ORIGINAL ARTICLE

ASSESSMENT OF PREVIOUS LOWER SEGMENT CAESAREAN SECTION SCAR BY ULTRA SONOGRAPY: IT'S INFLUENCE ON MODE OF DELIVERY AND FOETOMATERNAL OUTCOME

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ABSTRACT: BACKGROUND & PURPOSE OF STUDY: The present study is a prospective study to evaluate the usefulness of ultrasonographic measurement of the thickness of the lower uterine segment of post caesarean pregnancy at term for predicting the risk of intrapartum dehiscence. **METHODS:** This study was conducted in the Department of OBGYN, King George Hospital, Andhra Medical College, Visakhapatnam, from March 2011 to August 2012. All the pregnant women with previous one cesarean section attending Ante Natal Clinic for confinement were included in the study after giving consent. **RESULTS:** The out of 100 cases of post caesarean pregnancy, 42 elective LSCS were done in 14 cases, and VBAC in 17 cases. Out of 58 emergency LSCS repeat elective LSCS were done in 26 cases and 5 cases underwent VBAC. There was no case of perinatal mortality or rupture in the present study. **CONCLUSION:** There was significant thinning of lower uterine segment in emergency caesarean group. The 3.5mm mean of LUS thickness was taken as cut off value. There is 46% chance of uterine dehiscence when thickness is <3.5mm. There is 2.3% chance of uterine dehiscence when thickness is >3.5mm. If the thickness of lower uterine segment is >3.5mm the possibility of dehiscence during subsequent trials of labor is very small. Hence transvaginal delivery can be undertaken with more confidence.
KEYWORDS: Vaginal birth after caesarean section; Trial of labor after caesarean section; Lower uterine segment dehiscence; Ultrasound measurement.
NOTE: 1. VBAC= vaginal delivery after caesarean. 2. LSCS=Lower Segment Caesarean Section.

INTRODUCTION: The number of Caesarean sections is increasing steadily worldwide in recent decades. Although it is often assumed that caesarean sections improves neonatal outcome, there is no hard scientific evidence to support this. Elective repeat Caesarean delivery was the indication most responsible for the recent increase in caesarean births. In 1916 Cragin[1] made his famous oft-quoted "Once a caesarean, always a caesarean", but when this statement was made the classical vertical uterine incision was used. The frequency of uterine rupture developed in at least 4% of prior classical incision, and 0.5% in transverse incision. Vaginal delivery[2] after caesarean birth should normally be encouraged, wherever, emergency surgical intervention is available. Despite the knowledge of improved safety for a trial of labor, many obstetricians continue to follow the old dictum "once a caesarean section, always a caesarean section", perhaps because of the inability to precisely confirm the integrity of a scarred lower segment[3]. Maternal and perinatal morality rate for vaginal birth after caesarean section- trial of labor were no higher than those for elective repeat caesarean births. Several methods have been used to evaluate the power uterine segment after Caesarean delivery. Performed hysterography 6 or

more months after caesarean section. It was more invasive, reflected abnormalities poorly during pregnancy and labor.[4] concluded that antepartum X-ray pelvimetry increases caesarean section rate and poor prediction of outcome of labour. Employed amniography in 141 term gravidas, who had low transverse caesarean previously. The important potential complications were initiation of labor and chorioamnioitis. Magnetic resonance imaging does not give precise differentiation of isthmical myometrium from the bladder wall and thus measurement of scar thickness. Several recent reports[5,6,7] suggest that sonographic methods can be used to evaluate the lower uterine segment for defects. It has been suggested that uterine rupture is more common in cases with a sonographically thin uterine wall.[8,9] Present study is an attempt to evaluate the usefulness of sonographic measurement of the lower uterine segment before labor in predicting the risk of intrapartum uterine rupture.

MATERIALS & METHODS: This prospective study on "Prediction of uterine dehiscence by measuring lower uterine segment thickness prior to the onset of labor by trans-abdominal ultrasonography in post caesarean pregnancy conducted in between March 2011 to August 2012 at King George Hospital, Andhra Medical College, Visakhapatnam.

CASES: 100 cases of post caesarean pregnancies were taken for the study and the thickness of the lower uterine segment was measured and it is correlated with uterine dehiscence. Ultra sound equipped with 3.5 MHz transducer was to measure the lower uterine segment.

