

Open Versus Laparoscopic Surgery for Restoration of Incisional Hernia: A Case- Control Study

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ABSTRACT

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KEYWORDS

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Background and Aim: Incisional hernia is one of the most notable surgical complications that can be repaired either laparoscopically or by open surgery. This study aims to compare the surgery- related factors and surgical outcomes between these two groups.

Methods: This is a retrospective single center study, investigates the surgical outcomes of patients that have underwent either open or laparoscopic surgical repair in a tertiary hospital in Tehran, between 2019- 2020.

Results: 70 patients (35 in each group) enrolled the study. 71.42 % of patients were female and the mean age of total study sample was 53.12 ± 11.66 years. There were significant lower pain score, operation time, and hospitalization length in laparoscopic cohort ($p < 0.05$). There was no significant difference between rates of post- operative complications including seroma, hematoma, surgical site infection, and ileus ($p > 0.05$). Laparoscopic surgery significantly costs more than open surgery ($p < 0.05$). There was no case of recurrence within the 12-months after surgery.

Conclusion: In conclusion, while laparoscopic surgery costs more than open surgery, it is associated with significant decrease in pain score, operation time, and hospitalization length. There is no significant difference between post-operative complications including seroma, hematoma, and surgical site infection among two groups.

INTRODUCTION

Incisional hernia is one of the most notable complications following abdominal surgeries that represents more than 40% of ventral hernias (1). Incisional hernias are more common in women following gynaecologic surgeries and obesity and chronic constipation are other independent risk factors of it (1).

Incisional hernias can be complicated by events such as incarceration of abdominopelvic viscera, obstruction of entrapped bowel, or strangulation so they should be repaired (2, 3). Laparoscopic, open, and hybrid procedures are the three surgical approaches to repair them (4, 5).

While all of these techniques are widely accepted there are some controversies about the surgery- related factors and

post- operative complications of each procedure. In this single center case- control study, we aimed to compare the mean operation time, post- operative pain score, hospitalization length, post- operative complications, 12-month recurrence rate, and total cost were factors compared between groups underwent laparoscopic and open incisional hernia repair.

MATERIALS and METHODS

This study case- control study aimed to compare the surgical outcomes, cost, and recurrence rate following laparoscopic and open reconstruction surgery of incisional hernia.

Adult patients (age range: 18-80 years) with incisional hernia sizing 3-15 cm in the anterior abdominal wall candidate for



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surgical reconstruction, referring to a tertiary hospital in Tehran, between 2019-2020 were eligible for study inclusion. Patients with any contraindication of pneumoperitoneum or general anaesthesia, recurrent incisional hernia, immunodeficiency, intestinal rupture, intestinal obstruction, incarcerated/ strangulated hernia, or unwillingness to sign the written informed consent were excluded.

Mean operation time, post-operative pain score, and hospitalization length, post-operative complications including seroma, hematoma, surgical site infection, 12-month recurrence rate, and total cost were factors compared between two groups.

Ethical Consideration

This study was performed in line with the principles of the Declaration of Helsinki. The study protocol was approved by the research ethics committee of Shahid-Beheshti University of Medical Sciences and registered by code IR.SBMU.MSP.REC.1399.468. After complete explanation of treatment options, advantages, and disadvantages of each method, the study protocol, and clarification of random allocation among treatment groups, written informed consent for study participation and study result publication was obtained from the eligible patients.

Statistical analysis

Data were analyzed using a statistical package for social

sciences (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp). The quantitative and qualitative variables are expressed as mean \pm standard deviation (SD) and percentage, respectively. The normal distribution of quantitative data was assessed by Shapiro-Wolok test. T test, chi-square, and their non-parametric equivalents including Mann-Whitney test, were used for parametric and non-parametric data analysis. The level of significance was considered as $P < 0.05$.

RESULTS

A total number of 70 patients (35 in each group) enrolled the study. 71.42 % of patients were female and the mean age of total study sample was 53.12 ± 11.66 years. There were significant differences between pain score, operation time, and hospitalization length, between two groups, in favor of the laparoscopic cohort ($p < 0.05$). There was no significant difference between rates of post-operative complications including seroma, hematoma, surgical site infection, and ileus ($p > 0.05$). Laparoscopic surgery significantly costs more than open surgery ($p < 0.05$). Table 1 provides more details about demographics, surgery-related outcomes, and complications of each cohort. Of note, there was no report of recurrence after 12 months of follow-up.

