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ORIGINAL ARTICLE

Comparison of purse string suture versus transverse mattress suture to secure haemostasis in thinned out caesarean section scars.

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ABSTRACT… Objective: To compare the effectiveness of two types of haemostatic sutures to secure bleeding in thinned out caesarean section scars. **Study Design:** Comparative Interventional Study. **Setting:** CMH Okara, Pakistan. **Period:** September 2019 to September 2021. **Material & Methods:** Patients were divided in four categories. Category I was previous one scar patients while category II was previous two scars patients. Similarly, categories III and IV were previous three and four scar patients respectively. In each category hemostasis was secured either by purse string suture or transverse mattress sutures. Hemostasis whether achieved with difficultly or without difficulty was assessed and time utilized was also calculated. **Results:** In patients with previous one caesarean section 3 out of 15 (20%) had haemostatic difficulty with both purse string suture and horizontal mattress suture. In patients with previous two caesarean sections the number was 5 (33.33%) and 6 (40%) in both purse string and horizontal mattress suture respectively. In patients with previous three caesarean sections there were 7 (46.66%) women who had difficulty in haemostasis in both group I and II. The average time to achieve the procedure in group I (purse string suture) was 3.25 minutes while it was 7.5 minutes in group II (Horizontal mattress sutures). There was two times difference in time consumption between two groups. **Conclusion:** Purse string suture is more effective, convenient and quicker to apply as compared to transverse mattress sutures for haemostasis in thinned caesarean section scars.

Key words: Caesarean Section, Haemostasis, Horizontal Mattress Suture, Purse String Suture.

INTRODUCTION

Caesarean section is considered as one of the most commonly performed obstetric surgery worldwide. It is the oldest procedures performed in the history of surgery and the first caesarean delivery was documented in 1020 AD.[1,2] It was considered as a last resort surgery to save maternal life. Different variations were seen since old times in this respect. Initially the uterine scar was not sutured due to the fear of uterine contractions breaking the sutures.[2,3,4] In 1769 Lebas was the first surgeon who closed uterine incision.[2,3,4] Non-absorbable sutures were left protruding from the wound for later removal leading to maternal sepsis. In 1876, Eduardo Porro started performing subtotal hysterectomy during cesarean delivery to prevent blood loss.[9] In 1882 Max Sanger started suturing of the uterus.[5] Despite this, there is no universally accepted technique for performing cesarean section and every step in this surgical procedure differs from surgeon to surgeon.[7] In 2005, Berghella et al and five years later in 2010, Walsh did a comprehensive review of literature on cesarean techniques and analyzed based each step of caesarean section.[9,10]

The Cochrane review published in 2008 showed that that single-layer closure was associated with significant reductions in blood loss and operative time.[11] Hamar et al. reported equivalent scar thickness irrespective of the method of closure.[12]

Obstetricians for Cesarean sections have adopted various surgical techniques; however,

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no unanimous decision has been made regarding the best surgical technique.[11,12,13,15] In recent years, studies have been conducted to compare single and double layer closure for uterine incision.[14,15] There are very few studies done to determine the effects and efficacy of different types of suturing techniques for uterine scars. Patients with previous caesarean section have been known to be associated with scar defects, which occur due to deficient myometrial tissue after uterine incisions.[16] This usually happens when there is myometrial discontinuity at certain areas of previous uterine incision.[15, 17] The later effects are serious complications such as ectopic pregnancy or uterine scar rupture either silent or symptomatic. There is postulation of poor uterine healing contributing to these complications.[15,16,17]

There is need for further studies to determine the efficacy of different closure techniques of uterine incision for support of uterine scar and arrest of haemostasis. Although not studied for uterine incision but there are debates between conventional horizontal sutures and purse string sutures for wound closure. Some studies have shown better wound healing and lower rate of complications with the purse string suture technique.[17,18,19] Results from a clinical trial from Korea published in 2019 reported promising results with the use of base purse string suture to remove giant fibroids for myomectomy.[17] The mechanism of haemostasis is not only by pressure of the surrounding tissue but also by sealing the vessels.[17,18]

Similarly, horizontal mattress sutures are applied to secure haemostasis and strengthen deficient uterine scar. The mechanism is not only sealing of bleeding vessels but also pressure of tissue over and above the deficient tissue.[20] There are studies for mattress suturing techniques helping the injured areas to align tissues to prevent blood loss and future scarring.[19,21]

There are few studies comparing different suturing techniques that can be used to repair deficient uterine scar.[13,15,14,18] Our aim was to compare purse string closure and horizontal mattress suture for deficient uterine tissue of previously scarred uterus to secure haemostasis.

