

Original Research Article


# Post-operative surgical infection in clean and contaminated operations

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## Abstract

**Background:** A surgical site infection occurs when micro-organisms get into the part of the body that has been operated on and multiply in the tissues. Surgical site infections can sometimes be superficial infections involving the skin only. Other surgical site infections are more serious and can involve tissues under the skin, organs, or implanted material. CDC provides guidelines and tools to the healthcare community to help end surgical site infections and resources to help the public understand these infections and take measures to safeguard their own health when possible. In this study, a sincere effort has been put to understand and thus help the practising surgeons to help them manage the post – operative complications in infective wounds.

**Materials and methods:** The study was conducted in the Department of General Surgery, Nimra Institute of Medical Sciences (NIMS), Vijayawada on two hundred patients who were admitted for various surgeries were selected for the study randomly. The study was conducted between November 2015 and July 2016. Two hundred patients were included in the study.

**Results:** The overall infection rate was found to be 25 percent. In the case of clean surgical site of infection is found to be nil where as in the case of contaminated surgeries the rate infection rate was high. It was found the statistically significant. The complications faced during the surgery involved failing to see the proper field of vision at the surgical site, difficulty in approaching the site involved, bleeding and a significance higher level of surgery time involved. The post - operative complications were delayed wound healing at the surgical site, pain at the operated site, wound gaping and increased hospital stay.

**Conclusion:** The study concluded that the pre-operative wound management is a necessity in cases where the wounds or the parts of the body to be operated are infected in order to minimize the complications faced during the operative and post-operative periods.

## Key words

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Clean surgery, Contamination, Preoperative, Infection, Pathogens.

## Introduction

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The skin is a natural barrier against infection. Even with many precautions and protocols to prevent infection in place, any surgery that causes a break in the skin can lead to an infection. Physicians identify these infections surgical site infections (SSIs) because they occur on the part of the body where the surgery took place. In patients undergoing surgery, the chances of developing a complication is as low as 2 – 3% to as high as about forty percent [1].

The nightmare of any practising surgeon is to operate on already infected parts of the patient. The idea of a surgery in today's world is to have an operation done in an aseptic environment. Millions of dollars have been invested to study and find the new methods, so that the surgery can happen in utmost aseptic conditions. But what happens if the parts operated is itself a source of infection is the question of the hour.

Immunosuppression in cases of diabetes has been a major cause of worry in today's world. Especially in a developing country like ours, where diabetes will be diagnosed in patients when they land in hospitals after having plethora of complications. Diabetes is rampant and is still considered as an ice – berg phenomenon in India. Other causes of immune – suppression like immune – suppressant drugs are a major worry in causing infections in open wounds.

To prevent surgical site infections; doctors, nurses and other healthcare providers clean their hands and arms up to their elbows with an antiseptic agent just before the surgery. Clean their hands with soap and water or an alcohol-based hand rub before and after caring for each patient. May remove some of your hair immediately before your surgery using electric clippers if the hair is in the same area where the procedure will occur. Surgical team should wear special hair covers, masks, gowns, and gloves

during surgery to keep the surgery area clean. Antibiotics are advised before surgery starts. In many cases, antibiotics should give within 60 minutes before the surgery starts and the antibiotics should be stopped within 24 hours after surgery. Clean the skin at the site of your surgery with a special soap that kills germs. Surgical site infections are the main frontline causes of cost, morbidity and mortality related to surgical operations even in well - equipped tertiary hospitals [2].The infections can also be secondary due to pre - existing infections in natural orifices and the pathogens in these orifices acts as a natural reservoir of pathogens that has the potential to migrate on the surgical parts and thus has to be accessed [3, 4].

In this study, a sincere effort has been put to understand and thus help the practising surgeons to help them manage the post – operative complications in infective wounds. Goal of this study was to know the rate of surgical site disease and to find the frequencies of operative and post-operative complications; the study also focuses on different pathogens creating surgical site contamination with their anti-infection resistance paradigm in surgery ward.

## Aim and objectives

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- To study the frequency of surgical site infections.
- To study the infection rate in clean (group 1) and infected (group 2) surgeries.
- To find out the operative and post-operative complications.
- To find out the most common pathogen.
- To study antibody resistance pattern for the common pathogens involved.

