A COMPARATIVE STUDY OF EFFECTIVENESS OF SUBCUTANEOUS SALINE IRRIGATION DURING CLOSURE OF EMERGENCY LOWER SEGMENT CAESAREAN SECTION INCISION ON POSTOPERATIVE SURGICAL SITE COMPLICATIONS

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Abstract

Background: Healthcare-associated infections (HAI) are common worldwide and amongst one of them is wound infections which includes surgical site infections (SSI). Studies on unconventional methods of prevention of superficial wound infection, during emergency Lower Segment Caesarean Sections (LSCS)are relatively less in literature.

Aim: The study was conducted with the aim to determine the role of irrigation of subcutaneous tissue of wound with Normal Salineduring closure of emergency LSCS on reducing SSI and decreasing the morbidity.

Methodology:

An interventional study was conducted for a period of 8 months. A totalof 100 women who consented and fulfilled the inclusion criteria were included in the study. Patients were randomlyallocated to 2 groups by closed envelope method namely; Group A withirrigation of subcutaneous wound with normal saline and Group B as control with no saline irrigation of wound. Data entry was done in Microsoft excel and analysis using SPSS (Statistical Package for Social Sciences) Software version 20/ Epi Info. Postoperative laboratory findings after 24 hours and postoperative surgical site complications on day 7 were compared among Group A and Group B.

Result: The overall mean age in Group A was 32 ±5.52 years and in Group B was 30 ±5.12years.More than half of the patients were Primigravida. Based on laboratory findings and surgical site complications, both the groups were compared and it was found thatGroup Awas significantly better than control group in terms of healing of the wound (in the Group A versus Group B, incidences of surgical complications were; seroma 8% vs 18%, hematoma 6% vs 20%, and superficial SSI 4% vs 24%, p-values were <0.05). There was a clinically indifferent but statistically significant increase in the total time duration of surgery for Group A (mean value of 35.56 min versus 33.15 min, P<0.05 significant)

Conclusion: Saline irrigation of subcutaneous tissues during closure of emergency caesarean section can be a simple and effective, non-conventional method of reducing postoperative surgical site infection.

Keywords: wound gape, wound closure, saline irrigation, wound irrigation, WI, emergency lower segment caesarean section, LSCS, surgical site infection, SSI, HAI.

Introduction

According to the World Health Organization (WHO), healthcare-associated infections (HAIs) acquired by patients when receiving hospital-based treatment, are frequent adverse events worldwide. Urinary tract infection, pneumonia, bloodstream, and wound infections with microorganisms represent the most common HAIs[1]. Surgical site infection (SSI) describes an infectious complication of surgical wounds. With an incidence of about 20%, SSI has been shown to be the most common HAI[2]. The rationale behind wound irrigation (WI) with sterilenormal saline (NS)is to flush the surgical incision with a solution to physically remove cellular debris, trapped fluids and reduce bacterial load. In current guidelines, WI is not addressed as a means of reducing the rate of SSI, probably due to the low level of evidence. Nonetheless, data suggest potential benefit of WI prior to skin closure exit[3,4] and are in line

with our clinical experience with routine WI with normal saline prior to wound closure.Advantages of NS irrigation include- decreasing the incidence of SSI, low cost, no special technique required, decreased morbidity,very less guidance. Due to the limited data on NS irrigation of subcutaneous wound prior to closure in emergency LSCS,we undertook the present study to evaluate the effect ofthis non-conventionalmethod in prevention of postoperative surgical site complications.

Materials and Methods

The study was conducted among patients attending Department of Obstetrics and Gynaecology of Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune, India. An interventional study was conducted from January 2022 to August 2022. A prior ethical clearance was obtained from Institutional EthicsSub-Committee, before the initiation of the study (I.E.S.C./112/2021). Women undergoing cesarean delivery and who gave written informed consent to participate in the study were included.

Inclusion Criteria

- Patients between 20-40 years of age
- Gestational age of 37-42 weeks who were to undergo caesarean section for the first or second time were included in the study.

Exclusion Criteria

- Patients with an active infection,
- Premature rupture of membranes,
- Surgical drains,
- Subcutaneous tissue thickness of >3 cm,
- Allergic reaction, and
- Patients using steroids, and
- Patients with a body temperature above 38°C.

Methodology

The patients fulfilling the inclusion criteria were selected for the study. A total of 100 subjects were included in the study. They were divided equally into two groups by closed envelope method(GroupA with subcutaneous saline irrigation and Group B as control). The patient herself picked up a closed/sealed envelope with group name mentioned inside, it was handed and blind.Data was collected using a pretested proforma meeting the objectives of the study.Detailed history and necessary investigations were undertaken. As an institutional antibiotic policy, one grams of Ceftriaxone was administered intravenously, to all the

