Absorbable suture. Best aesthetic outcome in cesarian scar[1]

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Abstract

Purpose: To compare two suture threads, poliglecaprone 25 and nylon, used as intradermal suture for skin closure in women undergoing their first cesarean section.
Methods: This is a randomized clinical trial. A total of 60 women undergoing their first cesarean section were enrolled and prospectively assessed. They were randomly allocated to group I (n=30), which received an intradermal suture with nylon 4.0 or to group II (n=30), which had an intradermal suture with poliglecaprone 25, 4.0. The main author took standardized photographs of the scar 6 months after the operation. Four independent raters, two senior obstetricians and two senior plastic surgeons (a male and a female physician from each specialty) assessed the photographs.The panelists rated the scar according to Trimbos scale, composed by the subscales hypertrophy, color and width of the scar.
Results: At baseline, patients in both groups were similar regarding age and body mass index. Five patients withdraw the study, four from group and one from group II. Scars of patients from group II were significantly less hypertrophic (p=0.001), thinner (p=0.019) and had more acceptable color (p=0.019).
Conclusion: The intradermal suture with poliglecaprone 25 for skin closure after cesarean incision provides better aesthetic result.
Key words: Cesarean Section. Wound Closure Techniques. Sutures. Wound Healing. Esthetics.

■ Introduction

A cesarean section is a surgical procedure that consists of incising the abdomen and the wall of the uterus to release the concept[1]. It is the most frequent surgery in women, both in developed and underdeveloped countries[2].

The increasing incidence of caesarean section is a phenomenon common to almost every country in the world. However, another country is not known where the curve is so upward, nor the rates have reached levels as high as in Brazil[3]. Very low or very high cesarean section incision rates (CSIR) can be dangerous, however, the ideal rate is unknown[4]. In 1985 the World Health Organization (WHO) recommended that the cesarean section rate should not exceed 15%[5].

As the cesarean section became a safe procedure, in addition to the concern for mother-fetus health and safety, attention was also turned to maternal desires, being the importance given to aesthetic appearance in the present day[6]. In an attempt to improve the technique, Pfannestiel in 1900 described a transverse suprapubic incision used by most obstetricians and gynecologists, ensuring a safer and less painful closure postoperatively[7,8].

A técnica ideal para fechamento da pele deve ser segura, custo-efetiva e simples, enquanto maximiza os resultados estéticos e a satisfação da paciente com a ferida[9]. The incision can be reapproximated with intradermal continuous suture, immediately below the skin, can be made by interrupted suture or by means of staples[10]. Results are conflicting in reporting which suture material for intradermal closure is more advantageous in terms of wound healing, better aesthetic result and better patient satisfaction[10,11]. Identifying which surgical material provides the best healing and aesthetic result is a challenge[10]. The choice of surgical thread has been largely empirical. The art and the craft of surgery are taught by a preceptor and the tendency is to use the same thread used by him[12].

In surgical practice the threads are divided into two large groups: absorbable and non-absorbable. Two strands widely used for cesarean section incision skin closure: poliglecaprone 25, synthetic, monofilament, absorbable at about 91 to 119 days by the hydrolysis process, and nylon, synthetic, monofilament, non-absorbable, removed from about 7 to 10 days[13].

Since the 1970s, and more recently, the aim is to quantify the aesthetic aspect of the scar, with emphasis on aspects such as color, shape, volume and distinction of neighboring tissues. Criteria are proposed to separate the scarcely perceived, aesthetically normal evolution scars from the exuberant (hypertrophic) or even pathological (keloid) scars[14].

A table that evaluates aspects related to the aesthetic result of the scar was proposed by Trimbos *et al*.[15] is based on the conceptualization of the cicatricial aspect of hypertrophy, width, coloration and transverse marks.

A surgical scar can be evaluated through photographic analysis, a very common practice in plastic surgery. The documentation of images in scientific research can make its results measurable and can be analyzed objectively and accurately by the photograph. The evaluation can be carried out later in a more appropriate place and conditions[16,17].

The six-month post-operative scar inspection is as reliable as one year[15]. There are still surgeons who consider revision as sufficient after three months[17,18]. In this period the wound has 80% of the original resistance of the skin, and it is unlikely that significant changes in its remodeling or enlargement occur after this time, modifying aesthetic evolution[17,19].

The literature clearly provides the best

incision - Pfannestiel- the best suture for skin closure - intradermal continuous - but there are divergences of opinion on what would be the best yarn for such suture and rare works are available that compare aesthetic results between yarns surgical.

