



SUBCUTANEOUS FAT SUTURE IN CESAREAN SECTIONS AND WOUND DISRUPTION

Obstetrics & Gynaecology

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ABSTRACT

Background: Cesarean sections, which are performed either elective or as an emergency, have become a common procedure in obstetrics. Although there are many advantages of this procedure for the baby as well as for the mother in apt situations, there are many risks associated with it. Wound infection, or disruption is a common complication following caesarean section. The factors influencing the risk of these complications are many but maternal obesity, an increase in the subcutaneous fat, and its closure after the procedure are the main risk factors. Since there are no basic recommendations regarding suturing, the type of suture materials to be used, etc., the procedure varies among the practitioners, and hence the complications after the procedure. Thus, in this article, the effects of suturing the subcutaneous fat in cesarean sections on wound disruption are reviewed and the current status of the choice of suture materials to be used is also considered. **Conclusion:** There are no strong shreds of evidence to prove the influence of suturing the subcutaneous fat or the type of suture material used on wound disruption during cesarean section. Most of the authors agree with the fact that closure of the subcutaneous fat reduces the risk of wound disruption for subcutaneous tissue larger than 2 cm.

KEYWORDS

INTRODUCTION

Cesarean sections (CS) are now performed very commonly worldwide, with the scars as the only visible stigmatization after CS, hence its cosmetic outcome is important. Also, scars can cause considerable psychosocial distress, related to patient-rated scar severity and scar location.^[1] The wound disruption during the time of healing is an important factor for this scar formation and hence should be minimal. Since there are no definite suggestions or recommendations for suturing techniques to be followed after CS, which in actuality has a great influence on the amount of wound disruptions and the resulting scar formations, this area has to be explored in depth. In this article, the need for suturing the subcutaneous fat and its influence in the CS wound disruption is being reviewed.

Women who give birth by CS have a 5 to 20 times increased risk of peri-partum infective complications, compared with women who give birth vaginally. Surgical site infections are reported to occur in up to 12% of procedures. In addition, wound complications like hematoma, seroma, and dehiscence can complicate recovery after CS, all of which may hurt postnatal maternal health and wellbeing, the mother's ability to care for the baby, and the overall postnatal period experiences.^[2]

1. Suturing or non-suturing the subcutaneous fat- The dilemma

The subcutaneous fat lies between the sheath and the skin. There are no definite recommendations for suturing the subcutaneous fat layer during CS. According to Alderdice in 2003, this layer may be closed/ sutured or left non-sutured with the wound being closed by suturing only the skin.

It is acknowledged that according to the NICE guidelines 2015, the routine closure of subcutaneous fascia is not recommended, having not been shown to reduce the risk of wound infection.^[3]

Closure of the subcutaneous fat decreases tension on the skin layer, resulting in superior cosmetic outcomes. Further, this will reduce postoperative hematoma and seroma development. The suturing also prevents scar retraction, by closing off the dead space, thus gaining optimal leveling of the sides of the wound.^[4] On the contrary, suture closure of subcutaneous tissue can lead to an inflammatory reaction against the suture material, resulting in poorer cosmesis. The evidence says that suture closure of the subcutaneous fat during CS reduces the risk of wound disruption for subcutaneous tissue larger than 2 cm, but the cosmetic effect of this procedure is not sufficiently studied. So, most surgeons are reluctant to implement this important intervention routinely.^[5]

The burden of absorbable suture material is related to the increased relative risk of wound infection, among women who underwent subcutaneous fascia closure and skin closure with absorbable suture. Absorbable suture materials like Vicryl or Caprosyn are completely absorbed within 56–70 days. Whenever a foreign body such as a

suture, is placed within tissue, it induces an inflammatory reaction. Absorption of absorbable suture material can cause tissue reactions leading to free fluid, facilitating bacterial growth, congregation of macrophages and fibroblasts, lymphocytes, and plasma cells, which gradually reduce in number and concentration postoperatively. It is possible that this additive burden of concurrent tissue inflammatory responses can result in excessive inflammation, and decreased efficiency of removal of contaminating micro-organisms, thus increasing the risk of clinical wound infection.

