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ORIGINAL ARTICLE

Swabbing of Subcutaneous Tissues with Betadine for Prevention of Surgical Site Infection after Caesarian Section

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ABSTRACT

Background: Surgical site infections (SSIs) are infections that arise within 30 days following surgery. Povidone-iodine irrigation is a cost-effective and uncomplicated method that has the ability to prevent SSIs. This study aims to evaluate effectiveness of povidone-iodine S/C swabbing on postoperative wound infection following CS.

Methods: This was randomized controlled clinical research that involved a total of 240 women undergoing elective lower (uterine) segment caesarean section (LSCS). And was carried out in the labor ward of Damanhur Medical National Institute Hospital. They were separated into two groups:Povidone-Iodine Group: included 120 women who had S/C tissue irrigation with PVI one percent solution after elective CS. & control group: 120 women did not have S/C tissue irrigation with PVI one percent solution.

Results: Among the Povidone-Iodine & Control group, the incidence of SSI did not substantially vary (9.2% vs. 10%, p = 0.83). No statistically significant variances were noted among 2 groups concerning age, BMI, parity, gestational age, surgeon ranking, preoperative hemoglobin, anesthesia type, operating time, hemoglobin decline, the types of treatments employed, such as after operative pyrexia, wound infection, requirement for extra antibiotic dosages, secondary suturing, hospital stays, and category of infection.

Conclusion: The utilization of povidone iodine solution for irrigating S/C tissue before closing the skin in elective caesarian births does not provide any further advantage in decreasing the incidence of SSI & is thus not currently suggested.

Keywords: SubcutaneousTissues;Betadine;SurgicalSiteInfection;CaesarianSection.

INTRODUCTION

CS is a frequently conducted surgical technique carried out by obstetricians. The occurrence of infectious complications following cesarean birth can significantly affect the postpartum woman's recovery and her capacity to care for her infant. Although preventive antibiotics are commonly used, postoperative infectious morbidity continues to be a complication in cesarean births [1].

Surgical wound infection is a rare yet significant consequence. SSIs are infections that develop within 30 days following surgery and damage either incision, deep tissue at surgical site, or include organs or body space [2].

Surgical site infections have been documented to happen in approximately thirty percent of all surgical operations and in 8.4% of women undergoing CS according to recent research. SSIs have several adverse consequences, as discomfort, extended hospital stay or readmission, requirement for antibiotics, repeated surgeries, & increasing expenses [3].

The frequency of abdominal wound infection after cesarean birth varies from two percent to ten percent based on risk variables if preventive antimicrobials are provided [4].

A single dosage of an antimicrobial drug administered now of cesarean delivery dramatically reduces infection morbidity, according to several high-quality trials [5].

Significant efforts have been undertaken to diminish SSI following cesarean section. These measures encompass the administration of preventive antibiotics by an intravenous route before surgery, the usage of antiseptic solutions to cleanse the skin, the use of antiseptic solutions to clean the vagina before and after surgery, &the implementation of negative pressure wound dressing [6].

It is unclear if povidone-iodine wound irrigation, an antiseptic solution, would effectively reduce infection. Povidone-iodine irrigation is a straightforward, affordable remedy that may prevent SSI [7].

PVI irrigation in various types of surgery has been the subject of several investigations. Infection rates in treatment group were 2.9%, and in control group, they were 15.1% (p 0.001). No adverse effects or wound healing interference were seen in the treatment group [7].

Betadine, also known as PVI, is antiseptic solution made of polyvinylpyrrolidone, water, iodide, & one percent accessible iodine; it possesses bactericidal properties that are effective against a variety of infections [8]. Although there is a ton of literature on it utilize as topical antibacterial agent in surgery, it has received less attention when used as prophylactic irrigation solution against SSIs [7].

The purpose was to evaluate effectiveness of povidone-iodine subcutaneous swabbing on postoperative wound infection following CS.

METHODS

This was a randomized controlled clinical research that involved a total of 240 women undergoing elective LSCS. And was carried out in the labor ward at Damanhour Medical National Institute from October 2023 till March 2024

Ethical Consideration

All research participants were provided with written, informed permission after being informed of the investigation's specifics and after the ethics committee approved (ID HD000171).

