

Comparison Of Alternative Techniques Of Closure Of Subcutaneous Fat During Caesarean Section

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ABSTRACT

Background: A large number of women undergo caesarean section throughout the world. These women pass through a period of post-operative pain and morbidity period. Use of the appropriate technique to approximate the wound after caesarean section would not only avoid financial load, but also help in early recovery of the patient. **Objectives:** The aim of this study is to compare the effects of alternative techniques for closure of subcutaneous fat on maternal health and use of health care resources in caesarean section. **Materials and Methods:** Patients undergoing Caesarean section were divided in two groups of one hundred patients each. Patients with hematological disorders or malignancy, diabetes, septicemia or chorioamnionitis were excluded from the study. In all the patients, after stitching the uterus, the rectus sheath was stitched with thread Vicryl No.1 using a round body needle. Then the patients were divided into two groups. In group I, Vicryl No.1 thread used in stitching of the rectus sheath was continued into the skin with the application of subcuticular stitches, after securing the edges with a knot. In group II, after stitching the rectus sheath with Vicryl No. 1, the thread was cut and interrupted sutures were applied in subcutaneous fat with thread Vicryl No. 2. Skin was stitched with subcuticular stitches using Vicryl no.1, the two groups of patients were observed for the duration of surgery, evidence of wound infection or seroma, and cosmetic results. **Results:** It was noted that the duration of surgery in group I was on average 4.15 minutes less as compared to the duration in group II, there was a significant decrease in wound infection, haematoma, seroma and wound dehiscence after fat closure wound infection was more common in patient with leaking >18hours. **Conclusion:** It was concluded that in spite of using the best closure technique and keeping in mind the patient related factors complication arising after CS are frequent and most commonly associated with non closure of fat. Further studies are needed for evaluation of ideal suture materials for closure of skin.

Keywords: Caesarean section, suture material, wound infection, subcutaneous fat.

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INTRODUCTION

The anatomic planes of the abdominal wall are made up of multiple muscular and fascial layers that interdigitate and unite to form a protective musculo-fascial layer that protects the

visceral organs and provides strength and stability to the body's trunk.¹ Suture selection is highly surgeon dependent, potential advantages/ disadvantages are inherent with each particular suture. Suture length should be at least four times

the length of incision, ensuring that enough suture is available for adequate bites of fascia and that the stitch interval is not too apart.¹ The suture should prevent incisional hernia and wound dehiscence without increasing wound infection, wound pain and formation of suture sinus.² The goals of wound closure include the obliteration of dead space, even distribution of tension along deep suture lines, and maintenance of tensile strength across the wound. It is intended to achieve adequate tissue tensile strength after approximation and eversion of its epithelial portion. The methods employed for mechanical wound closure include staples, tape, adhesives, and sutures. Each method has specific indications, advantages and disadvantages. Suture closure permits primary wound healing as tissue is held in proximity until enough healing has occurred to withstand stress without mechanical support. Suture material being a foreign body implanted in the human tissue elicits a foreign body tissue reaction. During wound closure, a sterile field and a meticulous aseptic technique are critical to minimize the risk of wound infection.

The surgeon is responsible for choosing the abdominal incision best suited for the procedure and closure technique that will provide adequate security.³ The ideal abdominal wound closure provides strength and a barrier to infection. In addition, the closure should be efficient, performed without tension or ischemia, comfortable for the patient and aesthetic.³ Caesarean section is one of the most commonly performed abdominal operations on women in most countries of the world. Its rate has increased markedly in recent years, and is about 20–25% of all childbirths in most developed countries.^{4,5} For the closure of the rectus sheath, there are several possible suturing techniques and materials. Postoperative wound

infection or surgical site infection (SSI) is one of the major contributors to postoperative morbidity after CS. Due to the increasing number of CS performed each year, preventing SSI is not only important for the patient but also because it significantly increases costs. These all can cause an emotional and financial burden for the patient after delivery of her newborn.