## Materials and methods

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The present study was conducted in the Department of General Surgery, Nimra Institute

of Medical Sciences (NIMS), Vijayawada on hundred patients who were admitted for various surgery were taken as the sample study.

Out of these two hundred patients randomly picked one hundred and fifty patients belonged to Group 1 i.e. clean surgeries and the remaining fifty belonged to group 2 i.e. contaminated surgeries. The study was conducted from November 2015 to June 2016 in the Department of General Surgery. The age range was from twenty to forty years and gender factor could not be taken as female patients were not more in number.

Detailed history was taken and the pre surgical evaluation was done. The materials were collected from the contaminated parts before conducting surgeries and were sent to the Department of Micro – Biology for culture.

The swabs were collected from the orifices were also collected and were sent to the Department of Micro – Biology for culture. If tested positive then the cases were treated accordingly and was excluded from the study. This was done to remove the bias that would arise from the other source infections.

The Operation was conducted after necessary antibiotics were started and after taking necessary aseptic precautions. The surgical and post - surgical complications were noted in each group. The overall post – operative infections were observed. Post operatively the wound which was infected were identified and the swabs were used to take the material from the site of the wound and were sent to the Department of Micro – Biology to identify the most common pathogens and the antibiotic resistance pattern was checked. The discharged patients were asked to visit the hospital after thirty days and the surgical site was checked for healing.

#### **Inclusion criteria**

The patients were aged between 20 and 40 years. This was done to reduce the age related bias in the study.

#### **Exclusion criteria**

- Patients who were taking immune – suppressant drugs were not taken.
- Patients whose initial cultures were tested positive were excluded from the study.

Data were evaluated by chi square ( $X^2$ ) statistical test. P 0.05 or less was considered to be significant.

#### **Results**

Data consisted of total 200 patients, majority of the patients were operated for inguinal hernia (76), followed by diabetic foot ulcers (54). Rate of infection in various surgeries was as per **Table – 1**. Classification of surgical infection rate was as per **Table – 2**. Surgical complications were as per **Table – 3**. Post-surgical complications were as per **Table – 4**. Pathogens Involved were as per **Table – 5**. Antibiotics resistance pattern was as per **Table – 6**. Complications on day 30 were as per **Table – 7**.

**Table - 1:** Rate of infection in various surgeries.

<b>Surgery</b>	<b>No. of cases performed (%)</b>	<b>No. of cases infected</b>
<b>Inguinal hernia</b>	67	1
<b>Diabetic foot</b>	43	21
<b>Hydrocele</b>	10	4
<b>Appendix</b>	38	11
<b>Hepato-biliary</b>	09	1
<b>Breast (fibroadenoma)</b>	07	0
<b>Thyroid and parathyroid</b>	04	0
<b>Upper urinary</b>	11	7
<b>Oesophageal, gastric and small bowel</b>	04	2
<b>Large bowel</b>	07	3
<b>Total</b>	200	50

#### **Discussion**

The surgical site disease rate reports by various specialists have contrasted extensively. The

general disease rate in the present study was twenty five percent and contrasts positively and other reported rates ranging from 2.5 to 41.9 % [3-6].

**Table - 2:** Classification of surgical infection rate.

Type of wound	No. of cases performed	%
Clean	150	75
Contaminated surgery	50	25
Total	200	100

**Table - 3:** Surgical complications.

Complications	Clean	Contaminated
<b>Surgical Field Vision</b>	Vision of every part normally	Difficulty in viewing the parts involved in 28 cases
<b>Site Approach Difficulty</b>	Nil	Difficulty in approaching the site in 24 cases
<b>Bleeding</b>	2 cases	17 cases
<b>Mean Time of surgery</b>	1 hour 12 minutes	1 hour 58 minutes

**Table - 4:** Post-surgical complications.

Complications	Clean	Contaminated
<b>Mean Time Wound Healing</b>	16 days	24 days
<b>Pain</b>	Complained in four cases	Complained in 48 cases
<b>Wound Gaping</b>	Nil	Seen in 12 cases
<b>Mean hospital Stay</b>	18 days	27 days

Number of studies completed in India demonstrate an in general contamination rate of 4.04 to 30% for clean surgeries and 10.06 to 45% for clean surgeries [5, 7, 8]. Findings in the present study demonstrate that there is noteworthy ascent in contamination rate with expanded level of agent pollution; rate of

contamination for clean surgeries was 3.0% while in clean surgeries it was 21.2%.

