Original Research Article

DOI: http://dx.doi.org/10.18203/2349-2902.isj20171542

The incidence of postoperative infection in tertiary rural hospital

Meghraj Chawada^{1*}, Shobha S. Nisale¹, Ganesh K. Kharkate², Sudhir B. Deshmukh³

¹Associate Professor, ²Third year PG Student, ³Professor and HOD, Department of General Surgery, SRTR Rural Government Medical College, Ambejogai, Beed, Maharashtra State, India

Received: 31 March 2017 **Accepted:** 05 April 2017

*Correspondence:

Dr. Meghraj Chawada,

E-mail: dr.meghrajchawada@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Post-operative wound infections have been a problem since surgery was started as a treatment modality. Post-operative infections were responsible for 70-80% of deaths until Ignaz Semmelweis and Joseph Lister, in middle of 19th century, introduced methods of infection control by use of antiseptics. Objective was to study the incidence of postoperative infection in tertiary rural hospital.

Methods: A hospital based cross sectional study was carried out at Department of General Surgery, SRTR Rural Government Medical College from September 2015 to August 2016 among 1250 patients. Detailed history, complete and thorough clinical examination was carried out for each and every individual included in the present study. The patients are assessed pre operatively and post operatively.

Results: It was found that the maximum cases belong to the age group of 26-35 years i.e. 28.32% followed by age group of 36-45 years (25.68%). The proportion of males was slightly more than females. The most common surgical procedure done was inguinal hernioplasty in 24.96% of cases followed by internal appendectomy in 22.24% of cases. Maximum study subjects had clean surgical procedure in 62.08% of cases. The highest incidence (19.46%) was found in the age group of above 56 years followed by age more than 56 years in 19.46% of cases. It was found that the incidence of SSI was more among females than males. It was found that the incidence of SSI was more among those with some co-morbidity than among those who doesn't have any co-morbidity.

Conclusions: Surgical infections particularly, surgical site infections, have always been a major complication of surgery and trauma. The overall prevalence of surgical site wound infection in the surgical ward was 10.4%.

Keywords: Post operative infections, Post operative wound infection, Surgery, Treatment modality

INTRODUCTION

Post-operative wound infections have been a problem since surgery was started as a treatment modality. Post-operative infections were responsible for 70-80% of deaths until Ignaz Semmelweis and Joseph Lister, in middle of 19th century, introduced methods of infection control by use of antiseptics. The introduction of antiseptics has been considered to be an important milestone on the route to safe surgeries. The discovery of antimicrobial agents also enables surgeons to perform surgeries in many conditions that were previously thought to be impossible in the pre-antibiotic era, due to

the risk of infections. Since then, a number of significant advancements in medicine, particularly in the field of microbiology, have resulted in the prevention and the control of this infection. However, in spite of modern standards of preoperative preparation, antibiotic prophylaxis, and refinements in anaesthetic and operative techniques, surgical wound infection remains the second most common type of nosocomial infection, and accounts for almost one-third of all hospital- acquired infections.^{2,3}

The infection in a wound is a manifestation of the disturbed host-bacteria equilibrium that is in favour of the bacteria. This not only elicits a systemic septic response,

but it also inhibits the multiple processes that are involved in the wound healing i.e. each of these processes is affected when the bacteria proliferate in a wound.⁴

In complicated postoperative infections, clinical presentation may include profound systemic toxicity and rapid local advance of the infection, often involving all layers of body wall. Such infections occur during the first 48 hours after operation and characteristically caused by either clostridia or beta-hemolytic streptococci. These infections result in high mortality unless a rapid diagnosis is made on the basis of clinical presentation and investigations. Treatment includes parenteral administration of antimicrobials and aggressive, prompt surgical debridement of all infected tissue.⁵

The absolute prevention of surgical wound infection seems to be an impossible goal. It is the second commonest nosocomial infection and causes patient discomfort, prolonged hospital stay, more days off work and increased cost of therapy; the cost of an operation increase by 300% to 400%.6 An important requirement in the prevention of SSI is the availability of correct and recent data i.e. surgical audit and wound surveillance. The common correctable risk factors are malnutrition, obesity, the presence of infective foci, diabetes, hygienic conditions and the duration of the operation. These achievable preventive measures should be taken to save the economic burden on the patient, on the hospital and on the community as a whole. The improper and the prolonged use of antibiotics should be avoided, as this can lead to the development of resistant strains of microorganisms, which can lead to nosocomial infections. Hence present study was conducted to study the incidence of postoperative infection in tertiary rural hospital.

METHODS

It was a hospital based cross sectional study conducted at the Department of General Surgery, SRTR Rural Government Medical College for a period of one year from September 2015 to August 2016.

Sample size

A total of 1250 patients were studied during the study period.