Previous studies have identified obesity as a risk factor for wound complications, with rates ranging from 3.5% to 30%.⁶⁻¹⁰ Obesity was defined as BMI ≥ 30 according to the WHO criteria.¹¹ Closure of the subcutaneous fat after CS is advocated by many authors to reduce SSI. However, there are also reports of increased wound infection after suture closure of the subcutaneous fat.¹² A recent meta-analysis shows a 34% relative risk reduction of wound dehiscence in women whose subcutaneous fat is larger than 2 cm.¹³ On one hand, subcutaneous suture closure theoretically allows to perfectly align the edges of the wound that needs to be closed. This would decrease tension on the skin and thereby promote better wound cosmesis. By closing off the dead space it might also be possible to avoid retractions of the scar below the level of the skin; such retractions are especially bothersome and apparent in the standing position. On the other hand, the suture material used for closure of the subcutaneous fat could lead to a foreign body reaction to increased inflammation and consequently negative effect on wound cosmesis.

The subcutaneous fat may be closed (sutured), or left unsutured, with the wound being closed by suturing the skin only and shows that the theoretical advantage of closing the fat layer is the removal of space under the skin where blood or serous fluid could collect and lead to infection. The theoretical advantages of not closing it include a faster operation,

less foreign material in the wound to provide a focus for infection, and greater tissue mobility leading to easier skin closure and a more attractive scar. These theoretical advantages and disadvantages may be perceived differently by operators depending on the thickness of the subcutaneous fat. Some obstetricians would argue that the greater the fat thickness, the more reason for closure (to close a potential empty space). Others would argue that the thinner the fat layer the more reason for closing it, in order to bring wound edges together and allow the skin to heal under less tension. The aggregate outcome of 'wound complication' was significantly less frequent in the closure group. Closure of the subcutaneous fat at caesarean section may lead to a reduction in wound complications in general, and haematomas and seromas in particular. However the effects on haematoma and seroma may not be robust because of the potentially subjective nature of these diagnoses and the fact that wound infection rates were found to be similar in the two groups, 'Seroma' in particular, which was the commonest complication found. The present study was conducted to compare the effects of alternative techniques for closure of subcutaneous fat on maternal health and use of health care resources in caesarean section.

MATERIAL & METHODS:

This prospective and analytical study was carried out in the department of Gynecology & Obstetrics of JLN Medical College, Ajmer, Rajasthan after taking due permission from the institutional ethical committee. Only patients with a transverse incision during an elective or emergency caesarean section were included in this study while the patients with established or gestational diabetes, coagulation defects, hemodynamic instability, septicemia or chorioamnionitis were excluded. Patients on cytotoxic drugs or anticoagulants and

those with hematological disorders or malignancy were also excluded from the study.

This study was conducted on the patients undergoing caesarean section and these patients were divided into two equal groups. In group I, after stitching the uterus, the rectus sheath was stitched with thread Vicryl No.1 on a round body needle; after securing the edges with a knot, the thread of rectus sheath was continued into the skin with the application of subcuticular stitches. In group II, after stitching the rectus sheath with Vicryl No. 1, the thread was cut and interrupted sutures were applied in subcutaneous fat with Vicryl 2/0. The skin was stitched by subcuticular stitches with Prolene 2/0 and the length of surgery from skin incision to skin closure was recorded for each CS. Postoperative prophylactic antibiotics were given for 24 hours. Only round body needles were used in these surgeries. All the surgeries were done under regional spinal analgesia. Dressing was open on the second post-operative day. Patients were discharged from the hospital and called back between 8th and 12th post-operative days. The patients in group-I and group-II did not require removal of stitches. The two groups of cases were observed for the duration of surgery and were followed up for evidence of wound infection or seroma and cosmetic results. Signs of infection, presence of hematoma, wound secretion, and wound dehiscence were noted. Further temperature and vital parameters were checked on a regular basis. The data were collected in the operation theatre immediately following the surgery, at discharge from the hospital, at the first post-natal visit and six weeks after delivery. To allow a comparable assessment of pain, Visual Analogue Scale (VAS) was used with a 10 cm line labeled as '0' with 'no pain' and '10' with the 'worst pain'.

