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Original Article

Surgery Section

Surgical Site Infections in Clean and Clean-contaminated Surgeries at a Tertiary Care Centre: A Longitudinal Study

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ABSTRACT

Introduction: Surgical Site Infections (SSIs) are very common and the most frequently studied Hospital-Acquired Infection (HAI) in developing countries. Up to 5% of patients undergoing surgery develop SSIs, which can cause significant morbidity and, in some cases, be fatal.

Aim: To determine the prevalence of SSI and compare the factors related to its development between clean and clean-contaminated surgeries.

Materials and Methods: This longitudinal study was conducted at a rural tertiary care centre in the Department of General Surgery from May 2020 to April 2021. A total of 1,020 patients who underwent clean and clean-contaminated surgeries were clinically examined, investigated, and provided standard treatment modalities. Dirty and contaminated cases were excluded from the study. Clean and clean-contaminated surgeries were defined according to the guidelines provided by the Centres for Disease Control and Prevention (CDC). Demographic and risk factors, such as sex, age, nature of surgery, wound irrigation, American Society of Anaesthesiologists (ASA) score, smoking, preoperative stay, duration of surgery, hair removal, drains, immunosuppression, Diabetes Mellitus (DM), and Haemoglobin (Hb) levels, were observed and compared between the two groups. The development of SSI was diagnosed based on CDC guidelines. SSI cases were followed-up longitudinally in both groups. Continuous variables were analysed using an unpaired t-test, while categorical variables were analysed using a chi-square test. A p-value of <0.05 was considered statistically significant.

Results: Out of the 1,020 patients, a total of 93 (9.11%) developed SSI. Among the males (573, 56.17%), 39 (6.8%) developed SSI, while among the females (447, 43.83%), 54 (12.08%) developed SSI. The study found that 24 (3.46%) clean operations and 69 (21.1%) clean-contaminated surgeries developed SSI (p-value <0.0001). There was a significant association between SSI and risk factors such as ASA <2 (p-value <0.01), smoking (p-value <0.01), DM (p-value <0.01), Hb <8 gm% (p-value <0.01), shorter preoperative stay (p-value <0.01), prolonged surgery (p-value <0.01), use of drains (p-value <0.01), and immunosuppression (p-value <0.01). The majority of SSIs were caused by *Staphylococcus aureus* (24 cases, 25.8%), followed by *Pseudomonas aeruginosa* (18 cases, 19.3%) and *Escherichia coli* (12 cases, 12.9%). Patients who developed SSI had a mean postoperative stay of 32.35 days, compared to 7.19 days for those who did not develop SSI.

Conclusion: The study concluded that SSI was significantly more common in clean-contaminated surgeries compared to clean surgeries. Proper surveillance can help document SSI even after hospital discharge. Prompt identification of organisms can facilitate clinical recovery.

Keywords: Acquired, Classification, Hospital, Postoperative, Wound

INTRODUCTION

The occurrence of Surgical Site Infections (SSIs) as a major postoperative complication has been recognised for over 4,000-5,000 years. Galen observed that localised infection (suppuration) in wounds sustained by gladiators often indicated recovery, particularly after drainage. Theodoric, Pare, and Chauliac noted that clean wounds closed primarily could heal without infection [1].

There are four types of Hospital-Acquired Infections (HAIs): respiratory infections, urinary tract infections, bacteraemia, and SSIs. SSIs are the most common type of HAI, accounting for 20% of all cases and associated with increased hospital stays and a 2-11 times higher mortality risk [2]. In the United States (US), SSIs complicate 2-5% of all surgeries, resulting in an estimated annual expenditure of 3.5-5 billion USD. In low to medium-income countries, the incidence of SSIs can rise to 11.8% [3]. In India, the risk of acquiring an SSI ranges from 6-38.7% [4]. However, surveillance data remains limited, and the prevention of HAIs is not always prioritised [5,6]. Approximately 60% of these infections are preventable with evidence-based guidelines [7]. Consequently, SSIs serve as a quality metric to assess surgical care quality, which is then linked to performance ranking, reimbursement, and patient satisfaction [3,8].

