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Comparison of suture material and technique of closure of subcutaneous fat and skin in 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 a morbidity period. These women translate into a substantial portion of population and hence there is a load on the financial resources of healthcare system. 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. Aim: The aim of this study is to compare the effects of alternative techniques for closure of subcutaneous fat and skin on maternal health and use of healthcare resources in caesarean section.

Material & Methods: The present study was conducted in department of Gyane and Obs. department of J. L. N. Medical College, Ajmer. In this study 200 cases were included during period of July 2020 to December 2020. Patients undergoing Caesarean section were divided in two groups of one thousand patients each. In all the patients, after stitching the uterus, the rectus sheath was stitched with thread vicryl No.1 (synthetic absorbable braided sutures with polyglycolic acid, polycaprolactone and calcium stearate coating), 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 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 proline 2, a non-absorbable propylene suture.

Results: In our study post CS complications were found in 14% of cases with wound infection has been the most common complication occurring in 6.5% of cases studied. Other complication included were wound seroma (4%), wound dehiscence (2%), wound haematoma (2%), and suture sinuses (0%).

Conclusion: On the basis of this study, it was concluded that in spite of using best closure technique and keeping in mind the patient related factors complication arising after C.S. are frequent and most commonly associated with non closure of fat.

Keywords: Subcuticular stitches, intradermal stitches, suture material

Introduction

The goals of wound closure include 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. 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. Complications of wound healing such as hypertrophic scars, wide scars and wound dehiscence can result from patient factors, such as nutritional status, incorrect suture selection or a technique which causes excessive tension across the wound. Monofilament suture is made of a single strand, a structure that is relatively more resistant to harboring microorganisms. The monofilament sutures experience less resistance to passage through tissue than multifilament suture. Great care must be taken in handling and tying a monofilament suture because crushing or crimping can nick or weaken the suture leading to premature suture failure. A multifilament suture is composed of several filaments twisted or braided together. Although this material is less stiff, it has a higher coefficient of friction.

Multifilament suture generally has greater tensile strength, better pliability and flexibility than monofilament suture. This type of suture ties well. Since multifilament materials have more capillarity, the resultant increased absorption of fluid may act as a tract for the introduction of pathogens. 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 child-births in most developed countries [1, 2]. The rates in other parts of the world vary widely, from 1.6% of all child-births in Haiti to 59% in Chilean private hospitals [3]. A variety of surgical techniques for all elements of the caesarean section operation are in use [4]. Many of these have not yet been rigorously evaluated in randomized controlled trials, and it is not known whether or not they are associated with better outcomes. There is not enough evidence to say whether any particular technique for closing the abdominal wall during caesarean section is better than the others [5]. Because of the large number of women that undergo caesarean section, even small differences in post-operative morbidity rates due to different techniques could translate into improved health for a substantial number of women and significant savings of cost and health services resources. Interrupted sutures were applied in subcutaneous fat with vicryl 2/0. Skin was stitched by subcuticular stitches with proline 2/0. Prophylactic antibiotics were given for 24 hours. All surgeries were performed by consultants or residents with at least two years of training. Only round body needles were used in these surgeries. All the surgeries were done under regional spinal analgesia. Dressing was opened 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 did not require removal of stitches while the stitches of patients in group II were removed between 8th and 12th post operative days. The two groups of cases were observed for the duration of surgery and were followed up for post-operative pain in stitches, patient's satisfaction about removal of stitches, evidence of wound infection or seroma and cosmetic results. The data was collected in the Operation Theater immediately following the surgery, at discharge from the hospital, at first post-natal visit and six weeks after delivery.

Material & Methods

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with thread vicryl No.1 (synthetic absorbable braided sutures with polyglycolic acid, polycaprolactone and calcium stearate coating), 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 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 proline 2, a non-absorbable propylene suture.

