

Effect of Single versus Double Layer Suturing on Healing of Uterine Scar after Cesarean Delivery

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Abstract

Background: Cesarean delivery is the one of the oldest procedures performed in the history of surgery. Nowadays closure of the uterine incision is a key step in CD, particularly given the increasing awareness of future scar dehiscence. **Aim:** to improve quality of cesarean delivery. **Objective:** to assess healing after single- and double-layer suturing of uterine scar. **Patients and Method:** Randomized clinical trial conducted at Obstetrics and Gynecology department, Suez Canal University Hospital. Eighty primigravida women with full term pregnancy undergoing first elective CS were equally randomized to either single-layer or double-layer unlocked suture. Six weeks after the operation, the integrity of the cesarean scar done by 2 operators was assessed by sonohysterography. The thickness of the residual myometrium covering the defect "RMT", width of the triangular hypoechoic niche "W", depth of the triangular hypoechoic niche "D" and healing ratio "D/RMT" were calculated as markers of uterine scar healing. **Results:** There were no significant differences between the groups in terms of estimated blood loss, operation time, or additional hemostatic suture. However, frequency of appearance of niche in single layer patients was 65% compared to 30% in the double layer patients. The mean thickness of the residual myometrium covering the defect was significantly higher 9 ± 1.1 mm after double-layer than 7.9 ± 0.92 mm after a single-layer closure ($P = 0.002$). The mean healing ratio in double-layer was 0.2948 ± 0.05 versus 0.2969 ± 0.04 ; $P = 0.922$ in the single-layer closure. **Conclusions:** Double unlocked layer closure was associated with higher residual myometrial thickness than locked single layer and better uterine scar healing.

Key Words: niche, uterine scar healing ratio, sonohysterography

Introduction

The safe cut off thickness of scar in post LSCS uterus varies from 1.5 to 3.5 mm; the thinning of the site is the cause of worry of dehiscence scar or rupture in next pregnancy⁽¹⁾. Closure of the uterine incision is a key step in cesarean delivery, correct approximation of the cut margins is not guaranteed. This may be possibly due to edges

getting overlapped; and, after remodeling and the process of the healing, thickness of the site of incision is significantly reduced. There is also a very high possibility of inter surgeon variability. It was felt that if there is a suturing technique which ensures correct approximation of all the layers with nil or minimal possibility of inters operator variability, there will not be any thinning of lower segment cesarean section LSCS site,

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and scarred uterus repaired in this manner will be able to withstand the stress of labor in future^(2,3). So, we can assess the scar either by postnatal saline infusion sonohystrography (SIS) or transvaginal ultrasound of the uterus 6 weeks after cesarean delivery (CD)⁽⁴⁾. This procedure in which fluid is instilled into the uterine cavity transcervically to provide enhanced endometrial visualization during transvaginal examination; the technique improves sonographic detection of endometrial pathology^(5,6). So, in our study; we analyzed the effects of single versus double layer closure on healing of the uterine scar after CD using SIS.

Patients and Methods

This randomized clinical trial was conducted in Obstetrics and Gynecology department, Suez Canal University Hospital. The study was approved by the Suez Canal University Ethical Committee. 80 women was taken in the study, they calculated by a sample size based on the mean thickness of residual myometrium covering the defect after double layer closure and single layer closure in previous studies. Women with an elective primary cesarean delivery after term pregnancy and fulfilling the inclusion criteria (Primigravida, Full-term pregnancies & Singleton pregnancies) were approached and counseled to participate in this study and signed on a written informed patient consent with an explanation regarding the purpose, methods, effects, and complications. Women with obstructed labor, chronic diseases, previous CD, intraoperative or postoperative complications were excluded from the study. Full history was taken; physical examination, Laboratory and imaging studies were done. Patients were randomly divided into 2 equal groups (simple randomization) according to the type of uterine closure; Group 1: Uterus was closed by continuous

