DOI: 10.7860/JCDR/2025/76862.20921

Original Article

Obstetrics and Gynaecology Section

Ultrasonographic Evaluation of Uterine LSCS Scar and its Impact on Maternal Outcomes: A Cross-sectional Study

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ABSTRACT

Introduction: The evaluation of uterine scars following Caesarean Section (CS) is essential for predicting delivery outcomes, particularly in patients considering Vaginal Birth After Caesarean (VBAC) or those undergoing repeat Lower Segment Caesarean Section (LSCS). Ultrasonography has emerged as a valuable tool for assessing caesarean scars, providing insights into critical scar features such as thickness, shape, continuity, and echogenicity. These factors play a significant role in determining the risk of complications, including uterine rupture and scar dehiscence, and influencing the decision-making process for VBAC or repeat LSCS.

Aim: The study focused on identifying critical scar features, including thickness, continuity, and echogenicity, and their impact on delivery outcomes, specifically VBAC success rates and complications during repeat LSCS.

Materials and Methods: This hospital-based, cross-sectional study was conducted from February 2022 to January 2025 at a tertiary care hospital. A sample of 284 pregnant women, at a gestational age of over 35 weeks with a history of previous CS, was recruited. Participants underwent clinical evaluation, including a detailed history, physical examination, and ultrasonographic assessment of the LSCS scar. Scar parameters were measured transabdominally, including thickness, shape (triangular/ballooning), continuity, and echogenicity using transvaginal ultrasound imaging. Categorical variables were summarised as percentages, while continuous variables were expressed as mean±standard deviation.

Results: The majority of patients (201, 70.77%) were in the 26-30 age group, with 249 (87.68%) patients falling between 150-160 cm in height and 139 (48.94%) patients weighing 56-60 kg. A high proportion (236, 83.1%) resided in rural areas, and 227 (79.93%) patients belonged to the lower socioeconomic class. Scar patterns indicated that 55 (98.21%) cases of vaginal deliveries had a triangular scar, with only 1 (1.79%) had ballooning pattern, while 180 (78.95%) cases of LSCS had a triangular scar and 48 (21.05%) cases exhibiting a ballooning pattern. Thinner scars (<3 mm) were associated with a higher incidence of repeat LSCS (195, 85.09%). Continuous scars were linked to successful VBAC outcomes in 52 (92.86%) cases. Hyperechoic scars were found in 56 (100%) of vaginal deliveries, whereas hypoechoic (46, 20.18%) and isoechoic scars (12, 5.25%) were more common in LSCS cases.

Conclusion: Ultrasonographic evaluation of the LSCS scar plays a critical role in predicting delivery outcomes. Triangular scars and thicker scar measurements (>3 mm) were associated with higher success rates for VBAC, while ballooning patterns and thinner scars (<3 mm) were linked to higher rates of repeat CS.

Keywords: Caesarean section, Maternal outcomes, Perinatal outcome, Scar pattern, Scar thickness, Ultrasonography, Uterine rupture

INTRODUCTION

The evaluation of uterine scars following a CS is crucial in predicting delivery outcomes, especially for patients considering VBAC or those requiring repeat LSCS [1]. Factors such as the thickness, integrity, and healing of the previous uterine scar help assess the risk of uterine rupture during labour [2]. A well-healed scar with adequate myometrial thickness increases the likelihood of a successful VBAC, whereas a thin or dehiscent scar raises concerns about complications, necessitating an elective LSCS [3].

The decision for VBAC or repeat LSCS is also influenced by factors such as the indication for the prior CS, the time interval between pregnancies, and maternal comorbidities [1]. The rate of attempted VBAC has decreased; however, the success rate for these births has improved. This improvement is attributed to better maternal selection criteria and advancements in ultrasound assessment of the uterine scar [4,5]. Historically, LSCS was primarily indicated for a narrow pelvis. Over time, additional indications such as eclampsia, fibroid uterus, nephritis, heart defects, vulvar cancer, and placenta previa have emerged [6-9]. Currently, the incidence of LSCS is rising, with an increasing number performed for foetal indications [9]. The assessment of the morphological and functional properties of the uterine scar in clinical practice remains largely subjective, relying on palpation, bimanual examination, and ultrasound measurement of scar thickness [2,10]. Pregnancies involving uterine scars are closely associated with adverse outcomes. Clark and Silver reported that repeat LSCS are linked to long-term maternal morbidity [11]. Similarly, Getahun D et al., found that a prior LSCS increases the risk of placenta previa and placental abruption [12].

