



Association between caesarean scar defect and abnormal uterine bleeding among women with previous caesarean section: A prospective observational study.

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Abstract

Background

Abnormal uterine bleeding (AUB) in women with previous caesarean deliveries is increasingly attributed to caesarean scar defect (CSD), commonly known as "isthmocoele." It may result in irregular menstruation and is attributable to inadequate healing of the uterine incision.

Aim: To assess the relationship between irregular uterine bleeding and caesarean scar defects.

Methods

A one-year prospective observational research study involved one hundred women who had previously undergone caesarean sections. The caesarean scar malformation was identified using transvaginal ultrasonography. The occurrence of abnormal uterine bleeding was assessed in the patients. The chi-square test was employed for statistical analysis, with $p < 0.05$ considered statistically significant.

Results

A caesarean scar defect was present in 45 out of the 100 women. In contrast to 12 (21.8%) women without CSD, 30 (66.7%) women with CSD experienced abnormal uterine bleeding. The statistical study indicated a highly significant correlation ($p = 0.000015$).

Conclusion

Abnormal uterine bleeding is strongly associated with a caesarean scar defect. Enhanced management of abnormal uterine bleeding (AUB) in women with a history of caesarean deliveries may be achievable with the early identification of caesarean scar defects (CSD), facilitating prompt interventions and improved patient outcomes.

Recommendations

Routine evaluation for caesarean scar defects using transvaginal ultrasonography should be considered in women presenting with abnormal uterine bleeding after a previous caesarean delivery.

Keywords: Abnormal uterine bleeding, Caesarean delivery, Caesarean scar defects, Transvaginal ultrasonography, Uterine hemorrhage

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Introduction

Caesarean scar defect (CSD), also known as isthmocoele or niche, is a pouch-like defect that appears at the site of a previous caesarean section scar in the lower uterine segment. It is caused by insufficient healing of the myometrial incision, which leads to thinning or atrophy of the myometrium at the scar site. This deficiency may cause menstrual blood to accumulate within the niche, resulting in delayed clearance and a variety of gynaecological problems. Abnormal uterine bleeding (AUB) refers to any variation from typical monthly patterns in terms of frequency, duration, or volume, and encompasses problems such as heavy menstrual flow, intermenstrual bleeding, and protracted or irregular cycles (1).

Long-term consequences such as CSD are becoming more widely recognised as global caesarean delivery rates rise. Although caesarean section is a life-saving treatment, it is associated with several complications, including CSD, which has emerged as a clinically relevant but frequently underdiagnosed illness (2). Women with CSD frequently report symptoms such as postmenstrual spotting, intermenstrual bleeding, pelvic pain, and secondary infertility. AUB is the most common complaint and can have a substantial impact on quality of life, including physical discomfort, mental distress, and impaired daily functioning (3).

The pathophysiology of AUB in CSD is mostly due to the retention of menstrual blood within the scar defect, which causes delayed or irregular bleeding. Despite its clinical significance, CSD is frequently overlooked during routine screening of women with a history of caesarean section who present with irregular bleeding. This can lead to a delayed diagnosis and ineffective treatment (4).

Management of these symptoms necessitates a comprehensive and tailored strategy. Treatment options may include hormonal medication, surgical correction of the problem, or lifestyle changes, depending on the severity of the symptoms and the patient's preferences. Therefore, early detection of caesarean scar abnormalities in women with prior caesarean deliveries presenting with AUB is critical (5). Understanding the link between CSD and irregular uterine bleeding can help to improve diagnostic accuracy and recommend appropriate treatment options. The current study is to assess, in a prospective clinical context, the link between caesarean scar abnormalities and abnormal uterine bleeding in women with a history of caesarean section (6).

Methods

Study design

This hospital-based prospective observational study was conducted to evaluate the association between caesarean scar defect (CSD) and abnormal uterine bleeding (AUB) among women with a previous history of caesarean section. Eligible participants were consecutively recruited and followed during the study period. The presence of CSD was assessed using transvaginal ultrasonography, and its association with abnormal uterine bleeding was analysed.

Study duration

The study was conducted over a period of one year, from June 2024 to May 2025.

