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# What's the right time for dressing in a cesarean wound? Early versus late dressing removal in cesarean wound

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**Abstract**
**Background:** This study was carried out to evaluate the efficacy of early versus late dressing removal in cesarean wounds.
**Method:** Five hundred females, aged between 18 to 40 years who were admitted in a tertiary care center and underwent (both emergency and elective) were included in the study. Two study groups were formed after randomization: Early dressing removal group in which wound dressing was removed after post cesarean section day-4 and Late dressing removal group in this dressing was removed after 8th day post cesarean section. Each group had 250 cases. The primary outcome was incidence of surgical site infection (SSI) in both groups. The secondary parameters like duration of wound healing and hospital stay were studied.
**Result:** The incidence of superficial SSI (%) was significantly less in early removal group of 84% cases (p= <0.001). The duration (in days) required for complete wound healing (6.6 in early dressing removal group versus 10.6 in late dressing removal group; p<0.001) was statistically significant. The length of postoperative hospital stay (days) was significantly less in early removal group (5.6 versus 10.08; P=<0.001).
**Conclusion:** Early removal of dressing significantly reduces the incidence of superficial SSI in clean cesarean wound. It facilitates early wound healing and shorter hospital stay. Thus, improves quality of life and reduces financial burden.

**Keywords:** Early dressing removal, late dressing removal, postoperative stay, quality of life, surgical site infection, wound dehiscence

## Introduction
Cesarean delivery (CD) is one of the most common procedures performed in the India, accounting for 30% of all deliveries [1]. In India the overall rate of cesarean section has increased from 8.5% to 17.2% [2]. The cesarean section is complicated by various complications which lead to increased morbidity, prolonged hospital stay, return to operating theatre and readmission rates. Major Caesarean section (CS) surgical site infections (CSSSI) are common (3-15% of all CS) [3]. 2-7% cases post-cesarean section gets complicated by wound infection and 2-16% develops endometritis. After cesarean section, the skin incision is closed using stiches, staples, dermo bond or adhesive glue. At the end, the surgical wound is covered by sterile gauze and adhesive tape or an adhesive tape containing a sterile pad. The dressing can act as a physical barrier for the wound until the healing of the skin is restored (within about 48 hours) and to absorb exudate from the wound, keeping it dry and clean, and preventing bacterial contamination from the external environment [4, 5]. Early dressing removal encourages early identification of SSI, which is favored faster postoperative mobilization of the patient. Avoidance of post-operative wound inspection for four to more days may result in significant accumulation of sweat and dirt, compromising wound hygiene. Conversely, early removal effect on wound healing by disturbing the healing environment [5, 6].
There are currently no guidelines about the timing of wound dressing for its inspection after the caesarean without the risk to healing wound.
Hence this study was done to study and evaluate the clinical efficacy of Early [within post cesarean section day 4th] versus late [after 8th day post cesarean section].

**Aim and objective of study**

To study the benefits and risks of early (within post cesarean section day 4th) versus late (after 8th day post cesarean section) dressing removal in caesarean wound.

**Material and Method**

It was a prospective and randomized, controlled study which was conducted over a period of six months November 2019 to April 2020 at a tertiary care center in the department of Obstetrics and Gynecology, ESI PGIMSR Basaidarapur, New Delhi. The antenatal woman aged between 18 years to 40 years who underwent caesarean section were included in study. The cases with obstructed labor, chorioamnionitis, intrauterine death and fever were excluded from study. Women who agreed to participate and gave a written informed consent were enrolled in study. A detailed explanation, both verbal and written, was given by investigator to the patients prior to recruitment. After the caesarean section, in both elective and emergency cesarean, rectus was closed with vicryl suture. The subcutaneous area was washed with betadine. The skin was closed with either Monocryl or silk. After closure, the wound was cleaned with betadine. The wound was covered with two pieces of sterile gauze piece and water proof adhesive bandage or plaster was applied all over the wound. Per-operative antibiotics (based on the Institute protocol) were continued for 5 days or more depending on comorbidities. The women were assigned in groups randomly. The Group A- Early dressing removal: The dressings were opened on post caesarean section day 4th and Group B- Late dressing removal the dressing was opened after 8th day post caesarean section. The sutures were removed on 10th to 12th day post cesarean section. The wound was assessed for healing and presence of infection according to ASEPSIS score [7].

