Assessment of Primary Cesarean Section Incision Site Early in The Purpureum to Predict Subsequent Consequences.

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Short running title:

Assessment of Cesarean Section scar defect

Conflict of interest Statement:

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Abstract

Aim: To assess primary cesarean scar after 6 weeks post-delivery to describe its characteristics using two-dimensional transvaginal ultrasound.

Methods: This cross-sectional study was performed at Mansoura University Hospitals, Mansoura, Egypt from the beginning of March 2020 to March 2021. Eighty women underwent primary cesarean section fulfilled the inclusion criteria were examined by TVUS to evaluate cesarean scar after 6 weeks from delivery. The main outcome was measurement of residual myometrial thickness (RMT), while the secondary outcome was niche measurement (depth, width, site, shape).

Results: The mean age of included cases was 24.63 ± 6.23 years. The mean GA at delivery was 37.21 ± 2.50 weeks. The cephalic presentation was predominant in 68.75% of females. Maternal indications for CS were reported in 50% of females, fetal indications in 46.3%, while unreliable indications were shown in 3.7%. The mean niche depth was 1.16 ± 0.46 cm. The mean niche width was 1.48 ± 1.17 cm. The mean site (From incision to internal os) was 0.21 ± 0.43 cm. The mean RMT was 0.84 ± 0.55 cm. The mean RMT-OS was 1.8 ± 1.82 cm. Triangular shape of niche was the most common shape in 72.5% of females. Circular shape of niche was detected in 17.5 % of females, both oval shape and polygonal shape were 5 %, each. No significant differences were observed between level of experience of main surgeon, closure of visceral or parietal peritoneum & state of labor and RMT. Also, no significant difference was found between level of experience of main surgeon and site & shape of niche.

Conclusion: Caesarean section scar in women after 6 weeks from primary CS assessed by using 2D-TVUS was not affected by the site of CS incision, surgeon's experience, visceral or parietal peritoneum closure and labor stage at the time of CS.

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Introduction

In most countries, the most common obstetric procedure is the cesarean section (CS), which is becoming more and more popular. This procedure could result in late scar dehiscence, which could cause uterine rupture in a later pregnancy. Serious complications like as wound dehiscence and wound evisceration are linked to maternal death rates of 12 and 30 percent, respectively [1]. The approximately 60% population-based percentage of CS conducted in Egypt in 2014 significantly surpasses the WHO-recommended threshold of 10-15% [2]. Despite the fact that the observed increase in Egypt's CS rate over time is consistent with findings from other national and international research, this increase positions Egypt as the nation with the highest CS done globally [3]. A number of studies have been conducted with varying degrees of success to assess the relationship between the measurement of the lower uterine segment (LUS) and the risk of uterine rupture or dehiscence [4, 5]. The cesarean scar defect (CSD) (also known as niche or isthmocele) is the most frequent issue following cesarean delivery (CD); it has been referred to by several names in the literature, including pouch, niche, and isthmocoele. It is described as a triangular-shaped area of myometrial thinning or uterine scar dehiscence that continues into the endometrial cavity [6]. If the TVUS evaluation shows that RMT is less than 2.2 mm, or if the incision depth is at least 50 or 80% of the anterior myometrium, the CSD is deemed severe [7].

The incidence of a severe complication, such as uterine rupture during a subsequent pregnancy, is only 2%, but if the CSD is deemed severe, this percent can rise to 5% [8]. The frequency of CS scar abnormalities ranges from 24–70% in a routine ultrasonography evaluation of a non-pregnant uterus in women with a history of at least one CS. Owing to the overall number of CS cases and the frequency of CS scar abnormalities, this is a medical issue that primarily affects women [9]. It was discovered that two-dimensional transvaginal ultrasonography (2D-TVUS) was a reliable technique for measuring scar thickness. Additionally, it was discovered that colored Doppler was helpful in determining the scar's vascularity [10]. The LUS is seen on ultrasound as a two-layered structure made up of the comparatively hypoechoic myometrial layer and the echogenic visceral-parietal reflection, which extends from the bladder's interior inward and includes the bladder's musculosa and mucosa (the outer layer) [11].

