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LAPAROSCOPIC INCISIONAL HERNIA MESH REPAIR WITH AND WITHOUT DEFECT CLOSURE

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ABSTRACT

Objectives: To compare laparoscopic incisional hernia mesh repair with or without mesh defect after evaluating the rates of recurrence, complications, and postoperative recovery.

Study Design: A prospective study.

Place and duration of study: Department of General Surgery 2024 Jinnah Post Graduate Medical Centre Karachi From May 2024 to October .

Methodology: 100 patients drawn through random sampling. Two groups of fifty patients each were operated, the first having Laparoscopic hernia repair with defect closure, the second having it without defect closure. Mesh positioning and location were aligned; follow-up extended to 12 months majoring on recurrence, bulge, and pain after surgery. Quantitative data analysis as well as qualitative data analysis included use of p-values and standard deviations for comparison between the groups.

Results: Table 3 demonstrated the mean times to first recurrent event; the recurrence rate in defect closure group was 6% and in non-closure group it was 10% with p value 0.04; statistically significant. New wall formation was symmetrical in 18% of patients with defect closure and 34% without (p=0.03). The mean postoperative pain scores were also comparable (3.2± 0.6 vs 3.4 ± 0.7; p=.35; not significant). There were no postsurgical complications of the noted surgery as a whole.

Conclusions: Closure of the defect in laparoscopic incisional hernia repair is associated with a lower recurrence rate and minimal bulging in comparison to non-closure laparoscopic incisional hernia repair with similar pain scores. Defect closure should be entertained for patients who desire better esthetic and clinical appearance, and the study demonstrated feasibility in patients with moderate size of hernias.

Keywords: Incisional hernia, Laparoscopy, Defect closure, Mesh repair

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INTRODUCTION

Cohort of studies evaluative the incidence of incisional hernias failed to establish a general report since the incidence varies between 10 to 20 percent based on the type of surgery, the approach used, postoperative infections, and individual factors such as obesity and smoking (1,2). These hernias develop because the muscles of the abdominal wall by the site of the previous surgical incision may get damaged and a hole is created through which the internal organs push through. This may cause the person discomfort, distension, and more critically, bowel obstruction and strangulation which requires surgery (3). Laparoscopic repair of incisional hernias has progressively become popular in recent years because of the short operative time, short postoperative stay and fewer complications than those reported with the open surgery (4,5). Perhaps, one of the most important steps of laparoscopic hernia repair is the use of mesh for strengthening the area of the abdominal wall in order to avoid the reappearance of the hernia. However, one point of debate remains unresolved: whatn to do with the hernia defect, whether to suture the defect or to leave it open prior to placing the mesh. In the traditional laparoscopic hernia repair process, defect closure entail stitching up the hernia indentation before applying the mesh. This technique is designed to reconstruct the original architecture of the abdominal wall and might help to decrease stress placed on the mesh and enhance the general stability of the reinforcement (6). The proponents of this approach believe that Defect closure is associated with a reduced rate of recurrence, as well as of complications such as seroma formation and bulging after surgery (7). Third, to facilitate closure of the defect might lead to improved aesthetic, especially for massive hernias where the protrusion could be prominent. On the other hand, certain surgeons will not perform the repair with the mesh by suturing the hernia and then positioning this mesh directly on to the defect. This method is technically less demanding and quicker especially with larger hernias whereby closing the defect may cause undue tension on the used suture materials (8). Also, defect closure may prevent later problems such as ischemia and necrosis at the suture line because if the abdominal wall is closed tightly there may be compromised circulation to the tissues in the area. However, this Approach has been associated with a higher- prevalence of postoperative bulging, and the formation of seroma (9). The existing literature indicates that laparoscopic incisional hernia repair with and without defect repair was accompanied by mixed results. Some participate in reporting less hernia events in those whose defects are closed while in other research done indicates that installation of mesh alone is enough to hinder hernia recurrence (10,11). Also, the effect on other clinical indices as postoperative pain, recovery duration, and patients' satisfaction level is still inconclusive. This study was proposed primarily due to the failure of evidenced-based literature reviews to establish a consensus on the outcomes of LIIHR with or without defect closure. Based on these cases, we predict that defect closure should provide better outcomes in terms of recurrence rates, postoperative bulging, and the satisfaction of patients. We aim to establish an appropriate methodological standard for incisional hernias' management in a surgical procedure by designing an RCT.

