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FREQUENCY OF SURGICAL SITE INFECTION AFTER APPENDICECTOMY.

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ABSTRACT

BACKGROUND: Acute appendicitis is one of the most common surgical emergencies worldwide, and appendectomy remains the definitive treatment. Despite advancements in surgical techniques and perioperative care, surgical site infections SSIs continue to be a frequent complication following appendectomy, particularly in cases of complicated or perforated appendicitis. SSIs can significantly impact patient recovery, leading to prolonged hospital stays, increased healthcare costs, and morbidity. **OBJECTIVE:**To determine the frequency of surgical site infection after appendectomy. **Patients and METHODS**: This descriptive cross-sectional study was conducted on 50 patients who underwent appendectomy Department of General Surgery, Hayatabad Medical Complex Peshawar, from January 24 to June 24. Inclusion criteria were patients aged 18-65 years with a clinical diagnosis of acute appendicitis confirmed by histopathology. Exclusion criteria included patients with immunocompromised status, prior abdominal surgeries, and those on preoperative antibiotics. Surgical site infection SSI was defined according to CDC criteria and assessed postoperatively at 7, 14, and 30 days **RESULTS:**Surgical site infections SSIs were observed in 19 patients 38%, with 11 22% having superficial incisional SSIs and 8 16% having deep incisional SSIs. **CONCLUSION:**This study highlights the significant burden of surgical site infections SSIs following appendectomy, particularly in cases of complicated appendicitis.

KEYWORDS: Appendectomy, Surgical Site Infection, Postoperative Complications

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INTRODUCTION

Appendectomy is the most common emergency surgical procedure performed worldwide for acute appendicitis. Acute appendicitis affects approximately 7% of the global population, with an annual incidence of 86 per 100,000 people in Western countries [1]. The surgical removal of the inflamed appendix remains the gold standard treatment. However, despite advances in surgical techniques and perioperative care, surgical site infection SSI continues to be a significant postoperative complication, occurring in 5-30% of appendectomy cases depending on various factors such as the surgical approach, patient's comorbidities, and preoperative antibiotic use [2].

Surgical site infections SSIs after appendicitis are associated with increased morbidity, hospital length of stay, and healthcare costs. The infections can be deep, involving the muscle and fascia beneath or superficial, only instructing skin and subcutaneous tissue. In more severe cases, there could be organ or cavity infections leading to an abscessor generalized peritonitis. ContentAppendiceal inflammation degree eg, ruptured appendicitis, deferral as well as ssurgical treatment error in aseptic technique all-embracing caput the acceptance of SSI [3]. A US study found that the SSI rate after appendectomy was approximately 11% in patients with perforated appendicitis and 4% in patients without it [4]. Corresponding to this, a similar study done in Pakistan found that 15% of patients who underwent appendectomies developed infections at the operative site signifying the ubiquity of this complication in regional health

settings [5]. The burden of these transfusion-linked infections on patients and the healthcare system makes knowledge of their incidence, risk factors in specific populations, critical. Objective of this study is to find out the post appendectomy rate of SSIs in a tertiary care hospital Peshawar. The findings will be helpful in identifying gaps to improve surgical practice and develop targeted interventions to reduce SSIs, thus improving patient outcomes and reducing health service costs.

METHODOLOGY

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It is a descriptive cross-sectional study for the period of six months. The study was carried out at the Surgical "C" Unit Department of General Surgery Hayatabad Medical Complex, Peshawar from January 24 to June 24. A total of fifty patients who underwent appendectomies during the studied period were considered. Informed consent was taken from all patients. Ethical permission was obtained from the institutional review board. Successive sampling method was used for the selection of the cases.

Inclusion Criteria The study comprises patients of either gender, aged between 18 and 65 years, who could have provided informed consent and had a clinical diagnosis of acute appendicitis histopathologically confirmed.Inclusion criteria were placed on those who had history of previous abdominal surgeries, immunocompromised patients, use of antibiotics beyond the prophylactic use, and lack of adequate medical information. Patient demographics, clinical presentation, surgical specifics, and postoperative results were collected on a structured data collection form.Surgical site infections SSIs were identified according to CDC criteria and assessed postoperatively at 7, 14, and 30 days. The primary outcome was the frequency of SSIs following appendectomy.Data analysis was conducted using SPSS version 26. Descriptive statistics were used to summarize the data, with frequencies and percentages calculated for categorical variables. The association between SSIs and various risk factors was analyzed using the chi-square test, with a p-value of <0.05 considered statistically significant.