RESULTS

The present study shows the wound infection rate is more common in emergency caesarean section (10.2%) as compared to elective caesarean section (table 1) and duration of surgery in group-I on the average was 4.17 minutes less as compared in patient of Group-II (Table-2). The degree of pain was assessed on the basis of visual analogue scale with significant pain as more than 5/10. P-value was calculated to be less than 0.01 so that pain was significantly less in group-I during the first postoperative day. P-value was calculated to be >0.05 so that there was no difference in second postnatal week pain in two groups (Table-3). In this study, we observed that group-I had more wound infection (5.5%), hematoma (2%), seroma (3%) as compared to the group-II (Table-4) and the factor independent of suture material like type of surgery and duration of leaking. The wound infection was more common (33.33%) in the patient with leaking more than 18 hours as compared to leaking less than 18 hours or no leaking (1.27%) (Table-5).

Table1. Distribution Of Cases According To Type Of Surgery

Subgroup allotment	Group I	Group II	Total No.	Infections
Elective caesarean section	28	25	53 (26.5%)	1 (1.88%)
Emergency caesarean section	72	75	147 (73.5%)	15 (10.2%)

Table-2. Duration Of Surgery

Duration (Minutes)	Group I	Group II	Difference	P-value
<30 Minutes	23	2	21	$t=5.9336$
30-45 Minutes	73	87	-14	$p < 0.0001$
>45 Minutes	4	11	-7	standard error of
AVERAGE	33.92	38.09	-4.17	difference = 0.703

Table- 3 Post Operative Pain In Visual Analogue Scale

	Group 1 st		Group 2 nd		P value
	Significant	Not Significant	Significant	Not Significant	
1 st Post operative day	35	65	72	28	<0.01
2 nd Post Natal week	10	90	19	81	>0.05

Table 4: Distribution Of Cases According To Wound Complication

	Group I	Group II
Wound Dehiscence	4	0
Wound Infection	11	5
Wound Haematoma	4	0
Wound Seroma	6	2

Table 5 : Distribution of cases according to membrane status

Subgroup allotment	Group I	Group II	Total number	Wound Infection	
				Group I	Group II
Membrane status- A) Leaking <18 hours or No leaking	80	78	158 (79%)	2	0
B) Leaking >18 hours	20	22	42 (21%)	9	5

DISCUSSION:

The surgeon's aim is to restore the structural integrity of incised or injured tissues to as near normal as possible.¹⁴ The importance of the role played by the sutures in this cannot be exaggerated; however the suture technique has been found out to be equally important in surgery. Each suture material has its inherent advantages and disadvantages and is also widely affected by the patient, surgeon and wound related factors. Therefore, choice of an ideal suture material for abdominal closure in caesarean section has been a matter of debate for a long time. The first stage of absorption has a linear rate lasting for several days to weeks. The second stage is characterized by a loss of suture mass and this stage overlaps the first stage. The loss of suture mass occurs as a result of leucocytic cellular responses that remove cellular debris and suture material from the line of tissue approximation. Chemical treatments such as chromic salts lengthen the absorption time. Accelerated absorption may occur in patients with fever, infection or protein deficiency and may lead to an excessively rapid decline in tensile strength. Accelerated absorption may also occur in a body cavity that is moist, filled with fluid or if the sutures

become wet or moist during handling prior to implantation.

Nonabsorbable sutures elicit a tissue reaction that results in encapsulation of the suture material by fibroblasts. Nonabsorbable sutures are natural (surgical silk) or synthetic (nylon, PolypropyleneProlene). Prolene, a monofilament suture, is an isostatic crystalline stereo-isomer of a linear propylene polymer it permits little or no saturation. The material does not adhere to tissues and is useful as a pullout suture (e.g., subcuticular closure). Polypropylene also holds knots better than other monofilament synthetic material. This material is biologically inert and elicits minimal tissue reaction. Prolene is not subject to degradation or weakening and maintains tensile strength for up to 2 years. This material is useful in contaminated and infected wounds, minimizing the chances of sinus formation and suture extrusion.

