



## An Observational Study for Comparison of Wound Outcome with Interrupted Mattress versus Continuous Subcuticular Suture for Pfannensteil Skin Incision in Caesarean Section

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### Abstract

**Introduction:** Caesarean section is one of the most commonly performed operations today. Pfannensteil incision in the caesarean section is the most preferred incision nowadays. Given the trend of rising caesarean section rate, wound complications such as disruption or infection, remains an important cause of post caesarean. The aim and objective of this study is to compare the wound outcomes in Pfannensteil incisions closed with mattress sutures and subcuticular sutures using monofilament sutures in caesarean deliveries.

**Methods:** It is a prospective observational study done on 148 consecutive pregnant women who were admitted to labor room for elective or emergency caesarean section. Among 148 women, 74 had mattress sutures and 74 had subcuticular sutures for skin wound closure. Wound complications investigated on postoperative days from 3 to 7 and at the 6-week follow-up, the secondary result was examined.

**Results:** The study looked at 148 pregnant women who had a caesarean section and had similar baseline features and risk factors. The overall incidence of erythema, surgical site infection, wound dehiscence, resuturing and pain was more in mattress group and was statistically significant. Women with subcuticular sutures had a superior cosmetic scar and were more satisfied with their scars at 6 weeks than women with mattress sutures.

**Conclusions:** Subcuticular sutures generate much fewer wound problems and pain in the postoperative period than mattress sutures, at 6 weeks, there was significant difference in pain levels between two skin closure procedures.

**Keywords:** Caesarean section, Mattress sutures, Subcuticular sutures, Suture materials, wound healing

## INTRODUCTION

One of the procedures that is currently most frequently carried out is a caesarean section. The rate of caesarean births has steadily increased over the past few years as medical technology, particularly obstetrics, has advanced. Although both vertical and transverse skin incisions can be used for caesarean deliveries, transverse incisions have almost completely supplanted vertical incisions in recent years.<sup>[1]</sup> Only a few indications call for a vertical skin incision.

There are many types of transverse abdominal incisions viz., the Pfannensteil, the Joel-Cohen, Maylard's and Cherney's incision.<sup>[2]</sup> Transverse skin incisions provide equivalent, if not superior, pelvis visibility while being less uncomfortable, allowing for early postoperative ambulation, and being linked to a lower risk of future herniation. Nowadays, majority of caesarean deliveries are performed by Pfannensteil incision. Pfannensteil incision was first described and performed by Pfannensteil in 1897.<sup>[3]</sup> It is a low transverse, curvilinear incision made at a point approximately 3 cm above the pubic symphysis.

Following caesarean section, subsequent apposition of skin edges is important for wound healing by primary intention and to reduce postoperative morbidities. The goal of any skin closure technique is to produce appropriate skin approximation and adequate healing with minimal wound complications, scarring, pain and cost.<sup>[4]</sup>

A more contemporary method acknowledges that skin is made up of layers of various tissues, each with characteristics that can be better suited by different threads and stitches. The sub cutis, also called the hypoderm, is the innermost layer of skin. It is made up of several layers of connective tissue which has a good tensile strength. A subcuticular suture repairs this skin layer first. Suturing of the outer epidermis follows, by using thinner suture material with small but sharp needles, often using techniques to minimize scarring. The resultant scar is linear, thin and cosmetically more acceptable.<sup>[5]</sup> A subcuticular stitch in a Pfannenstiel incision runs along the natural skin lines hence improves and hastens the wound healing.<sup>[6]</sup> Since it avoids piercing the skin directly, which has maximum nerve endings, the post-operative pain is less, allowing early ambulation and faster recovery.

Materials and techniques used for skin closure influences the quality of wound outcomes in terms of postoperative pain, induration, infection, healing, cosmetic appearance and wound acceptance by patient.<sup>[7]</sup> There are various degrees of tissue response, notably inflammation, caused by various suture materials. A good suture material is the one which causes the least foreign body reaction and inflammation. However, Cochrane review by Alderdice et al concluded that there was no conclusive evidence in the choice of techniques and materials to use at skin closure at caesarean section.<sup>[8]</sup>

Hence in our study, we have compared the wound outcome when closure is done with subcuticular suture and interrupted mattress suture using monofilament suture in terms of postoperative pain (VAS) and requirement of analgesics, erythema, wound infection (Southampton Wound Scoring System), stitch line discharge, cosmetic appearance of wound in an unscarred abdomen so as to reduce postoperative morbidities.

