

Comparative Study of Amoxicillin and Multiple Antibiotics in Caesarean Section

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Abstract

Original Research Article

Background: Prophylactic antibiotic usage is important for preventing surgical site wound infections and related complications following caesarean delivery, which can lead to maternal morbidity, prolonged hospital stays, and increased treatment costs. Despite the recommendation for a single dose of preoperative antibiotic prophylaxis, clinicians are hesitant to adopt this approach due to variations in patient characteristics and concerns about aseptic techniques. **Objective:** To compare the efficacy of a single-antibiotic regimen versus multiple antibiotics in caesarean section procedures. **Materials and Methods:** It was a randomized clinical trial study. It was carried out in Obs and Gynae, North East Medical College, Sylhet, Bangladesh during the period of January 2022 to June 2022. The study included pregnant women above 34 weeks of gestation admitted to the hospital undergone elective or emergency caesarean delivery for singleton pregnancy. Total 92 sample patients with 46 patients in each group. Study involved two groups. Group A received Amoxicillin single antibiotic. Group B received multiple antibiotics. Statistical data calculations were done using Statistical Package for the Social Science (SPSS Inc., Version 25.0, Chicago, IL, USA) and Chi-square test was done. The p-value <0.05 was considered significant. **Results:** There were 46 patients in each group. Baseline characteristics, indications for caesarean delivery, duration of operation, duration of hospital stay and difficulties were similar. Post-operative morbidities like wound infection did not differ significantly ($P>0.05$). None of the women needed prolong hospital stay. **Conclusion:** The current study found no statistically significant difference in the outcome measures among the two study groups receiving different prophylactic regimens for caesarean delivery. Therefore, it can be concluded that both single and multiple antibiotics provide equally effective protection in reducing maternal infectious morbidity. Additionally, the single antibiotic regimen was found to be more cost-effective. In conclusion administration of only Amoxicillin as prophylactic in caesarean section is both cost-effective and efficient in reducing maternal infectious morbidity.

Keyword: Amoxicillin, SSI, multiple, caesarean section.

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INTRODUCTION

Cesarean delivery is a crucial procedure that can save lives and improve outcomes for both mothers and newborns, when performed appropriately. Although the World Health Organization (WHO) recommends an optimal cesarean rate of 10-15%, the rates are on the rise in both developed and developing countries [1]. However, like any surgical intervention, cesarean delivery can have undesirable effects such as postoperative infections. Surgical site infections (SSI) are common and can result in short and long-term complications, affecting both the skin and uterine incisions. SSI following cesarean delivery is a leading cause of morbidity and mortality, leading to longer

hospital stays, increased hospital costs, and reduced patient satisfaction [2].

Medical researchers have become interested in investigating the most effective way to prevent post-surgery complications, particularly infections, due to the rising rates of cesarean sections. Antibiotic prophylaxis is being studied as a potential solution, with three main areas of interest being examined for evidence. One of these areas is the timing of antibiotic administration [1].

Antibiotics are widely prescribed medications globally. They are substances created by microorganisms that can suppress the growth of or eliminate other microorganisms at low concentrations.³ Antibiotics are

effective in treating various infections and have significantly contributed to extending human life expectancy and improving its quality. However, it has been noted that in many cases, antibiotics are either unnecessary or used inappropriately in terms of the specific drug prescribed [4].

The inappropriate use of antibiotics has led to the emergence of antibiotic resistance, which has become a significant problem in developing countries. In addition to resistance, it also increases the cost of treatment, improper use of drugs, and raises mortality and morbidity rates, adverse effects, and prolonged hospital stays. Therefore, the rational use of antibiotics plays a crucial role. Rational use of drugs entails prescribing the right drug to the right patient, at the correct dose and dosage form, and for the appropriate duration of time. The World Health Organization (WHO) defines rational use of drugs as "patients receiving medicines appropriate for their clinical needs, in doses that meet their individual requirements, for an adequate period of time and at the lowest cost to them and their community." [5]. Antibiotics are used not only to treat diseases but also to prevent post-surgical wound infections, which are a major cause of morbidity and mortality in surgical patients. Although aseptic techniques are employed during surgery, bacterial infection cannot be completely eliminated, and thus, antibiotics are prescribed [3].

Several antibiotics have been proposed for use as prophylactic coverage in obstetric patients undergoing caesarean section, either alone or in combination. In caesarean section procedures, prophylactic antibiotics are traditionally administered in a single-dose regimen. However, due to inconsistencies in use, a thorough literature review has been deemed necessary [6]. An ideal prophylactic regimen should be clinically effective, provide broad-spectrum coverage against infectious

organisms, be affordable, well-tolerated, and not lead to antibiotic resistance. In recent times, the patients use of antibiotics has contributed to financial burdens, a high incidence of resistance, and suboptimal treatment, necessitating the development of a standard regimen to reduce antibiotic misuse, avoid patient discomfort, and prevent undesirable side effects ranging from mild nausea to severe drug reactions [7]. Given current needs, highly effective and cost-efficient prophylactic measures are needed. Accordingly, this study aimed to compare the efficacy of a single-antibiotic regimen versus multiple antibiotics in caesarean section procedures.

