

Aerobic Bacteriological Profile from Wound Site Infections in Road Traffic Accident (RTA) Patients

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Abstract

Background: Infections of musculoskeletal injuries due to road traffic accidents, especially open fractures, continue to pose a challenge. There is limited information on the early bacterial contaminants of these wounds and their antibiotic sensitivity patterns in our environment. This study was done to determine the aerobic bacteriological profile of wound site infections in road traffic accident patients at initial presentation and their antibiotic susceptibility profile. The study was carried out over a one year period.

Method: Discharge and swabs from the wounds of 247 patients presenting to the Casualty, KIMS Hospital were collected with aseptic precautions prior to the initiation of empiric antibiotic therapy. Gram stain, culture were performed and the isolates were subjected to antibiotic susceptibility testing by Kirby-Bauer disc diffusion method, as per CLSI guidelines.

Results: Of the 247 samples studied, growth was observed in 232 samples of which 221 were monomicrobial and 11 were polymicrobial. A total of 273 bacterial isolates were recovered. Gram positive cocci constituted 40.3% and gram negative bacilli constituted 59.7% of the isolates. The most common pathogen isolated was *Staphylococcus aureus* followed by *Pseudomonas* spp. and Coagulase Negative *Staphylococci*. 36.5% of the *Staphylococcus aureus* isolates were found to be methicillin resistant.

Conclusion: This study shows that *Staphylococcus aureus* and *pseudomonas* were the commonest organisms associated with the RTA wound site. A high rate of MRSA, MBL and ESBL producers was observed which imply treatment failure with empirical antibiotics. Hence the antibiotic susceptibility pattern of the isolated organisms should be obtained at the earliest to avoid unwarranted prolonged empirical therapy and to administer appropriate and effective treatment.

Keywords: Bacterial, Bacterial infections, Injuries, Infection, Trauma, Wounds, Wound infections.

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Introduction

One of the world's most serious but neglected health problem are trauma and accidents.¹ It has been reported by WHO that almost 1.3 million people die and around 20 – 50 million suffer non-fatal injuries every year as a result of road traffic accidents(RTA).² In India, trauma is a huge problem in India as a result of very high incidence of road traffic accidents.¹ Vehicular traffic injuries figure one among the top three causes of mortality in the age group between 5 to 44 years.³ As most of the patients are young, and usually without any underlying illness, there is a great need to save them.¹ Development of an infection in traumatised patients are observed to have a 5-fold higher mortality as opposed to those without any infection.¹

Across the globe more than 80% of the late deaths in the adult trauma patients are due to infections.² The host's natural protective barriers are jeopardized by trauma which disrupts the integrity of skin and tissues.¹

The potential for serious bacterial wound infections in the open injuries which may lead to chronic wound or bone infection, long term disabilities and even death.⁴ One of the most frequent and fatal complications in trauma patients are infections which complicate the recovery of a large number of injured patients.¹

For a multidisciplinary approach to treat these patients, epidemiology of infections need to be understood, which can act as the initial step towards prophylaxis and effective treatment.¹ The huge challenge in controlling wound infections is because of antimicrobial resistance to antibiotics and also the high rate of infections caused by the methicillin-resistant *Staphylococcus aureus* and polymicrobial flora.⁵

This study was done to evaluate the aerobic bacteriological profile of wound site contaminants in road traffic accident patients at initial presentation.

Materials and Methods

This prospective study was carried out over a one year period from October 2014 to September 2015. Discharge and swabs from the wounds of 247 patients presenting to the Casualty, KIMS Hospital were collected with aseptic precautions prior to the initiation of empiric antibiotic therapy. Two swabs were collected. One swab used for smear preparation and Gram stain. The second swab was used for aerobic bacterial culture by inoculation on various culture

media like blood agar, chocolate agar, MacConkey agar, thioglycollate broth etc. The isolates were identified by relevant biochemical tests.⁶ The isolates were subjected to antibiotic susceptibility testing by Kirby-Bauer disc diffusion method, as per CLSI guidelines.⁷

Results

Of the 247 samples, 15 samples showed no growth, whereas growth was observed in the remaining 232 samples of which 221(89.5%) were monomicrobial and 11(10.5%) were polymicrobial. A total of 273 bacterial isolates were recovered. **Table 1** Gram positive cocci constituted 40.3% with *Staphylococcus aureus* predominating followed by Coagulase Negative *Staphylococci* which accounted for 12.1%. 36.5% of the *Staphylococcus aureus* isolates were found to be methicillin resistant. Gram negative bacilli constituted 59.7% of the isolates with *Pseudomonas* species predominating, followed by *Klebsiella* species. 42.5% of the *Pseudomonas* species isolates were found to be MBL (metallo beta lactamase) producers. 41.9% of *Klebsiella* species and 40% of *Escherichia coli* isolates were found to be ESBL (extended spectrum beta lactamase) producers. Most of the gram negative organisms isolated showed very good sensitivity to amino glycosides and Quinolones.

Table 1

Organism	Number	Percentage
Staphylococcus Aureus	74	27.1%
Coagulase Negative Staphylococcus	33	12.1%
Pseudomonas Species	40	14.7%
Klebsiella Species	31	11.4%
Escherichia Coli	20	7.3%
Citrobacter Species	18	6.6%
NFGNB	26	9.5%
Proteus Species	7	2.5%
Providencia Species	6	2.2%
Enterococcus Species	2	0.7%
Streptococcus Species	1	0.4%
No Growth	15	5.5%
Total	273	100%

Discussion

The infection rate in this study is 94 %, comparable with the study by Mousa et al.⁸ In this study majority of the infections were monomicrobial infections as in other studies.^{8,9} Polymicrobial infections were of a small proportion only. As in several other studies *Staphylococcus aureus* was the most common isolate.^{5,8,10,11} The rate of MRSA is lower than reported by other authors.¹¹ *Pseudomonas* species was the most common gram negative bacillus which agrees with the study by Mathew et al.⁹ *Pseudomonas* species,

Klebsiella species, *Escherichia coli*, *Citrobacter* species and NFGNB were the main gram negative bacilli which were isolated as in other corresponding studies.

Conclusion

The study shows a very high infection rate as in trauma patients, the first principle of prophylaxis is violated since contamination has already occurred, by the time patients reach a hospital by potentially pathogenic *Staphylococci* and Gram negative organisms. *Staphylococcus aureus*, *Pseudomonas* and Coagulase negative *staphylococci* were the most common pathogens in the study, hence adequate wound toileting is a requisite to ensure efficient removal of the contaminants from the wound at the time of admission. The high rate of MRSA, MBL and ESBL producers observed imply treatment failure with empirical antibiotics. Hence antibiotic susceptibility pattern of the isolated organisms should be obtained at the earliest to avoid unwarranted prolonged empirical therapy and to administer appropriate and effective treatment.

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