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RESEARCH ARTICLE
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PREVALENCE AND RISK FACTORS OF PORT SITE HERNIA AFTER LAPAROSCOPIC SURGERY

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ABSTRACT

Introduction: Laparoscopic surgery, also known as minimally invasive surgery (MIS) is the most advancing surgical method. Although laparoscopic surgery has many benefits compared to open surgery but it is not without risks. These include complications from the pneumoperitoneum, surgical instruments, infection and hernia. Other possible issues include bleeding and injuries to internal organs, such as the bile duct, which can cause bile leakage, liver or any other organ depending upon site of surgery. Although with advancements in minimally invasive surgery, the occurrence of port site hernia(PSH) remains a concern, as it can lead to significant morbidity. Although the incidence of hernia is less with laparoscopic procedure but it can be managed if risk factors are identified earlier and managed for preventing morbidity.

Methodology: The study was conducted in Department of Surgery, Allied Hospital, Faisalabad. Through non probability consecutive sampling 360 patients were included in study. The factors like age, gender, BMI and site were assessed for risk factors of port site hernia. The chi square test was applied to see any association with risk with p value < 0.05 as significant.

Results: The study showed mean age of 44.74 ± 13.99 years. The majority of patients (56.94%) were between 46 to 70 years, while 43.06% were between 18 to 45 years. This suggests that more than half of the patients in the study were in the older age group (46-70). Out of 360 patients, 133 (36.94%) were male, and 227 (63.04%) were female. Among all patients 12 (3.33%) developed a port site hernia after laparoscopic surgery. Most hernias occurred at the umbilical site (58.33%). There was no significant association between age of patients, site, and BMI with port site hernia.

Conclusion: The port site hernia are less prevalent among patients undergoing laparoscopic surgeries. Although this study showed no significant relation between risk factors and port site hernia but the study highlights key trends in demographics and complication rates associated with laparoscopic surgery, specifically pertaining to port site hernias.

Keywords: Port site hernia, Laparoscopic surgery, Risk factors, BMI.

INTRODUCTION

Laparoscopic surgery, also known as minimally invasive surgery (MIS) or keyhole surgery, is a contemporary surgical method. Compared to traditional exploratory laparotomy, laparoscopic surgery offers several benefits for patients. These include less pain due to smaller incisions, reduced bleeding, and faster recovery times. The main feature of this technique is the use of a laparoscope—a long fiber optic cable that enables the surgeon to view the affected area by threading it through a small, easily accessible incision. Laparoscopy is the leading and most favored technique for performing various routine and complex surgeries, such as gallbladder, appendix, spleen, and adrenal gland removal, among others. Although laparoscopic methods have become widely used only in recent times, the progress in laparoscopy has been evolving over the past three centuries.

The first step in laparoscopic surgery is gaining access to the abdomen by creating a pneumoperitoneum (inflating the abdomen with gas), which can lead to potential risks such as injuries to internal organs or the abdominal wall. Injuries from the insertion of the trocar (a surgical instrument) are responsible for up to 40% of all complications in laparoscopic procedures. Although laparoscopic surgery offers many benefits compared to open surgery, it is not without risks. These include complications from the pneumoperitoneum (the gas used to inflate the abdomen) and from surgical instruments. Other possible issues include bleeding and injuries to internal organs, such as the bile duct, which can cause bile leakage.

While laparoscopic surgery has many advantages, concerns have been raised about its effects on the heart and lungs. The use of carbon dioxide to create pneumoperitoneum is essential for the procedure but has been shown to cause a temporary decrease in blood flow to the liver. The pressure and duration of pneumoperitoneum can influence the level of liver damage, leading to elevated levels of liver enzymes such as ALT, AST, alkaline phosphatase, GGT, bilirubin, and changes in blood clotting factors like INR.

Despite advancements in minimally invasive surgery, the occurrence of PSH remains a concern, as it can lead to significant morbidity. This study aims to quantify the incidence of PSH and, based on the results, offer recommendations for preventive measures. One such potential preventive strategy is fascia closure following laparoscopic procedures, which may help reduce the risk of developing port-site hernias. By providing data on the prevalence and risk factors of PSH, this study seeks to inform surgical practices and improve patient outcomes.