The ASEPSIS is a quantitative scoring method that provides a numerical score related to the severity of wound infection using objective criteria based on wound appearance and the clinical consequences of the infection. Severity of impaired wound healing is indicated by the total score as follows: satisfactory healing 0 to 10; disturbance of healing 11 to 20; minor wound infection 21 to 30; moderate wound infection 31 to 40; and severe wound infection more than 40.

**Statistical Analysis**

The presentation of the Categorical variables was done in the form of number and percentage (%). On the other hand, the presentation of the continuous variables was done as mean ± SD and median values. The data normality was checked by using Kolmogorov-Smirnov test. The cases in which the data was not normal, we used non parametric tests. The following statistical tests were applied for the results:

1. The comparison of the variables which were quantitative in nature were analyzed using Mann-Whitney Test.
2. The comparison of the variables which were qualitative in nature were analyzed using Chi-Square test.

The data entry was done in the Microsoft EXCEL spreadsheet and the final analysis was done with the use of Statistical Package for Social Sciences (SPSS) software version 21.0.

For statistical significance, p value of less than 0.05 was considered as significant.

The primary outcome parameters studied were ASEPSIS Wound Score.

1. Wound-related complications:
2. Stitch line infection
3. Disruption seroma
4. Hematoma formation

The women were followed up for a period of one month to detect complications.

The Secondary outcome studied were:

- ASEPSIS Wound Score [Time Frame: 2 Week Follow-Up]
- ASEPSIS Wound Score [Time Frame: 6 Week Follow-Up]
- ASEPSIS wound scoring system

| Criterion | Description | Point |
|---|---|---|
| A (Additional Treatment) | Antibiotics | 10 |
| | Drainage of pus under local Anesthesia | 5 |
| | Debridement of Wound (General Anesthesia) | 10 |
| S (Serious Discharge) | Daily | 0-5 |
| E (Erythema) | Daily | 0-5 |
| P (Purulent Exudates) | Daily | 0-10 |
| S (Separation of Deep Issues) | Daily | 0-10 |
| I (Isolation of Bacteria) | | 10 |
| S (Stay in Hospital Prolonged over 14 days) | | 5 |

**Result**

A total of 620 cases underwent cesarean section between November 2019 to April 2020. After the written and informed consent to participate in study, 500cases were enrolled who fulfilled the inclusion and exclusion criteria.

The Group A- Early dressing removal: 250 cases were enrolled and Group B- Late dressing removal: 250 cases were enrolled. Cases were randomly allocated in the two groups.

**Table 1:** Comparison of socio-demographic characteristics between day of dressing removal

| Socio-demographic characteristics | D4 (n=250) | D8 (n=250) | Total | P value | Test performed |
|---|---|---|---|---|---|
| **Age (years)** | | | | | |
| Mean ± Stdev | 29.8 ± 4.68 | 28.12 ± 4.47 | 28.96 ± 4.65 | <.0001 | Mann Whitney test;24000 |
| Median (IQR) | 29 (27-33) | 26 (25-31) | 28 (26-32) | | |
| Range | 22-38 | 22-39 | 22-39 | | |
| **Body mass index (kg/m²)** | | | | | |
| 18.5-22.9 {Normal BMI} | 140 (56%) | 80 (32%) | 220 (44%) | <.0001 | Chi square test,38.649 |
| 23-24.99 {Overweight} | 90 (36%) | 120 (48%) | 210 (42%) | | |
| 25-29.99 {Preobese} | 10 (4%) | 40 (16%) | 50 (10%) | | |
| >=30 {Obese} | 10 (4%) | 10 (4%) | 20 (4%) | | |
| Mean ± Stdev | 22.84 ± 2.31 | 23.37 ± 2.15 | 23.1 ± 2.24 | 0.0001 | Mann Whitney test;25200 |