Ethical considerations

Institutional Ethics Committee permission was taken prior to the start of the study. Informed consent was taken from each and every subject included in the study.

Detailed history including age, sex, social class and nutritional status was taken and recorded in the pre designed, pre tested semi structured questionnaire. Complete and thorough clinical examination was carried out for each and every individual included in the present study. Investigations were carried out as appropriate. The patients are assessed pre operatively and post operatively. Pre operatively they were assessed for type of wound, like clean wound, clean and contaminated wound, and contaminated wound. Post operatively they assessed for the length of hospital stay after surgery, how many times the dressing of the wound was opened, any wound hematoma formation, any occurrence of seroma, how much is the quantity of discharge from the drain, what is the duration of discharge from the drain, in gaps in the wound etc.

Statistical analysis

The data was recorded in the pre designed, pre tested, semi structured questionnaire. The collected data was entered in Microsoft excel worksheet and proportions were used to analyze the data.

RESULTS

Table 1 shows the age wise distribution of the study subjects. It was found that the maximum cases belong to the age group of 26-35 years i.e. 28.32% followed by age group of 36-45 years (25.68%). The proportion of cases present in the age group of 46-55 years was 20.64%. The percentage of cases belonged to the age group of 16-25 years was 16.32%. Least number of cases i.e. 113 (9.04%) were seen in the age group of more than 56 years.

Table 1: Age wise distribution of the study subjects.

Age group (years)	No. of cases	Percentage
16-25	204	16.32
26-35	354	28.32
36-45	321	25.68
46-55	258	20.64
>56	113	9.04
Total	1250	100

Table 2: Sex wise distribution of the study subjects.

Sex	No. of cases	Percentage
Male	681	54.48%
Female	569	45.52%
Total	1250	100%

Table 2 shows the sex wise distribution of the study subjects. The proportion of males was slightly more than females. The males were 681 (54.48%) and the proportion of females was 45.52%.

Table 3 shows surgical procedures followed in the present study for the study subjects. The most common surgical procedure done was inguinal hernioplasty in 24.96% of cases followed by internal appendectomy in 22.24% of cases. Incisional hernia with meshplasty was carried out among 15.12% of cases, whereas 7.68% of

cases underwent thyroidectomy. Pilonidal sinus excision was done in 6.72% of cases. Very few cases i.e. only 0.88% of cases underwent nephrectomy.

Table 3: Surgical procedures followed in the present study for the study subjects.

Surgical procedure	No. of cases	Percentage
Incisional hernia with meshplasty	189	15.12%
Thyroidectomy	96	7.68%
Inguinal hernioplasty	312	24.96%
Internal appendectomy	278	22.24%
Fistulectomy	36	2.88%
Umbilical hernia repair	32	2.56%
Laparoscopic appendicectomy	45	3.6%
Open cholecystectomy	28	2.24%
Pilonoidal sinus excision	84	6.72%
Open pyelolithotomy	18	1.44%
Mastectomy	54	4.32%
Hemicolectomy	19	1.52%
Nephrectomy	11	0.88%
Other (Fibroadenoma excision)	48	3.84%
Total	1250	100%

Table 4 shows classification of surgical procedures among the study subjects. Maximum study subjects had clean surgical procedure in 62.08% of cases. Only 3.84% of cases had dirty surgical procedure. 8.96% of cases had contaminated surgical procedure. And 25.12% of cases had clean-contaminated surgical procedure.

Table 4: Classification of surgical procedures among the study subjects.

Classification	No. of cases	Percentage
Clean	776	62.08%
Clean-contaminated	314	25.12%
Contaminated	112	8.96%
Dirty	48	3.84%
Total	1250	100%

Table 5: Incidence of SSI in different age groups among the study subjects.

Age group (years)	No. of cases (n=1250)	SSI (%)
0-16	0	0
16-25	204	11 (5.39%)
26-35	354	24 (6.77%)
36-45	321	32 (9.96%)
46-55	258	41 (15.89%)
>56	113	22 (19.46%)

Table 5 shows incidence of SSI in different age groups among the study subjects. The highest incidence (19.46%) was found in the age group of above 56 years followed by age more than 56 years in 19.46% of cases.

In the age group of 36-45 years, the incidence of SSI was 9.96% and it was 6.77% in the age group of 26-35 years. But in the youngest age group of 16-25 years, it was zero. Thus it was found that as the age increased the incidence of SSI increased.

Table 6: Incidence of SSI in sex groups.

Sex	No. of cases	SSI (%)
Male	681	62 (9.10%)
Female	569	68 (11.95%)

Table 6 shows incidence of SSI males and females. It was found that the incidence of SSI was more among females than males. It was 11.95% among females and 9.10% among males.

Table 7: Incidence of SSIs in patients with co-morbidities.