Patients and Methods

This a cross-sectional study was conducted from March 2020 to March 2021 in Obstetrics and Gynecology department in Mansoura University Hospitals, Mansoura, Egypt. The study was approved by the Mansoura Faculty of Medicine Institutional Research Board (Code No. MS.20.03.1085) and conducted according to the ethical standards of Declaration of Helsinki. During the study period, we examined 80 women underwent primary CS by 2D-TVUS to evaluate CS scar after 6 weeks to describe its characteristics and to evaluate impact on the subsequent events. All participants were interviewed, received sufficient information about the protocol of the study, and then counseled to be enrolled.

The main inclusion criteria were women underwent primary CS done for either maternal indications as: obstructed labor, failure to progress and medical disorders or fetal indications as malpresentation, multiple pregnancy, fetal distress, fetal anomalies and neonatal weight >3500 grams. Immunocompromised patients (chronic diseases, autoimmune conditions as (lupus, rheumatoid arthritis), asthma, extended use of biologics, disease-modifying antirheumatic

medications, and corticosteroids, active treatment for solid tumor and hematologic malignancies), patients with bleeding diathesis (inherited as hemophilia & Von Willebrand disease or acquired as thrombocytopenia & kidney failure), patients with Hb level< 10gm / dl and patients who had infection (if +ve C-reactive protein, chorioamnionitis, long period of premature rupture of membrane, fever) were excluded. Every patient who was enrolled in the study gave their informed consent and was given the option to leave the study at any time for any reason. All participants were submitted to complete history taking, obstetric history, medical history, previous surgical procedure, caesarean section indications (maternal or fetal). Recording of state of labour (in labour or not in labour), early CS complications and operative details as: (dissection peritoneal reflection, uterine incision, closure, blood loss, pre- and post-operative hemoglobin & hematcrit). Data were collected from medical records and recorded in the intraoperative sheet. In addition, ultrasonographic assessment of niche (site, width, shape), residual myometrial thickness (RMT), RMT-OS, distance proximal & distal to incision, uterine and cervical length & width.

Ultrasound examination was done at 6 weeks after the cesarean delivery using LOGIQ F6 ultrasound machine, (General Electric Medical Systems, China) with a 7 MHz transvaginal 2D probe by the candidate. For the diagnosis of CS defect (niche) we depended on the definition of the presence of defect at least 2 mm in depth. CS defect was considered large when the depth of the defect was more than 50% total myometrial thickness.

Women with half-empty bladder lied in a lithotomy position during the examination. Then, complete visualization of the uterus in sagittal plane. To locate the potential niche and CS scar, LUS was closely inspected. We measured the distance between CS scar and cervical internal os. Also, the uterine position whether ante-flexed or retro-flexed was documented. When a niche was found, in the midsagittal plane; RMT measured from the serosa covering the uterus to the niche apex, depth (D), distance from niche apex to the base of the niche and width (W) measured in the widest diameter of the hypoechoic area of niche base was measured. We excluded intrauterine device and the endometrium from the niche measurements (figure, 1). In women without a scar defect, RMT was measured from the endometrial boundary to the serosal surface at the level of the CS scar [12]. The thinnest RMT in the sagittal plane should typically be found, while it can also be found farther laterally.

Statistical analysis and data interpretation

Sample size was calculated by the use of G*power version 3.0.10 to depending on pregnancy outcome of pregnancy scar taking birth weight as the primary outcome, sample size of 80 patients was needed with effect size (0.47) retrieved from previous research [7], with error =0.05 and power = 80.0%.

We using Statistical package for Social Science (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) after revision of data. Paired samples t-test, Chi-Square test, Monte Carlo test, Kruskal Wallis, Fisher's exact test were used and P value <0.05 was set significant.