Table 1. Demographics, surgery-related outcomes, and total cost of surgery among laparoscopic and open surgery cohorts.

	Laparoscopic surgery cohort (n= 35)	open surgery cohort (n= 35)	P-value
Mean age (years \pm SD)	53.48 \pm 11.46	52.77 \pm 11.8	0.79
Male: Female ratio	11: 24	9: 26	0.59
Post-operative pain score	3.74 \pm 1.57	4.31 \pm 1.30	0.03*
Mean surgery time (min)	85.71 \pm 10.37	120.71 \pm 15.25	0.00*
Mean hospitalization (day)	2.25 \pm 0.44	2.62 \pm 0.68	0.01*
Seroma (n)	9	4	0.12
Surgical Site Infection (n)	1	4	0.35
Hematoma (n)	1	2	1.00
Ileus (n)	2	4	0.67
Total Cost	7.42 \pm 0.34	1.36 \pm 0.19	0.00*

DISCUSSION

According to our results, while laparoscopic surgery costs more than open surgery, it was associated with significant decrease in pain score, operation time, and hospitalization

length. There was no significant difference between post-operative complications including seroma, hematoma, and surgical site infection among two groups. There was no recurrence within the 12-month following surgery.

In general, our results are aligned with previous similar studies but there are some variations between studies. While our study and other studies including Leithy et al. reported that laparoscopic procedure is associated with less post-operative pain, other studies such as Arer et al. and Alsubaiee et al. stated there was no significant difference between two groups post-operative pain and patient satisfaction (6-8). Of note, Forester et al., reported more intense post-operative pain and higher narcotic use of narcotics following laparoscopic procedure (9).

Incidence of post-operative complications is another area of controversy. Although we did not find any significant difference between post-operative complications including seroma, hematoma, surgical site infection among two groups, and some studies such as Saad et al. supported our results (10), other studies such as Lodha et al. found significant lower post-operative complications in the laparoscopic cohort (11).

Similar to our findings, other studies reported less mean operation time and shorter hospitalization length in the laparoscopic cohort (12).

Rate of recurrence also varies between studies. Our study did not find any case of recurrence following 12 months after surgery and other studies also supported our results within both the same follow up duration and long term (13-15). While, Yang et al. reported higher rates of recurrence following laparoscopic hernia repair (16), studies such as Henriksen et al. reported lower rates of recurrence following laparoscopic hernia repair (17).

We highly suggest further studies to be designed as multi center, randomized trials with longer follow up.

CONCLUSION

In conclusion, while laparoscopic surgery costs more than open surgery, it is associated with significant decrease in pain score, operation time, and hospitalization length. There is no significant difference between post-operative complications including seroma, hematoma, and surgical site infection among two groups.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was performed in line with the principles of the Declaration of Helsinki. The study protocol was approved by the research ethics committee of Shahid Beheshti University of Medical Sciences and registered by code IR.SBMU.MSP.REC.1399.468. After complete explanation of treatment options, advantages, and disadvantages of each method, the study protocol, and clarification of random allocation among treatment groups, written informed consent for study participation was obtained from the eligible patients.

CONSENT FOR PUBLICATION

All participants signed the written informed consent for the anonymous data publication. This consent was also reviewed by the research ethics committee of Shahid Beheshti University of Medical Sciences, approved, and registered as an appendix of the study registered by code IR.SBMU.MSP.REC.1399.468.

AVAILABILITY OF DATA

All data analyzed during this study are included in this published article. More details would be provided by the corresponding author upon request.

AUTHOR CONTRIBUTIONS

NM and BS conceptualized and supervised the study. BG selected the patients and BS randomized them into the groups. HH performed surgeries and analyzed the data. YF wrote the primary draft. All authors read and approved the manuscript.

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CONFLICT OF INTEREST

The authors explicit no conflicts of interest.

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