

Skin Closure at Caesarean Delivery by Glue Versus Subcuticular Sutures: A Comparative Study

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ABSTRACT

Introduction: Caesarean Delivery (CD) rates have increased during the last few decades and it has become the most common surgery during a woman's reproductive years. A study was conducted to compare skin wound healing following elective Caesarean Delivery between skin closure with 2-0 vicryl (coated polyglactin 910) by subcuticular stitches and glue.

Material and methods: The present study was a hospital based prospective, observational and comparative study conducted over a period of 1 year (July 2018 - June 2019). The study was conducted at Obstetrics and Gynecology Department of R. G. Kar Medical College & Hospital, Kolkata. The total sample size was 330 with 165 in each each group. Group 1: Consisted of Women who underwent skin closure with glue. Group 2: Consisted of Women who underwent skin closure with subcuticular suture. Patient's demographics were obtained. Data were collected in details by history taking, examination and case sheets of the subjects. Investigations were performed.

Results: The results of our study showed that Glue (Group-1) was used to 165 (50%) participants and subcuticular sutures (Group -2) was given to another 165 (50%) participants. The mean age (mean \pm S.D) of the participants of Group-1 was 23.82 \pm 4.02 years and of the patients of Group-2 was 23.29 \pm 4.62 years. The mean BMI (mean \pm S.D.) of the patients of Group-1 was 24.73 \pm 2.61 kg/m² of the patients of Group-2 was 24.47 \pm 2.78 kg/m². There was no significant association between religions of the participants of two groups.

Conclusion: This comparative study of skin closure following CD by glue versus subcuticular sutures with coated polyglactin 910 showed that there was no significant difference among the two groups as regards to SSIs, wound disruptions (haematoma, seroma), cosmetic appearance of the scar (immediately and 8 weeks postoperatively, surgeon's and patient's satisfaction scores and hospital stay. Only the time taken for skin closure with glue was statistically significantly less when compared with subcuticular sutures with coated polyglactin 910.

Keywords: Caesarean Delivery, Haematoma, Seroma, Subcuticular Sutures, Glue

INTRODUCTION

Caesarean Delivery (CD) is an operative procedure where a birth of foetus occurs through incision in the abdominal wall (laparotomy) and the uterine wall. Caesarean deliveries have increased in both developed and developing countries. It was estimated by the World Health Organization (WHO) that 10 to 15 presents of all births require a caesarean section. At least 15 countries, the Caesarean Delivery rate exceeds 40%, including the Dominican Republic (58.1%), Brazil (55.5%), Egypt (55.5%) and Turkey(53.1%).¹ The

overall rate of caesarean delivery in 2015-16 was around 17.2% in India, increased from 8.5% in 2005-06. However the caesarean section rate was estimated to be low in rural areas (12.9%).^{2,3} The increases in caesarean section rates are due to various reasons and as CD rates have increased during the last few years, the incidence of wound complications have also increased.^{4,5} Surgical site infection (SSI) is one of the most common complications following caesarean delivery, and worldwide, it has an incidence of 3%-15%.⁶⁻⁸ Skin closure is an integral step of Caesarean Delivery (CD). It influences postoperative pain, wound healing, cosmetic outcome, the satisfaction of surgeons and patients. The optimal choice of skin closure at Caesarean Delivery has not yet been determined. There are various options namely interrupted mattress sutures or simple sutures, skin staples, subcuticular sutures and glue. Skin closure is also done by subcuticular stitches with 2-0 coated polyglactin 910 using a V-26 needle. The cosmetic appearance following this method of closure is very good and the pain is also much lesser. Glue is a liquid monomer that forms a strong tissue bond with a protective barrier that adds strength and inhibits bacteria. In addition, glue has the potential advantages of rapid application and repair time.^{9,10} A study was conducted to compare skin wound healing following elective Caesarean Delivery between skin closure with 2-0 vicryl (coated polyglactin 910) by subcuticular stitches and glue.

MATERIAL AND METHODS

The present study was a hospital based prospective, observational and comparative study conducted over a period of 1 year (July 2018 - June 2019). The study was conducted

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How to cite this article: Das KC, Jha T, Saha C, Mondal I, Das R, Saren L. Skin closure at caesarean delivery by glue versus subcuticular sutures: a comparative study. International Journal of Contemporary Medical Research 2021;8(3):C7-C12.