Thus, in view of the increasing rate of cesarean section, which is the most common method of delivery, according to WHO data, which is associated with a higher aesthetic value, it is pertinent to compare the aesthetic results between two monofilamentary synthetic yarns, nylon and poliglecaprone 25, since there are two types of suture material widely used at the time of surgery to close the skin.

The present research developed from the following objective to compare the non-absorbable (Nylon) versus absorbable (Poliglecaprone 25) thread for intradermal suture of the skin in cesarean section.

■ Methods

It is a clinical, primary, randomized, interventional and single center trial.Regarding ethical considerations, the study followed the Declaration of Helsinki 2013 and the norms of Resolution No. 466/12 of the National Health Council, guaranteeing total anonymity and patient privacy. Data collection began after approval by the Research Ethics Committee of the Sapucaí Valley University, under the number CAAE: 33107314.1.00005102.

The sample was calculated with the aim of studying differences between the mean scores of the Trimbos table according to the use of nylon (non-absorbable) and poliglecaprone 25 (PGL25) (absorbable) yarns.

The calculation was made by *OpenEpi* version 3, open source calculator -*Power Mean.* The sample constructed from these criteria presented a Power (Power) of 98.76% (calculated by the method of approximation of normal -www.openepi.com).

The following criteria were used:

1 - P = 0.05 (95% confidence interval)

2 - Beta = 0.20 (80% power)

Sample size ratio (Thread 2 / Thread 1) = 1

From a previous study in four patients (two in each group), Group I (nylon) had a mean score of 8.1 and a standard deviation of 1.8 and for Group II (poliglecaprone 25) the mean score of 6.2 and standard deviation of 1.7

The sample size was 28 patients, 14 per group. We chose to work with two groups of 30 patients each, GI = 30 (nylon) and GII = 30 (poliglecaprone 25), in order to prevent losses and bias, increasing the statistical power of the sample.

Sixty pregnant women undergoing the first cesarean section were selected from the Hospital das Clínicas Samuel Libânio (HCSL), patients who fulfilled the eligibility criteria were clarified about the study and only those who agreed to participate were included, signing the informed consent form. The data collected were recorded in a standardized form.

Patients who met the eligibility criteria were invited to participate in the study. Being the criteria for including patients that would be submitted to the first caesarean section, without any restriction as to age, ethnicity, education or social class.

The restrictions for inclusion were patients with previous suprapubic transverse scar (Pfannestiel); diabetic patients; patients with collagenosis; patients with preoperative exams that indicated any signs of systemic or local infection not previously treated until the time of surgery; patients of the black race, according to the classification of Fitzpatrick. Also by patients who withdraw the ICF and patients who did not attend the dates pre-scheduled for the postoperative controls.

The allocation was determined by computer generated random sequence

(Bioestat5.0 software, Institute Mamirauá, Brazil). The allocation concealment was secured by opaque, sealed and numbered envelopes, open the operating room to determine the allocation of patients in the skin suture groups with continuous intradermal point using nylon thread 4-0 (mononylon®) or poliglecaprone thread 25 4-0 (monocryl®), with 30 patients in each group.

Procedures

Both groups, Nylon and Poliglecaprone 25, underwent the same procedures.

• Pre-operative traditional preparation:

- Suprapubic trichotomy;

- Previous bladder emptying;

-Patient in dorsal decubitus, after subarachnoid anesthesia;

- Degermation of the abdomen and thigh root with chloroxedine 4% and after with chloroxedine alcoholic;

- Installation of sterile surgical fields and installation of electrocautery and aspirator.

• Opening technique:

- Classic technique with pfannestiel incision;

- Skin suture was performed with an intradermal point:

GROUP I - NYLON (Mononylon®) non-absorbable yarn, in the thickness of 4-0 USP with 1.5 cm cylindrical needle (Cod-Y 426-Ethicon)

GROUP II - POLIGLECAPRONE 25 (Monocryl®) absorbable thread, in the thickness of 4-0 USP with 1.5 cm cylindrical needle (Cod - 1129 - Ethicon);

- Occlusive dressing.

Evaluation of surgical scar

All patients returned to the first control between the 7th and 10th postoperative days, when the points were removed from the ones they needed. The second control was performed six months after the surgical procedure and had as objective the photographic documentation, for later evaluation of the aesthetic result of the surgical scar. Both controls were performed by the physician, responsible for the research.

