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RESEARCH ARTICLE
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THE MICROBIAL PATTERN AND ANTIBIOTIC SUSCEPTIBILITY IN POST-CAESAREAN SECTION WOUND INFECTION IN A TERTIARY CARE HOSPITAL IN BUNDI, RAJASTHAN

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Introduction

The third most frequent nosocomial infection is surgical site infection (SSI). Surgical site infections (SSI) account for 38% of all nosocomial infections in surgical patients, according to the CDC's National Nosocomial Infection Surveillance System.(1)They are to blame for the rising expense, morbidity, and death rates associated with surgery. SSI is still a significant issue even in institutions with state-of-the-art equipment and regular preoperative and antibiotic prophylactic measures.(2).

Any infection that develops at the incision or operative site (including drains) within 30 days of the procedure, if no implant is left in place, or within a year, if an implant is left in place, is considered a surgical site infection. The CDC defines three types of surgical site infections: "Organ or Space infection," which affects any part of the body other than the incision that is opened or manipulated during the surgical procedure; "Deep incisional," which affects the layers of muscle and fascia; and "Superficial incisional," which affects the skin and subcutaneous tissue.(3)Bacterial infections are nearly always the cause of surgical site infections. Both exogenous and endogenous sources could be to blame. Bacteria from the patient's skin, mucous membranes, or hollow viscera are examples of endogenous sources.(4). Endogenous organisms can include faecal flora (such as anaerobic bacteria and gramme negative aerobes), although they are mostly aerobic gram-positive cocci (like staphylococci). The operating room environment (including the air), operating room staff, and any equipment, supplies, and tools brought into the sterile field during an operation are examples of exogenous sources of SSI infections. Aerobes, particularly gram-positive organisms like streptococci and staphylococci, make up the majority of exogenous flora.(5). Caesarean delivery is one of the most common procedure performed worldwide. It is a clean contaminated type of surgery. Determinants of infection may be related to the host(such as tobacco use; limited prenatal care; obesity; corticosteroid use; nulliparity; twin gestations; and previous CD) ,intrapartum and operative factors (such as chorioamnionitis; premature rupture of membranes; prolonged rupture of membranes; prolonged labor, particularly prolonged second stage; large incision length; subcutaneous tissue thickness > 3 cm; subcutaneous hematoma; lack of antibiotic prophylaxis), type of procedure (emergency/elective), previous caesarean section, and environment of the operating room, microbe, malnutrition and low socioeconomic status further exacerbate the risk of infection in caesarean sections.(6) Understanding SSI and the variables affecting it with careful pre, inter and post surgical prevention and management of associated risk factors and following stringent infection control practices in the operation room can help to achieve minimal infection rate in patients undergoing caesarean delivery(7).

Objective

To ascertain the frequency of different bacteria causing surgical site infections (SSI) and their patterns of antibiotic resistance, as well as the rate of surgical site infections after caesarean delivery.

Material and Methods

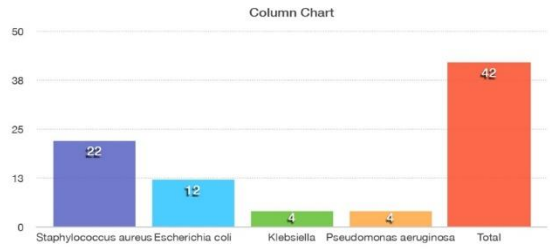
Patients who had caesarean deliveries at a tertiary care hospital in Bundi were the subjects of this retrospective study. Between April and November of 2024, 180 samples in all were received. Women who had a wound infection while in the hospital or within 30 days after surgery met the inclusion criteria.

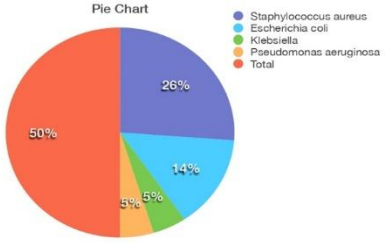
Two sterile cotton swabs were used to gather the discharge from the infected wound in individuals who had surgical site infections. Swabs were delivered as soon as feasible to the lab. One swab was used to create the smear, which was then stained with Gramme stain and examined for the presence of bacteria and pus cells. The second swab was plated on MacConkey's agar (MA), Blood agar (BA), and Chocolate agar (CA).For 18 to 24 hours, the Blood agar and MacConkey's agar plates were incubated aerobically at 37 ´C. For 18 to 24 hours, the chocolate agar plate was incubated at 37 °C with 5% CO2.