Co-morbidity	No. of cases	SSIs
Diabetes mellitus	112	22 (19.64%)
COPD	87	12 (13.79%)
IHD	102	8 (7.84%)
No co-morbidity	949	88 (9.27%)

Table 7 shows the incidence of SSI in terms of comorbidities. It was found that the incidence of SSI was more among those with some co-morbidity than among those who doesn't have any co-morbidity. The incidence (19.64%) was highest among those who had diabetes followed by 13.79% among those who had COPD. The incidence of SSI was lesser among those who had IHD compared to those who had no co-morbidity.

DISCUSSION

Post-operative wound infection still remains one of the most important causes of morbidity in surgically treated patients despite the advances in the operative techniques and a better understanding on the pathogenesis of the wound infections. Its rate varies in different countries, different areas and even in different hospitals.

The prevalence rate of surgical site infections, though preventable, is high in Indian hospitals than those in the US and European countries (0.5% to 15%).^{7,8} Different studies from India done at different places have shown SSI rates to vary from 6.09% to 38.7%.⁹⁻¹²

This study observed 10.4% post-operative wound infection rate. This marginally lower rate in our hospital compared with other hospital studies is probably due to the better infection control practices and also due to higher proportion of clean and elective surgeries included in present study.

Studies by Agarwal et al, Surange et al have shown SSI rates in India to be between 4-30%. The higher

infection rates in Indian hospitals are mainly due to the poor set up of our hospitals and due to lack of adequate attention towards basic infection control measures.

The present study observed a significantly increasing incidence of SSI with the increasing age of patients. The patients with ages of more than 55 years had higher incidence (19.46%) and 46-55 years had 15.89% of postoperative wound infections as compared to an incidence of 5.39% in the patients who had ages of less than 26 years. Well comparable findings were of Masood A et al who reported that patients in the age group 51-60 years were infected more than those in the vounger age groups. 15 Other authors like Scott et al and Perl TM also made almost similar observations that increased age was associated with an increased probability of a postoperative wound infection. 16,17 It can be due to multiple factors like a low healing rate, malnutrition, malabsorption, increased catabolic processes and a low immunity. 18

The percentage of males (9.10%) was found to be lower than that of females (11.95%) in this study which was similar to that found in India where males were 62.68% and females were 37.32%.¹⁹ In another study in India, males were found to have higher SSIs as compared to females.²⁰ This was however not the case in an Indian study where the female gender was found to be statistically significant in relation to SSIs.²¹

When categorized operation by traditional wound classification, infections occurred in 5.79% of the clean wounds, 10.82% of the clean-contaminated wounds, 21.42% of the contaminated wounds and in 56.25% of the dirty or the infected wounds, in the present study.

The post-operative wound infection rate in present study was 5.79% amongst the clean surgery cases, which was higher, as the usually reported rates varied from 1% to 4%, though most of the studies had documented a rate of less than 2%.22 The infection rate in present study for the clean-contaminated cases was 10.82%. Different studies had shown a range of 5-30% in this class.²³ Another study has quoted a figure of 40% in all clean and clean contaminated procedures, resulting in increased cost and morbidity of the patient.²⁴ A study which was conducted at the Mayo Hospital, Lahore, Pakistan reported an infection rate of 5.05% among the clean and a rate of 8.39% amongst the clean-contaminated cases.²⁵ Another study which was done by Hernandez in Peru in 2005 described rates of 13.9% and 15.9% amongst the clean and the clean-contaminated cases.²⁶

Co-morbidities like diabetes and COPD have been observed to be significant risk factors for SSI compared with patients without co-morbidities in the literature. Suchitra and Lakshmidevi have reported diabetes/diabetic status as a significant risk factor for SSI.²¹ In present study also patients with diabetes mellitus had higher (19.64%) incidence of SSIs followed by COPD (13.79%).

In present study, 75% incidence of SSI was observed in patients who had preoperative stay of more than 7 days. The patients with post-operative stay of more than 7 days were five times more likely to develop SSI. Anvikar et al demonstrated that preoperative hospital stay predisposed an individual to 1.76% risk of acquiring an infection. With an increase in preoperative stay, the risk increased proportionally.

