ORIGINAL RESEARCH

A Retrospective Analysis of Traumatic Orthopedics Related Infections: An Institutional Based Study

[1]Rajat Kumar Garg, [2]Deepak Chahar

[1]Assistant Professor, [2]Associate Professor, Department of Orthopedics, Rama Medical College Hospital and Research Centre, Hapur, Uttar Pradesh, India

Corresponding Author
Deepak Chahar
Associate Professor, Department of Orthopedics, Rama Medical College Hospital and Research Centre, Hapur, Uttar Pradesh, India
Email: deepakchahar816@gmail.com

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ABSTRACT
Background: Due to the advances in orthopedic and trauma-care, such as modern imaging methods, improved surgical techniques, and optimized design of implants and materials, patients are successfully treated. Hence; the present study was conducted for assessing the cases of traumatic orthopaedic related infections. **Materials &Methods:** A total of 100 patients were enrolled in the present study. Clinical data were combined, verified, and statistically evaluated. The data included accessible demographics (age, sex, white blood cell counts, etc.) and full laboratory findings (pathogen identification, antibiotic susceptibility testing (AST) results, etc.). Clinical specimens were gathered using a set procedure. Standardized laboratory bacteriology techniques were used to identify the bacterial isolates. Following the identification of the infections, the proper AST was carried out and antibiotic break-points were interpreted. **Results:** A total 100 cases of ORI were enrolled, resulting in the recovery and identification of 160 bacterial strains. From the 60 isolates, it was determined that 110 bacterial specimens would undergo AST testing. All the specimens underwent antibiotic susceptibility testing. Mean age of the patients were 53.9 years with majority being males. staph aureus was susceptible to chloramphenicol and gentamycin. Staphylococcus (Coag-negative) was susceptible to chloramphenicol, ciprofloxacin, clindamycin and gentamycin. Streptococcus spp, were susceptible to cefepime, ceftriaxone, clindamycin and gentamycin. **Conclusion:** Poorly developed public health systems with inaccurate data maintenance, poor post-operative wound care and hygiene, inadequate microbiological diagnosis, and a lack of appropriate antibiotic therapy to treat infections are just a few of the challenges that developing nations face and are typically overlooked by the developed world.
Key words: Orthopedic, Infection, Traumatic.

INTRODUCTION
Due to the advances in orthopedic and trauma-care, such as modern imaging methods, improved surgical techniques, and optimized design of implants and materials, patients are successfully treated. Despite these advances, infection is still a potential complication and often difficult to treat. Infections in orthopedic and trauma surgery include surgical site infections (SSI), periprosthetic joint infections (PJI), fracture-related infections (FRI), and biomaterial- or implant-associated infections (BAI or IAI). The main pathogen responsible for BAIs is *Staphylococcus aureus* (*S. aureus*).[1, 3]

The gold standard for diagnosing infection has a number of disadvantages, and thus new technologies to diagnose infection are being explored, including multilocus polymerase chain reaction with electrospray ionization-mass spectrometry and optical imaging. Numerous strategies have been employed to prevent orthopaedic infection, including use of antibiotic-impregnated implant coatings and cement; however, further research is required to optimize these technologies. Biofilm formation on orthopaedic implants is attributed to the glycocalyx-mediated surface mode of bacterial growth and is usually treated through a secondary surgery involving irrigation, debridement and the appropriate use of antibiotics, or complete removal of the infected implant.[4] In 2018, Metsemakers et al conducted a systematic review focusing on the FRI definition and totally analyzed 100 randomized controlled trials (RCTs). They found that only 2% of the studies cited a validated FRI definition, with 28% using a self-defined definition. With the support of the

Arbeitsgemeinschaft für Osteosynthesefragen (AO) Foundation and the European Bone and Joint Infection Society (EBJIS), experts from nine countries achieved a consensus for determining FRI, including confirmatory criteria and suggestive criteria. Later in 2019, the Chinese expert published a consensus regarding the definition of fracture-device-related infection (FDRI). Then in 2020, the international expert group updated the 2018 diagnostic criteria for FRI, including six confirmatory criteria and six suggestive criteria.[5- 8] Hence; the present study was conducted for assessing the cases of traumatic orthopaedic related infections.

MATERIALS & METHODS

The present study was conducted for assessing the cases of traumatic orthopaedic related infections.A total of 100 patients were enrolled in the present study.Clinical data were combined, verified, and statistically evaluated. The data included accessible demographics (age, sex, white blood cell counts, etc.) and full laboratory findings (pathogen identification, antibiotic susceptibility testing (AST) results, etc.). Clinical specimens were gathered using a set procedure. Standardized laboratory bacteriology techniques were used to identify the bacterial isolates. Following the identification of the infections, the proper AST was carried out and antibiotic break-points were interpreted. All the results were recorded in Microsoft excel sheet and was subjected to statistical analysis using SPSS software.