Results

The mean age of the studied females was 24.63 ± 6.23 years. The mean gestational age at delivery was 37.21 ± 2.5 weeks. The cephalic presentation was predominant in 68.75% of females followed by breech presentation (20%) and 11.25% had multiple pregnancies. The median number of gravidities, parities, abortions was 1, 2 & 1, respectively. There is 1.3% of females with previous still birth. Hypertension (HTN) was the most common reported

associated medical condition in 20% of cases followed by preeclampsia (7.5%) then diabetes mellitus (DM) and deep vein thrombosis (DVT) in 2.5%, each. Bronchial asthma (BA), hepatitis C virus (HCV), hyperthyroidism and mitral valve replacement & aortic regurgitation (MVR + AR) were shown in 1.3% for each of them. Manual vacuum aspiration (MVA) was conducted in 3.8 % of females, ovarian cystectomy in 2.5 % and hysteroscope & myomectomy in 1.3% of cases for each of them, table (1).

Maternal indications for CS were reported in 50% of females, fetal indications in 46.3%, while unreliable indications were shown in 3.7%. There were 22.5% of females in labor upon examination, table (2). The lower segment CS was performed in 96.3% of females as stated by the surgeons while as noticed by the observer, lower segment CS was performed in 75% of females. In addition, upper segment CS was performed in 3.8% of females as stated by the surgeons, while the observer noticed that the upper segment CS was performed in 25% of female. Dissection peritoneal reflection was performed in 27.5% of females. Transverse uterine incision and double layer closure were performed in all females except one. Extension of incision was performed in 1 female only. Peritoneal closure visceral was performed in 51.2% of females, while peritoneal closure parietal was performed in 65% of females, table (3).

Sparing endometrium during suturing was performed in 1 female only as decided by the surgeon and the observer. The only case which was closed by using single layer closure was 18 years old, pregnant ± 36 weeks, twin (cephalic-breech), patient was not in labour with closed cervix during CS. Level of experience of main surgeon > 3 years and there was agreement between main surgeon and observer about site of incision and transverse incision at lower segment. It was smooth caesarean with no intraoperative complications. Closure of both visceral and parietal peritoneum. The niche depth was 1.69 cm, niche width was 1.2 cm, site of niche (distance between niche and internal os was nearly zero), the shape was triangular. The RMT was 0.4 cm (figure, 2), the mean RMT-OS was 0.3 cm, the distance proximal incision was 1.7 cm, the distance distal incision was 1.9 cm, the distance incision uterovesical fold (UVF) of peritoneum was 1.27 cm, the length of uterus was 8.26 cm, the uterine width was 4.3 cm, the cervical length was 3 cm and the cervical width was 2 cm, table (3).

The mean amount of blood loss was 351.25 ± 76.30 ml. Complications were reported in 5% of cases. The mean preoperative and postoperative hemoglobin level were 11.28 ± 1.08 gm/dl and 10.96 ± 1.14 gm/dl, respectively. There was a decrease in the postoperative hemoglobin as compared to the preoperative values, but this decrease didn't achieve a statistically significant difference. The mean preoperative and postoperative hematocrit level were 35.13 ± 3.22 % and 34.41 ± 3.52 %, respectively. There was a decrease in the postoperative hematocrit as compared to the preoperative values, but this decrease didn't achieve a statistically significant difference, table (3).

The mean niche depth was 1.16 ± 0.46 cm. The mean niche width was 1.48 ± 1.17 cm. The mean site (From incision to internal os) was 0.21 ± 0.43 cm. The mean RMT was 0.84 ± 0.55 cm. The mean RMT-OS was 1.8 ± 1.82 cm. The mean distance proximal to incision was 1.97 ± 0.56 cm. The mean distance distal to incision was 1.9 ± 1.05 cm. The mean length of uterus was 8.43 ± 1.67 cm. The mean width of uterus was 4.88 ± 1.40 cm. The mean cervical length was 3.10 ± 0.47 cm. The mean of cervical width was 2.61 ± 0.41 cm. Triangular shape was more prevalent in 72.5% of females, circular shape (17.5 %), oval shape and polygonal shape were detected in 5 %, each, table (4).

