

# A Prospective Study of Prevalence of Post-Operative Wound Infection in Surgical Patients.

Avanish Kumar Saxena<sup>1</sup>

<sup>1</sup>Associate Professor, Department of Surgery, SNMC, Agra.

Received: October 2015

Accepted: November 2015

## ABSTRACT

**Background:** The prevalence of the wound infections, this study was designed to evaluate the frequency, clinical presentation, common risk factors and the different organisms which were involved in cases of clean and clean-contaminated, contaminated and dirty surgeries. **Method:** Total 50 infected cases were involved in this study, Out of which 16 females and 34 males were included. This case study was carried out in the Department of Surgery in a tertiary care centre. **Result:** We found that, most commonly infection caused by 30% Staphylococcus aureus followed by 24% Pseudomonas aeruginosa, 20% Klebsiella pneumoniae, 26% Escherichia coli were the causes of infections. **Conclusion:** This study concludes that, for effective prevention of surgical-site infections, surgeon should remember local and microbial factors should take appropriate measures to avoid them.

**Keywords:** Micro-organisms, Staphylococcus aureus, Pseudomonas aeruginosa, Klebsiella pneumoniae, Escherichia coli

## INTRODUCTION

Post-operative wound infection is a major source of morbidity and mortality for the patients who are undergoing operative procedures. Though, lots of advances have been made in operative techniques and a good understanding of the pathogenesis of wound infection and wound healing. In India, the incidence of wound sepsis is from 10% to 33%. Though, in the obstetric population, it varies with rates ranging from 2.8% to 26.6%.<sup>[1-3]</sup>

### Name & address of Corresponding author

Avanish Kumar Saxena  
Associate Professor,  
Department of Surgery,  
SNMC, Agra.

It has been reported that in Germany around 700,000 and in US 4,000,000, open abdominal procedures are performed annually. Around the world, the incidence of abdominal surgery is 25 per 10000.<sup>[4,5]</sup> Over the last decades, the major postoperative wound complication is incisional hernia. Though, it comes after open abdominal surgery with a stable incidence of 5% to 24%.<sup>[6,7]</sup> Post operatively, 52% of incisional hernias occur within 6 months, while burst abdomen occurs within 6 to 8 days after surgery. The most suitable method of abdominal wound closure should be technically simple. It should be free from the postoperative wound complications such as wound dehiscence, incisional hernia, and suture sinus formation. The quality of suture material has also been a matter of great controversy. Prolene is the

most common material that is used for closure of abdominal incision. The use of PDS and PDS plus has entirely changed the scenario in form of surgical site infections. Still both the techniques of abdominal closure and the suture material have been a matter of debate. Like many others we employ interrupted two layered closure, but the best suture material to be used is debatable.

The pioneers of infection control Ignaz Semmelweis and Joseph Lister, introduced the anti-septic surgery in the middle of the 19th century. But still the wounds became infected. This resulted in a mortality rate of 70-80% in the cases of extensive infections.<sup>[8]</sup> Later on, substantial developments, mainly in the field of microbiology, have made surgeries safer. Though, the overall incidence of the healthcare associated infections (HAIs) remains high. It denotes a substantial burden of the disease.

The confusion between the infection of a surgical incision and a traumatic wound was prevented by US Centers for Disease Control (CDC) in 1992 by revising 'wound infection' definition and by giving 'surgical site infection' (SSI) a new definition.<sup>[9]</sup> Though, the most of the SSIs are superficial in location, but they are the most common reason for the morbidity and the mortality associated with the surgeries.<sup>[10,11]</sup> In major wound infections, there are requirements of secondary procedure for being sure of an adequate discharge along with pus discharge from wound leading to associated systemic signs or a delay in returning home. While, there is no associated systemic signs or excessive discomfort along with pus or serous fluid discharge in minor

wound infections.<sup>[12]</sup> A wound infection is labeled as the most frequent and the most inconvenient disorder of the wound healing.<sup>[13]</sup>

**MATERIALS AND METHODS**

**Study population:**

Total 222 cases were involved in this study .Among these cases 22.5% were infected after surgery & 77.5% cases were non-infected after surgery. Out of 22.5% infected cases 16 females and 34 males were included.

**Study Area:**

This case study was carried out in the Department of Surgery in a tertiary care centre.

**Study duration:**

Duration of this study was six month.

