



COMPARISON OF OUTCOME OF SUTURE MATERIALS POYGLACTIN 910 & POLYAMIDE MONOFILAMENT AS SUBCUTICULAR STITCHES IN CAESAREAN SECTION.

Obstetrics & Gynecology

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ABSTRACT

INTRODUCTION:Caesarean delivery rate rose from 4.5 percent in 1970 to 32.9 percent in 2009. And then the rate has trended slightly downward, and it was 32 percent in 2015 in the USA. More than 85 percent of these operations are performed only for four reasons- prior caesarean delivery, dystocia, fetal jeopardy, or abnormal fetal presentation. As per the latest data (National Family Health Survey 2015-16 (NFHS-4), the caesarean rates at population level in India seems to be 17.2%. In 1985 WHO stated: —There is no justification for any region to have Caesarean section rates higher than 10-15%.

AIMS AND OBJECTIVES: The efficacy of two suture materials polyglactin 910 (Vicryl 2.0) and polyamide monofilament (Ethilon 2.0) in terms of pain, tenderness, swelling, induration, discharge, cosmesis and wound healing, suture materials with least complications.

MATERIALS AND METHODS:This was a prospective, observational, comparative study conducted in the Department of Obstetrics and Gynecology, in a tertiary medical college in Paschim Medinipur, for 18 months after getting approval from the Institutional Ethical Committee. 18 months; 1st April 2019 to 30th September 2020. Randomly selected term pregnant women admitted in the Department Of Obstetrics and Gynecology, Midnapore Medical College and Hospital during the study period and fulfilling the eligibility criteria (according to inclusion and exclusion criteria).

RESULTS AND ANALYSIS:It is clear that the parameters, pain and tenderness (p value = 0.3710), swelling and induration (p value = 1) and wound dehiscence (p value = 0) in both the groups are statistically insignificant and the other parameters are significant in both the groups; discomfort (p value = 0.0114) and wound dehiscence (p value = 0.0254347).

SUMMARY & CONCLUSION: Multifilament sutures also induce a more intense inflammatory response and contribute to larger knot volumes than monofilaments of equal sizes. Multifilament sutures demonstrate enhanced capillarity with a resultant increase in the transport and spread of microorganisms. There are multiple factors which cause surgical site complications that have not been analyzed in this study and need an additional evaluation in further studies and there is lack of previous research studies on the same topic.

KEYWORDS

Suture Materials Poyglactin 910, Polyamide Monofilament And Caesarean Section

INTRODUCTION

Caesarean delivery rate rose from 4.5 percent in 1970 to 32.9 percent in 2009. And then the rate has trended slightly downward, and it was 32 percent in 2015 in the USA. More than 85 percent of these operations are performed only for four reasons- prior caesarean delivery, dystocia, fetal jeopardy, or abnormal fetal presentation. As per the latest data (National Family Health Survey 2015-16 (NFHS-4), the caesarean rates at population level in India seems to be 17.2%. In 1985 WHO stated: —There is no justification for any region to have Caesarean section rates higher than 10-15%.

The studies on which the WHO based the 15% recommendation 30 years ago were—limited by either having incomplete data or relying on averaged caesarean delivery rates from multiple years without accounting for year to year variation in these estimates (Molina G, Weiser TG, Lipsitz SR, et al. Relationship between caesarean delivery rate and maternal and neonatal mortality. JAMA 2015;314: 2263-2270). And overall caesarean section rates increased markedly in recent years and is about 20-25% of all childbirths in most developed countries.¹

The WHO issued a new statement in 2015 with the headline —Every effort should be made to provide caesarean sections to women in need, rather than striving to achieve a specific rate (WHO statement on caesarean section rates. Geneva; World Health Organisation; 2015 (WHO/RHR/15.02). Wound infection can cause serious complications such as necrotizing fasciitis, rupture of the fascia, or dehiscence of the wound. The infection occurs in about 3-6% of women who undergo cesarean delivery. These women translate into a substantial portion of the population, and hence there is a load on the financial resources of health-care system.^{2,3}

The aims of tissue repair after surgical skin incisions are rapid

acquisition of strength, least tissue damage, no inflammation and an aesthetically acceptable scar. Suturing of subcutaneous tissue at the end of any surgical procedure has always been in debate. The classical surgical technique insists on accurate closure of the fat layer, the rationale being that this will prevent the creation of dead space, decrease the risk of subcutaneous bleeding and improve the adaptation of the wound edges. Any closure of open wound requires perfect approximation of the wound edges.

