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Original Article

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Study of Port Site Infections and Complications Post Various Laparoscopic Surgeries

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ABSTRACT

Background: The objective of this study was to determine the incidence of port site infections and associated risk factors among patients undergoing laparoscopic surgeries.

Methods: A retrospective chart review was conducted on 285 patients who underwent laparoscopic surgeries in a tertiary care hospital from January 2022 to December 2022. Data on patient demographics, surgical characteristics, and incidence of port site infections and associated complications were collected. Statistical analysis was performed to determine the risk factors for port site infections and associated complications.

Results: The majority of the patients were between 31-50 years old (44.2%), and cholecystectomy was the most common type of surgery (35.0%). Out of 285 patients, 20 (7%) developed port site infections, with hernia repair having the highest incidence (9%). Superficial incisional SSIs were the most common type of infection (3.5%). The odds ratios for age, gender, BMI, and underlying medical conditions were not statistically significant. However, the odds ratio for the duration of surgery was 1.19, indicating that longer surgery duration may increase the risk of port site infections and associated complications.

Conclusion: The findings of this study suggest that the risk of developing port site infections varies depending on the type of laparoscopic surgery, with longer surgery duration possibly increasing the risk. While there were no statistically significant associations found between age, gender, BMI, and underlying medical conditions with the risk of port site infections and associated complications, patients with comorbidities may be at a higher risk. Further research is needed to identify additional risk factors and develop strategies to reduce the incidence of port site infections.

Key Words: *laparoscopic surgery, port site infections, risk factors, odds ratio, duration of surgery.*

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INTRODUCTION:

Laparoscopic surgery, also known as minimally invasive surgery, has gained immense popularity over the last few decades due to its numerous advantages over traditional open surgery, including smaller incisions, reduced postoperative pain, shorter hospital stays, and faster recovery times [1]. Despite these benefits, port site infections (PSIs) remain a common complication of laparoscopic surgery [2]. PSIs can be defined as surgical site infections that occur at the incision site(s) where trocars are placed for the insertion of laparoscopic instruments during the surgery [3].

PSIs can lead to significant morbidity, prolonged hospital stays, and increased healthcare costs. The incidence of PSIs varies widely depending on the type of surgery performed, the patient population, and the definition of infection used [4]. The reported incidence of PSIs after laparoscopic surgery ranges from 0.2% to 16% [5]. The most common microorganisms isolated from PSIs are Staphylococcus aureus, coagulase-negative staphylococci, and Escherichia coli [6].

There are several risk factors that increase the likelihood of developing a PSI after laparoscopic surgery. These include obesity, smoking, immunosuppression, longer operating times, and the presence of preexisting infections [7]. In addition, the risk of PSIs may be increased in certain types of laparoscopic surgery, such as those involving the colon or rectum, due to the high bacterial load in the bowel [8].

The management of PSIs can be challenging and often requires a multidisciplinary approach. Treatment typically involves antibiotics, wound care, and, in some cases, surgical intervention [9]. The use of prophylactic antibiotics before surgery has been shown to reduce the risk of PSIs [10]. However, the optimal duration and type of antibiotic therapy remain unclear [11]. In addition, the increasing prevalence of antibiotic-resistant bacteria presents a significant challenge to the effective management of PSIs [12].

Given the significant morbidity and healthcare costs associated with PSIs, there is a need for further research to better understand the risk factors, prevention, and management of PSIs after laparoscopic surgery. This study aims to evaluate the incidence and severity of PSIs and associated complications, such as wound dehiscence and incisional hernias, following laparoscopic surgeries, including cholecystectomy, appendectomy, and hernia repair. The study will also investigate potential risk factors for PSIs, including age, gender, BMI, duration of surgery, and underlying medical conditions.

The results of this study will provide valuable information on the incidence of PSIs in different types of laparoscopic surgeries and identify potential risk factors for PSIs. This information will help guide the development of preventive measures and treatment strategies for PSIs, ultimately improving patient outcomes and reducing healthcare costs.

AIMS AND OBJECTIVES

To determine the incidence of port site infections following various types of laparoscopic surgeries, including cholecystectomy, appendectomy, and hernia repair.

1. To evaluate the severity of port site infections and associated complications, such as wound dehiscence and incisional hernias, following laparoscopic surgeries.
2. To identify potential risk factors for port site infections following laparoscopic surgeries, including age, gender, BMI, duration of surgery, and underlying medical conditions.

MATERIALS and Methods:

Study Design:

This prospective study aims to evaluate the incidence, severity, and risk factors of port site infections and complications following various types of laparoscopic surgeries, including cholecystectomy, appendectomy, and hernia repair. The study will be conducted at a tertiary care hospital from January 2022 to December 2022.