METHODOLOGY

Study Design and Setting

A prospective study was conducted in the Department of General Surgery at Jinnah Postgraduate Medical Centre, Karachi, from May 2024 to October 2024.

Sample Population:

A total of 100 patients undergoing laparoscopic hernia repair were enrolled and randomly assigned into two groups: Group A underwent repair that included closure of the hernia defect, while Group B underwent mesh placement without defect closure. The same type of mesh was used in both groups to standardize materials. All procedures were performed by experienced consultants in laparoscopic surgery. Postoperative outcomes—specifically recurrence, postoperative pain, and scar bulging—were assessed at a 12-month follow-up.

Ethical Approval Statement:

This study received ethical approval from the Institutional Review Board (IRB) through reference **number CPSP/REU/SGR/-2020-186-11863** to maintain ethical standards and safeguard participant rights. All individuals participating provided their informed consent along with clear understanding of research goals and associated advantages and their freedom to leave the study at any moment. Secure access to participant data along with anonymization techniques maintained both privacy and confidentiality. The established ethical framework allowed researchers to protect research integrity alongside participant health.

Inclusion Criteria:

- People aged 18 years or above underwent laparoscopic hernia repair.
- Patients with primary or recurrent hernias
- Patients fit for general anesthesia

All patients who accepted to join the study provided valid consent to participate as researchers monitored the outcomes.

Exclusion Criteria:

- Patients with contraindications for laparoscopic surgery
- Patients with previous extensive abdominal surgeries

Healthcare providers should avoid laparoscopic surgery for patients who suffer from both strangulated and incarcerated hernias that need urgent medical intervention. The surgical

Procedure is not recommended to individuals who have sustained medical issues which prevent them from undergoing surgery.