Ultrasonographic evaluation of LSCS scars is critical for assessing the integrity and thickness of the uterine scar, which has significant implications for maternal and perinatal outcomes [10]. This study aims to establish an association between ultrasonographic findings of LSCS scars and the risk of complications such as uterine rupture, placental abnormalities, and adverse perinatal outcomes. Accurate scar assessment can guide clinical decisions regarding the feasibility of VBAC and the timing of elective repeat LSCS, ultimately improving maternal and foetal safety.

MATERIALS AND METHODS

This hospital-based, cross-sectional study was conducted at the Department of Obstetrics and Gynaecology at Dr. D. Y. Patil Medical College and Research Centre, Pune, India, from November 2022 to

January 2025. Ethical approval was also secured (IEC/PGS/2022/ 125) and written informed consent was obtained.

Sample size: Based on the prevalence of CS births (25.8%) as reported by Polidano C et al., the required sample size was calculated using the formula [13]: "$n=Z\alpha^2\ pq/d^2$". At a 90% confidence interval ($Z\alpha=1.96$), with a prevalence (p) of 25.8% (0.258), its complement (q=1-p) being 74.2% (0.742), and a margin of error (d) of 5% (0.05), the minimum sample size required, accounting for a 10% attrition rate, was calculated to be 234.

Inclusion and Exclusion criteria: Pregnant women with one prior CS and an unlimited number of vaginal deliveries, women aged up to 42 years, single-foetus pregnancies without foetal anomalies, and a gestational age of over 35 weeks were included in the study. Women with uterine anomalies, previous surgeries on the uterus other than LSCS, or scars of unknown aetiology, as well as those with multifoetal pregnancies, foetal macrosomia, or abnormal foetal presentations, those with a low transverse hysterotomy were excluded. Pregnancies with a gestational age below 35 weeks, prior classical or T-shaped uterine incisions, and clinical conditions such as induction of labour, secondary uterine inertia, abnormal foetal heart rate, or the use of epidural anaesthesia were also excluded.

Data collection: Data were collected using a pre-designed proforma to document demographic and clinical details. Clinical evaluation included a general examination to assess height, weight, blood pressure, pallor, and pedal oedema, along with systemic examinations of the cardiovascular and respiratory systems. Obstetric examinations involved measuring uterine height, assessing foetal presentation and position, monitoring foetal heart rate, and eliciting scar tenderness through palpation.

Labouratory investigations consisted of Complete Blood Count (CBC), Random Blood Sugar (RBS), Renal Function Tests (RFT), Liver Function Tests (LFT), and routine urine analysis. Ultrasonography included both 2D and 3D imaging. While 2D ultrasound served as the standard method for anatomical assessments, 3D ultrasound was employed in cases requiring detailed evaluation of uterine scarring, focusing on parameters such as scar thickness, continuity, echotexture, and volume.

Scar thickness was measured using transabdominal and transvaginal techniques, accounting for varying states of bladder fullness and gestational age. The thinnest portion of the Lower Uterine Segment (LUS) at the site of the previous scar was measured. The measurement was taken from the serosal layer (outer uterine surface) to the bladder interface. Rozenberg's P criteria were applied to determine VBAC eligibility, particularly using the LUS thickness threshold [14].

The classification of uterine scar integrity intraoperatively was based on the extent of damage to the scar and the uterine wall [15,16]. Grade 1 refers to a well-formed LUS with an intact and healthy scar. Grade 2 describes a thin uterine scar where no uterine contents are visible, indicating that the scar is thin but still structurally intact. Grade 3 involves scar dehiscence, which is a partial-thickness loss of myometrial integrity, meaning the scar has started to weaken but has not fully ruptured. Finally, Grade 4 is characterised by a full-thickness rupture of the uterine wall and serosa, where the scar has completely separated, leading to a rupture of the uterus.

STATISTICAL ANALYSIS

Data entry was performed in MS Excel, and analysis was conducted using SPSS Version 16. Categorical variables were summarised as percentages, while continuous variables were expressed as mean±standard deviation.

RESULTS

In this study, among the 284 cases, the majority (201, 70.77%) fell within the 26-30 age group. Most patients (48.94%, n=139) were in the 56-60 kg weight range. A significant number of patients were in their second or third pregnancy, with 44.37% (n=126) and 42.96% (n=122) of patients, respectively. A majority of patients, 77.11% (n=219), had one child. A smaller proportion, 22.54% (n=64), had two children, while only a minimal number, 0.35% (n=1), had three children [Table/Fig-1].