RESULTS

A total 100 cases of ORI were enrolled, resulting in the recovery and identification of 160 bacterial strains. From the 60 isolates, it was determined that 110 bacterial specimens would undergo AST testing. All the specimens underwent antibiotic susceptibility testing. Mean age of the patients were 53.9 years with majority being males. staph aureus was susceptible to chloramphenicol and gentamycin. Staphylococcus (Coag-negative) was susceptible to chloramphenicol, ciprofloxacin, clindamycin and gentamycin. Streptococcus spp, were susceptible to cefepime, ceftriaxone, clindamycin and gentamycin.

Table 1: Orthopedic-related infections - gram positive pathogens antimicrobial susceptibility testing results; Staphylococcus sp. and Streptococcus sp.

Antibiotics	Staphylococcus aureus (n=50)	Staphylococcus (Coag-negative) (n=10)	Streptococcus spp (n=10)
Cefepime	NA	NA	6
Ceftriaxone	NA	NA	5
Chloramphenicol	45	8	NA
Ciprofloxacin	22	9	NA
Clindamycin	15	9	8
Erythromycin	16	5	5
Gentamycin	30	9	10

DISCUSSION

Infection is one of the most devastating and dreaded complications in orthopaedic surgery, often necessitating multiple reoperations and prolonged treatment with systemic antibiotics. Owing to the tremendous negative impact on health and quality of life associated with implant-related infections, attention has increasingly focused on innovative approaches for prevention. Despite decades of attempts to optimize antimicrobial prophylaxis, implant sterility, and other exogenous factors, the incidence of infection and resulting revision surgery has continued to rise. As a result, there has been a shift in focus in recent years toward host factors that can be identified and modified to medically optimize patients throughout the perioperative period to minimize infectious risk.[8- 10] Infection prevention should begin at the time of injury and, although context-specific depending on the level of care, includes appropriate irrigation, surgical debridement, wound care and coverage, fracture fixation, and antibiotic prophylaxis, in addition to basic infection prevention measures. Clinical practice guidelines to address infection prevention after combat trauma (including extremity infection) were developed in 2007 and revised in 2011, with endorsement from the Surgical Infection Society and the Infectious Disease Society of America. Nevertheless, significant challenges remain, including austere environments of care, multiple transitions of care, and lack of coordinated efforts in prevention.[11-14] Hence; the present study was conducted for assessing the cases of traumatic orthopaedic related infections.

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Orthopaedics and Rehabilitation Clinic of Lublin. The study was conducted on a group of 49 patients that were admitted or transferred to the ward over a period of 20 months in the years 2018–2020. The patients and therefore the infections were divided by age, sex, time of hospitalization and the underlying disease. The study also provided data about the most frequent infection types in these patients, as well as the most commonly used drugs to treat those infections. The results showed that in fact all of the examined factors have an impact on the frequency of nosocomial infections appearance rates. Furthermore, results in the study showed that factors examined by the study also have an impact on what type of infection was present in these groups of patients.[15]Le J et al, in another previous study, performed receiver-operating characteristic analysis to detect the optimum threshold of continuous variables. Independent risk factors of SSI were identified by univariate and multivariate analyses. Finally, 63 patients suffered from wound infection within the follow-up period, indicating a 2.7% incidence rate of SSI. Statistical results showed that open injury (odds ratio [OR], 9.5; 95% confidence interval [CI], 5.4-16.7), American Society of Anesthesiologists classified III-IV score (OR, 2.2; 95% CI, 1.3-3.8), surgical duration of >132 minutes (OR, 2.9; 95% CI, 1.1-5.0), serum albumin (ALB) of <36.4 mg/L (OR, 2.0; 95% CI, 1.6-3.4), and blood glucose (GLU) of >118 mg/dL (OR, 3.1; 95% CI, 1.1-5.3) were independent risk factors of postoperative SSI. With the application of sensitive and modifiable variables such as surgical duration and the levels of ALB and GLU, more geriatric patients with sub-high risk of postoperative SSI could be identified.[16]

CONCLUSION

Poorly developed public health systems with inaccurate data maintenance, poor post-operative wound care and hygiene, inadequate microbiological diagnosis, and a lack of appropriate antibiotic therapy to treat infections are just a few of the challenges that developing nations face and are typically overlooked by the developed world.

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