Correlations between Sonographically Measured Lower Segment Scar Thickness and Actual Incision Site Scar Status after Repeated Caesarean Section.

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ABSTRACT

OBJECTIVE: To verify the sonographically measured thickness of the lower uterine segment caesarean-section (LUS-CS) scar with incision site scar status in women undergoing repeated caesarean section to predict any obstetrical complication.

STUDY DESIGN: A cross sectional observational study.

PLACE AND DURATION: From 1st January 2016 to 30th June 2016. Department of Obstetrics & Gynecology of Zaiuddin University Hospital, Kemari Campus, Karachi

METHODOLOGY: 208 patients with previous caesarean section were selected in whom Lower Uterine Segment (LUS) was measured by abdominal ultrasound scan from 36 to 38 weeks. The scar was observed visually while performing caeserian section after measuring by ultrasound and was categorized into five groups i.e Normal, Thin, Very thin, Translucent and Scar dehiscence, to find the association between scar thickness measured sonographically and visually found scar status. Also factors were observed which influence the integrity of the caesarean section scar such as parity, BMI, previous vaginal deliveries, interval between the previous and present caesarean section, and whether the present Caesarean section was done in emergency or as an elective procedure.

RESULTS: Significant association was found between the Lower uterine segment measurements by trans-abdominal ultrasound during pregnancy and the status of scar at the time of delivery. 42.8% were found thin, 35.1% very thin, 7.7% translucent, 6.3% dehiscence and 8.2% were found normal. No significant association was found between the status of scar with parity, BMI and labour at previous caesarean section. Dehiscence was reported in 10.4% of women having a below average scar thickness in comparison to 3.9 % of women having an above average thickness.

CONCLUSION: Sonographic LUS thickness is a strong predictor for uterine scar defect in women with prior Caesarean section. The ultrasonic measurement of thickness of the LUS (the lower uter ine segment) has a practical application in the decision on the mode of deliveries in women who had previously given birth by Caesarean section.

KEYWORDS: Caesarean Section, Lower uterine segment Thickness, Caesarean scar. Third trimester, Pregnancy.

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INTRODUCTION

There is rise in the Caesarean section rates throughout world [1] due to which obstetrician were seeing more women with a Caesarean section scar. Incomplete and poor healing of a scar is a known complication of Caesarean Section and can lead to problems in subsequent pregnancy such as the risk of scar pregnancy, a morbidly adherent placenta, scar dehiscence, or uterine rupture[2]. To know whether the previous scar is defective or not is difficult to assess and this uncertainty lead to more Caesarean sections. With the improvement in the ultrasound technology it is possible to evaluate the previous caesarean section scar and measure the thickness of lower uterine segment. There are various methods to correlate measurement of the LUS with the risk of uterine rupture or dehiscence, either the full thickness of lower uterine segment is measured or only the muscular layer was measured using a trans-vaginal approach. Measurement of lower uterine segment thickness at term in women with previous Caesarean section is suggested as a method to assess the integrity of previous Caesarean section scar. The thickness of lower segment is correlated inversely with scar defect. It is said to be a fairly simple and non-invasive method to predict the scar dehiscence and rupture[3]

The status of scar at the time of delivery will foretell which women are good candidates for the trial of scar and can have a normal vaginal delivery[4] and which women are at risk of scar dehiscence and scar rupture. The thinner the lower uterine segment scars the more likely chances of the scar dehiscence and its rupture at the time of delivery[5]

The primary outcome of our study is to find a correlation between echo graphic measurements and features or the

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physical appearance of the Lower Uterine Segment at the time of CS. (grades I-V) The secondary outcome is to determine the correlation between different obstetrics factors such as the parity, BMI, number of previous Caesarean Section, inter delivery interval time, previous normal vaginal deliveries, labor at previous delivery and the LUS thickness.

We conducted this study to verify the sonographically measured thickness of the lower uterine segment caesarean-section (LUS-CS) scar with incision site scar status in women undergoing repeated caesarean section to predict any obstetrical complication".

METHODOLOGY

This cross sectional study carried out in the Department of Obstetrics and Gynecology Ziauddin University Hospital Kemari campus from 1st January 2016 to 30 June 2016, over a period of six months.

