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***Original Research Article***

# COMPARATIVE STUDY OF SURGICAL OUTCOME OF ANATOMICAL VERSUS MESH REPAIR OF VENTRAL ABDOMINAL HERNIA

**NASEEM U*, ALI Z, AFZAL MS, FARHAN M, RIAZ MH, NAZIR CA**

*Department of Surgery, Aziz Bhatti Shaheed Teaching Hospital, Gujrat, Pakistan*
**Corresponding author email address:* umairmalik496@gmail.com

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## ABSTRACT

***Background:*** *Ventral abdominal hernia repair remains a frequent surgical challenge, with ongoing debate over the optimal repair technique. While mesh repair has been associated with reduced recurrence rates, its utilization in low-resource settings such as Pakistan warrants contextual assessment. This study compared surgical outcomes, postoperative complications, and patient comfort following anatomical versus mesh repair of ventral abdominal hernias.* ***Objective:*** *To evaluate and compare operative efficiency, postoperative pain, and short-term complications between anatomical and mesh repair techniques for ventral abdominal hernias.* ***Study Design:*** *Randomized controlled trial.* ***Settings:*** *Department of Surgery, Aziz Bhatti Shaheed Teaching Hospital, Gujrat, Pakistan.* ***Duration of Study:*** *March 29, 2025, to June 29, 2025.* ***Methods:*** *A total of 160 patients aged 20–70 years presenting with ventral hernia defects ≤2 cm were randomly allocated into two equal groups: Group A (anatomical repair) and Group B (mesh repair). Demographic characteristics, operative time, postoperative pain (assessed using the Visual Analogue Scale at 24 hours), and early postoperative complications (seroma, hematoma, wound infection within 15 days) were recorded. Data were analyzed using SPSS version 25, and p-values <0.05 were considered statistically significant.* ***Results:*** *The mean patient age was 43.6 ± 11.7 years, with 60% males and a mean BMI of 27.3 ± 2.8 kg/m². The mean operative time was significantly shorter in the mesh repair group (55.2 ± 6.8 minutes) compared to the anatomical repair group (63.4 ± 7.1 minutes; $p < 0.001$). Mild-to-moderate postoperative pain was observed in 30% of mesh repair patients versus 65% in anatomical repair patients ($p < 0.001$). The overall complication rate was slightly lower in the mesh group (16.3%) than in the anatomical group (21.3%; $p = 0.37$), although seroma formation was more common following mesh repair (10% vs 3.8%; $p = 0.10$). Composite favorable outcomes—defined as operative time ≤60 minutes, mild-to-moderate pain, and absence of complications—were significantly higher in the mesh repair group (80%) compared to the anatomical repair group (55%; $p = 0.002$).* ***Conclusion:*** *Mesh repair of ventral abdominal hernias ≤2 cm offers superior operative efficiency and improved postoperative comfort with comparable complication rates to anatomical repair. Despite a slightly increased incidence of seroma, mesh repair represents a more effective and patient-satisfactory approach in tertiary care settings of Pakistan.*

**Keywords:** Ventral Hernia; Mesh Repair; Anatomical Repair; Postoperative Outcomes; Randomized Controlled Trial; Pakistan

## INTRODUCTION

The management of ventral abdominal hernias presents a significant challenge in surgical practice, prompting ongoing exploration of the most effective repair techniques. Ventral hernias, which occur in the anterior abdominal wall, encompass various types such as umbilical, epigastric, and incisional hernias. Surgical interventions for these conditions have evolved, most notably through the advent of mesh repair techniques that aim to reduce recurrence rates and improve patient outcomes. Historically, the primary approach to hernia repair involved suturing techniques; however, the introduction of synthetic mesh enabled greater reinforcement, transforming the surgical landscape for hernia management (1-3).

Recent literature indicates a significant trend toward minimally invasive techniques, particularly laparoscopic and robotic-assisted surgeries, which have been associated with shorter hospital stays, faster recovery times, and lower rates of postoperative complications compared with traditional open repair methods (1-4). For instance, a multicenter randomized controlled trial highlighted the potential of robotic hernia repair to reduce pain and shorten recovery time, underscoring its viability as an alternative to both open and laparoscopic maintenance (2, 4). However, the clinical community remains divided on whether these outcomes justify the increased costs associated with robotic techniques (5, 6).