Uterine scar closure effectively prevents blood loss per operatively. The method of uterine closure varies from surgeon to surgeon but whatever technique applied, strong uterine scar closure should be done in order to decrease complications in future pregnancies. It would become an ideal suturing technique for uterine closure when it will provide effective haemostasis and reduces risk for future complications of pregnancies.

MATERIAL & METHODS

It was a Comparative Interventional study conducted at Combined Military Hospital Okara Operation Theatre from September 2019 to September 2021.

Inclusion Criteria

All patients during the study time with previous one, two, three and four caesarean sections were included in study.

Exclusion Criteria

Patients with previous four caesarean sections, placenta accrete, placenta percreta, myomectomy and uterine repair scars were excluded from the study.

METHODOLOGY

A total of 500 patients were recruited for the study. They were divided in four categories. Most of the women were those who had one or two caesarean sections before. The number of women with previous three caesarean sections was less and even lesser with previous four operations.

Patients were divided in four categories. Category I was previous one scar patients while category II were previous two scars patients. Similarly category III and IV were previous three and four scar patients respectively. Out of them 120 patients were selected (30 from each category) by assessing intraoperatively.

For each category two groups were made for application of either purse string or horizontal mattress suture. Caesarean section was started

by conventional method. On opening peritoneal cavity thinned out scars due to previous operations were identified by clinically assessing thickness of lower uterine segment. Uterus was closed in single layer due to deficient uterine wall tissue. After first layer closure deficient areas, holes and bleeding areas in lower uterine segment were identified.

In each category hemostasis was secured either by purse string suture or transverse mattress sutures. Hemostasis whether achieved with difficultly or without difficulty was assessed. During the operation time consumed in securing bleeding with both type of sutures was also calculated. It was done by noting time to start after suturing first uterine layer and working with haemostatic sutures for each operation. Average mean was calculated by adding and dividing for 15 operations in each category. All calculations were presented in tabulated forms and results were calculated.

Data Analysis

All the data was spread in the form of tables and percentages were figured out. Data was analyzed by using SPSS version 22 and simple calculations were made. Results were analyzed by comparing percentages.

RESULTS

Table one shows patients number and percentage in which haemostasis was secured with difficulty in both groups. In patients with previous one caesarean section 3 out of 15 (20%) had haemostatic difficulty with both purse string suture and horizontal mattress suture. In patients with previous two caesarean sections the number was 5 (33.33%) and 6 (40%) in both purse string and horizontal mattress suture respectively. In patients with previous three caesarean sections there were 7 (46.66%) women who had difficulty in haemostasis in both group I and II. The results showed that both groups had almost similar number of patients in which haemostatic sutures were taken with difficulty or without difficulty and there was only minor variation of results.

Table-II shows average time utilized in both groups of study. It was done by noting start of time after first layer uterine closure and ended after the haemostasis was completely assured. Time was calculated individually in each operation from all the four categories in both groups and then average time was considered. The average time to achieve the procedure in group I (purse string suture) was 3.25 minutes while it was 7.5 minutes in group II (Horizontal mattress sutures). So there was two times difference in time consumption between two groups.

Serial No	Previous Number of Caesarean Sections	Purse String Suture Group I	Haemostasis Achieved With Difficulty %)	Horizontal Mattress Sutures Group II	Haemostasis Achieved With Difficulty (%)
1.	One (Category I)	15	3 (20%)	15	3 (20%)
2.	Two (Category II)	15	5 (33.33%)	15	6 (40%)
3.	Three (Category III)	15	7 (46.66%)	15	7 (46.66%)
8.	Four (Category IV)	15	7 (46.66%)	15	7 (46.66%)

Table-I. Comparison of number (Percentage) of patients in Group I (Purse String Suture) and II (Horizontal Mattress Suture) in which haemostasis was achieved with difficulty n= 120

-	Previous number of caesarean sections n=15	Average time utilized to achieve Haemostasis with Purse string suture Group I	Overall Average time utilized for Haemostasis with Purse string suture Group I	Average time utilized to achieve Haemostasis with Horizontal Mattress suture Group II	Overall Average time utilized for Haemostasis with Horizontal Mattress suture Group II
1.	One (Category I)	3 minutes	3.25 minutes	7 minutes	7.5 minutes
2.	Two(Category II)	3 minutes		7 minutes	
3.	Three(Category III)	3.5 minutes		8 minutes	
4.	Four(Category IV)	3.5 minutes		8 minutes	

Table-II. Average Time utilized to achieve Haemostasis In Group I & II patients n=120

