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**Original article:**

# Study of microorganisms related with surgical site infection

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**Abstract:**

**Introduction:** The common causes of wound dehiscence are infection at the wound, pressure on sutures, sutures too tight, injury to the wound area, weak tissue or muscle at the wound area, incorrect suture technique used to close operative area, use of high-dose or long-term corticosteroids, severe vitamin C deficiency

**Material and methods:** This was observational study . Study was carried out in a 750 bedded tertiary care teaching hospital located in rural area of central India for a period of two years.

**Results :** Staphylococcus aureus was the commonest organism isolated in the culture. [By applying Z-test of difference between two proportions, there is a statistical significance between the number of wound cultures positive for Staphylococcus aureus and cultures positive for other microorganisms ($p<0.05$)]

**Conclusion:** Staphylococcus aureus was found sensitive to penicillin group of drugs, mainly cloxacillin and erythromycin. Gram negative organisms were sensitive to gentamycin. The observations of different studies are shown below.

## Introduction:

The common causes of wound dehiscence are infection at the wound, pressure on sutures, sutures too tight, injury to the wound area, weak tissue or muscle at the wound area, incorrect suture technique used to close operative area, use of high-dose or long-term corticosteroids, severe vitamin C deficiency (scurvy). Patient with wound infection and dehiscence usually present with symptoms of bleeding from wound, pain at the stitch site, swelling and redness near the stitch site, fever and broken sutures and sometimes there is complete disruption of wound and bowel coming out of the abdominal wall. This condition is known as 'Burst abdomen,' an emergency and needs immediate attention. [1,2,3]

There are some known risk factors associated with the surgical wound infection and disruption. Important amongst them are overweight, increasing age, poor nutrition, diabetes, jaundice, smoking, malignant growth, presence of prior scar or radiation at the incision site, non-compliance with post-operative instructions (such as early excessive exercise or lifting heavy objects), surgical error, increased pressure within the abdomen due to: fluid accumulation (ascites); inflamed bowel; severe coughing; straining; or vomiting, long-term use of corticosteroid medication, other medical conditions such as: diabetes; kidney disease; cancer; immune problems; chemotherapy; radiation therapy.[1,2]

## Material and methods:

This was observational study . Study was carried out in a 750 bedded tertiary care teaching hospital located in rural area of central India for a period of two years. This multi-specialty hospital gets referral of high risk complicated gynecological cases from neighbouring villages and townships. Hospital has

well equipped operation theatre including video endoscopy unit, ICU facility, blood bank and team of experienced gynecologists, anesthesiologists and microbiologist. On an average, approximately 2500 major and minor abdominal surgeries are performed per year in the hospital.

Women as per inclusion and exclusion criteria mentioned below, who had undergone abdominal surgery for different indications, either by laparotomy or by laparoscopic technique during the study period.

**E) Inclusion criteria-**

1- Women of all age groups, who had undergone abdominal surgery for different obstetric or gynecological indications.

**2-** Operated cases, which developed either surgical site infection and or wound dehiscence.

**Exclusion criteria-**

1. Complicated cases which were recently operated at other hospital and required repeat laparotomy.

**Sample size**- Consecutive one hundred cases ,who developed either SSI and or dehiscence among all abdominal surgeries (laparoscopy or laparotomy) performed during study period were identified as study subjects for finding out the incidence, risk factors and microorganisms responsible for SSI.

**Methodology-** Patients requiring abdominal surgery, who fulfilled inclusion and exclusion criteria, were enrolled as study subjects. A written informed consent was obtained from each patient regarding nature of surgery, indication for surgery, benefits and risk involved in surgery**.**

Sources of data collection were hospital records like admission discharge register, operation theatre register, anesthesia register, indoor case file, treatment register. Data related to various outcome variables like age, body mass index, associated risk factors, indication and nature of surgery-emergency or elective, route and technique of surgery, duration of surgery and anesthesia, intra -operative complications, need for post-operative pain relief, duration of parenteral fluid therapy, need for blood or component therapy, timing of ambulation, infective morbidity, surgical site infections, hospital stay, wound related late complications was collected. Data on above variables was collected in a structured proforma**.**

**Statistical analysis**-

Data related to different variables was entered in Microsoft office excel **(Annex-V)** and was analyzed by using statistical package for the social sciences (SPSS) version 17. Data was analyzed and compared among different variables using percentages and Z-test of difference between two proportions. P value less than 0.05 were considered significant.

**Results:**

**TABLE 7: Micro-Organisms Isolated In Surgical Site Infections (SSI)**

| Sr No. | Type of Micro-organism | Number of cases of SSI (n=100) | % |
|---|---|---|---|
| 1. | Staphylococcus Aureus | 39 | 39.00% |
| 2. | Klebseilla | 07 | 07.00% |
| 3. | E.coli | 05 | 05.00% |
| 4. | Pseudomonas Aeruginosa | 03 | 03.00% |
| 5. | Acinobacter | 01 | 01.00% |
| 6. | Diptheroid | 01 | 01.00% |
| 7. | Enterococci | 01 | 01.00% |
| 8. | Streptococci | 01 | 01.00% |
| 9. | Multiple organisms | 10 | 10.00% |
| 10 | Sterile culture | 32 | 32.00% |
| | **Total** | **100** | **100%** |

**Discussion:**

Staphylococcus aureus was the commonest organism isolated in the culture. [By applying Z-test of difference between two proportions, there is a statistical significance between the number of wound cultures positive for Staphylococcus aureus and cultures positive for other microorganisms ($p<0.05$)]

Amongst 150 cases of wound infection studied by J.Y. Chia et al, 22.8% showed no bacterial growth in wound discharge sent for culture and sensitivity and 77.2% cultures were positive for bacterial growth.[4] Among the etiologic agents found in this study, staphylococcus aureus was the commonest 58.1% of which 49.5% were Methicillin sensitive staphylococcus aureus and 8.6% were methicillin resistant staphylococcus aureus. This was followed by streptococcus species 10.5% and klebseilla 9.5% and most of these organisms showed sensitivity to cloxacillin so cloxacillin was used by them to treat wound infection rather than time honoured Ampicillin and Metronidazole combination. In survey done by Pandit et al, 16.6% cases culture grew organisms, out of which staphylococcus aureus was the commonest 10% followed by enterobacter 6.6%

and klebseilla species 3.33%.[5]A study of 120 cases was done at University teaching hospital and health care, lle-llf, Nigeria by Shittu A.O et al in which bacteria were isolated in cultures of 62% cases and 38% did not show any bacterial association in culture.[6] Of these 62% cases, 38.23% were mono-microbial and 53.92% were poly-microbial. Staphylococcus was the predominant organism isolated in 25% cases, followed by e-coli in 12%, pseudomonas aeruginosa in 9% and staphylococcus epidermidis in 9% cases.

In the **present study**, in 68% cases cultures showed bacterial growth and in 32% they were sterile. Out of those showing bacterial growth, 90% were mono-microbial and 10% were poly-microbial. Predominant micro-organism isolated was staphylococcus aureus in 39% cases, klebseilla in 7%, e-coli in 5%, pseudomonas aeruginosa in 3%, and acinobacter, diptheroid, streptococcus and enterococci each in 1% cases.

**Conclusion:**

Staphylococcus aureus was found sensitive to penicillin group of drugs, mainly cloxacillin and erythromycin. Gram negative organisms were sensitive to gentamycin. The observations of different studies are shown below.[7,8]

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