Study setting

The study was conducted in the Department of Obstetrics and Gynaecology, Sri Krishna Medical College and Hospital (SKMCH), Muzaffarpur, Bihar, India. SKMCH is a tertiary care teaching hospital that provides comprehensive obstetric and gynaecological services, including antenatal care, high-risk pregnancy management, operative deliveries, infertility evaluation, and advanced diagnostic imaging facilities. The hospital caters to patients from Muzaffarpur and the surrounding districts of North Bihar.

Participant selection

Women attending the Department of Obstetrics and Gynaecology with a history of at least one previous caesarean section were screened for eligibility. Consecutive sampling was employed, and eligible women who fulfilled the inclusion criteria and provided informed consent were recruited until the required sample size of 100 participants was achieved.

Sample size

The sample size of 100 participants was determined based on the average number of eligible patients attending the department during the study period and the feasibility of completing detailed ultrasonographic assessments within the available resources and time frame.

Inclusion criteria

- History of at least one caesarean section
- Age 20–45 years
- Regular follow-up



Exclusion criteria

- Coagulopathy
- Fibroids or adenomyosis
- Endometrial pathology
- Hormonal therapy use
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Bias statement

To minimize selection bias, all eligible women presenting during the study period were consecutively enrolled. Standardized clinical assessment and transvaginal ultrasonography protocols were used for all participants. Data collection was performed using a structured proforma to reduce information bias.

Data collection

Demographic characteristics, obstetric history, number of previous caesarean sections, menstrual history, and abnormal uterine bleeding symptoms were recorded using a structured questionnaire. Transvaginal ultrasonography was performed to identify the presence or absence of caesarean scar defects. Data were entered into a predefined data

collection sheet and verified for completeness before analysis.

Ethical considerations

Ethical approval for the study was obtained from the Institutional Ethics Committee of Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar.

Statistical analysis

The Chi-square test was used in statistical analysis to evaluate the relationship between the variables. A p-value of less than 0.05 was deemed statistically significant, and a 95% confidence range was computed.

Results

A total of 118 women with previous caesarean section were screened. Twelve women did not satisfy the eligibility criteria, and six declined participation. Consequently, 100 women were enrolled and completed the study and were included in the final analysis.

A total of 100 women with a previous history of caesarean section were enrolled and analyzed in this prospective observational study.

Table 1. Distribution of caesarean scar defect among study participants

Variable	Frequency (n)	Percentage (%)
CSD Present	45	45.0
CSD Absent	55	55.0
Total	100	100.0

Table 1 shows that 45 (45.0%) women had a caesarean scar defect (CSD) detected on transvaginal ultrasonography, whereas 55 (55.0%) women did not demonstrate any scar defect.

Table 2. Association between caesarean scar defect and abnormal uterine bleeding

Group	Total (n)	AUB Present n (%)	AUB Absent n (%)
CSD Present	45	30 (66.7)	15 (33.3)
CSD Absent	55	12 (21.8)	43 (78.2)

Statistical Analysis: $\chi^2 = 20.24$, $p < 0.001$

Among the 45 women with caesarean scar defects, 30 (66.7%) experienced abnormal uterine bleeding, while only 12 (21.8%) of the 55 women without scar defects reported abnormal uterine bleeding. Conversely, the absence of

abnormal uterine bleeding was observed in 15 (33.3%) women with CSD and 43 (78.2%) women without CSD. Chi-square analysis demonstrated a highly significant association between caesarean scar defect and abnormal

uterine bleeding ($\chi^2 = 20.24$, $p < 0.001$). Women with CSD were considerably more likely to experience abnormal uterine bleeding compared with those without CSD.

