



ANALYSIS OF PORT SITE INFECTION FOLLOWING LAPAROSCOPIC SURGERIES.

General Surgery

Harshkumar Trivedi

MBBS, MS, Department of General surgery, India.

Dr. Sandesh Gawade*

MBSS, DNB Gen Surgery, Department of General Surgery, India. *Corresponding Author

Dr. Sachin Naik

MBBS, MS, Department of General surgery, India.

ABSTRACT

Background: Laparoscopic surgeries are becoming standard procedure for many surgical diseases while port site infection following laparoscopic surgeries increases morbidity and monetary loss to patient. This study aimed to find out the incidence of port site infection following laparoscopic surgery and risk factors contributing to it.

Method: 256 patients admitted in our institute undergoing laparoscopic surgery were included. All laparoscopic surgeries were performed by trained surgeons under all aseptic conditions. Patients with port site infections were investigated and analysed. Variables like gender, age, comorbidities, type of surgical procedure, port size and port site were analysed to reach the conclusion.

Results: Mean age of 256 (M: 139, Female: 117) study sample 45.19 ± 10.37 years reporting 6.67% incidence of PSI. Highest PSI infection rate was reported in appendectomies (9.9%). As site, umbilicus (52.9%) followed by epigastric region (35.3%) were most common site of port infection. There was no association between presence of PSI with comorbid diseases (chi-square - 0.8351, $p = 0.36$) and with gender (The chi-square - 0.1504, $p = 0.698$). A significant association was observed between presence of PSI with size of port ≥ 10 mm (chi-square - 18.5702, $p < 0.00001$) and emergency laparoscopic procedures (chi-square - 14.5461, $p = 0.000137$).

Conclusion: Type of procedure, Emergency procedures and large size of the port are important risk factors for port site infection while proper sterilization with aseptic surgical conditions and antibiotic prophylaxis helps to reduce incidence of infection.

KEYWORDS

Port site infection (PSI), Laparoscopic surgery, Risk factors.

INTRODUCTION:

Laparoscopic surgery have become the standard procedure for many gynaecological and surgical diseases with proven documented benefits and excellent outcome. Laparoscopic method of surgery is preferred in abdominal surgeries due to lower cost, less pain, less scarring, fast recovery & early discharge from hospital¹. Life threatening complications which are related while access such major vessel injury or accidental bowel injury are rare in laparoscopic surgery.^{1,2} In total complication rate after laparoscopic surgery are less than one per hundred procedure.³ Incidence of port site complication after laparoscopic surgery around 21 per one lakh procedure and it increases proportionally with increase in size of port incision & trocar.^{4,6} The overall complications/injuries that occur following laparoscopic surgeries involve, gastrointestinal (0.06%), genitourinary (0.03%), vascular (0.01%) and omentum (0.04%).⁷ PSI accounts for a significant increase in the morbidity, hospital stay and financial loss to the patient. The whole purpose of MAS (Minimal Access Surgery) to achieve utmost cosmesis is turned into an unsightly wound, and the quality of life of patients is seriously affected. PSI exists despite of improvement in antimicrobial agents, sterilization, surgical techniques and operating room ventilation.⁸

Proper storage of instruments and sterilization are recommended to prevent port site infection. The centres for Disease control & prevention classification (CDC) categorized Surgical Site Infection (SSI) into incision site infection and organ space infection. The incision site infection is divided into a superficial and deep infection. Superficial means only skin and subcutaneous tissue infection whereas deep means fascia and muscle involvement. PSIs are predominantly seen as the superficial infection.⁸ In present study we aimed to find the incidence of port site infection I

METHODOLOGY:

Patients admitted in our institute undergoing laparoscopic surgery were included in study. All laparoscopic instruments were sterilized by either 2% glutaraldehyde with a contact time of 120 minutes or Ethylene oxide before surgery. All laparoscopic surgeries were performed by trained surgeons under strict aseptic precautions. Pneumoperitoneum was created by using veress needle or open method in supra or infra-umbilical incision. Through the same incision, a 10/12 mm safety trocar (primary trocar) was introduced into the abdominal cavity. All 10/12 mm ports closure was done by

intermittent absorbable sutures and skin with non-absorbable and 5/6mm ports by non-absorbable suture material. Patients with port site infections underwent clinical examination and investigations such as culture and sensitivity, GRAM/ ZN stain or relevant radiological investigations. Variables like gender, age, co-morbidities, surgical procedure, port size and port site were analysed to reach the conclusion.

Data was analysed using SPSS version 16, The Chi-square test with Yates' correction was used to compare categorical variables. The unpaired *t* test was used to compare normally distributed continuous variables between groups.

RESULTS:

Mean age of 256 study sample (Male 139, Female 117) was 45.19 years (SD - 10.37). A total of 17 out of 256 cases reported port site infections (fig 1,2), hence Incidence of port site infection in our institute was 6.67%. Most common laparoscopic procedures performed in present study were cholecystectomy (93) and appendectomy (81) followed by Hernias (49) and gynaecological procedures (29). Highest PSI infection rate was reported in appendectomies (9.9%). Umbilicus (52.9%) followed by epigastric region (35.3%) were the commonest sites involved. Suprapubic and lateral port sites infection was also present in one patient each. Out of total 17 cases, 15 (88.2%) were superficial infections while 2 cases (11.8%) had deep infections.