Inclusion criteria

Age range: 22 to 37 years, body mass index: 21 to 31 kg/m^2, and duration from skin incision to skin closure for an elective cesarean section: less than 60 minutes.

Exclusion criteria

Diabetes mellitus, feverish patients, patients using steroids for chronic illnesses, pro-labor membrane rupture, a difference in hemoglobin levels of more than 10% between pre- and postoperative visits, patients with coagulopathies, and patients with mental conditions that make it impossible for them to comprehend the nature, scope, and potential outcomes of the research.

Sample size calculation

This investigation is depended on investigation conducted by Akl et al. [9] The sample size was calculated utilizing Epi Info STATCALC, taking into account the following assumptions- 95 percent two-sided confidence level, with a power of eightypercent. & α error of five percent. The final maximum sample size taken from the Epi- Info output was 217. Thus, the sample size was raised to 240 subjects to assume any drop out cases throughout follow up.

(Z a/2 + ZB÷ p1- p2)2 (p1q1+p2q2) **[10]**.

The following procedures were used for each subject

Pre-enrollment evaluation: All women received counseling on the manner of intervention & gave their informed consent. All females underwent a thorough medical history review, prenatal exams, investigations, hemoglobin and glucose tolerance tests, &

treatment for vaginal or urinary tract infections as necessary.

Randomization & covert allocation

A computer-generated randomization mechanism was used to divide the research population into two groups: Povidone-Iodine Group: involved 120 cases who had S/C tissue irrigation with PVI one percent solution after elective cesarean sections. 120 women who underwent elective caesarian sections but did not have S/C tissue irrigation with PVI one percent solution were involved in the control group.

Electivecaesariansection

Thirty minutes before making a skin incision, provide 1 gram of third-generation cephalosporins as a preventative measure.

Operative Procedures

Scalpel was used to make skin incisions in Pfannenstiel fashion. Scalpel was used to cut and divide subcutaneous tissue. A knife was used to divide the rectus sheath with satisfactory hemostasis. Sharp or blunt opening of the parietal peritoneum. Uterine cavity with a C-shaped opening. To promote uterine contraction and reduce blood loss, oxytocin 5 IU was slowly injected intravenously. Controlled cord traction was used instead of manually removing the placenta—using polyglactin 910 No 1 to close the uterus in two continuous layers. The parietal peritoneum is closed—continuous closure of the rectus sheath with polyglactin 910 No1.

Using diathermy in a coagulation mood, subcutaneous tissue achieves good hemostasis. Only the Povidone-Iodine Group was subjected to irrigation of subcutaneous tissue layers with PVI utilizing twenty cm syringe loaded with betadine—no subcutaneous tissue drain insertion. There are no skin sutures that are broken. They used polyglactin 910 (2-0) to approximate subcutaneous tissue if it is thicker than two cm. Closure of skin utilizing subcuticular polypropylene (2-0) stitches. Up to two weeks after an elective CS, participants were monitored for the occurrence of SSI, identified by: Only skin and subcutaneous tissue around this incision were infected, and it happened just two weeks after surgery.

At least one of these objects was present: There is purulent discharge without the need for culture proof. Organisms were isolated from the fluid & tissue of the superficial incision. There was at least single sign of inflammation, such pain, soreness, hardening, redness, or localized warmth near the wound. The surgeon purposefully opened the wound. The wound was deemed infectious by the surgeon.

Statistical Analysis

The acquired data was evaluated & the coding process was conducted manually. The numerical codes were inputted into the computer & subjected to statistical analysis using SPSS 22 for windows. Parametric variables needed the calculation of range, mean, & standard deviation. Non-parametric variables required the calculation of range, median, & interquartile range. Categorical variables required the calculation of the number & percentage. The confidence level for the coefficient was chosen at 95 percent. The level of significance was determined based on the following probability (P) values: A p-value below 0.05 was deemed to be statistically significant.

RESULTS

No statistically significant variances were noted among 2 groups concerning age, BMI, parity & gestational age (Table1).