INCLUSION CRITERIA FOR THE STUDY: Previous caesarean pregnancies, singleton pregnancy, term pregnancy, multiple pregnancies, term pregnancy, multiple pregnancies are included for study.

EXCLUSION CRITERIA FOR THE STUDY: Scar on the uterus other than due to caesarean delivery, and Wound infection in previous caesarean section.

ANTENATAL SONOGRAPHY: Transabdominal sonography with moderately distended bladder to create satisfactory sonographic window was performed near term prior to the onset of labor. For the purpose of the study the bladder was considered moderately full when abdominal scan carried at i.e., at 2 hours after ingestion of 500 ml water. Every patient was asked not to void urine and drink 500 ml water two hours before scheduled ultra sound was done.

ULTRASOUND: Ultrasound equipped with 3.5 MHz transducer was used to measure the thickness of lower uterine segment and to detect defective lower uterine segment. The thickness of the anterior wall of lower uterine segment was measured at level where it covers the foetal head, was measured from the interface of the urine and posterior wall of bladder to the interface of amniotic fluid and decidua. This is because it is impossible to differentiate the foetal membranes, decidua, bladder mucosa and musculature from the myometrium of the lower uterine segment by ultrasonography. Each case included multiple measurements of the thickness of anterior wall of the lower uterine segment both in longitudinal and transverse plane, minimum

of four readings were taken. The lowest value measured was used to describe the thickness of lower uterine segment. Lower uterine segment was made to move by giving gentle pressure by transducer against maternal abdomen. Any movement that distorted the shape of the lower uterine segment was considered abnormal. At sonography lower uterine segment was considered abnormal if any of the following findings were present.

1. Abnormally thin lower uterine segment.
2. Ballooning.
3. Wedge defect.
4. Abnormal movement of lower uterine segment.
5. Asymmetry of lower uterine segment.

All patients were followed up to the time of delivery either by caesarean or spontaneous delivery.

OBSERVATION AT CAESAREAN DELIVERY: At caesarean delivery the thickness of lower uterine segment was observed. The lower uterine segment was labeled abnormal when it was,

1. Papery thin.
2. Ballooning.
3. Window defect (through which Foetal scalp could be seen).

OBSERVATION AFTER VAGINAL DELIVERY: In patients, who delivered vaginally, postpartum Trans cervical exploration of scar was done, when there was persistent bleeding per vaginum, not explained by atonicity of uterus or cervical and vaginal tears.

STATISTICAL METHODS: The significance of the LUS thickness by Ultrasonography, was measured by applying chi-square test.

RESULTS: Lower uterine segment thickness was measured by Transabdominal ultrasound and its correlation with the occurrence of the uterine dehiscence was examined in 100 cases post caesarean. Various features of the study included age of the patient, parity, indication for previous caesarean section, gestational age of the patient, thickness of the lower uterine segment by ultrasound in the present pregnancy, outcome of the present pregnancy.

Mode of Delivery	Number of Cases
Elective Caesarean Section	35
Emergency Caesarean Section	43
VBAC	22
TOTAL	**100**

Table 1

Out of 100 cases of post caesarean pregnancy 35 cases had elective caesarean section, 54 had emergency caesarean section and 22 had vaginal delivery.

Mode of delivery:

Distribution of cases based on the parity:

Parity	Number of Cases
Second Gravida	84
Third Gravida	14
Fourth Gravida	2

Table 2

There were 5 cases with two previous LSCS, and 84 cases were second gravid, 14 cases were third gravida and 2 cases were fourth gravida.