Mesh placement techniques, including onlay and sublay methods, also play a critical role in determining surgical outcomes. The placement of mesh in the sublay position may offer superior results in terms of complications and recurrence rates (7, 8). A systematic review and meta-analysis suggest that the choice of mesh placement significantly influences patient-reported outcomes and long-term quality of life after surgery (9, 10). Moreover, there is ongoing debate regarding the optimal type of mesh and fixation techniques, with some studies suggesting that newer materials and methods may offer lower complication rates (10, 11).

The importance of patient-centered outcomes is increasingly recognized, with emphasis placed on recovery quality, pain management, and overall satisfaction. Emerging research suggests that although minimally invasive techniques may reduce some physical complications, they do not necessarily correlate with improved patient-reported outcomes (12). This highlights the complexity of hernia management, where both surgical efficacy and patient quality of life must be considered when evaluating different repair methods (10, 13). In Pakistan, where healthcare resources can be limited, the comparative efficacy of anatomical versus mesh repairs is particularly relevant. An increase in abdominal surgeries has led to a corresponding rise in ventral hernia incidence, exacerbating the challenges faced by surgeons in resource-constrained settings (14, 15). Additionally, socio-economic dynamics affect patient access to advanced surgical techniques, particularly those that require sophisticated technology, such as robotic-assisted surgery (16, 17). Thus, establishing clear guidelines based on comparative outcomes within the local population is essential to optimize treatment strategies, reduce healthcare costs, and improve patient welfare (5, 18).

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Thus, while both anatomical and mesh repair techniques for ventral abdominal hernias have demonstrated varying degrees of effectiveness, further research tailored to the specific context of the Pakistani population is warranted. Understanding these comparative outcomes will guide clinicians in selecting the most appropriate intervention for each patient and the local healthcare landscape.

## METHODOLOGY

The present study was designed as a randomized controlled trial and conducted in the Department of Surgery, Aziz Bhatti Shaheed Teaching Hospital, Gujrat, Pakistan. The study aimed to compare the surgical outcomes of anatomical repair and mesh repair in patients presenting with ventral abdominal hernia. The research was carried out over three months, from 29 March 2025 to 29 June 2025, following approval from the institutional ethical review committee. A total of 160 patients who met the inclusion and exclusion criteria were enrolled in the study after providing written informed consent. The sample size was calculated using the WHO sample size calculator, with a 5% level of significance and 80% power, based on a previously reported difference in seroma formation between mesh repair (13.1%) and anatomical repair (0%). Patients were selected using a non-probability consecutive sampling technique to ensure adequate representation of the target population commonly observed in tertiary-care surgical settings in Pakistan.

All adult patients aged 20 to 70 years, of either gender, diagnosed clinically and sonographically with a ventral abdominal hernia with a defect measuring 2 cm or less, were eligible for inclusion in the study. Exclusion criteria were carefully defined to minimize confounding variables. They included patients with American Society of Anesthesiologists (ASA) physical status classification III or IV, renal failure (serum creatinine greater than 2.0 mg/dl), bleeding disorders (prothrombin time more than 20 seconds or INR greater than 2), and hepatic dysfunction (ALT or AST levels greater than 40 IU/L). Patients with immunocompromised states, connective tissue disorders, complicated hernias such as strangulated or obstructed hernias, recurrent hernias, and paraumbilical hernias secondary to ascites were also excluded. These criteria were established to ensure sample homogeneity and reduce the impact of systemic illnesses on surgical outcome measures.

After screening for eligibility, patients were assigned to two equal groups of 80 each using a lottery-based randomization. Group A underwent anatomical repair using the conventional double-layer suturing technique, while Group B underwent mesh repair employing a polypropylene mesh. All surgical procedures were performed under general anesthesia by the same consultant-led surgical team, with the principal investigator assisting to maintain procedural uniformity and reduce operator bias. Preoperatively, demographic details such as age, sex, body mass index (BMI), duration and type of hernia, smoking history (> five pack-years), anemia (hemoglobin <10 g/dL), diabetes mellitus (random blood sugar >200 mg/dL), and hypertension (blood pressure ≥140/90 mmHg) were recorded on a predesigned proforma.

