



ORIGINAL RESEARCH PAPER

Obstetrics & Gynaecology

PREVENTION OF POST OPERATIVE INFECTIONS IN EMERGENCY CAESAREAN SECTIONS: ROLE OF SURGICAL BUNDLE AND VAGINAL CLEANING

KEY WORDS:

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ABSTRACT

Introduction: Caesarean section (CS) is one of the commonest surgical procedures performed in obstetrics. Postoperative infectious complications including surgical site infections (SSI) are a cause of significant morbidity after CS as compared to vaginal delivery.

Aim: To assess the role of application of surgical bundle and vaginal cleaning before caesarean section in preventing postoperative infectious complications.

Design: Prospective randomised interventional study.

Place and duration of study: Department of Obstetrics and Gynaecology, Jawaharlal Nehru Medical College and hospital, Aligarh from November 2016 to October 2018.

Methodology: Total of 216 patients undergoing emergency CS in the hospital was enrolled in the study. Patients were kept in 2 groups. In group 1, women undergoing emergency C-Section whom conventional preoperative preparation was done using savlon-povidone iodine as skin antiseptic and a 7 day postop prophylactic antibiotic regime was administered. In group 2, surgical bundle and vaginal cleaning was done but postop prophylactic antibiotic regime was reduced to 3 day

Results: Overall, SSIs were most common infectious morbidity in both groups with highest incidence in group 1 (14.7%) and lower in group 2 (7.01%), and the difference was statistically significant. Rates of endometritis, UTI and URTI were similar among 2 groups. Duration of hospital stay was lower for group 2 (6.43+ 3.29 days). No Significant association was noted between haemoglobin levels <8g/dl and number of >4 vaginal examinations with risk of development of SSI (p<0.05).

Conclusion: Bundled approach including vaginal cleaning has decreased the incidence of SSIs after emergency CS but larger clinical studies are needed to prove the definite role.

INTRODUCTION

Caesarean section (CS) is one of the most common surgical procedures performed in obstetrics. Despite of its implications there has been an unprecedented rise in the incidence of this procedure worldwide in the last few decades.

Postoperative complications are a cause of significant maternal and fetal morbidity after CS. Overall maternal morbidity rates increase twofold with caesarean delivery, mainly due to infection, haemorrhage, thromboembolism and adjacent organ injury¹. Infectious complications contribute to 5-20 fold increase following caesarean delivery as compared to vaginal delivery²⁻⁶ with fever, endometritis, wound infection and UTI as the major contributors^{7,8}

Surgical site infections (SSI), which occur in the wound created by any invasive surgical procedure reflects an important cause of infectious morbidity. Thus, post caesarean SSI is common in obstetrical scenarios, specifically in emergency caesareans⁹. These infections affect a woman's physical and mental health and so all preventive measures should be directed to improve a woman's quality of life.

Surgical site infections are graded as superficial, deep and organ and space infection. Superficial infections include skin and subcutaneous tissue; deep infections include fascia and muscular layer. Organ and space infection constitute the one in which any organ or space is infected.

Risk reduction of SSI post-surgery is of prime concern and so multiple evidence-based interventions were proposed by the

Institute of Healthcare Improvement (IHI) known as care bundles. Care bundles are collective and systematic strategies implemented to prevent SSI with potential to improve patient outcome. Individual intervention may vary between different bundles but success depends on application of all measures consistently and persistently in a bundle. Optimal care bundle includes maintaining normothermia, glycaemic control, timely and appropriate administration of antibiotic and clipping of hair. These are the core elements of care bundle and apart from it further additions can be made which may be synergistic or neutral.

With the view of reducing SSI we planned a study to assess the role of application of surgical bundle and vaginal cleaning with antiseptic solution in prevention of postoperative infectious morbidities after emergency CS.

MATERIALS AND METHOD

This was a prospective randomized interventional study, conducted in the Department of Obstetrics and Gynaecology, Jawaharlal Nehru Medical College and Hospital, Aligarh from November 2016 to October 2018. Patient selection was based on following criteria:

INCLUSION CRITERIA

- Patients undergoing emergency caesarean section with no recent injury or active infection in the area being operated.

EXCLUSION CRITERIA

- Patients with history of allergy to antimicrobial agent.
- Patients requiring dose adjustment of antibiotic- chronic

renal disease or liver disease or any other medical comorbidity.

- Patients having chorioamnionitis or any other pre-operative infectious disease at time of making decision of caesarean section.
- Patients had any other surgical procedure requiring spinal anaesthesia or general anaesthesia within 1 month prior to caesarean section.