RESULTS

The study population had a mean age of 38.54 years SD = 12.87. The mean Body Mass Index BMI was 25.22 kg/m² SD = 0.98. Patients reported an average duration of symptoms of 3.86 hours SD = 1.50 before presenting for surgery. The mean duration of the appendectomy procedure was 62.26 minutes SD = 4.30, and the average hospital stay post-surgery was 5.00 days SD = 1.39. Table-I

The study included 50 patients, with 29 58% males and 21 42% females. Regarding the type of appendicitis, 21 patients 42% had perforated appendicitis, while 29 58% had gangrenous appendicitis. Smoking was reported in 28 patients 56%, and 22 44% were non-smokers. Diabetes Mellitus was present in 6 patients 12%, and 12 patients 24% had hypertension. Surgical site infections SSIs were observed in 19 patients 38%, with 11 22% having superficial incisional SSIs and 8 16% having deep incisional SSIs. No SSIs were observed in 31 patients 62%. Table-II

Of the 50 patients, SSIs were observed in 19 38%, with 13 44.8% males and 6 28.6% females affected. In contrast, 31 patients 62% did not develop SSIs, comprising 16 55.2% males and 15 71.4% females. The association between gender and the occurrence of SSIs was not statistically significant, with a p-value of 0.242. Table-III

Among the 50 patients, 19 38% developed SSIs, with 11 39.3% being smokers and 8 36.4% being non-smokers. The remaining 31 patients 62% did not develop SSIs, with 17 60.7% of them being smokers and 14 63.6% non-smokers. The p-value for this association is 0.833, indicating no statistically significant relationship between smoking status and the risk of developing SSIs in this study population. Table-IV

Out of 50 patients, 19 38% developed SSIs, with 3 50.0% of these patients having diabetes mellitus and 16 36.4% without diabetes. Among the 31 patients 62% who did not develop SSIs, 3 50.0% had diabetes mellitus, and 28 63.6% did not. The p-value for this association is 0.519, indicating that there is no statistically significant relationship between diabetes mellitus and the risk of developing SSIs in this study population. Table-V

Table-I: Descriptive Statistics of Study n=50

Numerical Variables	Mean	Std. Deviation

Age Years	38.54	12.870
BMI kg/m2	25.222	.9794
Duration of Symptoms Hours	3.86	1.498
Duration of Procedure Minutes	62.26	4.299
Duration of Hospital Stay Days	5.00	1.385

Table-II: Demographic and Clinical Characteristics of Patients n=50

Categorical Variables n %	
Gender, n % • Male • Female	29 58% 21 42%
Type of Appendicitis, n % • Perforated • Gangrenous	21 42% 29 58%
Smoking Status, n % • Yes • No	28 56% 22 44%
Diabetes Mellitus, n % • Yes • No	06 12% 44 88%
Hypertension, n % • Yes • No	12 24% 38 76%
Surgical Site Infections, n % • Yes • No	19 38% 31 62%
Type of Surgical Site Infections, n % • Superficial Incisional • Deep Incisional	11 22% 08 16%
• No SSI	31 62%

Table-III: Association of Surgical Site Infections with Gender n=50

		Gender		Total	P Value
		Male	Female		
Surgical Site Infection	Yes	13	6	19	0.242
		44.8%	28.6%	38.0%	
	No	16	15	31	
		55.2%	71.4%	62.0%	
Total		29	21	50	
		100.0%	100.0%	100.0%	

Table-IV: Association of Surgical Site Infections with Smoking n=50

		Smoking Status		Total	P Value
		Yes	No		
Surgical Site Infection	Yes	11	8	19	0.833
		39.3%	36.4%	38.0%	
	No	17	14	31	
		60.7%	63.6%	62.0%	
Total		28	22	50	
		100.0%	100.0%	100.0%	

Table-V: Association of Surgical Site Infections with Diabetes Mellitus n=50

		Diabetes Mellitus		Total	P Value
		Yes	No		
Surgical Site Infection	Yes	3	16	19	0.519
		50.0%	36.4%	38.0%	
	No	3	28	31	
		50.0%	63.6%	62.0%	
Total		6	44	50	

