

Original Research Article

The study on post-operative wound infections at Vizianagaram in Andhra Pradesh, India

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ABSTRACT

Background: In most of the people post-operative wound infections are responsible for major complications such as cost, morbidity, mortality and duration of hospital stay related to surgeries. Objectives of the study were to demonstrate the incidence of post-operative wound infections at MIMS (Maharajah's Institute of Medical Sciences, Vizianagaram).

Methods: A cross sectional study has been carried out to know the incidence of post-operative wound infection. The study was conducted in MIMS (Maharajah's Institute of Medical Sciences). The study population was enrolled after fulfilling the selection criteria from General Surgery 100 patients (both elective and emergency surgeries) were selected using randomized technique.

Results: Out of 100 cases in the study 17 were positive for post-operative wound infection and out of which 10 were mild infections, 9 cases were moderate infections and 3 were severe infections including 1 burst abdomen. Coagulase positive *Staph aureus* was isolated in 10 out of 40. Over all infection rate in the study was 13.58%.

Conclusions: The study clearly depicted the changing pattern of wound infection toward mixed infection. A larger study with substantial number of patients will confirm the findings of this study.

Keywords: Infection, Post-operative, Surgery, Wound

INTRODUCTION

The rate of postoperative wound infection varies from one to nine per cent, depending on the surgical procedure. Each postoperative wound infection increases the length of stay in hospital, the cost of the procedure and is associated with significant morbidity.¹ *Staphylococcus aureus* is the causative agent in 15 to 20% of these infections, although the pathogen isolated varies according to the surgical site.² Risk factors for acquiring an infection can be divided into the following categories: host factors, surgical and environmental factors, and microbial characteristics. Host factors which may contribute to an increased risk of infection include: age, prolonged pre-operative length of stay, and concurrent

infection at another body site.³ Increased infection risk may result from an extended surgical procedure, the wound classification, the use of a razor for hair removal before surgery and may also be dependent on the surgeon's technical skill.⁴

Microbial factors related to the risk of developing an infection postoperatively are less well defined, however, many outbreaks of surgical wound infections have been linked to personnel carrying an organism which is then transmitted to the patient. Furthermore, patients who carry intranasal *S. aureus* have a two-to ten-fold increased likelihood of developing a postoperative wound infection due to *S. aureus*.⁵ Identification of patients most at risk of developing an infection is the ultimate goal,

however, risk indices must be highly sensitive, specific and accurate. To summarize, the epidemiology of postoperative wound infections remains poorly studied, however, since wound infections contribute significantly to morbidity, mortality and cost, future research is warranted.⁶

Wound infection is most commonly defined as discharge of pus from the surgical wound as a complication of surgery. Anaerobic infections and gas gangrene are exceptions to this definition. Therefore any discharge from the surgical wound after 48 hours from which microorganisms could be cultured implies wound infection. Many authors consider that a wound is infected by the presence of wound discharge and systemic manifestations like fever, malaise and toxemia. Some authors leave it to physician's discretion considering the amount of erythema and induration around the surgical wound and also the presence of wound discharge.⁷ Simple gaping of the wound without any discharge is considered as deranged healing rather than infection. Wilson et al. quantified the infection as mild, moderate and severe.⁸

Using their scoring system, after 5 consecutive day wound inspections, the criteria are presence of erythema beyond 5mm of the incision, presence of wound discharge and its nature, separation of deep tissues.⁹ They evolve the scoring system depending on the proportion of the surgical wound involved. The extended scoring system beyond the immediate post-operative period depending on the additional procedures done such as the use of antibiotics, drainage of pus, wound debridement. Isolation of microorganisms in the wound discharge, hospital stays of more than 14 days due to wound problem.¹⁰

CDC classification for surgical site infection

It is important to recall that the Centers for Disease Control and Prevention (CDC) classification of surgical site infection for superficial and deep, incisional surgical site infection is defined as an infection that occurs within 30 days of operation; but, if you implant a device (such as that mesh patient), it is within 1 year of the implanted device being in place. Many of the studies that we will look at have only 2-week or 28-day follow-up. But, if you are looking at ventral hernia patients, clearly their surgical site infections can occur far out.¹¹

Infection less than 1 year after surgery with an implant; involves deep soft tissues (fascia and muscle) with purulent discharge from the deep space but no extension onto the organ space or abscess found in the deep space surgical site infection by the surgeon or symptoms of fever, pain and tenderness leading to dehiscence of the wound or opening by a surgeon.¹²