80 subjects were having comorbid conditions like diabetes mellitus, hypertension or obesity. Few subjects were having more than one more comorbid conditions. 10 out 17 subjects with PSI were having any sort of comorbid condition but there was no association between presence of PSI and comorbid diseases (chi-square - 0.8351, $p = 0.36$). Incidence of port site infections was 7.2% in males and 6% in females, there was also no significant association of gender and occurrence of PSI (The chi-square - 0.1504, $p = 0.698$). Mean age of patient developed PSI (44.76 ± 12.02) was almost similar with those who didn't develop it (45.22 ± 10.27) and there was no significant difference between them ($p = 0.862$). A significant association was observed between size of port (≥ 10 mm) and presence of PSI (chi-square - 18.5702, $p < 0.00001$). A significant association was observed between emergency laparoscopic procedure developing PSI (chi-square - 14.5461, $p = 0.000137$). (Table 1)

Table 1: chi square statistics

Variable		PSI		p value
		Present	Absent	
Comorbidity	Present	7	73	0.36
	Absent	10	166	
Gender	Male	10	129	0.698
	Female	7	110	
Port size	5 mm	4	180	<0.01
	≥10 mm	13	59	
Procedure	Emergency	10	46	<0.01
	Elective	7	193	

In our study *Staphylococcus aureus* (64.7%) was most the common organism isolated followed by *Pseudomonas Aeruginosa* and *Klebsiella pneumoniae* from 11.8% cases each. Atypical mycobacteria was isolated from deep infection (11.8%).

DISCUSSION:

Smaller incision and minimal post-operative pain and less hospital stay make laparoscopic surgeries as gold standard in many diseases. Port site infection is one of the complication which undermines the benefits of laparoscopic surgery and hampers quality of life as well.

In our study incidence of port site infection in present study was 6.67%; there was no association between occurrence of PSI with gender (Table 1). Even no significant difference in genders age and developing PSI ($p=0.862$).

Table 2: Incidence of PSI in different study

Reference	(n)	Incidence
Karthik et al. ⁹	570	10 (1.8%)
Mir et al. ¹⁰	675	45 (6.7%)
Yanni et al. ¹¹	100	4 (4%)
Taj et al. ¹²	492	27 (5.48%)
Yi et al. ¹³	400	11 (2.75%)
Triantafyllidis et al. ¹⁴	1009	14 (1.39%)
Chuang et al. ¹⁵	420	6 (1.4%)
Shindholimath et al. ¹⁶	113	7 (6.3%)
den Hoed et al. ¹⁷	189	10 (5.3%)

Umbilicus (52.9%) followed by epigastric region (35.3%) were most common site of PSI in this study while same sites were also reported by Ravindranath G et al.¹⁸ (umbilical - 52.4% & epigastric - 38.1%) and Mandal PP et al.¹⁹ (epigastric - 7.7% & umbilical 26.31%). Cholecystectomy (93) and appendectomy (81) were most common laparoscopic surgeries and highest PSI was reported from appendectomy (9/9%). Kumar SS et al.²⁰ in their study, also observed that highest port site infection rate was reported in laparoscopic appendectomies (8.8%). Ravindranath G et al.¹⁸ in their study however observed maximum infection rate in cholecystectomy cases. The specimen in cases of cholecystectomy and appendectomies were infected in most cases, attributing to higher incidence of PSI in such cases. 15 cases were having superficial infection while 2 with deep infection. *Staph. aureus* (64.7%) was most common organism isolated followed by *Pseudomonas Aeruginosa* and *Klebsiella pneumoniae* from 11.8% cases each. Atypical mycobacteria was isolated from deep infection (11.8%). Clean surgical wounds usually harbor *Staphylococcus aureus* which may have an exogenous origin or may be from the patient's native flora.²¹

Emergency laparoscopic procedure and port size ≥ 10 mm are associated with presence of PSI ($p < 0.01$), while presence of comorbidities like diabetes mellitus hypertension not associated with PSI ($p = 0.36$). Factors like emergency laparoscopic surgery and surgery in acutely inflamed organs have been associated with increased frequency of PSIs across many studies.^{16,17} Karthik S et al.⁹ in their study observed that size of port is a risk factor for the development of infections at port site in laparoscopic surgeries. Kumar S et al.²⁰ in their study observed that port site infections are more common in 10 mm or more port size and in surgeries using 3 ports.

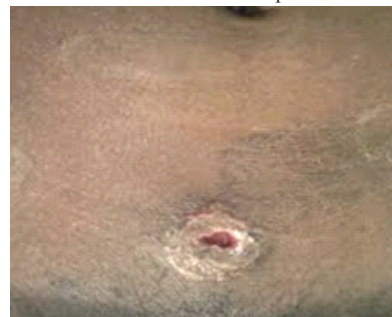
Limitations of study:

Various sterilisation methods and their relation with port site infection was not studied in our study. Treatment of port site infection and outcome was also not included in this study.

CONCLUSION:

The present study is an attempt to make surgeons aware about the port site infection and risk factors involved for the same.

Port site infection is one of the significant complication following laparoscopic surgery and major risk factors includes type of procedure, emergency procedures and large size of the port. Strictly following the procedures of sterilization and proper antibiotic prophylaxis can reduce its incidence. Further large scale studies are recommended related to specific type of laparoscopic procedures, different sterilisation methods and their relation with port site infection.

**Fig.1 Port Site Infection****Fig.2 Ugly Scar After Psi.**

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