ANTIBIOTIC USAGE IN PATIENTS HAVING UNDERGONE CAESAREAN SECTION

Shamshath Begum. M[1], Gunjan, Kashmira J Gohil[2], Sriram. A[3*]

Article History: Received: 12.12.2022 **Revised:** 29.01.2023 **Accepted:** 15.03.2023

Abstract

Caesarean section (CSEC) is one of the most common types of surgery done in both rich and poor countries. A prospective study of 75 prescriptions of women attending the inpatient and outpatient Department of Obstetrics and Gynaecology, a Tertiary Care Hospital, Agra. Among the 75 patients 40 developed mild to moderate surgical site infections giving a cumulative incidence of 44%. The age of study subjects ranged between 20 to 40 years. Majority (60%) of them belonged to 20-30 years group. The median preoperative length of stay (LOS) was 3 days. Cephalosporins cefuroxime 52%, cefuroxime 20%, Cefotaxime 12% were used pre operatively. Other antibiotics (e.g. Metronidazole, vancomycin, followed by amoxicillin+ potassium clavulanate) were used to treat post-surgical infections. The recommended regimen of ceftriaxone alone does not work against frequent isolates. Metronidazole was preferred as second line agent and used as extended spectrum regimen. This study found that there were a lot of SSIs after CSEC and that most of the pathogens that caused them were resistant to the antibiotic strains. Most SSIs caused by CSEC are found after the patient has left the hospital. A caesarean section that is done too quickly or without enough antibiotics is a major risk factor for SSI. This information is important for making targeted plans for surveillance and reducing the number of infections that happen after surgery. More research needs to be done to find out which set of interventions is best for preventing SSI after CSEC and improving patient outcomes.

Keywords: Surgical site infections, Caesarean section, Cephalosporins, Staphylococcus aureus, Wound-related complications

[1]Department of Pharmaceutics, Anand College of Pharmacy, Sharda Group of Institutions, Sharadha university, Agra-282007(UP)
[2]Department of Pharmacology, School of Pharmacy, Sharadha university, Greater Noida-201310(UP).
[3]Department of Pharmacology, Anand College of Pharmacy, Sharda Group of Institutions Sharadha university, Agra-282007 (UP).
[4]Department of Pharmacy Practice, SRM College of Pharmacy, Kattankulathur-603203 (Tamil Nadu)

DOI: 10.31838/ecb/2023.12.s2.246

1. Introduction

SSIs are linked to higher costs, more unhappy patients, longer stays in the hospital, and higher rates of death and illness [Molla M et.al., 2019]. It is thought that using an approach that is based on evidence can stop about half of all surgical site infections. Caesarean section (CSEC) is one of the most common types of surgery done in both rich and poor countries [Rano R et.al., 2013]. In the United States, 32% of all births are done with a Caesarean section. The most caesareans happened in the EU Member States of Cyprus (54.8%), Bulgaria (43.1%), Poland (41%), and Hungary (38%). High CSEC rates have also been found in China and Australia, where 32.4% and 41% of births, respectively, are by Caesarean [De D, Saxena et.al., 2013]. Up to 23% of all births in Ukraine are caused by CSEC. Postpartum SSI after CSEC is a major cause of long hospital stays, and it adds to the cost of care for both mothers and their families and the public health care system [Shahida SM et.al., 2016]. Women with these infections are more likely to get sick and die. Even though clinical obstetric care has gotten much better in many countries over the past 20 years, the rate of SSIs after CSEC is still an important issue. Obesity, smoking, blood transfusions, age, malnutrition, immune incompetence, immunosuppressive therapy, longer pre-operative hospital stays, and diabetes mellitus are all things that can lead to SSIs. Some things that lead to C-sections are not getting prenatal care, having more than one pregnancy, having had a C-section before, Chorioamnionitis, pre-labor rupture of the foetal membranes, labour dystocia, emergency/labored delivery, and getting obstetrical services in teaching hospitals. When compared to vaginal delivery, the number of mothers who get sick from an infection is five times higher after a Caesarean section. Antibiotic prevention is a big part of lowering the risk of infections after a caesarean section, like endometritis, surgical site infections, and urinary tract infections [Kawakita T et.al., 2017]. When antibiotic prophylaxis is done according to the guidelines, the bad outcomes of caesarean section, like long hospital stays, systematic antibiotic therapy that can lead to overuse or wrong use of antibiotics and the development of antimicrobial resistance, extra costs, and negative psychological and social effects, are less likely to happen. Infections at the site of surgery are a common problem after obstetric and gynaecological procedures. The use of antimicrobial prophylaxis before a caesarean section has been shown to reduce complications, costs, and lengths of stays in the hospital. One of the most common infections that people get in hospitals is an infection at the site of surgery. Up to 14–16% of hospital infections are caused by them. More wounds are getting worse because there are more caesarean births around the world. In 1998, 7.1% of births in India were done by caesarean section, and the rate is going up by 16.7% every year in India. 3 The rates of SSI are seen as a sign of how well hospitals perform surgery and care for patients after surgery. 4 Knowing the organisms that cause SSI and how they respond to and resist antibiotics gives you an idea of how antibiotics are prescribed now and what factors affect these practises. This study helps us learn about the risk factors and organisms that cause SSIs in our hospital, as well as how they react to different antibiotics. This helps us come up with ways to prevent infections [Prajapati V et.al., 2022].