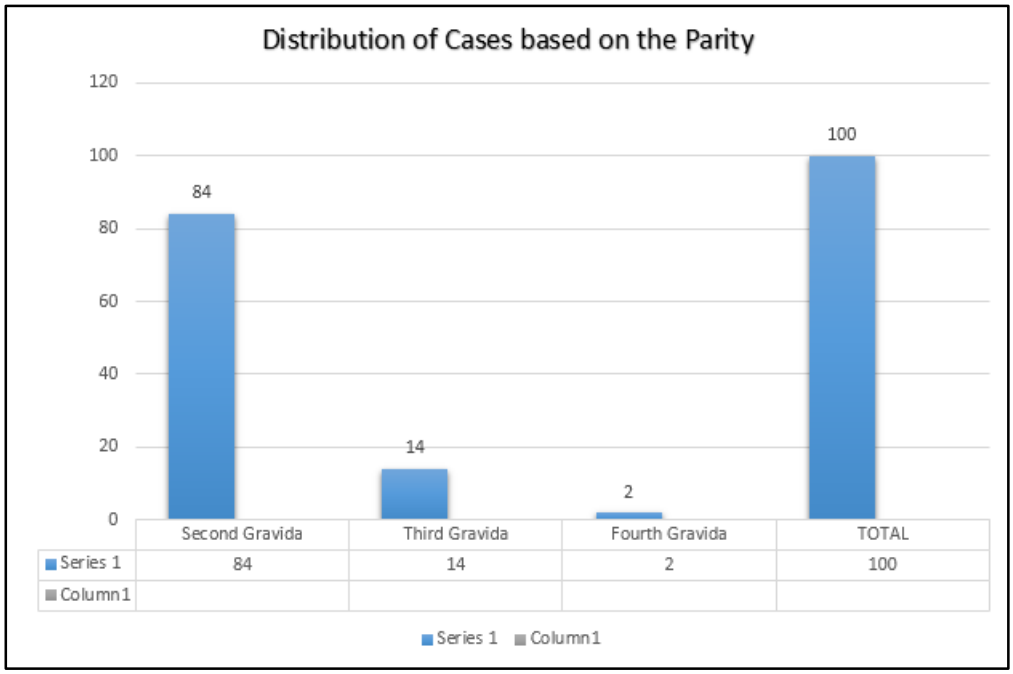

Figure 1

Distribution of cases according to age:

Age Group	Number of Cases
<19	4
20-29	88
30-39	8

Table 3

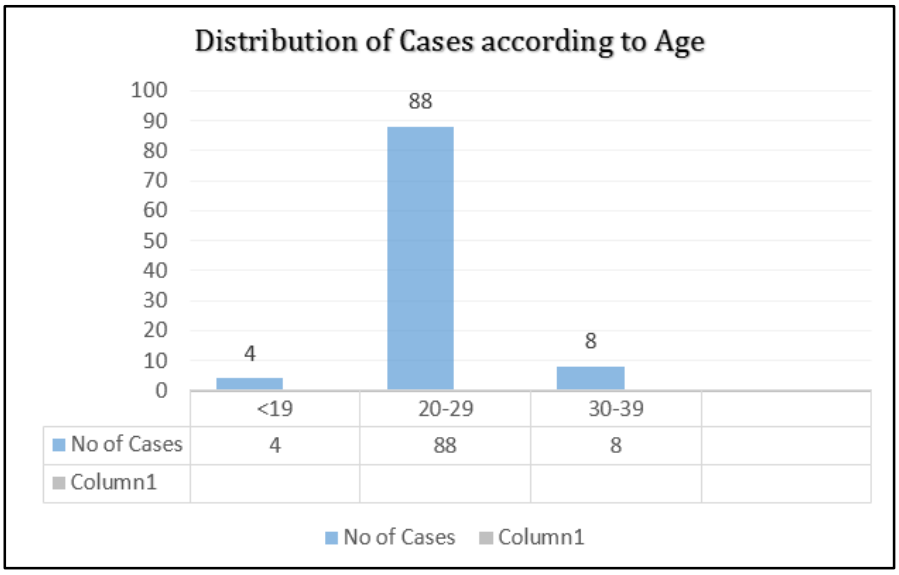

Figure 2

Maximum number of gases was in the age group of 20 to 29 years, 4 cases were below 19 years, 8 cases were above 30 years.

Indications for previous caesarean section:

Indications	Number of Cases	Percentage
Cephalo pelvic disproportion	23	23
Fetal distress	14	14
Failure to progress	19	19
Failed Induction	21	21
Malpresentation	15	15
Oligohydramnios	5	5
Medical Complications	3	3

