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Risk of Scar Dehiscence in Women with Previous Cesarean Section on Ultrasonography

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ABSTRACT

Purpose To estimate the risk of uterine dehiscence / rupture in women with previous cesarean section (CS) by comparing the thickness of lower uterine segment (LUS) and myometrium with Transabdominal (TAS) and Transvaginal sonography (TVS).

Methods In This Case - Control study in 100 pregnant women posted for elective CS (with or without previous; Group 1 and Group 2 respectively), the thickness of LUS and myometrium was measures sonographically (TAS and TVS).

Intra-operatively, LUS was graded (Grade I-IV) and its thickness was measured with calipers. The primary outcome of the study was correlative between ecgographic measurements (TAS and TVS) and features of LUS (Grades I-IV) at the time of CS. Secondary outcomes were correlation between myometrial thickness, number of previous CS, and inter-delivery interval with LUS (Grades I-IV).

Results Sonographic measurements of LUS and myometrium were significantly different between the two groups (both TAS and TVS p-value=0.000 each). However, the number of CS (p=0.440) and inter-delivery interval (p=0.062) had no statistical significant correlation with thickness of LUS.

Conclusion Sonographic evaluation of LUS scar and myometrial thickness (both with TAS and TVS) is a safe, reliable and non-invasive method for predicting the risk of scar dehiscence/rupture. Specific guidelines for TOLAC, after sonographic assessment of women with previous CS, are need of hour.

KEYWORDS

Transabdominal Ultrasonography; Transvaginal Ultrasonography; Cesarean Section; Pregnancy; Cesarean Scar.

INTRODUCTION

Cesarean section (CS) rates are increasing worldwide [1-3]. As a result, women presenting with previous CS are also rising. Previous CS is becoming the most common indication for CS [1], confirming the age old dictum proposed by Edward Raigin in 1914 “Once a cesarean always a cesarean”.

Although the absolute risk of uterine dehiscence/rupture in lower segment CS is very low (0.2-1.5%) [4], the unpredictable nature of this complication and its grave consequences for both mother and baby has resulted in decreased rates of trial by labour after CS (TOLAC) in many countries [5].

Ultrasound estimation of lower uterine segment A (LUS) provides a fairly simple and non-invasive method for prediction of scar dehiscence/rupture. The successful outcome of TOLAC depends on scar of previous CS, which is directly related to its thickness [6]. Evaluation of thickness of LUS has been found to be a potential factor for predicting scar dehiscence [7]. The risk of scar dehiscence/rupture has been directly related to the thinning of LUS [8]. However there is controversy over thickness of LUS above which TOLAC can be offered safely [6, 8-10]. Also, Asakura et al. have proposed myometrial thick-

ness as an alternative to LUS thickness for predicting the risk of scar dehiscence/rupture [11].

Hence the present study was planned to estimate the risk of scar dehiscence/rupture by ultrasound (TAS and TVS), to determine the correlation between LUS thickness measured during surgery and to predict an optimal thickness of LUS and myometrium above which women can be safely offered TOLAC.

MATERIALS AND METHODS

We conducted an observational study for estimating the risk of scar dehiscence/rupture by sonographic evaluation (TAS and TVS) in women with previous CS. This study was conducted in the department of Obstetrics and Gynaecology in close collaboration with the department of Radio diagnosis of SHKM Medical College, Mewat. The recruitment took place from January, 2016 to April, 2016 in medical college after obtaining an informed written consent from each and every female.

All women posted for elective CS were approached for enrollment. Women were eligible and included if they had singleton pregnancy between 36 and 41 weeks of period of gestation and were planned for elective CS. Exclusion criteria were active labour, multiple pregnancy, low dying placenta, leiomyoma of LUS of uterus, previous classical cesarean section/hysterectomy, previous uterine surgery other than CS (myomectomy, hysterotomy, polypectomy, lysis of uterine synechiae, hysteroscopic metroplasty).

Written informed consent was obtained from all the participating women. Previous records were reviewed regarding type of uterine incision and single versus double layered uterine closure. Subsequently, women were divided into two groups. Group-1 consisted of women with atleast previous one CS (previous low segment CS with double layered closure; with or without previous previous vaginal delivery) and group-2 included women with no previous scar and up to three normal vaginal deliveries (posted for elective CS in this pregnancy as per obstetrical indication).