1. To study the efficacy of two suture materials polyglactin 910 (Vicryl 2.0) and polyamide monofilament (Ethilon 2.0) in terms of pain, tenderness, swelling, induration, discharge, cosmesis and wound healing.
2. To compare the efficacy of these suture materials with least complications.

MATERIALS AND METHODS

STUDY DESIGN:

This was a prospective, observational, comparative study conducted in the Department of Obstetrics and Gynecology, in a tertiary medical college in Paschim Medinipur, for 18 months after getting approval from the Institutional Ethical Committee.

INCLUSION CRITERIA:

1. Participants undergoing caesarean section for the first time.
2. Hemoglobin more than 10 gm %.
3. Caesarean section done by qualified obstetricians.
4. Term pregnant women.
5. Transverse Pfannenstiel incision.

EXCLUSION CRITERIA:

Previous abdominal surgeries including previous Caesarean section, medical illness - pulmonary tuberculosis, bronchial asthma, diabetes,

hypertension, hematological disorders, skin infections, malnourished and obstructed labour.

PLACE OF STUDY:

Department of Obstetrics and Gynecology, Midnapore Medical College and Hospital.

PERIOD OF STUDY: 18 months; 1st April 2019 to 30th September 2020.

STUDY POPULATIONS:

Randomly selected term pregnant women admitted in the Department Of Obstetrics and Gynecology, Midnapore Medical College and Hospital during the study period and fulfilling the eligibility criteria (according to inclusion and exclusion criteria).

RESULTS AND ANALYSIS

We found that in Polyglactin 910 group, the mean age of patients was 21.48 years with range 17.0000 - 36.0000 years. In Polyamide monofilament, the mean age of patients was 21.29 years with range 18.0000 - 34.0000 years. Age of patients in two groups was not statistically significant ($p=0.740628$). In Polyglactin 910 group, the mean gestational age of patients was 39 weeks 6 days with range 37.0 - 42.0 weeks. In polyamide monofilament, the mean gestational age of patients was 39 weeks 4 days with range 37.0 - 42 weeks. Gestational age in two groups was not statistically significant ($p=0.7130861$). Table no.3 shows distribution on gravida in both the groups are statistically insignificant (p value = 0.27342). In Polyglactin 910, the booked patients were 83%. In polyamide monofilament the booked patients were 67%. Booked and unbooked cases in two groups were not statistically significant ($p=0.06143$). From Table 5. It is obvious that there is statistically insignificant difference related to post-operative wound complication on day 4 parameter of pain and tenderness between two groups polyglactin 910 and polyamide monofilament (p value 0.200825). And the rest parameters are statistically significant, Discomfort (p value= 0.010515), swelling and induration (p value 0.000825), wound discharge (p value= <0.0001), wound dehiscence (p value= 0.002496).

In our study showed that mild pain (p value = 0.68309), moderate pain (p value = 0.75183) and severe pain based on VAS on day 4 is statistically significant (p value = 0.01430). On post-operative day 10, all the parameters in both the groups are statistically insignificant. Mild pain (p value= 0.15729), moderate pain (p value = 0.28884) and severe pain (p value = 0.317311). On post-operative day 30, all the parameters on both the groups are statistically insignificant. Mild pain (p value = 0.56370), moderate pain (p value = 0.4795) and severe pain (p value = 0.000). Table no.10 shows that hospital stay in both the groups are statistically significant (p value = 0.02022). And the mean hospital stay of group 1, polyglactin 910 is 11.29 days and the mean hospital stay of polyamide monofilament group is 10.46 days.