The Centres for Disease Control and Prevention (CDC) defines SSIs as infections related to surgery occurring within 30 days (or 1 year if an implant is present) [9]. They are classified based on the depth and tissue layers involved, including superficial incisional, deep incisional, and organ/space infections. Superficial incisional SSIs are characterised by the discharge of pus or serous fluid from the superficial skin and subcutaneous tissues without excessive discomfort. Deep incisional SSIs involve the discharge of significant quantities of pus from deeper soft tissues (fascia, muscles) and are associated with systemic illness. Organ or deep space infections may present as purulent discharge from surgical drains or with systemic signs of sepsis, along with signs of organ failure such as decreased Partial Arterial Oxygen Pressure (PaO_2)/Fraction of inspired oxygen (FiO_2) ratio, thrombocytopenia, hyperbilirubinaemia, hypotension, delirium, or Acute Kidney Injury (AKI) [9].

The CDC classifies wounds into four groups: clean, clean-contaminated, contaminated, and dirty, with progressively increasing risk of SSIs. Clean wounds are uninfected with no inflammation encountered, and no entry into the respiratory, genital, or uninfected urinary tract (infection rate 1-3%). Clean-contaminated wounds involve entry into these tracts under controlled conditions (infection rate 5-8%). They are typically caused by contamination of the surgical site through endogenous bacteria or a breach in sterile technique and/or instruments. Contaminated wounds occur when there is a major break in sterile technique during an incision or gross spillage from the gastrointestinal tract, or when acute non-purulent inflammation is encountered. Additionally, open traumatic wounds older than 12-24 hours fall into this category. Dirty wounds occur when an incision is made during an operation where the viscera are perforated or when acute inflammation with pus is encountered (e.g., emergency surgery for fecal peritonitis) or in traumatic wounds with delayed treatment and presence of fecal contamination or devitalised tissue [10].

The Global Guidelines for the Prevention of SSI by the World Health Organisation (2018) and the CDC guideline for the prevention of SSI (2017) with the National Healthcare Safety Network outline risk and protective factors for SSI. Risk factors include advanced age, increased BMI, high ASA score, high National Nosocomial Infections Surveillance (NNIS) score, diabetes mellitus, smoking, dependence or frailty, malnutrition, severe wound class, ascites, co-existing remote infection, staphylococcal colonisation, skin disease at the surgical site, anaemia, and an increased number of co-morbidities. Factors related to surgery and management include duration of surgery, implantation of prostheses, reoperation, longer hospital stay before surgery, corticosteroid medication, inadequate sterilisation, skin antisepsis, emergency procedure, hypothermia, intraoperative blood transfusion, perioperative shaving, and failure to obliterate dead space. Protective factors include laparoscopic procedures and antibiotic prophylaxis [10].

Treatment strategies for SSIs involve pathogen identification, source control through incision opening in superficial or deep incisional SSIs or image-guided percutaneous drainage, laparoscopic or open drainage if indicated in organ/space SSIs, immediate empiric antibiotic coverage, timely antibiotic de-escalation, and local wound care [11].

The typical pathogens involved in SSIs depend on the specific surgical procedure performed. Infections after surgery of the skin and subcutaneous tissues are predominantly caused by gram-positive cocci, mostly *Staphylococcus aureus*. Gram-positive anaerobic cocci are typically responsible for infections following oral/pharyngeal procedures. Anaerobes and gram-negative bacilli are more common after colonic surgery. Overall, *Staphylococcus aureus* is the most common pathogen associated with SSIs, followed by coagulase-negative *Staphylococcus, Enterococcus* spp., *Escherichia coli*, *Enterobacter spp.*, and *Pseudomonas aeruginosa* [10].

Methicillin-Resistant *Staphylococcus aureus* (MRSA) is particularly virulent, difficult to treat, and associated with longer hospital stays, higher hospital costs, and increased mortality. MRSA infections are more prevalent in patients with nasal colonisation of MRSA, prior MRSA infection, recent hospitalisation, and recent antibiotic use [10].

As far as the authors have searched, there have been no recent studies from our region. However, a resurgence of SSIs has been observed, including port site infections following routine laparoscopic procedures. Based on this background, this study was conducted in a rural tertiary care hospital to determine the prevalence of SSIs and associated factors in clean and clean-contaminated surgeries, as well as their microbiological profile.