**Data collection:**

This study involved elective and emergency surgeries. In this study, for all cases was followed standard surgical protocol. A single dose preoperative antibiotic prophylaxis using, Ampicillin was given to all the patients at the time of induction of anesthesia. Postoperatively Ampicillin and Gentamycin were given for most of the cases till the time of suture removal. All the 50 wounds were inspected for evidence of wound infection such as erythema beyond 5 mm of incision, wound is charge and gaping of the wound on the 3rd post-operative day, at the time of suture removal and after one month at follow up .Vital charting was done, during the patients stay in the hospital. Post-operative fever was correlated with the wound findings as it could be due to reasons other than wound infection. Any discharge from the wound was sent for bacteriological evaluation, culture and sensitivity.

**Exclusion Criteria:**

Pregnant women and very elderly (>60 yr) were excluded.

**Ethical Approval detail:**

Duration of this study was six month and Institutional ethical committee clearance was taken well in advance before starting the study.

**Data Analysis:**

Data were analyzed by using Microsoft excel.

**RESULTS**

In this study, Total 50 cases were included, out of 50 cases 68% were male and 32% were female. In our

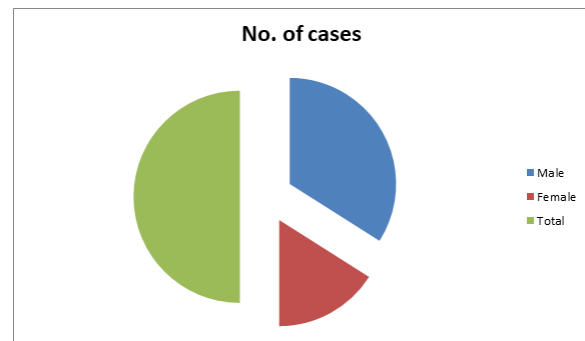
study we found that , 41-50 Most commonly age group were involved in this study followed by 11-20 (22%) age group, 21-30 (16%) age group, 31-40 (18%) age group, >50 (18%)age group. In the present study showed 56% cases had mild infection followed by moderate (32%) & severe (12%). In our study, 4% patients anemic ,Diabetic and obese .We found that, 30% Staphylococcus aureus, 24% Pseudomonas aeruginosa, 20% Klebsiella pneumoniae, 26% Escherichia coli were the causes of infections.

**Table 1:** Prevalence of postoperative wound infection

| Cases        | No. of cases | Percentage |
|--------------|--------------|------------|
| Infected     | 50           | 22.5%      |
| Non-infected | 172          | 77.5%      |
| Total        | 222          | 100        |

**Table 2:** Distribution of cases according to gender

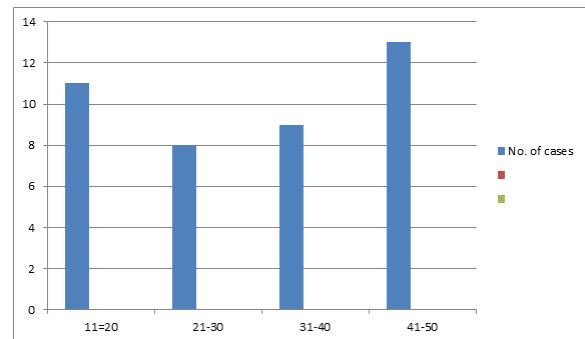
| Gender | No. of cases | Percentage |
|--------|--------------|------------|
| Male   | 34           | 68%        |
| Female | 16           | 32%        |
| Total  | 50           | 100%       |



**Figure 1:** Distribution of cases according to gender

**Table 3:** Distribution of cases according to Age

| Age   | No. of cases | Percentage |
|-------|--------------|------------|
| 11-20 | 11           | 22%        |
| 21-30 | 8            | 16%        |
| 31-40 | 9            | 18%        |
| 41-50 | 13           | 26%        |
| >50   | 9            | 18%        |
| Total | 50           | 100%       |



**Figure 2:** Distribution of cases according to Age

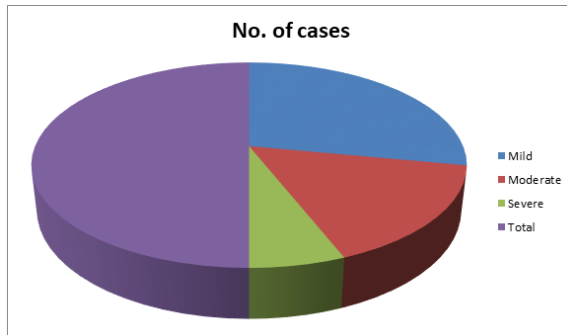
## Saxena; Prevalence of Post-Operative Wound Infection

**Table 4:** Grading of wound infection

|         |                    |                                              |
|---------|--------------------|----------------------------------------------|
| Grade 1 | Stich abscess      | Redness, Pustules                            |
| Grade 2 | Mild infection     | Slightly sero-purulent or purulent discharge |
| Grade 3 | Moderate infection | Frank infection ,purulent discharge          |
| Grade 4 | Severe infection   | Frank infection ,abscess formation           |