Table 4

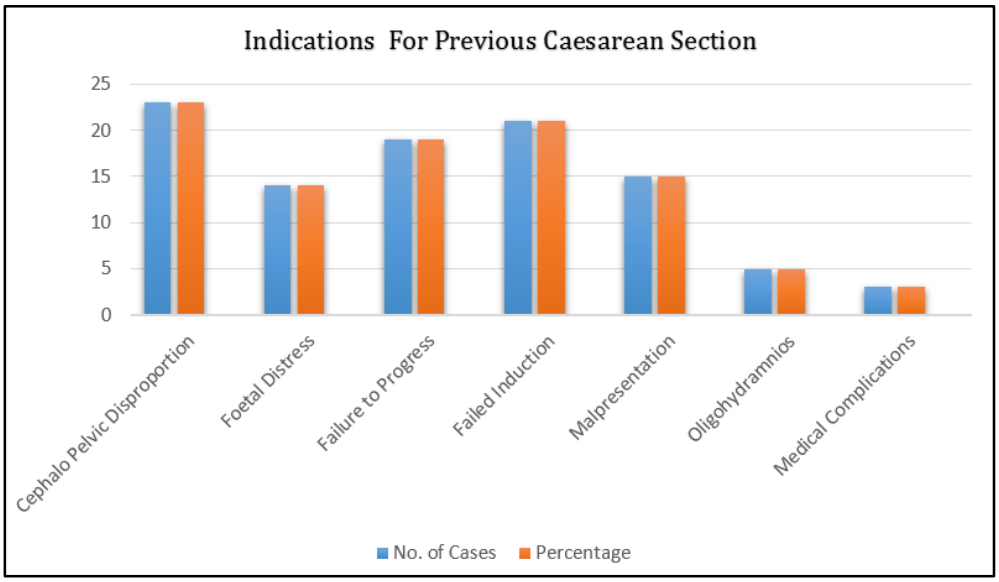

Figure 3

Distribution of cases according to mode of delivery in Previous Pregnancy:

Mode of Delivery	Number of Cases
Elective LSCS	42
Emergency LSCS	58

Table 5

Out of 42 elective LSCS, repeat elective LSCS was done in 11 cases, repeat emergency LSCS was done in 14 cases, and 17 cases underwent VBAC. Out of 58 emergency LSCS repeat elective LSCS was done in 26 cases and 5 cases undergone VBAC.

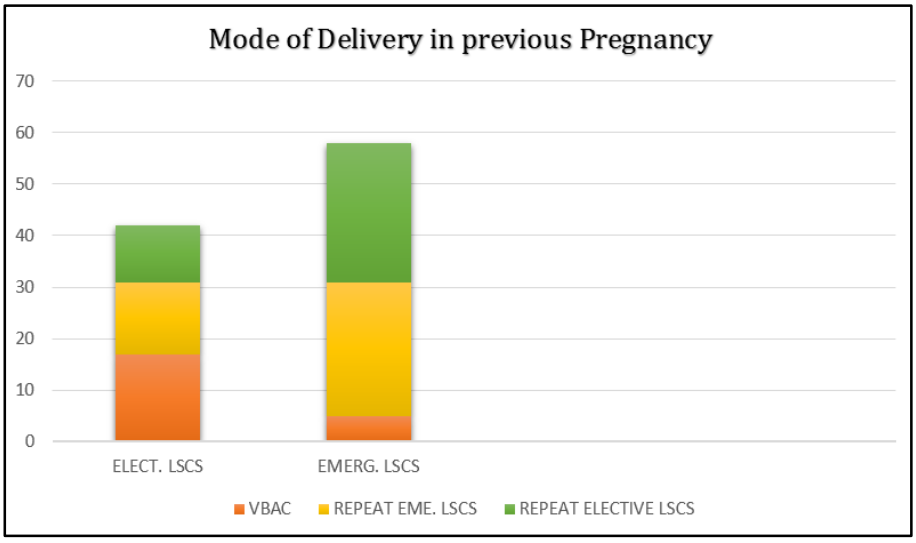

Figure 4

Indications for present Caesarean Section:

Indications	Number of Cases
Cephalo pelvic Disproportion	19
Scar Tenderness	12
Past Dates	11
Oligohydramnios	8
Failure to Progress	4
PROM	4
Foetal Distress	3
Malpresentation	3
Medical Complications	3

Table 6

Most common causes for repeat LSCS in this series of cases was Cephalo pelvic disproportion, scar tenderness and past dates. Out of 12 cases of scar tenderness there were 3 cases with scar dehiscence.