LITERATURE REVIEW

Laparoscopic surgery is advancing in robotic surgeries, however there are certain complications associated with it. With new advancements it is also necessary to understand the techniques and its associated risk factors for causing the port site hernia.(1) The true incidence of port site hernia is not known as the patients who do not develop the symptoms never report to the surgeons frequently, unless they develop any complication. But with time the prevalence of port site hernia can be observed among follow-up patients.(2) The overall injuries that occur following laparoscopic surgeries involve, GIT (0.6 per 1,000), urinary (0.3 per 1000), bleeding (0.1 per 1,000), and fascio-omentum (0.4 per 1,000).(3)

Several studies have suggested that the risk factors related to port site hernia can be considered as both patient related and the surgical procedure related. As age, gender and weight of patients and also the surgical volume, site of port, size of port and fascia handling during surgical procedures are all risk factors.(4) Also failure to close the fascia of large port sites (10–12-mm port sites) is the cause of increasing incidence of port site hernias.(5)

When considering the site of hernia common in laparoscopic surgery, the umbilical hernia is the most common site due to large bore size and week muscle strength.(6) Also the type of surgery is highly related to hernia as in hysterectomy the incidence of port site hernia specially the umbilical site hernia is very common.(7) The closure technique and fascial defects are also the risk factors of hernia.(8, 9)

Type of surgical procedure is related to port site hernia as laparoscopic cholecystectomy has an overall incidence of 0.69%. Laparoscopic colorectal procedures had the highest incidence of port site hernias of 1.47%.(10)
There may be asymptomatic hernias, that may remain undiagnosed, but with proper follow-up, the incidence of port site hernia is expected to increase. It is not only the hernia but a complicated hernia that is to be diagnosed earlier with follow-up among high risk patients.(11, 12)

METHODOLOGY

The study was conducted in Department of Surgery, Allied Hospital, Faisalabad. From 20th March 2021 to 19th September 2021. Through non probability consecutive sampling 360 patients were included in study. After approval from ethical review board, patients of both gender with age ranging between 18 and 70 who had laparoscopic surgery were included. Purpose of study was discussed with patients who had laparoscopic surgery and fulfill inclusion and exclusion criteria. Informed consent was taken from all patients. Particulars of patient were entered by researcher on a proforma. Follow up for assessment was done for 3 months for each patient. Examination was done for assessment of port site hernia according to guidelines. Data was entered in Statistical Package for Social Sciences (SPSS) version 26. Qualitative data like gender, presence of Port site hernia and site of hernia were presented as frequencies and percentages. Quantitative data like age and body mass index (BMI) of patients were presented as mean and standard deviation. Data was stratified for age, gender, BMI and site to address effect modifier. Post-stratification, chi square was applied to see effect modifier by keeping p value < 0.05 as significant.

RESULTS

The age range of patients was between 18 and 70 years, with an average age of 44.74 ± 13.99 years. The majority of patients (56.94%) were between 46 to 70 years, while 43.06% were between 18 to 45 years. This suggests that more than half of the patients in the study were in the older age group (46-70). Out of 360 patients, 133 (36.94%) were male, and 227 (63.04%) were female. The male-to-female ratio was approximately 1:1.7. The sociodemographic distribution is shown in table 1.

The mean BMI of the patients was 28.05 ± 2.94 kg/m². The majority of patients (60.83%) had a BMI ≥27, whereas 39.17% had a BMI below 27. Out of the 360 patients, 12 (3.33%) developed a port site hernia after laparoscopic surgery as shown in figure 1. Most hernias occurred at the umbilical site (58.33%), followed by the epigastric site (25.0%), with other sites accounting for 16.67%.

Among patients aged 18-45, 4.52% developed port site hernia, while 2.44% of patients aged 46-70 had this complication. The p-value was 0.277, suggesting no statistically significant difference in hernia occurrence based on age. Hernia rates were 2.26% in males and 4.13% in females. The p-value was 0.383, showing no significant difference in port site hernia incidence between genders. The majority of port site hernias were umbilical (58.33%), followed by epigastric (25%) and other sites (16.67%). The p-value for stratification by site was 0.170. The relationship of risk factors with port site hernia are shown in table 2.