**Table 5:** distribution of cases according to types of infection

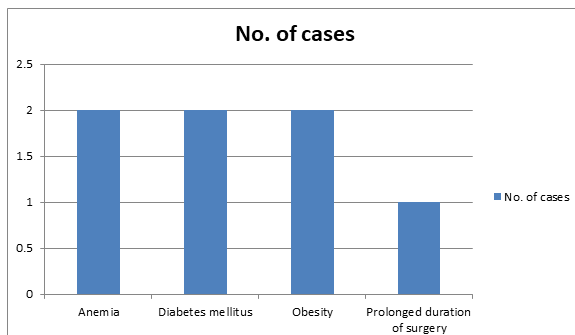
| Type of infection | Number of cases | Percentage |
|-------------------|-----------------|------------|
| Mild              | 28              | 56%        |
| Moderate          | 16              | 32%        |
| Severe            | 6               | 12%        |
| Total             | 50              | 100%       |



**Figure 3:** distribution of cases according to types of infection

**Table 6:** Associated risk factors in both groups

| Associated Risk factor        | No. of cases | Percentage |
|-------------------------------|--------------|------------|
| Anemia                        | 2            | 4%         |
| Diabetes Mellitus             | 2            | 4%         |
| Obesity                       | 2            | 4%         |
| Prolonged duration of surgery | 1            | 2%         |



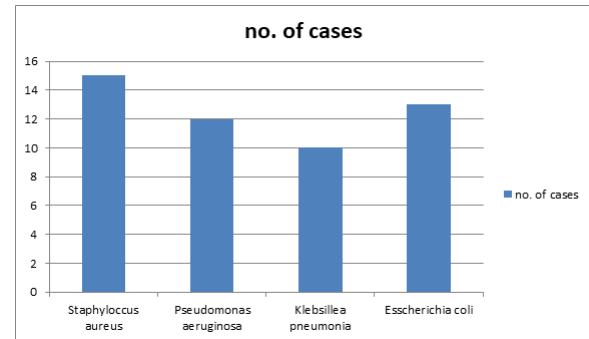
**Figure 4:** Associated risk factors in both groups

**Table 7:** Distribution of infected cases according to nature of surgery

| Nature of surgery    | Infected cases | Percentage |
|----------------------|----------------|------------|
| Clean                | 10             | 20%        |
| Clean-Contaminated   | 6              | 12%        |
| Contaminated & Dirty | 34             | 68%        |
| Total                | 50             | 100%       |

**Table 8:** Micro-organisms Isolated after post-operative surgery

| Micro-organisms        | No. of cases | Percentage |
|------------------------|--------------|------------|
| Staphylococcus aureus  | 15           | 30%        |
| Pseudomonas aeruginosa | 12           | 24%        |
| Klebsiella pneumoniae  | 10           | 20%        |
| Escherichia coli       | 13           | 26%        |
| Total                  | 50           | 100%       |



**Figure 5:** Micro-organisms Isolated after post-operative surgery

## DISCUSSION

Post-operative wound infection is determined by the interaction of various factors. These factors are the nature and degree of Contamination of the wound, local tissue factors and the generals Instance of the patient. The present study includes some of these factors. This study consists of 50 cases with post-operative wound infection. These cases belong to the elective surgeries accounting to 9.87%. Other researchers reveals in their study that 554 patients were operated as emergency surgery with a wound infection rate of 5.6% while 872 patients were operated as elective surgery with wound infection rate of 2.9%. In this way, this study supports the present study that shows post -operative wound infection rate is more in emergency surgeries. In the present study, the percentage of wound infection rates for clean contaminated, clean and dirty wounds is 12%, 20%, and 68% respectively. Cruse, Foord and Agarwal and et al also found the similar findings in their study. They also revealed the relation between anemia and incidence of wound infection.<sup>[14,15]</sup> Anemia increases the infection rate through hypoxia and by deranged tissue perfusion. These results indicate a strong association between anemia and post-operative wound infection and are statistically insignificant.

It has been found that there is a significant effect of pre-operative hospitalization on the post- operative wound infection. As the duration of preoperative hospitalization increases, the normal bacterial flora

of the patient is replaced by the resistant hospital flora.

It has been also found in this study that when the pre-operative hospitalization was more than one week in comparison to less than one week, the infection rate was higher. Though, the results are not significant but similar findings were also found in other study.<sup>[14,16]</sup>

Females (32%) had higher infection rate in comparison to males (68%). These were found insignificant statistically. The reason might be due to the small sample size of females. In cases with pre-operative hospitalization over 1 week and over 41-50 years of age, the infection rates were also found to be higher. These results were again found non-significant.