DISCUSSIONS

Caesarean section is one of the most common obstetric surgical procedures especially in the developed countries. And for good cosmetic results subcuticular stitches have been proven to offer a great advantage.⁴

Tables 5-9 shows the comparison of post-operative wound complications between the two suture materials polyglactin 910 (vicryl 2.0) and polyamide monofilament (ethilon 2.0) on days 4, 10, 30, and 70 of cesarean section.

PAIN AND TENDERNESS:

In our study pain and tenderness was insignificant in both the group polyglactin 910 group polyamide monofilament groups. The findings were noted in a study by Regan and Lawrence.⁵ at the Center of Dermatologic Surgery at Cooper University Hospital. This study was conducted on 140 patients to compare poliglecaprone 25 (a monofilament) and polyglactin 910 in cutaneous surgery and it was found that poliglecaprone 25 was less painful than polyglactin 910 as it resulted in significantly less extruded sutures than did polyglactin 910 (3.1% vs. 11.4%).⁵ Similarly, Vats and Pandit Suchitra.⁶ conducted a randomized clinical trial on 90 patients at LTMMC, Sion Mumbai, to compare the suture materials in cesarean section and showed that poliglecaprone 25 absorbable suture is associated with significantly less pain and tenderness at the suture site ($P < 0.05$) as compared to polyglactin 910.

DISCOMFORT:

In our studies discomfort is significantly less with polyglactin 910 groups than with polyamide monofilament groups on post-operative day 4 which is similar to the studies of Vats and Pandit Suchitra.⁶ Absorbable sutures have advantage over non absorbable sutures over discomfort because of high coefficient of friction and tissue reactivity of non-absorbable sutures which act like a foreign body and do not get absorbed. Sheety et al.⁷ conducted a 5-year retrospective review of 102 adult patients with hand lacerations and compared the quality of scar formation in scars repaired with 5-0 vicryl versus those repaired with 5-0 nylon. They recommended absorbable suture material as an acceptable alternative to non-absorbable sutures in the repair of hand lacerations.

SWELLING AND INDURATION:

In our studies, number of participants with swelling and induration is significantly more in group polyglactin 910 than in group polyamide monofilament. Similar results were demonstrated in a study by Vats and Pandit Suchitra,⁶ which showed that incidence of swelling and induration is significantly ($P < 0.05$) less with polyamide monofilament as compared to the multifilament polyglactin suture.

WOUND DISCHARGE:

Our study showed that the number of participants with discharge was significantly more with polyglactin 910 as compared to polyamide monofilament. Similar findings were noted in a study by Regan and Lawrence,⁵ which demonstrated that monofilament poliglecaprone 25 (3.1%) resulted in significantly less extruded sutures than did polyglactin 910 (11.4%), and hence found to be less inflammatory or infectious, less pustular, or papular. Similarly, Vats and Pandit Suchitra,⁶ showed that wound discharge is significantly ($P < 0.05$) less with poliglecaprone (monofilament) as compared to multifilament polyglactin suture. Compared the biocompatibility and absorption times of three absorbable monofilament suture materials (polydioxanone, poliglecaprone 25, and glycomer 631) and showed near-total absence of acute inflammatory cells at 1 month and —extremely low-tissue reaction values with poliglecaprone 25. Similarly, LaBagnara⁸ noted that poliglecaprone 25 was —nearly non-reactive in tissue and no cases of stitch abscess or excessive wound inflammation were found. This could be explained by the fact that Islam and Ehsan⁹ conducted this study at Military Hospital, Rawalpindi, Pakistan, on a large sample size of two thousand patients.

Osther et al.¹⁰ in a randomized control trial compared polyglycolic acid and monofilament polyglyconate sutures for abdominal fascial closure after laparotomy in patients with suspected impaired wound healing. Wound infection demanding surgical intervention was found in 7 % of patients with polyglyconate and 16 % with polyglycolic acid sutures. In a Cochrane review, 7 trials with 2056 women were analysed showing that the risk of haematoma or seroma was reduced with subcutaneous closure compared with non-closure but no difference in the risk of wound infection or other short-term outcomes was found.