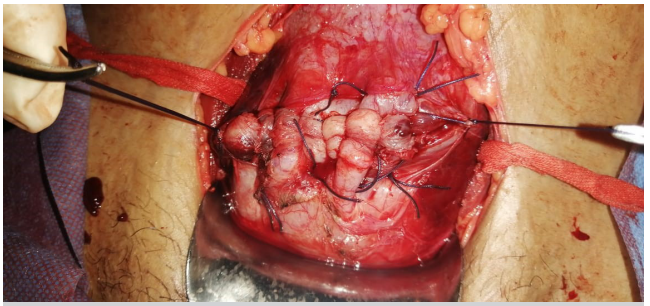

Figure-1. Horizontal mattress sutures in Group I patients

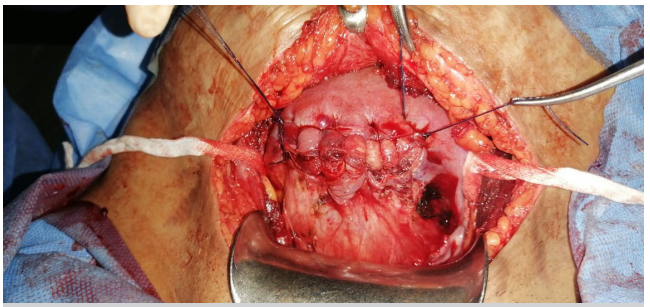

Figure-2. Purse string suture in Group II patients

DISCUSSION

Caesarean section is the most common surgical procedure being done in obstetrics practice. Uterine wall usually thins out when there are previous surgeries done.[1,4] Control of bleeding in uterine wall can be done by different techniques. Most commonly used method is suturing in two layers by using conventional thread type.[2,14] Some obstetricians do single layer closure. In thinned out scars when uterine wall tissue is deficient other options can be considered. These are suturing either by figure of eight sutures, horizontal (transverse) mattress sutures, simple mattress sutures or purse string suture.[1,2,8] In our study after first uterine layer closure we applied either purse string or transverse mattress sutures and compared the result and time consumed to apply the sutures.

Purse string suture secures haemostasis by applying pressure on the week tissues and engaging the uterine muscle wall side by side to reinforce the deficient area.[1,5] In our study it was applied with less difficulty and was quick to be finished. On the other hand transverse mattress sutures were almost equally effective. The mechanism of haemostasis in this type of suture was also application of pressure on week uterine musculature and was similar to engage weak uterine musculature on each side of defected areas. These sutures were applied with more difficulty as compared to purse string suture and also consumed more time to complete the procedure.

The study conducted by Turan C and his colleagues at Istanbul (Turkey) in 2015 to see the efficacy of purse string double layer closure for repairing of uterine incision during caesarean section. They compared the classical double-layer uterine closure to a double-layer purse-string uterine closure (Turan technique) in cesarean section regarding short- and long-term results. They studied the scar defect by transvaginal ultrasound at 6 weeks after operation as short term effect and subsequent pregnancy complication as long term effects. They calculated demographic data, operation time, hospitalization time, preoperative and postoperative hemoglobin values. During the 2-year of the follow-up period, eleven became pregnant again. No complication during their pregnancies and second cesarean operation were encountered.[11] Our study I comparable to them in terms of operating time and we found that operating time is less with purse string suture as compared to horizontal mattress sutures. With our techniques, the uterine incision length became shorter with adequate haemostasis.

A new technique for was proposed by Babu and Magon as a modification of the existing surgical technique of uterine closure for thinned out scars. In the new technique, the uterus is closed by continuous modified mattress suture technique in a single layer excluding the decidual layer. The aim of using this method is to ensure the correct anatomical approximation of the deciduas to deciduas, myometrium to myometrium and serosa to serosa layers. The thinned out margins were excised and sutured by the new technique. The approximation and homeostasis was excellent. The patient underwent hysterectomy at a later stage for fibroids. The site of the uterine scar repaired by the new technique was assessed and there was no thinning at the site of uterine repair.[18]

The study done by Shah S showed similar results.[20] Uterine incision was sutured either single layered or by continuous modified mattress suture.[18] Time taken for closure of the uterine wound was calculated and even time taken for taking extra stitches for achieving hemostasis was also counted. At eighth post-operative day and after 6 months, the uterine scar thickness was measured. The new technique of uterine closure by modified mattress sutures even though it takes more time yielded better scar thickness.[18,19,20]

There is better and quick outcome in terms of haemostasis security for thinned uterine scar closure with the help of purse string as well as horizontal mattress sutures. These techniques should be adopted and followed in simple and difficult caesarean deliveries.

CONCLUSION

Purse string suture is more effective, convenient and quicker to apply as compared to transverse mattress sutures for haemostasis in thinned caesarean section scars.

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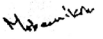
2	Amera Tariq	Planning.	
3	Mobeen Ikram	Analysis.	
4	Nabila Amin	Analysis.	
5	Saad Mukhtar	Data collection.	
6	Ayesha Imran	Final Review.