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A hospital-based assessment of the efficacy of prophylactic antibiotic usage to that of regular antibiotics usage in patients undergoing elective caesarean section: A comparative study

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Abstract
Aim: This study was planned to assess the efficacy of prophylactic antibiotic usage to that of regular antibiotics usage in patients undergoing elective surgeries.
Material and Methods: A comparative Prospective study was conducted in the Department of obstetrics and gynaecology, Mamata Academy of Medical Sciences, Bachupally, Hyderabad, India for the period of 2 years. Total 200 Patients for elective LSCS and BMI < 30 were include in this study. Group A - patients received injection Ceftriaxone 1gm. intravenous stat at the time of induction of anesthesia. Group B - patients received intravenous ampicillin and metronidazole for 1 day followed by oral for next 5 days. Temperature monitoring, vital signs, abdominal, perineal examinations were performed daily till 5-7 days.
Results: Patients were randomly divided on alternate number basis, in 2 groups (Group A Ceftriaxone 1gm iv stat and Group B ampicillin and metronidazole for 5 days) each consisted of 100 patients. Mean age was 24.5±4.2 years in group A & 23.4±3.8 years in group B. BMI at the time of admission was 27.9±7.8 kg/m² & 28.8± 6.2 kg/m² in group A & B respectively. Mean duration of surgery was 45.8±6.8 min in group A & 46.1±5.4 in group B. Average blood loss was in groups A 645±70 & 670±75 in group B was comparable. Mean days of hospitalisation was 4.6±4.1 days & 5.4±3.1 days in group A & B respectively. History of previous laparotomy like LSCS, ectopic surgery, etc. was present in 42 & 36 patients from group A & B respectively. Fever was most common morbidity noted (Group A – 7& Group B -5) followed by urinary tract infection (Group A – 5 & Group B -7), wound infection, endometritis & early neonatal sepsis. Statistical difference between group A & B was non-significant for all morbidities.
Conclusion: We conclude that the single dose antibiotic prophylaxis is as effective as conventional multi dose antibiotic therapy.

Keywords: Prophylactic antibiotic, cesarean delivery, ceftriaxone, ampicillin and metronidazole

Introduction
A caesarean delivery (CD) increases a woman's risk of infection by a factor of 5–20 compared to giving birth naturally. Infectious complications following CD contribute significantly to maternal morbidity and lengthen the duration and expense of hospitalization [1]. Fever, wound infection, endometritis, urinary tract infection, and more severe consequences including pelvic abscess, septic shock, and septic pelvic vein thrombopheblitis are all examples of infectious complications that can arise after CD. Long-term post-operative combinations of antibiotics have been shown to be just as effective as preventive single-dose antibiotics [2].
Infection after a cesarean section typically originates in the vaginal system, especially if the membranes were broken. Pathogens such as *E. coli*, other gram-negative aerobic rods, group B streptococcus, Staphylococcus aureus and coagulase-negative staphylococci, *Enterococcus faecalis*, *Gardnerella vaginalis*, anaerobes, and genital mycoplasma are frequently isolated due to the multimicrobial nature of most infections [3, 4]. Antibiotics are not given to kill all bacteria during surgery; rather, they are used as a supplement to bring the microbial burden down to a manageable level for the body's immune system. Antibiotic treatment is successful if a high enough tissue level is reached at the time of microbial infection, and the best agent will be durable, cheap, and side effect free [5, 6].
In both high- and low-risk patients, antibiotic prophylaxis before cesarean birth has been shown to reduce infection morbidity after the procedure [5].

The risk of infection can be reduced by more than half, from a baseline of as high as 20-50%, with the frequent use of prophylactic antibiotics. A single dosage of antibiotics is as effective as numerous doses administered peri-operatively [7, 8]. Statistically, the incidence of surgical and non-surgical infections, as well as endometritis, was lower when broad-spectrum antibiotics were used. When broad-spectrum antibiotics were taken, patients spent much less time in the hospital overall. 8 Compared to aminoglycosides, the serum level to minimum inhibitory concentration ratio of the third-generation cephalosporin ceftriaxone is substantially greater. In comparison to first- and second-generation cephalosporins, ceftriaxone showed improved coverage of gram-negative pathogens and some anaerobic coverage [9]. Ceftriaxone can be given to pregnant women and their newborns without adjusting the dosage for their kidney or liver function. After the patient has been fever-free for 24 to 48 hours, the parenteral antibiotics should be tapered off and the patient given oral antibiotics to finish the full 14 days of treatment. When the option is there, patients should be shifted to antibiotics selected for their specific culture and sensitivity needs. In light of these considerations, the purpose of this study was to evaluate the relative benefits of preventive vs routine antibiotic use in patients having elective major gynecological or obstetrical procedures.

Material and methods

A comparative study was conducted in the Department of obstetrics and gynaecology, Mamata Academy of Medical Sciences, Bachupally, Hyderabad, India, for the period of 2 years, after taking the approval of the protocol review committee and institutional ethics committee.

Methodology

Total 200 Patients for elective LSCS and BMI < 30 were include in this study. Women who had suspected hypersensitivity, cephalosporins Any co-existing diseases like diabetes mellitus, hypertension or cardiac problem, Surgical procedure exceeding more than 90 minutes and if and blood loss was more than 1500ml were exclude from study. The technique, risks, benefits, results and associated complications of the procedure were discussed with all patients. All patients were informed regarding the study and their consent was obtained.

Baseline assessment including vital signs, general physical, systemic and obstetric examination were performed.

Routine blood (CBC, RBS, RFT) and urine analysis & if required urine culture and sensitivity, high vaginal swab culture and sensitivity were carried out.