patients,30 minutes prior to incision. All surgeries were performed by on duty qualified surgeons, under same conditions and with strict aseptic precautions using standard protocols. Before closure of surgical site,the subcutaneous tissue was irrigated with 200 ml of sterile normal saline solution (0.9% w/v NaClsaline solution) in Group A and not used in Group B. The skin margins were held with Allis tissue holding forceps, 4 in number, on at each angle of skin and one on upper and lower edge, at centre of skin incision. The Allis forceps were used to pull up the skin to create a shallow crater, with one angle of skin being pulled more, to let the saline flow towards the other angle. Approximately200ml of sterile normal saline was directly poured from the saline bottle at room temperature on the subcutaneous fat and was allowed to flow by gravity towards the lower angle, where it was sucked out with the tip of a suction cannula. Thus overflow was taken care of. Skin was closed with ethilon 2-0,on reverse cutting point, 4cm, half-circle needle by vertical mattress suture (far- far, near-near). Patients' demographic characteristics, preoperative haemoglobin and haematocrit levels, duration of the operation, and evaluations of the surgical site in terms of hematoma, seroma, wound dehiscence and superficial surgical site infection was done through inspection on the 7th postoperative day, by all consultants (three) together in ward rounds andconclusions were made by majority. Consultants were not aware of the group allocations of patients.The collected data was coded, entered into Microsoft excel work sheet and exported to SPSS. Data was analysed using SPSS version 21. Chi-square test and t-test were used for test of statistics.

Results:

Table 1: Distribution according to age and BMI

	Group A	**Group B**	**P value**
Age	**32 ±5.52**	**30 ±5.12**	**0.48**
BMI	**28.19 ± 3.22**	**29.92 ± 3.41**	**0.06**

The mean age of Group A was 32 ±5.52 and in the Group B was 30 ±5.12. The mean Body mass index in the saline Group A was 28.19 ± 3.22 and in the control Group B was 29.92 ± 3.41. The study showed no difference in terms of demographic characteristics with relation to age, Body mass Index between the two Groups as the p-value was>0.05. (Table 1)

Table 2: Preoperative Haemoglobin (Hb) gm/dl and HCT%

	Group A	**Group B**	**P value**
Mean preoperative Hb gm/dl	**12.22±1.13**	**12.41 ±1.53**	**0.48**
Mean preoperative HCT%	**34.88 ±2.45**	**35.77 ±2.41**	**0.07**

In Group A the mean preoperative Hb ingm/dl was 12.22±1.13, mean preoperative HCT% was 34.88 ±2.45. In the control Group B, the mean preoperative Hb gm/dl was 12.41 ±1.53, mean preoperative HCT% was 35.77 ±2.41. There was no significant association with relation to preoperative Hb in gm/dl and HCT% between the groups as the p-value calculated to be >0.05. (Table 2)

Table 3: Postoperative laboratory findings

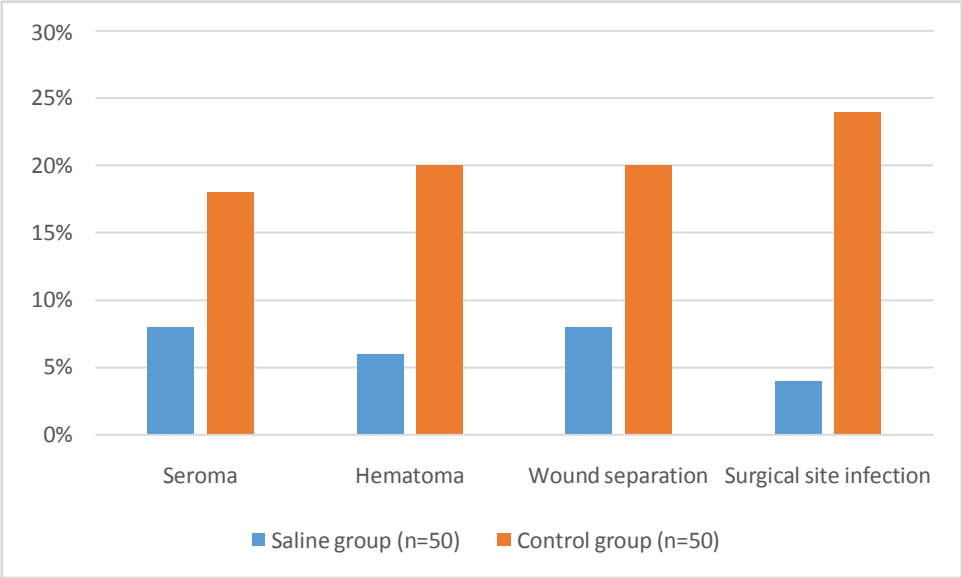
	Group A	**Group B**	**P value**
Mean postoperative Hb (gm/dl)	**11.21±1.41**	**11.73 ±1.74**	**0.10**
Mean postoperative HCT(%)	**33.11 ±2.65**	**32.98±1.54**	**0.76**
Mean duration of surgery (min)	**35.56 ±1.87**	**33.15 ±2.12**	**<0.05**

- In Group A, the mean postoperative Hb gm/dl was 11.21±1.41, mean postoperative HCT% was 33.11 ±2.65. In the control group, the mean postoperative Hb in gm/dl was 11.73 ±1.74, mean postoperative HCT% was 32.98±1.54. There was no significant association with relation to postoperative Hb gm/dl and HCT% between the groups as the p-value calculated to be >0.05(Table 3).
- The mean duration of surgery in minutes in the saline group was 35.56 ±1.87 and in the control group was 33.15 ±2.12. This observation was statistically significant as the p-value was <0.05 (Table 3).