All these women underwent ultrasound evaluation of LUS one day prior to scheduled surgery. All the sonographic measurements were done by some skilled sonologists. Examinations were performed with a scanner (GE logic P5, GE healthcare) consisting of a trans-abdominal convex array transducer with a frequency of 3MHz and a trans-vaginal probe with a frequency of 8 MHz. The thickness of LUS and of its myometrial component was assessed by a sonogram perpendicular to the uterine wall, according to the technique proposed by Jastraw et al. [9]. To measure thickness of LUS, a cursor was positioned at the interface between the uterine and the bladder wall and another curor between the amniotic fluid and the decidua [9]. The myometrial thickness was measured with the cursor at the interface of the bladder wall and the myometrium so that it included only the hypoechogenic layer. Three different values of LUS and myometrial thickness were taken, and the lowest vale of these was considered as the actual thickness. To optimize the measurement of LUS, the distension of the bladder was done by a standardized procedure according to Bujold et al. [12]. Women were instructed to empty their bladder and then drink 300ml of water 1hr before the examination. If during the ultrasound examination uterine contraction was observed, the examination was topped and resumed after the contraction had subsided. Sonography was also done from the lateral aspect of LUS to detect any symptomatic dehiscence. Any funneling, ballooning, or wedge defect was noted. Age, parity, gestational age and neonatal birth weight were assessed for all women.

At the opening of the abdominal wall during CS, surgeon made an objective evaluation of the integrity and thickness of the LUS, as described by Qureshi et al. [13]. The LUS was graded as follows: Grade I (LUS was well developed), Grade II (LUS was thin without visible content), Grade III (LUS was translucent with visible content), and Grade IV (LUS had well circumscribed defects, either dehiscence or rupture). All the surgeries were performed by one surgeon (C.D) to rule out the inter-observer variation in the assessment of LUS. The operating surgeon was blinded to the sonographic evaluation of the LUS and myometrium.

LUS was identified as the part of the uterus below the loose reflection of the vesico-uterine serosa. After the delivery of neonate, two Green-Armytage forceps were used to hold the lower flap of the uterine incision about 2 inches apart on either side of the midline. The flat upper end of a grasping forceps was placed on the inner aspect of LUS between the two Green-Armytage forceps to demascatethe inner surface of the LUS. A sterile caliper was placed on the lower flap of the incision at a right angle to the surface of grasping forceps and the measurement was taken at three different places, 1cm apart each and the lower value was taken as the thickness of the LUS.

Based on the previous studies [13-16], a sample size of 34 women in each group was required to compare the difference in mean LUS thickness for an α of 0.05 and a power of 0.80 with an anticipated SD of 0.8mm. Considering 10% rate of spontaneous labour before surgery and any lost follow up, a total of 50 women were selected in each group.

Statistical analysis was performed by SPSS 17 software for windows, using parametric and non-parametric when appropriate. The normality of the distribution was assessed by the Kolmogorov-Smirnov test. Continuous data was analyzed

with a t-test and categorical variables were analyzed with the Fischer's exact test, when appropriate. P<0.05 was considered statistically significant. Receiver operating characteristic (ROC) curve was assessed for the thickness of LUS and myometrium by TAS and TVS in women in Group 1. Group 1 was further evaluated for estimating the correlation between the myometrial thickness, number of previous CS and intra-delivery interval with LUS (Grades I-IV). Further, the correlation of TAS and TVS with actual thickness of LUS was also determined.

RESULTS

107 women were eligible for inclusion in the study. 3 women in the group-1 and IV women in the group-2 went into spontaneous labour before elective CS and as per study protocol were excluded from the study. So, there were 50 women in each group. As shown in (Table 1), there was no significant difference in the parity (abortion or previous vaginal delivery), gestational age, neonatal birth weight or sex of the neonate in the either group. However, there was significant difference in the maternal age. 27.6 ± 2.77 versus 25.1 ± 4.01 years (mean ± SD; p=0.000) and indication for CS (0.000) in two groups. In group-1, 76% women had previous two cesarean sections (n=10) and 4% (2) had both previous CS and vaginal delivery.

Table 1: Demographic Characteristics of Women in Study.

Feature		Group 1(n=50)	Group 2(n=50)	p-value
Maternal age (in years)		27.6±2.77	25.1±4.01	0.000
Parity	Abortion	08	05	0.372
	Previous Vaginal delivery	2	4	0.185
	Gestational agea (in weeks)	39±0.87	39.5±0.13	0.076
Indications For LSCS	Cephalopelvic disproportion	23	09	0.000
	Previous two LSCS	10	00	
	Early conception	07	00	
	Malpresentation	10	41	
Birth weighta (in kg)		3.04±0.34	2.89±0.59	0.127
Sex of baby	Boy	27	32	
	Girl	23	18	

a = Mean ± Standard deviation.

As shown in the (Table 2), there were 14% (n=7), women with early conception (<18 months of inter-delivery interval), 10% (n=5) had inter-delivery interval of 18-24 months, 20% (n=10) had interval of 25-36 months and 56% (n=28) had more than 36 months of inter-delivery interval in group-1. We did not correlated the effect of maternal age on grades of LUS as maternal age was significantly different in two groups (p=0.000) and none of the women in group-2 had abnormal grades of LUS (II-IV).