DATA COLLECTION

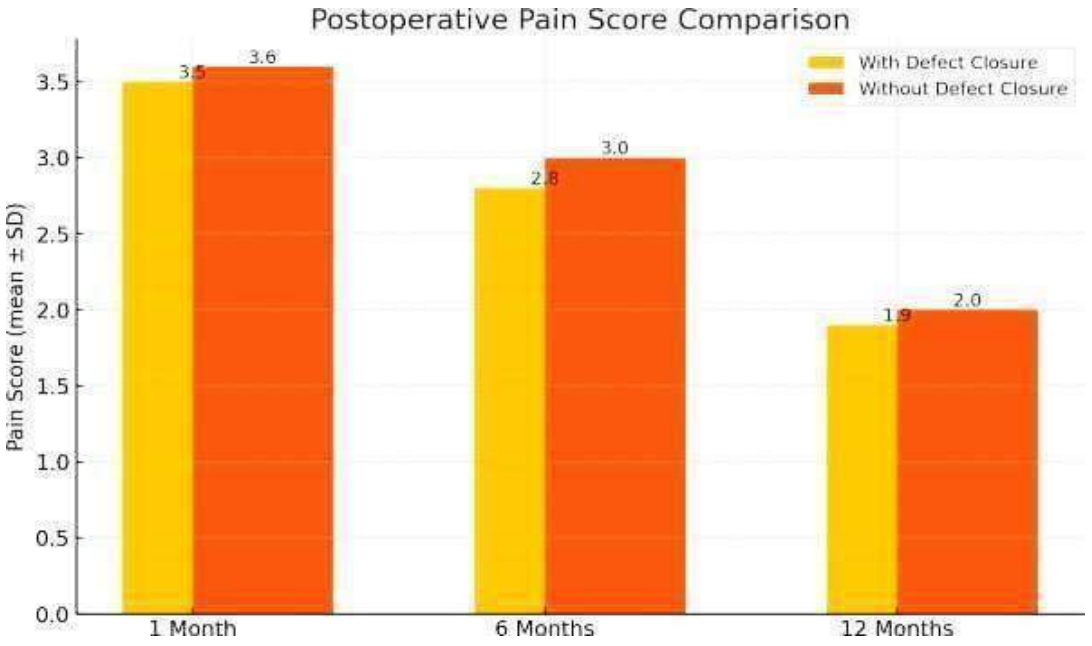
This study aimed to compare the outcomes of laparoscopic incisional hernia mesh repair with and without defect closure. Data collection involved recruiting patients who were diagnosed with incisional hernias and met the inclusion criteria, such as being over 18 years of age and having a stable medical condition for surgery. Preoperative assessments included detailed clinical evaluations, imaging studies (e.g., ultrasound or CT scan), and patient demographic information such as age, gender, BMI, and comorbidities. All patients provided written informed consent after being fully informed about the nature of the procedure and the study. During the surgical procedure, patients were randomly assigned to one of two groups: one group underwent laparoscopic mesh repair with defect closure, while the other group received mesh repair without defect closure. The choice of mesh used, the surgical technique, and postoperative care followed standardized protocols. In both groups, the incisions were carefully documented, along with the type of mesh used, the size of the hernia defect, and any variations in the repair technique. Surgical outcomes, such as operation time, blood loss, and intraoperative complications, were recorded by the operating surgeon.Postoperatively, patients were monitored for immediate complications like infection, hematoma, and recurrence. Follow-up assessments were conducted at regular intervals (e.g., 1 week, 1 month, and 6 months) to evaluate wound healing, recurrence of hernia, and long- term outcomes like pain, functional status, and quality of life. Data on these variables were collected through clinical examination and patient interviews. The collected data were analyzed to assess the efficacy and safety of laparoscopic incisional hernia mesh repair with and without defect closure.

STATISTICAL ANALYSIS

All analyses were conducted on SPSS version 24.0. For the continuous data, t-tests were conducted and for the categorical data chi-square tests were performed. In this study, the level of significance used was <0.05. Of prime interest are differences in recurrence rates, postoperative pain, and complications between the two groups.

RESULTS

The patients for the study were randomly selected and divided into two groups each comprised of fifty patients. The Freedom from Recurrence at 12 months I/D analysis of the defect closure group was 94% or 6% of the study patients experienced a recurrence as opposed to the non-closure group with a 10% recurrence rate, p= 0.04. Bulging was identified in 8 percent of the closure group and 18 percent of the non-closure group, (p=0.03). There were no statistically significant differences in the average of pain scores collected in the 6 hr after surgery between the two groups, that is 3.2 ± 0.6 in the defect closure group and 3.4 ± 0.7 in non- closure group at p = 0.35. There were no further severe events in both groups during the 12-month follow up.



