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Isolation, Assessment of Antimicrobial Sensitivity of Bacterial Pathogens from Post-Cesarean section Infection of patients in Thi-Qar Province

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Abstract: Cesarean section is the most frequent surgical procedure in obstetrics. This study was carried out to isolating and identifying bacteria causing cesarean section inflammation from patients and antimicrobial susceptibility test to bacterial isolates; 30 samples were collected from patients with different aged of women that had suffering from Post-Cesarean section Infection in Bent-Al-Huda & Al-Habboubi hospital in in Thi-Qar province. The isolates were identified on the bases of their morphological characteristics, the Gram stain reaction, biochemical tests and confirmed by the Api 20 E test. The results revealed that the rate of bacterial isolates in patients with Post-Cesarean section Infection was (76.6%). out of these (34.8 %) were E .coli, (30.4%) were Pseudomonas aeroginosa, (13%) of Staphylococcus aurous, (8.6%) isolates of Acintobacter and Bacillus. Antimicrobial susceptibility testing to 23 bacterial isolates showed variable sensitivity to antibiotic, they were more sensitive to chloramphenicol and Imipenem also the results appeared increasing prevalence of multidrug resistant between isolates.

Keywords: Post-Cesarean section Infection;; Antimicrobial Resistance.

1. INTRODUCTION

In clinical practice, the cesarean section (CS) is used as a lifesaving operation for both mothers and babies.; It is the most common surgical procedure in obstetrics since approximately 15 percent of births accounted for by this procedure worldwide; The worldwide rise in cesarean section (CS) levels is becoming a major public health concern and a source of considerable debate due to potential maternal and perinatal risks, cost issues and inequity in access (1, 2). The increase in CS rates observed in many developed and middle-income countries contrasts sharply with the very low rates in numerous low-resource settings, along with lack of access to emergency obstetric care. According to recent data, in Middle Africa, only 1.8% of all live birth deliveries occur by CS, compared to 24.3% in North America and 31% and in Central America(3).Cesarean section includes a major abdominal incision, it carries a prominent risk of surgical site infection (SSI). The single most important

risk factor for postpartum maternal infection is cesarean delivery, and women undergoing cesarean section have a 5-20-fold greater risk of infectious complications when compared with a vaginal delivery. These complications include fever, wound infection, endometritis, bacteraemia, urinary tract infection and other serious infections(4). In 2014, nearly 1.3 million CDs were performed (5). The Surgical Site Infection (SSI) is defined by the Disease Control and Prevention (CDC) criteria as an infection which occurs within 30days after a surgical procedure and is further divided into superficial incisional primary and secondary SSIs, deep incisional primary and secondary SSIs and organ/space SSIs if involving structures deeper than muscle and fascia space (6). SSIs are associated with increased costs, higher rates of patient dissatisfaction, increased length of hospital stay and high mortality and morbidity rates ; It is estimated that by using an evidence-based approached half of the surgical site infections can be prevented (7). As with all surgical procedures, CD can be associated with SSIs, including wound infections and endometritis, as well as being associated with higher maternal morbidity and mortality with future pregnancies (8).Wound infection presents with erythema, discharge, and induration of the incision, complicates 2-7% of patients and generally develops 4 to 7 days after CD (9). Wound infection occurs in about 2-16% of all Cesarean section deliveries (10). PCSSI incidence depends on many factors mainly owing to improvements in hygienic conditions, better use of prophylactic antibiotics and Adherence to standard infection management protocols (11). In Iraq, a report found that about 2.9 percent of the 1670 women delivered with elective or emergency CS reported signs and symptoms of PCSSI (12). If the wound infection develops within 48 h, the offending bacteria usually are groups A or B-hemolytic *Streptococcus*. Other common organisms involved in wound infections are *Ureaplasma urealyticum*, *Staphylococcus epidermidis*, *Enterococcus facialis*, *Staphylococcus aureus*, *Escherichia coli*, and *Proteus mirabilis* (13, 14).A surgical site infection is an infection which occurs at the incision / operative site (including drains) within 30 days after surgical operation). The Aims of the study to Isolation, identification and of bacteria causing Post-Cesarean Surgical Site Infection in thi-Qar province and Assessment of the sensitivity of the common bacterial pathogens isolates causing PCSSI to some of the clinically used antimicrobials

2. MATERIALS AND METHODS

2.1 Collection of Specimens

This cross-sectional study was conducted in Bent-Al-Huda & Al-Habboubi hospital in in Thi-Qar province. A total of 30 samples were collected in the period between November 2017 to April 2018, PCSSI signs and symptoms (fever, surgical wound inflammation and discharge, abdominal pain and tenderness). The swabs were taken by the obstetrician researchers.

