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Scar Thickness as a Variable for Deciding the Mode of Delivery in Patients with Previous One Caesarean Section: A Prospective Observational Study.

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ABSTRACT: *The objective of this study was to evaluate whether scar thickness measured by transabdominal sonography has any association with mode of delivery in patients with previous caesarean delivery.*
Methods: Pregnant women with previous one caesarean section underwent transabdominal sonography beyond 36 weeks of gestation to measure scar thickness. These scar thickness measurements were then correlated with the mode of delivery. The scar was measured at multiple sites (3–4) of the lower uterine segment and its thinnest portion was considered to be the scar.
Result: Scar thickness was thinner in those patients having caesarean delivery than those having vaginal delivery and this difference was statistically significant. Those with LUS thickness <3mm, average 20 - 44% had successful VBAC. Those with LUS thickness of >3mm had successful VBAC in 40 - 60% patients. However, the association of scar thickness and probability of successful VBAC is not statistically significant. Sensitivity and specificity of ultrasonography in detecting abnormal LUS according to present study was 84.79% and 100% respectively. The PPV and NPV was 100% and 91% respectively.
Conclusion: Our study concluded that thicker scars are associated with better chances of successful vaginal birth after caesarean. Measurement at third trimester can be a significant deciding factor for mode of delivery.
Keywords: *Transvaginal sonography, Scar thickness, VBAC, Previous caesarean section, third trimester.*

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I. Introduction:

Caesarean section is the most commonly performed surgery in obstetrics. The incidence of caesarean section rate persistently rising in the world. The reasons being: improved surgical techniques, improved anaesthesia, increased intrapartum monitoring and a greater number of mothers requesting caesarean section (maternal request).

The World Health Organization (WHO) earlier recommended around 5–15% rate of caesarean section in any population [1]. However, WHO recently suggested that they do not recommend a specific rate at either a country-level or a hospital-level [2]. The overall rate of caesarean section delivery in 2015–16 is around 17.2% in India, increased from 8.5% in 2005–06 [3,4].

Although caesarean delivery is considered as a relatively safe method of delivery (Althabe et.al (2006)) [5], but it has a higher risk of complications than does a vaginal birth or normal method of birth. Wagner(2000), Thomas and Paranjothy(2001), Villar et.al(2006), Hall and Bewley(2009) have discussed about the most frequent complications which may occurred during and after a caesarean delivery to the mother and also suggested by Medical Advisory Board are: infection, heavy blood loss, a blood clot in the legs or lungs, nausea, vomiting, and severe headache after the delivery, injury to another organ (such as the bladder) etc., and to child are: injury during the delivery, need for special care in the neonatal intensive care unit (NICU), immature lungs and breathing problems etc. And secondly, high cost for operation and stay (Robson et.al (2013)) in any medical institution.

However, in a mother, who is pregnant with a previous caesarean section, the decision for mode of delivery is critical. In case of a previous caesarean section a subsequent pregnancy can be planned beforehand to be delivered by either of the following two main methods:
Vaginal birth after caesarean section (VBAC)
Elective repeat caesarean section (ERCS)

The selection of mode of delivery is critical. Both the modes of delivery have higher risks than a normal vaginal birth with no previous caesarean section. There are many factors which affect the decision for planned vaginal or planned abdominal delivery. There is a slightly higher risk for uterine rupture and perinatal foetal death of the child with VBAC than ERCS, but the absolute increased risk of these complications is small,

especially with only one previous low transverse caesarean section.[6] 60–80% of women planning VBAC will achieve a successful vaginal delivery, although there are more risks to the mother and baby from an unplanned caesarean section than from an ERCS.[7,8] Successful VBAC also reduces the risk of complications in future pregnancies than ERCS.[9]

The choice of VBAC or ERCS depends on many issues: medical and obstetric indications, maternal choice and availability of provider and birth setting (institutional or home).

Ultrasound estimation of lower uterine segment (LUS) provides a fairly simple and non-invasive method for prediction of scar dehiscence/rupture. The successful outcome of TOLAC depends on the scar of previous CS, which is directly related to its thickness [6].

Hence, the present study was planned to estimate the scar thickness by ultrasound (TAS) and to determine the correlation between LUS thickness measured by TAS and the mode of delivery.

