Section: OBG

Original Research Article

COMPARATIVE STUDY OF POLIGLECAPRONE 25 (MONOCRYL) AND POLYGLACTIN 910 (VICRYL RAPIDE) FOR SUBCUTICULAR SUTURING IN CAESAREAN SECTION IN A MEDICAL COLLEGE IN KOLKATA

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ABSTRACT

Background: Caesarean section (CS) is one of the most commonly performed abdominal surgeries worldwide, with rising rates in both developed and developing countries. Optimal wound closure is critical to minimize complications and improve cosmetic outcomes. Monocryl (Poliglecaprone 25), a monofilament suture, and Vicryl Rapide (Polyglactin 910), a braided multifilament suture, are widely used for subcuticular closure, but comparative evidence remains limited. **Objective:** To compare the efficacy of Monocryl and Vicryl Rapide in subcuticular skin closure following caesarean section, focusing on pain, tenderness, swelling, wound discharge, wound dehiscence, cosmetic outcome, and surgical site infection. ($p = 0.028$) ($p = 0.035$).

Materials and Methods: From November 2023 to October 2024, a prospective, randomized, single-blinded comparative study was carried out at KPC Medical College & Hospital in Kolkata. Two groups, Group A (Monocryl, $n = 70$) and Group B (Vicryl Rapide, $n = 70$), were randomly selected from among 140 term pregnant women undergoing elective caesarean sections. On surgical days 3, 10, 30, and 45, clinical outcomes were evaluated using standardized instruments such as the Modified Hollander Cosmesis Scale (MHCS) and Visual Analogue Scale (VAS). SPSS v20 was used for the statistical analysis, and $p<0.05$ was deemed significant.

Results: After accounting for loss to follow-up, 131 participants were analyzed (Monocryl: 66; Vicryl Rapide: 65). Monocryl was associated with significantly lower wound discharge ($p=0.035$ at day 3; $p=0.001$ at day 10), reduced swelling ($p=0.028$ at day 3), and superior cosmetic scores (MHCS, $p=0.001$ at day 3). Tenderness resolved completely by day 45 in Monocryl, while two cases persisted in Vicryl Rapide. Wound dehiscence was significantly lower in Monocryl at day 10 ($p=0.035$) and day 45 ($p=0.023$). Surgical site infections occurred only in Vicryl Rapide (2 cases, 3.1%), though the difference was not statistically significant. ($p = 0.028$) ($p = 0.035$)

Conclusion: Monocryl demonstrated superior outcomes compared to Vicryl Rapide in terms of pain reduction, wound healing, and cosmetic appearance, while both sutures were safe for caesarean section closure. Monocryl may be considered the preferred suture material for subcuticular closure in caesarean section, particularly when patient comfort and cosmesis are prioritized.

Keywords: Caesarean section, Monocryl, Vicryl Rapide, subcuticular suturing, wound healing, cosmetic outcome.

INTRODUCTION

Since time immemorial sutures have been an integral part of surgery. Ancient civilizations used materials such as linen, plant fibres, thorns, animal hair, and even ant's jaws for closure of incisions. They quickly identified naturally derived suture materials (such as catgut, silk and cotton), which up until the 1930s served as the foundation of surgical practice.[1] Scientific developments during the past century have produced a wide variety of synthetic suture materials. Caesarean section (CS) delivery was documented for a long time ago, since then the process has greatly evolved.[2] Caesarean section is one of the most commonly performed abdominal operations throughout the world. These women pass through post-operative pain and morbidity period. Use of appropriate suture on skin after caesarean section helps in early recovery and also reduces hospital stay. Caesarean section rates worldwide have climbed from roughly 7% in 1990 to 21% in 2021, and are expected to rise more during the next decade.[3] C-sections have steadily grown more prevalent in nations that are developing. C-section rates in India have surpassed the World Health Organization (WHO) benchmark of 15%.[4]

The goal of wound closure includes obliteration of dead space, even distribution of tension on suture line, and maintenance of tensile strength across the wound. Methods used for mechanical wound closure includes staplers, tapes, adhesives and sutures. Each method has its advantages and disadvantages. Suture materials being a foreign body implanted in the human tissue elicits a foreign body tissue reaction. Complications of wound healing such as hypertrophic scar, wide scar, and wound dehiscence can result from patient factors, such as nutritional status, comorbidities and incorrect suture technique as well.