2.2. Identification of Bacterial Isolates

the samples taken by wound swab sterile and labeled then transported to the laboratory within 1-2 hour are streaking on blood agar and MacConkey agar , then All isolates were subjected to Gram staining for initial identification of organism According to their Gram reaction, colony morphology and finally by biochemical test. Gram negative bacteria were identified by The important biochemical tests were conducted according to (15). Tests {Kligler iron (KI), Oxidase test, Urease test, Indole test, Citrate utilization test, methyl. red, Voges-Proskauer and motility test,}(16,17).

2.3 -Api-20E system (Analytical profile index for Enterobacteriaceae test) and Api staph

Api-20E system and Api staph is used clinically for the rapid identification of the bacterial isolates this test done according to (18).

2..4-Antimicrobial susceptibility testing (AST) by disk diffusion

All isolates in this study were tested for resistance to six antimicrobials on Mueller-Hinton agar (Difco Laboratories, Detroit, MI) by a disk agar diffusion method (19). The following antimicrobials were used: Azithromycin(15ug) AZM, Nalidixic acid 30ug (NA), Amikacin 30ug (AK), Penicillin 10ug (PG), Imipenem 10ug (IPM), Gentamycin 10ug (GM), Chloramphenicol 30ug(C), Ampicillin 30ug (AMC) and according to the criteria published by the Clinical and Laboratory Standards Institute (CLSI), the isolates were characterized as susceptible, intermediate, or resistant. If there is growth of bacteria around antibiotics disc in inhibition zone this means that the bacteria are sensitive to this antibiotic and vice versa if there is no growth.

3. RESULTS AND DISCUSSION

Since the hospital stay after CS for most women is usually less than 72 h, post-discharge surveillance is imperative in these cases for optimal detection of SSI as it has been shown that lack of surveillance in these patients leads to under-notification of SSI. In the present study, 99 percent of SSI patients were diagnosed after hospital discharge which is inconvenient consistent with international data showing variable infection rates, defined by CDC diagnostic criteria, depending on the type of post-discharge surveillance implemented (20). Likewise, similar to an earlier study where patients with post-CS SSI were identified as outpatients, SSI cases in the present study who presented in the emergency room or the out-patient department were contacted by the infection control nurse after being notified by the attending physician (21). The results of isolation of bacteria from 30 samples woman with cesarean section randomly from Bent-Al-Huda hospital &Al-Habboubi hospital in The-Qar city appeared that (23) isolates identified (by biochemical test and API-20 system . A total of 30 samples out of these (34.8 %) were *E .coli* , (30.4%) were *Pseudomonas aeroginosa* , (13%) of *Staphylococcus aurous*, (8.6%) samples of *Acintobacter* , and *Bacillus* , as in table (1). while a cohort study included 14 hospitals in UK it was found that *staphylococcus aurous* comes at the top of the causative pathogenic microorganism (40.4%). Enterobacteriaceae (*E. coli*, *Protues, klebseilla* and others) isolated in 13% of cultures, while *Entrobacter* and *pseudomonas* spp. Appeared in 3.9 and 2% respectively (22). Another study revealed that in 31.8% *Staphylococcus aurous* was grown, while 13.6% of cultures *E. coli*, 6.8% *Pseudomonas* species (23).

Table (1):- the number and Percentage of bacteria from 30 samples woman with cesarean section

Type of microorganism	**No. of isolates**	**Percentage %**
E. coli	8	34.8 %
Pseudomonas aeroginosa	7	30.4%
Staphylococcus aurous	3	13%
Acintobacter	2	8.6%
Bacillus	2	8.6%
Total	23	100%

Resistance to antimicrobials has become a major medical and public health. Hospital troubles and even Public leaders(24). Hence trends of resistance to antibiotics would be beneficial for selecting the best one and accordingly minimizing the hospitalization period, morbidity and also mortality. This information will be useful For rational policies against Antimicrobial resistance. The results have revealed both microbial sensitivity and resistance toward eight antimicrobial drugs. The sensitivity and resistance were variable according to the species of microbes. Since the use of antimicrobial disc was determined according to according to the criteria published by the Clinical and Laboratory Standards Institute (CLSI), the isolates were characterized as susceptible, intermediate, or resistant. The sensitivity of the main microbial species isolated in this study 23 bacterial isolates showed the bacterial isolates appeared variable sensitivity to antibiotic, they were more sensitive to chloramphenicol and Imipenem and the results appeared increasing prevalence and all bacteria isolates were resistance to penicillin and ampicillin. The antimicrobial susceptibility test to eight types of antibiotics as the following table (2) and Figure (1) below.