No significant difference between level of experience of main surgeon and RMT < 1 cm ($p = 0.123$), site of niche ($p = 0.163$) or shape of niche ($p = 0.198$) was observed, table (5).

No significant difference was observed between closure of visceral peritoneum and RMT ($p = 0.352$) or closure of parietal peritoneum and

RMT (p = 0.346). Additionally, no statistically significant difference was found between state of labour and RMT (p = 0.797). table (6).

Discussion

The existence of a uterine niche, which is defined as any uterine dimpling 2 mm or more at the cesarean scar site that could be observed by ultrasound, specially with increase of CS [13]. There is little data connecting the existence of CS scar abnormalities on US scan to the function of the uterus during a subsequent pregnancy, yet they may be clinically significant. It is crucial to distinguish between uterine scar dehiscence and a full rupture of the uterine wall. Whereas the former presents a significant risk to both the mother and the fetus, the latter is not linked to a significant risk for either [14].

We evaluated the scar 6 weeks after CS. At that point, the scar is always discernible. At 6 weeks postpartum, the uterus has not fully involute, and scar healing at the uterotomy incision is still in progress.

It has been reported that cesarean scar defect (CSD) presence does not change from 6 weeks to 1 year; however, the scar shape may change owing to maturation [15]. TVUS allowed the CS scar to be seen in all women. In 26.8% of the instances, a fully healed hysterotomy scar was found; in the other patients (73.2%), the scar niche (a hypoechoic triangle) was visible [16].

Previously, non-reassuring fetal heart rate tracings (NFHRT) (40%), labor arrest (31%), and maternal request (11%) are the three primary indicators for CS. In 10% of all CDs, multiple gestations and possible macrosomia were detected. Of the women with CS, only 1% had pre-eclampsia [17]. The most common reason for CS (59.5%) was found to be maternal illness and fetal problems; labor troubles came in second (27.8%). Gestational diabetes and gestational hypertension were examples of maternal diseases.

A transverse lower cut made on the uterine muscle is the most common technique for carrying out a CS [18]. Better healing of the uterine scar is suggested by the double-layer with unlocked first-layer omitting the decidua approach, which was linked to larger myometrium thickness overall, myometrium thickness remaining, and healing ratio [19]. Additionally, according to the conclusions of other scientists, this approach can potentially result in a decrease in severe obstetric issues related to scar tissue [20].

AbdelMooty et al. [21] showed that niche prevalence was 84% of participants. 71% had a triangular niche (which was in accordance to our findings), 26% a semicircular niche, and 3% a droplet niche.

The niche and RMT measurements in previous researches were different, for example, the median RMT was 8 mm, the median niche depth 7.2 mm, the median niche width was 10.4 mm according to Glavind et al. [22]. Moreover, the mean niche depth was 3.3 mm after double-layer closure [23]. The mean height and base of the niche in the primary CS group was 4.63 mm and 6.05 mm, respectively and the mean RMT was 8.16 mm [24]. The differences could be explained due to variations in sample size, different inclusion criteria (primary CS or repeated CS) and the timing of ultrasound assessment post-delivery.

In this study, we didn't find significant difference between level of experience of main surgeon and RMT, site of niche (from incision to internal os) or shape of the niche.

Similarly, in previous studies, no significant relationship between RMT and surgeon's experience (resident vs specialist) was observed [6, 25]. Other researchers came to the conclusion that surgical experience considered a risk factor for the creation of a niche, and that a surgeon with higher experience (a gynecologist as opposed to a trainee) may be more likely to develop a niche due to inadequate approximation and

tissue handling which was different from our results [26].