DOI: <http://dx.doi.org/10.21276/ijcmr.2021.8.3.6>



at Obstetrics and Gynecology Department of R. G. Kar Medical College & Hospital, Kolkata. The study began after receiving approval from Institutional Review Board and the Institutional Ethical Committee. All pregnant women at 37-42 weeks of gestation and admitted in labour ward of department who underwent scheduled elective caesarean delivery during the period, who were willing to participate in the study, after they had provided signed informed consent were included in the study. Patients with Clinical signs of infection at the time of CD, Uncontrolled Diabetes Mellitus (defined as Hemoglobin A1C > 6%, abnormal glucose measurements, and fasting glucose > 95mg/dl), Chronic Corticosteroids or immune suppressants, History of Keloids and hypertrophic scar, Known Hypersensitivity to any of the suture materials, BMI > 35 kg /m² were excluded from the study. The total sample size was 330 with 165 in each group. Group 1: Consisted of Women who underwent skin closure with glue. Group 2: Consisted of Women who underwent skin closure with subcuticular suture. Patient's demographics were obtained which included age, Parity, Previous caesarean delivery, Pre-pregnancy BMI, Smoking. Data were collected in details by history taking, examination and case sheets of the subjects. Then data were entered and recorded. The following investigations were performed as and when necessary-Complete haemogram, Blood sugar Fasting.& Post Prandial(2 hours), ABO grouping & Rh typing, Routine & Microscopic urine examinations, VDRL, HIV1&HIV2, HBsAg&Anti-HCV, USG for Foetoplacental Profile(FPP) and Amniotic Fluid Index(AFI), Blood for TSH, HPLC for Thalassaemia, Any other test as deemed necessary. Outcome parameters noted were haematoma, seroma, wound disruption, hypertrophic scars, keloid scar. All patients took soap bath on the day of caesarean delivery. Anti-septic dressing was done by Povidone Iodine (10%) and Isopropyl alcohol (70%) for all cases before surgery. During skin closure subcuticular fat stitches were given in all cases by interrupted sutures with 2-0 atraumatic catgut or 2-0 vicryl (Coated Polyglactin 910). Skin closure was then done by either Subcuticular sutures with 2-0 Coated Polyglactin 910 or Glue. After the closure of the wound, povidone iodine dressings were given to all cases.

All data about skin closure at caesarean delivery, Glue vs. Subcuticular sutures were recorded and collected from these cases in the bed headed tickets (BHTs) and case preforms. Finally data were analysed for comparison between two groups.

Under descriptive analysis different frequency tables were prepared and calculations of means with corresponding standard deviations were performed. Chi-square test was used to test the association of different study variables. Z-test (Standard Normal Deviate) was used to test the significant difference between two proportions. T-test was used to compare the means. Odds Ratio (OR) with 95% confidence interval (CI) was calculated to find the risk factors. p<0.05 was taken to be statistically significant and confidence intervals were set at 95%.

RESULTS

In our study Glue (Group-1) was used to 165 (50%) participants and subcuticular sutures (Group -2) was given to another 165 (50%) participants. The mean age (mean ± S.D) of the participants of Group-1 was 23.82±4.02 years with range 19 – 35 years and the median age was 24 years. The mean age (mean ± S.D) of the patients of Group-2 was 23.29±4.62 years with range 19 – 32 years and the median age was 23 years. There was no significant difference in mean age of the participants of two groups. The mean BMI (mean ± S.D.) of the patients of Group-1 was 24.73±2.61 kg/m² with range 20.1 – 29.0 kg/m² and the median was 24.79 kg/m². The mean BMI (mean ± S.D.) of the patients of Group-2 was 24.47±2.78 kg/m² with range 20.0 – 28.9 kg/m² and the median was 24.41 kg/m². There was no significant difference in mean BMI of the participants of two groups. Proportion of Hindu participants in Group-1 (37.6%) was higher than that of Group-2 (43.0%). However, proportion of Muslim participants in Group-1 (61.2%) was higher than that of Group-2 (55.2%). Also participants with from other religion in Group-1 (1.2%) were lower in Group-2 (1.8%). There was no significant association between religions of the participants of two groups. Participants with habit of smoking in Group-1 (1.2%) were lower than that of Group-2 (1.8%). There was no significant association between habits of smoking of the participants of two groups.

Participants with Previous caesarean delivery (CD) in Group-1 (3.0%) were higher than that of Group-2 (1.8%). There was no significant association between previous CD of the participants of two groups.

Participants with subcutaneous thickness ≤ 2 cm in Group-1 (93.9%) were lower than that of Group-2 (95.8%). However, participants with subcutaneous thickness > 2 cm in Group-1 (6.1%) were higher than that of Group-2 (4.2%). There was no significant association between subcutaneous thicknesses of the participants of two groups.