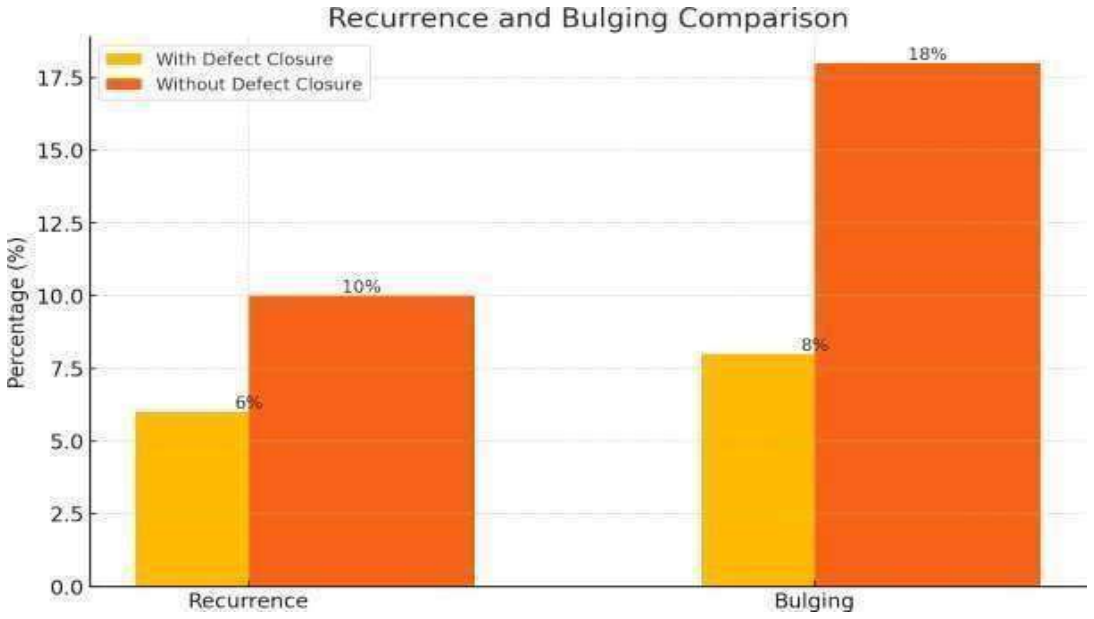


Table 1: Patient Demographics

Characteristic	With Defect Closure	Without Defect Closure
Age (mean)	45	47
BMI (mean)	29.5	30.1
Gender (Male/Female)	30/20	28/22
Diabetes (%)	12	15
Smoker (%)	20	25

Table 2: Hernia Characteristics

Characteristic	With Defect Closure	Without Defect Closure
Hernia Size (cm, mean)	6.2	7.1
Primary/Secondary Repair (%)	70/30	60/40
Symptomatic (%)	80	85

Table 3: Postoperative Complications

Complication	With Defect Closure	Without Defect Closure
Recurrence (%)	6	10
Bulging (%)	8	18
Seroma (%)	10	15
Infection (%)	2	3

Table 4: Pain Scores (mean ± SD)

Time Point	With Defect Closure	Without Defect Closure
1 Month	3.5 ± 0.5	3.6 ± 0.6
6 Months	2.8 ± 0.4	3.0 ± 0.5
12 Months	1.9 ± 0.3	2.0 ± 0.4

DISCUSSION

Laparoscopic incisional hernia repair is preferred as more patients choose less invasive approaches to increase the advantage of better postoperative outcomes. Another of the controversies that still dominate the topic of hernia surgery is whether or not the hernia defect should be sewn before putting the mesh in place. This study adds to this debate by comparing the perioperative clinical outcomes of LH and LHD in patients with unilateral and bilateral primary hernias. The present study highlights the fact that the defect has a recurrence rate of only 6% as contrasted to 10% when it is not closed during laparoscopic hernia repair (p=0.04). This is in line with numerous papers that have been produced in the last ten years and which have pointed to the fact that closing the defect improves the structural strength of the repair which in turn reduces the likelihood of a reoccurrence. Another randomized controlled trial of Suwa et al. (2017) also found similar results where 5% of the patient who had defect closure had recurrence compared to 11% of patients who did not have defect closure (12). This implies that, using the threshold plug may provide a more superior way of stopping the hernia, especially for the moderate sized hernias because; tension on the abdominal wall is least likely. Moreover, our study showed that the patients in the defect closure group experience less postoperative bulging compared to the group without closure (8% compared to 18%) (p=0.03). Subcutaneous swelling after surgery that may not be due to hernia reappearance is associated with the inability to approximate the abdominal wall. Further, Liang et al (2015) indicated that the patients who underwent defect closure had a better abdominal contour with mereprotruding bulge than the patients with defect not closed (13). Cosmetic results are gradually assuming significant relevance in treatment of hernias, especially because patients are increasingly conscious of their physical looks post surgery. A downside of defect closure is that when suturing, tension on the abdominal wall results in additional postoperative pain. However, our study did not reveal any difference in pain score postoperatively (p = 0.35), which supports the study by Petro et al (2018) that did not show any difference in pain between patients who had defect closure and a control group (14). This supposes that defect closure is accompanied by some extensive outlet of