Two hundred and eight women with one or more than one previous Cesarean section who had an ultrasound measurement of the Lower Uterine Segment thickness measured in the third trimester from 36 to 38 weeks and who underwent either elective or emergency Caesarean section were included in the study. Those women with placenta previa or uterine anomaly were excluded as it is difficult to measure the scar thickness in these women. Patient's demographics characteristics such as age, parity, BMI, Gestational age at the time of examination and at the time of delivery were recorded on a prescribed Performa. Abdominal sonographic assessment of LUS was carried in the third trimester of pregnancy. A standard protocol for evaluating the LUS thickness was developed and single senior designated obstetrician-sonologist performed all the scans to avoid the inter observer differences in the findings. Ultrasound examinations were performed by a single Ultra mark 4 plus ultrasound unit equipped with 3.5 MHz curvilinear array transducer to measure the LUS thickness.

The ultrasound was performed trans-abdominally with full bladder. Lower uterine segment is identified by the ultrasonologist as a two layer structure consists of an echogenic layer which include a bladder wall and a less echogenic layer representing myometrium. All women were followed up to the time of delivery. After the opening of the abdominal cavity the surgeon made an independent assessment of lower uterine segment status and classified into groups as five grades that is normal, thin, very thin, translucent and scar dehiscence.

The scar was considered as normal when the lower segment is developed[6], thin when scar is thinned out but contents not visible, very thin when contents are partially visible, translucent when scar is glossy and contents fully visible, rupture when there is obvious dehiscence. We considered normal looking and thin scar as scar of above average thickness and very thin translucent and scar dehiscence as scar of below average thickens, Sonographic assessment of LUS thickness and any abnormalities if any were noted. The normal or abnormal lower uterine segment thickness (direct observation at surgery and sonographic Impression) at 36 to 38 weeks was looked for association with some of the present and previous obstetric variables which influences the status of the scar at the time of delivery. Some of the variables were obesity, history of previous normal vaginal deliveries, number of previous Caesarean section, whether or not women had labor pain prior to previous Cesarean section, the inter delivery interval less or more than 18 months and whether the present Caesarean section was done as an elective procedure or done in emergency. The research was approved by Clinical review committee and ethical review committee of Zaiuddin University.

Data was analyzed using SPSS version 20. Frequencies and percentages were calculated for categorical variables. For numerical variables mean and standard deviation was calculated. Chi square was used to determine association between different categorical variables P value of .05 was considered significant. Prior permission was taken from all the study participants explaining fully the objective and methodology of the study.

RESULTS

A total of 208 women based on inclusion criteria were included in our study. The mean age, parity and gravidity of study participants were 27.45 + 4.85, 2.27 + 1.43 and 3.36 + 1.604 respectively. The ultra sonographically recorded mean scar thickness was 0.34 + 0.23 mm and mean gestational age at this examination was 35.63+3.54. The descriptive statistics of categorical variables is given in Table - I.

The women were asked that whether they had a prior spontaneous vaginal delivery (SVD), 27.9 % (n = 58) reported yes. Majority i-e 66.3% (n = 138) of the study participants were para 1 or 2, whereas only 2.9 % (n = 6) were grand multipara.

Complications at the time of delivery were seen in only 2.9% (n=6) of the women. Two of the women had ruptured uterus, one had hysterectomy. When means of ultra-sonographically measured scar thickness was compared using ANOVA, a significant difference (p=.01) was found. The mean was highest in women having a visually normal scar at time of delivery i-e .36 + .07. The lowest recorded mean was .26 +.07 in those women who had a translucent scar at the time of delivery in contrast to a higher mean of .29+.07 in women who had scar dehiscence and suffered complications such as rupture and hysterectomy.

Several maternal and obstetrical factors which might have an effect on status of scar at delivery were identified and statistically significant association was found among certain factors and scar status (Table - II). The ultra-sonographically measured thickness of the scar was categorized into two groups of below average and above average thickness and statistically significant association was found on its cross tabulation with scar status at time of delivery (p=.01). Dehiscence was reported in 10.4% (n=11) of women having a below average scar thickness in comparison to 3.9 % (n=4) of women having an above average thickness.

Factors at primary Cesarean operation that significantly influence the status of LUS at term in subsequent pregnancies were identified as interval between the present and last delivery, whether normal vaginal delivery or Caesarean section. The shorter the interval the more likely chances of scar

dehiscence and a very thin and translucent scar. Similarly if the caesarean section is done in emergency the likelihood of finding scar dehiscence is high. These factors were observed while performing CS.