Category	Group	Number of cases (n)	Percentage (%)
Age group	≤20	1	0.35
	21-25	41	14.44
	26-30	201	70.77
	>30	41	14.44
Weight group (kg)	≤50	4	1.41
	51-55	64	22.54
	56-60	139	48.94
	61-65	50	17.61
	66-70	23	8.1
	71-75	3	1.06
	>75	1	0.35
Parity	1	219	77.11%
	2	64	22.54%
	3	1	0.35%

[Table/Fig-1]: Demographic details of the study population.

The majority of patients (n=140, 49.3%) were in the 38-38.6-week gestational age range, indicating that nearly half of the patients reached this stage of pregnancy [Table/Fig-2].

Gestational age (weeks)	No. of patients	Percentage
<37 week	1	0.35%
37-37.8 week	65	22.89%
38-38.8 week	140	49.3%
39-39.8 week	67	23.59%
40 week	11	3.87%
Total	284	100%

[Table/Fig-2]: Distribution of patients based on gestational age (weeks).

Specifically, for those who underwent LSCS, the majority of patients (52.19%, n=119) had a pregnancy interval of 2-2.9 years since their previous CS. In contrast, among those who delivered vaginally, the highest percentage (42.86%, n=24) had an interval of 3-3.9 years [Table/Fig-3].

Mode of delivery	Interval in pregnancy from previous LSCS	No. of patients	Percentage
LSCS	1-1.9 year	89	39.04%
	2-2.9 year	119	52.19%
	3-3.9 year	15	6.58%
	4-5 year	3	1.32%
	6 year	2	0.88%
	Total	228	100%
Vaginal	1-1.9 year	0	0%
	2-2.9 year	7	12.5%
	3-3.9 year	24	42.86%
	4-5 year	21	37.5%
	6 year	4	7.14%
	Total	56	100%

[Table/Fig-3]: Interval in pregnancy from previous LSCS.

Among patients who underwent LSCS, 43.42% (n=99) reported scar tenderness, while 56.58% (n=129) did not. In contrast, none of the patients who had a vaginal delivery experienced scar tenderness, with 100% (n=56) reporting no tenderness [Table/Fig-4].

Mode of delivery	Scar tenderness (Y/N)	No. of patients	Percentage
LSCS	Yes	99	43.42%
	No	129	56.58%
	Total	228	100%
Vaginal	Yes	0	0%
	No	56	100%
	Total	56	100%

[Table/Fig-4]: Distribution of patients based on scar tenderness.

For patients who delivered via LSCS (n=228), the majority exhibited the triangular pattern (n=180, 78.95%). In contrast, among those who had a vaginal delivery (n=56), nearly all patients demonstrated this triangular pattern (n=55, 98.21%), with only a minor percentage showing ballooning (n=1, 1.79%) [Table/Fig-5].

Mode of delivery	Triangular	No. of patients	Percentage
LSCS	Triangular	180	78.95%
	Ballooning	48	21.05%
	Total	228	100%
Vaginal	Triangular	55	98.21%
	Ballooning	1	1.79%
	Total	56	100%

[Table/Fig-5]: Distribution of patients based on mode of delivery.

The data indicate that for patients undergoing a LSCS, a scar thickness of ≤3 mm was observed in 194 patients (85.09%), while a scar thickness greater than 3 mm was observed in 34 patients (14.91%) (n=228). In contrast, among those who delivered vaginally, 12 patients had a scar thickness of less than 3 mm (21.43%), while 44 patients had a scar thickness greater than 3 mm (78.57%) (n=56). This suggests that scars with a thickness of less than 3 mm are associated with a higher likelihood of requiring a repeat LSCS, whereas, thicker scars (greater than 3 mm) are more often seen in patients with successful vaginal deliveries [Table/Fig-6].

Mode of delivery	Scar thickness (mm)	No. of patients	Percentage
LSCS	≤3 mm	194	85.09%
	>3 mm	34	14.91%
	Total	228	100%
Vaginal	≤3 mm	12	21.43%
	>3 mm	44	78.57%
	Total	56	100%

[Table/Fig-6]: Distribution of patients based on scar thickness.

