



Prevalence and Risk Factors for Surgical Complications in Ventral Hernia Repair

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Abstract

AIM: The present study aimed to identify risk factors for the development of complications following the surgery for ventral hernia.

Material and Methods: This was a single-centre, hospital-based, retrospective, observational study. The data relating to all patients who underwent any type of surgery at the JK, Hospital Bhopal is maintained by the institute’s medical records department. For the present study, we analysed the data of all the patients who underwent ventral hernia repair between January 2020 and December 2022 at JK Hospital, Bhopal. For this study, we limited the follow-up time for the development complications to three months from the date of surgery.

Results: A total of 30 (24.2%) out of 124 patients who underwent ventral hernia repair at the institute developed complications within 3 months of surgery. Further, according to the Clavien-Dindo classification- 22 patients had Clavien type I–IIIa complications, Clavien type IIIb complications, and 1 patient each had Clavien type IV and Clavien type V complications. Among the analysed risk factors- age, hernia size >63 mm, concomitant GI surgery, being obese (BMI >30), presence of comorbidities, and postoperative hospital stay > 7 days were significantly associated with the development of complications. Further, the gender of patients, smoking, type of surgery, and ASA grade were not significantly associated with the development of complications.

Conclusions: Several risk factors increase the likelihood of complications after hernia surgery. Both patients and surgeons should be aware of these risk factors and discuss them during consultation before undergoing surgery. By doing so, they can make an informed decision about the best course of treatment and take steps to minimize the risk of complications.

Keywords: Ventral Hernia, Surgery, Patients

Introduction

Ventral hernia is the second most common type of hernia. Ventral hernia (a fascial rupture) can develop spontaneously as a main defect, at the site of a prior surgical incision, or as a result of severe trauma. With an incidence of 2%–13%, incisional hernias are one of the most frequent types of ventral hernia following laparotomies. The onset of ventral hernias is known to be predisposed by male gender, advanced age, compromised collagen synthesis, obesity, and smoking. Hernia formation can also be influenced by a number of ventral procedures, surgical techniques, and post operative consequences like wound infections. Although ventral hernias can be asymptomatic, they are frequently accompanied by side effects like pain, discomfort from cosmetic procedures, bowel obstruction, and incarceration. Due to the potential of bowel incarceration, surgery should be considered for any hernias producing severe symptoms.

One of the most frequently carried out surgical operations globally is the correction of a ventral hernia. Despite the enormous number of operations, the surgical community struggles to agree on the most effective method for ventral hernia repair. There are numerous open and laparoscopic surgical methods for treating ventral hernias. The traditional methods involve open procedures where a fascial defect is either sutured or mesh-repaired. The use of laparoscopic procedures has grown

significantly over the past ten years. The time spent in the hospital is shorter, the postoperative recovery is quicker, and the overall complication rate is lower in laparoscopic procedures (10%-32% vs 29%-48%), according to various studies comparing the outcomes of open and laparoscopic surgeries. Overall, there is a morbidity of around 23% and a mortality of 0.05% associated with surgical repair of ventral hernia.

When evaluating the effectiveness of any type of hernia repair, recurrence is traditionally the key result. Recurrence rates have decreased recently as a result of the development of synthetic reinforcing mesh. The issue of recurrence has not, however, been fully resolved by the use of synthetic mesh. In fact, the current rate of 12.3% for reoperations within five years is high given that the true recurrence rate can be four to five times higher. Additionally, prosthesis-related side effects like bowel obstruction, persistent site infection, and fistula formation have been brought on by mesh repair. These issues negate the advantages of a lower recurrence rate compared to suture repair in part. In terms of surgical site problems, minimally invasive procedures are advantageous in the short term. Additionally, after laparoscopic repair, there have been reports of higher rates of serious complications, such as bowel injury, adhesions, and fistulae. These issues are likely a result of the IPOM repair procedure requiring access to the abdominal cavity. In light of the aforementioned facts, we conducted the present study with the aim to assess the prevalence of complications within three months of ventral hernia repair and identify its determinants among a cohort of patients who underwent ventral hernia repair at our institute over a period of three years. In addition, we sought to understand how surgical technique affected the outcome of ventral hernias and how rates of complications varied between different operative techniques.

Material and methods

Study Design

This was a single-center, hospital-based, retrospective, cohort, observational study(17,18).

Study Setting

Department of Surgery, LN Medical College, and affiliated JK Hospital, Bhopal, Madhya Pradesh.

Study Duration

36 months- January 2020 to December 2022.

Study Outcomes

Development of complications within 3 months of surgery including surgical site infection, readmission to hospital, and recurrence. The complications were categorised according to the Clavien-Dindo classification.