## OBJECTIVES

**Primary Objective:** To determine proportion of cases with erythema in closure of skin incision with interrupted mattress suture and continuous subcuticular sutures for Pfannenstiel incision in caesarean section.

**Secondary Objective:** To determine proportion of cases with postoperative pain (in terms of VAS), stitch line discharge, analgesic requirement, removal of residual suture material, wound infection (in term of Southampton wound scoring system) in closure of skin incision with interrupted mattress suture and continuous subcuticular sutures for Pfannenstiel incision in caesarean section.

## METHODOLOGY

It is a prospective observational study done on pregnant women who were admitted to labor room for elective or emergency caesarean section during the period from February 2021 to October 2021 at the Department of Obstetrics and Gynaecology, SMS Medical College and Attached Hospitals, Jaipur. The study was approved by the institutional ethical committee. Informed consent was obtained from all patients.

### Inclusion criteria

A total of 148 caesarean section using a Pfannenstiel incision was utilized in our study. Patients undergoing caesarean section with Pfannenstiel skin incision and skin closure done with either mattress or subcuticular sutures are included in this study. Detailed history of the patient was taken and complete medical and obstetrical examination done as per our department protocol. After obtaining written consent, eligible women were enrolled into study. Prior to this evaluation, it was made sure that patient was not a part of any other study.

### Exclusion criteria

Obese women (BMI >30), history of allergy for antibiotics and analgesics, previous keloid formation or hypertrophic scar, chronic steroid use and presence of any immunological disorder. Patients not consenting for the study and patients who underwent non-routine procedure (midline skin incision, postpartum hysterectomy or laparotomy) because of an unexpected complication were also excluded.

Three patients were also excluded because of poor medical records, which did not indicate the skin closure method applied. By reviewing the charts, we excluded cases of neonatal deaths or severe morbidities. Therefore, a total of 12 patients were removed from the list owing to a fetal issue, and 2 were subtracted for maternal reasons, i.e., one for a severe peripartum haemorrhage requiring uterine arterial embolization, and one because of postpartum depression.

Out of 160 women, 148 women were enrolled into this study. Among 148 women, 74 women had mattress sutures and 74 women had subcuticular sutures for skin wound closure. The primary outcome studied were wound complications including erythema, dehiscence, wound infection and pain which were studied on postoperative day 3-7. The secondary

outcome was studied at 6 weeks follow-up in terms of pain, cosmetic appearance of scar and patient satisfaction about scar.

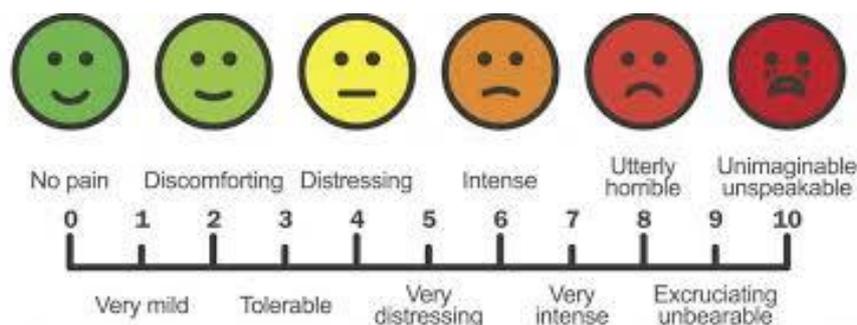
For the group a in present study, the skin closure method applies subcuticular stitch using a synthetic absorbable braided suture made of poliglecaprone 25 (MONOCRYL - 3-0). Interrupted mattress stitch using a nonabsorbable monofilament suture made of nylon, nylon 2-0. (ETHILON R), was applied to the group B. For both groups, the wound dressing was reinforced using a Micropore Tape), and patients were advised to remove them on postoperative day 7. The scar is then covered with a 10×20 cm Mepilex Border until postoperative day 1. According to a critical pathway program for caesarean sections, the patients are encouraged to discharge on postoperative day 5. Both the ends of absorbable braided suture were trimmed on day 5. Stitch removal, applied only to the group B, was conducted on postoperative day 7 at an outpatient clinic.

The suture encompassed only small portion of fatty tissue of subcutaneous layer and the edges were gently everted.

Suturing technique of the intradermal buried vertical mattress is well described in the study of Hohenleutner et al.<sup>[9]</sup> In mattress suture group, interrupted vertical mattress sutures are placed in “far-far-near-near” order of bites with nonabsorbable suture, nylon 2-0. (ETHILON R). The far loop enters and exits the skin surface at 90° angle and passes deep into dermis including the whole of fat layer. Fat layer was not sutured separately.