Total of 216 patients were enrolled and were kept in 2 groups made over consecutive periods of 6 months with reduction of number of days of prophylactic antibiotics.

Group 1 (102): women undergoing emergency CS on whom only conventional preoperative preparation was done using savlon-povidone iodine as skin antiseptic and a 7-day postop prophylactic antibiotic regime was administered.

Group 2 (114): surgical bundle and vaginal cleaning was done postoperatively prophylactic antibiotic regime was reduced to 3 days.

Surgical bundle consisted of intravenous antibiotic administration 15-60 min prior to skin incision, hair clipping in those who required, skin prepping using 2% chlorhexidine gluconate solution, vaginal cleaning with povidone iodine and maintenance of normothermia and euglycemia intra- and post operatively.

All patients were examined daily during hospitalization. In presence of adequate wound healing and absence of signs and symptoms of any infection, patients were discharged from hospital on day 4 or day 5. Stitch removal was done on day 9 or day 10. Subsequently patients were examined after 6 weeks postpartum.

In presence of any clinical features suggestive of an infectious morbidity, patients were examined for presence of fever, urinary tract infections (UTI), upper respiratory tract infection (URTI), wound discharge, induration or dehiscence, endometritis and pelvic abscess. SSIs were classified according to CDC criteria. Further investigations and appropriate management was done accordingly.

Rates and types of infectious complications were noted and data was entered into Excel and cleaved, then transferred to SPSS version 25 for analysis. Descriptive statistics was done by percentages and mean ±SD and inferential statistics was applied using chi square and fisher exact test. P-value < 0.05 was considered significant.

RESULTS

The prospective study was carried out on 216 patients who underwent emergency CS. All were randomised in 2 study groups. Both the groups were similar with respect to distribution of age, gravidity, socioeconomic status, OPD booking status, BMI, haemoglobin levels, time of rupture of membranes and indications of CS (p>0.05).

In our study, most common infection was SSI (table 1) with incidence of 15.70% in Group 1, and 7.01% in Group 2. The infection was lower in Groups 2 in which care bundle was applied as compared to Group 1, the difference was statistically significant. Febrile morbidity (fever>100.4F) occurred in 9.80% in Group 1, 4.38% in Group 2. The febrile morbidity was lower in Group 2, as compared to Group 1 however, the difference was statistically insignificant in both the groups. Rates of endometritis, UTI and URTI remained almost similar.

Regarding CDC category of SSI (table 2), most frequent were superficial incisional SSI with incidence of 6.14% in Group 2 and 13.74% in Group 1. The difference was, however, not statistically significant. The incidence of SSI, mainly

superficial incisional SSI and febrile morbidity was lower in Group 2 which was given 3 day antibiotic post-operatively as compared to Group 1 in which 7-day antibiotic was given.

Table 1- showing incidence of infectious complications in different study groups

Table No. 1: Incidence Of Infectious Morbidities

	Group 1 N= 102		Group 2 N= 114		P value
	number	%	number	%	
fever	10	9.8	5	4.3	0.117
SSI	16	15.6	8	7.0	0.042
Endo	1	0.9	1	0.8	0.936
UTI	2	1.9	2	1.7	0.910
URTI	2	1.9	1	0.8	0.496

Table No.2: Incidence Of Different Types Of Ssi

	Group 1 N=102		Group 2 N=114		P value
	number	%	number	%	
Superficial	14	13.7	7	6.1	0.06
Deep	1	0.9	0	0	-
Organ specific	1	0.9	1	0.8	-

Most common presentation of SSI was purulent discharge from wound which occurred in 85.3% of patients. Maximum number of infections were noted on post-operative day 5 and day 6. Most common pathogen isolated from pus culture swab from surgical wound was Staphylococcus aureus (36.5%) including 4 cases of MRSA followed by Citrobacter species.

Most patients in both the Groups were discharged within 10 days. Lowest average duration of hospital stay was 6.43±3.29 days, noted in Group 2.

Table 3: Incidence Of Various Infectious Morbidities According To No. Of Vaginal Examination

	Group 1 N=102		Group 2 N=114	
	<4 pv	>4 pv	<4 pv	>4
SSI	5	11	1	7
Endometritis	0	1	0	1
Fever	4	6	2	3
UTI	0	2	0	2
URTI	0	2	0	1

In our study, significant association between haemoglobin levels <10 g/dl and >4 vaginal examinations (tables 3 & 4) was not noted although the infectious morbidities were more in the group with decreased Hb levels and greater than 4 per vaginal examinations. No association was observed with specific age group, booking status, socio-economic class, BMI and time of ruptured membranes (p>0.05).

