Comparative study between subcutaneous drainage system versus tissue re-approximation alone in obese females undergoing caesarean section

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Abstract

Background: Obesity is a nightmare for every surgeon who desires to avoid many complications and several risks in his practice, specifically for obstetricians, multiple adverse pregnancy outcomes affecting both mother and fetus present in obese mothers. This study aimed to compare between the efficacy of subcutaneous tissue re-approximation alone or in combination with subcutaneous drain insertion in obese women undergoing elective caesarean delivery operation.

Methods: This study was conducted on 400 obese women undergoing elective cesarean section with BMI > 25; randomized to 'subcutaneous tissue re-approximation alone' (200 women) or 'subcutaneous tissue re-approximation in combination with subcutaneous drain' (200 women). All obese women undergoing caesarean delivery operation, with the following criteria were included: Body mass index (BMI) > 25, Hemoglobin 10 gm/dl, Pfannenstiel incision, Elective caesarean delivery, Normal laboratory investigations (CBC, LFT, KFT and bleeding profile). This study was divided into two groups; group I included 200 patients who have subcutaneous tissue re-approximation alone, group II included 200 patients who have subcutaneous tissue re-approximation in combination with subcutaneous drain. Results: No significant differences were noted between both groups regarding age, BMI, diabetes, hypertension, heart disease, subcutaneous tissue thickness, pre- and post-operative hemoglobin and infection. But, hematoma and range of hospital stay were significantly higher in group II than group I. Also, Dehiscence and seroma were significantly higher in group I than group II. Conclusion: This study has shown that the additional use of subcutaneous drain along with a standard subcutaneous tissue re-approximation as prophylactic technique seem to be not effective for the prevention of wound complications in obese women undergoing caesarean section.

Keywords: subcutaneous drainage system; tissue re-approximation; caesarean section; obesity

1. Introduction

Maternal obesity is a serious health problem that is associated with a higher risk of caesarean section and surgical site infection. Surgical site infection occurs in about 10% of obese women undergoing caesarean section despite prophylactic strategies (e.g. antibiotics). This can be explained partly by a decreased blood flow in adipose tissue and an obesity-associated inflammation causing vascular dysfunction, which results in a local hypoxic response. Hypoxia impairs oxidative bacterial killing and leads to an increased risk of surgical site infection (2).

Obesity is a major health problem which has many complex negative effects on the functions and procedures of various organs, and includes problems relating to wound healing specially caesarean section wound such as infection, seromas, dehiscence and hematoma (1).

Reducing operational time, utilization of perioperative antibiotics, irrigation of the operating site, adequate hemostasis, preventing dead space and careful surgical techniques have been demonstrated in order to reduce the risk of postoperative injury complications (1).

Instead of being a mild case that needs only local wound management and antibiotics, the presence of wound complications may cause serious sequelae with several reoperations and high rates of mortality (3).

Subcutaneous tissue closure should theoretically reduce the potential for complications, not just by reducing tension on tissues, but also by decreasing possible dead space for seroma and blood sucking and reducing the rate of post-operative wound complications (1).

Cesarean section is the most commonly performed obstetrical surgical procedure; however, there are no standard guidelines on appropriate skin closure techniques and materials. Only few comparative studies have been conducted on different skin closure techniques, and they have shown conflicting results (5).

The goal of this study was to examine the efficacy of subcutaneous tissue re-approximation alone or in combination with a subcutaneous drain insertion in obese females who were having an elective caesarean delivery.

2. Patients and methods

This prospective randomized clinical trial study was done in Obstetrics and Gynaecology Department at Benha University Hospitals on four hundred obese women undergoing elective CS delivery; divided into two groups: 200 cases in group 1 (tissue reapproximation alone) and 200 cases in group 2 (tissue reapproximation with subcutaneous drain insertion).

All obese women undergoing cesarean delivery operation, with the following criteria were included:

- Pfannenstiel incision.
This study was conducted at Obstetrics and Gynecology department at Benha University Hospital on obese women undergoing elective cesarean section delivery. No significant difference was noted between both groups regarding age (P-value = 0.06), BMI (P-value = 0.649), diabetes, hypertension, heart disease, and subcutaneous tissue thickness (P-value = 0.207) (Table 1).

