

Culture and Sensitivity Pattern of Organisms in Infected Wounds

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ABSTRACT

Objective To find out the common bacteria causing wound infections and their sensitivity pattern to different antibiotics.

Study design Cross-sectional study.

Place & Duration of study Bahawal Victoria Hospital Bahawalpur, from January 2014 to March 2014.

Methodology Patients with signs and symptoms of infected wounds were enrolled. Samples were collected by doctors in ward using commercially available sterile culture sticks after washing wound with saline to prevent surface contamination. The sample was sent to microbiology laboratory within one to two hours of sample collection. Culture and sensitivity pattern was performed in all the infected wounds. Data was analyzed manually and Chi square test was used to check the association of organisms with their antibiotic sensitivity pattern.

Results There were a total of sixty patients with infected wounds. Most common organism found in patients with infected wounds was *Klebsiella* (40%) followed by *Pseudomonas* (25%), *Staphylococcus aureus* and *Echerichia coli*, both 13.33%, and then *Proteus* (8.33%). All these bacteria were resistant to most of the routinely used antibiotics.

Conclusions Most common bacteria cultured from infected wounds were *Klebsiella* and *Pseudomonas*. These were found sensitive to combination of cefoperazone and sulbactam, tazobactam and ciprofloxacin.

Key words Wound infection, Antibiotic sensitivity, *Klebsiella*, *Pseudomonas*.

INTRODUCTION:

The wound is a break in the continuity of skin. This results in the loss of protective function of skin. There may and may not be damage to underlying connective tissue.¹ Wound can be accidental or pathological. All wounds contain bacteria but majority of the wounds do not get infected.² There are many variables that can promote wound infection when there is a discontinuity of skin barrier. This include both host and organism related factors like bacterial load and type, immune competence of hosts, co-

morbids like diabetes mellitus etc.³

Infection is one of the major causes of morbidity and mortality in hospitalized patients irrespective of the cause as it delays healing.⁴ It also causes longer hospital stay and increased expenses. In order to recognize early signs and symptoms of infections in a wound, whether complicated or not, skilled and vigilant team of doctors and paramedical staff is required.⁵ Contamination of wound with bacteria is one of the serious problems worldwide.⁶

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Management of infected wound is a difficult task. It incurs cost and human resource as well. Thus it becomes a burden on already poor resources available to health sector. Patients are also burdened as in many set ups they have to pay for health related care and added procedures that might be needed. This study was designed to find out which

type of the bacteria caused wound infections and their antibiotic sensitivity pattern.

METHODOLOGY:

This was a prospective cross sectional study carried out from January 2014 to March 2014 in the Department of Plastic and Reconstructive Surgery, Bahawal Victoria Hospital, Bahawalpur in collaboration with Department of Pathology and Microbiology Quaid-e-Azam Medical College, Bahawalpur. Plastic surgery ward receives patients from different wards of the hospital for grafting or flap coverage of the wounds. A large number of patients with wounds due to different causes are thus referred.

Patients with signs and symptoms of wound infection were included. The criteria for labeling wound infection included presence of pus, wound of more than fifteen days duration with no signs of healing, increasing size of the wound, high grade fever etc. Very ill patients and patients who were receiving antibiotics for two or more weeks were excluded. Samples were collected by doctors in the ward using commercially available sterile culture sticks after washing wound with saline to prevent surface contamination. The sample was sent to microbiology laboratory within two hours of sample collections. Samples were inoculated on nutrient agar, blood and chocolate agar and incubated at 37° Celsius temperature for 48 hours and then sensitivity pattern was recorded.

Data was analyzed manually and the association of organisms with their antibiotic pattern was tested by Chi square test. We set the significance level at 0.05.

RESULTS:

A total of sixty samples were collected from the infected wounds. Out of these fifty-two samples grew by Gram negative bacteria (86.67%) and eight samples showed growth of Gram positive bacteria (13.33%). *Klebsiella* was the most common bacteria present in 40% (n=24) of the samples. It was sensitive to combination of cefoperazone and sulbactam (91.6%), moxifloxacin (83%), gentamycin (83%), tazobactam (70.8%), ceftriaxone (70.8%), ciprofloxacin (62.5%) and linezolid (12.5%). The second most common bacteria in our study was *Pseudomonas* in 25% (n=15) of the samples. It was sensitive to tazobactam (80%), ciprofloxacin (80%), combination of cefoperazone and sulbactam (53.3%), gentamycin (53.3%), moxifloxacin (53.3%), ceftriaxone (33.3%) and linezolid (13.3%). Next most common bacteria was *Staphylococcus aureus* which was present in 13.3% (n=8) of the samples. It was

sensitive to linezolid (87.5%). *Escherichia coli* was also present in 13.3% (n=8) of the samples and was sensitive to tazobactam (50%) and moxifloxacin (50%). *Proteus* was found in 8.3% of the samples and was sensitive to tazobactam (80%). Details are given in figure 1. The p value was 0.00001. This showed that there was strong association of the presence of bacteria in the culture and antibiotic sensitivity pattern.