In group-1, 80% (n=40) women had previous one CS and 20% (n=10) had previous two CS. In group-2, 82% (n=41) women were primigravida, 2% (n=1) had previous one vaginal delivery, 6% (n=3) had two previous vaginal deliveries and remaining 10% (n=5) had abortions (n=4; one abortion, n=1; two abortions) prior to this pregnancy.

Table2: Inter-delivery interval from last CS in group1 and correlation with intra-operative grades II, III & IV of LUS.

Inter-delivery interval (in months)	No. of women	Grade II	Grade III	Grade IV
<18	07	0	1	1
18-24	05	5	1	1
25-36	10	4	0	0
>36	28	2	0	0

As shown in (Table 3), all women in group 2 had grade-I LUS as observed intra-operatively. However, in group-1, 35 women had grade-I, 11 women had grade-II and 2 women each had grade-III & IV (p=0.001). None of the women had any funnelling, ballooning or wedge defect in the cesarean scar.

Table 3: Intra-operative grades of LUS.

	Grade I	Grade II	Grade III	Grade IV	p-value
Group 1	35	11	02	02	0.001
Group 2	50	00	00	00	

The thickness of LUS and myometrium as measured by TAS and TVS was significantly different (p=0.000) in group 1 and 2 respectively [TAS LUS: 3.96±0.88 and 4.80± 1.08 mm, and TVSLUS: 4.0±0.82 and 4.93±1.16 mm, TAS myometrium 2.08±0.53 and 2.72±0.70 mm respectively (mean±SD)] as shown in (Table 4).

Table 4: Difference between mean thickness values of LUS and myometrial thickness by TAS & TVS.

			Mean + standard deviation	Mean difference	p-value
TAS	Total LUS Thickness	Group 1	3.96±0.88	0.84	0.000
		Group 2	4.80±1.08-		
	Total Myometrial Thickness	Group 1	2.11±0.42	0.51	0.000
		Group 2	2.62±0.66		
TVS	Total LUS Thickness	Group 1	4.06±0.82	0.87	0.000

There was a significant correlation (p=0.000) between LUS and myometrial thickness by TAS and TVS in women of group-1 with surgical LUS grade I & II with those of grade III & IV as shown in table 5. Furthermore, there was no significant correlation between no. of previous CS with surgical LUS grade I & II and grade III & IV, in group-I (p=0.440).

DISCUSSION

TOLAC is a responsible option in women with previous CS [14]. However the rates of TOLAC are declining due to a common belief that scar dehiscence/rupture cannot be reliably predicted [5]. Estimation of LUS thickness by Sonography appears to have the best potential for predicting scar dehiscence/rupture in women with previous CS.

Many studies have shown that thickness of LUS is directly related to the risk of scar dehiscence/rupture [6, 15]. In our study, thickness of LUS measured by TAS and TVS both had statistically significant difference (p=0.000) in women with LUS grades I & II and III & IV, as shown in table 5. We observed that the LUS thickness < 3.65 mm has 91% sensitivity, 93% specificity and 91% negative predictive value (Table 5) as measured by TAS. Rozenberg et al and Jastow et al had proposed cut-off of 3.5 mm for LUS thickness above which VBAC can be safely offered to women with previous CS [16]. We also observed that in all women with LUS grades III & IV, LUS thickness (as measured by TAS & TVS) was < 3 mm. Hence we propose, 3.65 mm of LUS thickness as measured by TAS to be the safe limit above which VBAC can be safely offered.

Sonographic management of myometrium has been analysed by Asakure et al. [11] and Gizzo et al. [10] We observed statically significant correlation between thickness of myometrium as measured by TAS and TVS (p=0.000) in women with LUS grades I & II and III & IV (as shown in table 5). Thickness of myometrium < 2.15 mm has 57% sensitivity, 93% specificity and 91% negative predictive value (Table 5) as measured by TAS. So, we propose that thickness of myometrium (cut-off 2.15mm) should be used as an adjunct to the LUS thickness for estimating the catastrophic outcome of scar dehiscence/rupture.

As proposed by American college of Obstetrics and Gynaecology [14], women with previous two CS can reasonably be offered TOLAC. In our study, women with previous two CS (in group1) when compared with respect to LUS grades I &II and III & IV between themselves (as shown in Table: 5) had no statically significant difference (p-value=0.440), similar to observation of Gizzo et al. [10].

One of the major detenents for offering TOLAC in women with previous one CS is early conception/short interpregnancy interval [14]. In our study, women with inter-delivery interval less than 18 months (n=7/50), when compared with other women in group 1 with respect to LUS grades II-IV, approached significance (p=0.062). This observation is contrary to the observation of the other investigators [10, 14]. This could be probably due to less no of women (n=7) with short inter-delivery interval in group 1.