Ideal suture material should have following characteristics- cost-effectiveness, early healing, user-friendly and should produce the optimal cosmetic result. While treating wounds, especially skin, emphasis should remain on the rapid closure with creation of a functionally aesthetic scar with adequate tensile strength. Wound infection can jeopardize the surgical scar by promoting necrotizing fasciitis, rupture of the fascia, or wound dehiscence all of which can prove to be fatal. Multiple studies showed that sub-cuticular skin closure with suture results in lower rates of wound complications compared to staple closure.[5]

Two of the most commonly used sutures are Vicryl, which is a braided synthetic multifilament, and Monocryl, a synthetic monofilament.[6] Monofilament suture (Monocryl) is made of single strand and is relatively more resistant to harboring microorganism. Monofilament suture experiences less resistance to passage through tissue than multifilament suture. Multifilament suture (Vicryl Rapide) generally has greater tensile strength, better pliability and flexibility than monofilament suture. However, the optimal choice of suture material for sub-cuticular skin closure is still unclear. In this context the present study was conducted to compare the efficacy of two suture materials Poliglecaprone 25 (Monocryl) and Polyglactin 910 (Vicryl Rapide) for Subcuticular Suturing in Caesarean Section in a Medical College in Kolkata.

MATERIALS AND METHODS

Study Design and Setting

This was an institution-based, prospective, observational, comparative, single-blinded, randomized study conducted in the Department of Obstetrics and Gynaecology at KPC Medical College & Hospital, Kolkata. The study was carried out over a 12-month period from **November 1, 2023 to October 30, 2024**, with subsequent data analysis and interpretation completed by **November 30, 2024**.

Study Population

The study population were all the term pregnant women admitted in the Department of Obstetrics and Gynaecology, KPC Medical College and Hospital during the study period and fulfilling the eligibility criteria (according to inclusion and exclusion criteria). **All procedures were performed by qualified obstetricians.**

Inclusion Criteria

- Participants undergoing caesarean section for the first time
- Participants undergoing elective caesarean section
- Haemoglobin more than 10 gm %
- Caesarean section done by qualified obstetricians
- Term pregnant women
- Transverse Pfannenstiel incision.

Exclusion Criteria

- Refusal to give informed consent and to participate in the study
- Previous abdominal surgeries including previous Caesarean section
- Medical illness - pulmonary tuberculosis, bronchial asthma, diabetes, hypertension, haematological disorders, skin infections, liver disease.
- Malnourished patients.[7]

Sample Size and Sampling

Based on prior literature, pain prevalence was estimated at 23.3% in Monocryl and 47.6% in Vicryl Rapide groups. Using a 95% confidence interval and 15% allowable error, the minimum sample size was calculated as 32 per group. After adjusting for dropout (10%) and design effect,[2] the final sample size was **70 participants per group**, totaling **140 subjects**. Systematic random sampling was employed to allocate participants into two groups:

- **Group A:** Poliglecaprone 25 (Monocryl, 2-0)
- **Group B:** Polyglactin 910 (Vicryl Rapide, 2-0)

Surgical Procedure

All participants underwent caesarean section with Pfannenstiel incision. The uterus was closed in two layers, rectus sheath with Vicryl No.1, and rectus muscles were not sutured. Skin closure was performed using subcuticular sutures with either Monocryl (Group A) or Vicryl Rapide (Group B). Standardized perioperative care was provided, including identical antibiotics, analgesics, antiseptic shaving, and dressing with povidone-iodine solution.[8]

Study Variables

- **Demographic:** Age, gravida, parity, gestational age, booking status, immunization status.
- **Operative:** Duration of procedure.
- **Clinical outcomes:**
- Pain and tenderness (Visual Analogue Scale, VAS)
- Swelling/induration (p = 0.028)
- Wound discharge (serous, serosanguinous, purulent) (p = 0.035)
- Wound dehiscence (superficial or deep)
- Cosmesis (Modified Hollander Cosmesis Scale, MHCS)
- Surgical site infection (SSI).[9]

Assessments were performed on **postoperative days 3, 10, 30, and 45**.

Data Collection and Tools

Data were collected using a pre-designed, pre-tested semi-structured schedule, supplemented by hospital records (labor room logbook, bed head tickets, investigation reports). Patient interviews and clinical examinations were conducted at each follow-up.

