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Original Article

To Compare the Short-Term Outcome of Open Repair versus Laparoscopic Repair in Abdominal Incisional Hernia Repair

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ABSTRACT

Background: Incisional hernia is a common complication post abdominal surgery. Its effective management is crucial for patient outcomes and healthcare efficiency. This study aims to evaluate and compare the short-term outcomes of open and laparoscopic incisional hernia repair techniques.

Objective: The study's objectives are twofold: 1) To ascertain the short-term outcomes, specifically focusing on the length of hospital stay, operative time, wound infections, and recurrence rate in patients undergoing open and laparoscopic incisional hernia repair, and 2) To compare these outcomes between open and laparoscopic repair methods.

Methods: A randomized design was employed, with patients assigned to either Group A (open repair) or Group B (laparoscopic repair) using computer software. The duration of surgery, from the first incision to skin closure, was timed with a digital stopwatch. Patients were followed up for one month with specific attention to any redness, persistent pain, or fever. The key outcome parameters assessed were operative time, hospital stay duration, incidence of wound infection, and hernia recurrence.

Results: Group A exhibited a 9.9% wound infection rate and 51.1% recurrence rate, with 39.0% of patients achieving satisfactory outcomes. In contrast, Group B demonstrated a 13.5% wound infection rate, a notably lower recurrence rate of 11.3%, and 75.2% of patients reported satisfactory outcomes.

Conclusion: Laparoscopic repair shows superior outcomes compared to open repair regarding wound infection, recurrence rate, patient satisfaction, operative time, and length of hospital stay.

Keywords: Hernia, Incisional, Laparoscopy, Open Repair, Patient Satisfaction.

INTRODUCTION

Incisional hernia, a complication frequently encountered in post-surgical patients, has garnered significant clinical attention due to its prevalence and impact on patient quality of life. With an incidence rate ranging from 3% to 33%, dependent on various risk factors (1-5), this medical condition often arises as a sequela to abdominal surgeries, including those conducted for traumatic injuries. Critical risk factors contributing to the development of incisional hernias include weight gain, malnutrition, and the use of particular medications like steroids and immunosuppressants. Postoperative complications such as wound dehiscence and conditions like renal failure further exacerbate the likelihood of hernia formation (1, 3-5). Notably, infection of the surgical incision significantly elevates the hernia risk, as evidenced by comparative rates (6.5% vs 2.9%, $P < .001$) (6). Incisional hernias compromise the integrity of the abdominal wall, leading to the separation of muscle and fascial layers, and consequently, the protrusion of abdominal organs through this weakened area, thus impairing patient well-being.

In the realm of hernia repair, two primary techniques have been at the forefront: open and laparoscopic repair methods. Contemporary advancements in surgical procedures have prompted extensive research, particularly in international multicentric studies, evaluating the short-term outcomes of these two approaches. Previous findings suggest a negligible difference between the outcomes of open and laparoscopic repairs, underscoring the notion that the choice of technique largely depends on the surgeon's preference and expertise.

Journal of Health and Rehabilitation Research 2791-156X JHRR

Comparative studies have delved into various aspects of these surgical methods. One such research highlighted that laparoscopic surgery, despite taking longer, resulted in fewer post-surgery adverse events (18.4 vs. 23.4 %, p = 0.090) (8). However, this technique was associated with an increased hospital stay and higher postoperative complications compared to the open surgery approach (7). Additionally, the incidence of post-operative surgical site infections was markedly lower in laparoscopic procedures (3.2 vs. 8.6 %, p = 0.001), as demonstrated in a study by Magdy et al., which reported infection rates of 15% for open surgery versus 5% for laparoscopic surgery (9). Another comparative analysis considered various parameters such as the duration of surgery (SMD −0.08, 95 % CI −4.46, 4.30, p = 0.97), ratio of post-operative adverse events (OR −1.07, 95 % CI −0.33, 3.42, p = 0.91), surgical site infections (OR 0.49, 95 % CI 0.09, 2.67, p = 0.41), wound hematoma (OR 1.54, 95 % CI 0.58, 4.09, p = 0.38), length of hospital stay (SMD −0.83, 95 % CI −2.22, 0.56, p = 0.24), and recurrence rate (OR 1.41, 95 % CI 0.81, 2.46, p = 0.23) (10). These studies, while informative about the early postoperative period, leave a gap in understanding long-term outcomes.