2. Methodology

A prospective study of 75 prescriptions of women attending the inpatient and outpatient Department of Obstetrics and Gynaecology, a Tertiary Care Hospital during the period of December 2022 to April 2023 was conducted. Prior to start of the study Institutional Ethics Committee approval was obtained.

The prescriptions were looked at using WHO core drug use indicators, such as the average number of drugs prescribed per visit, the percentage of drugs prescribed by generic name, the percentage of drugs prescribed from the essential drug list, patient care, and the availability of drugs. The collected data were looked at for the following things: i) age of patient; ii) gravidity; iii) type of caesarean section - (elective/emergency); iv) number of drugs per prescription; v) class of antimicrobials; vi) duration of anti-microbial treatment; vii) average number of antimicrobials prescribed; viii) polypharmacy; ix) number of fixed-dose combinations prescribed; x) generic/brand name prescribed; and xi) failure of prophylaxis. When compared to vaginal delivery, the number of mothers who get sick from an infection is five times higher after a Caesarean section. Antibiotic prevention is a big part of lowering the risk of infections after a caesarean section, like endometritis, surgical site infections, and urinary tract infections [15, 16]. By following the guidelines for antibiotic prophylaxis, the bad

outcomes of caesarean section, such as lengthy hospital stays, antibiotic treatment that leads to overuse or unnecessary use of antibiotics and the development of antimicrobial resistance, excess costs, psychological and social effects, are reduced.

Results

Table .1 Demographic Details (n=75)

Maternal age	**No's**	**(%)**
20-30	45	60
31-40	27	36
41-50	3	4
Background		
Urban	26	35
Rural	49	65
Antenatal visits		
Unbooked	47	63
Booked	28	37
Gravidity		
Primi	35	47
Gravida 2	23	30
Gravida 3	11	15
Gravida 4	6	8
Surgery type		
Caesserean	65	87
Uterine repair	8	10
Peripartum hysterectomy	2	3
Surgery duration		
Below 1 hour	59	79
Above 1 hour	16	21

Table .2 classification of patients based on surgical site infection

Risk factors	No's	(%)
Anemia	17	23
Diabetes mellitus	11	15
Hypertension	07	9
Thyroid	19	25
No comorbidities	21	28

Table.3. classification of patients based obstetric risk factors

Risk factors	No's	(%)
Prev. LSCS	35	47
Failed Induction	7	9
Rupture Uterus	6	8
Placenta Previa	9	12
Placenta Acreta	5	6
Chorioamnitis	13	18

Table .4. Classification of patients based on surgical site infection

History of caesarean section	No's	(%)
Without antecedent	11	14
Single uterine scar	29	39
Multiscarred uterus	35	47

Table 5: Organisms isolated from the pus

Isolated Organisms	**No's**	**%**
Pseudomonas aeruginosa	8	10%
Enterococcus	16	21%
Klebsiella	6	8%
Staphylococcus aureus	31	42%
Proteus mirabilis	4	5%
Clostridium difficille	10	14%

Table 6: Antibiotic usage pattern in pre- and post-Caesserean section

	Antibiotics	**No's**	**%**
Antimicrobials prior to admission	Ceftriaxone	39	52
	Cefuroxime	15	20
	Cefotaxime	9	13
	Metronidazole	8	10
	Cefazolin	4	5
Post partum antimicrobials	Vancomycin	9	12
	Metronidazole	19	25
	Linezolid	5	7
	Ceftriaxone+ sulbactam	3	4
	Amoxicillin+ clavulanate	10	13
	Ciprofloxacin+ Tinidazole	8	11
	Gentamycin	9	12
	Cefotaxime	12	16

3. Results

During the study period 75 patients underwent various surgeries in the general surgery department in tertiary care hospital, Agra. Among the 75 patients 40 developed mild to moderate surgical site infections giving a cumulative incidence of 44%. The age of study subjects ranged between 20 to 40 years. Majority (60%) of them belonged to 20-30 years group. The median preoperative length of stay (LOS) was 3 days. The lengthy stay for patients who developed SSIs was greater than for patients without SSIs. In total, 75 women were included in our study. The patients' age range was 20–30 years, with a median of 25 years with almost 60%. Among the patients, 65% patients came from rural background and they are having minimal comorbidities such as diabetes, anaemia, Thyroid problems and Hypertension. 28% of the patients were with no comorbidities. Patients' demographic and clinical characteristics were shown in Table.1. Out of 75 patients 63 % of the antenatal visits were unbooked. Most of them belong to primi gravida (47%). The most commonly causing organism was said to be staphylococcus aureus 42% followed by enterococcus 21%. In this study, patients were assessed about their medication with antibiotics prior to their admission to hospital. A total of 23 (28.70%) were taking one antibiotic, and more than half (57 of 80; 71.30%) were taking 2–5 antibiotics, either for a long time (more than 15 days) or in acute treatment. The most frequent antibiotic used was Cephalosporins cefuroxime 52%, cefuroxime 20%, cefotaxime 12% were used pre operatively. Other antibiotics (e.g., metronidazole, vancomycin, followed by amoxicillin+ potassium clavulanate) were used to treat post-surgical infections. The antibiotic prophylaxis practises were judged by five standard criteria: the reason for using antibiotics, the choice of antibiotics, the amount given, when it was given, and how long it was given.

