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Original Research Article

Povidone iodine- antiseptic wound irrigation prior to skin closure at caesarean section to prevent surgical site infection: a randomised study

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ABSTRACT

Background: Surgical site infection (SSI) is seen frequently in women undergoing caesarean sections for various indications leading to increase in morbidity amongst the patients in the postpartum period. Irrigation of the subcutaneous tissue before the skin closure with topical antibiotics, povidone iodine or saline has been shown to reduce the risk of SSI. This study was aimed to determine the efficacy of povidone iodine for irrigation of subcutaneous tissue in prevention of SSI.
Methods: This study was performed on 200 subjects undergoing caesarean section who were randomised into two groups- one in which intervention in the form of povidone iodine irrigation was performed and the other in which it was not. The incidence of SSI was calculated in both the groups.
Results: The overall incidence of wound infection in this study was 8.5%. In povidone iodine and no povidone iodine group, the incidence was found to be 9% and 8% respectively.
Conclusions: There was no significant difference between wound infection rates between the povidone iodine and the no povidone iodine group (p value =0.799 by chi square test, chi square value =0.06).

Keywords: Caesarean section, Povidone iodine, SSI

INTRODUCTION

Over 200 million surgical procedures are performed annually around the world.

Surgical site infection as defined by Centre for Disease Control and Prevention (CDC) as infections occurring up to 30 days after surgery that affect the incision, deep tissue at the operation site or involve the organs or body space; remains to be the most frequent infectious complications following caesarean section (CS).[1]

Among all the surgical procedures surgical site infections (SSI) are reported to occur in up to 30% of cases and in 8.4% of women having a caesarean section in recent study.[2]

One questionable prophylactic method is the irrigation of the subcutaneous tissue. Before the skin closure, prophylactic irrigation of wounds with topical antibiotics, povidone iodine or saline has been shown to reduce the risk of SSI.[3]

Hypothetically, intra operative wound irrigation (IOWI) with saline, povidone iodine (PVP-I) solutions or topical antibiotics represents a simple and economically reasonable measure to reduce SSI rates. Currently the clinical practice is largely variable and depends on individual preferences and hospital doctrine.

However, the current clinical guideline published by the UK's National Institute for Health and Care Excellence (NICE) advises against the routine use of IOWI with topical antibiotics or antiseptics due to potential adverse

effect, tissue toxicity of antiseptics, and increased development of bacterial resistance.[4,5] Yet the level of clinical evidence for these recommendations is poor.

In a meta-analysis involving patients only having abdominal surgeries, some benefit with povidone iodine was noted in patients undergoing colorectal surgery, possibly due to high risk of bacterial contamination (but all these trails were conducted before 1986).[3]

Till date there are only three studies that have focussed on women having CS.[6-8] The results from these studies do not prove a benefit in assessing the relation to the use of povidone iodine irrigation in the subcutaneous tissue during caesarean section.

To determine the current state of knowledge, we conducted a randomised study to discover the effect of antiseptic wound irrigation using povidone iodine prior to skin closure at caesarean section to prevent surgical site infection and also to determine the incidence of SSI.

METHODS

This prospective study on "povidone iodine- antiseptic wound irrigation prior to skin closure at caesarean section to prevent surgical site infection: a randomised study" was performed using 200 pregnant women who had undergone a caesarean delivery in the department of obstetrics and gynecology at 1200 bed, New Civil Hospital, BJ Medical College, Ahmedabad during the study period March 2023 to March 2024.

Inclusion criteria

All patients (healthy or with co-morbid conditions including but not restricted to chronic renal failure, heart disease, respiratory illness etc.) undergoing elective or emergency caesarean were included in the study.

Exclusion criteria

Patients who had an allergy to povidone iodine were excluded from the study.

Methodology

The division of the sample was such that 50 emergency and 50 elective cases were taken in both groups- where intervention in the form of wound irrigation using povidone iodine was done or not done.

Randomisation was done on the basis of the last digit of (in patient department) IPD number. Odd number: povidone iodine was poured before skin closure. Even number: povidone iodine was not poured before skin closure.

Recruitment was seized once a few more than the desired number was reached in each group.

After suturing all the layers, just prior to skin closure the last digit of IPD number was seen and intervention in the form of wound irrigation using 30 ml of 5% of povidone iodine was done when the digit was odd. In cases where the last digit of IPD number was even, skin closure was done without wound irrigation.