Statistical Analysis

Data were entered into MS Excel and analyzed using **SPSS version 20**. Descriptive statistics were expressed as mean ± SD for continuous variables and proportions for categorical variables. Normality was assessed, and appropriate parametric or non-parametric tests were applied. Differences between proportions were analyzed using Chi-square test, while repeated measures were compared using Friedman's two-way analysis of variance by ranks. A p-value <0.05 was considered statistically significant.

Ethical Considerations

The study was approved by the **Institutional Ethics Committee of KPC Medical College & Hospital** (Approval No. KPCMCH/IEC/2023/105). Written informed consent was obtained from all participants. Confidentiality and anonymity were maintained throughout the study. No additional interventions beyond standard care were performed.

Conflict of interest: There was no conflict of interest.

RESULTS

A total of 140 women undergoing caesarean section were enrolled, with 70 allocated to each group. After accounting for loss to follow up (4 in Group A, 5 in Group B), 131 participants were analyzed (66 in Group A: Monocryl; 65 in Group B: Vicryl Rapide).

Baseline Characteristics

The two groups were comparable in terms of age, gestational age, booking status, and immunization status. However, differences were noted in parity and gravida distribution. The mean duration of procedure was slightly longer in the Monocryl group (52.6 ± 9.3 minutes) compared to the Vicryl Rapide group (49.1 ± 7.8 minutes, p=0.033).

Table 1: Baseline demographic and clinical characteristics of study participants

Age (years)	Suture material n (column %)		p value
	Group A	Group B	
18-24	29 (41.4)	19 (27.1)	0.237
25-29	17 (24.3)	16 (22.9)	
30-34	13 (18.6)	18 (25.7)	
35-40	11 (15.7)	17 (24.3)	
Total	70 (100)	70 (100)	

Interpretation. Table 1 indicates that the majority of mothers belonged to the 18–24-year age group. The variation in age distribution between the two groups was not statistically significant (p = 0.237).

Table 2: Mean Visual Analogue Scale (VAS) scores at postoperative days 3, 10, 30, and 45

Timeline (days)	Visual analogue score mean (SD)		p value*
	Group A	Group B	
3	5.42 (1.21)	5.15 (1.17)	***0.001***
10	3.29 (0.94)	3.28 (1.65)	
30	1.26 (0.98)	1.42 (1.04)	
45	0.08 (0.26)	0.17 (0.37)	

Related sample Friedman's two-way analysis of variance by ranks

Interpretation. Table 2 indicates a steady decline in VAS scores across both groups, with Group A showing a slightly greater reduction at 30 and 45 days postoperatively.

The mean duration of disease 4.01±2.6. Most of the study participants had lichen planus for more than 4 years 36 (80%).

Table 3: Distribution of tenderness at postoperative days 3, 10, 30, and 45

Timeline (days)	Tenderness	Group		Total n (column %)	p value
		Group A	Group B		
3	Absent	15 (22.7)	20 (30.7)	35 (26.7)	0.298
	Present	51 (77.3)	45 (69.3)	96 (73.3)	
10	Absent	49 (74.2)	52 (80)	101 (77.1)	0.432
	Present	17 (25.8)	13 (20)	30 (22.9)	
30	Absent	59 (89.4)	61 (93.8)	120 (91.6)	0.358
	Present	7 (10.6)	4 (6.2)	11 (8.4)	
45	Absent	66 (100)	63 (96.9)	129 (98.4)	0.154
	Present	-	2 (3.1)	2 (1.6)	

Interpretation. Table 3 shows that Tenderness reduced steadily in both groups, with complete resolution in Monocryl by day 45. Two cases persisted in Vicryl Rapide, suggesting slightly slower recovery though differences were not significant.

Table 4: Distribution of swelling at postoperative days 3, 10, 30, and 45 (p = 0.028)

Timeline (days)	Swelling	Group		Total n (column %)	p value
		Group A	Group B		
3	Absent	53 (80.3)	41 (63.1)	94 (71.7)	***0.028***
	Present	13 (19.7)	24 (36.9)	37 (28.3)	
10	Absent	54 (81.8)	48 (73.8)	102 (77.8)	0.271
	Present	12 (18.2)	17 (26.2)	29 (22.2)	
30	Absent	64 (96.9)	63 (96.9)	127 (96.9)	0.987
	Present	2 (3.1)	2 (3.1)	4 (3.1)	
45	Absent	66 (100)	65 (100)	131 (100)	-
	Present	-	-	-	

Interpretation. Table 4 shows that swelling was significantly lower in the Monocryl group on day 3 compared to Vicryl Rapide (19.7% vs 36.9%, p = 0.028). By day 30, swelling had nearly resolved in both groups, and by day 45, no cases were observed, indicating complete recovery in all participants.