Photographic standardization

A metric scale was introduced into the photographic environment to give a real aspect ratio reference to the image. This scale was positioned below the scar, in the same horizontal plane, with its center located in the alba line (Figure 1).

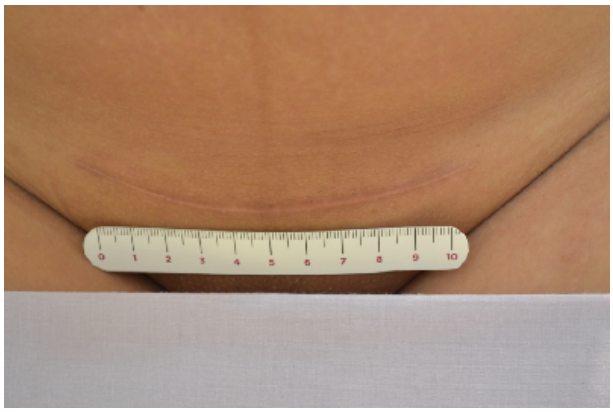

Figure 1 - Standardized photo of the scar.

The patient was always in the orthostatic position, with the photograph including the entire surgical scar and the objective axis was kept perpendicular to the photographic plane.

As a focal point, the number five of the 10 cm metric scale was used, adjusting the camera in automatic mode and focal length of 45 mm. The camera was placed on a tripod at a distance of 30 cm from the skin. In order to obtain adequate image horizontality, an air / liquid interface leveling device already adapted to the tripod was used.

The photographs were recorded with a Nikon D3100e digital camera stored on a personal computer with a Windows®XP operating system and Intel Corei.5® processor.

In order to measure the width, we used the Mias 2008 En Ver 2.2 Electronic Eyepiece program, which provides measurements in pixels.

The measurement of the 10 cm ruler was carried out and in three sites considered of greater cicatricial thickness.

Then the arithmetic mean of the three measures of the scar was obtained, obtaining the value of the cicatricial width, in pixel.

Because the Mias software provides the measurements in pixel, conversion was required in millimeters (mm). For this, a rule of three was performed: In the above case, the 10 cm ruler (1000 mm) equals 2597 pixels; the arithmetic mean of the three measurements with the greatest thickness of the cicatricial width of 126.3 pixels is X (mm).

Instrument for scar analysis

A pen drive was sent to each of the four evaluators (two obstetricians and two plastic surgeons) containing the photos, the excel table and the scoring table used for aesthetic evaluation of the surgical scar. A notebook was sent to an assessor (obstetrician) containing the Mias 2008 En Ver 2.2 Electronic Eyepiece program to measure the cicatricial thickness.

For evaluation of the scar, a semi-quantitative evaluation system proposed by Trimbos *et al*.[15] was used, based on the conceptualization of the cicatricial aspect of hypertrophy, color, width and marks of the points. All four evaluators appraised hypertrophy and coloration. Only one evaluator performed the cicatrization width measurement. The marks of the points have not been evaluated since intradermal continuous suture does not produce such marks.

Statistical analysis

Data were tabulated and submitted to statistical analysis. We used SPSS (StatisticalPackage for Social Sciences, Inc., Chicago, USA) and Bioestat 5.0 (Institute of Sustainable Development Mamirauá, Belém-PA, Brazil), with a rejection level of the null hypothesis set at 5%).

The descriptive statistics were presented as mean, median and standard deviation for the numerical variables and absolute and relative frequency for the categorical variables.

The Mann-Whitney test (Siegel) was used to compare the differences between the two study groups after six months; the Kendall W Test for inter-rater concordance; the Friedman test for differences between raters.

■ Results

The study included 60 patients submitted to the first cesarean section and randomly assigned to Group I (Nylon) or Group II (Poliglecaprone 25). In Group I were 28 primiparous and two patients with previous pregnancy with previous natural childbirth. In Group II there were 29 primigravidae and one with previous gestation with previous natural childbirth. All cesarean sections were performed by the researcher, assisted by resident doctors of the HCSL service. Of the 60 patients selected, five were excluded, remaining 26 patients in the Nylon group (non-absorbable) and 29 in the Poliglecaprone 25 (absorbable) group. The reason for the exclusion was non-attendance at the pre-scheduled dates for the postoperative controls. Four patients from the nylon group and one from the poliglecapone group were excluded.