4. Discussion

Wound-related complications, like surgical site infections after a caesarean section, are a major cause of illness and death. They also make patients stay in the hospital longer and cost the hospital more. It is the most common infection in people who have surgery, and it makes up 15% of all hospital-acquired infections. With the number of caesarean sections going up around the world, SSI is also going up [Rose AF et.al.,2018]. Also, it is one of the most common problems seen after surgery in this study. Most infections at surgical sites are caused by microorganisms from the patient's own body that get into the wound during surgery. This study shows that the overall SSI rate

varies a lot depending on the study sample, diseases that were already present, and the use of antibiotics [Aryani FS et.al., 2021]. Overall, the SSI rate in our study was very high, but it was about the same as the SSI rate reported around the world. There was a total of 75 people who were going to have a caesarean section, and 22% were found within 30 days of the surgery [Shea SK et, al.,2019]. 65% of the cases were found after the patients were sent home. After surgery, 10% of people got an infection at the site of the surgery. In this study, people younger than 35 have a lower chance of getting SSI than people older than 35. Surgical site infections are more likely to happen if the patient is older, has a lower immune system, or has other health problems. Surgical site infections were more likely when the surgery took longer. Also, having a surgery that took more than 4 hours was linked to a 4 times higher risk of SSI. The average time it took to diagnose SSI was 10.3+5.7 days after surgery. The median time for all SSI infections was 7 days [Ansaloni L et.al., 2001]. In this study, SSIs caused by a caesarean section were most often caused by s. aureus and E. coli. Most of the time, s. aureus, E. coli, Enterococci, anaerobes, and urea plasmas are found in the endometrial cultures of women with post-c-section wound infections. Urea plasma or mycoplasma genus is the most common organism found in amniotic fluid and chorioamnionitis at caesarean delivery. It is linked to a 3–8-fold higher risk of endometritis or wound infections after caesarean delivery. Prevention guidelines from 2017 strongly suggested that no extra prophylactic antibiotics are needed for clean, clean, and contaminated procedures if the skin cut is closed in the operating room. Most of the SSI, 63%, needed secondary suturing, but in 37% of the cases, the wound healed with daily aseptic dressings and secondary intention. In this study S. aureus was found to be responsible for 42% of SSIs. This was followed by gram-negative rods, such as Klebsiella species and E. coli. Penicillin didn't work on 44% of the S. aureus strains that were tested. Other studies have also shown that penicillin doesn't work on S. aureus. E. coli, Klebsiella, Pseudomonas were 100% sensitive to piperacillin and ticarcillin [Khan T et.al.,2023]. People with anaemia were thought to be more likely to get SSI. Puerperal sepsis is often linked to anaemia, which makes it harder to fight off infections. In this study, 48% of the patients had anaemia. The most frequent organism in post Caesserean section were staphylococcus enterococci, anaerobes. During surgery and in the days after, if glucose levels aren't well controlled, the risk of infection goes up and sepsis gets worse [Corbett et.al., 2021]. The length of time the membranes are broken before a caesarean section is both an internal and an external risk factor in obstetrics. Cephalosporins. Patients who admitted for a long duration after caesarean section are at risk of nosocomial infections and also these women may have some clinical conditions that lead to lengthy hospital stay in hospital which may leads to delayed wound healing [Astha Regmi et.al., 2022]. The recommended regimen of ceftriaxone alone does not work against frequent isolates. metronidazole was preferred as second line agent and used as extended spectrum regimen.

5. Conclusion

This study found that there were a lot of SSIs after CSEC and that most of the pathogens that caused them were resistant to the antibiotic strains. Most SSIs caused by CSEC are found after the patient has left the hospital. A caesarean section that is done too quickly or without enough antibiotics is a major risk factor for SSI. This information is important for making targeted plans for surveillance and reducing the number of infections that happen after surgery. More research needs to be done to find out which set of interventions is best for preventing SSI after CSEC and improving patient outcomes. The high rate of SSIs in this study shows how important it is to make SSI control a top priority by setting up clear post-discharge surveillance methods on a national level. This can be done by making sure that both patients and doctors can use the same valid SSI evaluation measures after they are sent home. By reducing the number of infections, wound surveillance programmes could lead to lower costs for monitoring and treating wounds. In the end, our study showed that third-generation cephalosporin (cefotaxime) and triple combination therapy (benzylpenicillin, gentamicin, and metronidazole) were the most common antibiotics given before and after surgery. In our study, there were less infections at the site of surgery. This could be because antibiotics were given before and after CS births. Doctors need to keep learning about how to use antibiotics most effectively.

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