IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 22, Issue 1 Ser.10 (January. 2023), PP 43-46
www.iosrjournals.org

A Study on the Microbiological Profiles and Risk Factors of Post Operative Implant Infections after Fracture Fixation

[1.] K Sudhakar [2.] Vasudev S [3.] SindhuraBattula [4.] D Venkateswararao
[5.] B S Raviteja

Keywords: Surgical Site Infection, Orthopedic surgery, Implant infection, Microbiological profile

Date of Submission: 12-01-2023 Date of Acceptance: 28-01-2023

I. Introduction:

In orthopaedic procedures, prosthesis replacement and implant surgery are frequently used to successfully reduce pain and increase joint mobility. The length of the patient's hospital stay prior to surgery, the type and length of the surgical operation, the type of anaesthesia, the patient's preoperative skin preparation, the use of implants and drains, and the postoperative wound care are all factors that affect the risk of developing SSI. It's crucial to identify these characteristics in order to design SSI prevention strategies(1).

Due to contemporary theatre facilities and aseptic procedures, the prevalence of SSIs has significantly decreased during the past century. With high morbidities and high expenditures, they continue to be a problem in developing nations.

It is crucial to ascertain the prevalence of surgical site infection, evaluate the severity of the issue, and offer a justification for setting priorities in infection control in hospitals, because the care of postoperative complications is a crucial aspect of total quality management. One of the key instruments for infection control is identifying the causative agent and the medications that are susceptible to it. The current study was created to determine the SSI-causing microbes and drug susceptibility pattern because there is a paucity of literature on this topic in India(2,3).

Aims and Objectives:

1. To find out the prevalence of SSI in this hospital.
2. To elicit the association between bacterial isolates and anatomical site of infection.
3. To identify the probable risk factors for the development of surgical site infections
4. To isolate and identify aerobic pathogenic bacteria from surgical site infections (SSI).
5. To determine the antimicrobial sensitivity pattern of pathogens.

II. Materials And Methods:

TYPE OF STUDY: The study was designed as a prospective type.
PLACE OF STUDY: The study was carried out in the Department of Orthopaedics, Siddhartha Medical College,Government General Hospital, Vijayawada, Andhra Pradesh.
STUDY PERIOD: From January 2021 to November 2022.
ETHICAL COMMITTEE: The present study was taken up after the review and approval by the institutional ethical committee. Informed oral consent was taken from the patients or attendants.
SAMPLE SIZE: The present study was conducted on 50 patients diagnosed with Implant infection out of the patients attending Orthopaedics OP department and inpatients of Government General Hospital, Vijayawada during the study period.

INCLUSION CRITERIA:

1. All patients suspected of infected orthopaedic implants attending orthopaedic OPD, Government general hospital, Vijayawada who are not on prior antibiotics.
2. All In-patients suspected of infected orthopaedic implants in post-operative orthopaedic ward.
3. Patients with age 18years - 70years including male and female.
4. Diabetic and hypertensive patients without neurovascular deficit.

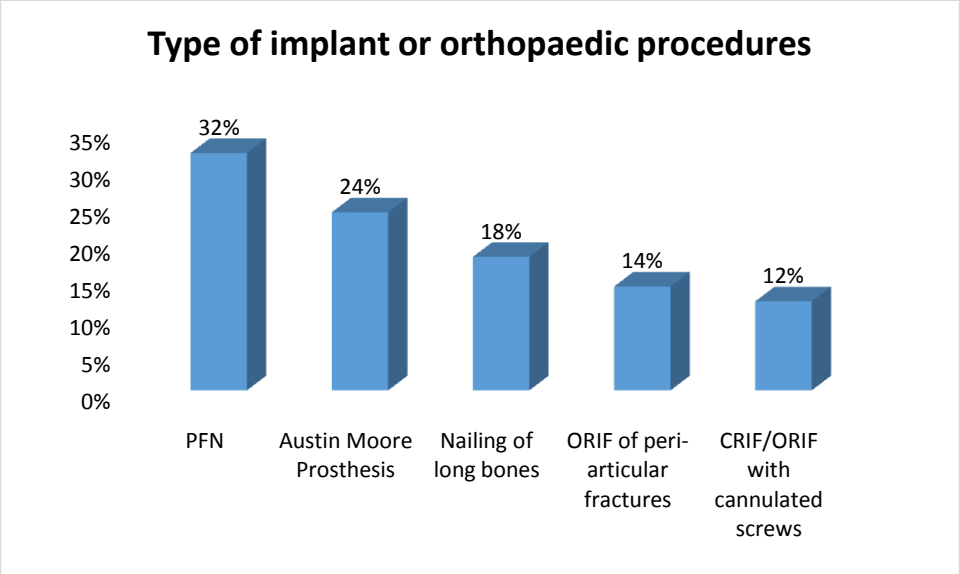
5. Patients with active infection.
6. Pathological fractures.

EXCLUSION CRITERIA:

1. Patients above the age of 70yrs, Patients having a neurovascular deficit, Patients with open fractures, Patients with percutaneous implant fixations (K-wire) were excluded from the study.