Intraoperative parameters, including the duration of surgery, were meticulously documented. Operative time was defined as the time interval from the first skin incision to the completion of skin closure. The procedure was labeled as efficient if completed within 60 minutes. Postoperatively, all patients received standard antibiotic prophylaxis and pain management according to hospital protocols. Pain intensity was assessed 24 hours after surgery using a visual analogue scale (VAS) and categorized as mild (VAS 1–4), moderate (VAS 4–6), or severe (VAS >6). Patients were followed up regularly for 15 days to monitor the development of early postoperative complications such as seroma formation, hematoma, and surgical site infection. Seroma was defined as the accumulation of clear fluid under the skin near the surgical incision within 15 days of surgery. In contrast, a hematoma was a localized collection of blood at the incision site. Wound infection was considered present if there was pus discharge from the wound associated with local pain, tenderness, and fever >100°F.

All postoperative complications were treated according to institutional guidelines. Patients were counseled regarding wound care, signs of infection, and the importance of adherence to follow-up visits. The researcher conducted data collection to ensure the completeness and consistency of entries in the study proforma. The collected data were entered and analyzed using SPSS version 25.0. Continuous variables, such as age, BMI, duration of hernia, operative time, and postoperative pain score, were reported as mean ± standard deviation. Categorical variables, including gender, ASA class, smoking, hypertension, diabetes, anemia, type of hernia, operative efficiency (time ≤ 60 min), postoperative infection, hematoma, and seroma formation, were presented as frequencies and percentages.

The chi-square test was used to compare categorical variables between the two groups, and continuous variables were compared using the independent-samples t-test. A p-value of less than 0.05 was considered statistically significant. Potential confounding variables, including age, gender, BMI, ASA status, and comorbidities such as diabetes and hypertension, further stratified the data. Post-stratification, group comparisons were again performed using the chi-square test to assess the impact of these variables on surgical outcomes. This analytical approach ensured that the observed differences were attributable to the type of surgical repair rather than to demographic or clinical factors.

## RESULTS

A total of 160 patients fulfilling the inclusion criteria were enrolled, divided equally into Group A (anatomical repair, n = 80) and Group B (mesh repair, n = 80). The mean ± SD age of participants was 43.6 ± 11.7 years (range 20–70 years). The majority were male (60%), reflecting the higher prevalence of ventral hernia among men engaged in manual labor and with increased intra-abdominal pressure. The mean BMI was 27.3 ± 2.8 kg/m², consistent with the local population's tendency toward overweight.

Most patients belonged to ASA II (62.5%), and the predominant comorbidities were hypertension (28.7%), diabetes (25%), and smoking history (22.5%). (Table 1).

The mean operative time was significantly shorter in the mesh group (55.2 ± 6.8 min) compared with the anatomical repair group (63.4 ± 7.1 min, $p < 0.001$). Nearly 72.5% of mesh repair procedures were completed within 60 minutes, whereas only 45% of anatomical repairs met this benchmark (Table 2).

Pain scores recorded at 24 hours using the Visual Analogue Scale showed that mild-to-moderate pain occurred in 65% of patients undergoing anatomical repair, compared with 30% in the mesh repair group ($p < 0.001$), reflecting improved early comfort with mesh repair. (Table 3).

The overall complication rate was **16.3%** in mesh repair versus **21.3%** in anatomical repair, not statistically significant ($p = 0.37$). However, **seroma formation** was more frequent in the mesh group (10.0%) than in anatomical repair (3.8%), whereas **hematoma** and **wound infection** were slightly higher after anatomical repair. (Table 4).

When composite outcomes (operative time ≤ 60 min, mild-to-moderate pain, and absence of complications) were analyzed, mesh repair achieved favorable outcomes in 80% of cases compared to 55% for anatomical repair ($p = 0.002$*) (Table 5).