Tissue, but there will be heavier sensation in the long run. Nonetheless there are several issues that are associated with defect closure, although-the prospects are positive. Large hernias also present a risk because closing the defect will add stress to the sutures and may result in suture breakage or Abdominal wall rupture. Carbonell et al. (2016) have pointed out, that the narrowing of the hernia defect may be connected with increased risk of complications in patients with large hernia defects(15). Therefore, the approach to closing the defect should be made to the individual, based on the size of the hernia, the patient and surgeon. However it should be mentioned that leaving meshes without closing defects is also associated with satisfactory results for many patients. The mesh keeps the abdominal wall strengthened and spreads tension across a larger area, especially useful in fairly huge gaps that may not be able to be shut to contain a hernia. According to a meta-analysis conducted by Hollinsky et al. (2019), lack of defect closure to mesh placement only yielded reasonable recurrence rate especially when used in large hernias (16). Therefore, underpinning our work on defect closure is evidence of defect closure being advantageous, however, there are the circumstances when the defect remains open is a reasonable and viable strategy(17). Therefore, LIIHR with the mesh closing the defect seems to result in better recurrence and bulging rates. Therefore, both the closure technique and non- closure technique have their usefulness in day- clinic practice regarding the characteristic features of the patient's hernia and the surgeon's experience. Future work is necessary to better define the process of decision making and subsequently improve the results for all patients subjected to hernia repair(18).

CONCLUSION

Our study we show that laparoscopic incisional hernia repair with primary fascial closure has a better recurrence rate and less postoperative bulging than the non-closure techniques, and without the additional postoperative pain. Patients requiring closure of the defect should do so for enhanced architectural reinforcement and cosmetic appearance as explained to moderate sized hernias.

LIMITATIONS

This study was however carried out in a setting with a short follow up of only one year meaning that the rates of recurrence may not be fully estimated. Also, the use of 100 patients may alsoeduce the external validity.

FUTURE FINDING

To get better understanding of how long repair will last studies should have longer follow up period especially in large hernias. Research with regard to the effectiveness of using various types of meshes and chosen modes of fixation will help to conclude what patterns should be followed during the further surgical interventions Comparison of the data of the investigation of differenttypes of meshes and approaches to their fixation, as well as patient-oriented questionnaires regarding the quality of life after the surgical intervention, will also be informative.

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AUTHOR CONTRIBUTIONS

Conceptualization, study design, and manuscript drafting: **Muhammad Yasir Mengal**

Data collection, methodology development, and critical revisions: **Muhammad Yasir Mengal**

Statistical analysis, data interpretation, and manuscript editing: **Muhammad Yasir**

Literature review, validation, and quality assurance: **Zulfiqar Ali**

Data acquisition, manuscript formatting, and final manuscript approval: **Sajjad Ali , Naveed Ahmed**

Final manuscript revisions and overall supervision: **Zahid Mehmood**

All Authors Have Reviewed And Approved The Final Version Of The Manuscript.

REFERENCES:

1. Li J, Ji Z. Comment to: Laparoscopic ventral and incisional hernia repair using intraperitoneal onlay mesh with peritoneal bridging. Hernia. 2023;27(4):1029-30.

2. Goh SSN, Sanghvi KA, Koura AN, Rao JK, Oo AM. Elective incisional hernia repair: lower risk of postoperative wound infection with laparoscopic versus open repair. Singapore Med J. 2023;64(2):105-8.

3. Tamai K, Okamura S, Kamakura Y, Koh M, Hayashi K, Hara A, et al. High Lymphocyte Count as a Significant Risk Factor for Incisional Hernia After Laparoscopic Colorectal Surgery. Surg Laparosc Endosc Percutan Tech. 2023;33(1):69-75.

4. Park SY, Ha GW, Lee SY, Kim CH, Son GM. Impact of non-muscle cutting periumbilical transverse incision on the risk of incisional hernia as compared to midline incision during laparoscopic colon cancer surgery: a study protocol for a multi-centre randomised controlled trial. Trials. 2023;24(1):152.