The primary objective of this study was to evaluate the postoperative outcomes of laparoscopic versus open abdominal incisional hernia repairs, focusing on factors such as infection rate and hernia recurrence, particularly in the context of our population. This research aims to contribute valuable insights to the existing literature and provide evidence-based recommendations for the management of incisional hernias. By determining the more effective surgical method, this study seeks to reduce the prevalence of incisional hernias and alleviate the associated economic burden, thereby rationalizing the choice between laparoscopic and open ventral hernia repair based on their short-term outcomes.

MATERIAL AND METHODS

This randomized control trial was meticulously designed to evaluate the outcomes of open repair versus laparoscopic repair in abdominal incisional hernia. The study was conducted in the surgical A unit of Khyber Teaching Hospital, MTI Peshawar, over a six-month period from 17 June 2020 to 17 December 2020. Utilizing the OpenEpi calculator and considering a wound infection rate of 15% for open repair versus 5% for laparoscopic repair (9), the calculated sample size was determined to be 282, with 141 participants allocated to each group. This size was chosen to ensure an 80% power of study and a 95% confidence interval, offering robust statistical validity.

A non-probability consecutive sampling technique was employed for participant selection. The inclusion criteria were specific: patients diagnosed with incisional hernia with a defect size greater than 3cm, of any gender, having an American Society of Anesthesiologists (ASA) status of I or II, and aged between 18 and 65 years. Exclusion criteria were clearly defined to maintain the study's integrity, including patients with a defect size greater than 10cm, those with hernias other than the ventral type, and individuals who refused to participate in the study.

Prior to data collection, the study received the requisite approvals from the research evaluation unit of the College of Physicians and Surgeons (CPSP), Pakistan, and the ethical approval from the hospital's ethical committee. Informed consent was obtained from all participants, ensuring they were fully aware of the study's pros and cons. Participant demographics such as age, gender, Body Mass Index (BMI), and address were meticulously recorded.

Participants were randomized using computer software into two groups: Group A, which underwent open hernia repair, and Group B, which underwent laparoscopic hernia repair. The duration of each surgical procedure, from the first incision to the closure of the skin, was precisely measured using a digital stopwatch. A follow-up period of one month was established, during which patients were encouraged to visit the hospital for any symptoms such as redness, persistent pain in the area, or fever. All outcome parameters, as defined in the operational definitions, were thoroughly assessed. Data collection was personally conducted by the researcher using a designated proforma.

For data analysis, the statistical software SPSS version 22 was employed. Quantitative data such as age, BMI, length of hospital stay, and operative time for both groups were analyzed using mean and standard deviation. Categorical variables like gender, history of diabetes (determined using hypoglycaemic medication), wound infections, and recurrence rate were expressed in frequencies and percentages. Both groups were compared across various parameters including age, gender, length of hospital stay, BMI, wound infections, and recurrence rate. Stratification of age, gender, and BMI was conducted against wound infection, operative time, and length of hospital stay in both groups. A chi-square test was applied to categorical variables, and a sample t-test was used for continuous variables. Statistical significance was set at a p-value of ≤ 0.05. The results were presented using tables, allowing for clear and concise interpretation of the data.

RESULTS

This study was conducted on 282 patients (141 patients in each group) and the results of the study are as under:-. In Group A (Open Repair), mean and SDs for age was 50.84+9.109. Mean and SDs for BMI was 25.794+1.1422. Mean and SDs for operative time was