Among patients who underwent a LSCS, 75.44% (n=172) had continuous scars, while 24.56% (n=56) had discontinuous scars (indicating areas of disruption, thinning, or incomplete healing in a previous LSCS scar). In contrast, among patients who delivered vaginally, 92.86% (n=52) had continuous scars, and only 7.14% (n=4) had discontinuous scars [Table/Fig-7].

Mode of delivery	Scar continuity	No. of patients	Percentage
LSCS	Continuous	172	75.44%
	Discontinuous	56	24.56%
	Total	228	100%
Vaginal	Continuous	52	92.86%
	Discontinuous	4	7.14%
	Total	56	100%

[Table/Fig-7]: Distribution of patients based on scar continuity.

Among patients who underwent a LSCS, 71.05% (n=162) had a smooth outer scar border. In contrast, among patients who delivered vaginally, 92.86% (n=52) had a smooth outer scar border. This indicates that smooth outer scar borders is associated with a higher rate of vaginal delivery, whereas irregular borders are more commonly linked to the need for repeat LSCS [Table/Fig-8].

Mode of delivery	Outer scar border	No. of patients	Percentage
LSCS	Smooth	162	71.05%
	Irregular	66	28.95%
	Total	228	100%
Vaginal	Smooth	52	92.86%
	Irregular	4	7.14%
	Total	56	100%

[Table/Fig-8]: Distribution of patients based on outer scar border.

Among patients who underwent a LSCS, 74.56% (n=170) exhibited hyperechoic scars, indicating a higher density or reflection of ultrasound waves. In contrast, 5.26% (n=12) had isoechoic scars, and 20.18% (n=46) presented with hypoechoic scars, suggesting varied levels of scar tissue density and healing. For patients who delivered vaginally, all presented with hyperechoic scars (100%, n=56), while no cases of isoechoic or hypoechoic scars were observed. This indicates that LSCS scars have a wider range of echogenicity compared to vaginal delivery scars, which are uniformly hyperechoic. The distribution suggests that hyperechoic scars may be associated with successful vaginal delivery, whereas isocehoic and hypoechoic scars are more commonly linked to repeat LSCS [Table/Fig-9].

Mode of delivery	Scar echogenicity	No. of patients	Percentage
LSCS	Hyperechoic	170	74.56%
	Isoechoic	12	5.26%
	Hypoechoic	46	20.18%
	Total	228	100%
Vaginal	Hyperechoic	56	100%
	Isoechoic	0	0%
	Hypoechoic	0	0%
	Total	56	100%

[Table/Fig-9]: Distribution of patients based on scar echogenicity.

[Table/Fig-10] presents the history of vaginal delivery following LSCS. Among patients with a history of LSCS, the majority, 227 out of 228 (99.56%), did not have a vaginal delivery after the LSCS. Only 1 patient (0.44%) had a vaginal delivery following the LSCS. Among those who had a vaginal delivery, 42 patients (75%) did not experience a subsequent vaginal delivery after an LSCS, while 14 patients (25%) did.

Mode of delivery	H/O Vaginal delivery after LSCS	No. of patients	Percentage
LSCS	No	227	99.56%
	Yes	1	0.44%
	Total	228	100%
Vaginal	No	42	75%
	Yes	14	25%
	Total	56	100%

[Table/Fig-10]: Distribution of patients based on history of vaginal delivery after LSCS.

The majority of patients, 117 (53.31%), were classified with Grade I scars. Grade II scars were observed in 67 patients (29.38%), while Grade III scars were seen in 37 patients (16.22%). Only 7 patients (3.07%) had Grade IV scars. This distribution suggests that most patients experienced less severe scarring, with Grade I being the most common [Table/Fig-11].

Among mothers with a scar thickness of ≤3 mm, a total of 157 cases (76.59%) had no complications. Among the remaining participants, the most common complication was Postpartum

Intraoperative grade scar	No. of patients	Percentage
I	117	51.31%
II	67	29.38%
III	37	16.22%
IV	7	3.07%
Total	228	100%

[Table/Fig-11]: Distribution of patients based on the intraoperative grade of scar.
Note: The intraoperative classification of uterine scar integrity was based on the extent of damage to the scar and the uterine wall. Since this is the intraoperative grading, therefore only LSCS cases were accounted for

Haemorrhage (PPH), occurring in 13.59% (n=28), followed by bladder injury at 3.88% (n=8). Other complications, such as obstetric hysterectomy and wound gaping, were less frequent, at 3.39% (n=7) and 2.42% (n=5), respectively. In contrast, among mothers with a scar thickness of >3 mm, 68 cases (87.17%) had no complications, while PPH occurred in 12.82% (n=10) of cases, with no reported instances of bladder injury, obstetric hysterectomy, or wound gaping. The total percentage of complications was higher in the group with a scar thickness of ≤3 mm. This indicates that, while PPH remains a notable complication in both groups, other complications are less prevalent in those with a thicker scar [Table/Fig-12].

