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A Study to assess risk factors associated with port site complications in laparoscopic abdominal surgeries

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A B S T R A C T

Objective: To assess the risk factors associated with port site complications in laparoscopic abdominal surgeries.
Methods: This prospective study included 100 patients who underwent abdominal surgeries. Patient demographics, risk factors, closure technique, body mass index were studied and association between risk factors and port site complications were studied.
Results: The mean age of participants was 21-40 years, with male predominance. 64% had history of previous abdominal surgeries. Among the risk factors, hypertension (34%), smoking (22%), obesity (21%), immunosuppression (7%), steroid use (11%), malnutrition (19%) was assessed. Standard closure technique was seen in majority (61%). Though our study did not find statistically significant association between risk factors and occurrence of complications. The association between closure technique and complications approached statistical significance (p=0.06), with a lower proportion of patients in extended fascial closure in the complication group (20.9%), compared to no complication group (38.6%). There was trend towards higher proportion of overweight patients (BMI 25-29.9) in complication group (32.6%), compared to no complication group (17.5%). This was not statistically significant.
Conclusion: Laparoscopic surgery has revolutionized modern surgical practice with its numerous advantages, but port-site complications remain a significant concern. Technical aspects like closure technique play a crucial role in minimizing complications. This study did not show significant association between risk factors and complications. There was a trend towards fewer complications with extended fascial closure compared to standard closure.

Keywords: Port site complications, laparoscopic surgeries, standard closure technique, extended fascial closure, risk factors.

INTRODUCTION:

Laparoscopic surgery, also known as minimally invasive surgery has revolutionized the field of abdominal surgery. This technique offers numerous advantages over open surgery. As a result they are used more commonly for many abdominal surgeries ranging from cholecystectomies to colonic resections. There are many complications associated with laparoscopy procedures. Most important is port site complications. They can occur both during the initial access and in the post operative period leading to significant mortality and morbidity. The incidence of port site complication varies widely in the literature, ranging from 1 to 6% for major complications and 30% for minor complications. Several risk factors have been identified as potential contributors to port site complications. These include patient factors such as obesity, diabetes, surgical factors like trocar type and size. Operative factors like duration of surgery and the level of surgeon experience. Understanding the risk factors is crucial for developing strategies to prevent and manage port site complications effectively. This study aims to provide comprehensive analysis of risk factors associated with port site complications.

Methodology:

It is a prospective study done at Department of General Surgery, at Navodaya Medical College Hospital and Research Centre, Raichur. Study was conducted for 18 months period from Jan 2023 to July 2024. A total of 100 patients undergoing abdominal laparoscopy surgery in General Surgery Department were included in the study, after obtaining their consent.

INCLUSION CRITERIA:

- Patients more than 13 years of both gender.
- Patient who gave consent.

EXCLUSION CRITERIA :

- Age less than 13 years.
- Patients converted to open surgeries.
- Pregnant females
- Patients with coagulation disorders.

METHODS OF DATA COLLECTION :

Institute Ethics Committee clearance was obtained before the start of the study. The study protocol was approved by the Institutional ethics committee of Navodaya medical college and Research center, Raichur and the research was conducted in accordance with the principles of Declaration of Helsinki. Written informed consent was obtained from all participants prior to their inclusion in the study.

PRE-OPERATIVE ASSESSMENT :

It was conducted for all the enrolled patients. This included detailed medical history, physical examination, and routine laboratory investigations (complete blood count, liver function tests, renal function tests and coagulation profile. Additionally patients underwent chest x ray and electrocardiogram examinations. Demographic data was collected.

SURGICAL PROCEDURE :

All laparoscopic procedures were performed by experience surgeons who had completed at-least 100 laparoscopic surgeries. The choice of port site access technique (open Hasson technique or closed veress needle technique) was left to the discretion of the operating surgeon. The number and size of ports used were recorded for each procedure. Standard aseptic precautions were followed, including skin preparation with povidone-iodine and prophylactic antibiotic administration as per hospital protocol.