Our findings showed that no significant variance between closure of visceral & parietal peritoneum and RMT. In the literatures, the double-layer uterine closure is associated with a greater RMT and healing ratio, suggesting that this technique is associated with better uterine scar healing [18]. According to certain theories, the uterine niche's growth and the ensuing negative consequences connected to CS may be related to the uterine incision closure procedure [27]. It was suggested that the surgical have an impact on the RMT and uterine scar healing. Nevertheless, there isn't a recommendation supported by evidence for the closure procedure, and it is unclear which approach to use for uterine closure [28]. According to earlier research, double-layer closure had a thicker RM and a reduced incidence of major defects. But there is still no conclusive analysis about other clinical outcomes [29].

Earlier research evaluating the CS scar shape in connection to the stage of labor, cervical dilatation, and station of the presenting fetal portion was prognostic of the formation of large niches, with RMT $\leq$ 2.2 mm, which was dissimilar to our findings. It's interesting to note that as cervical dilatation increased, so did the proportion of women with huge niches. 50% of the women with large niches experienced cervical dilatation of more than 8 cm [30]. In addition, in other study, compared to women without cervical dilatation and women in the first stage of labor, the mean RMT value was considerably lower in women who had the CS performed in the second stage of labor [31]. RMT value was significantly lower in women who had the CS performed in the second stage of labor [32]. These variations could be a result of various study designs.

The authors can specify that the primary limitations of this study are limited number of samples and incorporating the instances from a single facility as the latter couldn't reflect the variation in the surgeon preferences. Also, the follow up at a single time point could decrease the power of the results. The study also is a single arm study which couldn't provide efficient comparison of the obtained results.

Conclusion

Caesarean section scar in women after 6 weeks from primary CS assessed by using 2D-TVUS was not impacted by the location of the incision, the experience of the surgeon, the closure of the visceral or parietal peritoneum, or the stage of labor at the time of the C-section.

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Tables' legend:

Table (1): Demographic and basic data in the study participants.

Variables		Study cases (n= 80)
Age (years)	Mean ± SD	24.63 ± 6.23
	Median (min-max)	23 (17 - 42)
GA (years)	Mean ± SD	37.21 ± 2.50
	Median (min-max)	38 (29 - 42)
Gravidities	Median (min-max)	1 (1 - 6)
Parities	Median (min-max)	2 (0 - 4)
Abortion	Median (min-max)	1 (0 - 4)
Still-birth	Median (min-max)	1
Presentation		**Number (%)**
Breech		16 (20%)
Cephalic		55 (68.75%)
Multiple pregnancy		9 (11.25%)
Medical history		
DM		2 (2.5%)
HTN		16 (20%)
Preeclampsia		6 (7.5%)
PPH		0 (0%)
BA		1(1.3%)
DVT		2 (2.5%)
HCV		1 (1.3%)
Hyperthyroidism		1 (1.3%)
MVR + AR		1 (1.3%)
Surgical history		
MVA		3 (3.8%)
Hysteroscope		1 (1.3%)
Myomectomy		1 (1.3%)
Ovarian cystectomy		2 (2.5%)

Cont inuous data expressed as mean ±SD and median (range). Categorical data expressed as Number (%).

NB: Preterm, Ectopic/VM and Early neonatal death were not reported in the cases.

Abbreviations: BA: Bronchial asthma; DM: Diabetes mellitus; DVT: Deep vein thrombosis; GA: Gestational age; HCV: Hepatitis C virus; HTN: Hypertension; PPH: Postpartum haemorrhage; MVA: Manual vacuum aspiration; MVR: Mitral valve replacement; AR: Aortic regurgitation.

Table (2): Indications for CS and state of labor in the study participants.

Variables	Study cases (n= 80) Number (%)
Indication for CS	
Maternal	40 (50%)
Fetal	37 (46.3%)
Unreliable indications	3 (3.7%)
Patient in labour	
No	62 (77.5%)
Yes	18 (22.5%)

Categorical data expressed as Number (%).

Abbreviations: CS: Cesarean section.