MATERIALS AND METHODS

It was a randomized clinical trial study. It was carried out in Obs and Gynae, North East Medical College, Sylhet, Bangladesh during the period of January 2022 to June 2022. The study included pregnant women above 34 weeks of gestation admitted to the hospital undergone elective or emergency caesarean delivery for singleton pregnancy. Total 92 sample patients with 46 patients in each group. Study involved two groups. Group A received Amoxicillin single antibiotic prior to commencement of surgery than continued for total 7 days. Group B received multiple antibiotics prior to commencement of surgery. Primary outcome measured were postoperative infectious. All caesarean sections were done under spinal anaesthesia. All caesareans were done by consultant obstetricians. Prior to surgery, the abdomen was painted with povidone-iodine solution. Statistical data calculations were done using Statistical Package for the Social Science (SPSS Inc., Version 25.0, Chicago, IL, USA) and Chi-square test was done. The p-value <0.05 was considered significant.

RESULTS

Table 1: Age distribution of study subjects (n=92)

| Age in years | Amoxicillin (n=46) | | Multiple antibiotic (n=46) | | P value |
|--------------|--------------------|------|----------------------------|------|---------|
| | No | % | No | % | |
| ≤20 | 2 | 4.3 | 2 | 4.3 | 0.264 |
| 21-30 | 34 | 73.9 | 29 | 63.0 | |
| 31-40 | 8 | 17.4 | 9 | 19.6 | |
| 41-50 | 2 | 4.3 | 6 | 13.0 | |
| Mean±SD | 30.80±6.11 | | 30.91±8.52 | | |

Table 2: Educational status of the study subjects (n=92)

| Educational status | Amoxicillin (n=46) | | Multiple antibiotic (n=46) | | P value |
|--------------------|--------------------|------|----------------------------|------|---------|
| | No | % | No | % | |
| Illiterate | 13 | 28.3 | 12 | 26.1 | 0.572 |
| Primary | 18 | 39.1 | 19 | 41.3 | |
| SSC | 9 | 19.6 | 8 | 17.4 | |
| HSC | 4 | 8.7 | 6 | 13.0 | |
| Graduate | 2 | 4.3 | 1 | 2.2 | |

Table 3: Socio-economic status of the study subjects (n=92)

| Socio-economic status | Amoxicillin (n=46) | | Multiple antibiotic (n=46) | | P value |
|---|--------------------|------|----------------------------|------|---------|
| | No | % | No | % | |
| Low income: BDT <6821.16 | 16 | 34.8 | 15 | 32.6 | 0.487 |
| Lower middle income: BDT (6827.75 – 26851.98) | 25 | 54.3 | 24 | 52.2 | |
| Upper middle income : BDT (26858.64 – 83018.21) | 3 | 6.5 | 4 | 8.7 | |
| High income : BDT ≥ 83024.87 | 2 | 4.3 | 3 | 6.5 | |

Table 4: Comorbidity of the patient (n=92)

| Comorbidity | Amoxicillin (n=46) | | Multiple antibiotic (n=46) | | P value |
|----------------|--------------------|------|----------------------------|------|---------|
| | No | % | No | % | |
| None | 29 | 63.0 | 31 | 67.4 | 0.264 |
| HTN | 5 | 10.9 | 8 | 17.4 | |
| DM | 3 | 6.5 | 6 | 13.0 | |
| Anaemia | 0 | 0.0 | 1 | 2.2 | |
| Hypothyroidism | 4 | 8.7 | 3 | 6.5 | |
| GDM | 6 | 13.0 | 4 | 8.7 | |
| Preeclampsia | 2 | 4.3 | 1 | 2.2 | |
| HBsAg+ve | 1 | 2.2 | 1 | 2.2 | |
| BA | 1 | 2.2 | 2 | 4.3 | |