MATERIALS AND METHODS

This longitudinal study was conducted at North Bengal Medical College and Hospital from May 2020 to April 2021. A total of 1,020 cases, including 693 clean surgeries and 327 clean-contaminated surgeries, were studied. Universal sampling (non-probability) was employed after obtaining approval from the Institutional Ethics Committee (No. IEC/NBMC/2020-21/42).

Inclusion criteria: The inclusion criteria for the study were adult patients (age ≥18 years) who underwent clean or clean-contaminated surgeries in the field of general surgery.

Exclusion criteria included contaminated and dirty surgeries, operations with implants, and stitch abscesses.

Various details were recorded, including demographic information (sex, age), type of surgery (emergency or elective), duration of surgery, wound class (clean/contaminated), duration of preoperative stay, presence of co-morbidities (anaemia, diabetes mellitus), risk factors, ASA score [10], wound toilet, drain usage, need for resuturing, and duration of postoperative stay. Postoperative monitoring for SSI was conducted in the ward until discharge, and patients were followed-up for 30 days. An OPD dressing register was maintained to check for SSIs after discharge. Phone calls were made to all patients 30 days after surgery to inquire about any signs of SSI. The diagnosis of SSI was made based on CDC guidelines [9]. Surgeons filled out the SSI reporting form. Samples from these patients were collected through aspiration or with the help of a sterile swab from the affected site, following strict aseptic precautions. These samples were immediately sent to the microbiology laboratory for processing and identification of the infecting organism. Antibiotic susceptibility testing was performed using Vitek II.

STATISTICAL ANALYSIS

The data was entered into Microsoft Excel and analysed using GraphPad QuickCalcs (CA, San Diego, USA). Continuous data was analysed using the t-test, while categorical data was analysed using the chi-square test. A p-value of <0.05 was considered statistically significant.

RESULTS

The mean age of the total study population was 41.88 years. There were 573 (56.17%) male patients and 447 (43.83%) female patients. Out of the 1,020 clean and clean-contaminated surgeries, 93 (9.11%) patients developed SSI. Among the male patients, 39 (6.8%) developed SSI, while among the female patients, 54 (12.08%) developed SSI. The age of the patients ranged from 18 to 75 years, with 39 patients in the age group of 21-40 years, 21 patients each in the <20 and 41-60 years age groups, and 12 patients beyond the age of 60 years.

Among the 693 clean surgeries, 24 (3.46%) developed SSI, while among the 327 clean-contaminated surgeries, 69 (21.1%) developed SSI. This difference was statistically significant (p<0.0001) [Table/Fig-1]. In clean cases, the highest incidence of SSI was observed in mastectomies (20.83%), while in clean-contaminated cases, SSI was most commonly observed in lower urinary tract surgeries (37.5%) [Table/Fig-2-4].

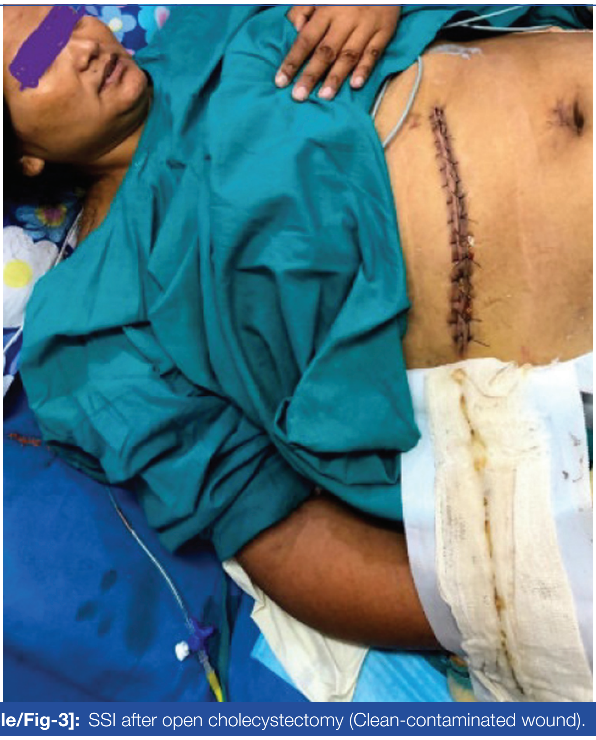
Wound class	Number of patients, n (%)	Number infected, n (%)	Statistics
Clean	693 (68)	24 (3.46)	χ^2 =66.015 df=1 p<0.0001, (S)
Clean-contaminated	327 (32)	69 (21.1)	
Total	1020 (100)	93 (9.11)	

[Table/Fig-1]: SSI and wound classification.

