Effect of Pre-Operative Vaginal Cleansing on Surgical Site Infections Post Caesarean Delivery

Received: 22 August 2022, Revised: 18 September 2022, Accepted: 23 October 2022

Anshul Tripathi

Senior Resident Department of Obstetrics and Gynaecology, Santosh Medical College and Hospital Santosh deemed to be university, Ghaziabad

Vaishali Gautam

Senior Resident Department of Obstetrics and Gynaecology, Santosh Medical College and Hospital Santosh deemed to be university, Ghaziabad

Manisha Gupta

Professor Department of Obstetrics and Gynaecology, Santosh Medical College and Hospital Santosh deemed to be university, Ghaziabad

Neelima Agarwal

Professor Department of Obstetrics and Gynaecology, Santosh Medical College and Hospital Santosh deemed to be university, Ghaziabad

Alpana Agrawal

Professor Department of Obstetrics and Gynaecology, Santosh Medical College and Hospital Santosh deemed to be university, Ghaziabad

Corresponding author: Dr. Anshul Tripathi

Phone No. 9717331612 Email.id – anshultripathi1995@gmail.com

Keywords

SSI, Pre-operative vaginal cleansing, Caesarean section

Abstract

Background: As rate of caesarean section is increasing alarmingly, so are its complications. The most common complication being "surgical site infections (SSIs)". Infections following surgery, close to or at the site of the incision, or deeper underlying tissue spaces and organs within 30 days of a surgical procedure are referred to as SSIs. The aim of this study was to determine the effect of pre-operative vaginal cleansing in prevention of post-operative SSIs and hence reducing post-operative morbidity and hospital stay.

Methods: This was a prospective interventional cohort study which was conducted on all the pregnant women undergoing caesarean section at our institute, either emergency or elective who met the inclusion criteria. It was done over a period of 2 months, which included a total of 200 women. These women were allocated in two groups by randomization.

All the women in group A (interventional group) underwent pre-operative vaginal cleansing with 5% povidone iodine while the women in the group B (control group) did not receive any intervention.

All pregnant women in both the groups received all standard preoperative, intraoperative and postoperative measures as per hospital guidelines

All these women were followed for a period of 30 days for surgical site infections (SSI). SSIs were classified as superficial, deep and organ space infections as per Centre for Disease Control (CDC). In women who presented with SSI either incisional or organ space, discharge from surgical incisional site was collected with sterile cotton swabs and was sent for culture and sensitivity. Antibiotics were given as per antibiotic susceptibility of the isolated organism. Results of both the groups were studied and compared.

"Statistical analysis was done and qualitative variables were analysed using Chi-square test/ Fisher's exact test. A p-value of <0.05 was considered statistically significant".

Results: The rate of SSI in pregnant women allocated in group A, i.e the group who received pre-operative vaginal cleansing was 5% (5 out of 100) whereas rate of SSI in group B, i.e control group was 18% (18 out of 100). Rate of SSI was found to be higher in group B than the group A and the difference was statistically significant with a p value of 0.0039.

"In group A, 3 patients (3%) had superficial incisional SSI, 1 patient (1%) had deep incisional SSI and 1 patient (1%) had organ space SSI. In group B, 10 patients (10%) had superficial SSI, 4 patients (4%) had deep incisional SSI and 4 patients (4%) had organ space SSI including endometritis".

Conclusions: Pre-operative vaginal cleansing in patients undergoing caesarean section helps in reduction of incisional and organ space SSIs.

1. Introduction

Caesarean delivery is the most common surgical procedure in obstetrics performed worldwide. Currently, 18.6% of all births occur by caesarean section worldwide.^[1] In India, it is 18-20% overall.^[2] As rate of caesarean section is increasing alarmingly, so are its complications. The most common complication being surgical site infections (SSIs), which occurs in 2-15% of women undergoing caesarean section.^[3]

SSIs are defined as infections occurring after surgery, near or at the incision site or deeper underlying tissue spaces and organs within 30 days of a surgical procedure.^[4]

Clinical trials and studies have revealed various perioperative measures to reduce SSIs rates after caesarean section. Since caesarean delivery is one of the most common surgical procedure performed worldwide, various evidence based preoperative, intra-operative and postoperative measures have been developed to decrease postoperative complications. But in clinical practice a wide variation exists in implementation of intra-operative measures depending upon the clinical situation and obstetrician's preference.