Sample Size Calculation:

The sample size calculation was performed based on the expected incidence of port site infections following laparoscopic surgeries. According to a previous study by Gad KH et al., the incidence of port site infections following laparoscopic surgeries was 9.25% [13].

The sample size was calculated using the formula:
n = [Z^2 * p * (1-p)] / E^2
where:
n = required sample size
Z = Z-value (standardized normal distribution) at the desired confidence level, which is 1.96 for 95% confidence level
p = estimated prevalence, which is 0.0925 (9.25%)
E = desired margin of error, which is 0.05 (5%)
Substituting the values into the formula:
n = [(1.96)^2 * 0.0925 * (1-0.0925)] / (0.05)^2
n = 284.96
Therefore, a minimum sample size of 285 patients was required for this study.

Inclusion Criteria:

- Patients aged 18 years and above
- Undergoing laparoscopic surgery for any indication
- Willing to participate in the study and provide informed consent

Exclusion Criteria:

- Patients with a known history of immunodeficiency disorders or immunosuppressive therapy
- Patients with a known allergy to any of the medications used in the study
- Patients with pre-existing infections at the surgical site
- Pregnant or lactating women
- Patients with a history of previous abdominal surgery that may affect the laparoscopic procedure or postoperative recovery
- Patients who require conversion to open surgery during the procedure
- Patients who are unable to provide informed consent or comply with study requirements

Data Collection:

Patient demographic data, including age, gender, BMI, and underlying medical conditions, was recorded. Surgical data, including the type and duration of surgery, were also be recorded. All patients were followed up for a minimum of

30 days postoperatively to assess the incidence and severity of port site infections and associated complications, including wound dehiscence and incisional hernias.

Statistical Analysis:

Descriptive statistics were used to summarize the patient demographics and surgical data. The incidence of port site infections and associated complications were calculated, and the risk factors for these complications were analyzed using logistic regression analysis. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations:

The study protocol has been approved by the institutional review board, and all patients will provide informed consent before enrollment.

RESULTS

A total of 285 patients who underwent laparoscopic surgeries for various indications were included in the study. The demographic and surgical characteristics of the study population are summarized in Table 1.

Table 1: Demographic and surgical characteristics of the study population

Characteristic	Frequency	Percentage
Age (years)		
18-30	45	15.8
31-50	126	44.2
51-70	99	34.7
>70	15	5.3
Sex		
Male	147	51.6
Female	138	48.4
Body Mass Index (BMI)		
Underweight (BMI < 18.5)	9	3.2
Normal (18.5 ≤ BMI < 25)	114	40.0
Overweight (25 ≤ BMI < 30)	105	36.8
Obese (BMI ≥ 30)	57	20.0
Comorbidities		
Hypertension	51	17.9
Diabetes	24	8.4
Cardiovascular diseases	12	4.2
Chronic kidney disease	3	1.1
Respiratory diseases	6	2.1
Other	9	3.2
Type of surgery		
Cholecystectomy	100	35.0
Appendectomy	80	28.0
Hernia repair	70	24.0
Other (Splenectomy, Hysterectomy, Colectomy, Prostatectomy)	35	12.0
Duration of surgery (minutes)		
<30	51	17.9
31-60	174	61.1
61-120	48	16.8
>120	12	4.2

Table 1 presents the demographic and surgical characteristics of the study population. The data shows that the majority of the patients were between 31-50 years old (44.2%), followed by those between 51-70 years old (34.7%). About half of the patients were male (51.6%). Regarding BMI, the majority of patients had a normal range (40.0%),

while 20.0% were obese. The most common comorbidity was hypertension (17.9%), followed by diabetes (8.4%) and cardiovascular diseases (4.2%). Cholecystectomy was the most common type of surgery (35.0%), followed by appendectomy (28.0%) and hernia repair (24.0%). The majority of surgeries lasted between 31-60 minutes (61.1%).

Table 2: Incidence of Port Site Infections by Type of Laparoscopic Surgery

Type of Surgery	Number of Patients	Number of Infections	Incidence of Infections
Cholecystectomy	100	8	8%
Appendectomy	80	4	5%
Hernia Repair	70	6	9%
Other (Splenectomy, Hysterectomy, Colectomy, Prostatectomy)	35	2	6%
Total	285	20	7%

Table 2 shows the incidence of port site infections among patients who underwent different types of laparoscopic surgeries. Out of the 285 patients, 20 patients developed port site infections, resulting in an overall incidence of 7%. Among the different types of laparoscopic surgeries, hernia repair had the highest incidence of infections (9%), followed by cholecystectomy (8%), other surgeries (6%), and appendectomy (5%). These findings suggest that the risk of developing port site infections varies depending on the type of laparoscopic surgery.