II. Methods

Prospective observational study which will include all the women of gestational age >36 weeks With one previous caesarean section. Study period was from January 2018 to December 2019. The study was conducted at a tertiary care centre in Nagpur. Total sample size of 150 cases is estimated. INCLUSION CRITERIA:

1. Pregnant women with previous one caesarean section
2. Singleton pregnancy
3. Vertex presentation
4. Gestational age > 36 weeks

EXCLUSION CRITERIA

1. Cephalopelvic disproportion in present pregnancy
2. Foetal malpresentation
3. Antepartum haemorrhage
4. Previous two caesarean section
5. Pregnancy with medical disorder like diabetes mellitus, heart disease, congenital anomalies in babies or uterus, post maturity, Intrauterine growth restriction, High estimated foetal weight (> 3.5kg).
6. multiple pregnancy
7. previous LSCS with postoperative complications: sepsis, burst abdomen, wound infection.

Detail history, general, systemic and obstetrical examinations will be done according to the proforma. If the patient fulfils the inclusion criteria, she is explained about the study objectives. After obtaining consent the cases will be subjected to the transabdominal sonography to measure the thickness of LUS, a cursor will be positioned at the interface between the uterine and the bladder wall and another cursor between the amniotic fluid and the decidua. The myometrial thickness will be measured with the cursor at the interface of the bladder wall and the myometrium so that it includes only the hypoechogenic layer. Three different values of LUS and myometrial thickness will be taken, and the lowest value of these will be considered as the actual thickness of LUS and the myometrial thickness. To optimize the measurement of LUS, the distension of the bladder will be done by instructing women to empty their bladder and then drink 300 ml of water 1 h before the examination (8).

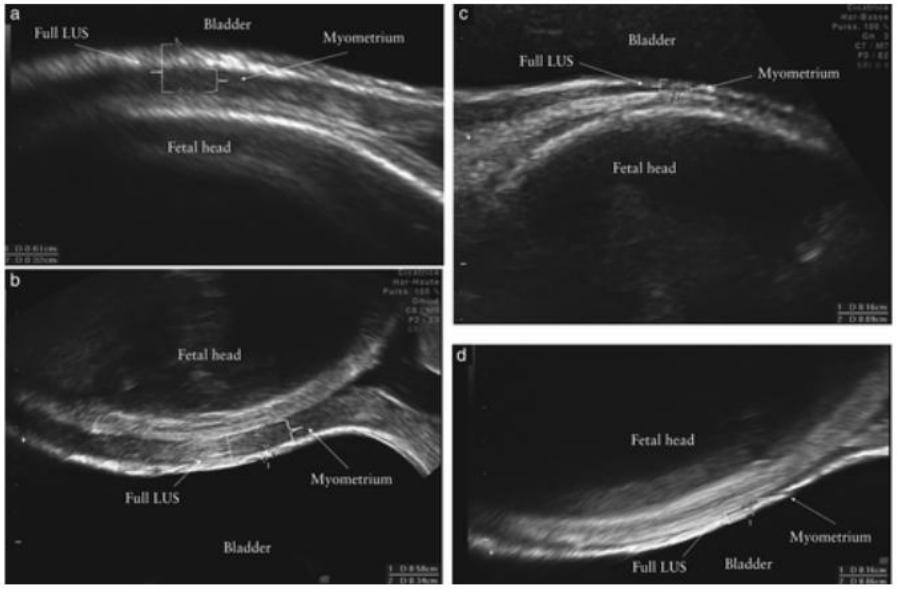


Figure 1. shows a thick and a thin LUS measured by transabdominal sonography.

Radiological findings will not be utilized for decision making of mode of delivery. This will be done to allow these women to undergo VBAC based on clinical parameters as is done in routine else. Elective caesarean section or caesarean at slightest indication will be done in women with thin scars.

Patients who gave consent for TOLAC were allowed to go into spontaneous labour. Those who did not go into spontaneous labour were induced at 39 completed weeks. The methods of induction used were: foley's induction, dinoprostone gel or amniotomy.

Number of vaginal deliveries were noted. The patients who had emergency caesarean section were segregated in a separate group. The indications for emergency caesarean section were noted.

III. Results

The maximum number of mothers (70%) were in age group 20 -29 years. The mean age was 27.9 years. Two patients were above age 35. But they did not have any other high-risk factors. No patient in this study was below age 20. 50.67% mothers were from urban area and 49.33% were from rural area, who were mostly referral patients. Maximum number of mothers (30.7%) belonged to lower middle class (class III) followed by lower socioeconomic class (class IV). 44.67% mothers were educated till primary standard. A significant 16% mothers were illiterate and only 2 cases had education up-to graduation. 54% mothers had 4-7 antenatal visits. Only 7.33% mothers had 8 or more antenatal visits which fulfils the new WHO ANC care model criteria of at least 8 ANC visits. As pregnancy with previous caesarean section is a high-risk pregnancy, there should be regular minimum 8 ANC visits as per WHO model for ANC. But still only 7.33% mothers had ≥ 8 ANC visits in our study.

