh was prepared; two non-absorbable ethilon sutures were placed on either side at the upper end along with two polypropylene sutures at the opposite end. This was done for easy identification based on the color difference. The mesh was anchored with the use of a spinal or cobbler needle. In some cases, we also used tackers in a double-crown fashion. A compression dressing was done over the defect.

Statistical analysis

The data were summarized as mean values with standard deviations (SD). The statistical analysis was performed using Student's t-test and Chi-square. The SPSS 21.0 for Windows computer software (SPSS Inc., Chicago, IL) was used for statistical analysis. $P < 0.05$ was considered significant.

RESULTS

The present study was conducted following Institutional Ethical Committee approval and written informed consent on 50 patients who were randomly divided into two groups (Table 1).

- Group A: Open onlay mesh repair (n=50)
- Group B: Intraperitoneal dual mesh repair (IPOM) (n=50)

Demographically age and gender in both the groups were comparable with $P \geq 0.05$ (NS), the mean age (in years) in Group A (open onlay mesh repair) was 49.84 ± 15.038 and Group B (intraperitoneal dual mesh repair) was 47.1 ± 16.011 , there was no significant difference between the two groups based on mean age distribution ($P = 0.37$) (Tables 2 and 3).

Mean surgery durations were significantly lower in laparoscopic repair when compared to open repair ($P < 0.001$) (Table 4). The mean post-operative stay in the hospital was shorter for the laparoscopic group than for the open hernia group (10.28 ± 2.100 vs. 8.02 ± 1.378 days;

Table 1: Age-wise distribution in our study

Age (in years)	Group A (open onlay mesh repair)		Group B (intraperitoneal dual mesh repair)	
	n	%	n	%
18–30	07	14.00	08	16.00
31–40	09	18.00	13	26.00
41–50	05	10.00	03	06.00
51–60	19	38.00	12	24.00
>60	10	20.00	14	28.00
Total	50	100	50	100

Table 2: Mean age-wise distribution in our study

Mean age (in years)	Group A (Open onlay mesh repair)	Group B (intraperitoneal dual mesh repair)	P-value
Mean±SD	49.84±15.038	47.1±16.011	0.37 (NS)

Table 3: Sex-wise distribution in our study

Sex (in years)	Group A (Open onlay mesh repair)		Group B (Intraperitoneal dual mesh repair)	
	n	%	n	%
Male	27	54.00	33	66.00
Female	23	46.00	17	34.00
Total	50	100	50	100

Table 4: Mean duration of surgery (in minutes) in our study

Mean duration of surgery (in minutes)	Group A (Open onlay mesh repair)	Group B (Intraperitoneal dual mesh repair)	P-value
Mean±SD	59.70±4.092	74.12±7.076	0.0001 (S)

P≤0.001) (Table 5). Return to activity or normal daily work is significantly lower in the laparoscopic group as compared to open repair of hernia (5.12±0.659 vs. 2.94±0.550 days; P<0.001) (Table 6). There were fewer post-operative complications with laparoscopy (Table 7).

DISCUSSION

The present study was conducted following institutional ethical committee approval and written informed consent on 50 patients who were randomly divided into two groups.

- Group A: Open onlay mesh repair (n=50)
- Group B: Intraperitoneal dual mesh repair (IPOM) (n=50).

Duration of surgery

In our study, mean duration of surgery was 59.70±4.092 min in Group A (open onlay mesh repair) whereas in Group B

Table 5: Mean hospital stay (in days) in our study

Mean hospital stay (in days)	Group A (Open onlay mesh repair)	Group B (Intraperitoneal dual mesh repair)	P-value
Mean±SD	10.28±2.100	8.02±1.378	0.0001 (S)

Table 6: Mean return to normal activity (in day)

Return to normal activity	Group A (Open onlay mesh repair)	Group B (Intraperitoneal dual mesh repair)	P-value
Mean±SD	5.12±0.659	2.94±0.550	0.0001 (S)

Table 7: Post-operative complication in our study

Post-operative complication	Group A (Open onlay mesh repair)		Group B (Intraperitoneal dual mesh repair)	
	n	%	n	%
Pain	17	34.00	12	24.00
Ileus	4	08.00	01	02.00
Seroma formation	14	28.00	07	14.00
Mesh infection	6	12.00	02	04.00
Hematoma form	0	00.00	0	00.00

The Chi-square statistic is 22.904. The P value is <0.00001. Significant at P<0.05

(intraperitoneal dual mesh repair), duration was found to be 74.12±7.076 min, the difference was seen to be significant with P=0.0001 (NS).

A similar result was also observed in the study of Loh et al.,⁶ where was statistical difference between the operative time for open IPOM repair group was 59±17 min and the Laparoscopic IPOM repair group was 74±26 min (P≤0.0001).

Sinha et al.,⁷ study entitled “A comparative study on IPOM repair versus open onlay mesh repair for ventral hernia” 30 patients in IPOM repair and 30 patients in open onlay mesh repair). The mean duration of surgery in Group 1 was 77.90±11.12 min and in Group 2 was 120.77±21.98 min. The difference was found to be statistically significant (P=0.001).

However, Lomanto et al.,⁸ conducted a study of laparoscopic versus open ventral hernia mesh repair: a prospective study in which a total of 100 patients, where the difference between the operating time for open IPOM repair group was no statistical was 93.32 min and Laparoscopic IPOM repair group was 93.60 min (P≥0.05).

