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Original article

Impact of preoperative vaginal preparation with povidone iodine on post cesarean infection

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Abstract

Background: Obtaining clinical methods in order to decrease the infectious morbidity of cesarean delivery is very important. The aim of this study was to determine the effect of preoperative vaginal preparation with antiseptic solution on post-caesarean infections.

Methods: This study was conducted on 400 singleton term pregnant women undergoing elective cesarean delivery. The samples were randomized into two groups; experimental group, including women who received an additional preoperative vaginal cleansing with 10% povidone iodine; and a control group, including women who received only the standard abdominal preparation. All subjects received a single dose of prophylactic antibiotic and were investigated after cesarean delivery until the 6th postoperative weeks for postoperative fever, wound infection, or endometritis. Data were analyzed using SPSS software and the P value < 0.05 was considered significant.

Results: The groups were similar in age, education level, body mass index, and parity. The operation variables such as the postoperative fever, wound infection, and endometritis were observed in the two groups, and the overall for these were found to be 6.0 %, 6.3%, and 6.5%, respectively. A total of 7.5% of the participants in the control group and 5.5% of the participants in the experimental group developed postoperative endometritis; but it was not statistically significant (relative risk= 0.86; 95% confidence interval, 0.61 –1.21; P=0.417). Also, there was no significant difference in postoperative fever, wound infection between these women with and without preoperative vaginal cleansing with povidone.

Conclusion: The findings of the present study indicated that vaginal cleansing with povidone iodine immediately prior to elective cesarean delivery did not decrease the post-caesarean infection rates and the incidence of endometritis in low-risk women.

Keywords: Cesarean delivery, Endometritis, Povidone iodine

Introduction

Since cesarean delivery is associated with less pain, such a delivery has become very common and many women are willing to use this method. Nowadays cesarean delivery is performed as a routine surgery in Iran (1). Despite the fact that there are many facilities, equipment, hospital beds and specialists involved in connection with this action, pregnancy mortality and complications in women undergoing cesarean is

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significantly more than those who have vaginal delivery (2).

Infection is the third most common cause of maternal mortality, especially in developing countries; and the incidence of pelvic infections is about 90 percent in women who do not undertake preventions before cesarean section. The incidence of infection following cesarean section varies depending on the socio-economic factors, and the use of antibiotics before the surgery has significantly changed (3). It is estimated that between 4 to 7 days after the delivery, infection may happen in 2.5-16% of the patients (4). Endometritis is the most common cause of fever and infection after the caesarean delivery and caesarean is one of its main risk factors (5). Also, the rate of endometritis after cesarean section has been reported to be 7-20% (6).

American Congress of Obstetricians and Gynecologists (ACOG) have recommended a single dose of antibiotics for all women who are at high risk of pelvic infections after cesarean delivery. This method of reducing the incidence of severe pelvic infection following cesarean delivery has been effective in the last 25 years, but it is still regarded as a significant risk for endometritis following cesarean section (7).

Since one important way to create a variety of vaginal and cervical endometritis spread of germs is upward, it was shown that vaginal preparation before the surgery can reduce the number of vaginal microorganisms. According to research studies, vaginal washing with povidone iodine prior to hysterectomy reduced the risk of infection, but there is little information about vaginal washing with povidone iodine before Caesarean section (8).

Given the prevalence of infection and endometritis after caesarean section, and that vaginal washing with povidone iodine has no risk and additional cost for the patient or the hospital, this study aimed to evaluate the effect of preoperative vaginal preparation with povidone iodine on post-caesarean infection.

Materials and Methods

The present study was a clinical trial and was conducted on 400 pregnant women, admitted to Ayatollah Rouhani hospital in Babol for elective cesarean over the period of two years between 2013 and 2014. This study was approved by the Research Ethics Committee of Babol University of Medical Sciences, Babol, Iran and the trial was registered at IRCT.IR. (IRCT2016061425292N6). Informed consents were also obtained from all participants. The women undergoing cesarean delivery were randomly divided into two groups: “vaginal cleaning” as experimental and “no vaginal cleaning” as control group, which was done through computer-generated random number table.

The inclusion criterion for the study was women with term singleton pregnancy undergoing elective cesarean delivery. The exclusion criteria included individuals with allergy to povidon iodine, ante partum hemorrhage, and premature rupture of membrane. Also those suffering from diabetes and those on antibiotics or under cortisones treatment were excluded from the study.

The outcomes of this study were the development of postoperative fever, postpartum endometritis, and early wound complications. Postoperative fever is defined as any temperature around 38˚ C after cesarean delivery, except for the first 24 hours after the surgery. Wound infection is defined as erythema, wound edge separation with purulent secretions, which require antibiotics, separation, or debridement.