Above discussion revealed that the strong indicators of infection are related to the effect of nature, duration and urgency of surgery along with diabetes, anemia and use of the drain. The varying framework of wound infection towards mixed infections has been shown in the present study.

After post-operative surgery, we found that *Staphylococcus aureus* most popular organisms which causes infection followed by *P. aeruginosa*, *K. pneumoniae*, *Escherichia coli*. If we get a chance in the future, we would like to study with larger and substantial number of patients to get the improved and more significant results to validate the findings of the present study.

## CONCLUSION

The present study concludes the effect of nature, duration and urgency of surgery along with diabetes, anemia and use of the drain as strong indicators of infection. The present study presented the changing outline of wound infection towards mixed infections. If we become a chance, we would like to this study again with greater number of patients to get the better results and to validate our findings of the present study. For effective prevention of surgical-site infections, surgeon should remember local and microbial factors should take appropriate measures to avoid them. One should use the most efficient and the best surgical techniques should try to avoid undue delays in the procedure to prevent postoperative wound infection. Prophylactic Antibiotics has been found to play a major role in preventing the post-operative wound infections.

## REFERENCES

1. Myles TD, Gooch J, Santolaya J. Obesity as an independent risk factor for infectious morbidity in patients who undergo cesarean delivery. *Obstet Gynecol* 2002; 100:959-964.

2. Naumann RW, Hauth JC, Owen J, et al. Subcutaneous tissue approximation in relation to wound disruption after cesarean delivery in obese women. *Obstet Gynecol* 1995;85:412-416.
3. Chelmow D, Huang E, Strohbehn K. Closure of the subcutaneous dead space and wound disruption after cesarean delivery. *J Matern Fetal Neonatal Med* 2002;11:403-408.
4. Knowler WC, Barret Connor E, Conze J, Klinge U, Schumpelick V. Incisional hernia. *Chirurg*, 2005; 76(9):897-909.
5. Statistics of abdominal surgery updated 2008 June 16; cited 2008 November 9 available from URS: <http://www.ncbi.nlm.nih.gov/pubmed/1634942152>.
6. LA, Jonsson T. Incisional hernia after midline laparotomy: a prospective study. *Eur J Surg*. 1996; 162:125-129.
7. Hoer J, Lawong G, Klinge U, Schumpelick V. Factors influencing the development of incisional hernia. A retrospective study of 2983 laparotomy patients over a period of 10 years. *Chirurg*, 2002; 73:474-480.
8. Leaper DJ. Wound Infection. In: Russell RCG, William NS, Bulstrode CJK, eds. *Bailey and Love's Short Practice of Surgery*; 24th ed. London: Arnold; 2004;118-32.
9. Horan TC, Gaynes RP, Martone WJ, Jarvis WR, Emori TG. CDC definitions of nosocomial surgical site infections, 1992: a modification of CDC definitions of surgical wound infections. *Am J Infect Control* 1992;20:271-74.
10. Kirkland KB, Briggs JP, Trivette SL, et al. The impact of surgical-site infections in the 1990s: attributable mortality, excess length of hospitalization, and extra costs. *Infect Control Hosp Epidemiol*. Nov 1999;20(11):725-30. (Pubmed)
11. National Nosocomial Infections Surveillance (NNIS) System. NNIS report, data summary from October 1986-April 1996, issued May 1996. A report from the NNIS System. *Am J Infect Control*. Oct 1996;24(5):380-88. (Pubmed)
12. Cohen IK. *A Brief History of Wound Healing*. Yardley, Pa: Oxford Clinical Communications Inc; 1998.
13. Nicholas RL. The wound Infection rates following clean operative procedures: (Can assume them below)? (Editorial). *Infect Cont Hosp Epidemiol* 1992; 13: 455.
14. Packard FR. *The life and Times of Ambroise Pare*, New York: Boeber, || 1927.
15. Cruse P JE, FoordRN. The epidemiology of wound infection :a 10 year prospective study of 62939 wounds. *Surg Clin NorthAm* 1980;60:27-40.
16. Leaper DJ (2010)Surgical site infection. *British Journal of Surgery*;97: || 1601-1602.

**How to cite this article:** Saxena AK. A Prospective Study of Prevalence of Post-Operative Wound Infection in Surgical Patients. *Ann. Int. Med. Den. Res.* 2015;1(3):366-69.

**Source of Support:** Nil, **Conflict of Interest:** None declared