In our study 255 of the women with Inter delivery interval < 18 months had normal scars, 29.2% had thin scars, 41.1% very thin, 3% with translucent and 4% had scar dehiscence. The Caesarean section done on emergency grounds reported 92.25% of scar dehiscence, 50% translucent, 36% very thin and 4% normal scars, only 1 scar dehiscence was found with elective procedure. The women with low parity had normal scars i.e 68% and 59.2% were scar dehiscence while in multi gravita 31.2% had normal scars and 30.8% scar ruptures were observed. The women with BMI in between 25 – 30 reported the maximum scar dehiscence rate of 69.2% and 56.2% had normal scars, only 1 scar dehiscence was found in BMI 31 – 34 and more than 35. (Detailed variables with relation to status of scar are shown in Table - II)

TABLE - I: FREQUENCY OF DESCRIPTIVE STATISTICS OF CATEGORICAL VARIABLES (N=208)

Factors		Frequency(n)	Percentage (%)
BMI	< 25	47	22.6
	25-30	119	57.2
	31-34	34	16.4
	>35	8	3.8
Prior SVD	Yes	58	27.9
	No	150	72.1
Labour before previous CS	No labour	144	69.2
	Latent phase (< 4cms)	33	15.9
	Active phase (>4 cms)	16	7.7
	Labour (unspecified)	15	7.2
Inter delivery interval	<18 months	68	32.7
	> 18 months	129	62
	Unknown	11	5.3
Current CS	Elective	145	69.7
	Emergency	63	30.3
Status of scar at time of delivery	Normal	17	8.2
	Thin	89	42.7
	Very Thin	73	35.1
	Translucent	16	7.7
	Dehiscence	13	6.3

TABLE – II: FREQUENCY OF ASSOCIATION BETWEEN THE SCAR STATUS (CS) AND MATERNAL AND OBSTETRICAL FACTORS (N-208)

		STATUS OF SCAR (VISUAL)										Chi-square value	p-value
		Normal		Thin		Very thin		Translucent		Dehiscence			
		n = 16	%	n =89	%	n =73	%	n =16	%	n =13	%		
Inter delivery interval	< 18 months	4	25	26	29.2	30	41.1	3	18.8	4	30.8	25.88	**0.004**
	> 18 months	12	68.8	61	68.5	39	53.4	13	81.2	5	38.5		
	Unknown	1	6.2	2	2.2	4	5.5	0	0	4	30.8		

Current type of CS	**Elective**	12	75	76	85.4	49	67.1	8	50	1	7.75	40.07	**0.001**
	Emergency	4	6.7	13	14.6	24	36.9	8	50	12	92.25		
Parity	**One to two**	11	68.8	56	62.9	49	67.1	12	75	9	69.2	3.43	**0.969**
	Three to five	5	31.2	30	33.7	22	30.1	3	18.8	4	30.8		
	More than five	0	0	3	3.4	2	2.7	1	6.2	0	0		
BMI	**< 25**	2	12.5	25	28.1	13	17.8	5	31.2	2	15.4	22.06	**0.106**
	25-30	9	56.2	50	56.2	47	64.4	4	25	9	69.2		
	31-34	4	25	13	14.6	10	13.7	5	31.2	1	7.7		
	>35	1	6.2	1	1.1	3	4.1	2	12.5	1	7.7		
Labour previous CS	**No labour**	11	68.8	61	68.5	49	67.1	14	87.5	9	69.2	19.39	**0.197**
	Latent phase(< 4cms)	2	12.5	15	16.9	15	20.5	0	0	0	0		
	Active phase(>4 cms)	0	0	7	7.9	6	8.2	1	6.2	2	15.4		
	Labour(unspecified)	3	18.8	6	6.7	3	4.1	1	6.2	2	15.4		

TABLE – III: ASSOCIATION OF SCAR MEASURED ON ULTRASOUND AND VISUAL STATUS (N=208)

Scar measured on Ultrasound	Complication seen visually (Scar Dehiscence)
Above average (Normal thin)	3.9%
Below Average (within translucent, Scar Dehiscence	10.4%

DISCUSSION

The main concern of obstetrician when dealing with women with previous caesarean section is the risk of scar dehiscence which is reported between 0.3 and 3.8 percent[7]. The rate of caesarean section is going high especially in the women with previous scars[8]. The low threshold to do repeate caesarean section is uncertainty about the integrity of previous caesarean section scar and the status of lower uterine segment (LUS). A thin LUS is likely to rupture in subsequent pregnancies.[9,10] It is therefore important to assess the integrity of LUS by ultrasound. There are several methods to measure the LUS thickness, either trans-abdominally or trans-virginally, measuring the whole thickness of the LUS or the thickness of middle muscular layer only. As described by Rozenberg[5] there is inverse relationship between LUS thickness and scar rupture and he found a LUS thickness of 3.5mm protective against uterine rupture. The findings of a meta-analysis indicate that there is a strong association between the degree of LUS thinning measured near term and the risk of uterine scar defect at birth. In their analysis they found full uterine scar thickness varied from 2.0 to 3.5 mm.[12]

Ejub Basic et al[13] in their study concluded that the women should be given a trial of labor if the lower uterine segment thickness is 3 to 3.5 mm. In another study the author found that patients in whom the lower uterine segment thickness is below 2.0 mm have a high risk of uterine scar separation[14]. Sanlorenzo O[15] concluded thickness less than 1.8 mm can be reasonably considered a valid with a higher risk of thin uterine scar. Other[16] took 3 mm thickness as cut off. A recent study performing 20 307 LUS thickness measurements at different gestational age determine an inverse correlation between LUS thickness and gestational age with a mean thickness of 2.3 ± 0.6 mm at 40 weeks of gestation [17].