INTRAOPERATIVE ASSESSMENT :

During the surgery, careful observation was made for any port site access-related complications. These include vascular injuries, visceral injuries, gas-embolism and subcutaneous emphysema. The operating surgeon documented any such events in real-time. The duration of surgery, intra-abdominal pressure maintained during pneumoperitoneum and any intraoperative complications were recorded in structured format.

POST-OPERATIVE FOLLOW UP :

Patients were closely monitored in the immediate post-operative period for any signs of port-site complications. They were followed up daily during their hospital stay and were examined for port site bleeding, infection or hematoma formation. After discharge, patients were followed up at 1 week, 2 weeks, 1 month and 3 months post-operatively. During each follow up visits, the port-site was thoroughly examined for signs of infection, dehiscence or hernia formation. Patients were also questioned about any port-site related symptoms such as pain and discharge.

RESULTS :

The present study was conducted in the department of General Surgery at Navodaya Medical College Hospital and Research Centre, Raichur from July2023toDecember2024 to determine the complications associated with the portsite in abdomen all aparoscopic surgeries. Total of 100 patients were included in the study. Following were the results of the study:

Table 1: Distribution of patients according to age

Age (in years)	Frequency	Percentage
14-20	8	8%
21-40	36	36%
41-60	28	28%
61-80	28	28%
Total	100	100%

Table 1 and graph 1shows the age distribution of patients, with the majority (36%) falling between 21-40 years, while 28% each were in the 41-60 and 61-80 age groups, and only 8% were between 14-20 years.

Graph 1: Distribution of patients according to age

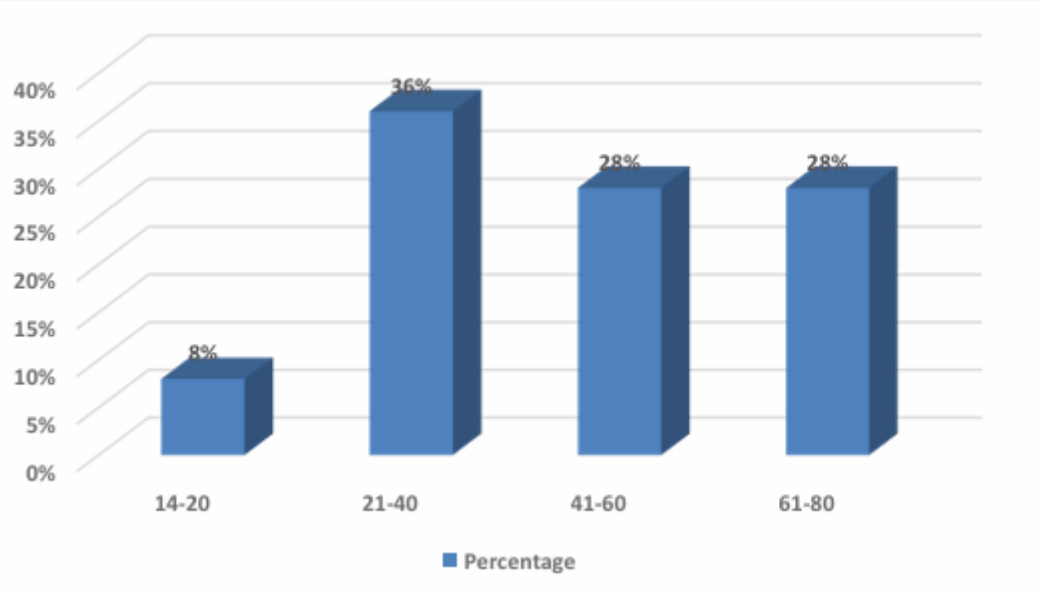


Table 2 : Distribution of patients according to gender

Gender	Frequency	Percentage
Female	42	42%
Male	58	58%
Total	**100**	**100%**

Table 2 and graph 2 reveals the gender distribution, with male patients (58%) outnumbering female patients (42%) in the study population.