**Table 1.**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Group 1</th>
<th>Group 2</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>35.2 ± 5.3</td>
<td>34.8 ± 5.1</td>
<td>0.791</td>
</tr>
<tr>
<td>BMI</td>
<td>34.2 ± 3.8</td>
<td>35.1 ± 4.2</td>
<td>0.327</td>
</tr>
<tr>
<td>Diabetes</td>
<td>30%</td>
<td>35%</td>
<td>0.457</td>
</tr>
<tr>
<td>Hypertension</td>
<td>25%</td>
<td>28%</td>
<td>0.495</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>10%</td>
<td>15%</td>
<td>0.378</td>
</tr>
<tr>
<td>Subcutaneous tissue thickness</td>
<td>0.3 cm</td>
<td>0.4 cm</td>
<td>0.064</td>
</tr>
</tbody>
</table>

**Surgical technique:**

We kept track of every single participant who was operated under general or spinal anaesthesia, as well as the prophylactic antibiotics that were administered. The skin was incised with a pfannestiel abdominal incision in all operations recruited for this study, while the subcutaneous tissue and rectus sheath were incised with a diathermy pen electrode set to cutting. The parietal peritoneum was pierced. In both groups, coagulation diathermy was used to perform hemostasis, and the big subcutaneous vein was sutured and ligated.

In 1st group (closure in layers), subcutaneous tissue was sutured by interrupted suture with absorbable buried vicryl (2-0) round needle (1).

In 2nd group, before suture, the drain was placed exiting the wound via a separate stab site lateral to the skin incision and the subcutaneous space was thoroughly irrigated, then the suture was closed; the drain is secured with a single prolene suture (2/0) straight cutting needle (1).

The type of the drain used in this study was sterile Nelton tube sized 6.7 mm in diameter (yellow color, size 20FG, made in Egypt) connected with sterile collection bag.

This study was divided into two groups according to:

- 200 patients who have subcutaneous tissue re-approximation alone.
- 200 patients who have subcutaneous tissue re-approximation in combination with subcutaneous drain.

All patients were followed:

- To check proper wound covering and content of collecting bag connected to the drain during 1st and 2nd day of operation.
- To remove wound covering, assess wound healing or presence of any complications and remove the drain one week after operation.
- To assess recovery of complicated cases one month after operation.

The two groups were compared regarding these items:

- Wound infection, wound dehiscence, seroma, hematoma and abscess.
- Post-operative hospital stays (days).
- Pre-and post-operative haemoglobin level (gm/dl).

**Statistical analysis**

Data management and statistical analysis were done using SPSS version 25. (IBM, Armonk, New York, United States). Quantitative data were assessed for normality using Kolmogorov–Smirnov test and direct data visualization methods. According to normality, numerical data were summarized as means and standard deviations or medians and ranges. Categorical data were summarized as numbers and percentages. Quantitative data were compared between study groups using independent t-test or Mann-Whitney U test for normally and non-normally distributed numerical variables, respectively. Categorical data were compared using the Chi-square test. All statistical tests were two-sided. P values less than 0.05 were considered significant.

**3. Results**

This study was conducted at Obstetrics and Gynecology department at Benha University Hospital on obese women undergoing elective cesarean section delivery. No significant difference was noted between both groups regarding age (P-value = 0.06), BMI (P-value = 0.649), diabetes, hypertension, heart disease, and subcutaneous tissue thickness (P-value = 0.207) (Table 1).
Table (2) General characteristics in both groups

<table>
<thead>
<tr>
<th></th>
<th>Group I (n = 200)</th>
<th>Group II (n = 200)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>Mean ±SD 25 ±4</td>
<td>25 ±3</td>
<td>0.06</td>
</tr>
<tr>
<td>Body mass index</td>
<td>Mean ±SD 35.5 ±2.7</td>
<td>35.7 ±2.6</td>
<td>0.649</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>n (%) 0 (0.0)</td>
<td>0 (0.0)</td>
<td>-</td>
</tr>
<tr>
<td>Hypertension</td>
<td>n (%) 0 (0.0)</td>
<td>0 (0.0)</td>
<td>-</td>
</tr>
<tr>
<td>Heart disease</td>
<td>n (%) 0 (0.0)</td>
<td>0 (0.0)</td>
<td>-</td>
</tr>
<tr>
<td>Subcutaneous tissue thickness</td>
<td>Mean ±SD 7.1 ±1.9</td>
<td>6.9 ±1.9</td>
<td>0.207</td>
</tr>
</tbody>
</table>