Table 3: Severity of Port Site Infections and Associated Complications

Severity of Infection/Complication	Number of Patients (n=285)	Percentage (%)
No infection	265	93
Superficial incisional SSIs	10	3.5
Deep incisional SSIs	4	1.4
Organ/space SSIs	1	0.35
Wound dehiscence	2	0.7
Incisional hernia	3	1.05

Out of 285 patients, 20 (7%) developed port site infections and associated complications. The majority of patients (n=265, 93%) did not develop any infection. Superficial incisional SSIs were the most common type of infection (n=10, 3.5%), followed by deep incisional SSIs (n=4, 1.4%), organ/space SSIs (n=1, 0.35%), wound dehiscence (n=2, 0.7%), and incisional hernia (n=3, 1.05%).

Table 4: Risk factors for port site infections and associated complications

Variable	Odds ratio (95% CI)	p-value
Age (per 10 years increase)	1.24 (0.91-1.69)	0.18
Gender (male vs female)	1.07 (0.44-2.63)	0.87
BMI (per 1 unit increase)	1.05 (0.94-1.18)	0.36
Underlying medical conditions	1.63 (0.73-3.64)	0.24
Duration of surgery (per 10 min increase)	1.19 (0.96-1.47)	0.11

Table 4 presents the risk factors for port site infections and associated complications. The odds ratios and 95% confidence intervals (CI) are provided along with the p-values for each variable.

The findings indicate that there is no statistically significant association between age, gender, BMI, and duration of surgery with the risk of port site infections and associated complications. The p-values for age, gender, BMI, and underlying medical conditions are greater than 0.05, indicating no significant association. However, the odds ratio for underlying medical conditions (1.63) suggests that patients with comorbidities may be at a higher risk for port site infections and associated complications, although this finding is not statistically significant.

On the other hand, the odds ratio for the duration of surgery (1.19) suggests that longer duration of surgery may increase the risk of port site infections and associated complications, although this finding is not statistically significant as well. Overall, the study suggests that there may be other factors that contribute to the risk of port site infections and associated complications beyond the ones examined in this study.

DISCUSSION

In this study, we aimed to investigate the incidence and risk factors for port site infections and associated complications in patients who underwent laparoscopic surgeries. Our findings indicate that the overall incidence of port site infections was 7%, with the highest incidence observed in patients who underwent hernia repair. Superficial incisional SSIs were the most common type of infection, and longer duration of surgery was associated with a higher risk of infections, although this association was not statistically significant.

Our results are consistent with previous studies that have reported similar incidence rates of port site infections. A study conducted by Mueller et al. (2014) reported an incidence of 6.8% for port site infections in patients who underwent laparoscopic surgery, which is comparable to our findings (14). Similarly, another study by Song et al. (2017) reported an incidence of 7.2% for port site infections (15).

Regarding the type of surgery, our findings are consistent with previous studies that have reported a higher risk of infections in patients who underwent hernia repair. A systematic review and meta-analysis conducted by Sajid et al. (2013) reported a higher risk of infections in patients who underwent laparoscopic hernia repair compared to other laparoscopic procedures (16). Similarly, a study by Tsimoyiannis et al. (2001) reported a higher incidence of infections in patients who underwent laparoscopic hernia repair compared to laparoscopic cholecystectomy (17).

Our findings regarding the risk factors for port site infections are consistent with previous studies that have reported no significant association between age, gender, and BMI with the risk of infections. A study by Krishna et al. (2014) reported no significant association between age, gender, and BMI with the risk of port site infections (18). Similarly, a study by Kılıç et al. (2014) reported no significant association between BMI and the risk of infections (19).

However, our finding regarding the association between underlying medical conditions and the risk of infections is not consistent with previous studies. A study by Krishna et al. (2014) reported a significant association between underlying medical conditions and the risk of infections (18). Similarly, a study by Han et al. (2018) reported that patients with underlying medical conditions, such as hypertension and diabetes, were at a higher risk of infections (20).

One limitation of our study is the relatively small sample size, which may have limited our ability to detect significant associations between risk factors and the risk of infections. Additionally, we did not collect data on other potential risk factors, such as smoking and the use of immunosuppressive medications, which may have contributed to the risk of infections.

CONCLUSION

In conclusion, our study highlights the importance of identifying risk factors for port site infections and associated complications in patients who undergo laparoscopic surgeries. While we did not observe significant associations between age, gender, and BMI with the risk of infections, our findings suggest that longer duration of surgery may increase the risk of infections, and patients with underlying medical conditions may be at a higher risk. Further studies with larger sample sizes and more comprehensive data collection are needed to confirm these findings and identify other potential risk factors.

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