Table (3): Operative details of the study cases.

Variables	Study cases (n= 80) Number (%)
Incision by surgeon	
Lower segment	77 (96.3%)
Upper segment	3 (3.8%)
Incision noticed by observer	
Lower segment	60 (75%)
Upper segment	20 (25%)
Dissection peritoneal reflection	
No	58 (72.5%)
Yes	22 (27.5%)
Uterine incision	
Transverse	80 (100%)
Extension	
No	79 (98.8%)
Yes	1 (1.2%)
Closure	
Double	80 (100%)
Peritoneal closure visceral	
No	39 (48.8%)
Yes	41 (51.2%)

Peritoneal closure parietal			
No		28 (35%)	
Yes		52 (65%)	
First layer surgeon			
Full thickness		79 (98.8%)	
Spare endometrium		1 (1.2%)	
First layer observer			
Full thickness		79 (98.8%)	
Spare endometrium		1 (1.2%)	
Blood loss (ml)	Mean ± SD	351.25 ± 76.30	
	Median (min-max)	325 (250 - 550)	
Items	Preoperative (n= 80)	Postoperative (n= 80)	Test of significance
Hemoglobin (gm/dl)	11.28 ± 1.08	10.96 ± 1.14	t = 1.814 P= 0.176
Hematocrit (%)	35.13 ± 3.22	34.41 ± 3.52	t = 2.260 P= 0.082
Complications			
No		76 (95%)	
Yes		4 (5%)	

t: Paired samples t-test
Continuous data expressed as mean ±SD and median (range)
Categorical data expressed as Number (%)
NB 1: Complications were in form of uterine injury.

Table (4): Ultrasonographic data in the study cases.

Variables		Study cases n= 80
Niche depth (cm)	Mean ± SD	1.16 ± 0.46
	Median (min-max)	1.17 (0 – 2.3)
Niche width (cm)	Mean ± SD	1.48 ± 1.17
	Median (min-max)	1.21 (0.29 – 8)
Site (From incision to internal os) (cm)	Mean ± SD	0.21 ± 0.43
	Median (min-max)	0 (0 – 1.48)
RMT (cm)	Mean ± SD	0.84 ± 0.55
	Median (min-max)	0.76 (0 – 3.7)
RMT – OS (cm)	Mean ± SD	1.8 ± 1.82
	Median (min-max)	1.75 (0 – 12)
Distance proximal to incision (cm)	Mean ± SD	1.97 ± 0.56
	Median (min-max)	1.97 (0.71 – 3.31)
Distance distal to incision (cm)	Mean ± SD	1.9 ± 1.05
	Median (min-max)	1.7 (1.1 – 7.9)
Uterine length (cm)	Mean ± SD	8.43 ± 1.67
	Median (min-max)	8.65 (3.65 – 11.25)

Uterine width (cm)	Mean ± SD	4.88 ± 1.40
	Median (min-max)	4.57 (3.24 – 11.9)
Cervical length (cm)	Mean ± SD	3.10 ± 0.47
	Median (min-max)	3 (2.28 – 4.06)
Cervical width (cm)	Mean ± SD	2.61 ± 0.41
	Median (min-max)	2.58 (1.95 – 3.73)
	Number (%)	
Shape of niche		
Circular	14 (17.5%)	
Oval	4 (5%)	
Polygonal	4 (5%)	
Triangular	58 (72.5%)	

Continuous data expressed as mean ±SD and median (range).

Categorical data expressed as Number (%).

Abbreviations: RMT: Residual myometrial thickness measured from measured from the serosa covering the uterus to the niche apex.

Table (5): Relation between level of experience of main surgeon and RMT, site of niche (from incision to internal os) and shape of the niche.