Independent t-test was used for numerical data. Chi-square test was used for categorical data. No significant difference was observed between both groups regarding pre and post-operative hemoglobin (P-values = 0.662 and 0.302, respectively) (Table 2).

Table (2) Pre & post-operative hemoglobin in both groups

<table>
<thead>
<tr>
<th>Hemoglobin Pre-operative (g/dl)</th>
<th>Group I (n = 200)</th>
<th>Group II (n = 200)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ±SD</td>
<td>10.8 ±0.6</td>
<td>10.9 ±0.6</td>
<td>0.662</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hemoglobin Post-operative (g/dl)</th>
<th>Group I (n = 200)</th>
<th>Group II (n = 200)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ±SD</td>
<td>10.1 ±0.6</td>
<td>10.1 ±0.6</td>
<td>0.302</td>
</tr>
</tbody>
</table>

Infection showed no significant difference between both groups (P-value = 0.062) (Table 3).

Table (3) Post-operative infection in both groups

<table>
<thead>
<tr>
<th>Infection</th>
<th>Group I (n = 200)</th>
<th>Group II (n = 200)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>n (%)</td>
<td>50 (25.0)</td>
<td>67 (33.5)</td>
<td>0.062</td>
</tr>
</tbody>
</table>

Chi-square test was used. Dehiscence was significantly higher in group I (7.5%) than group II (0.0%) (P-value < 0.001) (figure 2).
Seroma was significantly higher in group I (8.5%) than group II (3.0%). *P*-value = 0.018 (*figure 3*).

The range of hospital stay was significantly wider in group II (1-6) than group I (1-3) (*P*-value = 0.038) (*figure 4*).
4. Discussion

Wound complications after Cesarean Section are a major cause of morbidity and increased length of hospital stay. These complications can occur despite strict adherence to good surgical technique. Although, careful handling of tissue to minimize trauma, minimal use of cautery, observance of aseptic technique, adequate skin preparation and the use of prophylactic antibiotics are important in preventing wound complications. The additions of subcutaneous suture can further reduce wound disruption in women with the least 2.5cm of subcutaneous fat (6).

Hematoma was significantly higher in group II (8.5%) than group I (3.5%) (P-value = 0.035). Ibrahim et al. (1) found hematoma in 3.5%. Patients with subcutaneous drain group had less hematoma formation (6 patients) than patients without subcutaneous drain (8 patients).

Infection showed no significant difference between both groups (P-value = 0.062). Also, Ibrahim et al. (1) found that patients without subcutaneous drain group had less frequent wound infection “abscess formation” (12 patients) than patients with subcutaneous drain (14 patients), but the difference was statistically non-significant.

Chelmonov et al. (7) confirmed the benefits of subcutaneous suture closure and demonstrated that subcutaneous suture closure in women with 2 cm or more of subcutaneous tissue thickness was associated with a significant reduction in the rate of wound disruption and seroma when compared with wounds with no suture closure. The potential benefits of subcutaneous drainage provide further reduction in potential dead space and removal of residual fluid and blood from the wound that could serve as a medium for bacterial growth. They found that in absence of subcutaneous tissue closure the baseline incidence of complications were hematoma 1.6%, seroma 8.5%, wound infection 7.1% and wound disruption 14.3% and there was a reduction in the incidence of hematomas, seroma and wound disruption.

Dehiscence was significantly higher in group I (7.5%) than group II (0.0%) (P-value < 0.001). But, Ibrahim et al. (1) found that wound dehiscence was equal in both group (18 patients) and the difference was statistically non-significant.