Approximately a decade ago, the CDC and the National Nosocomial Infections Surveillance (NNIS) group did a

formal, logistic regression analysis. They evaluated all of the potential risk factors for surgical site infection and found that 3 were strongly linked with incidence of surgical site infection: an American Society of Anesthesiology score greater than or equal to 2; having a contaminated or dirty wound; but importantly, as well, the length of operation time being greater than the 75th percentile for the operation being performed.¹³

Organ space infection is less than 30 days after surgery with no implant. Infection less than 1 year after surgery with an implant and infection; involves any part of the operation opened or manipulated with purulent drainage from a drain placed in the organ space or cultured organisms from material aspirated from the organ space or abscess found on direct or radiologic examination or during reoperation or diagnosis of organ space infection by a surgeon.¹⁴

Far reaching advances in the field of medicine, techniques in surgery dependable anaesthetic techniques, innumerable antibiotics, advances in operating room maintenance after the introduction of lamellar airflow system and body exhaust systems have enriched the surgeons armamentarium. As a result, the post-operative infection rate has come down from about 70% in the pre-Listerian era to less than 1% in the developed countries.¹⁵

Despite these encouraging results, infection in its broader sense still remains one of the major causes of post-operative morbidity and mortality. The incidence of wound infection varies with type of the surgery, the amount of the contamination of the surgical field, the virulence of the microorganism and the host resistance.¹⁶

Therefore, incidence of infection \propto Virulence of microorganism / Host body resistance \times Amount of contamination.¹⁷ Hence a constant awareness of ever present infection would guide the surgical fraternity toward a better patient care. With this preview this study was undertaken.

METHODS

A cross sectional study has been carried out to know the incidence of post-operative wound infection. The study was conducted in MIMS (Maharajah's Institute of Medical Sciences). The study population was enrolled after fulfilling the selection criteria from General Surgery 100 patients (both elective and emergency surgeries) were selected using randomized technique. The data is generated by using structured interview schedule and statistical analysis was performed.

Minor surgical procedures were not considered and procedures in which wounds are left open and operations on ulcers were excluded. 13 cases were dropped from the study because of death of the patient due to reasons other than infection. There were no deaths due to post-operative wound infections.

Inclusion criteria

The post-operative wound infection The study was conducted in MIMS (Maharagah’s Institute of Medical Sciences). The study population was enrolled after fulfilling the selection criteria from General Surgery 100 patients (both elective and emergency surgeries) were selected using randomized technique.

Exclusion criteria

Wounds which are laid open and operations on ulcers like skin grafting. Perianal surgeries in which post-op contamination is imminent. Out of 120 operations 20 were dropped due to various reasons. Out of 100 cases 56 were males and 44 females.

Age, Sex, DOA, DOS, Hb%, Presence of any septic focus, Comorbidities, Use of any drugs have been determined.

Statistical analysis

Microsoft Excel computer programme was used for analysis of data. Chi square test was used to test statistical significance of the results. Odds ratio was calculated to measure the strength of association of various factors to wound infection.

RESULTS

The patients were first seen about 2-3 days after peritonitis had developed.

The infection rate was higher in emergency operative procedures (19.97%) when compared to elective surgeries (9.87%). Females were shown to have slightly higher infections rates (13.28%) when compared to males (13.14%). But the difference is not statistically significant as the female cases were small in number in the study.

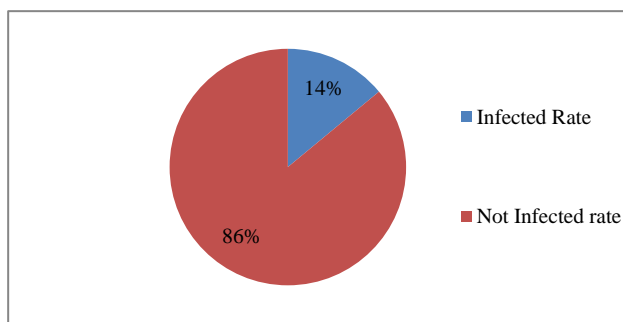


Figure 1: The post-Operative wound infection rate in subjects.

Infection rate was higher among the patients over 60 years (O.R.=2.09) and in patients with pre-operative hospitalization over 1 week (O.R.=1.95) though there is no statistical significance

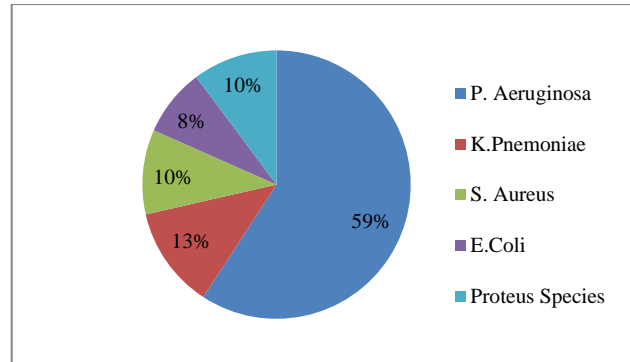


Figure 2: Post-operative wound infection and bacterial role in subjects.