In subcuticular suture group, skin was closed with subcuticular suture using poliglecaprone 25 (MONOCRYL - 3-0). Subcutaneous fat layer was sutured if it was more than 2.5 cm thick. Sterile dressing was done following skin closure in both groups. All patients were assessed daily after surgery until discharge from the hospital and again at 6 weeks.

Dressing was opened on 3rd postoperative day. Mattress sutures were removed on postoperative day 7 to 10. In subcuticular suture group, suture edges were cut on postoperative day 5 to 7. All patients included in the study were advised not to use any medication apart from the standard prescription that would affect wound healing or lowering the pain. They were given analgesics as per hospital protocol.



**Figure\_1:** Visual Analogue Scale

A standardized physical examination of the wound was performed by the consultant obstetrician at postoperative day 3-7 and again at follow-up at 6 weeks. At day 3-7, primary outcomes related to wound healing like erythema, discharge (serosanguineous/purulent), pain, cosmetic appearance were assessed.<sup>[10]</sup>

At 6 weeks follow-up, secondary outcomes were assessed. Pain was assessed using visual analogue scale. Overall patient satisfaction about pain was assessed using a 0-10 points visual analogue scale (VAS) (FIGURE: 1). 0 represented “not at all satisfied” and 10 “very satisfied”.

## STATISTICAL ANALYSIS

An Observational statistical analysis was used and data were expressed as frequency, percentage, mean  $\pm$  standard deviation and range. Continuous variables were summarized as mean and standard deviation while nominal/categorical variables were expressed as percentages. Unpaired t-test was used for analysis of continuous variables while chi-square test and other relevant statistical test were used for nominal/categorical variable. P-value < 0.05 was taken as significant.

## RESULTS

The following data were collected in the study conducted at SMS MEDICAL COLLEGE AND ATTACHED GROUP OF HOSPITALS in the DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY.

In this study we found that mean age for group A was 24.29 years and for group B it was 24.64 years. The majority 64.86% of women in group A and 58.1% women in group B were from 18-25 years group. The majority 64.8% women

in group A were from urban followed by 28.3% women from rural area. In group B we found that 59.4% women from urban followed by 27.03% women from rural area. (Table 1)

Demographic Characteristics		Subcuticular (Group A)		Interrupted (Group B)		P-Value
		Frequency (n)	Percentage	Frequency (n)	Percentage	
Age (Years)	18-25	48	64.86	43	58.11	0.49
	26-30	25	33.78	31	41.89	
	>31	1	1.35	0	0	
Region	Rural	26	35.14	30	40.54	0.39
	Urban	48	64.86	44	59.46	
Socioeconomic Status	Lower Class	19	25.68	19	25.68	1
	Middle Class	55	74.32	55	74.32	
Gravida	Primi	31	41.89	28	37.84	0.91
	Multi	43	58.10	46	62.16	
Category of LSCS	Elective	33	44.59	35	47.30	0.74
	Emergency	41	55.41	39	52.70	

**Table 1: Socio-demographic Characteristics of the participants (n = 148)**

The mean duration of surgery for group A was 43.85min and for group B it was 47.01 min. The mean thickness of subcutaneous fat for group A was 1.59 and for group B it was 2.56cm. The mean duration of skin closure for group A was 6.32min and for group B it was 12.33min. (Table 2)

Obstetrical	Group A		Group B		P-Value
	Mean	SD	Mean	SD	
Duration of Surgery	43.85	8.58	47.01	12.26	0.07
Thickness of Subcutaneous Fat (cm)	1.59	0.69	2.56	0.86	<0.0001
Duration of Skin Closure (min.)	6.32	1.88	12.33	1.9	<0.0001
No. of days of Hospital stay	5.05	0.82	7.62	1.22	<0.0001

**Table 2: Distribution of patients according to Obstetrical findings**

We found significant difference in perception of pain in both group at day 2, at week 4 and at week 6 as p value was <0.05. In above table, we found that majority 77.02% women in group A and 51.35% women in group B had Healthy wound and also, we found that majority 22.9% women in group A and 48.6% women in group B had erythema followed by 18.9% women in group A and 41.8% women in group B with infection. There was significant difference seen in both group as p value was <0.05. (Table 3&4)