The caesarean sections were performed by the specialist obstetricians, senior residents and the junior residents (in the presence of specialist obstetricians).

Before caesarean section, bladder catheterization was done and the abdominal skin was cleaned with povidone iodine. Skin shaving was not practiced.

Prophylactic antibiotic was administered to all the patients posted for elective CS 1 hour prior to the surgery. In category 2 CS the prophylactic antibiotic was administered at least 45 minutes before the CS. But in category 1 CS the timing of administration of prophylactic antibiotic varied depending on the indication of CS.

Cesarean section was performed as per the accepted standard protocol. Ecbolics were given after clamping of the umbilical cord.

At our institute it has been a practice to suture the uterus after its exteriorisation unless there are adhesions which limit uterine exteriorisation.

The uterine closure was done using polyglactin 910 (vicryl) in continuous locking manner in all the cases. Suture material used for rectus sheath closure was polyglactin 910 and the sheath was sutured in continuous non locking manner. After hemostasis was secured, the abdominal wall was closed in layers without closure of the peritoneum. Occasional cauterisation of the subcutaneous tissue was performed to secure hemostasis.

Subcutaneous tissue was approximated in all the cases where the depth of the subcutaneous tissue was >2 cm, using either polyglactin 910 or chromic catgut in interrupted manner.

The technique of skin closure was according to the consultant's choice after assessing the general condition of the patient and the skin near the surgical incision. Suture material used was either polyglactin 910 for suturing in subcuticular manner or polyamide (epimide) for suturing in vertical mattress manner.

Post operative vaginal cleansing with povidone iodine solution was done in all the cases, though pre-operative vaginal cleansing was not practised during the study.

The wound dressing was examined daily till suture removal which was done on post operative day 8-10. The major outcome was the incidence of wound infection at the time of suture removal. Wound infection was diagnosed when a wound drained purulent material or

serosanguinous fluid in association with induration, warmth and tenderness.

Data was collected as per proforma, tabulated in excel sheets and was then analysed using statistical tests. P value was calculated to assess whether the difference in the wound infection following subcutaneous tissue irrigation using povidone iodine was statistically significant or not.

RESULTS

Table 1 shows age distribution of patients in the study. Majority of the patients were between 21-30 years in both the groups.

Table 1: Age distribution.

Age (years)	Povidone iodine (n=100) (%)	No povidone iodine (n=100) (%)
Up to 20	06 (6)	07 (7)
21-25	45 (45)	34 (34)
26-30	33 (33)	40 (40)
31-35	15 (15)	14 (14)
>35	01 (1)	05 (5)
Mean age	26.19 years	26.84 years

The effect of past surgical history is shown in Table 2, majority of the patients in our study had not undergone any previous surgeries.

Table 2: Past surgical history.

	Povidone iodine (n=100) (%)	No povidone iodine (n=100) (%)
No past surgical history	53 (53)	43 (43)
Previous CS	38 (38)	31 (31)
Previous CS with history of other surgical procedure	01 (1)	02 (2)
Previous 2 or more CS	07 (7)	21 (21)
History of other surgeries (like myomectomy, laparoscopic surgeries)	01 (1)	03 (3)

Table 3: BMI.

BMI (kg/m^2)	Povidone iodine (n=100) (%)	No povidone iodine (n=100) (%)
<18.5	01 (1)	04 (4)
18.5-24.9	83 (83)	76 (76)
≥25	16 (16)	20 (20)

Distribution of the study population on the basis of BMI is mentioned in Table 3. Maximum patients had their BMI in the normal range in both the groups.

Table 4: Operating surgeon.

	Povidone iodine (n=100) (%)	No povidone iodine (n=100) (%)
Consultant	05 (5)	16 (16)
Senior resident	34 (34)	45 (45)
Junior resident	61 (61)	39 (39)

Table 5: Duration of surgery.

	Povidone iodine (n=100) (%)	No povidone iodine (n=100) (%)
Up to 1 hour	13 (13)	21 (21)
1-2 hour	67 (67)	70 (70)
>2 hours	20 (20)	9 (9)

Table 4 mentions who performed the caesarean section and Table 5 mentions the duration in which the surgery was completed.

Table 6: Type of suture and suturing manner.

	Povidone iodine (n=100) (%)	No povidone iodine (n=100) (%)
Polyglactin 910 (subcuticular)	87 (87)	79 (79)
Polyamide (vertical mattress)	13 (13)	21 (21)

Table 6 documents the type of suture material used in the study.