| | | | | | |
|---|---|---|---|---|---|
| Median (IQR) | 22 (21-24) | 23 (22-24) | 23 (22-24) | | |
| Range | 20-30 | 20-30 | 20-30 | | |
| **Diabetes** | | | | | |
| No | 240 (96%) | 230 (92%) | 470 (94%) | 0.06 | Chi square test,3.546 |
| Yes | 10 (4%) | 20 (8%) | 30 (6%) | | |

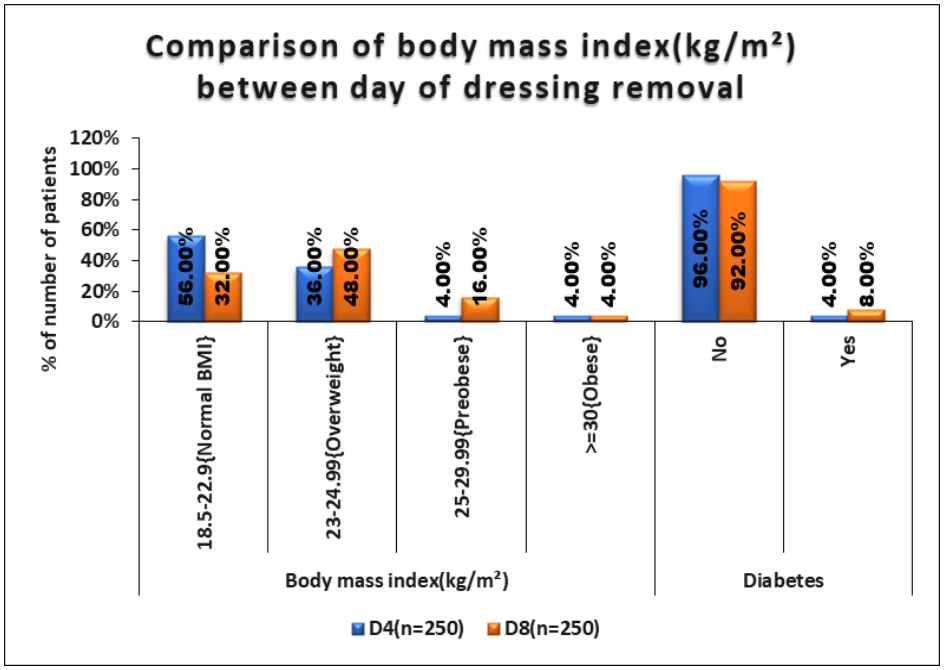


**Fig 1.1:** Comparison of body mass index (kg/m²) between day of dressing removal

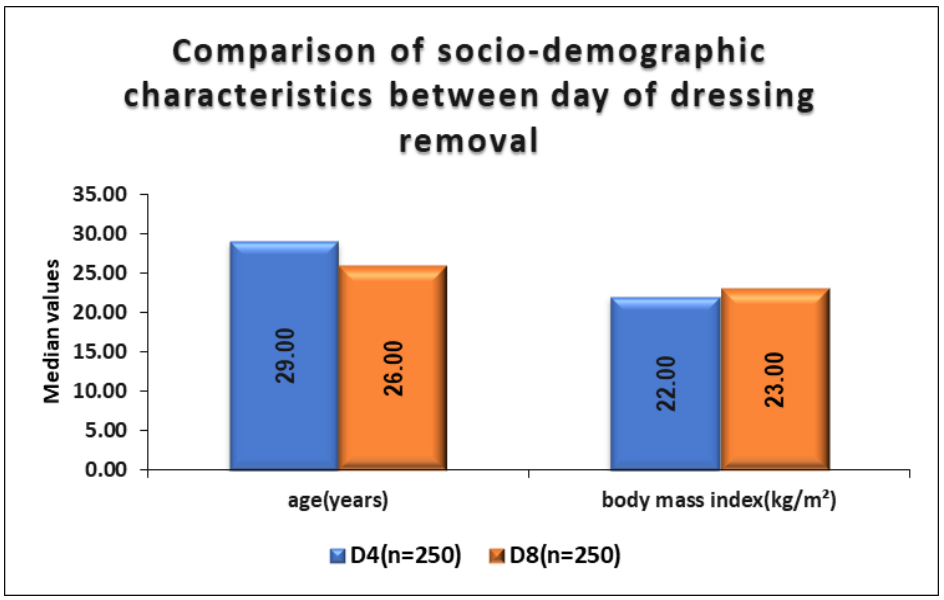


**Fig 1.2:** Comparison of socio-demographic characteristics between day of dressing removal.(non-parametric variable)

Both groups were comparable with demographic profile.

**Table 2:** Comparison of delivery characteristics between day of dressing removal

| Delivery characteristics | D4 (n=250) | D8 (n=250) | Total | P value | Test performed |
|---|---|---|---|---|---|
| **Indication** | | | | | |
| Elective | 50 (20%) | 70 (28%) | 120 (24%) | 0.036 | Chi square test,4.386 |
| Emergency | 200 (80%) | 180 (72%) | 380 (76%) | | |
| **Primary/repeat** | | | | | |
| Primary | 140 (56%) | 160 (64%) | 300 (60%) | 0.068 | Chi square test,3.333 |
| Repeat | 110 (44%) | 90 (36%) | 200 (40%) | | |
| **Subcutaneous/mattress suture** | | | | | |
| Mattress | 180 (72%) | 150 (60%) | 330 (66%) | 0.005 | Chi square test,8.021 |
| Subcutaneous | 70 (28%) | 100 (40%) | 170 (34%) | | |