Proportion of poor participants in Group-1 (43.6%) was lower than that of Group-2 (49.1%). However, proportion participants from middle socio-economic status in Group-1 (51.5%) were higher than that of Group-2 (46.7%). Also participants from upper middle class in Group-1 (4.8%) were higher in Group-2 (4.2%). There was no significant

Previous CD	Group-1 (n=165)	Group-2 (n=165)	Total	p-value
Yes	5	3	8	
Row %	62.5	37.5	100.0	
Col %	3.0	1.8	2.4	0.65 NS
No	160	162	322	
Row %	49.7	50.3	100.0	
Col %	97.0	98.2	97.6	
Total	165	165	330	
Row %	50.0	50.0	100.0	
Col %	100.0	100.0	100.0	

Table-1: Distribution of previous CD of the participants of two groups

association between socio-economic statuses of the participants of two groups.

The surgical site infection (SSI) in Group-1 was 1.8% which was lower than that of Group-2 (2.4%). There was no

Subcutaneous Thickness	Group-1 (n=165)	Group-2 (n=165)	Total	p-value
≤2 cm	155	158	313	0.45 NS
Row %	49.5	50.5	100.0	
Col %	93.9	95.8	94.8	
>2 cm	10	7	17	
Row %	58.8	41.2	100.0	
Col %	6.1	4.2	5.2	
Total	165	165	330	
Row %	50.0	50.0	100.0	
Col %	100.0	100.0	100.0	

Table-2: Distribution of subcutaneous thickness of the participants of two groups

Surgical site infection	Group-1 (n=165)	Group-2 (n=165)	Total	p-value
Yes	3	4	7	
Row %	42.9	57.1	100.0	
Col %	1.8	2.4	2.1	
No	162	161	323	0.70 NS
Row %	50.2	49.8	100.0	
Col %	98.2	97.6	97.9	
Total	165	165	330	
Row %	50.0	50.0	100.0	
Col %	100.0	100.0	100.0	

Table-3: Distribution of Surgical site infection of the participants

Wound disruption	Group-1 (n=165)	Group-2 (n=165)	Total	p-value
Yes	2	3	5	
Row %	40.0	60.0	100.0	
Col %	1.2	1.8	1.5	
No	163	162	325	0.65 NS
Row %	50.2	49.8	100.0	
Col %	98.8	98.2	98.5	
Total	165	165	330	
Row %	50.0	50.0	100.0	
Col %	100.0	100.0	100.0	

Table-4: Distribution of Wound disruption of the participants of two groups

Post-partum fever	Group-1 (n=165)	Group-2 (n=165)	Total	p-value
Yes	1	2	3	
Row %	33.3	66.7	100.0	
Col %	0.6	1.2	0.9	
No	164	163	327	0.56 NS
Row %	50.2	49.8	100.0	
Col %	99.4	98.8	99.1	
Total	165	165	330	
Row %	50.0	50.0	100.0	
Col %	100.0	100.0	100.0	

Table-5: Distribution of post-partum fever of the participants of two groups

PSAS	Group-1 (n=165)	Group-2 (n=165)	t-test (t_{328})	p-value
Mean±S.D.	19.00±10.01	23.18±11.43	3.53	<0.0001
Median	22	23		
Range	5 – 39	5 - 42		

Table-6: Distribution of PSAS and the participants of two groups

OSAS	Group-1 (n=165)	Group-2 (n=165)	t-test (t_{328})	p-value
Mean±S.D.	33.00±7.76	18.61±7.39	17.24	<0.0001 S
Median	20	20		
Range	7 – 34	6 - 30		

Table-7: Distribution of OSAS of the participants of two groups

Duration of surgery (in minutes)	Group-1 (n=165)	Group-2 (n=165)	p-value
Mean±S.D.	45.93±6.22	50.44±6.03	0.12 NS
Median	45	50	
Range	40 – 90	40 - 90	

Table-8: Distribution of duration of surgery of the participants of two groups

Duration of hospital stay (in days)	Group-1 (n=165)	Group-2 (n=165)	t-test (t_{328})	p-value
Mean± S.D.	5.50±0.50	5.48±0.50	0.36	0.62 NS
Median	5	5		
Range	5 – 6	5 – 6		

Table-9: Distribution of duration of hospital al stays of the participants of two groups

Level of Hb (in gm%)	Group-1 (n=165)	Group-2 (n=165)	t-test (t_{328})	p-value
Pre-operative				
Mean±S.D.	11.42±0.86	11.46±0.84	0.42	0.54 NS
Median	11.40	11.5		
Range	10.0 - 12.9	10.0 - 12.9		
Post-operative				
Mean±S.D.	10.78±0.93	10.87±0.97	0.86	0.12 NS
Median	10.8	10.9		
Range	6.9 - 12.4	6.5 - 12.5		
Amount of loss of Hb after surgery				
Mean±S.D.	0.62±0.25	0.63±0.35	0.29	0.81 NS
Median	0.6	0.6		
Range	0.4 - 3.1	0.1 - 3.5		