locked sutures in a single layer. Group 2: Uterus was closed by double unlocked layer closure, the standard CD technique was followed, and the following parameters were checked: Time of start of procedure, Time of finish, the need for extra haemostatic sutures and Estimate the amount of bleeding. Saline infusion Sonohystrography was done 6 weeks after CD. The following technique was adopted: the bladder was emptied; Casco speculum was inserted into vagina followed by insertion of soft non balloon tip catheter 5 French into uterus through vagina then cervix. The speculum was extracted to insert the transducer, 5-10 cc of saline was inserted through the catheter into the uterine cavity to allow the lining of the uterus to be imaged clearly on the ultrasound screen and showed any endometrial abnormality (figure 1)⁽⁷⁾. A triangular hypoechoic filling defect "niche" under the bladder recess, in the region between the uterine body and the cervix, in the typical location where low-transverse cesarean deliveries are performed⁽⁸⁾. Residual myometrial thickness "RMT" is the distance between the tip of the hypoechoic triangle and the surface of anterior uterine wall measured by mm. Width "W" of the triangular hypoechoic niche measured by the distance between the proximal and distal parts of myometrium of the anterior uterine wall measured at the surface of the endometrium, endocervix of the posterior uterine wall. Finally depth "D" is the distance between the surface of the endometrial / endocervical layer of the posterior uterine wall to the tip of the hypoechoic triangle⁽⁹⁾. The study outcome measures are niche, residual myometrial thickness and healing ratio (D/RMT) were evaluated. Data were processed using SPSS version 19. Quantitative data were expressed as mean \pm standard deviation "SD" and qualitative data as numbers and percentages. Student's/ test were used to significance of the difference

for quantitative variables and chi-square and Fisher's exact test for qualitative

variables. A probability value "P" <0.05 was considered statistically significant.

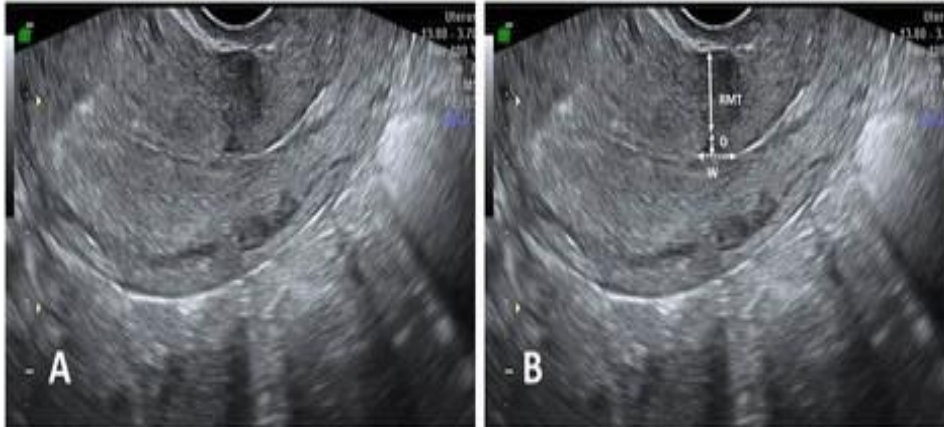


Figure 1: The visualization of the cesarean section scar during transvaginal ultrasound. A Presentation of the cesarean section scar B The assessed cesarean section scar parameters. RMT, residual myometrial thickness; W, width of the triangular hypoechoic scar niche; D, depth of the triangular hypoechoic scar niche⁽⁷⁾

Results

This study included Eighty primigravida women with full term pregnancy undergoing first elective CS. The indications for CS among our subjects were as follows; Contracted pelvis (32.5%), mal-presentation (30%), fetal macrosomia (22.5%), genital infection (herpes) (7.5%), reversed S/D Ratio (5.0%) and very low birth weight <1.5 kg (2.5%), Women divided in to 2 equal groups: group 1 where the uterus was closed by continuous locked sutures and group 2 where the uterus was closed by double unlocked layer closure. The difference in age, BMI, GA, and CS indications between the two assigned groups was statistically insignificant. There were no significant differences between the groups in terms of estimated blood loss, operation time (table I), or additional hemostatic suture. However, the appearance of niche using single layer technique was found in 65% of patient compared to only 30% in those who had double layer closer technique (figure 2) and the mean thickness of the residual myometrium covering the defect was 9 ± 1.1 mm

after a double-layer closure and 7.9 ± 0.92 mm after a single-layer closure ($P = 0.002$) (figure 2). The mean healing ratio in double-layer closure (0.2948 ± 0.05) and a single-layer closure (0.2969 ± 0.04 ; $P = 0.922$) difference between 2 groups was statistically insignificant (table 2). The relation between RMT and depth of niche among those where niche appeared was assessed by Spearman's correlation coefficient and showed moderate negative and statistically significant correlation among those with single layer and total correlation while was insignificant among patients sutured by double layer (table 3) (figure 3).