TABLE NO 1: MODE OF DELIVERY, NO OF CASES = 150

Mode of delivery		No of cases	Percentage (%)
Elective repeat caesarean section (ERCS)		4	2.7
TOLAC	Emergency LSCS	81	55.48
	VBAC	65	44.52
Total		150	100

The above table shows the data of mode of delivery of mothers in our study. 2.7% of patients were selected for elective LSCS and 97.3% mothers were selected for TOLAC after taking proper informed consent. 44.52% of mothers had successful VBAC and 55.48% mothers had emergency LSCS for various indication.

TABLE NO 2: METHODS OF VBAC (N = 65)

Method of VBAC	No of cases	Percentage
Spontaneous labour	23	35.4
Induction of labour	41	63.1
Foley's 35(85.4%) Dinoprostone gel 5 (12.2%) Amniotomy 1 (2.2%)		
Instrumental delivery	1	1.5

The above table describes the different methods of VBAC . 23 (35.4%) mothers had spontaneous onset of labour . 41 (63.1%) patients were induced with different methods. Most frequent method of induction was mechanical dilatation with foley's catheter. One case was delivered with instrumental delivery, i.e with forceps application for maternal exhaustion and foetal bradycardia.

DIAGRAM NO 1: BAR DIAGRAM SHOWING DATA OF MODE OF DELIVERY

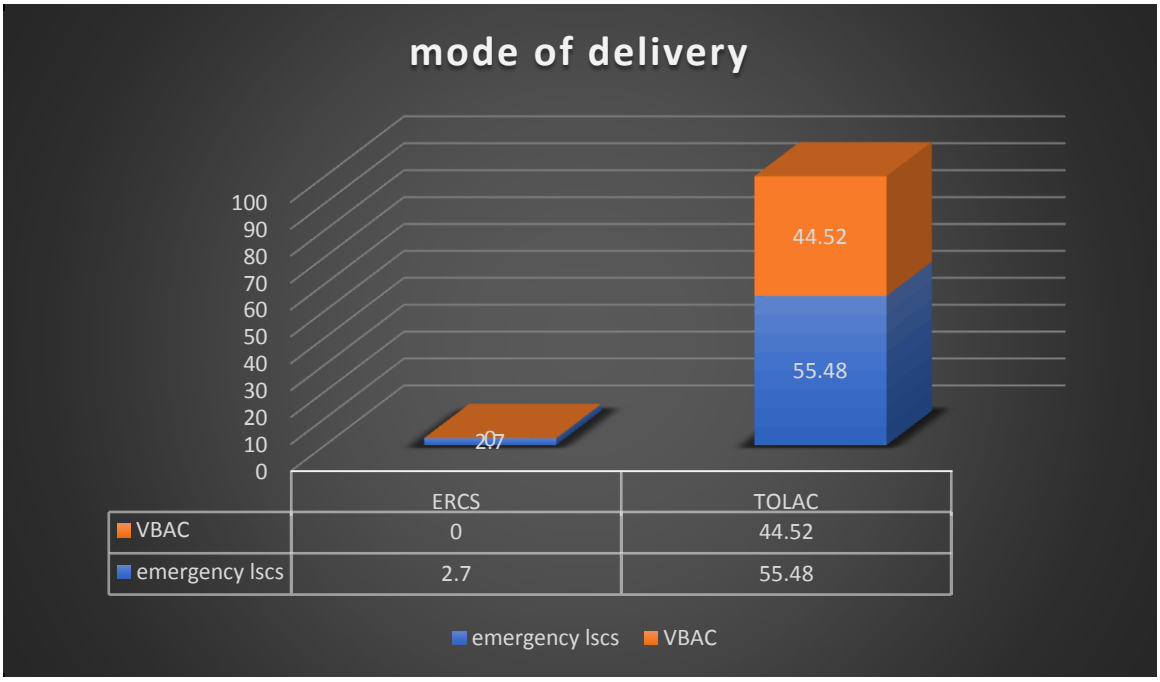
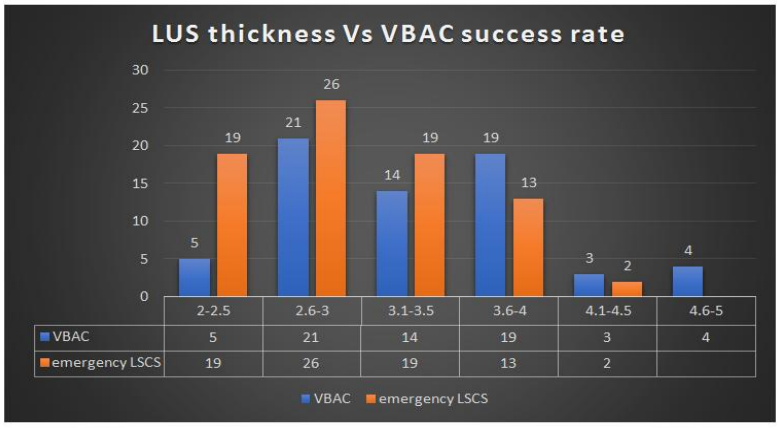