No statistically significant variances were noted among females in two groups concerning surgeon ranking, preoperative hemoglobin, anesthesia type, operating time, or hemoglobin decline (Table 2).

No significant variances were noted among 2 groups in terms of types of treatments employed, such as after operative pyrexia, wound infection, requirement for extra

antibiotic dosages, secondary suturing, and hospital stays(Table 3).

No statistically significant variances were noted among females in both groups concerning category of infection (Table 4).

Table1: Comparisonamongexaminedgroupsconcerningbasicdemographic&clinicalcharacteristics

	Povidone-IodineGroup (N=120)	**ControlGroup (N=120)**	**P**
Age (Yrs) **Range** **Mean±SD**	 22.0–33.0 25.4±2.9	 20.0–32.0 24.8±3.62	 0.16b
BMI (Kg/m^2) **Range** **Mean±SD**	 22.7–31.2 28.2±1.6	 23.9–30.0 27.9±1.85	 0.18b
ParityMedian(IQR) **No.ofpreviousCS**	 1(0– 4) 1.16±0.85	 1(0– 3) 1.14±0.92	 0.86b
Gestational ageRange **Mean±SD**	 37–41.0 38.8± 1.2	 38.0–41.0 39.1±1.3	 0.06b

an analysis utilizing an unpairedt-test;an Analysis

Table2: Comparisonamongexaminedgroupsconcerningoperative&anestheticcharacteristics

	Povidone-IodineGroup (N=120)	**ControlGroup (N=120)**	**P**
Surgeon ranking **Consultant** **Specialist** **Resident**	 15(12.5%) 22(18.3%) 83(69.2%)	 16(13.3%) 22(18.3%) 82 (68.3%)	 0.98a
Before surgery hemoglobin levels (gm/dL) **Range** **Mean±SD**	10.1–13.4 11.2±0.9	10.3–13.5 11.4±0.86	 0.08b
Surgical duration (min) **Range** **Mean±SD**	 30.0–60.0 42.6±6.2	 30.0–60.0 44.1±7.4	 0.09b
Anesthetic modality **Generalanesthesia** **Regional anesthesia** **Combined**	 12(10%) 108(90%) 0 (0%)	 14 (11.7%) 106 (88.3%) 0 (0%)	 0.68a
Decrease in hemoglobin levels (gm/dL) **Before surgery** **After surgery** **MeanPairedvariance**	 11.6±0.64 10.72±1.08 -0.88 ±0.44	 11.55±0.73 10.62±1.32 -0.93±0.59	 0.57b 0.52b

a Analysis utilizing the chi-squared test.bAnalysisutilizing unpairedt-test. cAnalysisutilizing Fisher'sexacttest. dAnalysisutilizing repeatedmeasureANOVA test.Only the p-valueforbetween-subject effectwasdisplayed.

Table3: Comparison among examined groups concerning after surgery pyrexia and wound infection, need for additional doses of antibiotics, secondary sutures, or hospitalization

	Povidone-Iodine Group (N=120)	Control Group (N=120)	P
After operative pyrexia	2(1.7%)	3 (2.5%)	0.65b
SSI	11 (9.2%)	12 (10%)	0.83b
Requirement for further antibiotic dosages	7(5.8%)	10 (8.3%)	0.45b
Needfor2rysutures	1(0.8%)	2(1.7%)	0.56b
Duration of hospitalization (days)	1.52±0.48	1.44±0.5	0.21c

a Excluding other cause of puerperal pyrexia.b Analysis utilizing the chi-squared test .c Analysis utilizing unpairedt-test.

Table4: Comparisonamongexaminedgroupsconcerningcategory of infection

	Povidone-Iodine Group (N=120)	Control Group (N=120)	P
Redness, ooze, non-specific	8 (6.7%)	10 (8.3%)	0.62b
Pus, antibiotics	7 (5.8%)	10 (8.3%)	0.45b

DISCUSSION

Povidone-iodine, often known as Betadine, is solution used as an antiseptic. It is made up of polyvinylpyrrolidone, water, iodide, & one percent accessible iodine. This solution has the capacity to kill wide range of harmful microorganisms [11].