Descriptive and total statistics of scores

Hypertrophy and staining were analyzed by the Evaluators 1, 2, 3 and 4. The width was analyzed only by the Evaluator 1. The value of the score obtained for the scar is inversely proportional to the aesthetic result (Tables 1 and 2).

Table 1 – Values corresponding to hypertrophy and scar staining: GI (Nylon) and GII (PLG 25).

		GROUPS					
		Nylon			PLG 25		
		Hypertrophy	Coloring	Brands	Hypertrophy	Coloring	Brands
E1	Mean±SD	3.19±0.85	2.88±0.95	1.00±0.00	2.10±1.05	2.27±1.03	1.00±0.00
	Median	3	3	1	2	2	1
E2	Mean	2.23	1.69	1.00	1.34	1.59	1.00
	SD	1.03	0.68	1	0.61	0.73	0.00
	Median	2	2	1	1	1	1
E3	Mean	2.15	2.08	1.00	1.41	1.93	100
	SD	1.08	0.80	0.00	0.78	0.80	0.00
	Median	2	2	1	1	2	1
E4	Mean	2.31	2.73	1.00	1.70	2.45	1.00
	SD	1.12	0.78	0.00	0.93	0.78	0.00
	Median	2	3	1	1	2	1

SD: Standard Deviation; E (1 to 4)=Evaluators

Table 2 – Values of the scar width for GI (Nylon) and GII (PLG 25).

		Width	
		Nylon	PLG 25
Evaluator 1	Mean	2.88	2.01
	SD	0.40	0.34
	Median	3.00	2.00

SD: Standard Deviation.

Statistical tests and their conclusions

Through the p-Values observed in Asymptotic Significance, evidence was observed that the treatments presented differences for the two observed aspects, hypertrophy and coloration, from the rejection of the null hypothesis that there are no differences between the two groups. It was observed p-values less than the significance level of 5%, it was concluded that there was a statistically significant difference between the treatments applied through the analysis of the total scores. In addition to the Mann-Whitney test, Kendall's W statistic also rejects the null hypothesis that the averages observed for the total scores were the same, leading to the conclusion that, in fact, the treatments presented statistically significant differences in the items Hypertrophy and Coloration, having larger scores for treatment with nylon and smaller for treatment with poliglecaprone 25.

The Hypertrophy question was also observed, with values lower than the significance level of 0.05 in the four comparisons made by the four evaluators, and there is significant statistical evidence that the poliglecaprone 25 treatments differ in fact in the Hypertrophy question, presenting averages of larger scores for Nylon treatment and lower for treatment with Poliglecaprone 25.

As to staining, a significant statistical difference was observed only for the first and third observer. There is insufficient evidence to state that other reviewers observed differences between the two treatments.

The Mann-Whitney test was used to verify statistically significant difference between the results obtained, the width was observed in both treatments. The conclusion of the test showed a significant difference between treatments, receiving Nylon a higher treatment score.

■ Discussion

Caesarean section is the most frequent surgery in women worldwide[2], especially in young and healthy women, and may have long-term and short-term consequences for the mother. These can be modified by the technique used at each time of the cesarean incision (CSI), and therefore, evidence has shown that choosing the best surgical technique is essential[20].

Well-known are short-term maternal risks of CSI, including infection, bleeding, and thromboembolic effects[8]. However, there has been a steady increase in the knowledge of the long-term effects of cesarean sections. These studies, in which this research is based, have explored surgical techniques for opening the fascia and closing the skin[4].

Various materials are used to close the skin after cesarean section. American obstetricians in 2011 found that only 4% used another method other than metal staples or absorbable suture[21]. These two methods (staples and absorbable wires) are those that have been mainly compared in randomized trials.

A meta-analysis composed of 877 patients from five studies compared the use of staples and subcuticular sutures, evidenced that the rates of dehiscence and wound complications increased with the use of staples, although the operating time has been shortened by only an average of 5,05 minutes. The authors recommended that subcuticular closure of the skin should be preferred to the use of staples[22].

The skin can be sutured in a continuous or interrupted way. The continuums are subcuticular and can be made with absorbable and non-absorbable strands, while the strands are usually made of non-absorbable material and wrap around the thickness of the skin. Superficial dehiscence of the wound can be reduced by using absorbable subcuticular continuous suture[23].

Since the suture is the best method for closing the skin at the cesarean incision, the choice of which intradermal (absorbable or non-absorbable) material is more advantageous in terms of wound healing, better aesthetic result and better patient satisfaction is also conflicting[11,21].