	100.0 %	100.0 %	100.0 %	

DISCUSSION

For example, our findings closely match a research by Jones et al. 2020 that found a 35% SSI risk in patients receiving emergency appendectomy for severe appendicitis [6]. The high occurrence of SSIs in complex cases is further supported by a research by Patel et al. 2021 that found that 32% of patients with gangrenous appendicitis experienced an SSI [7]. Our study, with a p-value of 0.242, could not determine any statistically significant association between gender and the risk of developing SSIs. The findings from another study by Thompson et al. 2022 were also related to no perceived difference in the SSI rates after appendectomy among boys and females [8]. This may indicate that other variables, such as the type of appendicitis or the technique used in surgery, would be the more significant arbiters of the risk for infection. Our regression also revealed no statistical significance with smoking status and SSIs, p-value being 0.833. Contrary to a meta-analysis by Kim et al. 2019, that demonstrated that smokers had significantly higher risk of developing SSIs when compared with nonsmokers 9. Our sample size was relatively low or perhaps the classification and reporting of smoking status could contribute to the discrepancy. Interestingly, in our research no positive relationship between SSIs and diabetes mellitus emerged since the p-value was 0.519. This finding is somewhat contradicted by the larger body of research, which frequently points towards a higher risk of SSIs in diabetic subjects. For instance, a study published by Garcia et al. 2021 illustrated that diabetic patients had dramatically increased opportunities for developing SSIs post-abdominal surgeries like appendectomy [10]. A more effective rate of glycemic control in the perioperative phase or a low number of diabetic patients in our group may be the reasons for not having a meaningful correlation in our study. Our study SSI rate agrees with the findings of other recent research indicating the significant burden of SSIs among patients having appendicectomies. For instance, the SSI rate of 38% in our study is approximately similar to what is reported by Harrison et al. 2020 in a group of patients with severe appendicitis at 37% [11]. This finding shows that even though the care during the perioperative period has improved and surgical techniques, the risk of SSIs is still quite high even in complicated appendicitis. In our analysis, there is no significant correlation between SSIs and gender, similar to the findings of Martin et al. 2019. Their study concluded that there was no evidence of difference in infection rates between males and females; consequently, gender is not a major predictor of SSIs among patients undergoing appendectomy [12]. The kind of appendicitis or patient comorbidities may be more of a risk factor for SSIs than gender itself. Our study could not identify a correlation between smoking status and incidence of SSIs, which tends to differ from several recent studies. According to Wang et al. 2020 study, smoking is one of the considerable risk factors for surgical site infections in patients after undergoing abdominal surgery, such as appendectomy. Smokers are significantly more likely to be infected than non-smokers [13]. This gap might be due to differences in the study populations, how smoking status is defined, or our study's very small sample size. Given the well-documented association of diabetes with susceptibility to infections, our findings of a lack of association with SSIs in diabetes mellitus are somewhat surprising. A related study by Singh et al. 2022 also showed that diabetic patients were manyfold more likely to experience SSIs after appendectomy. This is likely to be due to impaired immunity and delayed healing of wounds with the onset of diabetes [14]. It could be the reasons why our study has no relevance: effective perioperative glucose management or the small number of diabetes patients. Further comparison with the current studies reveals similar trends in SSI rates and risk variables. For instance, a study by Li et al. 2021 reported that 40% of patients with perforated appendicitis had SSI, which is slightly higher than our 38% rate but points out the increased risk of complex cases [15]. Their findings also addressed the aspect of the importance of early surgical intervention to decrease the rates of SSI, an aspect not directly covered in our study but rather a fundamental component of the medical literature. Moreover, our study failed to find a strong association between smoking status and SSIs, which opposes the findings of Ahmed et al.

2020, who established a direct relationship between smoking and higher incidence of SSIs in patients undergoing appendectomy [16]. This disparity may stem from differences in demographics among patients, sample size, or smoking habits, such as frequency and duration, which our study failed to investigate in detail. In this sense, our outcome that diabetes mellitus does not correlate with SSIs does not agree with the general perception of literature that diabetes mellitus significantly increases the risk of developing SSIs. A study in 2019 by Roberts et al. proved that the individual with diabetes is twice more likely to develop SSIs compared with a patient who does not have diabetes and is undergoing similar procedures [17]. The small number of diabetes individuals in our study could make it harder for us to point out the statistically significant difference, which can explain this discrepancy in our findings. More research is needed to better understand the reasons causing SSIs and create targeted measures to lower infection rates, particularly in high-risk populations, including bigger multi-center studies.

CONCLUSION

This study brings attention to everyone on the frequency of SSIs after appendectomy, and especially if appendicitis is complicated. Results showed that in our group, although diabetes mellitus, smoking status, and gender did not significantly coincide with SSI incidence, a total infection rate is still worrisome. These results point out the need for continued concern regarding infection control procedures, most especially in high-risk surgery conditions.

LIMITATION

It is also important to note the various limitations of this study. First, the sample size was small enough that this could decrease the generalizability of the findings and reduce the statistical power to detect meaningful relationships. In addition, the study was only conducted in one tertiary care hospital that could limit the generalizability of the data from other contexts and introduces selection bias. Furthermore, other risk factors that could determine the potential risk of SSIs were not considered in the study. These include time of surgery, administration of antibiotics at the time of procedure, and some specific surgical techniques applied.

ETHICS APPROVAL: The ERC gave ethical review approval.

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin.

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AUTHORS' CONTRIBUTIONS:

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTEREST: No competing interest declared

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