Wound irrigation with povidone-iodine, antiseptic solution, may have some benefits in decreasing infection. However, its effectiveness and potential risks are not well-established. Povidone-iodine irrigation is cost-effective & uncomplicated method that has the capability to avoid SSIs [12].

The current research revealed that regarding demographic data in studied group, no statistically significant variance was noted among groups as regards age, BMI, parity & gestational age. (P value >0.05)

Akl et al. [9] conducted study to evaluate effectiveness of using povidone iodine by S/C swabbing on CS wounds in order to prevent postoperative wound infections. The participants of the research were randomly separated into 2 groups: Povidone Iodine Group consisted of 275 women who had elective CS & received S/C tissue irrigation with a 1 percent solution of Povidone iodine. The control group was also included. Study Group: Comprised of 275 women who underwent elective CS without the use of S/C tissue irrigation. They found no statistically significant variance among women in 2 groups in terms of age, BMI, parity, or GA.

Furthermore, our findings align with Mohammad et al. [13] who conducted a study to evaluate the effectiveness of applying povidone iodine to CS wounds using subcutaneous swabbing, with the goal of preventing after surgery wound infection. Randomized controlled clinical experiment with two arms. There are two groups in the research. In Group A, S/C tissue will be swabbed with 10cc of undiluted ten percent povidone iodine & will not be disturbed. Group B will not undergo swabbing. They disclosed that there were no statistically significant variances in age & GA among

women in the two groups. The value of P is greater than 0.05.

Regarding the operational & anesthetic features, we observed no statistically significant differences among females in both groups in terms of surgeon ranking, preoperative hemoglobin levels, type of anesthesia, duration of surgery, or decrease in hemoglobin levels. The p-value is more than 0.05.

This finding aligns with the research performed by Akl et al. [9], which shown that no statistically significant variances were noted among the two groups of women in terms of surgeon rating, preoperative hemoglobin levels, type of anesthesia used, duration of the operation, & decrease in hemoglobin levels.

Furthermore, our findings align with those of Soliman et al. [14], who conducted a study to examine the impact of using povidone iodine solution for vaginal washing prior to cesarean birth on the occurrence of postoperative endometritis infection. They stated that there was no statistically significant variance among both groups in terms of preoperative hemoglobin levels.

Furthermore, Mahomed et al. [15] who reported that no statistically significant variance was noted among two groups regarding surgeon and operative time.

In current research we noted that no statistically significant variances were found among both groups in terms of the types of treatments employed, such as after operative pyrexia, wound infection (SSI), requirement for extra antibiotic dosages, secondary suturing, and hospital stays. (P value above 0.05)

The findings of our study align with those of Abdelrahman et al. [16], who conducted a study to assess the efficacy of S/C tissue irrigation with povidone iodine in reducing incidence of SSI in women following elective CS. The study revealed that the utilization of povidone iodine one percent solution did not provide any further advantage in reducing the occurrence of SSIs.

Furthermore, our findings align with those of Akl et al. [9] who observed no significant variances among both groups in terms of treatment modalities employed, as the requirement for extra doses of antibiotics, secondary suturing, & duration of hospitalization.

Moreover, Soliman et al. [14] who reported that no statistically significant variance was noted among 2 groups in terms of hospital stays.

In current research we noted that no statistically significant variances were noted among females in both groups concerning category of infection including (redness, ooze, non-specific Pus, antibiotics).

Our results are consistent with, Mahomed et al. [15] who noted that no statistically significant variance was noted among the study groups concerning category of infection redness, ooze, nonspecific Pus, antibiotics and treated at home.

Also, our results are in line with Mohammad et al. [13] who found that no statistically significant variance was noted among the groups in presence of post-operative infection including redness, hotness, tenderness, induration, swelling, ooze of serous fluid. (P>0.05)

CONCLUSION

Our findings indicate that using povidone iodine solution to irrigate subcutaneous tissue before closing the skin in elective caesarean births does not provide any further advantage in reducing the occurrence of SSI. Therefore, we do not suggest its usage at this time.