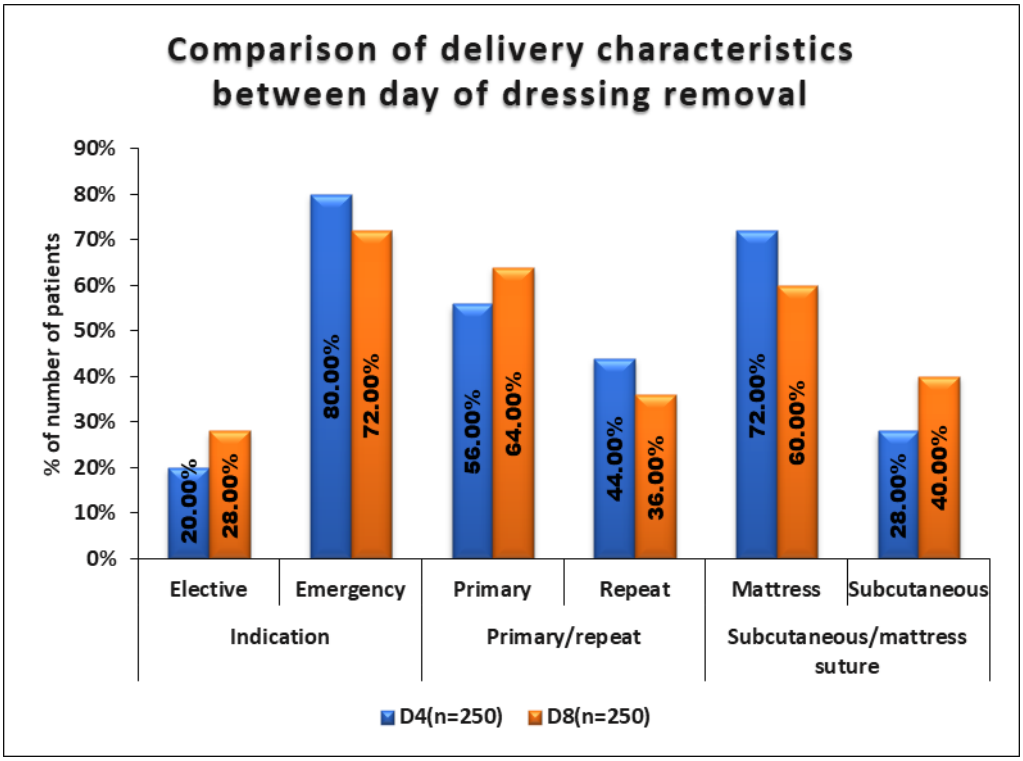


**Fig 2:-**Comparison of delivery characteristics between day of dressing removal

There was no statistically difference in the both groups regarding indication of cesarean section, whether primary cesarean section or a repeat cesarean section.

There was significant difference (p value <0.001) in the development of SSI –surgical site infection in both group. [16% in group A versus 32% in group B]. The incidence of SSI was more in emergency section as compared to elective cesarean section (87 versus 33, p-=.016). There was no significant difference in development of SSI based on type of section primary or repeat (82 versus32; p=0.059).

Type of suture material used to close the skin wound in both groups were comparable and no statistical difference was noted. There was statistically significant difference on the development of SSI depending on the type of skin suture (29 versus 91; p=0.039) showing that pt who have been given sub-cut suture have less chances to develop SSI.

| SSI Incidence | | Early Removal | Late Removal | P- Value |
|---|---|---|---|---|
| Total | | 40 (16%) | 80 (32%) | .001 |
| Type | Primary | 13 (32%) | 69 (86%) | 0.059 |
| | Repeat | 27 (67%) | 11 (14%) | |
| Indication | Elective | 12 (30%) | 21 (26%) | 0.016 |
| | Emergency | 28 (70%) | 59 (73%) | |
| Skin Suture | Subcutaneous | 10 (25%) | 19 (23%) | 0.039 |
| | Mattress | 30 (75%) | 61 (77%) | |

**Table 3:** Comparison of outcome between day of dressing removal

| Outcome | D4 (n=250) | D8 (n=250) | Total | P value | Test Performed |
|---|---|---|---|---|---|
| **Development of SSI** | | | | | |
| No | 210 (84%) | 170 (68%) | 380 (76%) | <.0001 | Chi square test,17.544 |
| Yes | 40 (16%) | 80 (32%) | 120 (24%) | | |
| **Number of dressing** | | | | | |
| Mean ± Stdev | 2.4 ± 0.98 | 3.12 ± 1.75 | 2.76 ± 1.47 | <.0001 | Mann Whitney test;25400 |
| Median (IQR) | 2 (2-2) | 2 (2-5) | 2 (2-2) | | |
| Range | 2-6 | 2-8 | 2-8 | | |
| **Duration of healing** | | | | | |
| Mean ± Stdev | 6.64 ± 1.86 | 10.64 ± 2.08 | 8.64 ± 2.81 | <.0001 | Mann Whitney test;5650 |
| Median (IQR) | 6 (6-6) | 10 (10-12) | 9 (6-10) | | |
| Range | 5-12 | 6-15 | 5-15 | | |
| **Hospital stay** | | | | | |
| Mean ± Stdev | 5.68 ± 2.13 | 10.08 ± 2.67 | 7.88 ± 3.27 | <.0001 | Mann Whitney test; 6150 |
| Median (IQR) | 5(4-6) | 10(8-12) | 8 (5-10) | | |
| Range | 4-12 | 6-16 | 4-16 | | |