Figure 1: Association between caesarean scar defect and AUB

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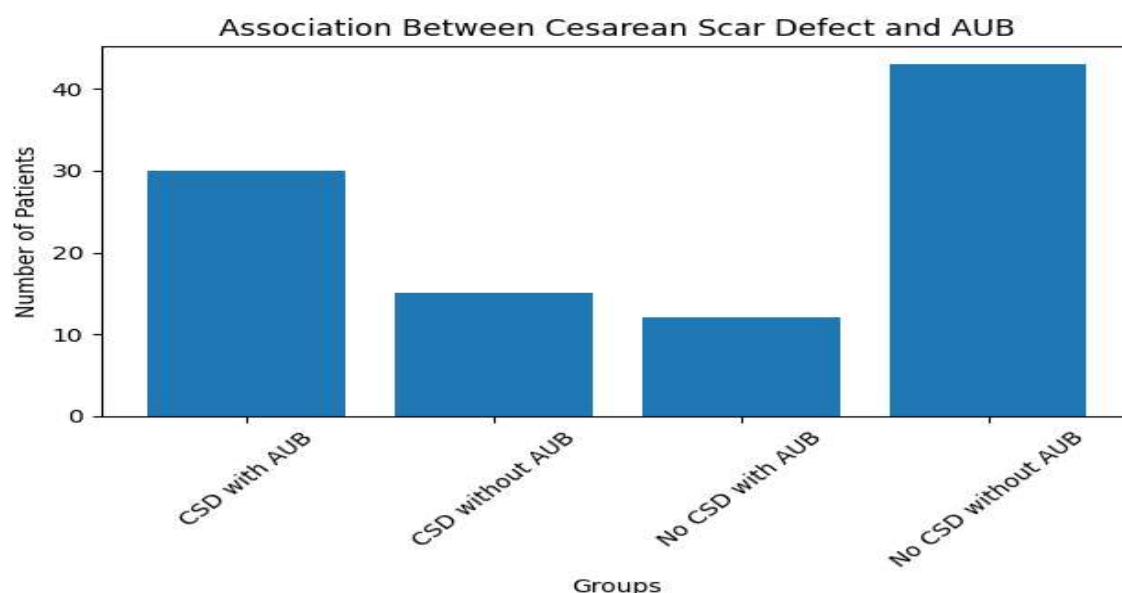


Figure 1 illustrates the significantly higher prevalence of abnormal uterine bleeding among women diagnosed with caesarean scar defects.

Discussion

The current study shows that among women who have had a caesarean section, there is a significant correlation between abnormal uterine bleeding (AUB) and caesarean scar defect (CSD). Only 21.8% of women without CSD reported abnormal uterine bleeding (AUB), compared to 66.7% of women with CSD in this study. The statistically significant p-value further supports the high correlation between irregular uterine bleeding and caesarean scar abnormalities (7).

It is believed that multiple pathways are involved in the pathophysiology of AUB in women with CSD. Menstrual blood may pool and become retained if there is a niche or pouch at the location of the caesarean scar (8). Prolonged spotting and delayed menstruation clearing could be the outcome of this retained blood. Incomplete menstrual blood evacuation may also result from myometrial weakening at the scar location, which may affect normal uterine contractility (9). Persistent local inflammation surrounding

the scar defect may also cause unusual bleeding patterns (10).

The current study's results are in line with earlier research, which found that women with caesarean scar abnormalities saw more postmenstrual spotting. Previous research has also shown that surgical correction, such as hysteroscopic repair, can greatly alleviate bleeding problems and that greater scar abnormalities are linked to more severe symptoms (11).

The findings underscore the importance of evaluating women with a history of caesarean section for potential CSD when they present with abnormal uterine bleeding. To minimize long-term consequences and enable prompt medical or surgical therapy, transvaginal ultrasonography is a useful and easily accessible diagnostic technique for early identification (3).

The findings suggest that abnormal uterine bleeding is considerably more common among women with caesarean scar defects. The accumulation of menstrual blood within the scar niche and impaired uterine contractility may explain



this association. These findings support previous studies reporting increased postmenstrual spotting and abnormal bleeding among women with CSD.

Generalizability

Since the study was conducted in a tertiary care hospital serving a large population, the findings may apply to similar hospital-based populations. However, caution should be exercised when extrapolating the results to community settings.

Limitations

The study was conducted at a single centre and included a relatively small sample size. The findings may therefore not represent all populations. Additionally, long-term follow-up was not performed to evaluate symptom progression or treatment outcomes.

Recommendation

Routine evaluation for caesarean scar defects using transvaginal ultrasonography should be considered in women presenting with abnormal uterine bleeding after a previous caesarean delivery. Larger multicentre studies are recommended to further validate these findings.