In a similar study done in our department we derived 23.61 mm as LUS thickness at which the normal vaginal delivery took place in women with previous caesarean section[18]. In the present study the mean LUS was found to be 0.34 + 0.23 mm .These are the women in whom we observed a normal or slightly thin scar at the time of delivery.

On studying this factors that influences on LUS integrity such as maternal weight, BMI and inter-delivery interval, we were unable to find any significant difference between number of previous caesarean section and scar defects. To reduce the rate of scar related complication, LUS was measured through ultrasound before performing caesarean section.

Landon[19] in his review described that as time passes the quality of uterine wound improves progressively we also found a significant association between the time which elapsed since the operation and the healing status. Another American study[20] concluded that an inter delivery interval of less than 18 months, but not between 18 and 24 months, be considered as a risk factor for uterine rupture. In a very large multicenter, retrospective, cohort study, Stamilio et al reported an adjusted OR for uterine rupture of 3.05 (95% CI, 1.36–6.87) in women with an inter pregnancy interval less than 6 months, of 1.18 (95% CI, 0.60–2.33) in women with an inter pregnancy interval between 6 and 11 months, and of 1.00 (95% CI, 0.56–1.79) for women with an inter pregnancy interval between 12 and 17 months, compared with women with an inter pregnancy interval between 18 and 59 months.[21]

Similar observations were noted by another author[13], similarly, Brahmalakshmy et al[22] in their study on different variables noted an increase in the rate of abnormal LUS in women with inter-delivery interval less than 18 months. Ejub Basic[13] also considered parity not crucial in assessing the scar. Jennifer A found BMI of more than 30 as a significant negative factor for a successful vaginal birth after a previous caesarean section[23]. In

another study BMI was significantly lower in the women who delivered vaginally after previous caesarean section compared to the women who failed to deliver vaginally[24]. Many studies have associated thicker LUS in women whose previous caesarean section was done during labor or who experienced labor pains during primary cesarean[12,25]. Whereas another researcher in their study observed a higher incidence of abnormal LUS in women whose primary cesarean was done during labor.[22] We found no substantial association in our study.

However significant association was found by observing the scar visually while performing caesarean section with inter delivery interval and current type of caesarean section, done electively or in emergency. Women in whom cesarean section was done in emergency had a thinner scar. The present study showed that ultra-Sonographic evolution of the LUS during pregnancy was well correlated with operative findings. Women with a scar thickness of more than 3 mm can be given reassurance that they can have a normal vaginal delivery as their scar was found normal at the time of delivery. Kushtagi P, Garepalli and B. L. Brahmalakshmy, Pralhad Kushtagi has also seen a good correlation between the intra-operative grading of LUS and its thickness measured by trans-abdominal ultrasound[8, 22].

The main limitation of this study is to draw a conclusion due to small sample size. There is a need to perform larger studies especially in our set up to answer such important questions.

CONCLUSION

Sonographic LUS thickness is a strong predictor for uterine scar defect in women with prior Caesarean section. The ultrasonic measurement of thickness of the LUS (the lower uterine segment) has a practical application in the decision on the mode of pregnancies in women who had previously given birth by Caesarean section.

CONTRIBUTION OF AUTHORS:

Sumbul: Data Collection, Statistical Analysis
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Jaffer M: Data collection