To determine which material used for subcuticular suture of the skin, in CSI, presents better aesthetic result, was the objective of this study. Two monofilament yarns, nylon (mononylon®) and poliglecaprone 25 (monocryl®) were compared, since multifilament yarns present a greater chance of infection and dehiscence of wounds[12].

Complications in the surgical wound such as hematoma, infection and dehiscence did not occur in any patient present in the study, in both groups, in the evaluation performed seven to ten days postoperatively.

This study was performed at the HCSL obstetrics service, which provides services to patients in 54 municipalities, being a reference center in high-risk gestation. This service collaborates with the training of resident doctors from various states and has as mission the improvement of surgical techniques, prioritizing the safety of the mother-fetus binomial and seeking patient satisfaction.

Three characteristics relevant to the aesthetic aspect of the scar were evaluated: hypertrophy, color and width of the scar. Cross-stitch marks have not been evaluated, since intradermal suture does not produce such marks.

Of these cicatricial features, hypertrophy is probably the most important and relevant variable in the aesthetic result,

followed by the width, presence of transverse marks and coloration[15].

Edwin Smith's papyri in 1700 BC had already mentioned the normal formation of scars as a result of failures in the process of wound contraction[24]. These scars may become elevated, tense, and confined to the margins of the original lesion, called hypertrophic[25].

In the present series, we chose to review the scar with six postoperative months, based on the literature[26,27]. It is also worth noting that long-term follow-up of patients in the postoperative period is difficult, due to the low rate of attendance at the later controls, if the patient has no complaints related to the operation[28].

Contrary to other studies[12,13], the present work pointed to the absorbable Poliglecaprone 25 wire, with better esthetic results when hypertrophy, coloration and width of the intradermal suture of the Pfannestiel incision were evaluated in the cesarean section.

Analyzing hypertrophy, the results presented a statistically significant difference, both in the individual analysis of all the evaluators and in the total score. Regarding coloration, the results were significant in the individual analysis of two evaluators (an obstetrician and a plastic surgeon) and reached a relevant total score.

Additionally, the absorbable suture with poliglecaprone 25 is associated with less discomfort at the surgical site when compared to the non-absorbable nylon suture[12]. Other relevant advantages are observed in the absorbable suture, among them are to avoid any physical and emotional trauma that may occur during its removal[26]. Considering also the inconvenience to the patient of an extra commitment to the removal of the non-absorbable yarn in a very troubled period (postpartum) should be considered and, in contrast, does not require doctor's follow-up visit to remove them.

In the HCSL GO Service, where this study was carried out, up to the beginning of the study, unabsorbable wire (Nylon) was used in 100% of the cases for SUS (Health Unic System) patients.

Unfortunately advances in technology and optimization in resource use often take longer than they should have to be incorporated into SUS[29] user care.

This study allowed the standardization, in the HCSL GO Service, of the use of absorbable yarn, poliglecaprone 25, to close the skin at the cesarean incision.

In this way, the best aesthetic results achieved with the absorbable thread analyzed, combined with the advantages already mentioned: anxiety and dorna withdrawal of the inabsorbable yarn, unnecessary return associated with schedule in the medical agenda with priority, made the poliglecaprone 25 a great option to close the cesarean section.

Social impact

The cesarean, in view of its wide use, impacts both economically and socially.

The use of absorbable surgical materials brings healing with better aesthetics, not only providing positive impacts on the patient's well-being, but also reducing the costs of the Health System and the patient herself.

Although it was observed that the initial cost of acquiring unabsorbable yarns is lower, the use of the absorbable ones, in the end, becomes less costly, as it becomes unnecessary to return the patient to stitch removal procedure, avoiding costs with the health professional, with the establishment of health and respective supplies, and also expenses with hygiene of surgical instruments and, finally, the costs with the patient's own displacement.

The absence of physical pain is emphasized by avoiding the painful procedure of removing the inabsorbable yarn, which contributes to the patient's emotional recovery.

The present study confirmed the aesthetic improvement in the use of absorbable yarns in the suture, and can infer a lower cost, as a whole, in the Health System, since the cost-effectiveness analysis emphasizes that not only the costs involved with comparative technologies, but rather the whole cost involved in clinical evolution, regardless of who they are.

■ Conclusion

The absorbable monofilament yarn (poliglecaprone 25) presented a better aesthetic result when compared to monofilament, nonabsorbable (nylon) yarn in the closure of skin with intradermal suture, in patients undergoing cesarean section.

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