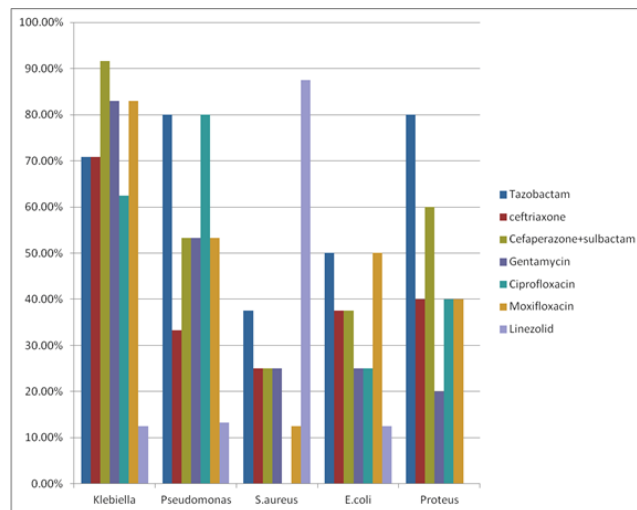


Fig 1: Sensitivity pattern of bacteria isolated from infected wounds.

DISCUSSION:

The results of current study are important as it provided evidence of organisms causing wound infection and their sensitivity pattern from a tertiary care hospital. The observation has a significance as it revealed virulence of organisms against commonly used antibiotics. A research carried out in Niger Delta University Teaching Hospital demonstrated that 86.1% of wounds were infected with pathogenic bacteria.⁴ The most commonly isolated pathogen was *Pseudomonas aeruginosa* which had high sensitivity for amoxicillin-clavulanic acid (94.9%), cloxacillin (100%) and cefuroxime (92.3%). A study conducted in Western Nigeria showed *Klebsiella Pneumoniae* as a common bacteria causing wound infection sensitive to amoxicillin-clavulanic acid and cephalosporin.⁷ This pattern was not seen in our study as organisms were found highly resistant to commonly used antibiotics.

In a research carried out in Gujarat, India *Staphylococcus aureus* was reported as causing most of the wound infections with 26.23% sensitivity to vancomycin, rifampicin and levofloxacin.⁸ Another study which was done in Van, Turkey provided

evidence that *Actinobacter* species were the common cause of infected wound and the bacteria was sensitive to ceftazidime (93%), tazobactam (90%) and imipenem (86%).⁹ This organism was not isolated in present study though sensitivity against antibiotics from our study was quite similar.

A study conducted in India for the time period of eight years showed that *Pseudomonas* was the most common pathogen followed by *S. aureus*, *Klebsiella* and *Proteus*.¹⁰ A study conducted by Mohammad et al in Kano, Nigeria shows that wounds are commonly infected by *S. aureus*, *E. coli*, *Pseudomonas* and *Klebsiella* species which were sensitive to most of the aminoglycosides and quinolones used in the facility.¹¹ The results of these two studies are also comparable to our results as we found the same organisms in culture reports.

In a study conducted at Children's Hospital, Lahore *Staphylococcus aureus* was reported as a common pathogen causing wound infection and sepsis affecting 41.8% of the patients.¹² Another research done in Pediatric Burn Unit of Khyber Teaching Hospital, Peshawar showed *S. aureus* as common cause with frequency of 25% followed by *Pseudomonas* (21%) in infected wounds.¹³

Another study conducted by Edward et al showed that the infection of wound does not depend solely on the bacterial count or the species present, but also on the host immune response and the virulence of the organisms. There is evidence that bacteria within chronic wounds live within biofilm communities, so that the bacteria are protected from host immune system and also develop resistance to antibiotics.¹⁴ Properly performed wound swab cultures provide useful data which helps in the diagnostic and therapeutic decision making. Many studies have shown that there are more cases of Gram-negative aerobes as compared to Gram positive bacteria in the infected wounds.¹⁵ We also noted in our study that Gram negative bacteria were more common cause of wound infection (86.67%) as compared to Gram positive (13.3%).

Klebsiella species was the most common cause of infected wounds in current study. Wound infections were treated effectively as the organism was sensitive to different antibiotics with good response. The important observation was that a combination of cefaperazone and sulbactam and other drugs was needed. Similar pattern of sensitivity was observed with other organisms. This increased the cost of treatment. It also highlighted probably indiscriminate use of antibiotics and possibility of hospital acquired infection in such cases. Infections Control Hospital

Policies are thus important to control and rationalize the use of antibiotics in cases of wound infection.

CONCLUSIONS:

Klebsiella and *Pseudomonas* species were the most common cause of wound infections. A high resistance to commonly used antibiotics was observed.

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