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REFERENCES

1. Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: Global, regional and national estimates: 1990–2014. PLoS ONE 2016;11 (2):1-12.
2. Naji O, Abdallah Y, Bij AJ, De Vaate A Standardized Approach for Imaging and Measuring Cesarean Section Scars Using Ultrasonography. Obs & Gyne 2112 ; 39(3):253-59.
3. Chanderdeep S, Mukesh S, Anjali S. Sonographic Prediction of Scar Dehiscence in Women with Previous Cesarean Section. The J of Obs & Gyne of India 2015; 65(2):97–103.
4. Cheung VY. Sonographic measurement of the lower uterine segment thickness in women with previous caesarean section. J Obs Gyna Can. 2005;27(7):674-81.
5. Rozenberg P, Goffinet F, Philippe HJ. Ultrasonographic measurement of lower uterine segment to assess risk of defects of scarred uterus. Lancet 1996; 347: 281–84.
6. Gizzo S, Zambon A, Saccardi C. Effective anatomical and functional status of the lower uterine segment at term: estimating the risk of uterine dehiscence by ultrasound. Fertil Steril. 2013; 99(2):496–501.
7. Ofili-Yebovi D, Ben-Nagi J, Sawyer E. Deficient lowersegment Cesarean section scars: prevalence and risk factors. Ultrasound Obs Gyne. 2008;31(1):72–77.
8. Kushtagi P, Garepalli S. Sonographic assessment of lower uterine segment at term in women with previous cesarean delivery. Arch Gyne Obs 2011; 283(3) :455–59.
9. American College of Obstetricians and Gynecologists. ACOG Practice bulletin no. 115: Vaginal birth after previous Cesarean delivery. Obs Gyne 2010; 116: 450–63.
10. De Lau H, Gremmels H, Nico W. Schuitemaker, Kwee A. Risk of uterine rupture in women undergoing trial of labour with a history of both a caesarean section and a vaginal delivery. Arch Gyna Obs 2011; 284(5): 1053-58.
11. Kok N, Wiersma IC, Opmeer BC, de Graaf IM, Mol BW, Pajkrt E. Sonographic measurement of lower uterine segment thickness to predict uterine rupture during a trial of labor in women with previous Cesarean section: a meta-analysis Ultrasound Obs Gyne 2013; 42(5) :132–39.
12. Jastrow N, Chaillet N, Roberge S. Sonographic Lower Uterine Segment Thickness and Risk of Uterine Scar Defect: A Systematic Review. J Obs Gyna Can. 2010; 32(4):321-27.
13. Basic1 E,Cetkovic B, Kozaric H. Ultrasound Evaluation of Uterine Scar After Cesarean Sectionmem 2012 ; 20(3):149-53.
14. Wang CB, Chiu WWC, Lee CY, Sun YL, Lin YH. Cesarean scar defect: correlation between Cesarean section number, defect size, clinical symptoms and uterine position. Ultrasound in Obs & Gyne. 2009; 34(1):85-89.
15. Sanlorenzo O, Farina A, Pula G, Zanello M. Sonographic evaluation of the lower uterine segment thickness in women with a single previous Cesarean section. Minerva Ginecologica 2013 ;65(5):551.
16. Dane B, Dane C, Gultekin E, Cetin A, Yayla M. Is it possible to predict the lower uterine segment thickness by sonographic examination in cases with previous abdominal delivery? Turkiye Klinikleri Jinekoloji Obstetrik 2010; 20:161–64.
17. Misao Fukuda. Ultrasound Assessment of Lower Uterine Segment Thickness during Pregnancy, Labour, and the Postpartum Period. J of Obs & Gyna Can. 2016; 38(2) 134–40.
18. Ali HS, Ishtiq S, Fawad B, Gul R. Sonographic Lower Uterine Segment Thickness Measurement and Risk of Uterine Scar Defect in Women with Previous Caesarean Section. Pak J of Med & Dent 2017; 6 (01):10-14.
19. Landon MB. Predicting Uterine Rupture in Women Undergoing Trial of Labor after Prior Cesarean Delivery

Seminars in Perinatology.2010;34(4):267-71.
20. Bujold E. Gauthier RJ. Risk of Uterine Rupture associated with an Interdelivery Interval between 18 and 24 Months. Obs & Gyne: 2010 ; 115 (5): 1003-1006
21. Stamilio DM, DeFranco E, Pare E, Odibo AO, Peipert JF, Allsworth JE, et al. Short interpregnancy interval: risk of uterine rupture and complications of vaginal birth after cesarean delivery. Obs & Gyne 2007;110:1075–82.
22. Brahmalakshmy BL, Pralhad K. Variables influencing the integrity of lower uterine segment in post-cesarean pregnancy. Arch Gyne Obs 2015; 291:755–76.
23. Tessmer-Tuck JA. Predicting Vaginal Birth after Cesarean Section: A Cohort Study Gyne & Obs Invest 2014;77:121–26.
24. Abdelazim. Obstetric risk factors of TOLA. J Turk Ger Gynecol Assoc 2014; 15: 245-49
25. Be´rube´ L, Arial M, Gagnon G, Brassard N, Boutin A, Bujold E. Factors associated with lower uterine segment thickness near term in women with previous caesarean section. J Obs & Gyna Can. 2011; 33(66) :581–87.