Perception of Pain		Group A		Group B		P-Value
		No. of Patients	Percentage	No. of Patients	Percentage	
at day 2	No Pain	22	29.73	0	0.00	<0.0001
	Mild	50	67.57	69	93.24	
	Severe	2	2.70	5	6.76	
at day 7	No Pain	28	37.84	34	45.95	0.31
	Mild	46	62.16	40	54.05	0.32
at 4 weeks	No Pain	5	6.76	31	41.89	<0.0001
	Moderate	69	93.24	43	58.11	
at 6 weeks	Moderate	57	77.03	30	40.54	<0.0001
	Severe	17	22.97	44	59.46	

**Table No- 3 Distribution of patients according to Perception of Pain**

Wound Condition	Group A		Group B		P-Value
	No. of Patients	Percentage	No. of Patients	Percentage	

Healthy Wound	57	77.02	38	51.35	0.0005
Erythema	17	22.97	36	48.65	0.001
Discharge	8	10.81	14	18.92	0.16
Dehiscence	5	6.76	12	16.22	0.07
Infection	14	18.92	31	41.89	0.002
Resuturing required	1	1.35	3	4.05	0.31

**Table No 4: Distribution of patients according to Wound Condition**

We found that majority 63.5% women in group A and 31.08% women in group B were satisfied. There was significant difference seen between these group as p value was <0.05. (Table 5)

Satisfaction	Group A		Group B		P-Value
	No. of Patients	Percentage	No. of Patients	Percentage	
NS (Not Satisfied)	27	36.49	51	68.92	0.0001
S (Satisfied)	47	63.51	23	31.08	

**Table No 5: Distribution of patients according to Satisfaction**

In women undergoing lower segment caesarean section, age group and gravid status were matched with term gestation. After applying inclusion and exclusion criteria, preliminary routine investigations were done. Patient underwent caesarean section after taking written and informed consent from cases of group A and B.

When both groups were compared statistically no significant difference was seen on the basis of age, residence, gravid status and period of gestation.

## DISCUSSION

Given that caesarean sections are the most widely used surgical operation worldwide, incision-related morbidity is crucial to the advancement of maternity care as a whole. In one group (Group A) we have used continuous subcuticular suture and in Group B we have used interrupted mattress suture for Pfannenstiel skin incision in lower segment caesarean section.

The pain associated with caesarean sections is greater than that of other delivery methods. The degree of discomfort is substantially influenced by skin closure. 10% of women reported having wound-related morbidity, primarily as a result of skin approximation.

The type of suture used to close a wound has an impact on how well it heals. Any skin closure technique's primary goal is to generate enough healing and approximation with minimal discomfort, scarring, and wound complications. The procedure ought to be more expedient, economical, and patient-satisfying overall.<sup>[4]</sup>

Different materials have been tried with variable results.<sup>[11]</sup> Tumuli et al in their meta-analysis and review of studies comparing subcuticular suture to staple in caesarean sections found that, staple closure is faster to perform but associated with a higher risk of wound complications.<sup>[12]</sup>

## CONCLUSION

Due to advancement in technology and diagnostic modalities, caesarean section is an important surgery to reduce adverse fetomaternal outcome in modern obstetrics.

In today's world, cosmesis is significant. The method and material utilised for skin closure play a significant role in the healing of the wound and the appearance of the scar following surgery with a Pfannenstiel incision. The "perfect" method to heal surgical wounds completely is still being sought after. In our study, we have compared wound outcome with interrupted mattress vs continuous Subcuticular suture for Pfannenstiel skin incision.

Two groups: Group a (subcuticular suture) and group B (interrupted mattress suture) were selected by matching demographic factors (age, residence), parity and period of gestation.

In our observation, subcuticular stitches appear to be superior to the interrupted mattress stitches to close Pfannenstiel skin incision with regard to wound outcome and cosmetic appearance.

Subcuticular suture has better long-term cosmetic results and higher patient compliance but requires more technical know-how, training, finer surgical abilities, and expensive suture materials. While mattress suture is easier, needs less training, less surgical skills and cheaper suture materials but can cause thicker scars and more pain in immediate postoperative period. Further studies with large number of data will improvise and establish the regular use of subcuticular suture over interrupted mattress suture in Pfannenstiel skin incision closure in lower segment caesarean section.

Wound outcome and scar appearance after surgery with Pfannenstiel incision largely depends upon the material and the technique used for skin closure. There is a continual search for 'ideal' way to close surgical wounds with the best possible outcome. In our observation subcuticular stitches with absorbable synthetic material, appear to be superior to the interrupted mattress stitches to close Pfannenstiel incisions with regard to wound outcome and cosmetic appearance.

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**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the Institutional Ethics Committee

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