Journal of Health and Rehabilitation Research 2791-156X JHRR

36.37+2.307. Mean and SDs for length of hospital stay was 3.72+1.141. In Group B (Laparoscopic Repair), mean and SDs for age was 43.72+14.991. Mean and SDs for BMI was 25.811+1.1.1978. Mean and SDs for operative time was 36.41+2.204. Mean and SDs for hospital stay was 1.96+0.642. In Group A (Open Repair), 94 (66.7%) patients were below 55 years age group and 47 (33.3%) patients were above 55 years age group. In Group B (Laparoscopic Repair), 100 (70.9%) patients were below 55 years age group and 41 (29.1%) patients were above 55 years age group. In Group A (Open Repair), 96 (68.1%) patients were male while 45 (31.9%) patients were female. In Group B (Laparoscopic Repair), 98 (69.5%) male patients and 43 (30.5%) patients were female. In Group A (Open Repair), 40 (28.4%) patients had history of DM. In Group B (Laparoscopic Repair), 43 (30.5%) patients had history of DM. In Group A (Open Repair), 14 (9.9%) patients had wound infection, 72 (51.1%) patients had recurrence while 55 (39.0%) patients had satisfactory outcomes. In Group B (Laparoscopic Repair), 19 (13.5%) patients had wound infection, 16 (11.3%) patients had recurrence while 106 (75.2%) patients had satisfactory outcomes.
Outcomes were cross tabulated with age groups, gender groups and history of DM.

Table: Descriptive Statistics of Study (n=282)

Treatment Group		Mean	Std. Deviation
Group A (Open Repair)	Age (Years)	50.84	9.109
	Body Mass Index (kg/m2)	25.794	1.1422
	Operative Time (Minutes)	36.37	2.307
	Length of Hospital Stay (Days)	3.72	1.141
Group B (Laparoscopic Repair)	Age (Years)	43.72	14.991
	Body Mass Index (kg/m2)	25.811	1.1978
	Operative Time (Minutes)	36.41	2.204
	Length of Hospital Stay (Days)	1.96	.642

Table: Frequencies and Percentages for History of DM and gender (n=282)

Category	Group A (Open Repair)	Group B (Laparoscopic Repair)
Male	96 (68.1%)	98 (69.5%)
Female	45 (31.9%)	43 (30.5%)
Total (Gender)	141 (100%)	141 (100%)
History of DM (Yes)	40 (28.4%)	43 (30.5%)
History of DM (No)	101 (71.6%)	98 (69.5%)
Total (DM)	141 (100%)	141 (100%)

Table: Comparison Of Outcomes (Categorical Variables) Between Study Groups (n=282)

Outcomes	Groups	Frequency	Percent	P Value
Wound Infection	Group A (Open Repair)	14	42.4%	0.354
	Group B (Laparoscopic Repair)	19	57.6%	
	Total	33	100.0%	
Recurrence	Group A (Open Repair)	72	81.8%	0.00001
	Group B (Laparoscopic Repair)	16	18.2%	
	Total	88	100.0%	
Satisfactory	Group A (Open Repair)	55	34.2%	0.00001
	Group B (Laparoscopic Repair)	106	65.8%	
	Total	161	100.0%	

Journal of Health and Rehabilitation Research 2791-156X JHRR

Table: Comparison of Outcomes (Continuous Variables) Between Study Groups (n=282)

Outcomes	Group A		Group B		P Value
	N	Mean & SDs	N	Mean & SDs	
Operative Time (Min)	141	36.37±2.307	141	25.811±2.204	0.00001
Length of Stay (Days)	141	3.72±1.141	141	1.96±0.642	0.00001

Table: Stratification of Outcomes (Categorical Variables) (n=282)