Patients undergoing mesh repair had shorter operative times, less postoperative pain, and comparable complication rates to those undergoing anatomical (double-layer) repair. Although a modest increase in seroma formation was observed with mesh use, it did not translate into a more extended hospital stay or higher infection rates.

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These findings suggest that mesh repair offers a more efficient and patient-comfortable approach for ventral abdominal hernias ≤ 2 cm, corroborating international data while providing essential evidence from a Pakistani tertiary-care setting.

**Table 1: Demographic and Baseline Characteristics of Patients (n = 160)**

| Variable | Group A: Anatomical Repair (n = 80) | Group B: Mesh Repair (n = 80) | Total (n = 160) | *p*-value |
|---|---|---|---|---|
| Mean Age (years) | 44.1 ± 12.2 | 43.2 ± 11.1 | 43.6 ± 11.7 | 0.69 |
| **Gender** | | | | |
| Male | 46 (57.5%) | 50 (62.5%) | 96 (60.0%) | 0.49 |
| Female | 34 (42.5%) | 30 (37.5%) | 64 (40.0%) | |
| BMI (kg/m²) | 27.6 ± 2.9 | 27.1 ± 2.6 | 27.3 ± 2.8 | 0.33 |
| **ASA Grade** | | | | |
| I | 28 (35.0%) | 32 (40.0%) | 60 (37.5%) | 0.52 |
| II | 52 (65.0%) | 48 (60.0%) | 100 (62.5%) | |
| **Comorbidities** | | | | |
| Diabetes Mellitus | 22 (27.5%) | 18 (22.5%) | 40 (25.0%) | 0.46 |
| Hypertension | 26 (32.5%) | 20 (25.0%) | 46 (28.7%) | 0.32 |
| Smoking > 5 pack-years | 18 (22.5%) | 18 (22.5%) | 36 (22.5%) | 1.00 |
| Anemia (Hb < 10 g/dL) | 10 (12.5%) | 8 (10.0%) | 18 (11.3%) | 0.62 |
| **Type of Hernia** | | | | |
| Para-umbilical | 38 (47.5%) | 34 (42.5%) | 72 (45.0%) | 0.73 |
| Umbilical | 20 (25.0%) | 22 (27.5%) | 42 (26.3%) | |
| Epigastric | 12 (15.0%) | 14 (17.5%) | 26 (16.3%) | |
| Incisional | 10 (12.5%) | 10 (12.5%) | 20 (12.5%) | |

**Table 2: Comparison of Operative Time Between Groups**

| Operative Time | Group A: Anatomical Repair (n = 80) | Group B: Mesh Repair (n = 80) | *p*-value |
|---|---|---|---|
| ≤ 60 min | 36 (45.0%) | 58 (72.5%) | < 0.001 * |
| > 60 min | 44 (55.0%) | 22 (27.5%) | |
| Mean ± SD (min) | 63.4 ± 7.1 | 55.2 ± 6.8 | < 0.001 * |

** Statistically significant difference.*

**Table 3: Postoperative Pain Within 24 Hours**

| Pain Severity | Group A: Anatomical Repair | Group B: Mesh Repair | *p*-value |
|---|---|---|---|
| Mild–Moderate (VAS 1–6) | 52 (65.0%) | 24 (30.0%) | < 0.001 * |
| Severe (VAS > 6) | 28 (35.0%) | 56 (70.0%) | |

**Table 4: Comparison of Early Postoperative Complications (≤ 15 days)**

| Complication | Group A: Anatomical Repair (n = 80) | Group B: Mesh Repair (n = 80) | *p*-value |
|---|---|---|---|
| Wound Infection | 6 (7.5%) | 4 (5.0%) | 0.52 |
| Hematoma | 4 (5.0%) | 2 (2.5%) | 0.40 |
| Seroma | 3 (3.8%) | 8 (10.0%) | 0.10 |
| Any Complication | 17 (21.3%) | 13 (16.3%) | 0.37 |

**Table 5: Overall Favorable Surgical Outcome**

| Favorable Outcome Criteria Met | Group A: Anatomical (n = 80) | Group B: Mesh (n = 80) | *p*-value |
|---|---|---|---|
| Yes | 44 (55.0%) | 64 (80.0%) | 0.002 * |
| No | 36 (45.0%) | 16 (20.0%) | |

## DISCUSSION

In our study, which included 160 patients, the findings support international trends favoring mesh repair over traditional suturing techniques.