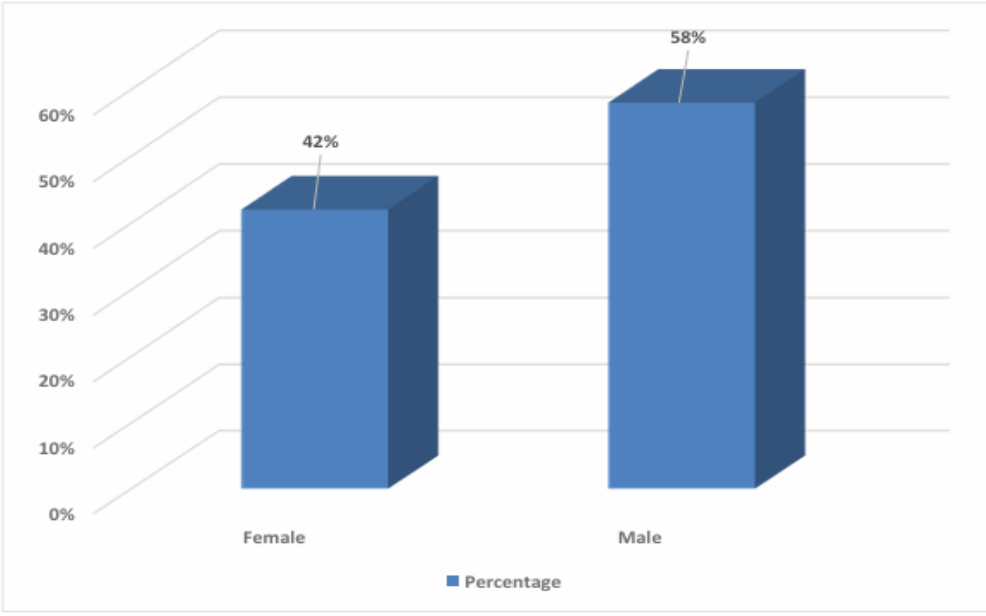


Table 3: Distribution of patients according to previous abdominal surgery

previous abdominal surgery	Frequency	Percentage
Yes	36	36%
No	64	64%
Total	**100**	**100%**

Table 3 and graph 3 indicates that 36% of patients had previous abdominal surgery, while 64% had no prior abdominal surgical history,

Graph 3: Distribution of patients according to previous abdominal surgery'

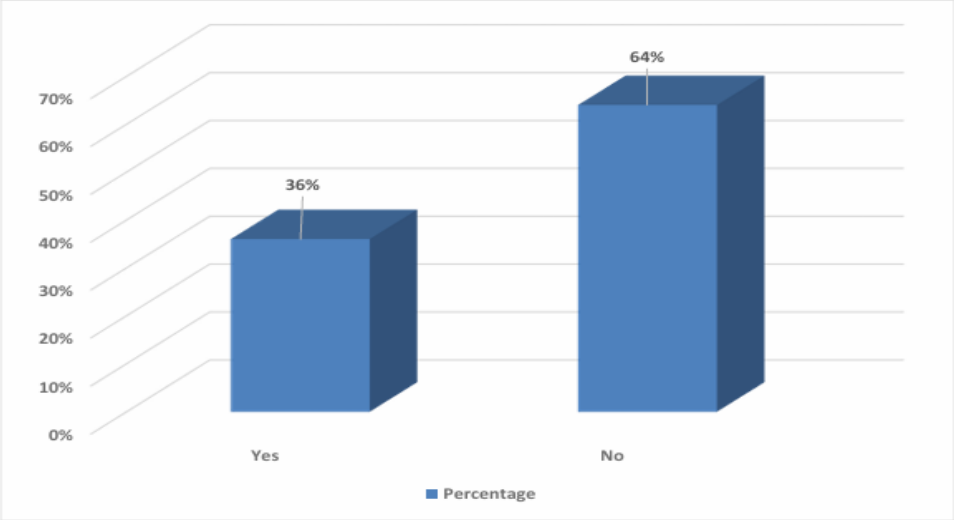


Table 4: Distribution of patients according to risk factors

Risk factors	Frequency	Percentage
Smoking history	22	22%
Hypertension	34	34%
Obesity	21	21%
Immunosuppression	7	7%
Steroid use	11	11%
Malnutrition	19	19%

Table 4 and graph 4presents the distribution of risk factors, with hypertension being the most prevalent (34%), followed by smoking history (22%), obesity (21%), and malnutrition (19%).