CONCLUSION

Surgical infections particularly, surgical site infections, have always been a major complication of surgery and trauma. The overall prevalence of surgical site wound infection in the surgical ward was 10.4%. Significant determinants of surgical site infection were; old aged groups, diabetes, long stays in the ward, prolonged operation time and certain surgical procedures such as open cholecystectomy, mastectomy.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

institutional ethics committee

REFERENCES

- Leaper DJ. Wound infection. In: Russell RCG, William NS, Bulstrode CJK, eds. Bailey & Love's Short Practice of Surgery; 24th ed. London: Arnold; 2004:118-132.
- 2. Zoutman D, Pearce P, McKenzie M. Surgical wound infections occurring in day surgery patients. Am J Infect Control. 1990;18:277-82.
- 3. Eltahawy AT, Mokhtar AA, Khalaf RM. Postoperative wound infection at a University hospital in Jeddah, Saudi Arabia. J Hasp Infect. 1992;21:79-83.
- 4. Robson MC. Wound infection. A failure of wound healing caused by an imbalance of bacteria. Surg Clin North Am. 1997;77(3):637-50.
- Nicholas RL. Wound Infection rates following clean operative procedures: Can assume them below? (Editorial). Infect Cont Hosp Epidemiol. 1992;13:455.
- Steven M, Steinberg J. Investigation and treatment of surgical infection. In: Cuscheri A, Steele RJC, Moossa AR, eds. Essential Surgical Practice. 3rd ed. London: Butterworth Heinemann; 1995:20.
- 7. Culver DH, Horan TC, Gaynes RP. Surgical wound infection rates by wound class. Operative procedure and patient risk index. National Nosocomial Infections Surveillance System. Am J Med. 1991;91(3B):152S-7S.
- 8. European Centre for Disease Prevention and Control Title. Surveillance of surgical site infections in Europe, 2008-2009. Stockholm: ECDC; 2012.
- 9. Anvikar AR, Deshmukh AB, Karyakarte RP. A one year prospective study of 3,280 surgical wounds. Indian J Med Microbiol. 1999;17:129-32.

- Lilani SP, Jangale N, Chowdhary A. Surgical site infection in clean and clean-contaminated cases. Indian J Med Microbiol. 2005;23:249-52.
- Ganguly PS, Khan Y, Malik A. Nosocomial infection and hospital procedures. Indian J Comm Med. 2000;990-1014.
- Mahesh CB, Shivakumar S, Suresh BS. A
 Prospective study of surgical site infections in a
 teaching hospital. J Clin Diagn Res 2010;4(5):31149.
- 13. Agarwal SL. Study of postoperative wound infections. Indian J Surg. 1972;34:314-20.
- 14. Surange BN, Rai UK. Bacteriological pattern and their sensitivity to antibiotics in wound infections. Indian J Pathol Microbiol. 1979;22:331-6.
- Masood A, Shams NA, Obaidullah K. Postoperative wound Infection: A Surgeon's Dilemma. Pak J Surg. 2007;23(1):41-7.
- 16. Scott JD, Forrest A, Feuerstein S. Factors associated with post-operative infections. Infect Control Hosp Epidemiol. 2001;22(6):347-51.
- 17. Perl TM, Cullen JJ, Pfaller MA. The MARS study team. A randomized, double-blind, placebocontrolled clinical trial of intranasal mupirocin ointment (IM) for prevention of S. aureus surgical site infections (SSI) [abstract]. Abstracts of the IDSA 36th Annual Meeting. 1998;91(88).
- 18. Mark RM, Edwin AD. Nutrition and Infection. Surg Clin North Am. 1994;74:659-64.
- 19. Anusha S, Vijaya LD, Pallavi K. An Epidemiological study of surgical wound infections in a surgical unit of tertiary care teaching hospital. Indian J Pharm Pract. 2010;4:8-13.

- Anand S, Mahendra PS, Swagata B. Surgical site infection among postoperative patients of tertiary care centre in Central India- A prospective study. Asian J Biomed Pharm Sci. 2013;17:41-4.
- Suchitra JB, Lakshmidevi N. Surgical site infections: Assessing risk factors, outcomes and antimicrobial sensitivity patterns. Afr J Microbiol Res. 2009;4:175-9.
- 22. Ojiegbe GC, Njoku Obi AN, Ojukwu JO. Incidence and parametric determinants of Postoperative Wound Infection in university teaching hospital. Cent Afr J Med. 1990;36:63-7.
- 23. Wilson AP, Weavill C, Burridge J. The use of wound scoring method 'ASEPSIS' in postop. wound surveillance. J Hosp Infect. 1990;16(4):309.
- 24. Holtz TH, Wenzel RP. Post-discharge surveillance for Nosocomial Wound Infection. A brief review and commentary. Am J Infect Cont. 1992;20:206-13.
- 25. Akhtar S, Gondal KM, Ahmed M. Surgical wound site infection-our experience. Ann King Edward Med Coll. 2001;7(3):211-2.
- 26. Hernandez K, Ramos E, Seas C. Incidence of and risk factors for Surgical Site Infection in a Peruvian hospital. Infect Control Hosp Epidemiol. 2005;26(5):473-7.

Cite this article as: Chawada M, Nisale SS, Kharkate GK, Deshmukh SB. The incidence of postoperative infection in tertiary rural hospital. Int Surg J 2017;4:1541-5.