Table 4: Incidence Of Infectious Morbidity According To Haemoglobin Level

	Group 1 N=102		Group 2 N=114	
	No.	%	No.	%
	6-9.9	≥10	6-9.9	≥10
SSI	10	6	6	2
Endometri	1	0	1	0
Fever	7	3	3	2
UTI	2	0	2	0
URTI	2	0	1	0

DISCUSSION

Post-operative infectious morbidity varies in incidence due to difference in population characteristics, associated risk factors, proper use of preoperative procedures and adequate post op surveillance for SSI and other sources of infections.

Among all known practices, application of surgical bundle has considerably affected the incidence of SSI¹⁰. Use of single dose prophylactic antibiotic is recommended by WHO as a

part of care bundle¹¹. Injudicious use of antibiotics is practiced among 25-50% of cases, in the form of overuse or underuse.¹²

In our study we created 2 groups where on one end a group was formed where along with surgical bundle post op antibiotic was given for 7 days and the other group had all the core elements of surgical bundle with a 3 day post op antibiotic course with vaginal cleaning.

Incidence of febrile morbidity was 9.8% in Group 1, 4.3% in Group 2, which was lower in comparison to the first group.

Incidence of SSI, in our study, was 15.6% in Group 1, 7.01% in Group 2 which was statistically significant. RonghuaLiet al in a study with 7 day post op antibiotic similar to group 1 suggested SSI rate of 8%¹³. A study conducted in Telangana¹⁴ reported 9.18% incidence of SSI, after emergency caesarean section in which post-operative antibiotics were given for 7 days. Clayton et al¹⁵ in their study compared the rate of SSI after 3 day vs 1 day post op antibiotic and found the rates lower in the first group.

To prevent the infection from establishing there is a decisive period when the defence system of the body tries to contain the infection, and interventions post that period is of little benefit to the patient. Presence of minimum inhibitory concentration of antibiotic in the tissues at the time of invasion of the bacteria is required and so preoperative antibiotic prophylaxis plays crucial role. Post operatively how long the antibiotics should be continued is debatable

In this study we have tried to compare the effectiveness of the two regimens that is 7-day vs 3-day antibiotic course in preventing post op infections. Our results clearly suggest that 3-day antibiotic regimen is better at preventing SSI in concordance with few studies conducted to compare benefits of prolongation of antibiotic course^{16,17} which concluded no added benefit.

In our study, superficial incisional SSI was more common in both the groups. The incidence of deep incisional SSI and organ SSI (endometritis) was less than 1% in group1 and no patient developed deep incisional SSI or endometritis in Group 2. A study conducted to evaluate the role of antibiotic prophylaxis suggested preoperative prophylaxis to be the most beneficial irrespective of the duration of post op antibiotic in preventing endometritis.¹⁸ Despite the duration and timing of antibiotics the risk of SSI and endometritis still persists and therefore in addition to antibiotic prophylaxis vaginal cleaning with the help of povidone iodine or chlorohexidine solution can further reduce the chances of these post op infections as it reduces the bacterial load in the genital tract¹⁹. In our study we used vaginal prepration with povidone iodine in second group in addition to 3 day antibiotic course, and the incidence of endometritis was lower than first group but not statistically significant. Another study showed significant reduction in incidence of endometritis post vaginal prepration.²⁰ Mady et al showed significant reduction in endometritis with almost no effect on fever and SSI²¹. Thus vaginal prepration should be included in preop procedures to reduce post op infections mainly endometritis.

Certain other parameters were included in the study to assess their impact on post op infections. In the present study, significant association was noted between haemoglobin levels <10 g/dl and >4 vaginal examinations in both the groups separately with risk of development of SSI (p<0.05). No association was observed with specific age group, booking status, socio-economic class, BMI and time of ruptured membranes (p>0.05). These findings were supported in other studies^{14,17-19}.

CONCLUSION

Infectious morbidities after CS impose a major women health challenge. It is important to prevent these complications by implementing appropriate measures. Present study shows that application of surgical bundle with 3 day postoperative antibiotic regimen and vaginal cleaning can reduce postop infectious complications. Prolonging the duration of antibiotics post operatively does not provide any added benefit but on contrary can lead to increased bacterial resistance, increased hospital stay and increased economic burden. Further vaginal cleaning has proven benefits in reducing post op infections which is supported by our study. Further trials are required to assess the necessity of 3 day antibiotic regimen and its effectiveness to reduce infectious morbidities.

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