Graph 4: Distribution of patients according to risk factors

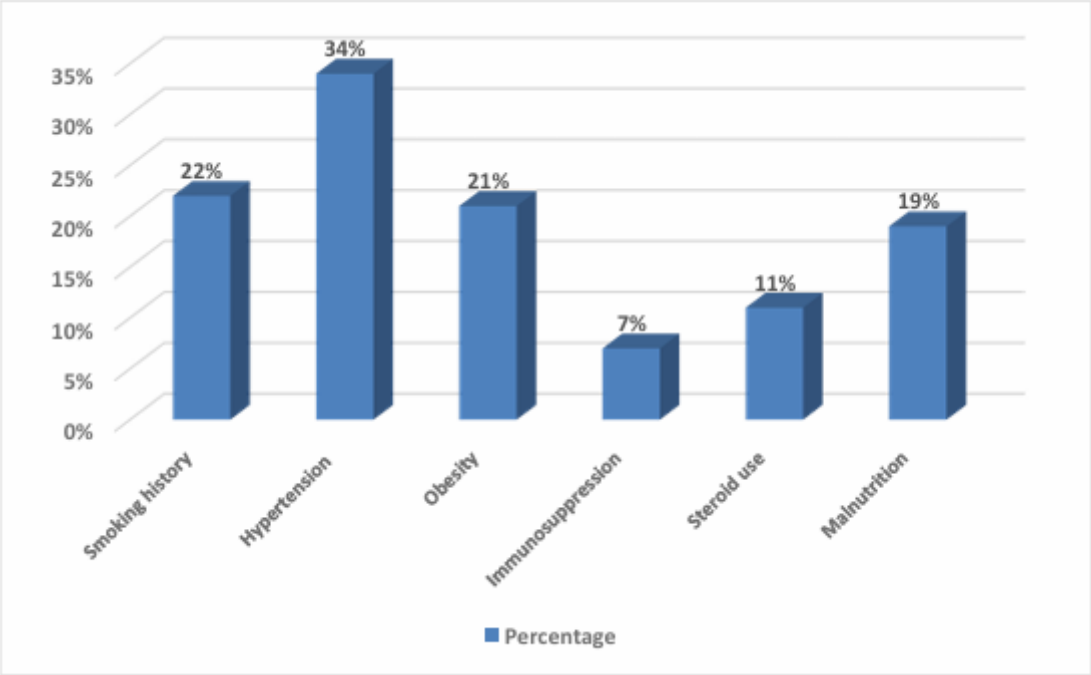


Table 5: Association of presence of complications with risk factors

Risk factors	Complications		p-value
	Absent	Present	
Smoking	12 (21.1%)	10 (23.3%)	0.79
Hypertension	18 (31.6%)	16 (37.2%)	0.55
Immunosuppression	3 (5.3%)	4 (9.3%)	0.43
Steroid use	6 (10.5%)	5 (11.6%)	0.86
Malnutrition	11 (19.3%)	8 (18.6%)	0.93

Table 5 and graph 5 indicates no statistically significant associations between various risk factors (smoking, hypertension, immunosuppression, steroid use, and malnutrition) and the presence of complications.