Table 5: Indication of operation of the patient (n=92)

| Indication of CS | Amoxicillin (n=46) | | Multiple antibiotic (n=46) | | P value |
|--|--------------------|------|----------------------------|------|---------|
| | No | % | No | % | |
| Previous H/O C/S | 21 | 45.7 | 19 | 41.3 | 0.461 |
| Prolong 1 st stage with foetal distress | 14 | 30.4 | 11 | 23.9 | |
| PROM | 6 | 13.0 | 7 | 15.2 | |
| Term pregnancy with GDM | 3 | 6.5 | 4 | 8.7 | |
| Term pregnancy with pre-eclampsia | 2 | 4.3 | 3 | 6.5 | |
| Placenta previa | 2 | 4.3 | 2 | 4.3 | |
| Term pregnancy with oligohydramnios | 2 | 4.3 | 1 | 2.2 | |
| IUFD | 1 | 2.2 | 1 | 2.2 | |
| IUGR | 1 | 2.2 | 1 | 2.2 | |
| Eclampsia | | | | | |

Table 6: Infection of the patient (n=92)

| Infection | Amoxicillin (n=46) | | Multiple antibiotic (n=46) | | P value |
|-----------------|--------------------|------|----------------------------|------|---------|
| | No | % | No | % | |
| None | 45 | 97.8 | 44 | 95.7 | 0.557 |
| Wound infection | 1 | 2.2 | 2 | 4.4 | |

Table 7: Hospital stay of the patient (n=92)

| Age in years | Amoxicillin (n=46) | | Multiple antibiotic (n=46) | | P value |
|--------------|--------------------|------|----------------------------|------|---------|
| | No | % | No | % | |
| <7 | 44 | 95.7 | 43 | 93.5 | 0.646 |
| ≥7 | 2 | 4.3 | 3 | 6.5 | |
| Mean±SD | 3.45±1.31 | | 3.73±1.43 | | |

DISCUSSION

Postoperative wound infection and dehiscence is a great concern for surgeons. Despite advancements in surgical techniques and accessibility of surgery, the

rising incidence of wound dehiscence has been a setback. Various internal factors, such as diabetes, hypertension, suturing practices, suture method, and external factors related to wound care, can impact the intricate process of

wound healing. The incidence of post-caesarean wound infection and the independent risk factors associated with it have been examined retrospectively [8].

This study proves that single prophylactic Amoxicillin is as effective as multiple drug, multiple dose antibiotic regimen of caesarean section at low risk for infection, even in the low socioeconomic rural population with educational served at our hospital. Prophylactic antibiotics have been recommended by many research workers [9]. The study findings of this research were discussed and compared with previously published relevant studies.

Preoperative short course prophylactic antibiotic coverage before obstetric procedure such as caesarean section is known to reduce incidence of endometritis and wound infection and has also proved to be cost-effective due to decrease in patient morbidity and duration of hospital stay [7]. Hopkins L and Smaill F in the Cochrane review evaluated several multicentre trials, different antibiotics used for prophylaxis based on the route of administration and the number of doses and concluded that the benefits incurred from single or multiple dose regimen were similar and posed no added benefits [10]. A single vs multiple dose antibiotic given preoperatively provide similar benefits in terms of decreasing postoperative infectious morbidity [1-6]. Similar results were demonstrated from present study where three different regimen provided similar benefit to the patient on postoperative complications.

Pinto-Lopes *et al.*, [6], study presented no significant difference in occurrence of wound infection and duration of hospital stay due to variability in single vs multiple dose regimen which mirrors the result of present study.

Febrile morbidity, surgical site infection, and urinary infection are common postoperative infectious complications that can result in prolonged hospital stay and treatment cost. Previous studies have reported an incidence of 5%, 6.5%, and 6.5% for febrile morbidity [11-13]. For caesarean delivery, the incidence of surgical site infection ranges from 3% to 15% with a mean of 6%. In the current study, the incidence of surgical site infection was 2.2% in the single antibiotic (Amoxicillin) group and 2.2% in the multiple antibiotic group. These findings are consistent with previous studies [1-9].

Previous studies by Shakya *et al.*, McMurray *et al.*, and Williams N *et al.*, reported the incidence of UTI to be 3.5% and 2%, respectively [11-13]. Infectious complications can increase hospital stay and cause psychological distress to patients. In our study, mean hospital stays for non-infectious and infectious patients were 1 to 7 days, respectively, while Ziogos E *et al.*, [16], reported an average stay of four days. In developing countries such as India and Nepal, patients are often

responsible for medical expenses, making the cost of hospital stays a significant concern. Kayihura V *et al.*, [17], found that a single antibiotic prophylaxis regimen cost only one-tenth of the cost incurred by a multiple antibiotics regimen.

CONCLUSION

The results of this study indicate that using multiple antibiotics does not offer any additional advantages when compared to using a single antibiotic for prophylaxis. Additionally, single antibiotic prophylaxis is significantly less expensive than multiple antibiotics and is equally effective in reducing complications and hospitalization time. These findings should provide reassurance to surgeons regarding the effectiveness of recommended prophylactic antibiotics for caesarean section.

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