Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i6.6664

THE FREQUENCY OF SURGICAL SITE INFECTIONS AMONG PATIENTS UNDERGOING ELECTIVE AND EMERGENCY SURGERY

Sumaira Otho[1*], Syed Baquer Ali Rizvi[2], Muhammad Asif[3], Lal Shah[4], Shoaib Ahmed[5], Umar Zeb[6]

[1*]Assistant Professor of Surgery, Fazaia Ruth Pfau Medical College Karachi Pakistan.
email: sumaira.otho@gmail.com
[2]Consultant General Surgeon, Public Welfare Hospital, Sui Balochistan Pakistan.
email: Surgeon.syedbaqir@gmail.com
[3]Postgraduate Trainee of General Surgery, Shaheed Mohtarma Benazir Bhutto Medical College, Larkana Pakistan. email: asif921996@gmail.com
[4]Chief Resident Medical officer Surgey department, People's University of Medical and Health Sciences for Women (PUMHSW) Nawabshah Pakistan. email: drlalshah@gmail.com
[5]Consultant Surgeon General Surgery, Sheikh Khalifa Bin Zayyad Al Nayan Hospital Quetta Pakistan.
email: shoaibahmed819@yahoo.com
[6]Postgraduate Trainee of General Surgery, Dr. Ziauddin Hospital Keamari Karachi Pakistan.
email: uzaib0306@gmail.com

***Corresponding author:** Sumaira Otho
*Assistant Professor of Surgery, Fazaia Ruth Pfau Medical College Karachi Pakistan.
email: sumaira.otho@gmail.com

Abstract

Background: A surgical wound is the remaining skin defect after a surgical incision. The Centers for Disease Control and Prevention (CDC) divides these wounds into four categories: clean (Class I), clean-contaminated (Class II), contaminated (Class III), and dirty (Class IV). According to the CDC, surgical site infections (SSI) may develop up to 30 days following an operative surgery, or up to a year if an implant is used. The CDC divides SSI into three categories based on tissue depth: superficial SSI, deep incisional SSI, and organ/space SSI. The stated SSI rate is 4.34% for elective treatments and 12.41% for emergency cases, for an overall average of 7.32%.

Objective: To investigate the frequency of surgical site infections among patients receiving elective surgery and those treated in emergency situations.

Study design: A cross-sectional study

Place and Duration: this study was conducted in Fazaia Ruth Pfau Medical College Karachi from March 2023 to March 2024

Methodology: Non-probability purposive sampling was used to calculate the sample size. This study included all general surgery patients of both genders who had surgeries either on an elective or emergency basis. All patients were monitored postoperatively in the ward and then in the outpatient department on the 5th, 7th, and 30th days. During each visit, patients were queried about fever and wound pain, and their wounds were checked for discharge.

Results: There were a total of 950 patients who were a part of this research. The patients in this study aged from 13 to 65 years. There were a total of 346 (36.5%) females, while 604 (63.5%) males. There were 693 (73.1%) patients who had elective surgery while 257 (26.9%) were operated in emergency. The infection rate was 4.7% for elective patients and 65% for emergency cases, with an average age of 18 to 40 years.

Conclusion: Patients who underwent emergency surgery had a much higher prevalence of wound infections as compared to elective surgeries.

Keywords: emergency surgery, elective surgery, wound infections

INTRODUCTION

A surgical wound is the remaining skin defect after a surgical incision [1]. The Centers for Disease Control and Prevention (CDC) divides these wounds into four categories: clean (Class I), clean-contaminated (Class II), contaminated (Class III), and dirty (Class IV) [2]. Class I wounds do not enter hollow organs, whereas Class II wounds do [3]. Class III wounds occur when an open wound becomes contaminated as a result of a sterile procedure breach or unanticipated leakage from the gastrointestinal system or other hollow organs [4]. Class IV wounds are extremely polluted and infected, with devitalized tissues and bacteria [5].

According to the CDC, surgical site infections (SSI) may develop up to 30 days following an operative surgery, or up to a year if an implant is used [6]. The CDC divides SSI into three categories based on tissue depth: superficial SSI, deep incisional SSI, and organ/space SSI [7]. Classifying surgical wounds can assist predict future infections, complications, and the need for reoperations [8]. Wound infections increase sepsis-related morbidity and mortality while also lowering quality of life [9]. Prior infectious disease exposure, low serum albumin levels, extreme ages, high BMI, smoking, known comorbidities, and others are all risk factors for surgery site infections [10]. Surgical risks include extended operation time, inadequate surgical washing, insufficient skin preparation, and incorrect handling of tissues.

Symptoms of surgical site infection include purulent discharge from the wound, painful, red, hot, and tender swelling, the presence of bacteria on culture, and slow healing [11]. SSIs are difficult to treat and increase the expense of surgical operations, thus patient counseling is vital. The stated SSI rate is 4.34% for elective treatments and 12.41% for emergency cases, for an overall average of 7.32% [12]. E. coli is the most common organism discovered in elective instances, while Proteus mirabilis is identified in emergency cases [13]. The purpose of this study is to investigate the frequency of SSIs among patients receiving elective surgery and those treated in emergency situations.