There is limited literature available about standard intra-operative methods for surgical site infection

prevention following caesarean delivery. Therefore, this study was planned to find out effect of preoperative vaginal cleansing in prevention of postpartum surgical site infections and related morbidity and mortality.

2. Materials and Methods

This study involved 200 pregnant women and was a prospective interventional cohort study that lasted for two months. Block randomization using a sealed envelope approach was used with women who met the study's inclusion requirements and provided their informed permission. A represents Group A receiving pre-operative vaginal washing, and B represents Group B not receiving pre-operative vaginal cleansing. A and B were assigned to five envelopes each in ten randomly generated treatment allocations that were sealed in opaque envelopes. As a result, for every ten patients randomly assigned, five did not receive any washing whereas the remaining five underwent vaginal cleansing at the time the Foley's catheter was inserted in this approach. A swab soaked in a solution of 5% povidone iodine available in hospital pharmacy was held with sponge holding forceps and vagina was cleaned in its entirety for not more than 30 seconds and this was followed by abdominal cleansing and draping. Both the groups received all standard

preoperative, intraoperative and postoperative measures as per hospital guidelines.

Both groups were followed in the post-operative period for presence of post-operative infectious morbidity and SSIs for 30 days. All the participants were followed at day 4 (day of discharge from hospital), day 8 (day of suture removal in family planning OPD) and day 30 of caesarean section for any surgical site infections, including incisional and organ space infections.

At each visit, all the women were checked for: i) temperature, ii) any discharge from wound site/induration/erythema/wound gape, iii) uterine tenderness, iv) foul smelling lochia/excessive vaginal discharge. The outcomes were rate of SSI in both interventional and control group and type of SSI i.e, superficial incisional, deep incisional or organ space SSI. In women who presented with SSI either incisional or organ space, were admitted and discharge from surgical incisional site was collected with sterile cotton swabs under all aspetic precautions and was send for culture and sensitivity. High vaginal swabs were taken in patients presenting with foul smelling discharge per vaginally. Antibiotics were given as per antibiotic susceptibility of the isolated organism which was checked using standard disc diffusion method as per Clinical Laboratory Institute (CLSI) guidelines.^[5] All the information was recorded on a preset Performa and post caesarean infectious morbidity was studied and compared to know effect of intraoperative surgical bundle on SSI post caesarean delivery.

Inclusion Criteria:

• "Women undergoing caesarean section at 37 weeks or greater gestation in age group 20 to 35yrs of age".

Exclusion Criteria:

• "Women with chorioamnionitis, defined as fever of at least 38.0 degree Celsius plus foetal tachycardia (>160bpm) or purulent fluid from cervical os and with prolonged rupture of membranes > 18hours".

• "Women having known medical disorders which is known for increasing risk for surgical site infections, such as, overt DM, immunocompromised state, and many more".

Outcomes:

- Rate of surgical site infections following caesarean delivery in control group.
- Rate of SSI in interventional group after pre-operative vaginal cleansing.
- Type of surgical site infections following caesarean delivery in both the groups.

Statistical Analysis

"Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean \pm SD and median. Normality of data was tested by Kolmogorov-Smirnov test. If the normality was rejected then non parametric test was used.

Statistical tests were applied and qualitative variables were compared using Chi-Square test /Fisher's exact test.

A p value of <0.05 was considered statistically significant.

The data was entered in MS EXCEL spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0"

3. Results

This was a prospective interventional cohort study including 200 pregnant women. These pregnant women were allocated in two different groups i.e, group A and group B.