Graph 5: Association of presence of complications with risk factors

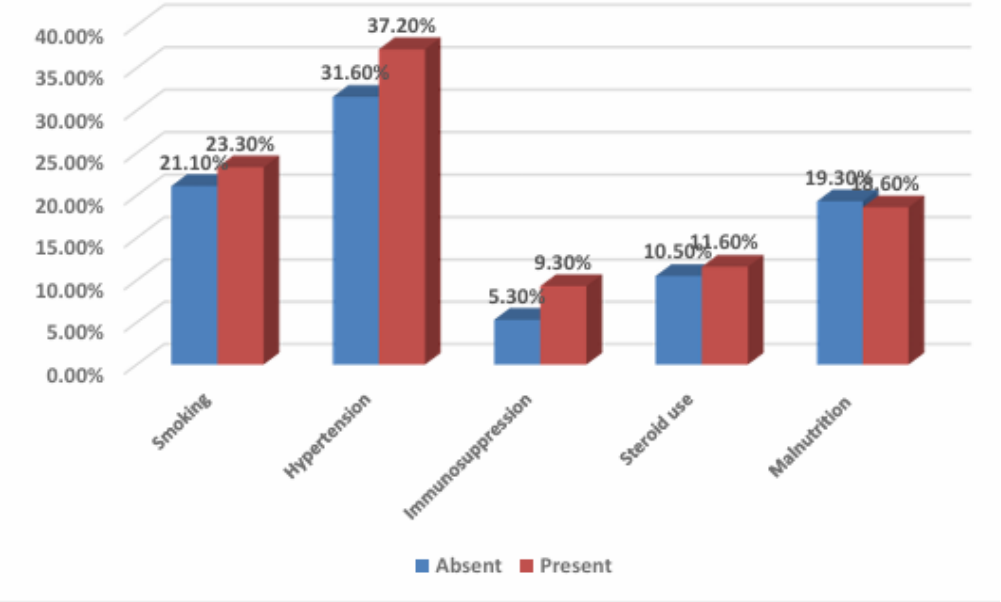


Table 6: Distribution of patients according to closure technique.

Closure technique	Frequency	Percentage
Standard	69	69%
Extended fascial	31	31%
Total	**100**	**100%**

Table 6 and graph 6 indicates that standard closure technique (69%) was more commonly employed than extended fascial closure (31%) for port site wounds.

Graph 6: Distribution of patients according to closure technique

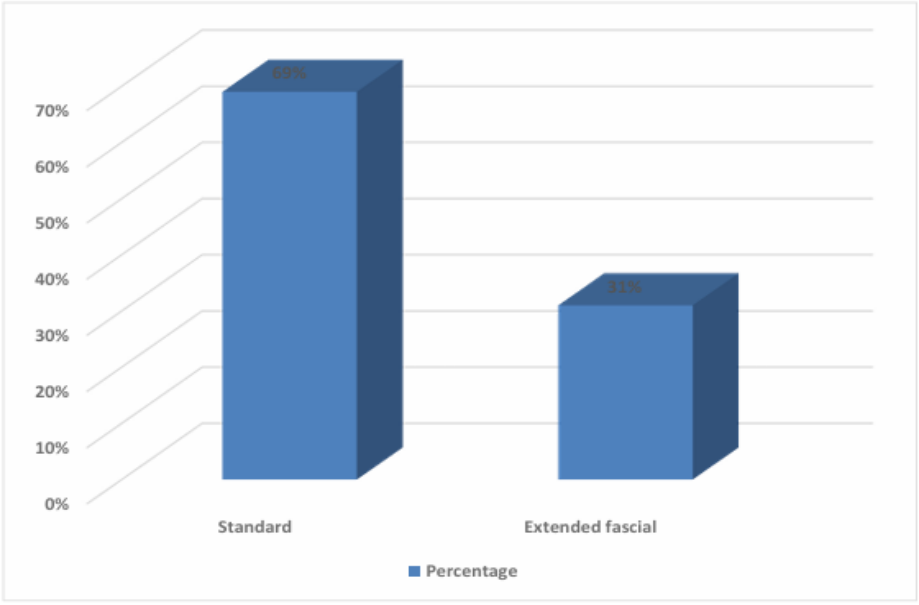


Table 7: Distribution of patients according to complications .