Patients were randomly divided in 2 groups (Group A and Group B) each consisted of 100 patients. Group A - patients received injection Ceftriaxone 1gm. intravenous stat at the time of induction of anesthesia. Group B - patients received intravenous ampicillin and metronidazole for 1 day followed by oral for next 5 days. Temperature monitoring, vital signs, abdominal, perineal examinations was performed daily till 5-7days. If body temperature was more than 101^0 F on 2 occasions 4 hours or more apart, excluding the night of surgery, it was considered as febrile morbidity and appropriate investigations were performed including urine culture, blood culture, high vaginal swab culture before starting appropriate multi dose antibiotics. Wound was inspected for superficial or deep infection, any pus discharge, surgical site abscess formation, wound dehiscence, vault haematoma and pelvic abscess. At discharge, patients were instructed to contact if they have any signs and symptoms of infection. All patients were followed up to 3 months at monthly intervals.

Results

Patients were randomly divided on alternate number basis, in 2 groups (Group A Ceftriaxone 1gm iv stat and Group B ampicillin and metronidazole for 5 days) each consisted of 100 patients. Mean age was 24.5±4.2 years in group A & 23.4±3.8 years in group B. BMI at the time of admission was 27.9±7.8 kg/m² &28.8± 6.2 kg/m² in group A & B respectively. Mean duration of surgery was 45.8±6.8 min in group A &46.1±5.4 in group B. Average blood loss was in groups A 645±70& 670±75 in group B was comparable. Mean days of hospitalisation was 4.6±4.1 days & 5.4±3.1 days in group A & B respectively. History of previous laparotomy like LSCS, ectopic surgery, etc. was present in 42&36 patients from group A & B respectively. Fever was most common morbidity noted (Group A – 7& Group B -5) followed by urinary tract infection (Group A – 5& Group B -7), wound infection, endometritis & early neonatal sepsis. Statistical difference between group A & B was non-significant for all morbidities. One patient from each group required resuturing. No mortality was noted in present study.

Table 1: Demographic Profile of the Patients

Parameter	Group A	Group B
Mean age in years	24.5±4.2	23.4±3.8
BMI in kg/m²	27.9±7.8	28.8± 6.2

Table 2: Characteristics of patients in two surgical groups

Characteristics of patients	Group A	Group B
Mean duration of surgery (min)	45.8±6.8	46.1±5.4
Mean blood loss (ml.)	645±70	670±75
Mean days of catheterisation	1.1	1.2
Mean days of hospitalisation (days)	4.6±4.1	5.4±3.1
History of previous laparotomy	42	36

Discussion

Antimicrobial prophylaxis is most effective when the kind of bacteria present at a given place is known.[10]No global study of antibiotic prophylaxis in the low-risk category, i.e., the patient undergoing aseptic surgery, has been conducted. Patients who are at high risk for infection (those who have recently undergone procedures like a prosthetic implant or colorectal surgery, for example) are encouraged to take preventive antibiotics.[11] Repeat caesarean section, emergency caesarean section, length of surgery > 60 minutes, prolonged labor, excessive blood loss during labor, delivery, or surgery, and failure to follow proper steps for wound care after leaving the hospital are all factors that increase the risk of post-caesarean section infection. Consequences of SSIs include higher morbidity and mortality, as well as the need for further operations, worse quality of life, longer periods of antibiotic treatment and rehabilitation, and missed time at work. Because of the longer hospital stays and higher readmission rates that follow SSIs, they also place a significant financial strain on the healthcare system. Improved hygiene, aseptic surgical procedures, carrier screening, decolonization, administration of antibiotics to the surgical site prior to wound closure, and intravenous antibiotic prophylaxis are the current measures targeted at avoiding SSIs.[12,13] Prophylactic antibiotics were being given after cord clamping at several facilities, preventing them from entering the foetal circulation. Administration of the medicine after cord clamping was motivated by fears of covering up evidence of sepsis in new borns, of the spread of antibiotic resistance, and of undetected pathogens in blood cultures. Giving the antibiotic before skin

incision, however, has been shown in recent research to drastically reduce the occurrence of maternal infection without harming the infant [14, 15]. Data from systematic reviews and meta-analyses show that antibiotic prophylaxis with a single dosage is effective for both abdominal and vaginal hysterectomy. Recent recommendations and articles demonstrated that single dose antibiotic prophylaxis is equally beneficial in clean, and clean contaminated, surgical operations, challenging the long-held belief that perioperative antimicrobial prophylaxis is necessary for safe and successful surgical outcomes [16]. Wound infections after elective surgery are less common in people who are given antibiotics perioperatively (within 3 hours after skin incision) than in those who are given antibiotics within the 2 hours prior to skin incision (0.6% vs 1.4%) [16]. Due to the lack of statistical significance between the two groups, it may be concluded that a single dosage of antibiotics is just as effective as the standard 5-day treatment. There are less unintended consequences for patients, less administrative burden, etc. In low-resource settings, it is beneficial to adopt the practice of administering a single dosage of antibiotic prophylaxis due to its lower cost and less workload [17]. Among the complications associated with C-sections, Ansari N *et al*. [15] observed that fever episodes occurred in 4% of patients, whereas Endometritis and wound infection occurred in 2% of cases. Mudholkar AS [19] did not uncover any cases of endometritis, however wound infection episodes occurred in 0.93 percent of patients. In all groups, fever was the leading cause of illness. Other frequent complications were urinary tract infections, wound infections, endometritis, and early neonatal sepsis.

Conclusion

We conclude that the single dose antibiotic prophylaxis is as effective as conventional multi dose antibiotic therapy. It is cost effective, antibiotic resistance of microorganisms can be prevented, reduces patient side effects, nursing staff work. Further knowledge of antibiotic susceptibility and resistant strains is to be considered while choosing antibiotic.

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