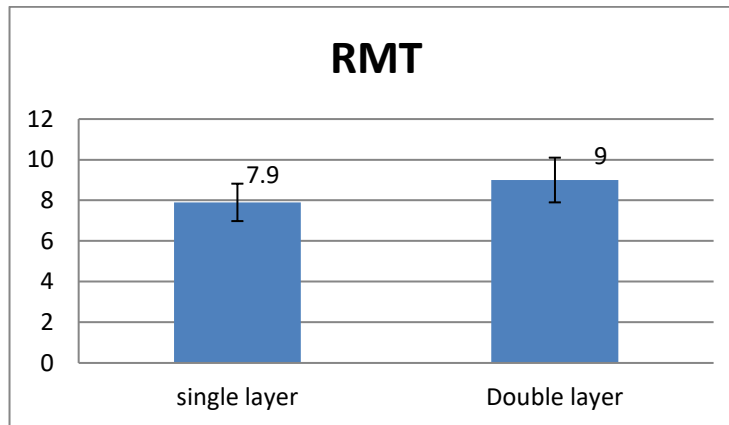
Discussion

This clinical trial was performed on 80 primigravida women with full-term pregnancy that had CS and evaluation of uterine scar after 6 weeks of delivery by SIS in which fluid is instilled into the uterine cavity transcervically to provide enhanced endometrial visualization and improves sonographic detection of endometrial pathology during transvaginal

Table 1: Intra-operative parameters among the two groups

	Single layer No. (%)	Double layer No. (%)	p-value
Time consumed in minutes			
Mean \pm SD	33.2 \pm 3.1	37.8 \pm 3.4	< 0.001 ^{1*}
Median (range)	32.5 (30 – 42)	37 (33 – 43)	
Amount of bleeding			
Mean \pm SD	502.5 \pm 75.2	467.5 \pm 59.1	0.131 ¹
Median (range)	500 (400 – 600)	450 (400 – 550)	

¹=Mann Whitney U test; *Statistically significant at $p < 0.05$

**Figure 2:** Difference of RMT (in mm) among the 2 studied groups**Table 2:** healing ratio among both single- and double-layer patients

	Single layer (n = 26)	Double layer (n = 12)	p-value
Healing ratio (niche D/RMT) Mean \pm SD	0.2969 \pm 0.04	0.2948 \pm 0.05	0.922 ¹

¹=Student's t test.

Table 3: Spearman correlation coefficient between RMT and depth of niche.

	Niche depth					
	Single layer		Doubly layer		Total	
	r	p-value	r	p-value	r	p-value
RMT	- 0.558	0.047 [*]	- 0.667	0.140	-0.654	0.002 [*]

* Statistically significant at $p < 0.05$.

examination. The main objective of our research was to compare the effect of single-versus double-layer closure on healing of uterine scar after CS. While performing SIS in patients with previous CS, a triangular hypoechoic or anechoic filling defect called “niche” under the bladder recess is

noticed, in the region between the uterine body and the cervix, in the typical location where low-transverse CS are performed. By TVS, the scar was identified in the sagittal transection of the uterus and we assessed: residual myometrial thickness, width, depth of niche and healing ratio⁽¹⁰⁾.