In our study, postoperative complications were found in 14% of cases with wound infection has been the most common complication occurring in 6.5% of cases studied. Another complication included were wound seroma (4%), wound dehiscence (2%), wound haematoma (2%), and suture sinuses (0%). This data is statistically similar to the studies conducted by Isralsson LA et al,¹⁵ Irvin TT et al,¹⁶ and Gys T et al,¹⁷ who find out the wound infection rate post laprotomy to be 3–9%. Wound infection rate is more common in emergency caesarean section (10.2%) as compared to elective caesarean section. In our study, wound infections were found in 8% of the cases and it was 3.5% higher in group-I (5.5%) as compared to group-II (2.5%). Neumann et al¹⁸, Cetin and Cetin A¹⁹, Allaire et al²⁰, Chelmow et al²¹ study shows wound infection more in the fat closure group as compared to fat non closure group. In our study it was to be noted that

the duration of surgery in group-I (average 33.92min) on average 4.17 minutes less as compared to group-II (38.9min) with p-value<.0001.

The subcutaneous fat (between the sheath and the skin) may be left to heal without suturing, or can be closed using a variety of techniques. Closing the subcutaneous fat may reduce the risk of some wound complications (haematoma and seroma) but further research is needed to investigate how these outcomes affect the well being and recovery of the patient concerned.⁶ On one hand, subcutaneous suture closure allows to perfectly align the edges of the wound that needs to be closed. This would decrease tension on the skin and thereby promote better wound cosmesis. By closing off the dead space it might also be possible to avoid retractions of the scar below the level of the skin; such retractions are especially bothersome and apparent in the standing position. On the other hand, the suture material used for closure of the subcutaneous fat could lead to a foreign body reaction to increased inflammation and consequently negative effect on wound cosmesis.

The subcutaneous fat may be closed (sutured), or left unsutured, with the wound being closed by suturing the skin only and shows that the advantage of closing the fat layer is the removal of space under the skin where blood or serous fluid could collect and lead to infection. The advantages of not closing it include a faster operation, less foreign material in the wound to provide a focus for infection, and greater tissue mobility leading to easier skin closure and a more attractive scar. In our study demonstrate that there was a 2% decrease in wound haematoma after fat closure (0%) compared to nonclosure (2%). Neumann et al¹⁸, Cetin and Cetin A¹⁹, Allaire et al²⁰, Chelmow et al²¹ study shows wound hematoma in 0% of cases in fat closure group and 3% of cases in fat non

closure group.

The present study shows more incidence of wound dehiscence was noted in fat non closure group (2%) while the fat closure group did not show any incidence of wound dehiscence. There was a significant decrease in wound disruption. This reduction seems to be largely a result of a decrease in wound haematoma and seroma. Various authors show wound disruption is less in fat closure group as compared to the non closure group.¹⁸⁻²¹ and more incidence of wound seroma was noted in fat non closure group (3%) while 1% in the fat closure group. Same study done by Neumann et al¹⁸, Cetin and Cetin A¹⁹ who found that 5.7% of cases in fat closure group and 3% of cases in fat non closure group.

The risk of hematoma and seroma was reduced with fat closure as compared with non closure. There was no case of death or maternal infectious morbidity in any group. Patients were observed for two weeks after delivery and there was no operative procedure on the wound, blood transfusion or primary post partum hemorrhage. It is important that caesarean section operations are performed as safely and effectively as possible and that methodologically rigorous randomized controlled trials are performed to establish the effectiveness of different surgical techniques. In mass closure of abdominal incisions, persistent suture sinus and scar pain are likely to occur if care is not taken to bury the knot as mentioned in literature by Aries LJ et al in his study : Experimental study with synthetic fibre as a buried Suture.¹⁹ These complications are almost exclusively seen with the non absorbable sutures. Tissue reactivity refers to the tissue reaction elicited after the implantation of sutures inside the wound. This occurs to some degree with all sutures for first 7 days. It then decreases for most non absorbable sutures with polypropylene exhibiting the

least reactivity. Sutures of natural origin and multi filament sutures show maximum tissue reactivity. Synthetic monofilament sutures like polydioxanone show intermediate tissue reactivity.

CONCLUSION:

On the basis of this study, it was concluded that in spite of using the best closure technique and keeping in mind the patient related factors complication arising after Cesarean section are frequent and most commonly associated with non closure of fat. There was a significant decrease in the wound hematoma, seroma and wound dehiscence after the fat closure. The wound infection rate was higher with prolonged leaking (leaking >18hrs) and in an emergency caesarean section. Further studies are needed for evaluation of ideal suture materials for closure of skin.

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Conflicts of Interest: None.

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