Participants recruitment

The records of participants that fulfilled the following criteria were included in the present study:

Inclusion

- Patients \geq 18 years
- Any type of ventral hernia
- Patient with at least three months of follow up
- Patients with complete case record

Exclusion Criteria

- Recurred ventral hernia
- Hernia other than ventral hernia
- Divarication of recti
- Patients with incomplete case records
- Patients with less than 3 months of follow up.

Sample Size

All patients who underwent any type of surgical repair for any type of ventral hernia between January 2020 and December 2022 and fulfilled the selection criteria were enrolled into the present study.

Following this the medical records of a total 158 patients were included in the present study.

Sampling Methodology

For including the medical records of the participants for present study, we employed the non-probability, convenience, purposive sampling methodology (22).

Data Collection

The data were collected in a paper-based proforma designed to collect the data on the necessary variables for the present study.

Statistical Analysis Plan

The primary outcome was the prevalence of different types of complications among participants within three months of surgery. Secondary outcomes were the associated risk factors viz. demographic, clinical, and surgical parameters associated with the development of complications. For the continuous data, the author calculated the mean, median, mode, and standard deviation. For discrete data, the author calculated and reported frequency, proportion, and percentage(25,26). We conducted binary backwards logistic regression analysis to identify factors significantly associated with the development of complications.

Funding

The present study did not receive any financial support.

Result

A total of 158 patients with ventral hernia underwent surgery at the institute during the period of the study, however, the records of 34 patients were excluded from the data analysis as they did not fulfil the selection criteria for the present study.

Among the total 124 patients included in the study 35.5% (44) were diagnosed as having epigastric hernia, 28.2% (35) umbilical hernia, 19.4% (24) incisional hernia and 16.9% (21) paraumbilical hernia. The socio-demographic parameters of the 124 participants included in the present study are shown in Table 1. The mean age of the participants was 52.7 years and 41.9% of participants

were female. The mean and the median BMI of the participants was 26.7 and 28 kg/m². A maximum of 62.9% of the participants were categorised as belonging to ASA class II, 41.1% participants consumed tobacco. The mean size of the hernia was 63 millimetres ranging from 43 to 104 millimetres.

Variable	n	%
Gender		
Male	72	58.1
Female	52	41.9
Age		
<30	22	17.7
31-45	30	24.2
46-60	38	30.6
>60	34	27.4
ASA Grade		
Class I	40	32.3
Class II	78	62.9
Class III	4	3.2
Class IV	2	1.6
Tobacco Consumption		
Tobacco Consumption	51	41.1
BMI (median)		
BMI (median)	28	
Mean Hernia size (mm)		
Mean Hernia size (mm)	63	

Method of repair		
	n	%
Anatomical Repair	25	20.2
In-Lay	24	19.4
On-Lay	71	57.3
IPOM	4	3.2%
Type of Complications as per Clavien-Dindo Classification		
No complication	94	75.8
Clavien I-IIIa	22	17.8
Clavien IIIb	6	4.8
Clavien IV	1	0.8
Clavien V	1	0.8

There was no mortality during or within three months of hernia surgery. Furthermore, there were no instances of hernia recurrence within three months of surgery.

However, 13 (10.4%) patients were readmitted to the hospital within three months of discharge from the hospital. Of the total 124 patients, 30 (24.2%) patients developed complications within three months of surgery- 17.8% developed Clavien type I-IIIa complications, 4.8% developed Clavien type IIIb complications, and 1 patient each developed Clavien type IV and V complications.

Independent variable	Odd's Ratio	95% CI	P-value
Male	1.20	0.93 -1.54	0.084
Age	1.29	1.08- 1.67	0.043
Hernia size > Mean	2.87	1.43 -3.43	0.034
Concomitant GI Surgery	2.59	1.81 – 3.27	0.012
BMI > 30	1.34	1.12- 1.92	0.038
Tobacco consumption	1.12	0.82 -1.47	0.067
Laparoscopic	0.93	0.84 – 1.13	0.092
ASA Class >II	1.62	0.82 – 2.34	0.075
Comorbidities	1.82	1.34 – 2.45	0.024
Hospital of stay > 7 days	2.21	1.67 – 2.87	0.008

Table 3 illustrates the result of the logistic regression to identify the risk factors for the development of complication within 3 months of surgery. Among the analysed risk factors- age, hernia size >63 mm, concomitant GI surgery, being obese (BMI >30), presence of comorbidities, and postoperative hospital stay > 7days were significantly associated with development of complications. Further, gender of patients, smoking, type of surgery, and ASA grade were not significantly associated with development of complications.