Table (2):- Antibiotic susceptibility patterns in bacteria isolates (n=23)

Type of organisms	**Percentage of resistance**							
	AK	**AZM**	**IPM**	**AMC**	**C**	**GM**	**PG**	**NA**
E. coli	25%	62.5%	0%	100%	0%	100%	100%	75%
Pseudomonas aeroginosa	0%	28.6%	0%	100%	57.1%	14.3%	100%	71.4%
Staphylococcus aurous	0%	100%	0%	100%	100%	100%	100%	100%
Acintobacter	0%	0%	0%	100%	0%	100%	100%	0%
Bacillus	0%	100%	0%	100%	100%	100%	100%	100%

Contrasted with other research such as a Nigerian study, *Staphylococcus aurous* bacteria have shown a low sensitivity to aminoglycosides in 14.3 percent of cultures (23). This difference can be explained by the continuously changing microbial resistance that is directly related to the rate of antimicrobial prescription in clinical practice for such infections (25). In another study conducted in India, bacteria sensitivity toward chloramphenicol 33.3% highly differ from our result and this high sensitivity may be due to the non-routinely usage of chloramphenicol for such infection in Iraq(26).

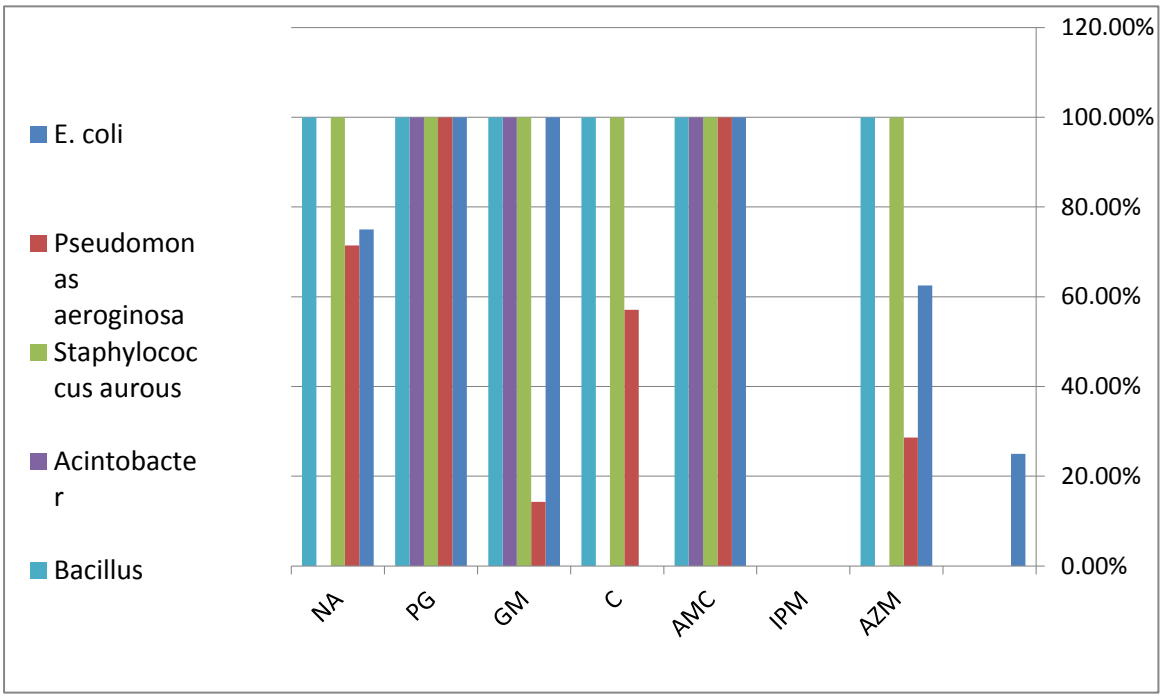

Figure (1): Antibiotic susceptibility patterns in bacteria isolates (n=23).

In Iraq, significant landing in susceptibility. antibiotics rates to β-lactams, aminoglycosides,. quinolones and other antibiotics. was lately observed in .Gram negative (27). El-Kholy *et al*., (2002) noted that the happening of .high percentage of Resistance .to some antibiotics perhaps .ascribable to random use of antibiotics among .population without medical prescription(28). The wide difference in microbial sensitivity is mostly related to the difference in microbial resistance which mostly affected by antimicrobial prescription patterns(25). all isolates considered as multi-drug resistant because the isolates were totally non-susceptible to equal or more than one antibiotic in equal or more than three antimicrobial categories. In addition to the factors related to the microorganism itself and horizontal gene transfer ;Antimicrobial resistance patterns in bacteria isolates can different greatly in depending on geographical location, patterns of antibiotic consumption among the studied people, and the period of study. the lacking or inadequate regulation of antibiotic consumption, inappropriate implementation of existing laws, and population movements are among people and the behavioral factors that related to the emergence of multidrug-resistant microorganisms (MDR) in development countries (29).

4. CONCLUSION

Cesarean section is the most frequent surgical procedure in obstetrics. the rate of bacterial isolates in patients with Post-Cesarean section Infection was high ; the more frequent are *E .coli*, and *Pseudomonas aeroginosa* then *Staphylococcus aurous*, *Acintobacter* and *Bacillus*. Antimicrobial susceptibility testing to bacterial isolates showed variable sensitivity to antibiotic, also the results appeared increasing prevalence of multidrug resistant between isolates.

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