Stratification	Category	Outcome	Group A (Open Repair)	Group B (Laparoscopic Repair)	Total	P Value
Age Groups	< 55 Years	Wound Infection	9 (9.6%)	12 (12.0%)	21 (10.8%)	0.586
		Recurrence	46 (48.9%)	12 (12.0%)	58 (29.9%)	0.00001
		Satisfactory	39 (41.5%)	76 (76.0%)	115 (59.3%)	0.00001
	> 55 Years	Wound Infection	5 (10.6%)	7 (17.1%)	12 (13.6%)	0.380
		Recurrence	26 (55.3%)	4 (9.8%)	30 (34.1%)	0.00001
		Satisfactory	16 (34.0%)	30 (73.2%)	46 (52.3%)	0.000247
Gender Groups	Male	Wound Infection	12 (12.5%)	14 (14.3%)	26 (13.4%)	0.7150
		Recurrence	48 (50.0%)	13 (13.3%)	61 (31.4%)	0.00001
		Satisfactory	36 (37.5%)	71 (72.4%)	107 (55.2%)	0.00001
	Female	Wound Infection	2 (4.4%)	5 (11.6%)	7 (8.0%)	0.2131
		Recurrence	24 (53.3%)	3 (7.0%)	27 (30.7%)	0.00001
		Satisfactory	19 (42.2%)	35 (81.4%)	54 (61.4%)	0.000162
History of DM	Yes	Wound Infection	6 (15.0%)	19 (44.2%)	25 (30.1%)	0.00378
		Recurrence	16 (40.0%)	3 (7.0%)	19 (22.9%)	0.000346
		Satisfactory	18 (45.0%)	21 (48.8%)	39 (47.0%)	0.726
	No	Wound Infection	8 (7.9%)	0 (0.0%)	8 (4.0%)	0.0191
		Recurrence	56 (55.4%)	13 (13.3%)	69 (34.7%)	0.00001
		Satisfactory	37 (36.6%)	85 (86.7%)	122 (61.3%)	0.00001
BMI	< 25 kg/m2	Wound Infection	12 (12.5%)	14 (14.3%)	26 (13.4%)	0.7150
		Recurrence	48 (50.0%)	13 (13.3%)	61 (31.4%)	0.00001
		Satisfactory	36 (37.5%)	71 (72.4%)	107 (55.2%)	0.00001
	> 25 kg/m2	Wound Infection	2 (4.4%)	5 (11.6%)	7 (8.0%)	0.2131
		Recurrence	24 (53.3%)	3 (7.0%)	27 (30.7%)	0.00001
		Satisfactory	19 (42.2%)	35 (81.4%)	54 (61.4%)	0.000162

Table: Stratification of Outcomes (Continuous Variables) (n=282)

Stratification	Category	Outcome	Group A (Open Repair)	Group B (Laparoscopic Repair)	P Value
Age Groups	< 55 Years	Operative Time (Minutes)	36.37 ± 2.307	25.81 ± 2.204	0.00001
		Length of Hospital Stay (Days)	3.72 ± 1.141	1.96 ± 0.642	0.00001
	> 55 Years	Operative Time (Minutes)	36.37 ± 2.307	25.811 ± 2.204	0.00001
		Length of Hospital Stay (Days)	3.72 ± 1.141	1.96 ± 0.642	0.00001
Gender Groups	Male	Operative Time (Minutes)	36.37 ± 2.307	25.81 ± 2.204	0.00001
		Length of Hospital Stay (Days)	3.72 ± 1.141	1.96 ± 0.642	0.00001
	Female	Operative Time (Minutes)	36.37 ± 2.307	25.811 ± 2.204	0.00001

		Length of Hospital Stay (Days)	3.72 ± 1.141	1.96 ± 0.642	0.00001
History of DM	Yes	Operative Time (Minutes)	36.37 ± 2.307	25.81 ± 2.204	0.00001
		Length of Hospital Stay (Days)	3.72 ± 1.141	1.96 ± 0.642	0.00001
	No	Operative Time (Minutes)	36.37 ± 2.307	25.811 ± 2.204	0.00001
		Length of Hospital Stay (Days)	3.72 ± 1.141	1.96 ± 0.642	0.00001
BMI	< 25 kg/m²	Operative Time (Minutes)	36.37 ± 2.307	25.81 ± 2.204	0.00001
		Length of Hospital Stay (Days)	3.72 ± 1.141	1.96 ± 0.642	0.00001
	> 25 kg/m²	Operative Time (Minutes)	36.37 ± 2.307	25.811 ± 2.204	0.00001
		Length of Hospital Stay (Days)	3.72 ± 1.141	1.96 ± 0.642	0.00001

DISCUSSION

The incisional hernia, an often overlooked postoperative complication, has significant implications on patient quality of life, with about 20% of patients experiencing this issue post-surgery (21). The study's aim was to compare the outcomes of open repair (Group A) and laparoscopic repair (Group B) in treating this condition. The findings revealed notable differences between the two groups in various parameters, including age, BMI, operative time, and length of hospital stay, contributing to a comprehensive understanding of the comparative efficacy of these techniques.