Complications	Frequency	Percentage
Port side bleeding	17	17%
Port site infection	12	12%
Port site hernia	3	3%
Omental herniation	3	3%
Visceral injury during port insertion	2	2%
Vascular injury during port insertion	5	5%
Subcutaneous emphysema	10	10%

Table 7 and graph 7 details the complications observed, with port site bleeding being the most common (17%), followed by port site infection (12%), subcutaneous emphysema (10%), and vascular injury during port insertion (5%).

Graph 7: Distribution of patients according to complications

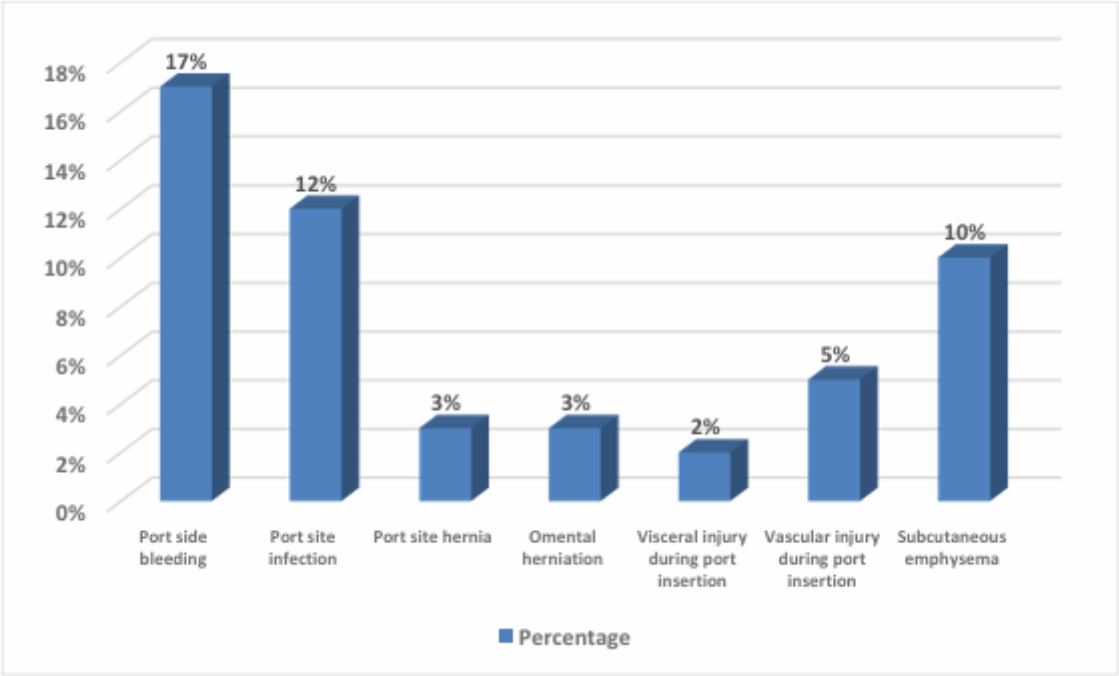


Table 8: Association of presence of complications with closure technique

Closure technique	Complications		p-value
	Absent	Present	
Standard	35 (61.4%)	34 (79.1%)	
Extended fascial	22 (38.6%)	9 (20.9%)	0.06
Total	**57 (100%)**	**43 (100%)**	

Table 8 and graph 8 shows a trend toward significance (p=0.06) in the association between closure technique and complications, with standard closure technique associated with a higher complication rate (79.1%) compared to extended fascial closure (20.9%).

Graph 8: Association of presence of complications with type of port used.