Table 5: Distribution of wound discharge at postoperative days 3, 10, 30, and 45 (p = 0.035)

Timeline (days)	Discharge	Group		Total n (column %)	p value
		Group A	Group B		
3	Absent	59 (89.4)	49 (75.4)	108 (82.4)	***0.035***
	Present	7 (10.6)	16 (24.6)	23 (17.6)	
10	Absent	66 (100)	43 (66.1)	109 (83.2)	***0.001***
	Present	-	22 (33.9)	22 (16.8)	
30	Absent	66 (100)	65 (100)	131 (100)	-
	Present	-	-	-	
45	Absent	66 (100)	65 (100)	131 (100)	-
	Present	-	-	-	

Interpretation. Table 5 shows that wound discharge was significantly lower in the Monocryl group on postoperative days 3 and 10 (p = 0.035 and p = 0.001, respectively). By day 30 and 45, discharge had resolved completely in both groups, indicating effective healing.

Table 6: Distribution of study subjects according to mean Modified Hollander Cosmesis Scale score (MHCS) at post-operative period of 3, 10, 30, 45 days (n=131)

Timeline (days)	MHCS mean (SD)		p value*
	Group A	Group B	
3	1.67 (0.97)	2.57 (1.28)	***0.001***
10	0.96 (0.92)	1.59 (1.17)	
30	0.36 (0.74)	0.64 (0.72)	
45	0.21 (0.7)	0.34 (0.58)	

Related sample Friedman's two-way analysis of variance by ranks

Interpretation. Table 6 shows that Group A consistently had lower MHCS scores across all postoperative time points, indicating better cosmetic outcomes. The difference was statistically significant on day 3 (p = 0.001), with both groups showing progressive improvement over time.

Table 7: Distribution of wound dehiscence at postoperative days 3, 10, 30, and 45

Timeline (days)	Wound dehiscence	Group		Total n (column %)	p value
		Group A	Group B		
3	Absent	59 (89.4)	52 (80)	111 (84.7)	0.135
	Present	7 (10.6)	13 (20)	20 (15.3)	
10	Absent	59 (89.4)	49 (75.4)	108 (82.4)	***0.035***
	Present	7 (10.6)	16 (24.6)	23 (17.6)	
30	Absent	61 (92.4)	56 (86.1)	117 (89.3)	0.245
	Present	5 (7.6)	9 (13.9)	14 (10.7)	
45	Absent	61 (92.4)	65 (100)	126 (96.2)	***0.023***
	Present	5 (7.6)	-	5 (3.8)	

Interpretation. Table 7 shows that wound dehiscence was consistently lower in the Monocryl group across all time points. Statistically significant differences were observed on days 10 (p = 0.035) and 45 (p = 0.0237), indicating better wound integrity and healing with Monocryl.

Table 8: Distribution of surgical site infection (SSI) between groups

SSI	Group		Total n (column %)	p value
	Group A	Group B		
Absent	66 (100)	63 (96.9)	129 (98.5)	0.154
Present	-	2 (3.1)	2 (1.5)	
Total	66 (100)	65 (100)	131 (100)	

Interpretation. Table 8 shows that surgical site infections were rare in both groups, with only two cases reported in the Vicryl Rapide group. The difference was not statistically significant (p = 0.154), indicating comparable safety profiles.

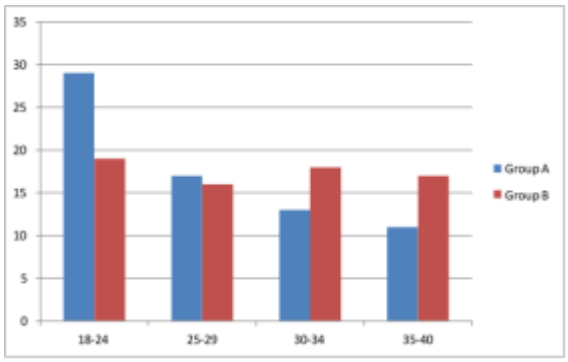

Figure 1: Baseline demographic and clinical characteristics of study participants

Interpretation. Figure 1 shows that participants of 18-24 years age group and 25-29 years were more among group A and 30-34 years and 35-40 years were more among group B.