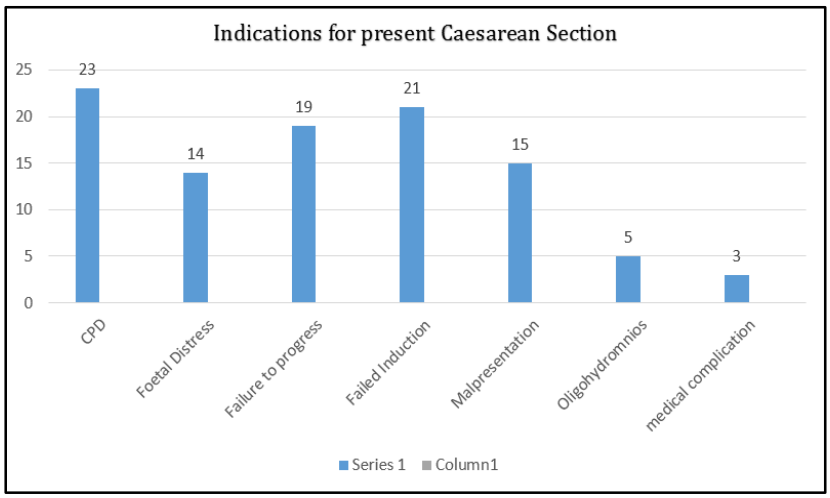

Figure 5

Distribution of Cases according to LUS Thickness:

Thickness	Number of Cases
>4.5mm	50
3.6-4.5 mm	37
2.6-3.5 mm	11
< 2.5	2

Table 7

There were 87 cases with LUS thickness greater than 3.5 mm and 13 cases with thickness less than 3.5 mm.

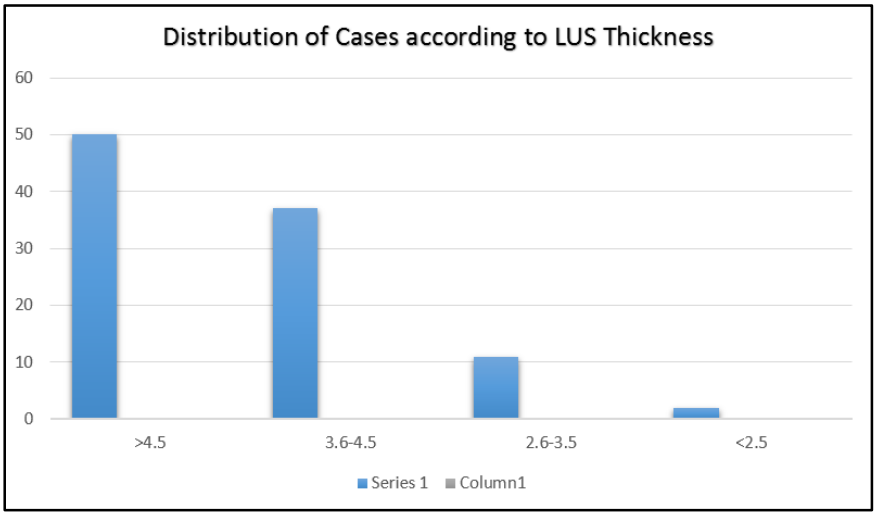

Figure 6

Distribution of cases according to Intra operative findings:

Group of Patients	Mean Thickness	Normal LUS	Thinned Out LUS	Dehiscence
Elective LSCS	4.7	33	1	1
Elective LSCS	4.26	29	8	6
Elective LSCS	4.5	22	-	-

