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ORIGINAL ARTICLE

Role of Saline Irrigation of Subcutaneous Tissue to Reduce Wound Infection in Cesarean Section in Obese Women

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Abstract

Background: Obesity, previous caesarean delivery, hypertensive disorders of pregnancy, and tobacco use are all risk factors for postcesarean infectious problems, emergency or unscheduled cesarean delivery, and chorioamnionitis.

Aim and objectives: Aim of the work was to know if saline irrigation of subcutaneous tissue to reduce wound infection in cesarean section in obese women.

Studied cases and techniques: This was prospective randomized control research showed with 200 obese women whose was undergo elective CS during the period from August 2020 to December 2021.

Results: The patients Puerperium "Wound dehiscence" at first week, second week, third week, fourth week, fifth week, sixth week, there were zero (0%), 40 (40.0%), 35 (35.0%), 32 (32.0%), 31 (31%), and 28 (28%), respectively in Control Group, there was highly statistically important variation with (P value < 0.001 highly significant).

Conclusion: The current study found that saline irrigation of obese pregnant women's subcutaneous tissue throughout caesarean section greatly reduced rates of seroma, hematoma, and superficial surgical place infections. Even so, there were no variations in wound dehiscence among categories.

Keywords: Cesarean section obese women, Saline irrigation, Subcutaneous tissue, Wound infection

1. Introduction

Obesity, previous caesarean delivery, hypertensive disorders of pregnancy, tobacco use, emergency or unscheduled caesarean delivery, existence of labour or rupture of membranes, and chorioamnionitis are all risk factors for postcesarean infectious problems.¹

Furthermore, researches in general surgery and obstetric studied cases have shown that chlorhexidine-alcohol is superior to povidone-iodine based solutions for skin antisepsis and that its use reduces rate of surgical site infections and office visits for wound problems.²

Prophylactic intraoperative wound irrigation of subcutaneous and deep soft tissue prior to skin

closure with saline or antiseptic solutions is simple and cost-effective way to decrease wound infection rates, and it is already widely used in clinical practise. Even so, World Health Organization's most recent official guidelines for avoidance of wound infection conclude that IOWI with saline is ineffective in preventing SSI. Even so, because of paucity of supporting evidence, these recommendations are conditional. In comparison, British National Institute for Health clinical guidelines state that efficacy of IOWI for any irrigation solution is unproven & that its use should be prevented to avoid potential tissue toxicity and systemic side effects of other antiseptics.³

Aim of the work was to know if saline irrigation of subcutaneous tissue to reduce wound infection in cesarean section in obese women.

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2. Studied cases and methods

This was prospective randomized control research conducted with 200 obese women whose was undergo elective CS during the period from August 2020 to December 2021.

2.1. Population

Studied cases were randomly divided into two groups: Group I (saline group): included 100 cases were submitted to saline irrigation of subcutaneous tissue before closure of the wound. Group II (control group): included the other 100 cases used as control group not undergo irrigation of subcutaneous tissue.

All patients were selected from Air Force Hospital.

2.2. Intervention

All cases underwent complete detailed history (including age gravidity parity chronic disease), general examination (Height, weight BMI Blood pressure).

Ultrasound evaluation and basic laboratory investigations (including blood group and Rh, CBC, blood sugar, urine analysis Hepatitis B s ag. hepatitis C antibodies, and HIV antibodies).

A written consent was taken from every case involved in the study was conducted before doing the procedure.

2.3. Methods

All patients of this study were submitted to the following: Inclusion criteria: obese women (body mass index $>30 \text{ kg/m}^2$, term pregnancy (37–40 2 weeks gestation) and singleton pregnancy. 4- Elective CS.

2.4. Exclusion criteria

Multiple pregnancy, emergency CS, preterm labor, PROM, any chronic diseases like diabetic, hypertensive, renal, hepatic, & cardiac, anemic patients, and patients receiving corticosteroids, immunosuppressive drug or antibiotic.

Under spinal anaesthesia, all CS were conducted by specialist obstetricians, credentialed trainee registrars, or juniors in existence of specialist obstetrician using modified Misgav Ladach surgical method.

Postoperative observation to all case throughout the perperium every week to detect the wound affection (seroma-gapped-infected).

2.5. Outcomes

2.5.1. Primary outcome

Any type of wound sepsis (such as seroma, abscess, or any discharge) or incomplete wound healing (such as ecchymosis, subcutaneous hematoma, edges separation, or gapped wound).