Postoperative endometritis is defined as fever more than 38 ° C with uterine tenderness and foul-smelling lochia, which require a wide variety of intravenous antibiotics. Of the total 440 singleton term pregnant women undergoing elective cesarean delivery subjects, 27 (6.1%) had premature rupture of membrane, 4 (0.9%) had antepartum hemorrhage, 7 (1.6%) had diabetes, 2 (0.5%) used antibiotics or cortisones. All these women (40 women) were excluded from the study, and a total number of 400 subjects remained for the sake of this study. The samples were randomized into two groups: an experimental and a control group. For the experimental group, the vaginal washing was performed before stomach washing (after anesthesia induction) with two gauzes impregnated with povidone iodine 10%. Each gauze sponge was rotated 360-degrees in all parts of the vagina, especially in the fornices of the vagina, and the washing process lasted for 30 seconds. In both groups, the abdomen washing was done with povidone iodine 10% and 3 gauzes sponge, which was performed from the von Stein incision area to the top of the navel and thigh and pubis

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Table 1: Characteristics of subjects in "vaginal cleansing" and "no vaginal cleaning" groups

Characteristics	No vaginal cleaning group (N = 200)	Vaginal cleansing group (N = 200)	P value
Age (year)			
≤30	103(50.2)	102(49.8)	0.920
>30	97(49.7)	98(50.3)	
Education			
Elementary	4.5	5.4	0.13
High school	56.5	49.9	
University	39	44.7	
Gravidity			
≤2	105(46.9)	119(53.1)	0.158
>2	95(54.0)	81(46.0)	
Abortion			
No	123(61.5)	136(68.0)	0.174
Yes	77(38.5)	64(32.0)	
*BMI *(kg/m2)*			
<30	65(32.5)	55(27.5)	0.275
≥30	135(67.5)	145(72.5)	
*Hb** before surgery*			
<11	30(15.0)	26(13.0)	0.564
≥11	170(85.0)	174(87.0)	
Hb after surgery			
<10	58(29.0)	61(30.5)	0.743
≥10	142(71.0)	139(69.5)	
WBC before surgery			
<10000	137(68.5)	119(59.5)	0.061
≥10000	63(31.5)	81(40.5)	
WBC after surgery			
<12000	93(46.5)	89(44.5)	0.688
≥12000	107(53.5)	111(55.5)	

*Body Mass Index
**Hemoglubin

area. The total process of belly washing lasted for five minutes.

The control group received only the abdomen wash with povidone iodine.

After clamping the umbilical cord, 2 gram of intravenous cefazolin (Rx) was injected to all patients. All patients received intravenous antibiotic (cefazolin 1 gram every 6 hours) up to 24 hours after the surgery. The data collection process was done by interviews, examinations and checklists. Variables included age, education, body mass index, parity, hemoglobin and white blood cells level before and after the operation through which the information was collected in the prepared questionnaire. The two groups of subjects

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were followed by one of the researchers, blinded to the allocation of experimental and control groups, at the time of hospital discharge, one week, and 6 weeks after the discharge.

Data were analyzed using SPSS-20 statistical software. Independent t-test Chi-square and relative risk were also used for the statistical analysis. P-values less than 0.05 were considered significant.

Results

The groups were similar in age, education level, body mass index, and parity. There was no significant difference between the two groups in level of hemoglobin and white blood cell count before and after the surgery (table 1).

The operation postoperative fever, wound infection, and endometritis were observed in the two groups, and the overalls for these were found to be 6.0 %, 6.3%, and 6.5%, respectively. There was no significant difference for postoperative fever and wound infection between the women with and without preoperative vaginal cleansing with povidone.

All patients with diagnosed wound infections controlled the infection by local wound care (twice daily) and antibiotics, and there was no disruption of fascia and necrotizing fasciitis.

A total of 7.5% of the participants in the control group and 5.5% of the participants in the experimental group developed postoperative endometritis; but this was not statistically significant (relative risk= 0.86; 95% confidence interval, 0.61 –1.21; P=0.417). All patients with diagnosed endometritis were treated with clindamycin (Cleocin®) and garamycin (gentamicin®) for 72 hours and their symptoms all disappeared. All result are shown in Table 2.

Discussion

According to the results, adding vaginal washing to abdominal washing before the surgery in the case of elective cesarean delivery makes no significant difference in postoperative fever, endometritis, and wound infection.

Vaginal washing with antiseptic solutions before vaginal or abdominal hysterectomy have been performed since 1970 and have shown a decrease in postoperative infection. Osborn et al. showed that preoperative vaginal wash with povidone iodine reduced the vaginal bacteria up to 48% (9). Vaginal wash reduces anaerobic gram-positive rod bacteria, gram-negative rod bacteria and some anaerobes, and various cocci, particularly enterococci (10). There are, nevertheless, few studies about the effect of vaginal washing before cesarean delivery on the decreased incidence of endometritis after the surgery (11).

Studies have proven the effect of antibiotic prophylaxis in reducing the incidence of post-operative infections (12). Despite the use of antibiotic prophylaxis, the incidence of infectious complications after cesarean delivery is still significant (13, 14).