**Table - 5:** Pathogens Involved.

Pathogens	Frequency	%
<b>Staphylococcus aureus</b>	14	28
<b>Psuedomonas aeruginosa</b>	11	22
<b>Escherichia coli</b>	2	04
<b>Klebsiella pneumoniae</b>	1	02
<b>Mixed</b>	3	06
<b>No Growth</b>	19	38

**Table - 6:** Antibiotics resistance pattern.

Antibiotics Resistance	Pathogens
<b>Gentamycin</b>	Psuedomonas aeruginosa (100%)
<b>Ampicilline</b>	Other gram negative bacterias (100%)
<b>Tetracyclines</b>	Other gram negative bacterias (100%)
<b>Third Generation Cephalosporin</b>	Staph aureus(1 case)

**Table - 7:** Complications on day 30.

Complications on day 30	Clean	Contaminated
<b>Wound gaping</b>	Nil	Nil
<b>Pain</b>	Nil	5 cases
<b>Other complications</b>	Serous discharge (1 case)	Pus at the site (3 cases)

A delayed preoperative stay with presentation to hospital environment and its pervasive symptomatic strategies, treatments and microflora have been appeared to build the rate of surgical site infection [9].

In the present study there are 50 patients who were diagnosed with infection and overall infection rate was 33.33 out of 200 patients. In the case of contaminated surgery, diabetic foot was found to contribute 32 cases and were operated. Out of 10 cases which were hydrocele

4 were infected and the rate of infection was found to be 40 per cent from total patients operated for hydrocele. Appendix was found to be infected in 11 cases out of thirty eight cases which contributed to approximately twenty nine percent of the cases with appendicitis. In the case of hepato-biliary, 09 cases were operated and rate of infection was seen in one in eight cases. For upper urinary infection seven out of eleven cases were seen to be infected. Oesophageal, gastric and small bowel there are four cases which were operated and out of which 50% cases were infected. In large bowel cases three out of seven cases was having infection. In the case of clean surgeries, the majority of the cases were operated for inguinal hernia. Out of which only one was having infections.

In a study conducted by SP Lilani, et al. [10], the following observations were made. The infection rate was reported to be 8.95 percent. Surgical site infection rate was seen in 3.03 percent in clean surgeries and 22.41% in contaminated cases.

In our study the rate of infection is significantly more this may be due to population who were undertaken were different and in our study the bias was removed and the patients were picked based upon the contamination shown. In their study the cases involving the diabetic foot is not considered. In our study the diabetic foot was considered and as a result there are far more contaminated cases.

However our study is in agreement with the study done by SP Lilani, et al. in terms of the pathogens involved and the resistance pattern shown [10].

The complications faced during the surgery involved failing to see the proper field of vision at the surgical site, difficulty in approaching the site involved, bleeding and a significance higher level of surgery time involved. The post-operative complications were delayed wound healing at the surgical site, pain at the operated site, wound gaping and increased hospital stay.

On day thirty post-operatively five cases complained of pain and in that three patients had pus at the site of surgery in contaminated cases.

The contaminated cases that are posted for surgery no doubt will face more in terms of morbidity. The more the hospital stays more the chances of acquiring the nosocomial infections. The morbidity rate increases due to prolonged hospital stay itself. In the present study the importance of pre – operative identification of the contamination with prompt treatment is shown. This noble gesture will save unnecessary complications and is intended to help the fellow surgeons to understand the complications involved while attending a contaminated surgery.

## **Conclusion**

The study concludes that the pre-operative wound management is a necessity in cases where the wounds or the parts of the body to be operated are infected in order to minimize the complications faced during the operative and post-operative periods. Despite the fact that the definite increment in patient-care cost due to drawn out postoperative hospital stay couldn't be calculated, it is a reason causes of concern any hospital. Reconnaissance of surgical site disease with input of proper information to specialists would be attractive to diminish the surgical site disease rate.

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