METHODOLOGY

The Ethical Review Committee has approved this research. All of the participants were informed about this study and their written consent was obtained. Non-probability purposive sampling was used to calculate the sample size. This study included all general surgery patients of both genders who had surgeries either on an elective or emergency basis.

Exclusion criteria: Patients under the age of 12 were excluded since they are referred to the pediatric surgery department. Immunocompromised patients, those with unclean wounds, those taking steroids,

and patients who had been operated on at other facilities and presented with a burst abdomen were all not a part of this research.
All patients were monitored postoperatively in the ward and then in the outpatient department on the 5th, 7th, and 30th days. During each visit, patients were queried about fever and wound pain, and their wounds were checked for discharge. The type of surgical operation conducted determined whether the wound was clean, clean-contaminated, or contaminated. The severity of surgical site infections was classified as mild (redness and tenderness with mild serous discharge), moderate (purulent discharge extending into the subcutaneous plane with increased redness and pain), and severe (infection spreading into deep tissues such as muscles, accompanied by systemic infection symptoms).

The database was built with SPSS version 23. Complications were recorded based on their frequency and proportion of total cases. A 95% confidence interval was constructed for each proportion and assessed using a one-sample t-test for binomial proportions against the null hypothesis of p=0.5. The normal theory technique determined that results were significant at p=0.05.

RESULTS

There were a total of 950 patients who were a part of this research. The patients in this study aged from 13 to 65 years. There were a total of 346 (36.5%) females, while 604 (63.5%) males. There were 693 (73.1%) patients who had elective surgery, while 257 (26.9%) were operated in emergency. Table number 1 shows the distribution of participants according to their gender in both elective and emergency surgery cases.

Table No. 1: distribution of participants according to their gender in both elective and emergency surgery cases. (n=950)

Surgery	Male		Female	
	n	%	n	%
Elective	409	59.01	284	40.99
Emergency	195	75.8	62	24.2

Table number 2 shows the details of surgical site infection in emergency surgery cases.

Table No. 2: details of surgical site infection in emergency surgery cases

Emergency surgery cases		
Emergency procedures	**Number of patients**	**Number of infected patients**
Laparotomy for peritonitis	135	132
Obstructed inguinal hernia	22	8
Trauma	16	7
Laparotomy for intestinal obstruction	22	8
Appendectomy	62	12
Total	257	167 (65%)

Table number 3 shows the details of surgical site infection in elective surgery cases.

Table No.3: details of surgical site infection in elective surgery cases

Elective surgery cases		
Elective procedures	**Number of patients**	**Number of infected patients**
Mastectomy	56	1
Para umbilical hernia	45	3
Inguinal hernia	150	4
Thyroidectomy	52	1
Incisional hernia	52	4
Open cholecystectomy	38	2
Colorectal cancer surgeries	60	9
Laparoscopic cholecystectomy	240	10
Total	693	34 (4.7%)

DISCUSSION

In this study, the infection rate was 4.7% for elective patients and 65% for emergency cases, with an average age of 18 to 40 years. In comparison, another study found that emergency abdominal surgery had a greater SSI rate (20.7%) than elective cases (4.9%) [14]. Surgical site infections are usually nosocomial and affected by patient cleanliness. The majority of patients in our study came from low-income families, therefore personal cleanliness was a major concern both during admission and after discharge. Sterilization and antiseptic techniques in the operating room may contribute to wound infections even in clean situations [15]. However, our facility's low infection rate in elective cases demonstrates that we have effective equipment sterilization policies and surgical techniques in place. Typhoid intestinal perforation and tuberculous ileal perforation were particularly common in this study. The infection rate related with peritonitis in these patients was higher than in other nations, such as France, where it is 2.5% [16]. Contaminated equipment can contribute to these infections, emphasizing the significance of rigorous cleaning to avoid surgical site infections [17]. In this study's emergency cases, the infection rate among peritonitis cases was 97.8%, indicating infected wounds. Another study in China found a very high infection rate of 7.5% in peritonitis cases compared to other procedures, however it was substantially lower than ours [18].

Wound categorization predicts surgical site infections, with contaminated wounds having a greater infection rate than clean-contaminated wounds. This study found a significant infection rate in peritonitis cases, which supports this observation. Another study found an infection rate of 11.4% in emergency laparotomy cases, but trauma cases in our analysis had a similar proportion of infected patients, totaling 7 cases [19]. Early detection and treatment of infections can help to prevent serious surgical site infections, allowing patients to recover more quickly. Diabetes mellitus, hypertension, and coronary artery disease are all risk factors for infections due to impaired wound oxygenation, hence they must be managed properly. Furthermore, sepsis might complicate the management of diabetes and other cardiovascular diseases. Smoking and poverty are two additional risk factors that can predispose people to infections.

In this study, the infection rate in elective cases was low, most likely due to the overall better health of patients scheduled for surgery and improved care of comorbid medical disorders. Elective settings are often associated with clean or occasionally clean-contaminated situations, such as gallbladder rupture and bile spillage during laparoscopic cholecystectomy. In such cases, infection rates are

expected to be slightly higher. However, in another study, the overall incidence of surgical site infection in elective cases was 14.29%, which is higher than the rate found in our study [20].