Table-10: Distribution of level of Haemoglobin (Hb) of participants of two groups

Blood transfusion	Group-1 (n=165)	Group-2 (n=165)	Total	p-value
Yes	2	3	5	0.65 NS
Row %	40.0	60.0	100.0	
Col %	1.2	1.8	1.5	
No	163	162	325	
Row %	50.2	49.8	100.0	
Col %	98.8	98.2	98.5	
TOTAL	165	165	330	
Row %	50.0	50.0	100.0	
Col %	100.0	100.0	100.0	

Table-11: Distribution of requirement of blood transfusion of the participants of two groups

significant association of surgical site infection between the participants of two groups. Thus Surgical site infection was more or less equally distributed over the participants of two groups.

The Wound disruption in Group-1 was 1.2% which was lower than that of Group-2 (1.8%). There was no significant association between Wound disruption of the participants of two groups ($p=0.65$). Thus Wound disruption was more or less equally distributed over the participants of two groups.

The prevalence of Post-partum fever of Group-1 and Group-2 were 0.6% and 1.2% respectively. Thus prevalence of Post-partum fever was lower in Group-1 as compared to Group-2. There was no significant association between Post-partum fever and the participants of two groups. Thus Post-partum fever was more or less equally distributed over the participants of two groups.

The mean PSAS (mean \pm S.D.) of the patients of Group-1 was 19.00 ± 10.01 with range 5 – 39 and the median was 22. The mean PSAS (mean \pm S.D.) of the patients of Group-2 was 23.18 ± 11.43 with range 5 – 42 and the median was 23. The Patients Scar Assessment Score of the participants of the Group-2 was significantly higher than that of the participants of Group-1.

The mean OSAS (mean \pm S.D.) of the participants of Group-1 was 33.00 ± 7.76 with range 7 – 34 and the median was 20. The mean OSAS (mean \pm S.D.) of the patients of Group-2 was 18.61 ± 7.39 with range 6 – 30 and the median was 20. The Observer Scar Assessment Score of the participants of the Group-1 was significantly higher than that of the participants of Group-2 ($t_{328}=17.24$; $p<0.0001$).

The mean amount of duration of surgery (mean \pm S.D.) of the participants of Group-1 was 45.93 ± 6.22 minutes with range 40 – 90 minutes and the median was 45 minutes.

The mean amount of duration of surgery (mean \pm S.D.) of the participants of Group-2 was 50.44 ± 6.03 minutes with range 40 – 90 minutes and the median was 50 minutes. The mean duration of surgery was less in group 1.

The mean duration of hospital stay (mean \pm S.D.) of the patients of Group-1 was 5.50 ± 0.50 days with range 5 – 6 days and the median was 5 days.

The mean duration of hospital stay (mean \pm S.D.) of the patients of Group-2 was 5.48 ± 0.50 days with range 5 – 6 days and the median was 5 days.

There was no significant difference in mean duration of hospital stay of the participants of two groups. Thus the participants of two groups were discharged after more or less equal length of hospital stay.

The mean amount of loss of Hb after surgery (mean \pm S.D.) of the participants of Group-1 was 0.62 ± 0.25 gm% with range 0.4 – 3.1 gm% and the median was 0.6 gm%. The mean amount of loss of Hb after surgery (mean \pm S.D.) of the patients of Group- 2 was 0.63 ± 0.35 gm% with range 0.1 – 3.5 gm% and the median was 0.6 gm%.

There was no significant difference in mean pre-and post – operative level of Haemoglobin (Hb) and the amount of loss of Hb after surgery of the participants of two groups.

Thus the amount of loss of Hb after surgery was more or less similar of the participants 2 groups.

1.2% of the participants of Group-1 required blood transfusion which was lower than that of Group-2 (1.8%). There was no significant association between requirements of blood transfusion of the participants of two groups.

DISCUSSION

We conducted a study “Skin Closure at Caesarean Delivery by Glue Versus Subcuticular Sutures” at R.G.Kar Medical College & Hospital between July 1, 2018 to June 30, 2019. In this study, an attempt has been made to compare outcome of skin closure at caesarean delivery by glue versus subcuticular sutures. In this comparative study, 330 participants were included. Glue was applied in 165(50%) participants and a subcuticular suture was given in 165(50%) participants. Thus the participants of the two groups were in the ratio 1:1. They were matched for their ages, socio-economic status, religion, and habit of smoking, previous CD, subcutaneous thickness, BMI and pre-operative level of Hb%.