VARIABLES	GROUP-A (INTERVENTIONAL GROUP, N = 100)	GROUP-B (CONTROL GROUP, N=100)	P - value
AGE (years)	25.38 ± 3.10	25.51 ± 2.99	0.354
BMI (kg/m ²)	21.34 ± 1.46	21.38 ± 1.67	0.912
Period of Gestation	38.81 ± 1.30	38.76 ± 2.13	0.847
Parity			
Primigravida	36	38	0.769
Multigravida	64	62	

Table 1: Demographic and obstetric parameters of study population

Both the groups were analysed for demographic characteristics and no statistically significant differences were found between the two groups.

	STUDY GROUP		Chi-Squared Test		
Indication of LSCS	GROUP A (N=100)	GROUP B (N=100)	Total	χ2	P Value
APH	5 (5.0%)	3 (3.0%)	8	15.493	0.078
Arrest Of Cervical Dilatation	7 (7.0%)	5 (5.0%)	12		
Failed IOL	12 (12.0%)	9 (9.0%)	21		
Fetal Distress	34 (34.0%)	33 (33.0%)	67		
Malpresentation	4 (4.0%)	8 (8.0%)	12		
Multifetal Pregnancy	2 (2.0%)	3 (3.0%)	5		
Others	6 (6.0%)	8 (8.0%)	14		
Previous LSCS	28 (28.0%)	29 (29.0%)	57		
Second Stage Arrest	2 (2.0%)	2 (2.0%)	4		
Total	100 (100.0%)	100 (100.0%)	200 (100.0%)		

Table 2: Indications of Caesarean Section in both phases of study

Most common indication of caesarean section at our institution as shown by our study was found to be fetal distress followed by previous LSCS. Both the

groups were comparable and there was no statistically significant difference between both the groups.



Table 3: Rate of SSI in study population

	GROUP			Chi-Squared Test	
SSI	GROUP A (INTERVENT IONAL GROUP)	GROUP B (CONTROL GROUP)	Total	χ2	P Value
Yes	5 (5%)	18 (18%)	23		
No	95	82	177	8.3026	0.0039
Total	100	100	200		

Figure 1: Comparison of rate of SSI in study population



The rate of SSI in pregnant women allocated in group A, i.e the group who received pre-operative vaginal cleansing was 5% (5 out of 100) whereas rate of SSI in group B, i.e control group was 18% (18 out of 100) as shown in table 2. Rate of SSI was found to be higher in group B than the group A and the difference was statistically significant with a p value of 0.0039.

In group A, 3 patients (3%) had superficial incisional SSI, 1 patient (1%) had deep incisional SSI and 1 patient (1%) had organ space SSI. In group B, 10 patients (10%) had superficial SSI, 4 patients (4%) had deep incisional SSI and 4 patients (4%) had organ space SSI including endometritis.

	GROUP		Chi-Squared Test		
Type Of SSI	GROUP A INTERVENT IONAL GROUP (N=100)	GROUP B CONTROL GROUP (N=100)	Total	χ2	P Value
Absent	95	82	177		
Superficial Incisional	3	10	13		
Deep Incisional	1	4	5	8.324	0.0397
Organ Space	1	4	5		
Total	100	100	200		

Table 4: Type of SSI in study population

4. Discussion:

This study found that pre-operative vaginal cleansing before caesarean section with 5% povidone iodine is associated with decreased incidence of surgical site infections and the reduction was found to be statistically significant.

This result was supported by various other studies done on effect of pre-operative vaginal cleansing on post caesarean infectious morbidities.

In a Cochrane review by Haas et al in 2020, preoperative vaginal cleansing with antiseptic solution was associated with reduction of post caesarean infectious morbidities. Risk of wound infection and endometritis was found to be reduced; wound infection: "RR 0.62, 95% CI 0.50 to 0.77 and incidence of endometritis was reduced from 7.1% in control groups to 3.1% in vaginal cleansing groups (average risk ratio (aRR) 0.41, 95% confidence interval (CI) 0.29 to 0.58)".^[6]

Cochrane reviews published in 2018 and a systematic review done by Caisutti et al have also concluded pre-operative vaginal cleansing as a beneficial intervention in reduction of rate of post-operative infectious morbidity.^[7,8]