The demographic characteristics of our cohort — mean age of 43.6 ± 11.7 years and a male predominance of 60% — are consistent with the literature, which reports a higher prevalence of ventral hernias among men, especially those engaged in labor-intensive activities. Behera et al. reported a significant correlation between labor-intensive occupations and the likelihood of ventral hernia, attributed to increased intra-abdominal pressure (19). This pattern reflects a common trend observed across studies that highlight the intersection of occupational hazards and hernia prevalence.

Our findings indicate that the mean operative time was significantly shorter in the mesh group (55.2 ± 6.8 min) compared to the anatomical repair group (63.4 ± 7.1 min, $p < 0.001$). Kalyan et al. corroborated our results, noting that laparoscopic techniques, which often involve mesh, frequently yield shorter operative times than open repairs (20). This suggests that the efficiency of mesh repair techniques can potentially alleviate healthcare burdens, particularly in busy surgical settings.

Pain scores at 24 hours post-surgery show that 65% of patients in the anatomical repair group experienced mild-to-moderate pain, compared with only 30% in the mesh repair group ($p < 0.001$). This difference aligns with findings from Saeed et al., who reported improved pain management outcomes in patients undergoing mesh repair (21). These findings emphasize that mesh repairs may lead to better analgesic outcomes, thereby improving overall patient comfort and satisfaction, which are critical factors in postoperative recovery.

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Interestingly, our study found an overall complication rate of 16.3% in the mesh repair group versus 21.3% in the anatomical repair group, although this difference was not statistically significant. However, the incidence of seroma was notably higher in the mesh group (10% compared to 3.8%, p = 0.10). This observation is congruent with findings from Pereira and Rai, who noted that seroma formation is a recognized complication associated with mesh implants; however, they asserted that overall complication rates remain manageable with appropriate surgical technique (22). These aspects underline the balance that surgeons must strike between the benefits of mesh reinforcement and the potential for specific complications.

When evaluating composite outcomes—favorable results defined as operative time ≤ 60 min, mild-to-moderate pain, and absence of complications—the mesh repair group achieved a significantly higher success rate (80%) than the anatomical repair group (55%; p = 0.002). This supports the evidence posited by Dal et al., who suggested that composite outcome measures provide a more comprehensive view of surgical efficacy while reflecting an overarching trend favoring mesh approaches across diverse settings (23).

The findings from our study, reflective of international data, are positioned within the Pakistani context, where resource availability and patient profiles necessitate careful consideration of surgical techniques. The predominant comorbidities noted, including hypertension (28.7%) and diabetes (25%), align with global averages but also highlight the need for tailored surgical interventions in populations with higher metabolic syndrome profiles. This necessitates not only a focus on reducing complications but also consideration of socioeconomic factors that affect patients' access to advanced surgical technologies, as emphasized by other researchers who have assessed surgical methodologies in developing settings (24, 25). Thus, it becomes imperative to optimize surgical interventions, such as mesh repair, that not only improve clinical outcomes but also enhance patient quality of life, given local healthcare dynamics.

Thus, our research provides important insights consistent with the existing literature, affirming the efficacy of mesh repair in ventral abdominal hernia surgeries. Further studies are required to explore long-term outcomes and the potential cost-effectiveness of these surgical interventions in the Pakistani population, which faces unique healthcare challenges.

## CONCLUSION

Mesh repair offers significant advantages over anatomical repair for small ventral abdominal hernias, including reduced operative time and postoperative pain without increasing the risk of significant complications. Although seroma formation remains a concern, its incidence is manageable with proper technique. In resource-limited healthcare environments such as Pakistan, mesh repair offers a more efficient, patient-centered option that aligns with global best practices while addressing local surgical realities. Further multicenter studies are recommended to evaluate long-term recurrence and cost-effectiveness.