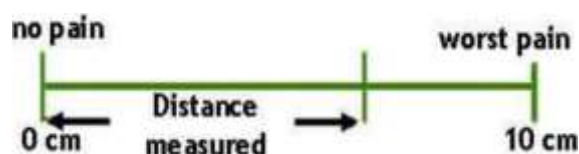
Inclusion criteria

- Minimum 18 years of age
- Younger than 50 years
- Study consent

Exclusion criteria

- HELLP syndrome
- Febrile infection 2 weeks prior/ Septicemia/ Chorioamnionitis
- Current signs of infection
- Chronic diseases which involve corticosteroid use
- Immunosuppression
- History of keloids
- Allergy or sensitivity to used suture material
- Established or Gestational diabetes
- Coagulation defects
- Hemodynamic instability

A thorough patient history is taken (including: parity, age, BMI prior and during the pregnancy, basic gynecologic history, previous surgeries, current and past medical history and current medications), HIV and Hep B status is evaluated, blood pressure and pulse are determined and a urine dip and sonography was performed. During sonography placental location and biophysical profile were assessed. To allow a comparable assessment of pain, Visual Analogue Scale (VAS) was used with a 10 cm line labeled at '0' with 'no pain' and '10' with 'worst pain'



Results

Table 1: Distribution of cases according to type of surgery

Sub group allotment	Group 1 st (Vicryl)	Group 2 nd (Prolene)	Total number	Infections
(1) Elective caesarean section	28	25	53 (26.5%)	1(1.88%)
(2) Emergency caesarean section	72	75	147 (73.5%)	15(10.2%)

This table 1 and fig. 1 shows distribution of cases according to type of surgery performed. Incidence of emergency C.S (73.5%) is more as compared to elective C.S. Wound infection rate is

more common in emergency caesarean section (10.2%) as compared to elective caesarean section.

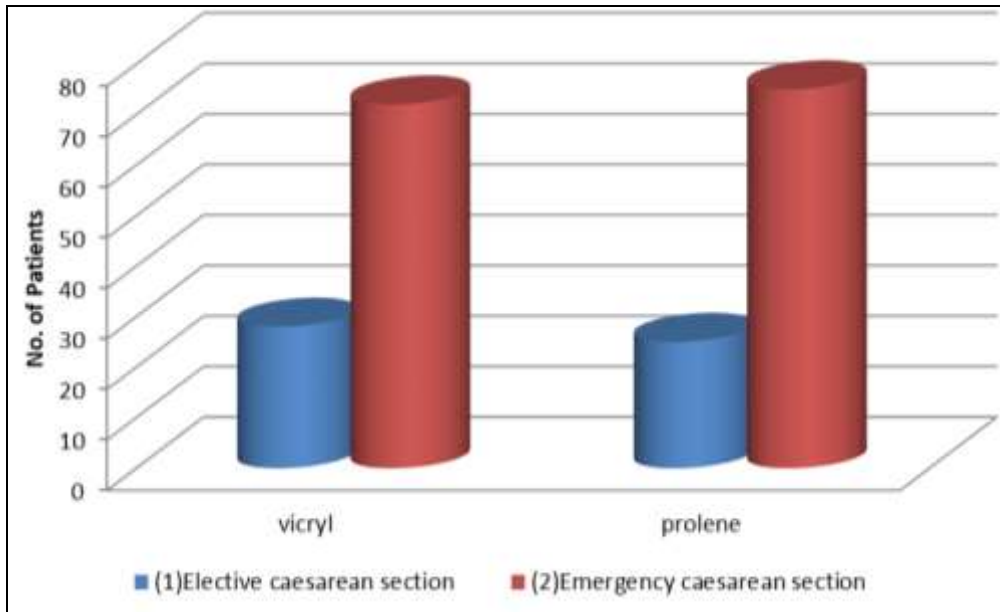


Fig 1: Distribution of cases according to type of surgery

Table 2: Duration of surgery

Duration (Minutes)	Group 1 st (Vicryl)	Group 2 nd (Prolene)	Difference	P-value
<30 minutes	23	2	21	t=5.9336 p < 0.0001 standard error of difference = 0.703
30-45 minutes	73	87	-14	
>45 minutes	4	11	-7	
Average	33.92	38.09	-4.17	

This table 2 and fig. 2 shows the average duration of surgery. It is to be noted that the duration of surgery in group 1 on the

average was 4.17 minutes less as compare in patient Group II.