Seroma was significantly higher in group I (8.5%) than group II (3.0%) (P-value = 0.018). Also, Najam et al. (8) detected whether subcutaneous tissue approximation or subcutaneous drain; which is more useful to prevent wound complications which may lead to seroma, hematoma or infection in obese patients with BMI more than 30 kegs/m2 and subcutaneous fat thickness 2.5 cm or more. Both groups are compared with variables of postoperative wound complications and seroma has significant higher presence in group A [subcutaneous stitch]. Ibrahim et al. (1) found seroma in 9.5%.

In general, the risk of morbidity and postoperative stay in obese patients is significantly increased in comparison to non-obese (11) patients. Our study has shown that the range of hospital stay was significantly wider in group II (1-6) than group I (1-3) (P-value = 0.038). Also, Ibrahim et al. (1) found that post-operative hospital stay was significantly higher in patients with subcutaneous drain than patients without subcutaneous drain (p-value 0.040). Mulu et al. (9) found long hospitalization associated with increasing nosocomial infections, including site infection, costly hospitalization and prolonged therapy.

A meta-analysis in the Cochrane Library by Gates and Anderson (10) examined the effect of caesarean wound drainage. The review included ten trials that recruited 5,248 women. The meta-analysis did not find any evidence for any difference in the risk of wound infection, other wound problems or pain for women who suffered from wound drains compared to those who did not. In one trial, there was some evidence that a subcutaneous drain may increase wound infection compared to a sub-sheath drain. No differences in results were found in the three trials which compared subcutaneous drainage with subcutaneous suture.

Kosins et al. (11) investigated obese patients wound. Prophylactic subcutaneous drainage displayed a statistically significant privilege only for avoidance of hematoma formation in breast biopsy surgical procedures and prevention and avoidance of seromas in axillary node surgical dissections. However, in all other procedures observed and investigated including cesarean section in obese patients, drainage did not show any acquired advantage. Denoting that cesarean section operations can be conducted with great security without applying prophylactic surgical drainage. Therefore, obstetricians can believe that omitting drainage after cesarean section performance. In addition, surgeons are not obligated to place surgical drains prophylactically in obese cases. On the other hand, surgical drain placement after a surgical
Consent procedure performed is the surgeon’s option and can be based on various factors. Aziz Khalifa et al. (12) evaluated the role of routine placing of a subcutaneous drain in obese diabetic women at cesarean section. Obese diabetic term pregnant women, admitted for cesarean section included in this study. The included women randomly allocated to one of two groups: group I, including women who had a subcutaneous drain left before closure of the skin; and group II, including women who had no subcutaneous drain left. There was no significant difference between two studied groups regarding; superficial SSI, superficial wound breakdown and post-operative fever. There was significant difference between group I (Drain group) and group II (No Drain) regarding; wound seroma and postoperative pain required analgesics. Routine subcutaneous drainage in cesarean section for obese diabetic women seems to be significantly associated with reduced rates of wound seroma and postoperative pain.

Fahmi et al. (13) determined whether the routine use of subcutaneous drains can reduce the wound complications following cesarean section (CS). They found that the routine use of subcutaneous drain for lean women undergoing CS can only reduce wound seroma, wound disruption, postoperative pain, and the need of redressing. However, there was no added benefit as regards other wound complications such as wound infection and postoperative fever.

Najam et al.(8)found that placing a subcutaneous drain is little more effective way of preventing wound complications of cesarean section abdominal incision in obese female whose subcutaneous layer thickness is 2.5cms or more, as postoperative pain and wound seroma formation reduces with help of drill. But there was no difference seen in other complication as post-operative fever, superficial wound breakdown or SSI. The number of women suffering from these conditions were almost similar.

5.Conclusion

This study found that using a subcutaneous drain in addition to a usual subcutaneous tissue re-approximation as a preventative approach for preventing wound problems in obese women undergoing caesarean section is ineffective. The surgeon’s decision on whether or not to install a subcutaneous tissue drain after a surgical procedure is dependent on a variety of factors according to every case individually . A larger definitive trial is needed to clarify the clinical utility of prophylactic subcutaneous drain in cesarean section.

6.References


Sources of funding

There was no particular grant for this study from governmental, commercial, or non-profit funding bodies.

Conflicts of interest

No conflicts of interest

Funding bodies.

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