In 2021, WHO strongly recommended pre-operative vaginal cleansing before caesarean section with antiseptic solution due to significant reduction in rate of post-caesarean wound infection,

endometritis, post-operative febrile morbidity and maternal sepsis. On further comparison of vaginal cleansing with povidone iodine to chlorhexidine solution, it was concluded that rate of SSI is reduced with chlorhexidine solution compared to povidone iodine ("3 studies, 1540 women; RR 0.43, 95% CI 0.22 to 0.85").^[9]

Although some other studies showed varied results too, concluding little or no benefit from vaginal cleansing in reduction of endometritis, wound sepsis or febrile morbidity.

In one RCT done in Indian settings by Nandi et al on 274 women found contrary evidence. In this study, no significant difference in post infectious morbidity was seen using vaginal cleansing with 5% povidone iodine before caesarean section. Small dropout rates was the strength of study whereas limitation was that all mothers receive prophylactic antibiotic which reduced the rate of post-operative infection in both case and control groups.^[10]

Hence, there are no strong recommendations for perioperative vaginal preparation, still povidone iodine is approved for use in vagina. Chlorhexidine could be considered in women with allergies to iodine.^[11]

5. Conclusion:

In the light of above results, it has been found that pre-operative vaginal cleansing with 5% povidone

iodine solution for 30 seconds before caesarean section is associated with reduction in incidence of SSIs and post-operative infectious morbidity.

LIMITATIONS:

Small sample size was found to be major limitation of the study.

6. Acknowledgements

Authors would like to thank all professors, consultants, seniors, colleagues and juniors who helped me unconditionally throughout this study. We would like to show sincere gratitude to all my patients and their relatives, whose unquestioning trust and co-operation always kept us motivated to give our best.

Funding: No funding sources **Conflict of interest:** None declared

References

- [1] Betran AP, Ye J, Moller AB, Zhang J, Gulmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: global, regional and national estimates:1990-2014. PLoS One. 2016;11:e0148343.
- [2] Nidhi J. Led by Wealthy Urban Women, Caesarean Sections rise in India. Available from: http://archive.indiaspend.com/coverstory/led-by-wealthy-urban-women-caesareansections-rise-in-india-45728. [Last accessed September 6, 2019].
- [3] Kawakita T, Landy HJ. Surgical site infections after caesarean delivery: epidemiology,

prevention and treatment. Matern Health Neonatol Perinatol. 2017;3:12.

ISSN: 2309-5288 (Print)

- [4] Borchardt RA, Tzizik D. Update on surgical site infections: The new CDC guidelines. JAAPA. 2018;31:52-4.
- [5] A. Mathew, R. Franklin, A. William., "Performance standards for antimicrobial susceptibility testing," Clinical and Laboratory Standards Institute, vol. 26, supplement 16, 2006.
- [6] Haas DM, Morgan S, Contreras K, Kimball S. Vaginal preparation with antiseptic solution before caesarean section for preventing postoperative infections. Cochrane Database of Systematic Reviews. 2020.
- [7] Haas DM, Morgan S, Contreras K, Enders S. Vaginal preparation with antiseptic solution before caesarean section for preventing postoperative infections. Cochrane Database Syst Rev 2018;7:CD007892.
- [8] Caisutti C, Saccone G, Zullu F, Quist-Nelson J, Felder L, Ciardulli A, Berghella V. Vaginal cleansing before caesarean delivery: a systematic review and meta-analysis. Obstet Gynecol. 2017;130:527-38.
- [9] Devi SL, Durga DV. Surgical site infections post caesarean section. Int J Reprod Contraception, Obstet Gynecol 2018;7:2486.
- [10] Nandi JK, Saha DP, Pal S, Barman S, Mitra A. Antiseptic vaginal preparation before caesarean delivery to reduce post operative infection: a randomised controlled trial. JMSCR. 2015;3:4310-5.
- [11] Mohammad H, Hassan S, Hemida R. Vaginal preparation with antiseptic solution before caesarean section for reducing post partum morbidity. OSR-JNHS. 2015;4:75-80.