Complications to mother	Scar thickness (mm)			
	≤3 mm	%	>3 mm	%
No complication	158	76.69%	68	87.17%
Bladder injury	8	3.88%	0	0%
PPH	28	13.59%	10	12.82%
Obstetric hysterectomy	7	3.39%	0	0%
Wound gape	5	2.42%	0	0%
Total	206	100%	78	100%

[Table/Fig-12]: Distribution of patients based on complications to mother.

[Table/Fig-13] presents the distribution of intraoperative grading for elective and emergency LSCS cases. Intraoperative Grade I was observed in 50 elective LSCS cases (86.2%) and 67 emergency LSCS cases (39.4%). No elective LSCS cases were classified as Grade III or IV, while 36 emergency LSCS cases (21.2%) were grade III and 6 emergency cases (3.5%) were Grade IV. This distribution highlights that intraoperative grading is more frequently higher in emergency LSCS compared to elective LSCS.

Intraoperative grade of scar	Number of elective LSCS cases n (%)	Number of emergency LSCS cases n (%)
Normal (Grade-I)	50 (86.20%)	67 (39.41%)
Thinned-out (Grade-II)	8 (13.80%)	61 (35.88%)
Dehiscent (Grade-III)	0	36 (2.17%)
Ruptured (Grade-IV)	0	6 (3.52%)
Total	58 (100%)	170 (100%)

[Table/Fig-13]: Distribution of intraoperative scar based on LSCS.

DISCUSSION

This study focused on analysing the uterine LSCS scar through ultrasonography and evaluating its correlation with maternal and perinatal outcomes. The findings provide meaningful insights when compared to other recent studies.

The study showed that shorter intervals (1-2.9 years) were more common among patients undergoing repeat LSCS, while longer intervals (3-3.9 years) were linked to vaginal deliveries. Studies by Lannon SMR et al., support these findings, suggesting that shorter intervals between CSs increase the risk of uterine rupture, which often necessitates repeat LSCS [17]. Longer intervals, on the other hand, allow for better uterine healing, increasing the likelihood of successful VBAC, as reported by Huang WH et al., and Gulersen M et al., [18,19].

Scar tenderness was observed in 43.42% of LSCS patients. This is consistent with findings by Patil P et al., which showed that tenderness in previous caesarean scars is a significant predictor of uterine rupture during labour [16]. An extensive review by Lieberman suggests that scar tenderness, along with other factors such as multiple previous caesarean scars, labour induction, a short inter-delivery interval, or a history of postpartum fever following a prior caesarean, increases the risk of uterine rupture [20]. This is supported by another study by Gaikwad HS et al., which reports the sensitivity, specificity, and accuracy of scar tenderness as a predictor of scar complications were 92.3%, 3.8%, and 33.3%, respectively, with a likelihood ratio of 1.48. The high percentage of scar tenderness in this study correlates with the increased rate of repeat LSCS [21].

In this study, a triangular pattern of the LUS was associated with a 98.21% success rate for vaginal delivery, while ballooning was more common in repeat LSCS cases (21.05%). This finding aligns with the study by Rozenberg P et al., which demonstrated that a triangular pattern on ultrasound is predictive of successful VBAC, while ballooning increases the risk of uterine rupture, leading to repeat caesarean delivery [14]. Similarly, in the study by Kalyankar B et al., cases with scar thickness of less than 3 mm frequently exhibited a ballooning pattern of the scar, observed in 60 cases, indicating a higher risk for uterine rupture. Conversely, in cases with scar thickness greater than 3 mm, a triangular shape was noted in 102 cases, suggesting better scar integrity and a higher likelihood of successful vaginal delivery. Both the present study and the Kalyankar B et al., study emphasise that scar shape and thickness are critical factors in predicting delivery outcomes, with triangular patterns and thicker scars being strongly associated with successful VBAC, while ballooning patterns and thinner scars indicate higher risks, often leading to repeat LSCS [22].