Pain Scores (VAS)

Pain decreased progressively in both groups over time. On day 3, mean VAS scores were slightly higher in the Monocryl group, but by day 30 and 45, Monocryl showed lower scores compared to Vicryl Rapide.

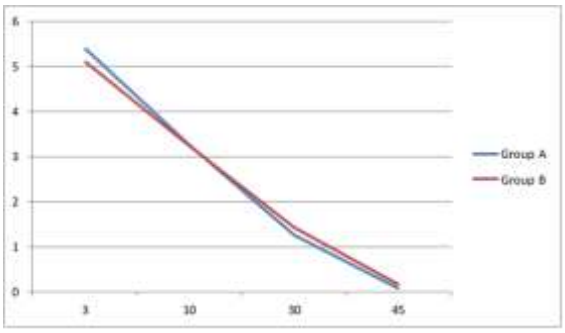

Figure 2: Mean Visual Analogue Scale (VAS) scores at postoperative days 3, 10, 30, and 45

Interpretation. Figure 2 illustrates a consistent decline in pain scores over time for both suture groups. Group A (Monocryl) showed a slightly greater reduction in VAS scores at day 30 and 45, indicating better long-term comfort. This trend supports Monocryl's advantage in minimizing postoperative pain during recovery.

Tenderness

Tenderness was common in both groups at day 3, but resolved faster in the Monocryl group. By day 45, no cases of tenderness were observed in Monocryl, whereas two cases persisted in Vicryl Rapide.

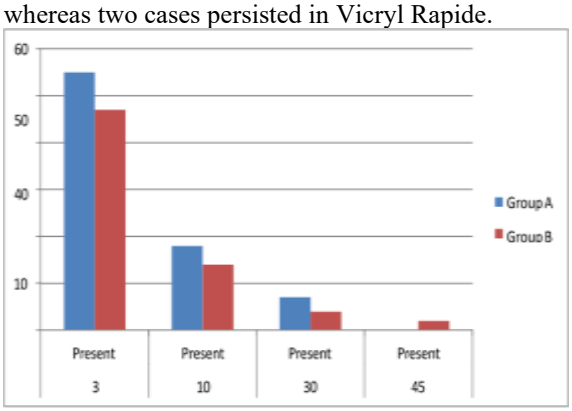

Figure 3: Distribution of study subjects according to tenderness at post-operative period of 3, 10, 30, 45 days (n=131)

Interpretation. Figure 3 shows that tenderness was initially high in both groups but declined steadily over time. By day 45, it had completely resolved in the Monocryl group, while two cases persisted in Vicryl Rapide.

Swelling/Induration (p = 0.028)

Swelling was significantly less in the Monocryl group at day 3 (19.7% vs 36.9%, p=0.028). By day 30, swelling had resolved in nearly all participants. (p = 0.028)

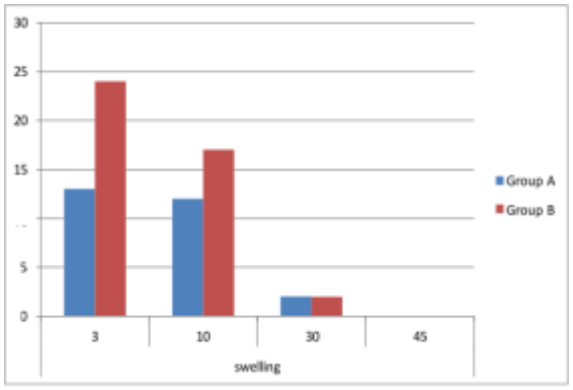

Figure 4: Distribution of study subjects according to swelling at post-operative period of 3, 10, 30, 45 days (n=131) (p = 0.028)

Interpretation. Figure 4 shows that swelling was more frequent in the Vicryl Rapide group on day 3, with a statistically significant difference (p = 0.028). Swelling gradually resolved in both groups, and by day 45, no cases were observed, indicating complete recovery.

Wound Discharge

Discharge was considerably lower in the Monocryl group on days 3 (10.6% vs 24.6%, p=0.035) and 10 (0% vs 33.9%, p=0.001). On days 30 and 45, neither group showed any signs of discharge. (p = 0.035).