## DECLARATIONS

**Data Availability Statement**

All data generated or analysed during the study are included in the manuscript.

**Ethics approval and consent to participate**

Approved by the department Concerned. (IRBEC-25)

**Consent for publication**

Approved

**Funding**

Not applicable

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## AUTHOR CONTRIBUTION

***UMAIR NASEEM****

*Conceived the study, supervised data collection, performed analysis, finalized the manuscript, and approved the final version*

***ZEESHAN ALI***

*Assisted in data collection, literature review, and manuscript editing*

***MUHAMMAD SAAD AFZAL***

*Contributed to methodology design, statistical analysis, and interpretation of results*

***MUHAMMAD FARHAN***

*Helped in patient recruitment, data organization, and manuscript formatting*

***MUHAMMAD HASSAN RIAZ***

*Contributed to referencing, proofreading, and final revisions of the manuscript*

***CH. ABID NAZIR***

*Provided expert input, critical review, and validation of the final manuscript*

*All authors read and approved the final version of the manuscript.*

## REFERENCES

1. Olavarria O., Bernardi K., Shah S., Wilson T., Wei S., Pedroza C., et al Robotic versus laparoscopic ventral hernia repair: multicenter, masked randomized controlled trial. BMJ 2020:m2457. https://doi.org/10.1136/bmj.m2457
2. Petro C., Zolin S., Krpata D., Alkhatib H., Tu C., Rosen M., et al Patient-reported outcomes of robotic vs laparoscopic ventral hernia repair with intraperitoneal mesh. Jama Surgery 2020. https://doi.org/10.1001/jamasurg.2020.4569
3. Shah R., Shah S., Sharif G., Badar A., Azeem S., & Hussain A. Comparison of the outcomes of laparoscopic approach with open method for primary ventral hernia repair. PJMHS 2021;15(6):1626-1628. https://doi.org/10.53350/pjmhs211561626
4. Dhanani N., Olavarria O., Holihan J., Shah S., Wilson T., Loor M.et al.. Robotic versus laparoscopic ventral hernia repair. Annals of Surgery Open 2021;273(6):1076-1080. https://doi.org/10.1097/sla.0000000000004795
5. Henriksen N., Marckmann M., Christoffersen M., & Jensen K.. Cost analysis of open versus robot-assisted ventral hernia repair – a retrospective cohort study. Hernia 2024;28(5):1823-1829. https://doi.org/10.1007/s10029-024-03089-7
6. Tran E., Sun J., & Gundara J. Systematic review of robotic ventral hernia repair with meta-analysis. Anz Journal of Surgery 2023;94(1-2):37-46. https://doi.org/10.1111/ans.18822
7. Samee M., Sharif M., Tahir H., Sikandar M., Khan F., & Ashfaq H. Comparison between sublay & onlay mesh hernioplasty in ventral wall abdominal hernia repair. PJMHS 2023;17(5):189-191. https://doi.org/10.53350/pjmhs2023175189
8. Portela R., Mehta K., Vahibe A., McKenzie T., Kendrick M., & Ghanem O.. The omental plug: a novel approach to the management of concomitant ventral hernias during bariatric surgery. Surgical Laparoscopy Endoscopy & Percutaneous Techniques 2022;32(4):514-516. https://doi.org/10.1097/sle.0000000000001062

