



SUBCUTANEOUS FAT SUTURE CLOSURE AND POST-CESAREAN DELIVERY WOUND DISRUPTION.

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ABSTRACT

Background: Each year cesarean sections are performed in millions of women worldwide. Wound infection or disruption is a prevalent complication following cesarean section, with several factors influencing the likelihood of these complications. As with most of surgical procedures, there is no standard technique for cesarean sections also. Given the absence of standardized recommendations regarding suturing techniques and choice of suture materials, practices vary among practitioners, leading to differences in post-procedural complications. Maternal obesity with increased subcutaneous fat, and the closure techniques post-procedure influence the post-procedure healing and the complications associated. This article reviews the impact of suturing the subcutaneous fat in cesarean sections on wound disruption. **Conclusion:** Most authors agree that closure of the subcutaneous fat reduces the risk of wound disruption for subcutaneous tissue larger than 2 cm.

KEYWORDS

Cesarean sections, Wound complications, Subcutaneous fat, Hematoma

INTRODUCTION

Cesarean sections (CS) account for approximately 20% of all deliveries worldwide. ^[1] Women who give birth by CS have a 5 to 20 times higher risk of peri-partum infective complications, compared with vaginal birth. Surgical site infections occur in up to 12% of procedures. In addition, hematoma, seroma, and dehiscence can complicate recovery after CS. ^[2] Disruption of the skin incision is a major cause of postoperative morbidity after CS, seen after 2.5–16% of procedures. ^[1]

Typically, the risk factors for wound breakdown reported include duration of surgery, obesity, diabetes, patient age, and poor nutrition. Normally, CS are usually done in young and healthy women, with short hospital stays. The measures to prevent wound complications were investigated by multiple studies. Some advocate that the closure of subcutaneous tissue prevents wound disruption, stressing the importance of approximating dead space. While some others do not routinely close this space, validating that it may increase wound disruption. Thus, opinions have varied as to the causes of wound disruption and whether subcutaneous closure would make a difference.

Suturing the fat tissue and closing the subcutaneous dead space can prevent, the formation of hematomas and seromas, thereby minimizing the wound disruption. But at the same time, including an additional foreign body, a nidus for wound infection formation may be created, increasing wound infection. These two mechanisms could occur simultaneously. ^[3]

It should be acknowledged that according to the NICE guidelines 2015, the closure of subcutaneous fascia is not routinely recommended, having not been shown to reduce the risk of wound infection. ^[4]

A review of practice guidelines revealed no clear statement on subcutaneous closure with CS. Thus, at present, usual practice depends on individual provider preferences. ^[5]

Benefits of subcutaneous fat suture closure after CS.

There are only a few recent studies evaluating the effects of different subcutaneous tissue and skin closure methods at CS. A meta-analysis done by Chelmon et al. strongly suggests that subcutaneous wound closure should be performed in all CS patients with wound thickness greater than 2 cm. Since the studies considered were done through Pfannenstiel incisions, they suggested subcutaneous dead space closure should be performed with Pfannenstiel incisions. ^[3]

Regarding the cosmetic outcome after the closure of the subcutaneous fat, although the development of hypertrophic scarring seems to have multiple causes, tension acting on a scar is reported to be the

commonest initiating factor. Closure of the subcutaneous fat decreases tension on the above skin layer by the closure of the dead space, therefore, resulting in superior cosmetic outcome. ^[5]

Further, suture closure of the subcutaneous fat theoretically reduces the rate of postoperative hematoma and seroma and can prevent retraction of the scar below the level of the surrounding skin. Closing off dead space will help in achieving optimal leveling of the opposing wound sides. ^[3]

Shortcomings Of Suturing Of Subcutaneous Tissue After CS.

The researchers say that whenever a foreign body like a suture, is placed within tissue, it induces an inflammatory reaction. According to many authors, 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 absorbed completely within 56–70 days. Absorption of absorbable suture material can cause tissue reactions leading to free fluid, facilitating bacterial growth, congregation of macrophages and fibroblasts, lymphocytes, plasma cells, etc., which gradually reduce in number and concentration postoperatively. It is possible that this additive burden of tissue inflammatory responses results in excessive inflammation, and decreased efficiency of removal of contaminating micro-organisms, thus increasing the risk of clinical wound infection. ^[6]

Very few studies were found, evaluating the closure of subcutaneous tissue. Some of these were done particularly in gynecologic oncology patients, a group with a high rate of obesity and other comorbidities. Although the closure of subcutaneous tissue prevents dead space and decreases serous fluid collection, this additional suture materials have the potential to increase the risk of wound infection. The inflammatory reaction against the suture material leads to wound disruption and therefore results in poorer cosmesis. ^[7]

The subcutaneous tissue cannot be measured with a ruler. Therefore, in many cases, women with <2cm of subcutaneous fat might also receive suture closure, thus increasing the inflammatory reactions, which may lead to wound disruption. ^[5]