REFERENCES

1. **Haas D, Morgan S, Contreras K, Kimball S.** Vaginal preparation with antiseptic solution before cesarean section for preventing postoperative infections. Cochrane Database of Systematic Reviews. 2020(4).
2. **Verwilghen D, Weese J.** Complications associated with surgical site infections. Complications in Equine Surgery. 2021 Apr 23:168-95.
3. **Onuzo C, Sefogah P, Nuamah M, Ntumy M, Osei M, Nkyekyer K**. Surgical site infections following caesarean sections in the largest teaching hospital in Ghana. Infection prevention in practice. 2022 Jun 1;4(2):100203.
4. **Çetin B, Mathyk B, Barut S, Koroglu N, Zindar Y, Konal M, et al.** The impact of subcutaneous irrigation on wound complications after cesarean sections: a prospective randomised study. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2018 Aug 1; 227:67-70.
5. **De Simone B, Sartelli M, Coccolini F, Ball CG, Brambillasca P, Chiarugi M, et al**. Intraoperative surgical site infection control and prevention: a position paper and future addendum to WSES intra-abdominal infections guidelines. World journal of emergency surgery. 2020 Dec; 15:1-23.
6. **Mahomed K, Seeto K, Norton M, Zhu S**. Implementation of an evidence-based bundle to reduce surgical site infection after caesarean section–Review of the interventions. American Journal of Infection Control. 2022 Oct 1;50(10):1103-9.
7. **Zhao L, Zhang W, Liu K, Chen X, Yang K, Chen X, et al.** Comparing the efficacy of povidone-iodine and normal saline in incisional wound irrigation to prevent superficial surgical site infection: a randomized clinical trial in gastric surgery. Journal of Hospital Infection. 2023 Jan 1; 131:99-106.
8. **Thakur S, Bai A, Chan D, Lu J, Lu M, Su A, et al.** Ex vivo evaluation of the influence of pH on the ophthalmic safety, antibacterial efficacy and storage stability of povidone‐iodine. Clinical and Experimental Optometry. 2021 Feb 17;104(2):162-6.
9. **Akl S, ElMekkawi S, El-Kotb A, Okily A**. Swabbing of subcutaneous tissues with betadine for prevention of surgical site infection after caesarian section. The Egyptian Journal of Hospital Medicine. 2018 Jul 1;72(9):5183-8.
10. **Takazawa A, Morita S**. Optimal decision criteria for the study design and sample size of a biomarker-driven phase III trial. Therapeutic Innovation & Regulatory Science. 2020 Sep; 54:1018-34.
11. **Bayer G, Grasselli S, Malchiodi A, Bayer I.** Antiseptic povidone-iodine encapsulating edible phospholipid gels. Colloids and Surfaces A: Physicochemical and Engineering Aspects. 2021 Jun 20; 619:126537.
12. **Monstrey S, Govaers K, Lejuste P, Lepelletier D, de Oliveira P.** Evaluation of the role of povidone iodine in the prevention of surgical site infections. Surgery Open Science. 2023 Mar 16.
13. **Mohammad M, Abd El D, Aal M, Asmaa M, Ibraheem I.** The efficacy of subcutaneous swabbing of cesarean section wounds with povidone iodine to prevent post-operative wound infection: a randomized controlled study. The Medical Journal of Cairo University. 2018 Dec 1;86(December):3943-50.
14. **Soliman Ahmed Mohamed S, Samir Faheem A, Fawzy Elsayed Ali H**. Effect of Vaginal Cleansing with Povidone Iodine Solution before Cesarean Section on Postoperative Endometritis Infection. Egyptian Journal of Health Care. 2021 Jun 1;12(2):630-43.
15. **Mahomed K, Ibiebele I, Buchanan J, Baade R, Sanderson S, Drew A, et al.** The Betadine trial–antiseptic wound irrigation prior to skin closure at caesarean section to prevent surgical site infection: A randomised controlled trial. Australian and New Zealand Journal of Obstetrics and Gynaecology. 2016 Jun;56(3):301-6.
16. **Abdelrahman A, Samy M, Shawky M, Azmy G.** Subcutaneous tissue irrigation with povidone iodine in decreasing the rate of surgical site infection following cesarean section:(randomized control trial). QJM: An International Journal of Medicine. 2020 Mar 1;113(Supplement_1): hcaa056-020.

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