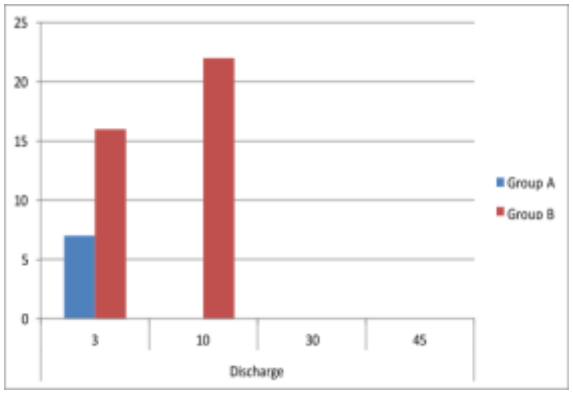

Figure 5: Distribution of study subjects according to discharge at post-operative periodof 3, 10, 30, 45 days (n=131) (p = 0.035)

Interpretation. Figure 5 shows that wound discharge was significantly higher in the Vicryl Rapide group on days 3 and 10. By day 30 and 45, discharge had resolved completely in both groups, indicating full wound healing. (p = 0.035)

Cosmetic Outcome (MHCS)

Cosmetic scores were consistently better in the Monocryl group across all time points. At day 3, mean MHCS was 1.67 ± 0.97 in Monocryl vs 2.57 ± 1.28 in Vicryl Rapide (p<0.001). By day 45, scores had improved in both groups, but Monocryl maintained superior cosmesis.

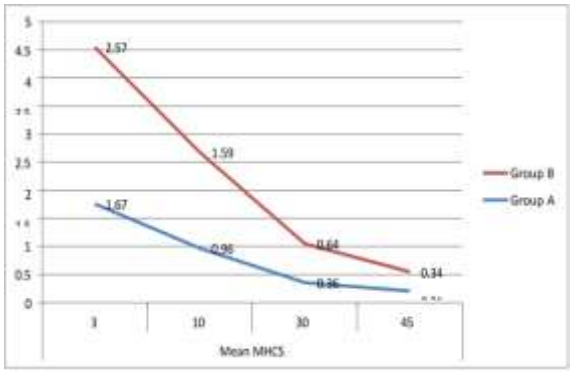

Figure 6: Distribution of study subjects according to mean Modified Hollander Cosmesis Scale score (MHCS) at post-operative period of 3, 10, 30, 45 days (n=131)

Interpretation. Figure 6 shows that MHCS scores declined steadily over time in both groups, indicating progressive improvement in cosmetic outcomes. Group A consistently had lower scores at all time points, suggesting better cosmesis, with a statistically significant difference on day 3 (p = 0.001).

Wound Dehiscence

Wound dehiscence was less frequent in the Monocryl group at day 10 (10.6% vs 24.6%, p=0.035). By day 45, no cases were observed in Vicryl Rapide, while 7.6% persisted in Monocryl.

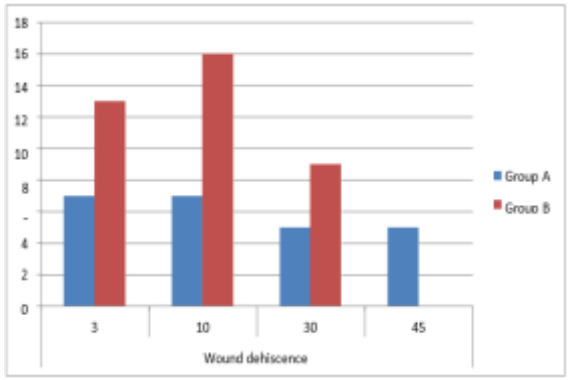

Figure 7: Distribution of study subjects according to Wound dehiscence at post-operative period of 3, 10, 30, 45 days (n=131)

Interpretation. Figure 7 shows that wound dehiscence was more frequent in the Vicryl Rapide group, especially on days 10 and 30. Statistically significant differences were observed on days 10 (p = 0.035) and 45 (p = 0.0237), with Monocryl showing better wound stability over time.

Surgical Site Infection (SSI)

SSI was observed only in the Vicryl Rapide group (2 cases, 3.1%), while no infections occurred in the

Monocryl group. The difference was not statistically significant.