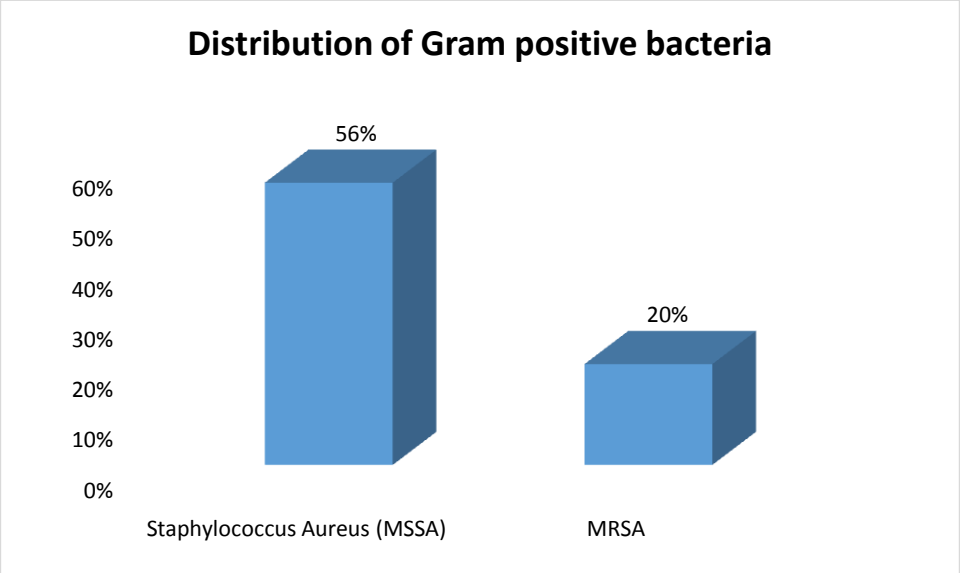
Results:

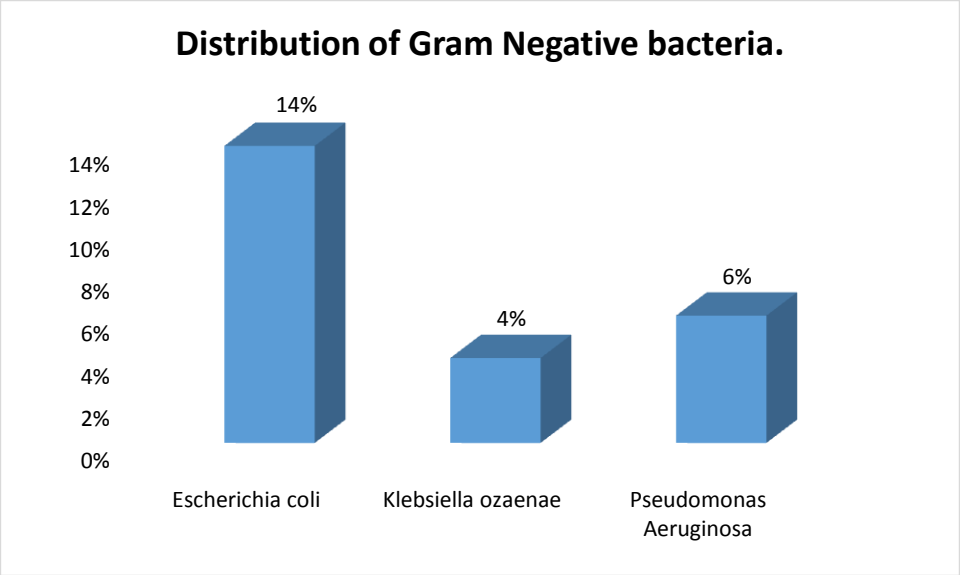
The most common age group was 61-70 years (26%), followed by 51-60 (24%). Majority of them were males (76%), with a M:F ratio of 1.3:1. 48% of the patients had an ASA index of I. Only 8% had ASA IV grade.



The data regarding risk factors shows that 26% of patients were above 60 years age, 22% were alcoholics and 16% of them had Diabetes mellitus. Hypertension was present in 10% of the study subjects while 6% were anaemic.

Majority of the patients in our study were on antibiotic therapy for 8-14 days, followed by 22% of the study subjects on antibiotics for >14 days.





Sensitivity patterns of Gram positive organisms:

Antibiotic	Staphylococcus (MMSA)	MRSA
Ciprofloxacin	66%	46%
Ceftriaxone	100%	87%
Gentamycin	64%	54%
Vancomycin	24%	67%
Tetracycline	84%	89%
Azithromycin	84%	47%
Linezolid	100%	100%

Sensitivity patterns of gram negative organisms:

Antibiotic	Klebsiellaozaenae	Escherichia coli	Pseudomonas Aeruginosa
Ciprofloxacin	87%	35%	50%
Ceftazidime	56%	47%	65%
Amikacin	86%	90%	90%
Gentamycin	85%	73%	73%
Piperacillin-tazobactum	85%	85%	86%
Sulbactum-ceftazidime	79%	78%	80%
Sulbactum-cefepim	50%	54%	53%
Ampicillin-sulbactum	65%	47%	63%
Ertapenem	100%	100%	100%
Imipenem	100%	100%	100%
Meropenem	100%	100%	100%