Conclusion

In women with a history of caesarean section, a significant association exists between abnormal uterine bleeding (AUB) and caesarean scar defect (CSD). Consequently, it is essential to assess for the presence of CSD in women presenting with AUB after a prior caesarean delivery. The quality of a patient's life can be improved through timely intervention and symptom alleviation facilitated by early diagnosis using appropriate imaging techniques. It is recommended that additional multicentric research with bigger sample sizes be conducted to enhance the existing data and attain a clearer comprehension of this association.

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Conflict of interest

The authors declare no conflict of interest.

Data availability

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

Author contributions

AK: Conceptualization, data collection, manuscript preparation.

PS: Supervision, methodology, manuscript review.

P: Data interpretation, statistical analysis, manuscript editing.

List of abbreviations

AUB Abnormal Uterine Bleeding

CSD Caesarean Scar Defect

TVS Transvaginal Sonography

CS Caesarean Section

Author biography

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References

1. Kayikcioglu SE and F. Development of the Er-Kay Classification: A Novel Volume-Based Assessment of Caesarean Scar Defects and Their Association with Abnormal Uterine Bleeding. *J Clin Med.* 2025;14(1-13).
<https://doi.org/10.3390/jcm14186592> PMID:41010796
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2. El-samie AA, Fawzy RA, El-baradie SMY, El-fattah LEA. Relationship and Prevalence of Uterine Scar Defects (Niches) With Cases of Abnormal Uterine Bleeding. Clin Obstet Gynecol Res. 2024;3(1):1-8.
3. Abhishek S, Shreevijay B, Sona M, Kulkarni S. Case Report Abnormal uterine bleeding in a woman with caesarean scar defect (isthmocele): a case report. Int J Reprod Contraception, Obstet Gynecol. 2022;11(5):1608-11. <https://doi.org/10.18203/2320-1770.ijrcog20221307>
4. Kumari T, Sinha A. Association of Caesarean Scar Defect with Abnormal Uterine Bleeding: The Results of a Prospective Study. Int J Curr Pharm Rev Res. 2025;17(2):1187-92.
5. Saifaldeen S, Damra A, Yasir A, Abdalla H, Awad S, Farah F, et al. A Systematic Review on Caesarean Niche and Postmenstrual Spotting Syndrome: The Scar That Speaks. Cureus. 2025;17(12):1-13.
6. Ally Murji, Ari P Sanders, Ilza Monteiro, Shabbir Haiderbhai, John Matelski, Chris Walsh, Jason A Abbott, Malcolm G Munro SM. Caesarean scar defects and abnormal uterine bleeding: a systematic review and meta-analysis. Fertil Steril [Internet]. 2022;118(4):758-66. Available from: <https://doi.org/10.1016/j.fertnstert.2022.06.031> PMID:35985862
7. Riitta M. Antila-Långsjö, Johanna U. Mäenpää, Heini S. Huhtala, Eija I. Tomás SM. Caesarean scar defect: a prospective study on risk factors. Am J Obstet Gynecol [Internet]. 2018;219(5):458.e1-458.e8. <https://doi.org/10.1016/j.ajog.2018.09.004> PMID:30240650
8. Xu X, Jia J, Sang Z, Li L. Association of caesarean scar defect with risk of abnormal uterine bleeding: results from meta-analysis. BMC Women's Health. 2024;24:1-9. <https://doi.org/10.1186/s12905-024-03198-6> PMID:39075427 PMCID:PMC11285571
9. Yanpeng Wang, Yongshu Han, Xiaoyan Guo, Qianqian Wei, Yan Xia, Leilei Gao, Huihua Wang, Xue Lu JS. Caesarean Scar Endometrial Defects Contribute to Post-Caesarean Abnormal Uterine Bleeding and Chronic Endometritis: A Retrospective Case-Control Study. BJOG. 2025;132(2):132-9. <https://doi.org/10.1111/1471-0528.18089> PMID:39918213 PMCID:PMC11997634
10. Amulya G, Syamala O. Association of caesarean scar defects in abnormal uterine bleeding: A clinical study. Int J Clin Obstet Gynaecol. 2025;9(6):132-6. <https://doi.org/10.33545/gynae.2025.v9.i6b.1739>
11. Singh D, Arya S, Jain S, Singh R. Association of Caesarean Scar Defect with Abnormal Uterine Bleeding: The Results of A Prospective Study. Int J Curr Pharm Rev Res. 2025;17(2):996-9.

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