Other antiseptic solutions for vaginal washing before operation were also used. Rouse et al. used chlorhexidine for the vaginal washing (15), and Pitt et al. used vaginal metronidazole, and showed a significant reduction in the rate of wound infection (16). Several strategies were used to reduce the risk of endometritis after caesarean section, and vaginal washing before cesarean delivery is one of them. Povidone iodine was used for this purpose in different studies (11, 17) and showed different results. We used the same intervention method, and also utilized povidone iodine 10% before the surgery. This intervention is safe, cheap, and simple. The effect is rapid and lasts for about 10 minutes (18).

In this study, the incidence of postoperative endometritis in the control group was 7.5%, and it was 5.5% in the case group, which was not statistically significant.

In a study conducted by Reid et al. in 2001, the prevalence of endometritis in vaginal wash group was

Table 2. Postoperative infectious morbidities by allocation group in "vaginal cleansing" and "no vaginal cleaning" groups

Variables	No vaginal cleaning N(%)	Vaginal cleaning N(%)	P value	Relative risk (95% CI)
Fever	14(7.0)	10(5.0)	0.400	0.85 (0.60 – 1.21)
Wound infection	13(6.5)	12(6.0)	0.846	0.96 (0.65 – 1.42)
Postoperative endometritis	15(7.5)	11(5.5)	0.417	0.86 (0.61 –1.21)

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7.2% and 7.0% of wound infection, which had no significant difference with the control group (11). In our study, the rate of wound infection in the control group was 4.5%, and it was 5% in the case group. The results of our study are consistent with that of Reid, but it should be mentioned that the endometritis risk factors such as morbid obesity (over 114 kilogram), severe anemia and diabetes were not excluded from their study, and there was no explanation about antibiotic prophylaxis. All these variables were considered in our study, and antibiotic prophylaxis was prescribed for all patients.

The incidence of post-operative fever in our study was consistent with the previous studies, and there was no significantly difference between the two groups (11, 17, 19). The solution was well tolerated in all patients and there was no allergic reaction or skin irritation.

In a study by Memon et al. (2011) and Asgharnia et al. (2011) in Rasht city, the use of povidone iodine significantly reduced the infection rates and the incidence of endometritis after cesarean delivery (20, 21). In our study, the rate of wound infection in the control group was 5%, and it was 4.5% in the case group, which was not statistically significant. This difference could be attributed to the research population. In these studies, cases with the emergency water bag rupture and febrile patients who were exposed to a higher risk for infection were included, but our study included only those patients who were enrolled in the elective cesarean section.

The results of the study by Yildirim et al. (2012) also showed that vaginal wash with povidone iodine reduced the amount of postoperative endometritis (22). All these results were consistent with our results after the removal of emergency patients. After the exclusion of women with ruptured membranes and women who were in labor before the surgery, there was no significant association between the two groups in the incidence of endometritis anymore. These cases were all excluded from the present study, which makes the results inconsistent with that of Yildirim's study.

In another study by Starr et al. in 2005, the prevalence of endometritis was 7 % in the vaginal wash group with povidone iodine, and it was 14.5 % in the control group, which made the differences statistically significant (23).

Guzman et al. (2002) showed that vaginal wash with povidone iodine before cesarean reduced the incidence of endometritis. The differences between the results of their study and those of our study could be due to the inclusion of emergency patients in their study.

Swapit et al. (2006) also conducted a comparative study on the vaginal washing group with povidone iodine or normal saline before abdominal hysterectomy and fever as the postoperative complications. Fever was observed in 16% of normal saline group, and it was 25% for povidone iodine group, which was indicative of no significant differences between the two groups. This could be due to the effects of saline on the vaginal microbiota (24).

Eason et al. also conducted a study on 1570 abdominal hysterectomy cases (8). In that study, the risk of pelvic abscess was reduced after the use of vaginal povidone-iodine gel, but in the case of our study, we failed to show a significant difference in the overall rate of infection after elective cesarean delivery.

In this study, 90% of subjects underwent an elective repeat cesarean, and only 10% were nulliparus. However, due to the fact that the infectious morbidity could vary between emergency cesarean delivery and a cesarean delivery, an elective cesarean delivery started right after the labor. Thus, there is a possibility of underreporting in post-caesarean infection. Future studies on women undergoing emergency cesarean delivery will provide higher infectious morbidity and the impact of preoperative vaginal preparation on postcaesarean infection may be statistically significant. In addition, factors such as wound closure techniques are important and need to be considered.

Perhaps the differences in the results of some studies could be attributed to socio-economic factors as well as vaginal colonization by a variety of micro-organisms in different communities. Ultimately, the lack of effect of vaginal washing with povidone iodine in reducing the incidence of endometritis in this study can be attributed to the use of antibiotics 24 hours after the operation.

Conclusion

In our study, vaginal washing with povidone iodine before the cesarean delivery did not reduce the infection rates, and the incidence of endometritis in low-risk patients could be due to the fact that the research was exclusively done on female candidates for

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elective non-emergency cesarean delivery. Due to the lack of effectiveness of vaginal wash with povidone iodine in patients with elective caesarean, assessing such main factors as wound closure techniques is useful for a more accurate assessment of infectious morbidity of cesarean delivery.

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Conflict of interest

The authors declare that there is no conflict of interests.

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