III. Discussion:

The biofilm that forms over orthopaedic implant infections makes treatment more challenging. There is challenging for the medications to enter it and eradicate the infection-causing bacteria. As a result, careful attention should be paid to cleaning, draping, and sterilising implants and surgical equipment. The frequency of infections is reduced by pre-operatively prepping the patient, improving baselines, using titanium implants, and taking pre-operative medications. Lamellar airflow circulation system, the serious demeanour of the surgeon, the operating room staff, and other factors all reduce infection rates. Supplemental oxygenation in the recovery room, minimising hypothermia, maximising feeding, continuing intravenous antibiotics for 72 hours, and post-operative wound care are postoperative practises that reduce infection rates(4).

A key element in the development of SSI is the timing of antibiotic prophylaxis administration. A higher rate of SSI was linked to the administration of antibiotics two hours or more prior to surgery or afterward. The selection of the appropriate antibiotics and the timing of their administration can greatly reduce the incidence of SSI. The antibiotics should be administered ideally within 30 minutes and most definitely within two hours of the time of the incision(5).

The majority of orthopaedic SSIs are caused by Staphylococcus aureus, according to the findings of our study, which was conducted in almost all studies conducted worldwide.[71]aureus and then a variety of Klebsiella. Others include Escherichia coli and Pseudomonas species(6).

According to culture and sensitivity reports, patients were kept on oral antibiotics for three weeks or until pus discharge stopped while also receiving daily dressing changes and debridements. The treatment was effective on every patient. In no case was an implant removed too soon.

Twenty percent of S. Methicillin-resistant Staphylococcus aureus was sensitive to vancomycin, linezolid, and tetracycline, and all MRSA isolates were. S. was also mentioned in the findings of Mundhada and Tenpe et al. The majority of staphylococcal isolates from SSIs were identified as being sensitive to vancomycin and linezolid, according to numerous other studies. Staphylococcus aureus with vancomycin resistance (VRSA) is not yet common. The first line of treatment for MRSA is still vancomycin. Vancomycin, teicoplanin, and linezolid were effective against the coagulase-negative staphylococci (2.26%)(7).

We propose that imipenem, ertapenem, and meropenem are the most effective agents and Ceftriaxone, tetracycline, vancomycin, and linezolid are the most effective agents against gram positive organisms based on the antimicrobial susceptibility data for gram negative organisms.

References:

[1]. Fernandes A. The Microbiological Profiles of Infected Prosthetic Implants with an Emphasis on the Organisms which Form Biofilms. JCDR [Internet]. 2013 [cited 2023 Jan 20]; Available from: http://www.jcdr.net/article_fulltext.asp?issn=0973-709x&year=2013&volume=7&issue=2&page=219&issn=0973-709x&id=2732

[2]. Mukherjee S, Mukherjee J, Kumar S, Misra S, Bhatta R, Sengupta M. A study to evaluate the pattern of microorganisms causing early post-operative wound infection in patients undergoing orthopaedic surgery with implant for closed fracture or disease in medical college and hospital, Kolkata. International Journal of Research in Orthopaedics. 2020 Oct 22;6(6):1204–9.

[3]. Anusha S, Ld V, Pallavi K, Manna PK, Mohanta G, Manavalan R. An Epidemiological Study of Surgical Wound Infections in a Surgical unit of Tertiary care Teaching Hospital. Indian Journal of Pharmacy Practice [Internet]. 2010 [cited 2023 Jan 20]; Available from: https://www.semanticscholar.org/paper/An-Epidemiological-Study-of-Surgical-Wound-in-a-of-Anusha-Ld/70c778c5bd3ce40526d1c9bddd705a86f9549145

[4]. Mawalla B, Mshana SE, Chalya PL, Imirzalioglu C, Mahalu W. Predictors of surgical site infections among patients undergoing major surgery at Bugando Medical Centre in Northwestern Tanzania. BMC Surg. 2011 Aug 31;11:21.

[5]. Kochhal N, Mudey GD, Choudhari SZ. A study of clinico-microbiological profile of surgical site infections in a tertiary care hospital. International Journal of Advances in Medicine. 2019 Mar 25;6(2):324–9.

[6]. Makanjuola OB, Olowe OA, Adeyankinnu AF. Bacterial Agents of Surgical Site Infections in South-Western Nigeria. Am J Biomed Sci. 2013 Oct;217–25.

[7]. Okoro KA, Ede O, Iyidobi EC, Enweani UU, Nwadinigwe CU, Eyichukwu GO, et al. The Bacteriological Profile of Surgical Site Infections in Orthopaedic Implant Surgeries in South-East Nigeria. JBM. 2019;07(09):19–27.

K Sudhakar, et. al. "A Study on the Microbiological Profiles and Risk Factors of Post Operative Implant Infections after Fracture Fixation." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 22(1), 2023, pp. 43-46.