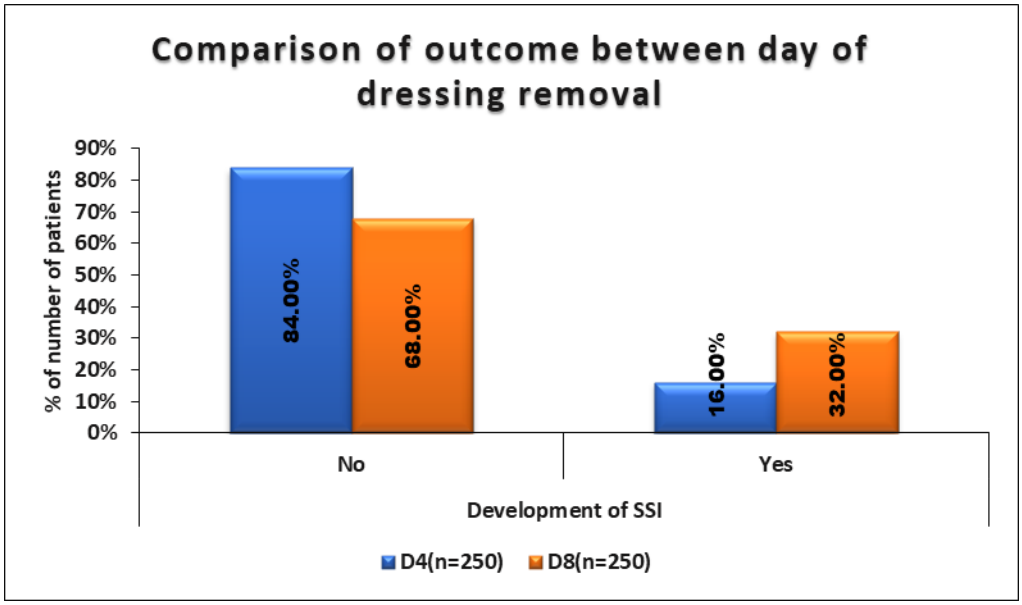


**Fig 3.1:** Comparison of outcome between day of dressing removal

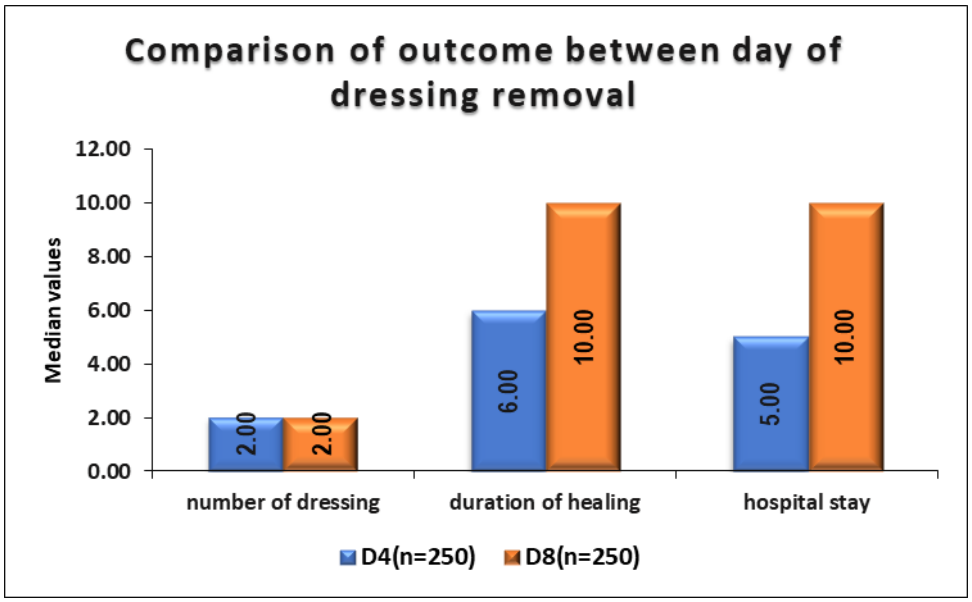


**Fig 3.2:** Comparison of outcome between day of dressing removal (non-parametric variables)

There was statistically significant difference between the two groups in terms of the number of days required for complete wound healing (6 versus 10 p value <0.001). The mean number of dressings required to achieve complete wound healing were less in early wound dressing group which was statistically significant (p value <0.001).