Discussion

Hernia surgery is one of the most common surgical procedure conducted across the world. It involves repairing a hernia i.e., an organ or fatty tissue protruding through a weak spot in the surrounding muscle or tissue. Although hernia surgery is generally safe and effective, it can sometimes result in complications, such as infection, bleeding, or recurrence of the hernia. Several factors can

increase the risk of complications after hernia surgery. In the present study, we explored the prevalence of different complications and identified risk factors for the development of complications after hernia surgery.

There was no mortality after surgery in the present study. The period of study coincided with the corona pandemic that disrupted the health system greatly. Moreover, this study was conducted at a single hospital and there were multiple waves of Covid-19. These two factors contributed to a smaller sample size of the present study. Lindmark et al., (2018) measured the complication rates among 408 patients who underwent surgical repair for ventral hernia. They also did not report any mortality among their cohort of patients. However, Lindmark M et al., (2022) in a separate but much larger study that analysed data of patients over a period of 10 years involving data of 45,676 patients- the mortality rate following hernia surgery was 0.01% (total 43 patients) died from complications within 30 days after index surgery. In the present study, out of total 124 patients, 30 (24.2%) patients developed complications within three months of surgery. Lindmark et al., (2018) reported that eighty-one patients (20%) out of 408 suffered a complication; 58 (14%) were classified as Clavien classes I-III A. Twenty-one of 408 (5%) patients had an infection. Seven of the 81 (9.2%) had a severe complication (Clavien >III A), these being two anastomotic leakages, one enterocutaneous fistula, three cases of skin necrosis and two infections.

One of the primary risk factors for complications after hernia surgery is age. Elderly patients are at a higher risk of complications due to their weakened immune systems, reduced muscle strength, and pre-existing medical conditions. Studies have shown that patients over the age of 65 are at a significantly higher risk of developing complications after hernia surgery than younger patients.

In the present study, age of the patients was significantly associated with the development of complications (OR- 1.19; 95% CI 1.08- 1.67; p-value= 0.043). Lindmark et al., (2018) also reported that age of the patients was significantly associated with the development of complications.

The size and location of the hernia can also play a role in the risk of complications. Larger hernias may require more extensive surgery and may be more prone to complications such as bleeding, infection, or mesh displacement. Similarly, hernias located in areas with more significant strain, such as the abdomen, may be more prone to recurrence after surgery. In the present study, we also observed that hernia size greater than the mean size was associated with two times higher odds of development of complications (OR- 2.87; 95% CI 1.43 - 3.43; p-value= 0.043). Several other authors have also reported that surgery performed for larger hernia were associated with development of complications.

Certain medical conditions can increase the risk of complications after hernia surgery. Patients with chronic obstructive pulmonary disease (COPD), diabetes, or heart disease may be at higher risk of respiratory or cardiac complications. Similarly, patients on blood-thinning medications may have an increased risk of bleeding during or after surgery. We also observed that patients with multiple chronic diseases at the time of surgery had higher odds of developing complications. Obesity is another significant risk factor for complications after hernia surgery. Obese patients have a higher risk of complications such as infection, wound healing problems, and respiratory complications. Additionally, the presence of excess fat in the abdominal area can make hernia repair more challenging and increase the risk of recurrence. We also observed that BMI > 30 kg/sq.

metres was associated with development of complications.

Smoking is a risk factor for a wide range of surgical complications, including those associated with hernia repair. Smoking can impair wound healing, increase the risk of infection, and prolong recovery time. Patients who smoke are advised to quit smoking for at least four weeks before and after surgery to minimize the risk of complications. However, the tobacco consumption (smoking or chewing) was not associated with development of complications (p-value = 0.067). The type of hernia being repaired can also impact the risk of complications after surgery. For instance, incisional hernias, which occur when a hernia develops at the site of a previous surgical incision, are more challenging to repair and carry a higher risk of complications than inguinal hernias, which occur in the groin area. However, because of smaller sample size for the present study, we could not calculate the complication rate for different types of ventral hernia.

In conclusion, several risk factors can increase the likelihood of complications after hernia surgery. Both patients and surgeons should be aware of these risk factors and discuss them during consultation before undergoing surgery. By doing so, they can make an informed decision about the best course of treatment and take steps to minimize the risk of complications. Obesity, diabetes, size of hernia and unhealthy tobacco consumption a few of these issues that may be changeable. Therefore, reducing these risk variables before to surgery may enhance patient outcomes and lower the costs of care related to these problems. This in-depth knowledge of the relationships between particular comorbidities and surgical recovery may enable the creation of a focused pre operative optimisation programme, which is presently the focus of statewide quality improvement efforts. When

assessing the need for ventral hernia repair, many different factors must be taken into account. Delaying repair may result in a larger hernia to repair and a higher risk of problems because hernias frequently expand in size over time. Therefore, the hazards associated with potential hernia expansion over time should be weighed against the dangers associated with waiting for changes in a patient's condition, such as waiting for weight loss.

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