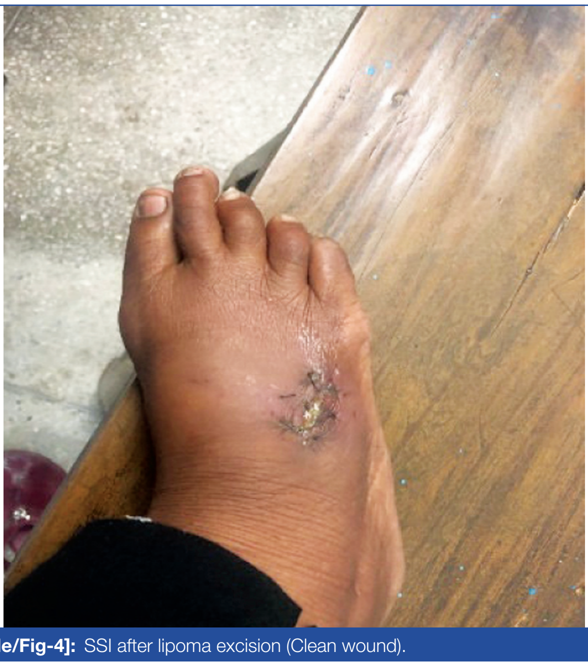
Operation	Number (%)	SSI number (%)
Clean		
Hydrocele-Jaboulay/Lord's	124 (12.15)	2 (1.61)
Inguinal hernia	296 (29.01)	2 (0.67)
Ventral hernia	69 (6.76)	3 (4.34)
Mastectomy	72 (7.05)	15 (20.83)
Lumpectomy	93 (9.11)	2 (2.15)
Thyroidectomy	18 (1.76)	0
Other clean cases	21 (2.05)	0
Clean-contaminated		
Appendectomy	78 (7.64)	17 (21.79)
Hepatobiliary	111 (10.88)	19 (17.11)
Upper urinary tract	18 (1.76)	3 (16.66)

Lower urinary tract and genitalia	24 (2.35)	9 (37.5)
Gastrectomy	36 (3.52)	9 (25)
Large bowel	60 (5.88)	12 (20)

[Table/Fig-2]: SSI in different surgeries.



[Table/Fig-3]: SSI after open cholecystectomy (Clean-contaminated wound).



[Table/Fig-4]: SSI after lipoma excision (Clean wound).

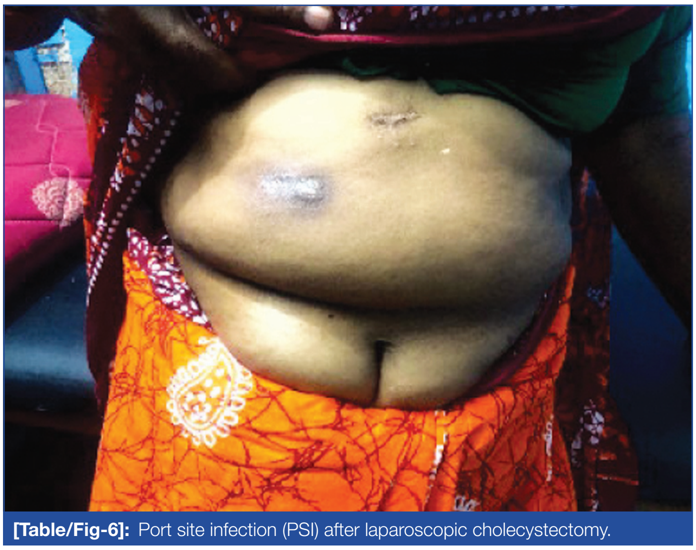
It was observed that 57 (8.29%) out of 687 elective surgeries and 36 (10.81%) out of 333 emergency surgeries had SSI. Among the 41 diabetic patients, 11 (26.8%) developed SSI, while among the non-diabetic patients, 8.38% developed SSI (p-value=0.006) [Table/Fig-5].