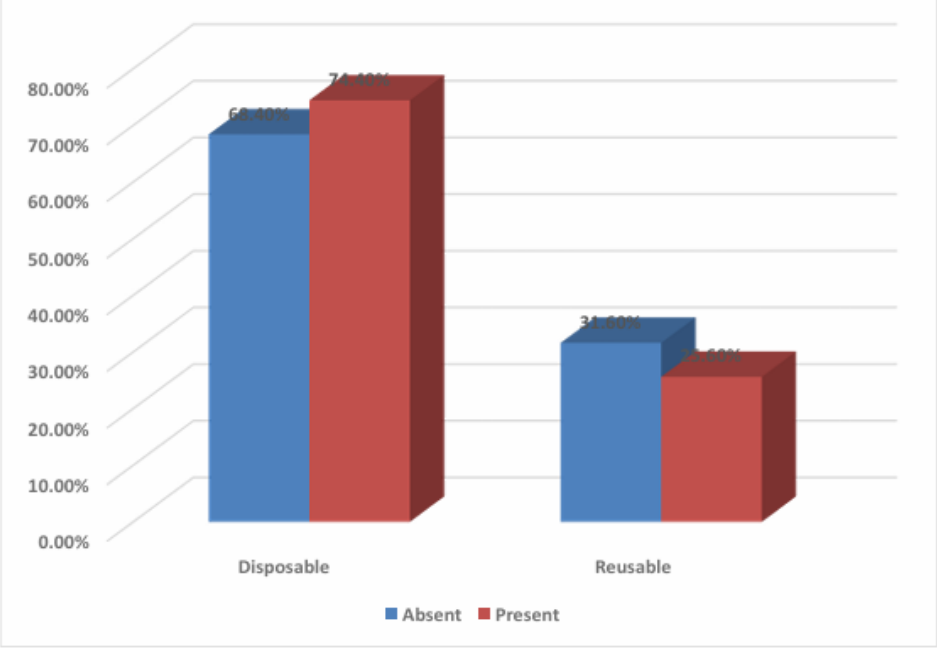


Table 9: Distribution of patients according to BMI

BMI	Frequency	Percentage
<18.5	20	20%
18.5-24.9	35	35%
25-29.9	24	24%
>30	21	21%
Total	**100**	**100%**

Table 9 and graph 9 presents the BMI distribution of patients, showing that 35% had normal BMI (18.5-24.9), 24% were overweight (25-29.9), 21% were obese (>30), and 20% were underweight (<18.5).

Graph 9: Distribution of patients according to BMI

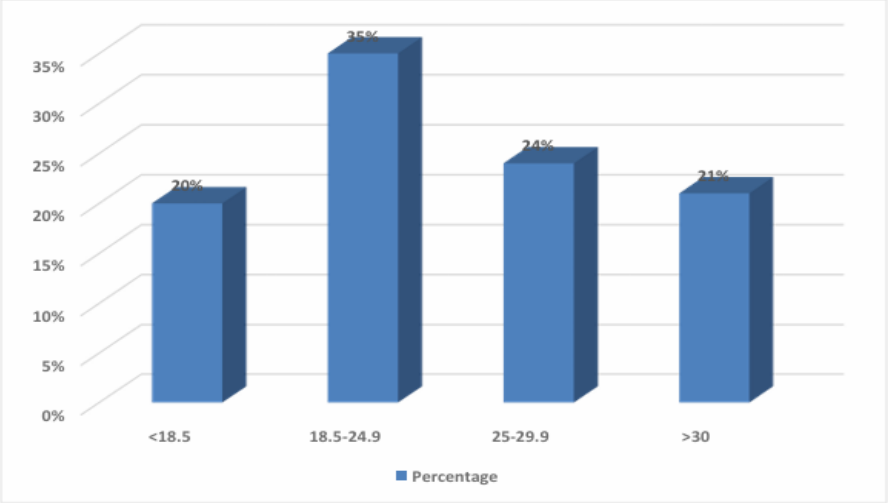
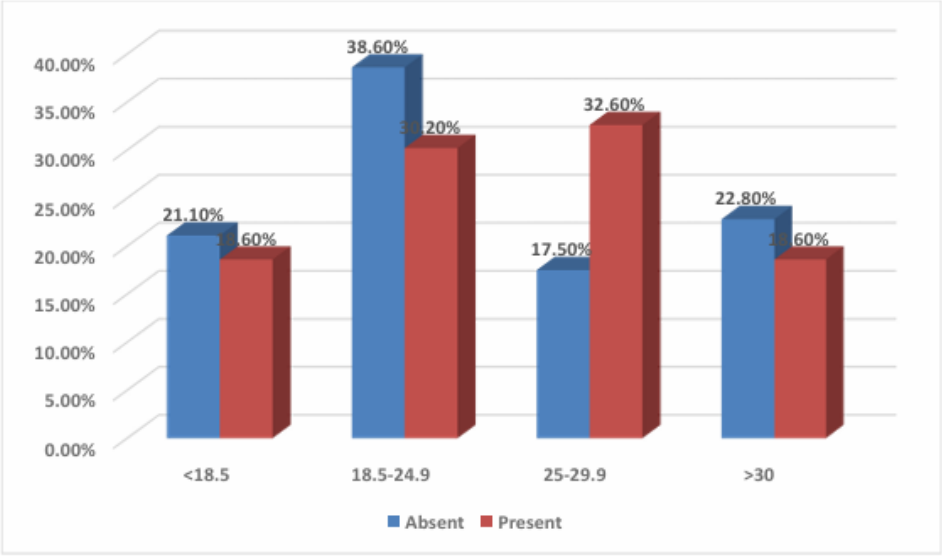