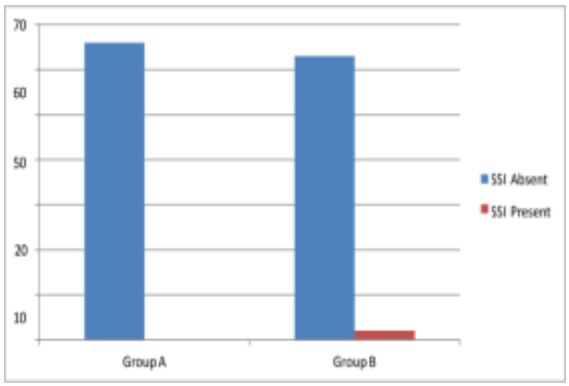

Figure 8: Distribution of study subjects according to surgical site infection (SSI) (n=131)

Interpretation. Figure 8 shows that surgical site infections were rare, with only two cases reported in the Vicryl Rapide group. The difference between groups was not statistically significant (p = 0.154), indicating comparable postoperative safety.

DISCUSSION

Caesarean section rates have risen globally over the past decade, with nearly one in five births now delivered surgically.[10] This growing reliance on surgical delivery highlights the importance of refining wound closure techniques to minimize complications and improve cosmetic outcomes. The choice of suture material is particularly critical, as it directly influences postoperative pain, infection risk, and scar quality.

In our study, Poliglecaprone 25 (Monocryl) demonstrated superior outcomes compared to Polyglactin 910 (Vicryl Rapide), with lower pain scores, faster resolution of tenderness, reduced swelling and discharge, and better cosmetic results. These findings are consistent with recent comparative studies, which reported that monofilament sutures are associated with fewer wound complications and improved scar appearance compared to braided sutures.[11] The reduced bacterial adherence and lower tissue drag of monofilament sutures likely explain these advantages. (p = 0.028) (p = 0.035)

Cosmetic outcomes are increasingly recognized as a determinant of patient satisfaction following obstetric procedures. Evidence from randomized controlled trials has shown that Monocryl provides better healing and fewer complaints compared to Vicryl Rapide in perineal repair, reinforcing its role in optimizing cosmesis.[12] Similarly, recent reviews of advanced suture technologies emphasize that monofilament sutures reduce tissue reaction and infection risk, making them preferable for subcuticular closure in surgical practice.[13]

Although Vicryl Rapide offers greater tensile strength and pliability, it was associated with more tissue reaction and inferior cosmetic scores in our cohort. This aligns with evidence that braided sutures, while strong, may increase local inflammation and discharge. Importantly, wound dehiscence and surgical site infection rates were low overall, confirming that both materials are safe for use in caesarean section. (p = 0.035)

Clinical Implications

Taken together, these findings suggest that Monocryl should be preferred for subcuticular closure in caesarean section, particularly when cosmetic outcome and patient comfort are prioritized. With caesarean deliveries becoming more common worldwide, adopting suture materials that optimize healing and cosmesis is essential for improving maternal outcomes.

Limitations

This was a single center study with a modest sample size and a follow up limited to 45 days. Longer term outcomes such as scar maturation and patient reported satisfaction beyond six months were not assessed. Larger multicenter randomized controlled trials are needed to validate these findings.

CONCLUSION

This prospective comparative study evaluated the effectiveness of Poliglecaprone 25 (Monocryl) and Polyglactin 910 (Vicryl Rapide) for subcuticular skin closure in caesarean section. The findings demonstrated that Monocryl was associated with lower pain scores, faster resolution of tenderness, reduced swelling and wound discharge, and superior cosmetic outcomes compared to Vicryl Rapide. Although Vicryl Rapide offered slightly shorter operative time and fewer late cases of wound dehiscence, overall healing and safety outcomes were satisfactory in both groups. Importantly, surgical site infections were observed only in the Vicryl Rapide group, while none occurred in Monocryl. (p = 0.028) (p = 0.035).

Taken together, these results suggest that Monocryl provides better patient comfort, improved wound healing, and superior cosmetic results, making it a more suitable choice for routine subcuticular closure in caesarean section.

Recommendations

- Clinical Practice: Monocryl should be considered the preferred suture material for subcuticular closure in caesarean section, especially when cosmetic outcome and patient satisfaction are prioritized.
- Patient-Centered Care: Given the rising rates of caesarean delivery worldwide, emphasis should be placed on wound closure techniques that minimize complications and optimize scar quality.
- Future Research: Larger multicenter randomized controlled trials with extended follow-up are recommended to validate these findings and

assess long-term scar maturation, cost-effectiveness, and patient-reported outcomes.

- Training and Guidelines: Obstetricians should be encouraged to adopt monofilament sutures such as Monocryl in routine practice, and institutional protocols may be updated to reflect evidence-based preferences for skin closure.

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