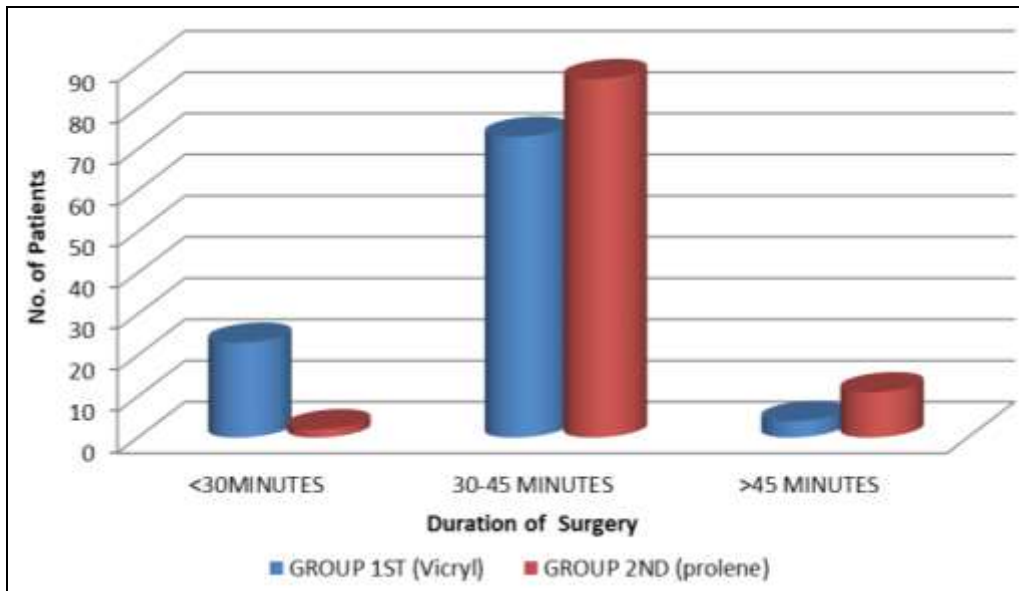


Fig 2: Duration of surgery

Table 3: Post operative pain in visual analogue scale

	Group 1 st		Group 2 nd		P value
	Significant	Not Significant	Significant	Not Significant	
First post operative day	35	65	72	28	<.01
Second post Natal week	10	90	19	81	>.05

This table 3 and Fig. 3 shows post operative pain according to Visual Analogue scale. 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 in first postoperative day. p value was calculated to be >.05 so that there was no difference in second postnatal week pain in two group.

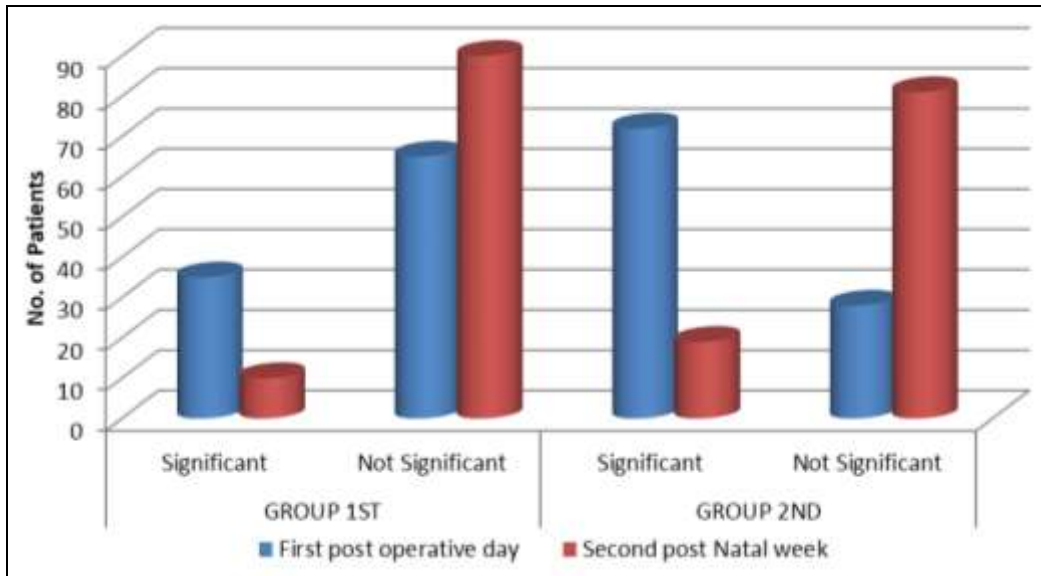


Fig 3: Post operative pain in visual analogue scale

Table 4: Distribution of cases according to complications

S. No.	Complications	Cases	Percentage (%)
1	No complication	167	83.5
2	Wound infection	16	8
3	Wound dehiscence	4	2
4	Hematoma	4	2
5	Seroma	8	4
6	Suture sinus	0	0