Table 4: Post-operative complications

	Saline group (n=50)	**Control group (n=50)**	**P value**
Seroma	4 (8%)	9 (18%)	0.02*
Hematoma	3 (6%)	10 (20%)	0.03*
Wound separation	4 (8%)	10 (20%)	0.72

Surgical site infection	2 (4%)	12 (24%)	0.004*



- The incidence of seroma in the saline group was 8% and in the control group was 18%.

This observation was statistically significant (Table 4).

- The incidence of Hematoma in the saline group was 6% and in the control group was 20%. This observation was statistically significant (Table 4).
- The incidence of Wound separation in the saline group was 8% and in control group it was 10%. This observation was not significant (Table 4).
- Superficial Surgical Site infection in the saline group was 4% and in control group it was 24%. This observation was statistically significant (Table 4).

Discussion

Caesarean section is one of the most common surgical procedures[5]. The incidence of LSCS has increased significantly in the last two decades, especially in developed countries[6]. After surgical procedures, wound complications develop in 3 to 30% of the patients[7]. Hence the present study was conducted to evaluate the efficacy of wound irrigation with normal saline in reducing surgical site infection and to compare the rate of SSI in patients following wound irrigation with normal saline to that of patients without wound irrigation prior to wound closure.The study presented is least likely to be surgical skill biased as all the surgeons who performed caesarean section had similar surgical skills. Assessment bias was also reduced as the authors and chief consultant have assessed the surgical wound at same time and

unanimously a decision was taken. Similarly, observer bias as reduced as same antibiotics at same dosing along with same analgesics were given to all the patients.

In the present study, the incidence of post-operative complications in the saline irrigation group vs Control group where seroma was 8% vs 18%; P=<0.05, hematoma was 6% vs 20%; P<0.05, wound separation was 8% vs 10%; P=>0.05, superficial surgical site infection was 4% vs 24%; P<0.05.

In a prospective intervention study conducted by Suzanne et al[8] reported that SSI after CS, we recorded an initial SSI rate of 16%, which was reduced to 4.9%, a statistically significant difference, after a series of quality interventions.Incidence of surgical site infection post CS was recorded a rate of 17% in an Australian study.[9]In a study from New York, 59 of 765 patients developed an SSI, for a rate of 7.7%[10] A Brazilian study reported an overall SSI rate of 24% (44 of 187 women),[11] higher than our baseline rate.

In a meta-analysis conducted by Mueller et al where wound irrigations with antibiotics, povidone-iodine or saline were reported to reduce the risk of SSI[12] while another meta-analysis reported that wound irrigation with povidone-iodine solution had a low impact on SSI.[13]Although there are different solutions for wound irrigations, saline (0.9% sodium chloride) is the most commonly used solution. There is scant data on intraoperative wound irrigation with saline to prevent infections. The Cervantes-Sanchez study reported that on patients who had abdominal surgery reported a reduction of SSI from 25% to 8.7% with the saline irrigation[14].

Al-Ramahi et al[15] study did not report a significant difference in terms of wound infections in women that underwent gynecologic surgeries (10.6% in the saline group vs 9.8% in the control group).Gungorduk et al[16] used 100 ml of saline for the irrigation of the subcutaneous tissue while we preferred 200 ml of saline for the irrigation. In our study, found a meaningful difference among the two groups in terms of superficial SSI (4% in the saline group vs 12% in the control group).

These observations on the surgical site complications with statistical significance in our study, suggest that woundsirrigated with normal saline during closure of emergency LSCS may have lesser wound complications and infections, most probably due to clearance of cellular doubles, oil debris, decreasing of bacterial load (all LSCS are clean contaminated wounds), better visibility of underwater bleeders and most importantly the surgeon might be taking more care when WI is done.Also, sometimes would, might get dry and normal saline WI prevents this.

The statistically significant increase in the time duration of the surgery did not clinically affect much,in terms of overall surgeon performance. Infact, the surgeons probably were more cautious, which can also be a performer bias, and this could not be avoided. The overall favourable surgical outcomes in patients in Group A with subcutaneous saline wash, outweigh the increase in duration of the LSCS surgery.

Limitations

1. Sample size was small.
2. Operating surgeon could not be blinded to WI, infact the surgeon did WI.
3. There can be a possibility of performance bias with more meticulous closure done in Group with WI.
4. Long term assessment not possible due to loss of follow-up.

Conclusion

The study suggested that, giving saline irrigation subcutaneously, before surgical closure of the skin, in emergency Lower Segment Cesarean Sections (LSCS), significantly reduced the post-operative surgical site complications like seroma, hematoma, wound separation, infection.Hence giving subcutaneous saline irrigation during closure of emergency LSCS, might be beneficial for the patient, hospitals, society and might be economically more affordable. It might also bring down the use of antibiotics overuse and misuse by decreasing the incidence of surgical site infections and complications.

Source of funding: Normal saline were already available in Operation Theatre. No additional funds required for the conduct of the study.

Conflict of interest: Nil

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