2.5.2. Secondary outcome

Including any other surgical or obstetrics morbidity or mortalities such as.

2.6. Statistical analysis

Data collected were analysed with statistical package for social sciences, version 20.0. (SPSS Inc., Chicago, Illinois, USA). Mean \pm standard deviation of quantitative data were used. Frequency and percentage of qualitative data were used. *Following examinations were done:* Independent-samples when comparing 2 means, t-test of significance was used. Whitney Mann U exam: used in nonparametric data for 2-group comparisons. To compare proportions among qualitative parameters, Chi-square test of significance was used.

3. Results

The patient's age in Saline Group ranged from 19 to 39 years with (mean age 26.44 ± 5.58). While the age in Control Group ranged from 14 to 37 years with (mean age 27.56 ± 4.79), there is no statistically important variation among groups regarding years old, gravidity, parity, BMI and previous CS. [Table 1](#).

The patients Puerperium 'Seroma at 1st week' there were 20 cases (20%) of Saline Group, compared to 65 cases (65%), there was greatly statistically important variation among groups with (P value of <0.001 highly significant). As for the Puerperium 'Serous at 2 nd week' there were 10 cases (10%) of Saline Group, compared to 20 cases (20%), there was statistically important variation among categories with (P value of 0.048 significant). While Puerperium 'Pus at 6th week' there were 2 cases (2%) of Saline Group, compared to 13 cases (13%), there was statistically important variation among categories with (P value of 0.003 significant). Also Puerperium 'Wound dehiscd at 6th week' there were 7 cases (7%) of Saline Group, compared to 28 cases (28%), there was greatly statistically important variation among categories with (P value of <0.001 highly significant). [Table 2](#).

The patients Puerperium "Wound dehiscd" at first week, second week, third week, fourth week, fifth week, and sixth week, there were 0 (0%), 20

Table 1. Comparing among saline group and control group according to baseline characteristics regarding years old, Gravidity, Parity & BMI [wt/(ht)²].

Baseline characteristics	Saline Group (n = one hundred)	Control Group (n = one hundred)	Test	P value
Age (years)				
Mean \pm SD	26.44 \pm 5.58	27.56 \pm 4.79	$t = -1.522$	0.130
Range	19–39	14–37		
Gravidity				
Median (IQR)	3 (2–4)	3 (2–4)	$z = -1.468$	0.142
Range	1–7	1–7		
Parity				
Median (IQR)	2 (1–2)	2 (1–3)	$z = -1.101$	0.271
Range	0–6	0–6		
Previous CS				
Yes	78 (78%)	86 (86%)	$\chi^2 = 1.660$	0.197
No	22 (22%)	14 (14%)		
BMI [wt/(ht)²]				
Mean \pm SD	33.84 \pm 1.92	34.09 \pm 1.92	$t = 0.945$	0.346
Range	30–39.5	30–39		

Using: t-Independent Sample *t*-test; z-Mann–Whitney test.

P value > 0.05 NS.

Table 2. Comparing among saline group and control group according to puerperium.

Puerperium	Saline Group (n = 100)	Control Group (n = 100)	χ^2	P value
1st week				
Negative	80 (80.0%)	35 (35.0%)	41.432	<0.001**
Seroma	20 (20.0%)	65 (65.0%)	41.432	<0.001**
Serous	0 (0%)	0 (0%)	0.000	1.000
Pus	0 (0%)	0 (0%)	0.000	1.000
Wound dehiscence	0 (0%)	0 (0%)	0.000	1.000
2nd week				
Negative	70 (70%)	20 (20%)	50.253	<0.001**
Seroma	0 (0%)	20 (20%)	22.111	<0.001**
Serous	10 (10%)	20 (20%)	3.902	0.048*
Pus	0 (0%)	0 (0%)	0.000	1.000
Wound dehiscence	20 (20%)	40 (40%)	9.476	0.002*
3rd week				
Negative	30 (30%)	20 (20%)	2.653	0.103
Seroma	30 (30%)	10 (10%)	12.438	<0.001**
Serous	15 (15%)	25 (25%)	3.109	0.078
Pus	10 (10%)	10 (10%)	0.000	1.000
Wound dehiscence	15 (15%)	35 (35%)	10.613	0.002*
4th week				
Negative	40 (40%)	20 (20%)	9.476	0.002*
Seroma	20 (20%)	8 (8%)	5.950	0.015*
Serous	25 (25%)	28 (28%)	0.230	0.632
Pus	5 (5%)	12 (12%)	3.134	0.077
Wound dehiscence	10 (10%)	32 (32%)	14.514	<0.001**
5th week				
Negative	40 (40%)	23 (23%)	6.663	0.010*
Seroma	22 (22%)	7 (7%)	9.029	0.003*
Serous	27 (27%)	27 (27%)	0.000	1.000
Pus	3 (3%)	12 (12%)	5.809	0.016*
Wound dehiscence	8 (8%)	31 (31%)	16.766	<0.001**
6th week				
Negative	40 (40%)	23 (23%)	6.663	0.010*
Seroma	23 (23%)	7 (7%)	9.989	0.002*
Serous	28 (28%)	29 (29%)	0.024	0.876
Pus	2 (2%)	13 (13%)	8.677	0.003*
Wound dehiscence	7 (7%)	28 (28%)	15.196	<0.001**