This table 4 and fig. 4 shows distribution of cases according to various complications arising after C.S. Wound infection is the

most common complication occurring after C.S. found in 16 cases (8%) followed by wound seroma 8 cases(4%).

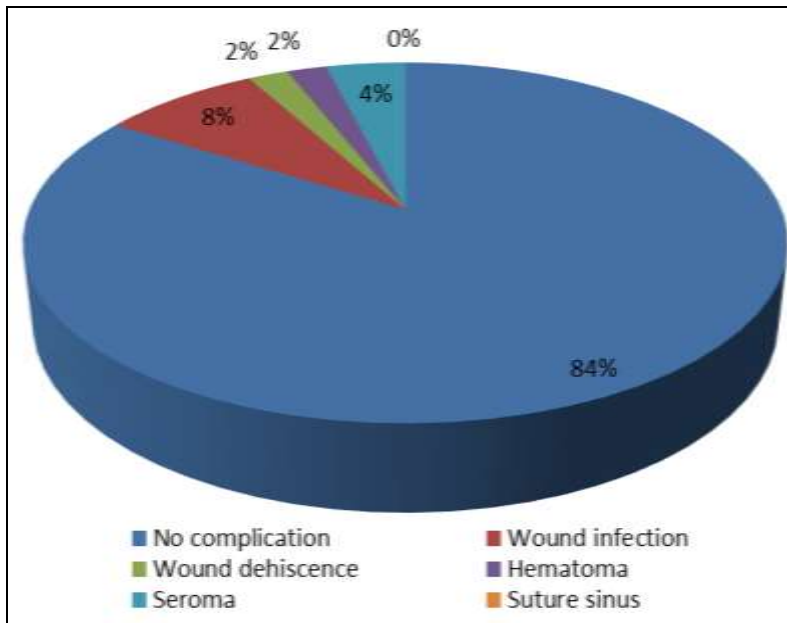


Fig 4: Distribution of cases according to complications

Table 5: Distribution of cases according to wound infection

	Group 1 st (Vicryl)	Group 2 nd (Prolene)
Wound Infection	11	5

This table 5 and figure 5 shows distribution of cases according to wound infection in different suture group. Vicryl shows more incidence (5.5%) of wound infection and prolene less (2.5%).