At The Department of Obstetrics and Gynaecology, Meir Medical Centre, Israel, Daykan et al.(2017) conducted a randomized control trial in which 104 pregnant women [Glue ($n=52$), Suture ($n=52$)] underwent scheduled caesarean delivery, were randomly assigned to skin (epidermis) closure with glue or with a monofilament synthetic suture. Considering demographic characteristics, clinical background, pregnancy BMI and subcutaneous thickness similar in both the groups, the study concluded skin closure using glue or monofilament synthetic suture had similar results. Both methods were shown to be safe and successful for skin closure after a caesarean delivery and, therefore, can be used based on surgeon and patient preferences.¹¹

In the year 2010, Cromi et al. conducted a randomized controlled trial on cosmetic outcomes of various skin closure methods following caesarean delivery. The study concluded that in women undergoing CS, stapled wounds and those closed with subcuticular sutures result in equivalent cosmetic appearance of the scar.¹²

Dumville et al. (2014) conducted a study on the effects of various tissue adhesives compared with conventional skin closure techniques for the closure of surgical wounds; concluded that Sutures are significantly better than tissue adhesives for minimizing dehiscence. In some cases tissue adhesives may be quicker to apply than sutures. Although surgeons may consider the use of tissue adhesives as an alternative to other methods of surgical site closure in the operating theatre, they need to be aware that sutures minimize dehiscence.¹³

In the year 2012 Siddiqui et al. Conducted a study on skin closure of pfannenstiell incision (PSI) with derma bond, staples, or suture during caesarean delivery: experience of a single attending and concluded that the PSI closure, Derma bond may be a useful alternative skin closure device, though a randomized trial is warranted.¹⁴

Another study in the year 2004 Draaijers et al. mentioned that the Patient and Observer Scar Assessment Scale was

developed for the evaluation of all scar types. However, in their study, it was only shown that the Patient and Observer Scar Assessment Scale were suitable for the rating of surgical scars. Additional research on different categories of scar tissue, such as linear scars, is mandatory. They concluded that the Patient and Observer Scar Assessment Scale offered a suitable, reliable, and complete scar evaluation tool.¹⁵

The optimal choice of skin closure at caesarean delivery had not yet been determined. We conducted a randomized controlled trial in which pregnant women underwent a scheduled caesarean delivery were randomly assigned to skin closure with glue or coated polyglactin 910. The subcutaneous tissues were sutured for all participants. The primary outcomes were incidence of wound complications (SSI, wound disruption), to measure and compare OSAS and PSAS at 8 weeks after caesarean delivery. The secondary outcomes were to measure and compare the duration of surgery, surgeon's satisfaction and the hospital stay.

Our comparative study of skin closure of CD by glue versus subcuticular sutures showed that all the primary and secondary objectives were comparable in the two groups and there was no significant difference. Only the time taken for skin closure with glue was statistically significantly less, compared with subcuticular sutures with coated polyglactin 910.

The study "skin closure at caesarean delivery by glue versus subcuticular sutures" conducted by us at R.G.Kar Medical College & Hospital in 2018-2019, concluded that skin closure using glue or coated polyglactin 910 suture had similar results. Both methods were shown to be safe and successful for skin closure after a caesarean delivery.

CONCLUSION

This comparative study of skin closure following CD by glue versus subcuticular sutures with coated polyglactin 910 showed that there was no significant difference among the two groups as regards to SSIs, wound disruptions (haematoma, seroma), cosmetic appearance of the scar (immediately and 8 weeks postoperatively, surgeon's and patient's satisfaction scores and hospital stay. Only the time taken for skin closure with glue was statistically significantly less when compared with subcuticular sutures with coated polyglactin 910.

Strengths of the study

Strengths of this study were that two different techniques were compared during skin closure of CD where the demographic data of the two groups were absolutely comparable. The sample size was also reasonably big and both short term and long term (8 weeks postpartum) results were compared. The background and justification of the study is also strength as our department is a very busy one with almost 30-35 CDs happening every day. The results of the study show that skin closure by glue saves valuable time and this would help in reducing the waiting time for women waiting for CD.

Limitation of the study

The limitation of this study was that it was conducted only on participants who underwent elective CD. Women

undergoing emergency Caesarean Section were not included in this study. The study was done at single centre. Moreover, this was not a randomised controlled study. Therefore, some amount of bias may have crept up while skin closure.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 20-01-2021; **Accepted:** 22-02-2021; **Published:** 26-03-2021