The overall infection rate in this study is found to be 13.58 %. Out of 100 wounds 14 were infected. Of these, 8 were mild infections, 5 were moderate, 2 were severe and 1 burst abdomen.

The infection rate was observed to be higher in contaminated and dirty operations. 36.3% of the infections in the clean surgeries in the present study were due to the presence of distant focus. The wound infection rate in elective operations is 9.87 % where as that in emergency operations is 21.24%.

The incidence of wound infection in emergency was about 2.46 times higher than in elective operations. There is no statistically significant increase in the risk of infection with increase in the age of patient. The wound infection rate is noted to be higher in females 15.26% than it is in males is 13.14%.

The post-operative wound infection rate in patients who were admitted for less than 1 week before surgery in the hospital is observed to be lesser than in patients who were admitted for more than 1 week before surgery. It is noted that there is no change in the incidence of wound infection when duration of surgery was less than 2 hours. There is an increase in the incidence of wound infection with decrease in the Hb level.

Post-operative wound infection rate in non-diabetics is 10.86% whereas it is 33.33% in diabetics. It is observed that when drains were not used the infection rate was 6.13% and it was 25.37% when drains were used.

DISCUSSION

Causes of post-operative wound infections are multifactorial, determined by interaction of several factors: the nature and degree of contamination of the wound, local tissue factors and general resistance of patient probably modified by therapeutic measures.⁵ Various factors both intrinsic and extrinsic to the patient have been incriminated to wound sepsis. A few of them are considered in this study.

Incidence of infection

The overall infection rate in this study is 13.58%. The infection rates in the contaminated and dirty procedures, emergency procedures is more when compared to elective and clean surgeries according to Hall et al.⁷

Patient dependent factors

Infection rates are higher in extremes of age with a peak over 65 years. Though the infection Rate in above 60 years group is 2 times higher than in younger ages.

Sex of the patients

Many studies have shown higher infection rates in males compared to females. Females have been observed to have hormonal and cell mediated response when compared to males. High testosterone and low estrogen levels are instrumental in immunosuppression.

Anaemia

Anemia increases the infection rate through hypoxia and by deranged tissue perfusion. Infection rate is very high when hemoglobin levels are less than 10 %.

Diabetes

Diabetic patients are more prone to infection when compared to non-diabetic persons. The influence of diabetes would be confounded by increasing age, presence of septic focus, generalized debilitation and increased pre-operative admission. Studies have shown that infection rates are higher in uncontrolled diabetes with ketoacidosis.⁴

Preoperative hospitalization

Preoperative hospitalization has significant impact on the postoperative wound infection. As the duration of preoperative hospitalization increases the normal bacterial flora of the patient is replaced by resistant hospital flora.

Duration of operation

Direct relationship between length of operation and wound infection. An infection rate roughly doubles with every hour of surgery. If the duration of operative procedure is less than 2 hours there is no significant rise in infection rates.

Use of drains

Cruse and Food found that use of drains is associated with higher infection rates. This study was confirmed by increased incidence of wound infection in operations where drains were used.

CONCLUSION

In spite of the modern surgical and sterilization techniques and the use of prophylactic antibiotics, post-operative wound infections pose a great threat for the patients in terms of morbidity and mortality and for healthcare systems in terms of economic costs.

The Post-operative wound infection was more in male patients as compared to female. Male: female ratio was approximately 3:1 in Post-operative wound infected patients. In males Post-operative wound infection was more as compare to females probably due to higher exposure in environmental conditions and associated with risk factors.

The common risk factors include ill nutrition, obesity, and presence of infective foci, diabetes, hygienic conditions and the duration of the operation. Studies have shown that surgical techniques, skin preparations and the method of the wound closure are the significant factors that can influence the incidence of the post-operative wound infections. An antibiotic prophylaxis has also had a positive impact after certain types of surgeries. This study established in influence of nature of surgery, urgency of surgery, duration of surgery, anemia, diabetes and use of drains on the incidence of infection with a strong statistical association. The study clearly depicted the changing pattern of wound infection toward mixed infection. A larger study with substantial number of patients will confirm the findings of this study.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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