Out of the 93 SSIs, 24 were culture negative. Of the remaining 69, 24 had MRSA, 18 had *Pseudomonas aeruginosa*, 12 had *Escherichia coli*, 9 had Klebsiella pneumoniae, and 6 had *Staphylococcus aureus* + *Escherichia coli*.

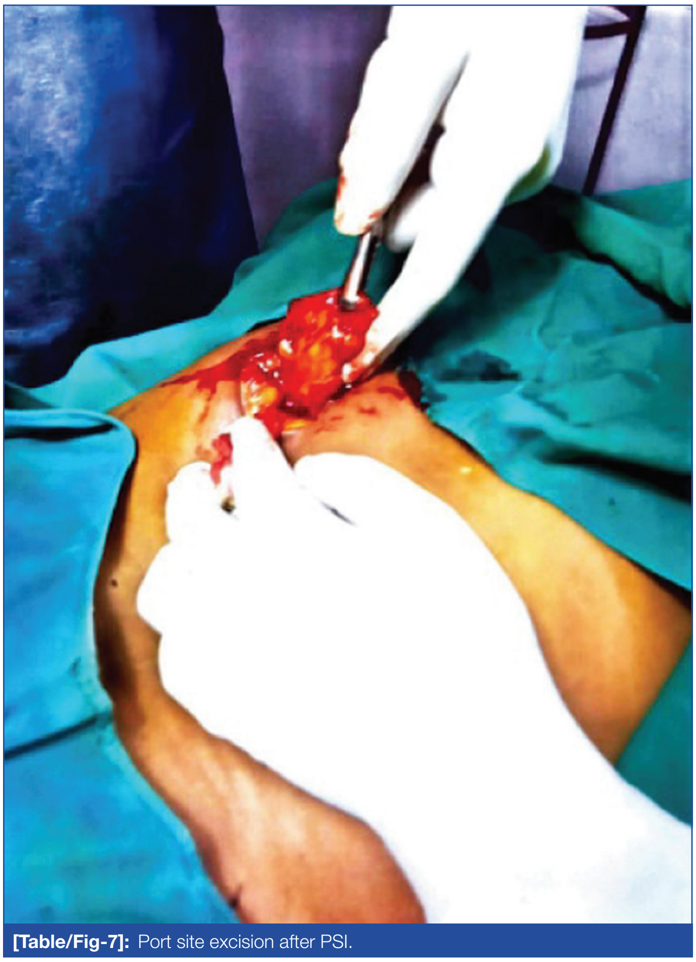
Variables		Number	Number of SSI (%)	Statistics
Sex	Male	573	39 (6.8)	χ^2=6.893 df=1 p<0.0082, (S)
	Female	447	54 (12.08)	
Age (years)	<20	231	21 (9.09)	χ^2=9.9473 df=1 p<0.019, (S)
	20-40	291	39 (13.4)	
	41-60	252	21 (8.33)	
	>60	246	12 (4.87)	
Nature of surgery	Elective	687	57 (8.29)	χ^2=1.414 df=1 p=0.2345 (NS)
	Emergency	333	36 (10.81)	
Wound irrigation	Normal Saline (NS)	660	60 (9.1)	χ^2=0.001 df=1 p=0.9708 (NS)
	Povidone iodine	360	33 (9.17)	
ASA score	≥2	246	42 (17.07)	χ^2=19.678 df=1 p<0.01, (S)
	<2	774	51 (6.59)	
Smoking	Yes	186	36 (19.35)	χ^2=22.375 df=1 p<0.01, (S)
	No	834	57 (6.83)	
Preoperative stay (week)	≤1	654	33 (5.04)	χ^2=29.578 df=1 p<0.01, (S)
	>1	366	60 (16.39)	
Duration of surgery (week)	<1	741	21 (2.83)	χ^2=98.948 df=1 p<0.01, (S)
	>1	279	72 (25.8)	
Hair removal	Shaving	531	39 (7.34)	χ^2=3.496 df=1 p=0.0615 (NS)
	Epilation	489	54 (11.04)	
Drains	Yes	267	42 (15.73)	χ^2=15.317 df=1 p<0.01, (S)
	No	753	51 (6.77)	
Immunosuppression	Yes	33	12 (36.36)	χ^2=20.533 df=1 p<0.01, (S)
	No	987	81 (8.20)	
Diabetes mellitus	Yes	41	11 (26.83)	χ^2=11.668 df=1 p<0.01, (S)
	No	979	82 (8.38)	
Haemoglobin (gm%)	<8	68	13 (19.12)	χ^2=6.753 df=1 p<0.01, (S)
	>8	952	80 (8.40)	