Using: χ^2 : Chi-square test.

P value > 0.05 NS.

*P value < 0.05 S.

**P value < 0.001 HS.

(20.0%), 15 (15.0%), 10 (10.0%), 8 (8.0%), and 7 (7.0%), respectively in Saline category, there was highly statistically important variation with (P value of <0.001 highly significant) (see Fig. 1). Fig. 2.

Patients Puerperium 'Wound dehiscence' at first week, second week, third week, fourth week, fifth week, sixth week, there were 0 (0%), 40 (40.0%), 35 (35.0%), 32 (32.0%), 31 (31%), and 28 (28%), respectively in Control category, there was highly statistically important variation with (P value of <0.001 highly significant). Fig. 3.

Studied case must be informed that wound will now need to recover by secondary intention, which

can take many weeks. To accelerate recovery, larger wounds can be handled with Vacuum-Assisted Closure device. Table 3.

4. Discussion

Irrigation's aim is to clean wound whereas minimising trauma to wound bed and risk of introducing bacteria into wound bed. Protocol for systemic review and meta-analysis on impacts of saline irrigation before wound closure in reducing surgical place infection was published in 2018.⁴

Prospective randomized control research was conducted on 200 obese women who will undergo elective CS during the period from August 2020 to December 2021 recruited from Air Force Hospital. All patients were separated into two categories: category I (saline category): included 100 cases have been submitted to saline irrigation of subcutaneous tissue before closure of the wound. Group II (control group): included the other 100 cases used as control group not undergo irrigation of subcutaneous tissue.

As regard the baseline characteristics of the studied groups, the present study showed that the patient's age in Saline Group ranged from 19 to 39 years with (mean age 26.44 ± 5.58). While the age in Control Group ranged from 14 to 37 years with (mean age 27.56 ± 4.79).

The present study can be supported by Andan et al.⁵ who intended to look back at impact of saline irrigation on decrease of surgical wound location infections after caesarean section. Total of 2220 studied cases were enrolled in study. Total of 1090 caesarean sections with skin irrigation were done in

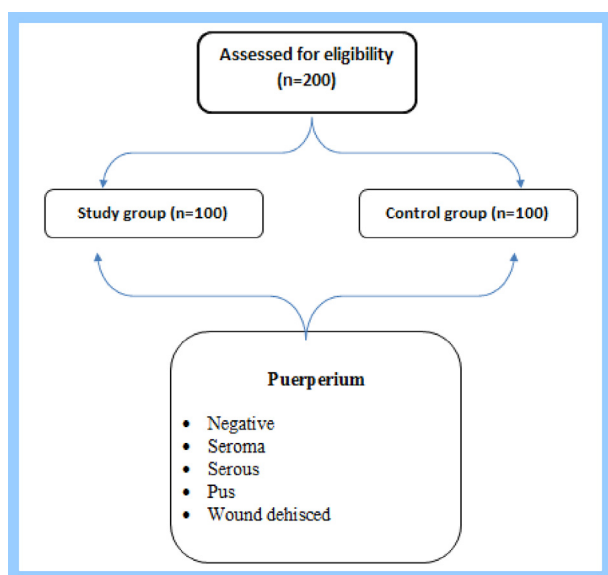


Fig. 1. Flow chart.