WOUND DEHISCENCE:

Our study showed wound dehiscence was significantly more in polyglactin 910 compared to polyamide monofilament. It is in compliance with the study by Vats and Pandit Suchitra,⁵ which showed that wound dehiscence and requirement of resuturing are significantly ($P < 0.05$) less with monofilament as compared to the polyglactin suture. However, Reported a systematic review of published RCTs and demonstrated that absorbable sutures do not increase the risk of skin wound dehiscence, rather lead to a reduced risk of wound dehiscence compared to non-absorbable sutures which could be explained by the fact that non-absorbable sutures need to be removed manually, and if inadvertently removed in improperly healed wound, it may result in wound dehiscence.

COSMESIS:

Table 8 shows comparison of excellent wound healing between suture materials assessed on the day 70 of cesarean section. The current study found that monofilament poliglecaprone 25 has excellent wound healing properties compared to multifilament polyglactin 910. Similar findings were found in a study which demonstrated that monofilament poliglecaprone 25 resulted in significantly less hypertrophic scars than polyglactin 910.

Bezwada et al.¹¹ published a paper on —monocryl suture, a new ultra-pliable absorbable monofilament suture — and showed that monocryl

sutures display excellent handling properties, minimal resistance during passage through tissue, and excellent tensile properties. These sutures provide in vivo breaking strength retention of approximately 20-30% after 2 weeks, considered by many to be the critical wound healing period and produces slight or minimal tissue reaction. In our study ethilon 2.0 being monofilament also produced the same outcome and resulted in excellent wound healing properties as compared to as vicryl 2.0 a multifilament suture. Yag-Howard and Lavallee,¹² in their study showed that the absorbable monofilament poliglecaprone 25 can serve as the sole suture material in closing deep surgical defects involving subcutaneous and epidermal tissue with the benefits of providing esthetically pleasing outcomes, possibly due to the material's low tissue reactivity and clear colorless appearance, and cost effectiveness.

SUMMARY & CONCLUSION

Our comparative prospective study was carried out in the Department of Obstetrics and Gynaecology in a Tertiary Care Center, Midnapore Medical College and Hospital of West Bengal from April 2019 to September 2020.

This analysis was to study and compare the efficacy of two suture materials, that is, polyglactin 910 (vicryl 2.0) and polyamide monofilament (ethilon 2.0) in subcuticular skin stitches in women undergoing cesarean section to establish the more efficacious and with least complications. A total number of 150 pregnant women undergoing caesarean section were divided in two groups randomly fulfilling the inclusion criteria mentioned above. First group was given polyglactin 910 (vicryl 2.0) and the second group was given polyamide monofilament (ethilon) for subcuticular skin closure. Out of total 150 participants in the study, most of the participants were primigravidae in both the groups, 121 (80.66%).

Multifilament sutures also induce a more intense inflammatory response and contribute to larger knot volumes than monofilaments of equal sizes. Multifilament sutures demonstrate enhanced capillarity with a resultant increase in the transport and spread of microorganisms. There are multiple factors which cause surgical site complications that have not been analyzed in this study and need an additional evaluation in further studies and there is lack of previous research studies on the same topic.

Table: Distribution of cases according to gestational age:

Gestational Age	Polyglactin 910 (n=75)	Polyamide monofilament (n=75)	P value
<37 weeks	0	0	0.7130861
37-40 weeks	51 (68%)	54 (72%)	
>40-42 weeks	24 (32%)	21 (28%)	
Mean	39 weeks 6 days ± 1.548	39 weeks 4 days ± 1.613	

Table : Comparison Of Post Operative Wound Complications Parameters On Day 30 Between Suture Materials:

Parameters	Polyglactin 910 (n=75)	Polyamide monofilament (n=75)	P value
Pain and tenderness	3 (4%)	5 (7%)	0.3710
Discomfort	2 (3%)	10 (13%)	0.0114
Swelling and induration	2 (3%)	2 (3%)	1
Wound discharge	0	0	0
Wound dehiscence	10 (13%)	5 (7%)	0.025347

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