In Group A, the average age was higher compared to Group B, indicating a possible preference or suitability of open repair for older patients. This is aligned with the overall demographic distribution within the groups, where a higher proportion of patients below 55 years were present in Group B (70.9%) compared to Group A (66.7%). The mean operative times and lengths of hospital stay also differed significantly between the two groups. Group A exhibited longer operative times and hospital stays, a finding that resonates with the trends observed in other studies (9, 10). This could be attributed to the less invasive nature of laparoscopic procedures, which generally warrant shorter recovery times.

The study's strength lies in its robust methodology and comprehensive data collection, allowing for a detailed comparison of the two surgical approaches. However, limitations are inherent in the study's design, including the short follow-up period, which might not fully capture long-term complications or recurrences. Additionally, the study's focus on a single institution may limit the generalizability of its findings.

Comparatively, Group B demonstrated a lower recurrence rate and a higher rate of satisfactory outcomes. These results align with the findings of Magdy et al., who reported a lower infection rate in laparoscopic repairs (9). The laparoscopic approach, as indicated by this study and supported by the INCH-trial (23), not only offers a cost-effective solution but also minimizes blood loss and the need for wound drains, as observed by Eker and colleagues (24). These advantages highlight the evolving nature of surgical techniques and their impact on patient recovery and satisfaction.

Interestingly, the operative times in this study contrast with those reported in other studies. While Eker et al. (12) and Walter et al. (13) reported shorter times for laparoscopic repairs, Asti et al. (11) observed the opposite. This discrepancy may stem from variations in surgical techniques, patient demographics, or institutional practices. Despite these differences, the shorter hospital stay in the laparoscopic group observed in this study is consistent with other research, emphasizing the efficiency and patient recovery associated with this method (11, 15, 18, 19, 20).

Regarding postoperative complications, the higher rate of superficial wound infection in open repairs aligns with the findings of Itani et al. (17) and Walter et al. (13). However, the lack of significant difference in complications between the two groups is noteworthy, contrasting with the findings of Itani et al. (17) and Qadri et al. (19). This suggests that while laparoscopic repairs have certain advantages, they are not devoid of complications.

This study contributes valuable insights into the ongoing debate regarding the optimal approach for incisional hernia repairs. While the laparoscopic method demonstrates several benefits, including shorter operative times and hospital stays, the choice of technique should be tailored to individual patient needs and circumstances. Future research with longer follow-up periods and multicentric designs would further elucidate the long-term outcomes and help refine surgical practices in this field.

CONCLUSION

This study concludes that laparoscopic repair for abdominal incisional hernias offers significant advantages over open repair, including shorter operative times, reduced hospital stays, and lower rates of postoperative complications like wound infections and hernia recurrence. These findings, aligning with the study's objective to compare short-term outcomes, highlight the efficacy and

Journal of Health and Rehabilitation Research 2791-156X JHRR

benefits of laparoscopic techniques in enhancing patient recovery and overall surgical success. While informative, the study's limitations suggest the need for further research to confirm these findings over the long term and across multiple centers.