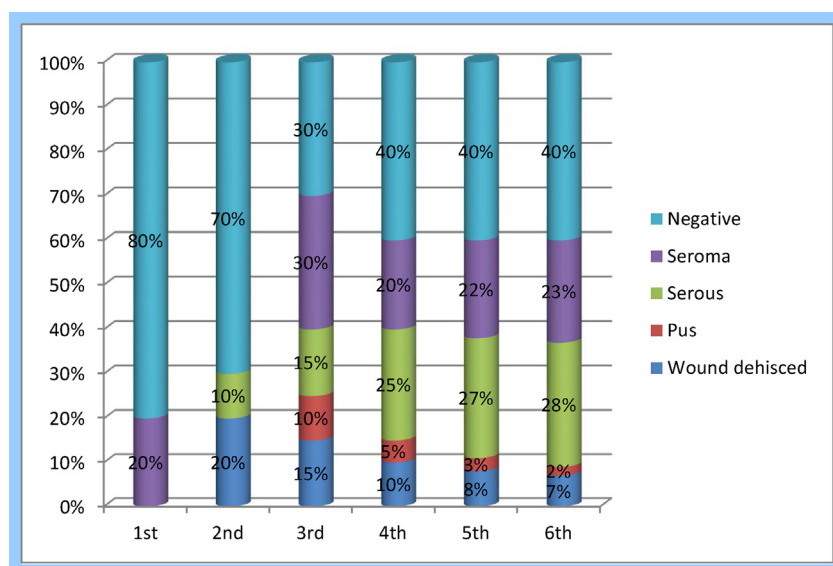


Fig. 2. Extent of difference over weeks through Puerperium in the Saline Group.

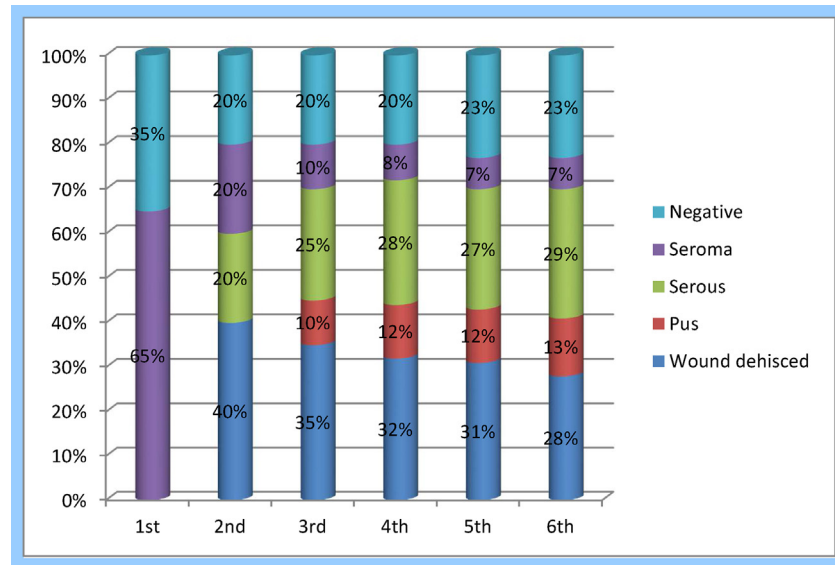


Fig. 3. Extent of variation over weeks through Puerperium in Control category.

Table 3. Comparing among saline category and control category according to puerperium at secondary outcome.

Puerperium	Saline Group (n = 7)	Control Group (n = 28)	χ^2	P value
1st week				
Negative	5 (71.4%)	20 (71.4%)	1.667	0.644
Seroma	2 (28.6%)	4 (14.3%)		
Serous	0 (0.0%)	3 (10.7%)		
Pus	0 (0.0%)	1 (3.6%)		
Wound dehiscence	0 (0.0%)	0 (0.0%)		
2nd week				
Negative	7 (100.0%)	21 (75.0%)	2.188	0.534
Seroma	0 (0.0%)	3 (10.7%)		
Serous	0 (0.0%)	3 (10.7%)		
Pus	0 (0.0%)	1 (3.6%)		
Wound dehiscence	0 (0.0%)	0 (0.0%)		
3rd week				
Negative	7 (100.0%)	21 (75.0%)	2.188	0.335
Seroma	0 (0.0%)	5 (17.9%)		
Serous	0 (0.0%)	2 (7.1%)		
Pus	0 (0.0%)	0 (0.0%)		
Wound dehiscence	0 (0.0%)	0 (0.0%)		
4th week				
Negative	7 (100.0%)	28 (100.0%)	0.000	1.000
Seroma	0 (0.0%)	0 (0.0%)		
Serous	0 (0.0%)	0 (0.0%)		
Pus	0 (0.0%)	0 (0.0%)		
Wound dehiscence	0 (0.0%)	0 (0.0%)		

Using: χ^2 : Chi-square test.