It is found in many studies that those who had skin closure with non-absorbable sutures with non-closure of the subcutaneous fascia had rates of infection like women with fascia closure and absorbable skin sutures. This can be because of the additive effect of two sources of the inflammatory response to foreign material and possibly, the closure of the subcutaneous fascia is protective against post-operative wound infection, more than 60% of the treated women have a body mass index (BMI) of 25 kg/m² or more.

The closure of fascia among women with more than two centimeters depth of subcutaneous fat to reduce wound infection, secondary to the elimination of wound dead space is usually considered with mixed findings. Maternal overweight and obesity is a common issue in the current obstetric practice, with nearly 50% of pregnant women across developed countries are seen with overweight or obese. Being overweight and obese represent a significant risk factor for wound infection, and at a population level, considering the use of non-absorbable, rather than absorbable skin sutures for women who require closure of the subcutaneous fascia results in significant reductions in wound infection, and needs to be considered further.^[6]

2.1 Advantages of suturing the subcutaneous fat

The cosmetic outcome after the closure of the subcutaneous fat is significant as the tension acting on a scar is a common initiating factor for the development of hypertrophic scarring.^[7]

Another theoretical advantage of closing the fat layer is to remove the space under the skin where blood or serous fluid gets collected which can lead to infection. Hematomas or seromas predispose to wound morbidity and, hence, to be avoided. According to some studies, there is an increased risk of hematoma or seroma with non-closure of the subcutaneous fat.^[8]

2.2 Advantages of non-suturing the subcutaneous fat

The advantages of not closing it are faster operation, less foreign material in the wound to provide a focus for infection, greater tissue mobility resulting in easier skin closure, and a more attractive scar.

These pros and cons may be perceived differently by surgeons depending on the subcutaneous fat thickness. Some obstetricians argue that when there is greater fat thickness, to close a potential empty space, there are more reasons for closure. Others say the thinner the fat

layer the more reason for closing it to bring wound edges together and allow the skin to heal under less tension. In the UK survey by Tully in 2002, on the variation in practice among obstetricians, 42% always closed the fat layer, 1% sometimes closed it, 21% never closed it, 28% closed it only if thick, and 8% closed it only when it is thin. Thus, the thickness of the fat layer under the skin therefore influenced practice.

The suturing techniques and materials also varied from continuous non-locking (35%) or interrupted (63%) sutures for the subcutaneous fat, to plain catgut (56%) or vicryl (30%).

2. Types of outcome measures for suturing the subcutaneous fat

Many outcomes are measured by different trial authors for studying the influence of sutures in subcutaneous fat during CS. These are divided mainly into two categories: short term outcomes which last up to six months after hospital discharge and long term outcomes which last more than six months after discharge. These outcomes are as follows.

2.1 Short term outcomes.

Postoperative febrile morbidity, postoperative analgesia or pain which is usually measured by visual analog scale score, the need for blood transfusion and postoperative anemia, incidences of wound infection, and wound complications including operative procedures carried out on the wound and wound hematoma or disruption. Breastfeeding and voiding problems at discharge, duration of surgery, the incidences of thromboembolism, need for re-laparotomy, maternal death or admission to the intensive care unit, etc., are the short-term outcomes that are defined by most of the trial authors.

3.2 Long term outcomes

Long term wound complications e.g. numbness, keloid formation, incisional hernia, fertility problems which are mostly secondary infertility due to adhesion formation, complications in future pregnancies like placenta praevia or uterine rupture and complications at future surgery due to adhesion formation, are most of the long-term outcomes that are defined by many trial authors.^[8]

3. DISCUSSION

In approximately 5% of women who undergo CS, wound complications are encountered, including hematomas, seromas, and infection.^[9] These may lead to wound dehiscence. Obesity has a direct effect on wound complication rates. Vermillion et al. have shown that when the subcutaneous tissue thickness is larger than 3 cm the relative risk of developing wound infection reaches 2.8.^[10] Yamato et al suggested that the rates of wound dehiscence tend to increase as the BMI advances.^[11]