Visual analog scale (VAS) pain

In our study, the majority of the patients in Group B (intraperitoneal dual mesh repair) had less post-operative

pain as compared to Group A (open onlay mesh repair) on day 1 was 4.92 ± 0.877 versus 4.54 ± 0.579 ($P=0.001$), day 2–5 was 2.7 ± 0.789 versus 2.2 ± 1.212 ($P=0.001$), and day 6–7 days was 1.72 ± 0.497 versus 0.62 ± 0.490 ($P=0.0001$) (Table 8).

A similar result was also observed by Kumar et al.,⁹ in the study, where the mean post-operative pain in terms of VAS was significantly ($P=0.001$) lower among the patients of laparoscopic repair (3.11 ± 1.12) than open repair (5.20 ± 1.56).

Sinha et al.,⁷ study entitled “A comparative study on IPOM repair versus open onlay mesh repair for ventral hernia” 30 patients in IPOM repair and 30 patients in open onlay mesh repair. The mean VAS in Group 1 was 3.80 ± 1.06 and in Group 2 was 5.27 ± 0.74 . The difference was found to be statistically significant ($P=0.001$). The mean VAS was significantly higher in Group 2 patients in comparison to Group.

A similar result was also observed by Lomanto et al.,⁸ the pain score was similar in the two groups at 24 and 48 h, but significantly less at 72 h in the laparoscopic group.

Post-operative complication

The pain was seen in 17 (34%) patients in Group A (open onlay mesh repair) and 12 (24%) in Group B (intraperitoneal dual mesh repair). Ileus was seen in Group A was 4 (8%) patients and in Group B was 1 (2%) patients. Seroma formation was in 8 (25%) patients of Group A and in Group B was 7 (14%) patients. Mesh infection seen in Group A was 6 (12%) patients and in Group B was 2 (4%) patients. The post-operative complication was significantly higher in the Group B (intraperitoneal dual mesh repair) patients in comparison to Group A (open onlay mesh repair) patients ($P>0.0001$).

A similar result was also observed by Kumar et al.,⁹ in the study where was the post-operative complication, hematoma formation was in 6.7% of patients of the open group and was nil in laparoscopic group, and seroma formation was in 10% of patients of open group and 3.3% of laparoscopic. However, the difference was statistically insignificant ($P>0.05$).

Cosmesis score

In our study, the mean cosmesis score in Group A (open onlay mesh repair) was 8.26 ± 1.046 and in Group B (intraperitoneal dual mesh repair) 4.06 ± 0.767 . However, the difference was highly statistically significant ($P>0.0001$) (Table 9). These results were comparable with the results reported by Lomanto et al.,⁸ which observed mean cosmesis score in open group was 4.99 and in laparoscopy group was 1.71 ($P=0.001$).

Table 8: Mean VAS pain in our study

Mean VAS pain	Group A (Open onlay mesh repair)	Group B (Intraperitoneal dual mesh repair)	P-value
Day 1	4.92 ± 0.877	4.54 ± 0.579	0.01 (S)
Day 2–5	2.7 ± 0.789	2.2 ± 1.212	0.01 (S)
Day 6–7	1.72 ± 0.497	0.62 ± 0.490	0.0001 (S)

VAS: Visual analog scale

Table 9: Cosmesis score

Mean cosmesis score	Group A (Open onlay mesh repair)	Group B (Intraperitoneal dual mesh repair)	P-value
Mean±SD	8.26 ± 1.046	4.06 ± 0.767	0.0001

Table 10: Recurrence in our study

Post-operative complication	Group A (Open onlay mesh repair)		Group B (Intraperitoneal dual mesh repair)	
	n	%	n	%
Present	3	6.00	0	0.00
Absent	47	94.00	50	100
Total	50	100	50	100

Hospital stay (in days)

In our study, the mean hospital stay (in days) for Group A (open onlay mesh repair) was 10.28 ± 2.100 days and for Group B (intraperitoneal dual mesh repair) was 8.02 ± 1.378 days. This difference was found to be statistically significant with $P=0.0001$. These results were comparable with the results reported by Sinha et al.,⁷ Kumar et al.,⁹ and Thota et al.¹⁰

Recurrence

In our study, recurrence in Group A (open onlay mesh repair) was 3 (6%) patients and no patients of Group B (intraperitoneal dual mesh repair) (Table 10). These results were comparable with the results reported by Loh et al.⁶

Return to normal activity

In our study, the mean return to normal activity (in days) in Group A (open onlay mesh repair) was 5.12 ± 0.659 days, and in Group B (intraperitoneal dual mesh repair) was 2.94 ± 0.550 days. This difference was found to be statistically significant with $P=0.0001$.

Rubby et al.¹¹ found in their study that patients operated with laparoscopy returned to daily activities within 10 days of surgery, whereas it took 22 days for the patients in open group.

Limitations of the study

This was a single-centered study.

CONCLUSION

The findings demonstrate that laparoscopic intraperitoneal dual mesh repair (IPOM) for ventral hernia in our experience was safe and resulted in fewer complications, shorter hospital stays, and better cosmesis results. Hence, it should be considered the better choice for ventral hernia repair.

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