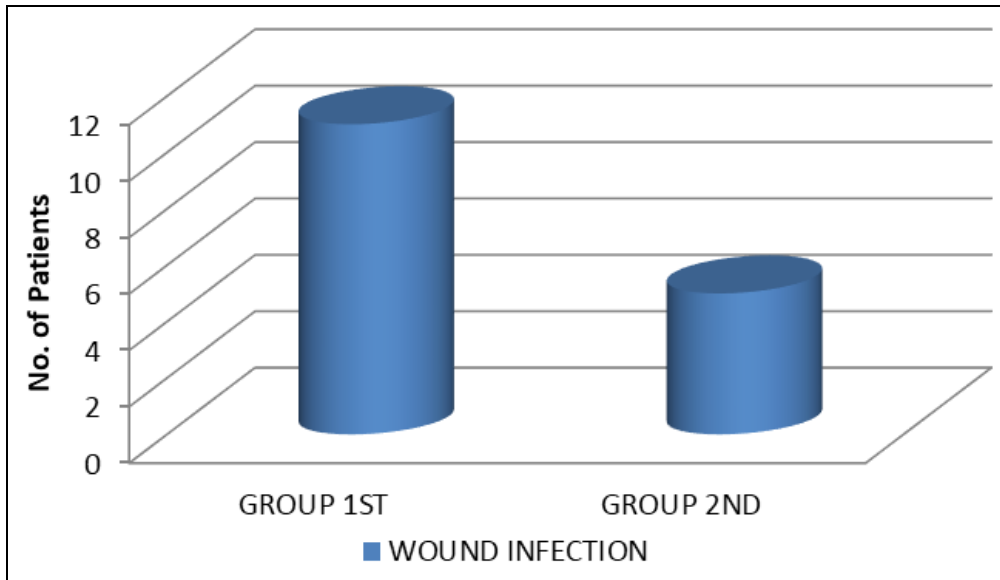


Fig 5: Distribution of cases according to wound infection

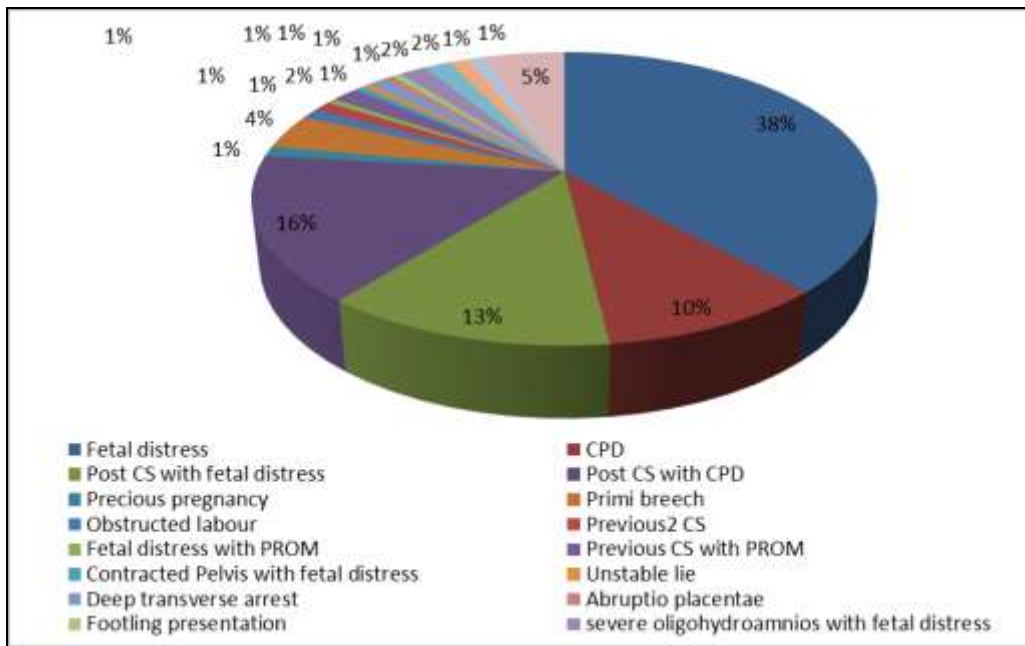


Fig 6: Distribution of cases according to indication of surgery

This figure 6 shows distribution of cases according to indication of C.S. for which C.S. were performed. Maximum number of C.S. were performed for fetal distress (46.5%) followed by previous C.S. With C.P.D.

Women’s satisfaction with the results of surgery. Patient in group 1 were more satisfied with the results of surgery and they were relieved to know that their stitches did not need to be removed. P value was >0.05(x2=1.05). So there was no significant difference between two group. There was no patient in either group with a morbid wound infection. Cosmetic result in both group were equally good.

Discussion

The present study was undertaken on 200 patients undergoing caesarean section (both elective and emergency) at the J.L.N. Hospital Ajmer over a period of one year.

The aim of our study was to examine two specific aspects of techniques used in caesarean section to help determine which method can lead to a better outcome for women and health care

resources. It was a randomized trial making comparison of (a) suture used for closure of subcutaneous fat versus none, and (b) suture materials used for closure of skin.

In our study, maximum number of patients were in the age group of 20-30 year and most common indication were fetal distress and CPD.

Commonly encountered indication which necessitate C.S. include fetal distress, CPD, previous CS with fetal distress, precious pregnancy, primi breech, obstructed labour, pre 2 CS, fetal distress with PROM, Previous CS with PROM etc.