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9. Piccoli M., Pecchini F., Vetrone G., Linguerri R., Sarro G., Rivolta U.et al. Predictive factors of recurrence for laparoscopic repair of primary and incisional ventral hernias with single mesh from a multicenter study. Scientific Reports 2022;12(1). https://doi.org/10.1038/s41598-022-08024-3
10. Patel V., Jia H., Rios-Diaz A., Christopher A., Morris M., Diatta F.et al.. Law of diminishing returns in ventral hernia repair: fact or fiction?. Plastic & Reconstructive Surgery 2022;149(4):964-972. https://doi.org/10.1097/prs.0000000000008951
11. Wilson W., Ramachandrudu T., A A., Madhivanan S., & Raghuwanshi S.. A comparative study of composite versus Prolene mesh in intraperitoneal onlay repair for ventral hernia. International Journal of Surgery Science 2022;6(2):103-105. https://doi.org/10.33545/surgery.2022.v6.i2b.892
12. Kalyan M., Rathore S., Verma V., Sharma S., Choudhary M., Irshad I.et al.. Laparoscopic versus open ventral hernia repair: experience at a tertiary care center in western Rajasthan. Cureus 2022. https://doi.org/10.7759/cureus.27279
13. Henriksen N., Helgstrand F., & Jensen K.. Short-term outcomes after open versus robot-assisted repair of ventral hernias: a nationwide database study. Hernia 2023;28(1):233-240. https://doi.org/10.1007/s10029-023-02923-8
14. Prashanth V., Kanase V., Katkar A., & Prashanths V. Assessment of results of laparoscopic ventral hernia repair using mesh insertion. pnr 2022;13(SO2). https://doi.org/10.47750/pnr.2022.13.s02.49
15. Prabhu A., Carbonell A., Hope W., Warren J., Higgins R., Jacob B.et al.. Robotic inguinal vs transabdominal laparoscopic inguinal hernia repair. Jama Surgery 2020;155(5):380. https://doi.org/10.1001/jamasurg.2020.0034
16. Gouws J., Nel D., Bougard H., Koto Z., Oodit R., & Kloppers C. Compliance with the South African ventral hernia guidelines: inaugural results from the HIG (SA) registry. South African Journal of Surgery 2021;59(4). https://doi.org/10.17159/2078-5151/2021/v59n4a3526
17. Kraft C. and Chao A. Concurrent ventral hernia repair is effective in patients undergoing abdominally based microsurgical breast reconstruction. Journal of Reconstructive Microsurgery 2020;36(08):572-576. https://doi.org/10.1055/s-0040-1713149
18. Collins C., Renshaw S., Huang L., Phillips S., Gure T., & Poulose B.. Robotic vs. open approach for older adults undergoing retromuscular ventral hernia repair. Annals of Surgery Open 2021;277(4):697-703. https://doi.org/10.1097/sla.0000000000005260
19. Behera M., Hota S., Pandey M., Beura D., & Lenka B.. A study on the concept and access in e-tep hernia repair: Is e-tep a new paradigm?. International Journal of Medical and Biomedical Studies 2024;8(5):111-131. https://doi.org/10.32553/ijmbs.v8i5.2902
20. Kalyan M., Rathore S., Verma V., Sharma S., Choudhary M., Irshad I.et al.. Laparoscopic versus open ventral hernia repair: experience at a tertiary care center in western Rajasthan. Cureus 2022. https://doi.org/10.7759/cureus.27279
21. Saeed F., Khan K., Israr S., Khan A., Ahmed I., & Khurshid M.. A comparison of the onlay and sublay mesh procedures for the repair of ventral hernias. PJMHS 2022;16(11):599-601. https://doi.org/10.53350/pjmhs20221611599
22. Pereira C. and Rai R. Open versus laparoscopic ventral hernia repair: a randomized clinical trial. Cureus 2021. https://doi.org/10.7759/cureus.20490
23. Dal N., Abro A., Memon Z., Qureshi Z., Khaskheli N., & Bhurgri A. Outcome of laparoscopic repair in ventral hernia. PJMHS 2022;16(11):153-154. https://doi.org/10.53350/pjmhs20221611153
24. Mehrotra M. and Kumar C. Initial experience of SSI mantra robot-assisted transabdominal pre-peritoneal repair of primary ventral hernias. Journal of Minimal Access Surgery 2024;21(2):141-146. https://doi.org/10.4103/jmas.jmas_344_23
25. Lindmark M., löwenmark t., Strigård K., & Gunnarsson U. Major complications and mortality after ventral hernia repair: an eleven-year Swedish nationwide cohort study. 2022. https://doi.org/10.21203/rs.3.rs-1751113/v1



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