The conventional microbiological procedure, which includes Gram stain, colony morphology, and biochemical testing, was used to further identify the pure colonies. As advised by the Clinical and Laboratory Standards Institute (CLSI), antimicrobial susceptibility testing was performed on Muller Hinton agar (MHA) and blood agar using the disc diffusion method for each detected bacterium.The guidelines were compared with the measured zones of inhibition. The implementation of quality control methods throughout the entire laboratory work process ensured the dependability of the results. Staphylococcus aureus (ATCC 25923), P. aeruginosa (ATCC 27853), and E. coli (ATCC 25922) were the reference strains utilised as controls.

RESULT.

ORGANISMS ISOLATED	NO. OF CASES(%)
Staphylococcus aureus	22
Escherichia coli	12
Klebsiella	4
Pseudomonas aeruginosa	4
Total	42





Discussion

It is a difficult experience to develop SSI. Surgical site infections continue to be a major concern despite the introduction of antisepsis principles and improvements in infection control procedures, including better operating room ventilation, sterilisation techniques, barriers, surgical technique, and the availability of antibiotic prophylaxis.

The prevalence rate of wound infection following caesarean section in this study was 23.33%, which was in line with infection rates observed in other studies. M.S. Venkataraman et al.(9) reported a rate of 24.7% for clean contaminated procedures, while Anikar et al.(8) reported a rate of 10.06%.

In the current investigation, Staphylococcus aureus was identified as the most prevalent pathogenic bacterium causing SSI.The results from Koigi-Kamau R et al. were comparable.(10). Due to inadequate surgical skill, this organism—which is a normal skin commensal—may have contaminated the wound during surgery.(11). The most frequently isolated organisms were Escherichia coli, Pseudomonas aeruginosa, and Klebisella. Khadijah Hassan et al.'s findings were comparable. (12)

The patient's typical endogenous microbial faecal flora may be the cause of the presence of enteric organisms. Because of its significant role in hospital cross-infection and the generation of severe antibiotic-resistant strains, Staphylococcus aureus surgical site infections are of particular concern. 86.36% of the Staphylococcus aureus strains from the infected site in this investigation were penicillin-resistant. According to other studies, penicillin is ineffective against Staphylococcus aureus.(13, 14)

Methicillin resistance was present in 11 out of 22 (50%) strains of Staphylococcus aureus, although amikacin resistance was present in only 4.54% of the strains. Gentamicin, one of the antibiotics used for antimicrobial prophylaxis, proved ineffective against all strains of Pseudomonas aeruginosa. When isolated from the infected site, gram-negative bacteria other than Pseudomonas aeruginosa showed resistance to tetracycline, ceprofloxacin, carbimoxazole, cefotaxime, gentamycin, and amikacin in decreasing order.

Summary and Conclusion

The current investigation includes 180 Post Caesarean delivery wound samples in total. In which 23.33% was the total rate of surgical site infections. The most prevalent isolate in the infected wounds was Staphylococcus aureus, which was followed by Escherichia coli, P. aeruginosa, and Klebisella. Penicillin resistance was found in 83.36% of the identified Staphylococcus aureus strains.MRSA, or methicillin-resistant Staphylococcus aureus, accounted for half of all cases.When it comes to treating Pseudomonas aeruginosa wound infections, gentamycin is useless. 68.75% of the Gram-negative bacteria that were recovered from the infected site were sensitive to gentamycin, while the remaining bacteria (apart from P.aeruginosa) were resistant to tetracycline. Even though the organisms identified from the infected wounds showed variable percentages of sensitivity to some of the medicines used for antimicrobial prophylaxis, future issues could arise from improper antibiotic administration. Optimising antibiotic prophylaxis would be one strategy to prevent surgical site infections.

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