[Table/Fig-5]: Analysis of SSIs.

It was observed that out of the 12 SSIs after hepatobiliary surgeries, 9 were port site infections [Table/Fig-6] following routine laparoscopic cholecystectomy, but there was no growth on routine culture. However, after empirical treatment with oral clarithromycin and ciprofloxacin twice daily for three weeks, when there was no response, the port site wounds were excised [Table/Fig-7] and sent for histopathological examination and Cartridge Based Nucleic Acid Amplification Test (CBNAAT), where *Mycobacterium tuberculosis* was found in three cases and atypical mycobacteria in six cases. Secondary suturing was required in 24 patients with SSI (25.8%). The mean postoperative stay was 32.35±22.7 days in those who developed SSI, compared to 7.19±5.13 days in those who did not (p-value <0.0001). Approximately 54 (58.07%) patients developed



[Table/Fig-6]: Port site infection (PSI) after laparoscopic cholecystectomy.



[Table/Fig-7]: Port site excision after PSI.

SSI in the second week after surgery, followed by 18 (19.35%) patients in the first week, 15 patients (16.13%) in the third week, and six patients (6.45%) in the fourth week.

DISCUSSION

The rates of Surgical Site Infections (SSIs) can vary significantly across different studies. In the present study, an overall SSI rate of 9.11% was encountered in clean and clean-contaminated surgeries. This incidence rate is lower compared to Tolpadi AG et al., from Pune, who reported a rate of 2.05% in clean and clean-contaminated surgeries, and higher compared to Madhusudhan NS and Mareen T from Mumbai, who reported an SSI rate of 12% [12,13].

The SSI rate in clean surgeries was 3.46%, and for clean-contaminated surgeries, it was 21.1% ($p<0.0001$). These findings are similar to the study conducted by Lilani SP et al., [14], but slightly different from the study by Awan MS et al., from Pakistan, which reported rates of 5.4% and 11.4% respectively [15].

In the present study, 6.8% of male patients and 12.08% of female patients developed SSI. Tolpadi AG et al., reported infection rates of 0.69% in males and 3.70% in females [12]. Pathak A et al., found a higher SSI incidence in males [16]. The age group of 20-40 years recorded the highest number of SSIs, which is similar to the findings of Tolpadi AG et al., who found the most affected age group to be 21-30 years, while Pathak A et al., found it to be in the 36-50 years age group [12,16].

In clean cases, the highest incidence of SSI was observed in mastectomies (20.83%), while in clean-contaminated cases, SSI was most commonly observed in lower urinary tract surgeries (37.5%). These findings are similar to the study conducted by Lilani SP et al., [14].

In the present study, 8.29% of elective procedures and 10.81% of emergency procedures resulted in SSI. Tolpadi AG et al., reported a 3.4% SSI rate in emergency cases and a 1.58% rate in elective cases [12]. Patients with an ASA score >2 had a higher incidence of SSI (p-value <0.01) compared to those with an ASA score <2. Pathak A et al., also found a higher rate of SSI in patients with an ASA score >2 (p-value <0.001) [17]. Mezemir R et al., observed significantly higher SSI rates among patients with ASA II-III compared to ASA-I in clean-contaminated surgeries (p-value=0.003) [17].

Smoking was significantly associated with a higher incidence of SSI (p-value <0.01). Pathak A et al., reported a similar association with smoking (p-value=0.077) [16]. In the present study, 26.8% of diabetic patients and 19.11% of anemic patients developed SSI. Awan MS et al., found that 27.7% of diabetic patients and 17% of anemic patients developed SSI [15].