In randomized, prospective study, done by Sevket to assess RMT and healing ratio as markers of uterine scar healing 6 months after CD, they found that; RMT covering the defect was 9.95 ± 1.94 mm after a double-layer closure and 7.53 ± 2.54 mm after a single-layer closure ($p = 0.005$). The mean healing ratio was significantly higher after a double-layer closure (0.83 ± 0.1) than after a single-layer closure (0.67 ± 0.1 ; $p = 0.004$). They suggested that; double-layer locked/unlocked closure of the uterine incision at CD decreases the risk of poor uterine scar healing⁽¹¹⁾. In agreement with our results, Roberge had evaluated the impact of 3

techniques of uterine closure after CS on uterine scar healing. Closure of the uterine scar was carried out by locked single layer including the decidua, double layer with locked first layer including the decidua, or double layer with unlocked first layer excluding the decidua. They found that compared to single-layer closure, double-layer closure with unlocked first layer was significantly associated with thicker RMT ($p < 0.001$) and greater healing ratio ($p = 0.004$). In contrast, double-layer closure with locked first layer was not significantly different than single-layer closure in either RMT or healing ratio⁽¹²⁾.

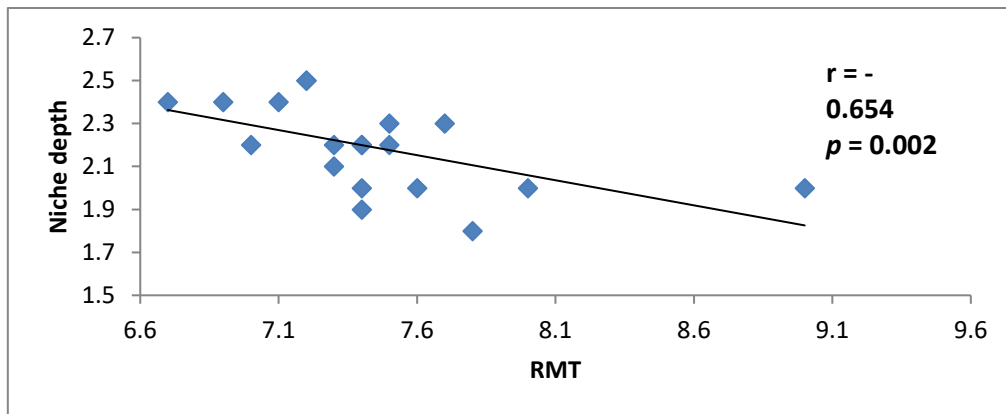


Figure 3: the relation between RMT and niche depth among all participants with niche

Similar results were found in retrospective cohort study performed by Glavind. They measured TVS of RMT, scar defect depth, width and length and myometrial thickness adjacent to the scar were compared in women with single- versus double-layer closure. RMT was significantly higher in women with double-layer closure versus in those with single-layer closure ($p = 0.04$)⁽¹³⁾. In addition, scar defect length was greater in women with single-layer closure than in those with double-layer closure ($p = 0.01$). Measurements of defect depth and width, and the proportion of scars with RMT < 2.3 mm were similar in the two groups. They concluded that RMT was greater and

defect length, but not defect depth and width, was smaller following double-layer compared with single-layer closure, which may indicate some limited benefit of double-layer closure following first elective CS⁽¹³⁾. In contrast to our results, Bennich found that there was no difference in RMT between the two groups, both at time of discharge and after 5 months postpartum. RMT was approximately half that of the normal myometrium at both examinations. They suggested that double-layer closure of a Cesarean uterine incision does not increase RMT compared with single-layer closure when an unlocked technique is used⁽¹⁴⁾. The strengths of this study are the

randomized controlled and the prospective design. A weakness is that in many scans the CS scar defect (niche) was not visible to operators. It seems likely that a poorly visible scar has an absent hypoechoic 'apparent defect' and a correspondingly larger RMT. Of the cases in which the scar was not visible the uterus was retroverted in the majority, while the scar was almost always visible when the uterus was anteverted. This discrepancy may relate to tension being put on the scar by the position of the uterus; when retroverted the internal cavity surface of the lower segment is brought together and a smaller scar may result, hence limiting its visibility⁽¹⁴⁾. From our observations we founded that both groups showed no significant differences regarding percentages of niche and the width of the uterine scar whoever the RMT was significantly higher in double suture group while the depth was significantly lower in the same group. So, we concluded that double unlocked layers closure is associated with better uterine scar healing and higher RMT than locked single layer.

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