CONCLUSION

Patients who underwent emergency surgery had a much higher prevalence of wound infections as compared to elective surgeries.

Funding source

This study was conducted without receiving financial support from any external source.

Conflict in the interest

The authors had no conflict related to the interest in the execution of this study.

Permission

Prior to initiating the study, approval from the ethical committee was obtained to ensure adherence to ethical standards and guidelines.

REFERENCES

1. Irfan T. Surgical Site Infection Following Elective and Emergency Surgical Procedures. Journal of Surgery Pakistan. 2023 Jun 27;28(2):33-7.
2. Malik ZI, Nawaz T, Abdullah MT, Waqar SH, Zahid MA. Surgical site infections in general surgical wards at a tertiary care hospital. Pakistan Journal of Medical Research. 2013 Oct 1;52(4):116.
3. Iqbal M, Zia MN, Ijaz S, Malik NA. Surgical site infection; effect of contamination and duration of surgical procedure. Journal of Rawalpindi Medical College. 2022 Sep 30;26(3).
4. Awan MS, Dhari FJ, Laghari AA, Bilal F, Khaskheli NM. Surgical site infection in elective surgery. J Surg Pak (Int). 2011 Jan;16:33-7.
5. Bibi S, Channa GA, Siddiqui TR, Ahmed W. Frequency and risk factors of surgical site infections in general surgery ward of a tertiary care hospital of Karachi, Pakistan. International Journal of Infection Control. 2011 Feb 1;7(3).
6. Ghous F, Sarwar M, Faisal MS. Frequency of surgical site infection after emergency abdominal surgeries; an audit of 200 cases at a tertiary care unit. Proceeding Shaikh Zayed Postgrad Med Comp. 2018;32:29-34.
7. Singh LM, Yadalwar V. Study of post-operative surgical site infection in patients of emergency laparotomy in teaching hospital of central India.
8. Bilal M, Karamat A, Basit MS, Bashir MS, Naqvi Q, Hashmi GM. Incidence of Surgical Site Infection in Patients Presented for Orthopaedic Surgery. Pakistan Journal of Medical & Health Sciences. 2022 Sep 17;16(08):289-.
9. Malik AZ, Ali Q. Surgical site infections after elective surgery in Pakistan: Surgipak Study. Journal of Rawalpindi Medical College. 2015 Dec 30;19(3).
10. Janugade HB, Nagur BK, Sajjan KR, Biradar SB, Savsaviya JK, Reddy M. Abdominal surgical site infection occurrence and risk factors in Krishna Institute of Medical Science, Karad. Int J Sci Stud. 2016 Feb 1;3(11):53-6.
11. Onyekwelu I, Yakkanti R, Protzer L, Pinkston CM, Tucker C, Seligson D. Surgical wound classification and surgical site infection in an orthopedic patient. J Am Acad Surg Glob Res Rev. 2017;1(3):e022. https://doi.org/ 10.5435/jaaosglobal-d-17-00022
12. Herman TF, Bordoni B. Wound Classification. 2022 In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2022. https://www.ncbi.nlm.nih.gov/books/NBK5 54456/
13. Ansari S, Hassan M, Barry HD, Bhatti TA, Hussain SZM, Jabeen S, et al. Risk factors associated with surgical site infections: a retrospective report from a developing country. Cureus. 2019;11(6):e4801. doi:10.7759/cureus.4801.

14. Amutha B, Viswanathan T. Retrospective study on the pattern of pathogens isolated from surgical site wound infection in tertiary care hospital in Coimbatore, India. Int Res J Med Sci. 2014;2:1- 6.https:doi.org/10.5455/2320- 60j.ijso.2019.09.008.
15. Trimas SJ. 5 simple ways to prevent surgical site infections in surgery centres. Becker's Clinical leadership and infection control. Chicago, IL: Becker`s Healthcare;2011.
16. Li Z, Li H, Lv P, Peng X, Wu C, Ren J, et al. Prospective multicenter study on the incidence of surgical site infection after emergency abdominal surgery in China. Sci Rep. 2021;11(1):7794. doi: 10.1038/s41598- 021-87392-8.
17. Gorvetzian JW, Epler KE, Schrader S, Romero JM, Schrader R, et al. Operating room staff and surgeon documentation curriculum improves wound classification accuracy. Heliyon. 2018;4(8):e00728.
18. Surgical site infection (SSI). Centre for disease control and prevention (CDC). Atlanta, GA: CDC. 2010. [Internet] https://www.cdc.gov/hai/ssi/ssi.html accessed in February 2023.
19. Chauhan S, Chauhan B, Sharma H. A comparative study of post operative complications in emergency vs elective laparotomy at a tertiary care centre, Int Surg J. 2017;4:8. https://doi.org/10. 18203/10.18203/2349-2902.isj20173408
20. Saravanakumar R, Devi BMP. Surgical site infection in a tertiary care centre-an overview - A cross sectional study. Int J Surg Open. 2019;21:12-6. doi.org/10.1016/j.ijso.2019.09.008.