In our study fetal distress was the most common indication for which C.S. was performed accounting for 46.5% followed by previous CS with CPD 14.5% cases. Other indications in the decreasing order of their frequency include CPD, primi breech, previous CS with PROM, precious pregnancy, obstructed labour, previous 2 CS, abruption, DTA, unstable lie, transverse lie, previous CS with breech, NPOL, placenta previa etc.

Emergence of these complication is affected by technique of closure, suture material, surgeon and patient related factor.

In spite of perfect asepsis, improved surgical skills, antibiotics etc, wound complications comprise nearly 50% of all post operative complications^[9]. Hence, there is a constant search for a suture technique and material which would minimize the wound failure rate.

Absorbable sutures provide temporary wound support, until the wound heals well enough to withstand the normal stress. The absorbable surgical sutures are made from either "natural" or synthetic polymers. Natural polymers include collagen, surgical gut and chromic. Their absorption occurs by enzymatic degradation.

Synthetic sutures are chemical polymers absorbed by hydrolysis and cause a lesser degree of tissue reaction following placement. These sutures include Polyglactin 910 (Vicryl), Poliglecaprone 25 (Monocryl), Polysorbond Polydioxanone.

Non-absorbable sutures elicit a tissue reaction that results in encapsulation of the suture material by fibroblasts. Non-absorbable sutures are natural (surgical silk) or synthetic (nylon, Polypropylene-Prolene). Prolene, a monofilament suture, is an isotactic crystalline stereoisomer of a linear propylene polymer; it permits little or no saturation. The material does not adhere to tissues and is useful as a pull-out suture (e.g., subcuticular closure). Polypropylene also holds knot 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.

Wound infection is the most common complication that occur after CS although a number of factor are responsible for occurrence of wound infection. The choice of suture material and suture technique also has an important role to play. The presence of obesity, hypoproteinemia, immune suppression diabetes mellitus, leaking, membrane status, anaemia, duration of surgery are some of factor which increase wound infection rate. Multi filament suture because of their rough texture, promote bacterial adherence and migration by their capillary action and therefore might lead to an increase rate of wound infection.

In our study post CS complications were found in 14% of cases with wound infection has been the most common complication occurring in 6.5% of cases studied. Other 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 Israelsson LA *et al.*^[10] Irvin TT *et al.*^[11] Gys T *et al.*^[12] and Ooster PH *et al.*^[13] who found 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 it was to be noted that the duration of surgery in group I (average 33.92min) on average 4.17minute less as compared to group II(38.9min). (p value<.0001)

Aliya Islam *et al.* study shows that duration of surgery in fat nonclosure group on average 7.7 min less as compared to fat closure group^[7].

In our study demonstrate that there was 2% decrease in wound haematoma after fat closure (0%) compared to nonclosure (2%). In our study more incidence of wound dehiscence was noted in fat non closure group (2%) while fat closure group did not show any incidence of wound dehiscence. There was a significant decrease in wound disruption. This reduction seem to be largely a result of decrease in wound haematoma and seroma.

The degree of pain assessed on the basis of visual analogue scale with significant pain as more than 5/10. P value was <.001(x²=27.51). Pain (first post operative day) was significantly higher skin closure with prolene. P value was >.05(x²=3.266). There was no significant difference between two group in second postoperative week.

We found that suture closure of the subcutaneous fat resulted in significantly less wound hematomas.

There was no statistically significant difference in the duration of hospitalization between the two groups. The incidence of wound sepsis was higher in the mass closure than layer group (5.5% vs 1.9%) but intra abdominal and peritoneal adhesions were commoner in the layer group. Mass closure reduces operative time, exposure to anaesthesia and is cost effective.

In our study patients in group 1(40.5%) were more satisfied with the result of surgery as compared to group 2(20.5%) and they were relieved to know that their stitches did not need to be removed. P value was >.05(x²=1.05) so there was no significant difference between two group. There was no patient in either group with a morbid wound infection. Cosmetic result in both group were equally good.

Conclusion

On the basis of this study, it was concluded that inspite of using best closure technique and keeping in mind the patient related factors complication arising after C.S. are frequent and most commonly associated with non closure of fat.

There was a significant decrease in wound haematoma, seroma and wound dehiscence after fat closure. Pain was significantly higher and patient satisfaction was lower with prolene but infection rate was also lower with prolene so prolene is the best suture material for closure of skin in C.S.

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