Lilani SP et al., found that none of the patients who were operated within the first two days after admission developed SSI. The overall increase in the duration of preoperative stay had a significant impact on the SSI rate (p-value of 0.0034) [14]. In the present study, 5.04% of patients who stayed for <1 week prior to the operation developed SSI, while 16.39% developed SSI when the stay was >1 week. Pathak A et al., also found a similar strong association (p-value 0.005) [16].

It was observed that 85.71% of patients who had SSI had an operation lasting for more than 1 hour in the study by Tolpadi AG et al., [12]. Lilani SP et al., found that there was no SSI in operations lasting less than 30 minutes. Among patients with surgeries lasting <30 minutes, 1.47% developed SSI, whereas 38.46% of those with surgeries exceeding two hours developed SSI [14]. In the present study, there was also a significant association between the length of surgery and SSI (p-value <0.01).

Lilani SP et al., found that 22.4% of patients who had drains developed SSI, while 3.03% of those who did not develop SSI (p-value of 0.00016) [14]. Pathak A et al., found these percentages to be 9% and 4.1% respectively [16]. This association was also statistically significant in the present study (p-value <0.01).

In the present study, the most common organisms causing SSI were MRSA (24 patients), followed by *Pseudomonas aeruginosa* (18 patients), *Escherichia coli* (12 patients), *Klebsiella pneumoniae* (9 patients), and a combination of *Staphylococcus aureus* and *Escherichia coli* (6 patients). This was consistent with the findings reported by Lilani SP et al., who also found *Staphylococcus aureus* to be the most common gram-positive organism causing SSI and *Pseudomonas aeruginosa* to be the most common gram-negative bacilli [14].

Among the SSI cases after hepatobiliary surgeries, 9 out of 12 were port site infections following routine laparoscopic cholecystectomy. *Mycobacterium tuberculosis* was found in three cases and atypical mycobacteria in six cases. Majid MA et al., found that nine out of 18 SSI patients had tuberculosis, including two laparoscopic cholecystectomy wounds that did not respond to broad-spectrum antibiotics [18].

In the present study, 24 patients (25.8%) required secondary suturing. Tolpadi AG et al., found that 34.7% had co-morbidities and 6.12% required secondary suturing [12]. Pathak A et al., found no association between SSI and diabetes mellitus (p-value of 0.653) or other chronic diseases (p-value=0.649) [16].

The present study found that 9.17% of patients who were scrubbed with Aqueous Povidone Iodine (API) and 9.1% of patients who were scrubbed with Normal Saline (NS) developed SSI. Maemoto R et al., found that the incidence of incisional SSI was 7.6% in the API group and 5.1% in the NS group (p-value=0.154). Wound irrigation was compared with the study by Maemoto R et al., [19] normal saline 468 (5.1%) and for povidone iodine 473 (7.6%) which was found to be closely related to present study.

Tolpadi AG et al., found that 75.51% of patients who developed SSI had a postoperative stay longer than a week [12]. Lilani SP et al., found that patients with SSI had a mean postoperative stay of 24.82 days compared to a mean of 6.29 days in those without