Table 1: Frequency distribution of Sociodemographic variables.

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18-45	155	43.06
Age (years)	46-70	205	56.94
Gender	Male	133	36.94
Gender	Female	227	63.06
BMI (kg/m²)	<27	141	39.17
BMI (kg/m²)	≥27	219	60.83

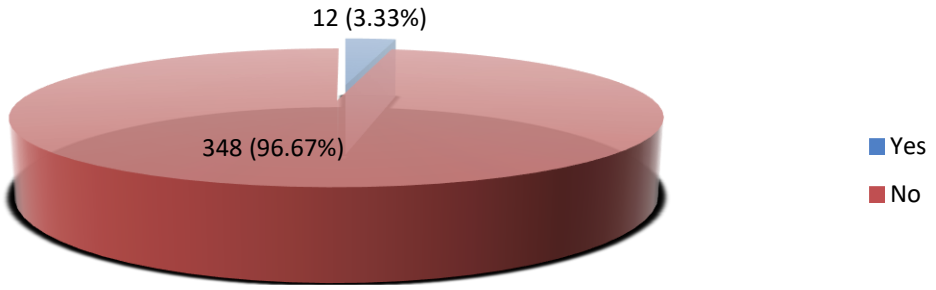

Figure 1: Prevalence of port site hernia in laparoscopic surgery.

Table 2: Association of risk factors with port site hernia in laparoscopic surgery.

Risk factors	Port site hernia	p-value
Age(years)		
18-45	07 (4.52%)	0.277
46-70	05 (2.44%)	
Gender		
Male	03 (2.26%)	0.38
Female	09 (4.13%)	
BMI(kg/m²)		
≤27	05(3.55%)	0.857
>27	07(3.20%)	
Site		
Umbilical	07 (1.94%)	0.17
Epigastric	03 (0.83%)	

DISCUSSION

The findings from this study showed the age distribution of older patients, with over half (56.94%) aged between 46 to 70 years. This showed the increase prevalence of surgical procedures in older populations, it might be due to the higher incidence of age-related health issues requiring surgical intervention. A population based study in US also showed prevalence of 48.4% patients aged over 75.(13)

The mean age of patients was 44.74 years, along with the range of 18 to 70 years, it showed that laparoscopic surgery is common among adult patients. A significant percentage of patients were within the older age group. The analysis did not show a statistically significant relation in hernia development across age groups, as shown by the p-value of 0.277. This shows that factors other than age may play a more crucial role in the development of port site hernias following laparoscopic procedures.(6, 14)

Gender distribution in our study showed a higher proportion of female patients (63.04%) compared to males (36.94%). The relatively balanced male-to-female ratio of approximately 1:1.7 shows the general demographic trends seen in many surgical settings. When examining the rates of port site hernia, the incidence was found to be 2.26% in males and 4.13% in females. This difference was also observed in another study in India with female predominance, 65% females to 35% males.(15) However, the p-value of 0.383 indicates that this difference is not statistically significant, suggesting that gender does not significantly influence the risk of hernia development post-operatively.(16)

The mean BMI of the patients was 28.05 ± 2.94 kg/m² with the majority of patients (60.83%) overweight or obese (BMI ≥ 27). This finding is same as in other study that suggests higher BMI is a risk factor for complications following laparoscopic surgery.(17, 18)

A total of 12 patients (3.33%) developed port site hernias, with the majority occurring at the umbilical site (58.33%). This is consistent with previous studies that also report a higher incidence of hernias

at this site, likely due to the anatomical and surgical factors associated with the umbilicus.(19) The p-value of 0.170 for stratification by site indicates no statistically significant differences in hernia rates based on the surgical site.

The surgical volume, type of surgical procedure, stretching of port site and size of port size might be the risk factors for causing port site hernia.(20) Surgical technique and closure methods may need to be further assessed to mitigate these risks.

Conclusion: The study showed trends in demographics and complication rates associated with laparoscopic surgery, related to port site hernias. Although the study did not find statistically significant associations with age or gender, the results underscore the importance of considering BMI and surgical techniques in the management of potential complications. However future research on the implementation of modified surgical practices can minimize the occurrence of port site hernias, especially in high-risk populations in relation to BMI and surgical site.

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