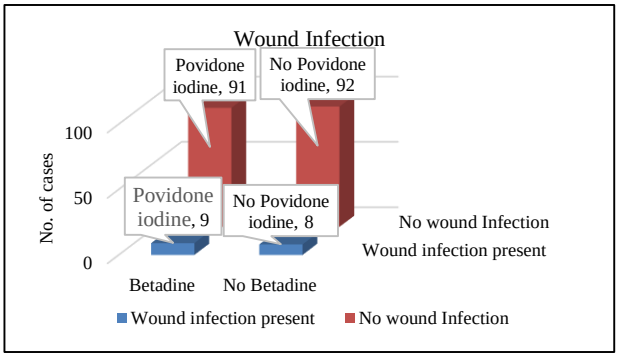

Figure 1: Outcome in the form of wound infection.

Table 7: Sub group analysis of wound infection depending upon the setting under which caesarean section was performed.

	Povidone iodine (%)		No povidone iodine (%)	
	Elective (n=50)	Emergency (n=50)	Elective (n=50)	Emergency (n=50)
Wound infection				
Yes	04 (8)	05 (10)	02 (4)	06 (12)
No	46 (92)	45 (90)	48 (96)	44 (88)
Category of wound infection				
Redness, induration	01 (2)	02 (4)	01 (2)	01 (2)
Discharge (serous or purulent)	02 (4)	02 (4)	01 (2)	02 (4)
Wound separation	01 (2)	01 (2)	00 (0)	03 (6)

The Figure 1 shows the incidence of wound gap in the povidone iodine group as 9% and as 8% in the no povidone iodine group.

Table 7 mentions the details about the incidence of wound infection and the category of wound infection in caesarean sections performed under elective and emergency settings.

DISCUSSION

The study population was well balanced in terms of the age group. In this study most of the study subjects in both the groups (78% in the povidone iodine group and 74% in the no povidone iodine group) were between 21-30 years, with the mean age in both the groups as 26 years. In a randomised controlled trial by Mahomed et al, the mean age in povidone iodine group and the no povidone iodine group was 28 years.[9] In a study by Cetin et al, the average age in saline group was 29 years and in the no saline group it was 28 years.[10]

In this study there were 53% cases in the povidone iodine group and 43% cases in the no povidone iodine group who had no previous surgical history. In a study by Mahomed et al, there were significantly more women who have had more than one previous CS in the povidone iodine group compared with the no povidone iodine group (3.2% versus 0.1%).[9]

83% patients in the povidone iodine group and 76% patients in the no povidone iodine group had their BMI in the normal range while there were 4% patients who were underweight in no povidone iodine group and 1% in the povidone iodine group. In a study by Mahomed et al, 29.7% patients in the povidone iodine group and 29.9% of the patients in the no povidone iodine group had their BMI in the normal range; 1.8% patients in the povidone iodine group and 2.1% patients in the no povidone iodine group were underweight having BMI<18.5 kg/m^2.[9] In another study by Cetin et al, the BMI of most patients in the saline group and non-saline group was 27 kg/m^2.[10]

In this study 95% of the caesarean sections in the povidone iodine group and 84% in the no povidone iodine group were performed by the senior and the junior residents. In a study by Mahomed et al, more than 50% of the caesarean sections in the emergency and elective settings were performed by the registrar >3 years and <3 years in both povidone iodine and the no povidone iodine group.[9]

Most of the caesarean sections 80% in the povidone iodine group and 91% in the no povidone iodine groups were completed in less than 2hour duration. 20% caesarean in the povidone iodine group and 9% in the no povidone iodine group lasted for more than 2 hours. A study by Mahomed et al, duration of surgery was assessed only in the caesarean section performed under non-emergency circumstances.[9] In 42.4% cases in the povidone iodine group and 41.3% cases in the no povidone iodine group the caesarean section lasted for more than an hour.

Polyglactin 910 was used as the suture material in 87% cases in the povidone iodine group and 79% of that in the no povidone iodine group whereas polyamide was used in 13% cases in the povidone iodine group and 21% cases in the no povidone iodine group. In their study Mahomed et al, used staples or Monocryl suture material for skin closure.[9] In less than 2% cases in both emergency and elective caesarean setting (in both povidone iodine and the no povidone iodine group) staples were used for skin closure. In our study staples were not used in any of the case. The suture material used in our study was polyglactin 910 or polyamide.