Operative techniques during CS vary widely between surgeons. According to a systematic review, skin closure with staples with a subcuticular suture has been associated with an increased risk of postoperative wound complication, this difference was not observed when considering data from randomized trials only in the study. A systematic review of 10 trials of closure or non-closure of the subcutaneous fascia found a significant reduction in wound seroma but not in wound hematoma or infection with closed wounds. It is also not known which type of skin suture is better. The choice of suture material for skin closure and the decision to close the subcutaneous fascia are important factors in reducing the risk of wound infection or complications. There are currently insufficient pieces of evidence to guide obstetricians to adopt the optimal techniques.^[12]

According to a meta-analysis done by Chelmow et al, the suture closure of subcutaneous fat during cesarean delivery resulted in 34% decrease in the risk of wound disruption in women with fat thickness more than 2 cm.^[5]

Another meta-analysis demonstrated no difference in wound infection risk between the closure group and the non-closure group with a relative risk (RR) of 1.02 and, a 95% confidence interval (CI) of 0.69 to 1.50. Hematoma or seroma were less common in the closure group with RR 0.52, and 95% CI of 0.33 to 0.82. The wound complications which included wound infection, wound separation, hematoma, and seroma, were significantly less frequent in the closure group with RR 0.68, and 95% CI of 0.52 to 0.88.

A study was done to see the effect of subcutaneous tissue closure at CS on wound complications and cosmesis. They found that in women with subcutaneous fat less than 2 cm, closure of subcutaneous tissue

decreases the incidence of postoperative hematoma and scar retraction, with no effect on wound disruption, surgical-site infection, seroma, or a need for reclosure.^[13]

In another study, where those with CS performed were divided into closure and non-closure of the subcutaneous tissue, 68 women with subcutaneous tissue thickness of at least 2 cm, there was no difference between closure and no closure subgroups in terms of incidence of wound disruption. In 91 subjects with subcutaneous tissue thickness more than 2 cm, the incidence of wound disruption was significantly higher in the non-closure group. Thus, they concluded that subcutaneous tissue approximation with absorbable suture during CS, reduces the rate of postoperative wound disruption in those with more than 2 cm of subcutaneous tissue.^[14]

Regarding the type of suture materials used, there is only some weak evidence to suggest that the combined intervention of subcutaneous fascia closure and skin suturing with absorbable monofilament suture like Caprosyn, is associated with an increased risk for postoperative wound infection, compared to subcutaneous fascia closure and skin suturing with non-absorbable monofilament suture like Prolene. Many studies have shown no statistically significant difference in wound infection rates compared with the use of absorbable versus non-absorbable skin sutures, the combination of subcutaneous fascia closure or non-closure with different skin sutures needs to be explored further.^[6]

Six randomized controlled trials with a total of 1853 women examined the effects of closure versus non-closure of subcutaneous tissue at CS on maternal outcomes by Del Valle et al. 1992, Naumann et al. in 1995, Cetin et al. in 1997, Allaire et al. in 2000, Chelmow et al. in 2002, and Magann et al. 2002. These trials had taken into consideration; the wound infection and various wound complications such as hematoma, seroma, and wound disruption as the outcomes. None of these trials reported long term outcomes and many of them were not clear about the time point at which these complications were identified and whether all the subjects were followed up for the same period.^[8]

Further trials are needed using blinded outcome assessment to investigate whether the apparent increased risk of hematoma or seroma with non-closure of the subcutaneous fat is real or not. It is also important to investigate whether the interventions and the outcomes reported by the two techniques lead to a different postoperative recovery experience for the women. It is significant to know any differences in the rates of medical interventions such as antibiotics, further surgery, or prolonged admission by the two techniques employed. The trials with an increased range of immediate outcomes along with many longer term outcomes, with an increased sample size are required to validate the effects of the two methods.^[8]

4. Conclusion:

According to this review, there is only weak evidence to prove the influence of suturing the subcutaneous fat or the type of suture material used on wound disruption during cesarean section. However, many authors suggest that closure of the subcutaneous fat reduces the risk of wound disruption for subcutaneous tissue larger than 2 cm. Hence there is a need for further studies in this regard to validate the conclusion, which would be helpful for the practitioners to apply in their regular practice.

5. List of abbreviations:

CS - Cesarean section
NICE - National Institute for Health and Care Excellence
BMI - Body Mass Index
RR - Relative Risk
CI - Confidence Interval

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