Experience	**More than 1year** [N=16]	**More than 2 years** [N=39]	**More than 3 years** [N=19]	**More than 5 years** [N=6]	**Test of Sign.**
RMT					
RMT < 1 cm	11 (68.8%)	30 (76.9%)	18 (94.7%)	6 (100%)	MC = 5.773 P = 0.123
RMT ≥ 1 cm	5 (31.2%)	9 (23.1%)	1 (5.3%)	0 (0%)	
Site of niche (from incision to internal os)	0 (0 – 1.48)	0 (0 – 1.4)	0 (0 – 1.48)	0 (0 – 0.4)	KW = 5.126 P = 0.163
Shape of the niche					
Triangular	9 (56.3%)	30 (76.9%)	15 (78.9%)	44 (66.7%)	MC = 12.278 P = 0.198
Circular	2 (12.5%)	7 (17.9%)	3 (15.8%)	2 (33.3%)	
Oval	2 (12.5%)	1 (2.6%)	1 (5.3%)	0 (0%)	
Polygonal	3 (18.8%)	1 (2.6%)	0 (0%)	0 (0%)	

MC: Montecarlo test; KW: Kruskal Wallis: RMT: Residual myometrial thickness.

*: Statistically significant ($p < 0.05$).

Note: Experience > 1 year: mid senior resident; > 2 years: senior resident; > 3 years: level of assistant lecturer; > 5 years: level of consultant.

Table (6): Relation between closure of peritoneum & state of labor with RMT.

Visceral peritoneum	**Not closed** [N=39]	**Closed** [N=41]	**Test of Sign.**
RMT < 1 cm	31 (79.5%)	34 (82.9%)	$\chi^2 = 0.203$ P = 0.352
RMT ≥ 1 cm	8 (20.5%)	7 (17.1%)	
Parietal peritoneum	**Not closed** [N=28]	**Closed** [N=52]	**Test of Sign.**
RMT < 1 cm	22 (78.6%)	43 (82.7%)	$\chi^2 = 0.212$ P = 0.346
RMT ≥ 1 cm	6 (21.4%)	9 (17.3%)	
RMT	**Not in labor** [N=62]	**In labor** [N=18]	**Test of Sign.**
RMT < 1 cm	50 (80.6%)	15 (83.3%)	FET = 0.066 P = 0.797
RMT ≥ 1 cm	12 (19.4%)	3 (16.7%)	

χ^2: Chi square test
FET: Fisher's exact test
RMT: Residual myometrial thickness

Figures' legend:

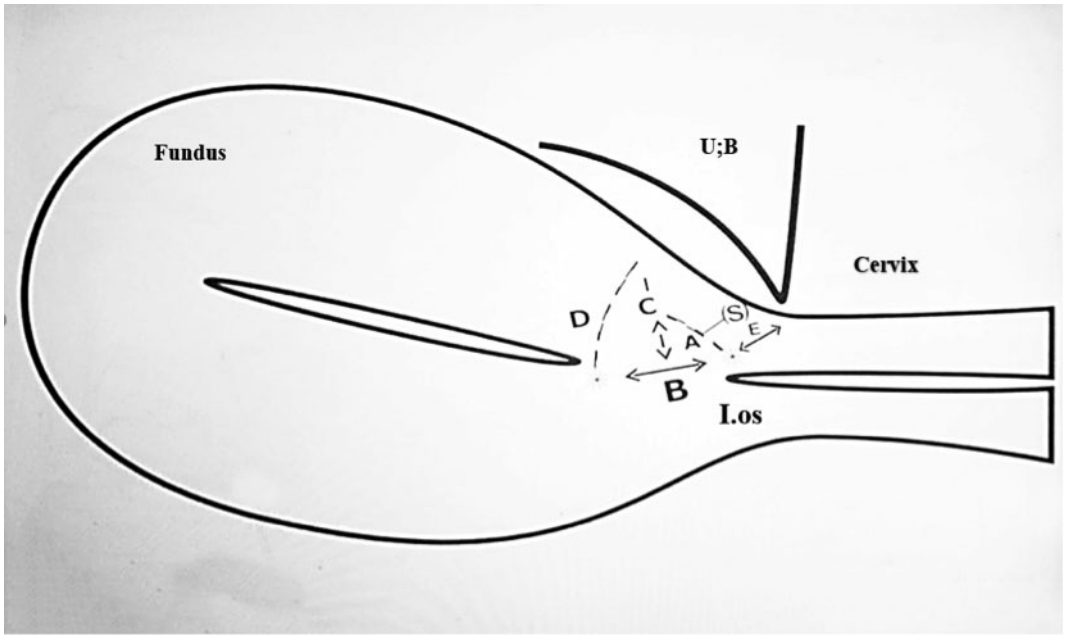

Figure (1): Transvaginal-2d- ultrasound six weeks post-partum

1- Niche (A) Depth (B) Width.
2- RMT(c) (Distance between RMT & I. OS).
3- Depth of myometrium proximal to incision (D).
4- Depth of myometrium distal to incision (S).
5- Distance between I. OS & UV fold of peritoneum (E).

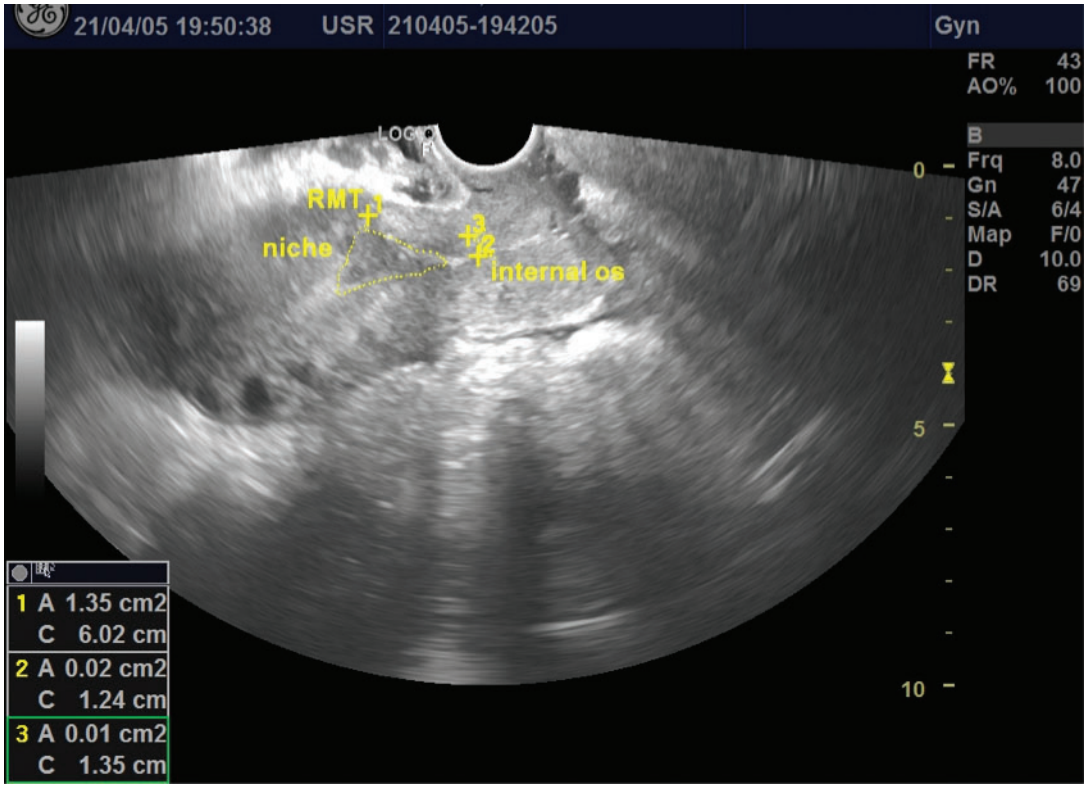

Figure (2): Triangular shaped niche at the level of internal os, AVF uterus 2D-TVUS in sagittal plane.