As per this study involving 200 cases, the overall incidence of wound infection was 8.5%. In povidone iodine and no povidone iodine group, the incidence was found to be 9% and 8% respectively. There was no significant difference between wound infection rates between the povidone iodine and the no povidone iodine group (p value =0.799 by chi square test, chi square value =0.06).

In a study by Mahomed et al, analysis of wound infection in 3027 caesarean cases, the overall incidence of wound infection was 9.6% with incidence in the povidone iodine group as 9.5% and in the no povidone iodine group as 9.8%.[9] Their study has shown quite clearly that the use of povidone iodine irrigation prior to skin closure at CS did not prevent SSI (p value =0.79). In another study by Cetin et al, there was no significant difference in superficial SSI

rates between the group where saline irrigation was performed and where it was not.[10]

In this study the incidence in both povidone iodine and the no povidone iodine group was found to be more when caesarean sections were performed under emergency setting as compared to that done as elective procedures;11% versus 6%. In a study by Mahomed et al, the infection rate was generally higher in the women having elective compared to having CS in labor; 10.8% versus 8.5% with no plausible explanation.[9]

As evidence for betadine irrigation of subcutaneous tissue during caesarean section is anecdotal, we could compare our result to only a single study which analysed the same intervention. Not many studies have been done to assess the effect of subcutaneous tissue irrigation using betadine during caesarean section.

A potential limitation of our study was the sample size which was randomly selected as 200. This could have been calculated after assessing the hospital's wound infection rate. Despite this limitation, the similar demographic variables in the study population and performance of the surgery at a single institution by the same surgical team with the same surgical techniques likely increases the validity of our results and mitigated the weaknesses within the study.

CONCLUSION

In our study we tried to determine the efficacy of a preventive strategy to reduce the occurrence of SSI by irrigation of subcutaneous tissue by 30 ml of 5% povidone iodine solution. The overall incidence of surgical site infection (wound infection) as derived from this study was 8.5% with specific incidence of SSI in the povidone iodine group as 9% and in the no povidone iodine group as 8% and this difference was not statistically significant (p value =0.79). The incidence was found to be more when the operation was performed by the junior residents because of their less experienced operating skills.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR, Hospital Infection Control Practices Advisory Committee. Guideline for prevention of surgical site infection, 1999. Infect Control Hosp Epidemiol. 1999;20(4):247-80.
2. Wloch C, Wilson J, Lamagni T, Harrington P, Charlett A, Sheridan E. Risk factors for surgical site infection following cesarean section in England: results from a multicentre cohort study. BJOG. 2012;119(11):1324-33.
3. Mueller TC, Loos M, Haller B, Mihaljevic AL, Nitsche U, Wilhelm D, et al. Intraoperative wound irrigation to reduce surgical site infections after abdominal surgery: a systematic review and meta-analysis. Langenbecks Arch Surg 2015;400(2):167-81.
4. National Institute for Health and Clinical Excellence (NICE). Surgical site infection- prevention and treatment of surgical site infection. NICE Clinical Guideline 74. RCOG, London; 2008.
5. Alexander JW, Solomkin JS, Edwards MJ. Updated recommendations for control of surgical site infections. Ann Surg. 2011;253(6):1082-93.
6. Pradhan GB, Agrawal J. Comparative study of post-operative wound infection following emergency lower segment cesarean section with and without the topical use of fusidic acid. Nepal Med Coll J. 2009;1:189-91.
7. Mathelier AC. A comparison of postoperative morbidity following prophylactic antibiotic administration by combined irrigation and intravenous route or by intravenous route alone during cesarean section. J Perinat Med. 1992;20(3):177-82
8. Güngördük K, Asicioglu O, Celikkol O, Ark C, Tekırdağ AI. Does saline irrigation reduce the wound infection in cesarean delivery? J Obstet Gynaecol. 2010;30(7):662-6.
9. Duff P. Maternal and perinatal infection-bacterial. In: Gabbe S, Niebyl J, Simpson J, Landon M, Galan H, eds. Obstetrics Normal and problem pregnancies 6th edn. Philadelphia, PA: Elsevier Inc; 2012:1140-1155.
10. Owen J, Andrews WW. Wound complications after cesarean sections. Clin Obstet Gynecol. 1994;37(4):842-55.

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