Our study further confirms the available evidence regarding the usefulness and efficacy of sonographic evaluation of LUS and myometrium for safely predicting the outcome of TOLAC. Also it reaffirms the view of ACOG regarding TOLAC in women with previous two CS, as the benefits of successful outcome of TOLAC in terms of maternal and neonatal benefits is well documented. Although the correlation between inter-delivery interval and grades of LUS (II-IV) approached significance (p=0.062), it was not statically significant probably due to less no. of women (n=7).

A definitive technique for use of ultrasound for measurement of LUS and myometrium needs to be standardized(as per Jastrow et al.[9], filling of urinary bladder before sonography(Bujold et al[12]), and grades of LUS (Qureshi et al [13]) and training module for obtetricians and sonologists should be offered for assessments of LUS and myometrium.

CONCLUSION

Observations of present study collaborate the fact that sonographic measurement of thickness of LUS and myometrium is an excellent method for safely predicting the risk of scar dehiscence/rupture in women with previous CS. With different cut off for critical values of thickness of LUS and myometrium in different studies [8-11], specific guidelines regarding the measurement technique of LUS by TAS and TVS, critical thickness of LUS and myometrium for evaluation of LUS is need of the hour to save many pregnant women and babies from significant morbidity and mortality.

REFERENCES

1. Chanrachakul B, Herabutya Y and Udomsubpayakulu. (2000). Epidemic of cesarean Section at the general, private and university hospitals in Thiland. J obstet Gynecol Res. 26(5): 357-361.
2. Villar J, Valladares E, Wojdyla D, Zavaleta N, et al. (2006). Cesarean delivery rates and pregnancy outcomes: the 2005 world global survey on maternal and perinatal health in Latin America. Lancet. 367(9525): 1819-1829.
3. Devendra K and Arul kumaran S. (2003). Should doctors perform an elective cesarean section on repeat? Ann Acad Med Singap. 32(5): 577-581.
4. Chebing VY, Constantinescu OC and Ahluwalia BS. (2004). Sonographic evaluation of the uterine segment in patients with previous cesarean delivery. J ultrasound Med. 23(11): 1441-1447.
5. Yeh J, Wactawski-Wende J, Shelton JA and Reschke J. (2006). Temporal trends in the rates of trial of labour in low risk pregnancies and their impact on the rates and success of vaginal birth after cesarean delivery. Am J obstet Gynecol. 194(1): 144.

6. Sen S, Malik S and Sahan S. (2004).Ultrasonographic evaluation of lower uterine segment thickness in patients of previous cesarean section. Int J Gynecol Obstet. 87(3): 215-219.
7. Ofili-Yebovi D, Ben-Nagi J, Sawyer E, Yazbek J, et al. (2008). Deficient lower-segment cesarean section scars: prevalence and risk factors. Ultrasound Obstet Gynecol. 31(1): 72-77.
8. Rozenberg P, Goffinet F, Phillippe HJ and Nisand I. (1996). Ultrasonographic measurement of lower uterine segment to assess risk of defects of scarred uterus. Lancet.347: 281-284.
9. Jastrow N, Chaillet N, Roberg S, Morency AM,et al. (2010). Sonographic lower uterine segment thickness and risk of uterine scar defect: a systematic review. J Obstet Gynaecol Can.32: 321-327.
10. Gizzo S, Zambon A, Saccardi C, Patrelli TS, et al.(2013). Effective anatomical and functional status of the lower uterine segment at term: estimating the risk of uterine dehiscence by ultrasound. Fertil. Steril. 99(2): 496-501.
11. Asakura H, Nakai A, Ishikawa G, Suzuki S, et al. (2000).Prediction of uterine dehiscence by measuring lower uterine segment thickness prior to the onset of labor: evaluation by transvaginal ultrasonography. J Nippon Med Sch. 67(5): 352-356.
12. Bujold E, Jastrow N, Simoneau J, Brunet S, et al. (2009). Prediction of complete uterine rupture by sonographic evaluation of lower uterine segment. Am J Obstet Gynecol. 201(3): 320.
13. Qureshi B, Inafuku K, Oshima K, Masamoto H, et al. (1997).Uultrasonographic evaluation of lower uterine segment to predict the intensity and quality of cesarean scar during pregnancy: a prospective study. Tohoker J Exp Med.183(1): 55-65.
14. American college of obstetricians and Gynecologists. (2010). ACOG practice bulletin no 115: vaginal birth after previous cesarean delivery. Obstet Gynecol. 116(2): 450-463.
15. Chung VY. (2005).Sonographic measurement of the lower uterine segment thickness in women with previous cesarean section. J Obstet Gynaecol Can. 27(7): 674-681.
16. Jastrow N, Antonelli E, Robyr R, O.Irion, et al. (2006). Inter and intra observer variability in sonographic measurement of lower uterine segment after a previous cesarean section. Ultrasound Obstet Gynecol. 27(4): 420-424.