P value > 0.05 NS.

*P value < 0.05S.

**P value < 0.001 HS.

comparison to 1130 caesarean sections without irrigation. According to research, there was no statistically important variation among categories in terms of all baseline characteristics.

As well, Gül,⁶ purpose of this study was to see how subcutaneous saline irrigation throughout

caesarean section affected postoperative surgical location difficulties. Two groups of 230 females undergoing elective caesarean delivery were formed. In group one (n = 115), subcutaneous tissue was irrigated with saline solution, but not in group 2 (n = 115). Comparison of groups in terms of

demographic characteristics demonstrated no differences in terms of years old, BMI, & gestational age ($P > 0.05$ for all).

Research found that patients Puerperium “Seroma at first week” there were 20 cases (20%) of Saline Group, compared to 65 cases (65%), there was greatly statistically important variation among categories with (P value of <0.001 highly significant).

While Puerperium “Seroma at second week” there were 0 cases (0%) of Saline Group, compared to 20 cases (20%), there was greatly statistically important variation among categories with (P value of <0.001 highly significant).

In a prospective randomized study, Çetin et al.,⁷ found no important variation among categories in terms of SSI rates (14.3% in the saline group, 12.8 percent in control category, $P = 0.76$). But, they reported that the presence of hematoma and seroma in saline irrigation category was significantly minor than control category.

Also, present research was supported by Gül,⁶ who revealed that Seroma (7% vs. 15.7%, $P = 0.013$), hematoma (6.1% vs. 15.7%, $P = 0.024$), and superficial surgical place infection (4.3% vs. 11.3%, $P = 0.035$) were significantly lower in saline irrigation group, whereas wound dehiscence ($P = 0.176$) was similar.

As regard extent of variation over weeks through Puerperium in Saline Group. Patients Puerperium “Seroma” at first week, second week, third week, fourth week, fifth week and sixth week, there were 20 (20.0%), 0 (0.0%), 30 (30.0%), 20 (20.0%), 22 (22.0%), and 23 (23.0%), respectively in Saline Group, there was greatly important variation with (P value of <0.001 highly significant).

The present study revealed the beneficial effect of saline irrigation in women underwent CS. was supported by several studies, Gül,⁶ reported that Seroma (seven percent vs. 15.7%, $P = 0.013$), hematoma (6.1% vs. 15.7%, $P = 0.024$), and superficial surgical place of infection (4.3% vs. 11.3%, $P = 0.035$) were significantly lower in saline irrigation group, whereas wound dehiscence ($P = 0.176$) was similar. They concluded that irrigation of subcutaneous tissue with saline throughout caesarean section significantly reduced rates of seroma, hematoma, and superficial surgical place of infections.

However, Çetin et al.⁷ reported that There was no statistically important variation in SSI rates between groups (14.3% in saline group vs 12.8% in control group, $P = 0.76$). Even so, when compared to control group, presence of hematoma and seroma was significantly lower in saline irrigation group. According to findings of research, irrigation of subcutaneous tissue reduces occurrences of both

postoperative hematoma and seroma in females undergoing primary caesarean sections.

In contrast to our outcomes Andan et al.⁵ SSI was found in 22 (1%) of 2220 studied cases. Infected studied cases included 9 (0.8%) in saline group and 13 (1.1%) in control group. There was no important variation in SSI among studied cases who received saline irrigation prior to closing surgical wound incision and those who did not ($P > 0.05$). The disagreement may be due to the differences in sample size and inclusion criteria.

Furthermore, the systematic review and meta-analysis by Ambe et al.⁸ included relative risk of developing SSI was smaller when wound irrigation with normal saline was done prior to wound closure in 4 RCTs involving total of 1194 studied cases, however impact was not statically important. Equally, there was no variation in hospital stay length between two intervention arms. This systematic review found no benefit to routine irrigation of abdominal wounds with normal saline over no irrigation prior to wound closure in terms of avoiding or decreasing rate of SSI.

4.1. Conclusion

The current research found that saline irrigation of obese pregnant female's subcutaneous tissue throughout caesarean section significantly reduced rates of seroma, hematoma, and superficial surgical place of infections. Even so, there were no variations in wound dehiscence among categories.

Authorship

All authors have a substantial contribution to the article.

Consent for publication

I verify that all authors have agreed to submit manuscript.

Availability of data & material

Available.

Conflict of interest

Authors declare that there is no conflict of interest, and have no financial interest to declare in relation to the content of this article.

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