Table 10: Association of presence of complications with BMI

BMI	Complications		p-value
	Absent	Present	
<18.5	12 (21.1%)	8 (18.6%)	0.38
18.5-24.9	22 (38.6%)	13 (30.2%)	
25-29.9	10 (17.5%)	14 (32.6%)	
>30	13 (22.8%)	8 (18.6%)	
Total	**57 (100%)**	**43 (100%)**	

Table 10mand graph 10 shows no statistically significant association (p=0.38) between BMI categories and the presence of complications, although the overweight group (25-29.9) had the highest complication rate (32.6)

Graph 10: Association of presence of complications with BMI



DISCUSSION:

Laparoscopy surgery has revolutionized surgical practice and has numerous advantages over conventional open surgery, including reduced post operative pain, faster recovery and shorter hospital stay, decreased wound related complications. Despite these benefits, port site complications remain a concern for surgeons and can lead to significant morbidity, prolonged hospitalization, additional interventions and increased health care costs. Understanding the risk factors is important for optimizing patient outcomes in laparoscopic surgery.

Our study analyzed several potential risk factors for port site complications. Hypertension was the most common risk factor (34%), followed by smoking history (22%), obesity (21%), malnutrition (19%), steroid use (11%), and immunosuppression (7%). Interestingly, our analysis did not find a statistically significant association between risk factors and occurrence of complications.

The lack of statistical significance in our study could be attributed to relatively small sample size, which might have limit the power to detect significant association. Additionally, the multifactorial nature of port site complications, involving both patient-related and technical factors, might have confounded the analysis.

There was a trend towards a higher proportion of patients in the complication group, (37.2%), compared to no complication group (31.6%). ,although this did not reach statistical significance (p=0.55). Hypertension as a marker of cardiovascular disease, could potentially influence wound healing and susceptibility to complications, although the direct mechanism is not clear.

The association between closure technique and complications approached statistical significance (p=0.06), with a lower proportion of patients in extended fascial closure in the complication group (20.9%) compared to no complication group (38.6%). This suggests that extended fascial closure might be protective against post site complications, especially hernias, as corroborated by previous studies.

There was a trend towards a higher proportion of overweight patients (BMI-25-29.9) in the complication group (32.6%) compared to the no-complication group (17.5%), this was not statistically significant (p=0.38). This trend aligns with the established understanding that obesity can complicate port placement, prolong operating time , and increase the risk of port site complications.

CONCLUSION:

Laparoscopic surgery has revolutionized modern surgical practice with its numerous advantages, but port-site complications remain a significant concern. Port site bleeding (17%), infection (12%) and subcutaneous emphysema (10%) were most frequently observed complications. The demographic profile revealed that laparoscopic surgeries were performed in middle age group (21-40 years). Technical aspects like closure technique play a crucial role in minimizing complications. While our study did not find statistically significant associations between risk factors and complications, there was a trend towards fewer complication with extended fascial closure compared to standard closure.

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