In the present study, 85.09% of patients with scar thickness of less than 3 mm underwent repeat LSCS. These results are consistent with findings from Kalyankar B et al., where 39.3% of patients had scar thickness ≤3 mm and were advised to undergo elective LSCS [22]. Moreover, the findings from Rozenberg P et al., and Kaur D and Singh H further corroborate this, with their respective studies establishing a scar thickness cutoff of 3.5 mm for determining the risk of uterine rupture [14,23].

Continuous scars were more common in vaginal deliveries (92.86%), while discontinuous scars were more prevalent in LSCS cases (24.56%). The present study was consistent with the findings of Kalyankar B et al., where discontinuous scars were associated with a higher risk of rupture or dehiscence, and smooth scar borders were indicative of better healing and a higher likelihood of VBAC [22]. Fu L et al., did not directly address scar continuity in patients with Caesarean Scar Pregnancy (CSP) but did report that type III CSP, where the gestational sac extends beyond the outer contour of the uterus, was associated with outcomes [24]. This type of CSP suggests more significant erosion of the uterine wall, similar to the discontinuity observed in LSCS scars in the present study. Both studies agree that a lack of scar continuity or integrity is associated with worse poorer outcomes whether through an increased risk of uterine rupture or postpartum complications.

Smooth scar borders were more common in vaginal deliveries (92.86%) than in LSCS (71.05%). This finding is consistent with previous studies that have also shown that irregular scar borders are predictors of complications during labour, often leading to repeat LSCS [25,26]. Hyperechoic scars were observed in all patients who delivered vaginally (100%). The present study aligns with the findings of Kalyankar B et al., where hyperechoic scars were associated with better healing and successful VBAC outcomes [22].

Grade I scars were predominant in elective LSCS cases (86.2%), while emergency LSCS exhibited a higher frequency of Grade III and IV scars. Studies by Patil P et al., similarly found that planned caesareans are associated with better scar grades compared to emergency procedures [16]. In the study conducted by Kalyankar B et al., the intraoperative grading of the LUS during LSCS was distributed as follows: Among elective LSCS cases, 24.09% had a normal, well-developed LUS (Grade I), while 48.98% showed thinning of the LUS (Grade II), indicating a higher risk of complications. Additionally, 27.71% of cases had scar dehiscence (Grade III), and 1.20% experienced scar rupture (Grade IV), which is a more severe complication. In emergency LSCS cases, the majority (56.52%) had a normal LUS (Grade I), while 34.78% presented with LUS thinning (Grade II). Only a small percentage had scar dehiscence (8.69%), and none experienced scar rupture [22].

In the comparison of studies regarding maternal complications, the incidence of PPH and obstetric hysterectomy varied across different research. In the study by Landon MB et al., the rate of obstetric hysterectomy was reported at 0.26%, although PPH was not mentioned [27]. Conversely, Tan PC et al., reported a 5% incidence of PPH and a much lower rate of hysterectomy at 0.04% [28]. In contrast, the present study reported a lower PPH rate of 0.47% and no hysterectomies, demonstrating better outcomes in managing severe complications such as PPH and avoiding hysterectomies.

The findings of this study align with and expand upon existing literature on the ultrasonographic evaluation of LSCS scars. Scar thickness, continuity, echogenicity, and scar patterns significantly impact delivery outcomes, with thicker, continuous, and hyperechoic scars being associated with a better chance of successful vaginal deliveries. The study confirms that ultrasonography is a crucial tool for predicting maternal and perinatal outcomes in patients with previous CSs.

CONCLUSION(S)

The findings highlighted that thicker, continuous, and hyperechoic scars were associated with successful VBAC, while thinner, discontinuous, and ballooning scars were linked to higher rates of repeat CSs due to concerns about uterine rupture or scar dehiscence. Ultrasonographic monitoring of LSCS scars proved valuable in guiding clinical decisions regarding Trial Of Labour After Caesarean (TOLAC) or elective CSs, thereby reducing the risk of complications such as PPH and improving maternal and neonatal health. Future directions include developing standardised ultrasonographic criteria for LSCS scar evaluation, integrating these criteria into routine prenatal care, and enabling better risk stratification and personalised management for women with a history of CS. Advancements in ultrasound technology and techniques may enhance the accuracy and predictive value of LSCS scar assessments ultimately, improving delivery practices and health outcomes.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Dec 22, 2024
- Manual Googling: Apr 10, 2025
- iThenticate Software: Apr 12, 2025 (11%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Dec 21, 2024**
Date of Peer Review: **Feb 13, 2025**
Date of Acceptance: **Apr 14, 2025**
Date of Publishing: **May 01, 2025**