The difference in the mean length of postoperative hospital stay between the groups was statistically significant (5 versus 10; p value <0.001).

All the patients in both groups at the end of one month, achieved wound cover either by primary intention (by surgery) or secondary intention

## Discussion

There is global increase in the rate of cesarean section, accounting for 21% of births globally in 2015. [8] The cesarean section surgical site infection is the major cause of increased maternal morbidity. The cesarean section surgical site infection is responsible large burden on health care system. The risk factors for SSI includes maternal factors (such as tobacco use; limited prenatal care; obesity; corticosteroid use; nulliparity; twin gestations; and previous CD), intrapartum and operative factors (such as chorioamnionitis; premature rupture of membranes; prolonged rupture of membranes; prolonged labor, particularly prolonged second stage; large incision length; subcutaneous tissue thickness > 3 cm; subcutaneous hematoma; lack of antibiotic prophylaxis; emergency delivery; and excessive blood loss) [3, 9].

The Wound dehiscence is a condition which adds significant morbidity and prolongs the hospital stay. The most dreaded immediate complication is burst abdomen which requires urgent re-exploration. Other complications include deep seated abscess, sepsis (early complications) and high incidence of an incisional hernia (late complications) (69%) [5, 6, 10].

In the present study, the BMI of cases in both group has no effect on SSI in respect to day dressing. The similar finding was observed by Eberhardt D *et al.* that BMI greater than 25 was not a definitive risk factor for wound dehiscence (p=0.456) [10].

The presence of diabetes as comorbidity in a case of cesarean section has not been associated with increased incidence of SSI

with respect to day of dressing post cesarean section. The present study supports it as there is no statistically significant difference in SSI in relation to diabetes in both groups (P value=0.06). The study done by Dumville JC *et al*. found that there was no significant effect of diabetes in the occurrence of wound dehiscence [11].

The SSI was higher in emergency cesarean sections (70% - 73%) as compared to (23% to 30%) in elective cesarean sections. The indication of surgery has significant effect on development of SSI. Norman G *et al.* reported 1.8 times increased risk of SSI (OR=1.8) in emergency surgeries [12].

The wound healing depends on the method of stitch line closure. Kajari *et al* [13] found 28%better healing and good cosmetic results in subcuticular closure as compared to 10% in vertical mattress closure. In this study, the incidence of SSI was higher in mattress closure and delayed wound dressing. The percentage of stitch line infection with subcuticular stitch line closure was 23% in early dressing group to 25% in delayed wound dressing group. The percentage of stich line infection in mattress closure technique was 75% in early dressing group to 77% in delayed dressing group.

In the present study, the development of SSI was more in delayed dressing group (p value <0.001) as compared to early dressing group. The number of dressing, hospital stay and duration of wound healing were statistically less in early dressing when compared to delayed dressing group. (p value <0.001).

These findings correlated with the finding of Vijaykumar *et al* study. Early dressing removal is found to be beneficial for early identification of the SSI (both superficial and deep) in the study done by Vijaykumar *et al*. [14] The study also concluded that early wound dressing reduces the time the required for wound healing.

Gavin NC and Toon CD *et al*. reported that there is no significant difference in the length of hospital stay among the compared groups (p= 0.06) [15, 5].

## Conclusion

With the global increase in burden of cesarean section, there is need for early removal of dressing to facilitate timely recognition of stitch line infection and decrease hospital stay. Early removal of dressing significantly reduces the incidence of superficial SSI in cesarean wound. The advantage of early removal is that it reduces the duration required for complete wound healing and facilitates early discharge of the patient compared to late dressing removal. The early discharge of patients in the early dressing removal group was due to earlier detection of SSI (both superficial and deep) compared to the late dressing removal group. On early discovery of SSI, necessary steps were taken to handle the infection at the earliest. Hence, wound healing is faster in the early dressing removal group and patient recovery is early. Early removal of dressing makes patient feel good sense of wellbeing and satisfied.

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