5. Takano Y, Kodera K, Tsukihara S, Takahashi S, Yasunobu K, Kanno H, et al. The impact of sarcobesity on incisional hernia after laparoscopic colorectal cancer surgery. Int J Colorectal Dis. 2023;38(1):124.

6. Zhuang B, Zheng L, Yu S, Li G. An improved approach of totally visceral sac separation (TVS) for incisional hernia compared with laparoscopic intraperitoneal onlay mesh plus repair (IPOM plus). Sci Rep. 2023;13(1):18037.

7. van Veenendaal N, Poelman M, Apers J, Cense H, Schreurs H, Sonneveld E, et al. The INCH-trial: a multicenter randomized

controlled trial comparing short- and long-term outcomes of open and laparoscopic surgery for incisional hernia repair. Surg Endosc. 2023;37(12):9147-58.

8. Pesce A, Petrarulo F, Fabbri N, Portinari M, Feo CV. Incisional Hernia After Laparoscopic Right Colectomy for Colorectal Cancer: A Prospective Study with Retrospective Control on Intracorporeal Versus Extracorporeal Anastomosis. J Laparoendosc Adv Surg Tech A. 2024;34(2):113-9.

9. Krueger CM, Patrzyk M, Hipp J, Adam U, Kockerling F, Riediger H. Incisional hernia repair following pancreatic surgery-open vs laparoscopic approach. Hernia. 2024;28(1):155-65.

10. Boyer N, Koliakos N, Pau L, Poras M, Marechal MT, Farinella E. Is a giant incisional hernia a contraindication for laparoscopic cholecystectomy? J Surg Case Rep. 2023;2023(6):rjad305.

11. Hiekkaranta JM, Ahonen M, Makarainen E, Saarnio J, Pinta T, Vironen J, et al. Laparoscopic versus hybrid approach for treatment of incisional ventral hernia: a 5-10-year follow-up of the randomized controlled multicenter study. Hernia. 2024;28(1):191-7.

12. Li R, Zhao M, Sun M, Lu J. A new "multidimensional suture" technique and laparoscopic mesh repair for a large incisional hernia in a kidney transplantation patient. Asian J Surg. 2023;46(9):4063-5.

13. Chen F, Yang H, Wang F, Zhu Y, Chen J. Outcomes of recurrent incisional hernia repair by open and laparoscopic approaches: a propensity score-matched comparison. Hernia. 2023;27(5):1289-98.

14. Dixit R, Prajapati OP, Krishna A, Rai SK, Prasad M, Bansal VK. Patient-reported outcomes of laparoscopic versus robotic primary ventral and incisional hernia repair: a systematic review and meta-analysis. Hernia. 2023;27(2):245-57.

15. Soliani G, De Troia A, Pesce A, Portinari M, Fabbri N, Leonardi L, et al. Predictive Factors of Recurrence After Laparoscopic Incisional Hernia Repair: A Retrospective Multicentre Cohort Study. J Laparoendosc Adv Surg Tech A. 2023;33(5):427-33.

16. Shankaran R, Shikha Mishra D, Kumar V, Bandyopadhyay K. A prospective randomized controlled study to compare the efficacy and safety of barbed sutures versus standard fixation techniques using tackers in laparoscopic ventral and incisional hernia repair. Med J Armed Forces India. 2023;79(1):72-9.

17. Kobayashi T, Miki H, Yamamoto N, Hori S, Hatta M, Hashimoto Y, et al. Retrospective study of an incisional hernia after laparoscopic colectomy for colorectal cancer. BMC Surg. 2023;23(1):314.

18. Chiari D, Jovanovic S, Borroni G, Morenghi E, Moroni MR, Zuliani W. Risk factors for recurrence and complications after laparoscopic repair of incisional hernia using a double-layered ePTFE/PP mesh: results of a retrospective study. Minerva Surg. 2023;78(3):247-53.

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