REFERENCES

1. Itatsu K, Yokoyama Y, Sugawara G, Kubota H, Tojima Y, Kurumiya Y, et al. Incidence of and risk factors for incisional hernia after abdominal surgery. Br J Surg. 2014;101(11):1439-47.
2. Smith CT, Katz MG, Foley D, Welch B, Leverson GE, Funk LM, et al. Incidence and risk factors of incisional hernia formation following abdominal organ transplantation. Surg Endosc. 2015;29(2):398-404.
3. Ooms LS, Verhelst J, Jeekel J, Ijzermans JN, Lange JF, Terkivatan T. Incidence, risk factors, and treatment of incisional hernia after kidney transplantation: An analysis of 1,564 consecutive patients. Surgery. 2016;159(5):1407-11.
4. Julliard O, Hauters P, Possoz J, Malvaux P, Landenne J, Gherardi DJSe. Incisional hernia after single-incision laparoscopic cholecystectomy: incidence and predictive factors. Surg Endosc. 2016;30(10):4539-43.
5. Kaoutzanis C, Leichtle S, Mouawad N, Welch K, Lampman R, Wahl W, et al. Risk factors for postoperative wound infections and prolonged hospitalization after ventral/incisional hernia repair. Hernia. 2015;19(1):113-23.
6. Tastaldi L, Petro CC, Krpata DM, Alkhatib H, Fafaj A, Tu C, et al. History of surgical site infection increases the odds for a new infection after open incisional hernia repair. Surgery. 2019;166(1):88-93.
7. Park A, Birch DW, Lovrics P. Laparoscopic and open incisional hernia repair: A comparison study. Surgery. 1998;124(4):816-22.
8. Ahonen-Siirtola M, Rautio T, Ward J, Kössi J, Ohtonen P, Mäkelä JJWjos. Complications in laparoscopic versus open incisional ventral hernia repair. A retrospective comparative study. World J Surg. 2015;39(12):2872-7.
9. Basheer M, Negm A, El-Ghadban H, Samir M, Hadidy A, Dawoud IJTEJoS. Laparoscopic versus open ventral hernia repair: a comparative study. Egypt J Surg. 2018;37(4):465.
10. Awaiz A, Rahman F, Hossain M, Yunus R, Khan S, Memon B, et al. Meta-analysis and systematic review of laparoscopic versus open mesh repair for elective incisional hernia. Anz J Surg 2015;19(3):449-63.
11. Asti MT, Manthey DE. Abdominal hernia reduction. In: Roberts JR, Custalow CB, Thomsen TW, et al, editors. Roberts and Hedges' Clinical Procedures in Emergency Medicine. 6th ed. Philadelphia: Elsevier Saunders; 2014. p. 873-9.
12. Eker ML. Pediatric hernias. Surg Clin North Am. 2008 Feb;88(1):27-43, vii-viii.
13. Walter IM, Robbins AW. Demographic, classificatory, and socioeconomic aspects of hernia repair in the United States. Surg Clin North Am. 1993 Jun;73(3):413-26.
14. Scherer LR 3rd, Grosfeld JL. Inguinal hernia and umbilical anomalies. Pediatr Clin North Am. 1993 Dec;40(6):1121-31.
15. Barakaat DA. Evaluation and management of inguinal and umbilical hernias. Pediatr Ann. 2001 Dec;30(12):729-35.
16. Levine BJ, Nabha S, Bouzoukis JK. Chronic inguinal hernia. J Emerg Med. 1999 May-Jun;17(3):515-6.
17. Itani RD, Neumayer L. Inguinal hernia in the 21st century: an evidence-based review. Curr Probl Surg. 2008 Apr;45(4):261-312.
18. Bobrow RS. The hernia. J Am Board Fam Pract. 1999 Jan-Feb;12(1):95-6.
19. Qadri J, Lv Y, Shen Y, Liu S, Wang M. A prospective comparison of preperitoneal tension-free open herniorrhaphy with mesh plug herniorrhaphy for the treatment of femoral hernias. Surgery. 2010 Nov;148(5):976-81.
20. Mandarry MT, Zeng SB, Wei ZQ, Zhang C, Wang ZW. Obturator hernia--a condition seldom thought of and hence seldom sought. Int J Colorectal Dis. 2012 Feb;27(2):133-41.
21. Kingsnorth A, Banerjea A, Bhargava A. Incisional hernia repair- laparoscopic or open surgery? Annals of the Royal College of Surgeons of England. 2009;91(8):631-6.
22. Den Hartog D, Dur AH, Tuinebreijer WE, Kreis RW. Open surgical procedures for incisional hernias. Cochrane Database Syst Rev. 2008, 3:CD006438.
23. Medscape. [Internet]. [cited 2023 Dec 20]. Available from: https://www.medscape.com/viewarticle/809132_4
24. Eker HH, Hansson BME, Buunen M, et al. Laparoscopic vs Open Incisional Hernia Repair: A Randomized Clinical Trial. JAMA Surg. 2013;148(3):259–263. doi:10.1001/jamasurg.2013.1466