TABLE NO 3: LUS SCAR THICKNESS AND OUTCOME

LUS (mm)	No of cases	Par operative grading of lower segment scar				Elective LSCS (n)	TOLAC	VBAC Success		Emergency LSCS		Chi-square score	*P* value
		IV	III	II	I			N	%	N	%	85	0.03
<2	4	4	-	-	-	4	-	-	-	-	-		
2 – 2.5	24	1	13	5	-	-	24	5	20.8	19	79.2		
2.6 - 3	47	-	-	17	9	-	47	21	44.7	26	55.3		
3.1-3.5	33	-	-	4	15	-	33	14	42.4	19	57.6		
3.6-4	32	-	-	3	10	-	32	19	59.3	13	40.7		
4.1-4.5	5	-	-	-	1	-	5	3	60	2	40		
4.6-5	6	-	-	-	1	-	6	4	66.7	2	33.3		
>5	-	-	-	-	-	-	-	-	-	-			
								65		81			

The above table compares antenatal ultrasonographic measured LUS thickness with mode of delivery and intra operative scar grading. All the patient with LUS thickness <2mm had grade IV scar intra operatively. And those with LUS thickness of 3mm or more had grade I – II intra operatively. Those with LUS thickness <3mm, average 20 - 44% had successful VBAC. Those with LUS thickness of >3mm had successful VBAC in 40 - 60% patients. However, the association of scar thickness and probability of successful VBAC is not statistically significant. Sensitivity and specificity of ultrasonography in detecting abnormal LUS according to present study was 84.79% and 100% respectively. The PPV and NPV was 100% and 91% respectively.

DIAGRAM NO 2: LUS THICKNESS VS VBAC SUCCESS RATE



IV. Discussion

Although ultrasonography (USG) has been widely used for pelvic imaging, it has been reported that the lower transverse caesarean scars are visible in only 30% of cases. USG is now used as an imaging modality for the evaluation of LUS. A number of reports of sonographic evaluation of LUS have appeared in literature since 1982. It has been speculated that thickness of the LUS is related to the quality of wound healing. There is strong correlation between the anatomic status of scarred LUS as assessed by USG and its functional status which is tested during labour.

Ultrasonography is one such useful tool used to measure the thickness of LUS and predict the outcome of labour. Irrespective of whether transabdominal or transvaginal route, the measured thickness at a particular cut-off value had a high negative and positive predictive value in predicting scar rupture. Thus, the patients with thick lower uterine scar are less likely to have a scar dehiscence/rupture, similarly, patients with a thin LUS are more likely to rupture.

As reported in various studies the overall rate of vaginal delivery following previous caesarean delivery varies from 28% to 51%. Gonen and colleagues from Nigeria reported 51.22% of patients delivering vaginally. Chattopadhyay and colleagues reported an incidence of 40% and Landon et al reported an incidence of 28.57% (59). Our study is comparable to this, with 43% of the patients delivering vaginally and 57% of our patients culminated in emergency LSCS as shown in Table 18.

TABLE NO 20: COMPARISON OF VBAC SUCCESS RATE IN DIFFERENT STUDIES

Study	VBAC success rate (%)
Chattopadhyay and colleagues (1988)	40
Landon et al (2006)	28.57
Gonen and colleagues (2006)	51.22
Bangal et al (2013)	85
Anagha et al (2014)	46.7
Our study (2019)	43

PrahladKuhtagi et al in their study on 106 women with previous caesarean delivery and 68 women with unscarred uterus concluded that pre labour USG can be useful in predicting thinning of previous caesarean scar in labour . The introduction of radiological evaluation of scar thickness into clinical practice for deciding mode of delivery in pregnancy with previous caesarean may contribute to increase success of trial of labour in such women.

V. Conclusion

We conclude that sonographic evaluation of LUS thickness is a reliable, practically useful method to predict the success of TOLAC in a woman with previous CS. as risk of defective scar is directly related to degree of thinning of the LUS at term pregnancy. Ultrasonographic evaluation of LUS thickness correlates significantly with intraoperative LUS appearance. Trial of vaginal delivery is safe at LUS thickness of 2.5mm or more, provided there are no other risk factors. Needs further larger randomized controlled trials to correlate LUS thickness with successful VBAC. .

CONFLICT OF INTEREST

There is no conflict of interest.

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