Table 8

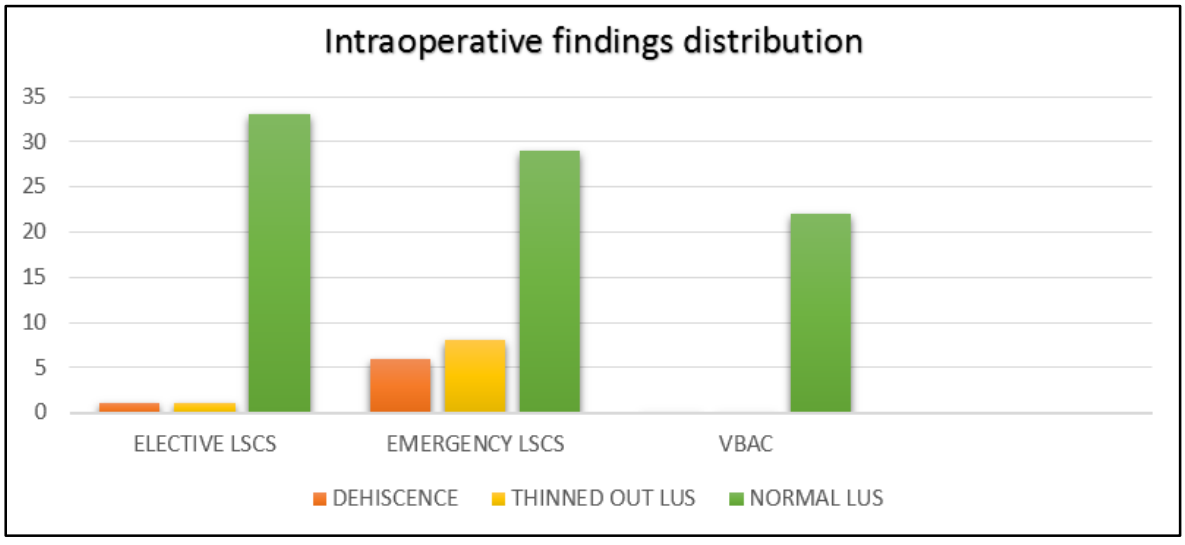

Figure 7

There was 1 case showed scar dehiscence in Elective group with scar thickness 3.7mm, with history of two previous LSCS.

LUS thickness	No of Cases	No of thinned out LUS Cases	No of dehiscence cases	No of rupture cases
>4.5mm	50	-	-	-
3.6-4.5mm	37	6	1	-
2.6-3.6mm	11	2	5	-
<2.5mm	2	1	1	-

Table 9

By applying Chi-Square tests, $p<0.0001$ which is significant at 99.9% confidence interval.

Maternal Outcome:

Mode of delivery	PPH		Infections	
	Atonic	Traumatic	Wound	Pulm.inf
Elective LSCS	3	1	4	2
Emergency LSCS	4	2	6	4
VBAC	1	-	-	-

Table 10

Maternal morbidity is more in caesarean section when compared with VBAC.

FOETAL OUTCOME:

	TTNB	LOW APGAR	H I E	STILL BORN
ELECTIVE LSCS	20	-	-	-
EMERGENCY LSCS	5	2	-	-
VBAC	-	-	-	-

Table 11

There is no perinatal morbidity or mortality in vaginal delivery. Transient tachypnea of new born is most commonly seen in caesarean section. Trial vaginal delivery was monitored by partogram. (TTNB:-Transient tachypnea of newborn; HIE—Hypoxic ischemic encephalopathy)

Effort to study the ability of one value of lower uterine segment thickness to predict defective scars was made. Cut off values for LUS thickness was arrived after deducting 1, 1.5, 2 and 2.5 times of standard deviations from the mean LUS thickness of women with previous LSCS. Since there were no cases with mean 2.5 SD, with (Mean-2SD) 3.5 mm is taken as cut off value, at this 3.5 mm it is predictor of scar integrity by virtue of higher sensitivity, specificity and higher predictive values.

Sensitivity: 80% Specificity: 94.3%

Positive predictive value: 61.5% Negative predictive value: 97.6%

In this study specificity is high indicating that those with more thickness of LUS have less chance of dehiscence.

DISCUSSION: In obstetric practice, one decision making regarding the route of delivery in cases of port caesarean pregnancy is a challenge. The old dictum propounded by Cragin in 1960 that "once a caesarean always caesarean has changed now, because of awareness of obstetricians about the safety of vaginal birth in a scarred uterus as well as the awareness of greater maternal morbidity and increased risk of maternal mortality in caesarean birth[10]. The morbidity of this major operation makes the obstetrician think about the trial of labor by vaginal route in a scarred uterus as an alternative to routine repeat caesarean section. To reduce the overall caesarean rate, it is equally important to reduce the repeat caesarean as well as primary caesarean sections.

Although the rate is very low, the estimated frequency of uterine rupture in a scarred uterus with a trial of labor is between 0.3 – 0.3.8%. This is due to lack of perfect method of assessing the integrity of scarred lower segment and to blindly selecting the patients for trial of vaginal birth. With the availability of ultrasonography[11], assessment of the integrity of the lower uterine scar has become possible even in gravid uterus. Speculated that thickness of the lower segment related to the quality of the wound healing. According to, the healing process of the uterine wound might affect the regeneration of isthmus of the uterus in such a way that it would become thinner. In subsequent pregnancies due to enlargement, this thinning could lead to a thinner lower segment. Measurement of lower uterine segment thickness by Transabdominal sonography was prospectively evaluated for the diagnosis of defects and abnormal thinning of the scarred lower uterine segment at term.