Suturing Vs Non-suturing Of Subcutaneous Tissue After CS

There are multiple studies to see the most appropriate method for surgical abdominal wall incision closure, yet there is still a debate about this topic. Many studies are retrospective and limited by their lack of standardization of surgical methods, patient selection criteria, and definitions of wound complications. ^[8]

Husslein et al. did a study that compares the effect of suturing and non-suturing of the subcutaneous tissue after CS. They divided the study

group into two; one with sutures given and the other without suturing of the subcutaneous tissue. The study subjects followed up for six months. They found significantly fewer wound hematomas in the group with suture closure of the subcutaneous fat.^[5]

A prospective randomized controlled trial for 1 year comparing the suturing and non-suturing groups stated that not closing the subcutaneous tissue did not influence the patient's long-term cosmetic results, but operating time can be shortened if the suturing can be avoided.^[9]

Another prospective randomized controlled study aimed to assess the effects of subcutaneous closure versus non-closure on wound complication rate in patients with a subcutaneous tissue depth ≥ 4 cm measured with ultrasonography by Bayrak et al. also found no significant differences in wound dehiscence rates between the closure and non-closure groups. They observed insignificantly fewer seromas in the closure group.^[7]

Selection Of Suture Material For Subcutaneous Tissue

Regarding the type of suture materials used, there is only weak evidence to suggest the ideal suture material to be used for subcutaneous fat tissue after CS. 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 is stated by some reports. Many studies have shown no statistically significant difference in wound infection rates comparing the use of absorbable versus non-absorbable skin sutures. Hence, the combination of subcutaneous fascia closure or non-closure with different skin sutures needs to be studied further.^[6]

Because the various individual studies presented scant data on suture material, primary versus repeat procedure, and incision type, further study is necessary to determine the optimal suture material and whether this effect is uniform over all incision types and for primary and repeat procedures. Many practitioners and several of the studies used rapidly absorbable sutures with size of 3–0 plain, and this seems to be a reasonable choice.^[3]

On the suturing techniques and materials, Tully in 2002 did a survey in UK and he observed that the choices varied from the practicing surgeons from continuous non locking (35%) or interrupted (63%) sutures for the subcutaneous fat, to plain catgut (56%) or vicryl (30%).^[10]

DISCUSSION

Operative techniques during CS vary widely between surgeons. In the UK survey by Tully, on the variation in practice among obstetricians, 42% closed the fat layer always, 1% sometimes closed it, 21% never closed it, 28% closed it only if thick, and 8% closed it only if it is thin. Thus, the thickness of the fat layer under the skin influences the practice.

The advantages and disadvantages of suturing the subcutaneous tissue may be perceived differently by surgeons depending on the fat thickness. Some obstetricians say that when there is greater fat thickness, the reason for closure is to close the potential empty space. 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.^[10]

Wound complications are encountered in approximately 5% of CS cases, including hematomas, seromas, and infections leading to wound dehiscence.^[11] The results of a systematic review of 10 trials by Pergialiotis et al. on closure or non-closure of the subcutaneous fascia show that a significant reduction in wound seroma but not in wound hematoma or infection with closed wounds.^[12]

To see the effect of subcutaneous tissue closure at CS on wound complications and cosmesis, a study was done by Helmy et al. They found that in women with subcutaneous fat < 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]

It is an accepted fact that obesity has a direct effect on wound complication rates. Vermillion et al. have established that when there is

> 3 cm subcutaneous tissue thickness, the relative risk of developing wound infection reaches 2.8.^[14] It is also suggested by Yamato et al that as the BMI advances the rates of wound dehiscence tend to increase.^[15]

In many studies comparing the effect of suturing and non-suturing of subcutaneous tissue thickness of more than 2 cm in CS, the incidence of wound disruption was significantly higher in the non-closure group. Thus, it can be inferred that subcutaneous tissue approximation with suture during CS, reduces the rate of postoperative wound disruption in those with > 2 cm of subcutaneous tissue.^[16]

The studies done so far have many limitations and the effects of sutures considered were considered differently by different authors. Hence it is important to investigate further whether the interventions and the outcomes reported by the closure or non-closure of the subcutaneous tissue led to a different postoperative recovery experience for the women. It is significant to know the differences in the rates of medical interventions like antibiotics, further surgery, or prolonged admission by these two techniques.^[10]

CONCLUSION

This review on the effect of subcutaneous fat suture closure on post-caesarean delivery wound disruption showed that subcutaneous tissue suturing is required in women with a fat tissue thickness of more than 2 cm to avoid wound disruption or dehiscence, owing to the fact of the increase in wound complications in obesity. As the evidence is scanty, this needs to be explored further with more standard studies.

List of Abbreviations

CS - Cesarean section
NICE - National Institute for Health and Care Excellence
UK - United Kingdom

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