Study with reference	Time, place	Sample size (n)	Nature (n, %)		Sex (n)	Age (yrs)	Nature of Sx (n,%)		ASA (%)	Smoking (%)	Preop. stay (n, %)		Duration of Sx (n, %)		Drain (%)	DM (n, %)		Haemoglobin (n, %)	
			Cl	CC	M/F		Elective	Emergenc	≤2/≥2	Y/N	<1 wk	>1 wk	<1 hr	>1 hr	Y/N	Y	N	<8	>8
Present	2020-2021	1020	693, 3.46	327, 21.1	573/447	21-40, 13.4	687, 8.29	333, 10.8	6.59/17.07	19.35/6.83	654, 5.04	366, 16.39	741, 2.83	279, 25.80	15.73/6.77	41, 26.83	979, 8.38	68, 19.12	952, 8.4
Tolpadi AG et al., [12]	2019-2020, Pune	2382	Total 49, 2.05		1298/1084	21-30, 3.24	1770, 1.5	616, 3.40	-	-	-	-	7, 14.29	42, 85.79	-		-	-	-
Madhusudhan NS and Mareen T [13]	2014 Puducherry	242	126, 11.1	116.129	77/165	18-29, 37.9	-	-	-	23, 8.69	-	-	Depended on the type of Sx		-	26, 3.84			
Lilani SP et al., [14]	2001-2002, Mumbai	190	132, 3.03	58, 22.41	-	-	-	-	-	-	<2 d,0	-	0, <30 Mins	38.46% >2 hrs	41/03	-	-	-	-
Awan MS et al., [15]	2009-2002, Pakistan	300	147, 5.4	123, 11.4	- -	>50, 15.9	-	-	-	-	-	-	Infection more when >80 mins Sx		-	15, 27.7	285, 8.42	<9.9 Hb% 47, 17%	10-12.9 Hb% -206, 8.7
Pathak A et al., [16]	2010-2011, MP	720	631, 3.5		549/171	36-50, 7.4	691, 96% of Sx-so low SSI	29	4.3/14.9	6.7/3.8	592, 8.7	128, 23.5	572, 3.5	148, 10.8	9/4.1	13, 7.7	707, 5	-	-
Mezamir R et al., [17]	2016, Addis Abbaba	249	125, 0	110, 43.6	100/149	>60, 34	141, 56.6 of total Sx	108	23.45/66.7	-	207, 21.7- <4 hrs	58, 27.58- >4 hrs	94, 25.53- <2 hrs	35, 34.28- >2 hrs	-	8, 62.5	241, -	-	-
Khan K et al., [20]	2021-2022, Pak	132	28, 35.71	25, 40	63/69	41-70, 38.7	61, 21.3	71, 23.3	38.33/23.61	7	-	-	69.10.1- <2 hrs	63, 52.4- >2 hrs	41.8/18.5	37, 24.3	-	<11 Hb%- 71, 19.7	>11 Hb%- 61, 42.6
Birhanu [A et al., 21]	2022, Ethlopia	408	72, 19.3	-	221	-	-	-	-	-	>14 days- 2 times more likely to		-	-	-	-	<7 Hb% 10.4 times more likely to		
Ashoobi MT et al., [22]	2019-2020, Iran	506	-	-	301/205	182, 4.9	470, 4	36, 13.9	-	3.6/5.1	<3 days 32, 25	>3 days- 474, 3.4	<2.5 hrs- 441, 3.6	>2.5 hrs- 65, 12.3	-	-		<12 Hb% -279, 5.7	>12 Hb%- 227, 3.5

[Table/Fig-8]: Comparison of different studies [12-17,20-22].
Sx: Surgery; DM: Diabetes mellitus

SSI [14]. In the present study, the mean postoperative stay was 32.35 days in patients who developed SSI compared to 7.19 days in those who did not.

Pathak A et al., reported immunosuppression in 1.7% of their patients, but none of them developed SSI [16]. However, the present study had 33 patients with immunosuppression, and 12 of them developed SSI (p-value <0.01).

The present study found that 58.07% of SSIs developed in the second week after surgery, followed by 19.35% in the first week, 16.13% in the third week, and 6.45% in the fourth week. Tolpadi AG et al., found that 49% of patients developed SSI between 6-10 days after surgery, 18.37% ≤5 days after surgery, 4.08% between 16-20 days after surgery, 4.08% between 21-25 days after surgery, 2.04% between 26-30 days after surgery, and only 4.08% developed SSI after 30 days of surgery [12]. A comparison of the studied variables has been tabulated for easy reference [Table/Fig-8] [12-17,20-22].

Limitation(s)

Not all risk factors were evaluated in this study, such as antibiotic prophylaxis and laminar airflow. The results could be more accurate with a randomised controlled trial., It is important to note that the results of this study cannot be generalised to the entire population, and the follow-up period was short.

CONCLUSION(S)

Clean-contaminated surgeries showed a significant association (p-value <0.0001) with an increased incidence of SSI compared to clean surgeries. Male sex, a higher ASA score, smoking, a longer preoperative stay, and a longer duration of surgery were also significantly associated with SSI. Taking proper pre and postoperative measures can help reduce the incidence of SSI in surgery. Early diagnosis of SSI and identification of the causative organism are crucial for prompt and effective treatment.

Acknowledgement

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