In the present study of 100 cases of post caesarean pregnancies were studied. Out of 100 cases 34 had elective caesarean section and 22 had vaginal delivery. There are studies which considered different cut off values for lower segment thickness indicating good healing caesarean scar. More than 4.5 mm, 3.6-4.5mm 2.6-3.5 mm and 1.6-2.5 mm. The proportion of defects rose as the thickness decreased. None of the 278 women in greater than 4.5mm group had dehiscence or rupture. In the 3.6-4.5 mm group, there were 177 patients of whom three had defects. Out of 136 patients in 2.6-3.5 mm group 14 patients had defects and in the group with thickness of 1.6-3.5mm group 14 patients had defects and in the group with thickness of 1.6-2.5 mm, there were 8 (16%) defects. The relative risk of defects (odds ratio) was 20.1 when the lower uterine segment thickness was 3.5 mm or less and 6.3 when the lower uterine segment thickness was 2.5 mm or less at the beginning of 9th month. They studied the risk of a defect according to each thickness category by calculating odds ratio. A cut off point of 3.5 mm was not useful, because the relative risk was highest at this value. This cut off point allowed excellent sensitivity (88%) and negative predictive value (99.3).

Qureshi et al performed Trans vaginal sonography from the 16th week onwards considered LUS thickness of greater than 2 mm indicative of as good healing and selected for trail for vaginal delivery if no other obstetrical indication existed for a repeat section. The appearance of lower uterine segment during surgery was compared with ultrasonographic assessment by direct

inspection. The sensitivity and specificity are 86% and 100 respectively. The positive predictive value and negative predictive value are 100% and 86.7% respectively.

Cheung VY (2005) sonographic examination was performed in 102 pregnant women with previous caesarean section between 36 and 38 weeks gestation to assess the LUS thickness. The mean sonographic LUS thickness was 1.8 mm; standard deviation 1.1 mm; an intra-operatively diagnosed paper thin or dehisced LUS, when compared with an LUS of normal thickness had significantly smaller sonographic LUS measurement. A sonographic LUS thickness of 1.5mm had a sensitivity of 88.9%, and specificity of 59.5% and positive predictive value of 32% and negative predictive value of 96.2% in predicting a per thin or dehisced LUS. In the present study of 100 cases of post caesarean pregnancies were taken and the LUS thickness was measured at term that is between 37 to 40 weeks. There are no defects among 50 women with measurements greater than 4.5 mm. in between 3.6-4.5 2 cases had paper thin LUS and between 3.4-2.6 there were 3 cases of dehiscence and 2 cases of paper thin LUS. With thickness <2.5mm out of 2 cases 1 case had dehiscence.

Sensitivity 80% Specificity 94.3 %.

Positive predictive value 61.5% Negative predictive value 97.6%.

There were 12 cases that underwent emergency caesarean section for scar tenderness but three cases had scar dehiscence. There was significant thinning in emergency group in which the caesarean section was done in active phase. Maternal morbidity and blood transfusions were more in caesarean section group compared to VBAC. There was no perinatal mortality and morbidity.

CONCLUSION: The present study is a prospective study done in 100 cases of post caesarean pregnancy. Transabdominal measurement of LUS done prior to the onset of labor in 100 cases in between 37 to 40 weeks. The cases were followed up to the delivery and the outcome is correlated with the occurrence of uterine dehiscence or rupture. There was significant thinning of lower uterine segment in emergency caesarean group.

We conclude that there was significant correlation between ultra sonographic LUS thickness and intra-operative findings. The p value was 0.0001at 99.9% confidence interval. If the thickness of lower uterine segment is >3.5mm the possibility of dehiscence during subsequent trials of labor is very small. Hence Transvaginal delivery can be undertaken with more confidence. There were 8 cases with Oligohydramnios with mean thickness of 4.7mm. This implies that the thickness of the LUS may depend on the content of the uterine cavity. Blood transfusions, wound infections are more in caesarean section group. There was no case of perinatal mortality or rupture in the present study.

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