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Clinical Presentation, Ultrasound Characteristics, and Management Outcomes of Caesarean Scar Pregnancy: A 12-Case Series

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Abstract: ***Background**: Caesarean scar pregnancy (CSP) is an uncommon form of ectopic implantation associated with severe haemorrhage, uterine rupture, placenta accreta spectrum, and loss of fertility. Because presentation and available treatment options are heterogeneous, detailed institutional case series remain clinically informative. **Methods**: We reviewed 12 women diagnosed with CSP and recorded demographic characteristics, obstetric history, presenting symptoms, transvaginal ultrasound findings, serum beta-human chorionic gonadotropin (beta-hCG), haemoglobin, management, operative findings, transfusion, intensive care admission, and length of hospital stay. Data were summarised descriptively. **Results**: The mean age was 31.8 +/- 3.6 years. Seven women (58.3%) had vaginal bleeding, six (50.0%) had abdominal pain, and five (41.7%) were diagnosed incidentally. None presented with syncope, shock, abdominal tenderness, or sonographic haemoperitoneum. All had an empty uterine cavity and cervical canal with a gestational sac at the previous cesarean scar. Median gestational age was 6+4 weeks (range 5+3-9+5), median beta-hCG was 7,501 IU/L (range 207-111,505), fetal cardiac activity was present in 4 (33.3%), and median residual myometrial thickness was 3.0 mm (range 2.0-10.0). Eight women (66.7%) received primary medical management with systemic methotrexate and four (33.3%) underwent surgical or combined treatment. Surgical procedures included laparoscopy (n=3), laparotomy (n=1), suction evacuation (n=2), uterine artery embolisation (n=1), Foley balloon tamponade (n=1), scar repair (n=1), and hysterectomy (n=1). One woman required blood transfusion; no intensive care admission or postoperative complication was documented. Median hospital stay was 11 days (range 2-20). **Conclusion**: Early transvaginal ultrasound enabled diagnosis before haemodynamic compromise in this series. Management was individualised according to viability, beta-hCG, myometrial thickness, and operative findings. Standardised ultrasound reporting and documentation of serial beta-hCG resolution, reintervention, and reproductive outcomes are essential for comparing treatment strategies.*

Keywords: ceasarean scar pregnancy, ectopic pregnancy, methotrexate, transvaginal ultrasonography, previous ceasarean

1. Introduction

Caesarean scar pregnancy (CSP), also termed cesarean scar ectopic pregnancy, is implantation of an early pregnancy within or in close contact with a previous cesarean scar niche. Although uncommon, it is clinically important because progressive trophoblastic invasion into a poorly developed myometrial layer can result in massive haemorrhage, uterine rupture, placenta accreta spectrum, hysterectomy, and maternal death (1-3). The frequency of CSP is expected to rise as cesarean delivery rates increase and first-trimester transvaginal ultrasound becomes more widely available.

Diagnosis is primarily sonographic. Classical features include an empty endometrial cavity and cervical canal, a gestational sac embedded in the anterior lower uterine segment at the level of the cesarean scar, and a thin or absent myometrial layer between the sac and urinary bladder. Colour Doppler assessment of peritrophoblastic vascularity and systematic measurement of the residual myometrial thickness improve diagnostic confidence and assist treatment planning. (4-6) Standardised sonographic terminology is increasingly emphasised because inconsistent definitions and incomplete reporting limit comparison between studies.

There is no single treatment suitable for all patients. Reported options include local or systemic methotrexate (MTX), ultrasound-guided uterine aspiration, hysteroscopy, laparoscopy, transvaginal resection, laparotomy, uterine artery embolization (UAE), balloon tamponade, and combinations of these approaches.(3,7,8) Choice of treatment is influenced by hemodynamic stability, symptoms, gestational age, fetal cardiac activity, beta-hCG concentration, residual myometrial thickness, direction of sac growth, vascularity, fertility preference, and local expertise. Current Society for Maternal-Fetal Medicine guidance recommends against expectant management and against systemic MTX alone, favouring operative resection, ultrasound-guided aspiration, or intragestational MTX with or without adjunctive therapy. (3)

This case series describes the clinical presentation, ultrasound findings, management, and short-term outcomes of 12 women with CSP treated at a single institution. It also identifies data elements that should be captured prospectively to enable meaningful evaluation of treatment success.

2. Materials and Methods

Study design and setting

This was a retrospective descriptive case series of 12 women diagnosed and treated for CSP at Goa Medical college between January 2025 and December 2025. The draft was prepared using CARE reporting principles adapted for a case series. (9)

Case identification and diagnostic criteria

Cases were identified from departmental clinical records. CSP was diagnosed by transvaginal ultrasound in a woman with at least one previous cesarean delivery when the recorded examination demonstrated: (1) an empty uterine cavity; (2) an empty cervical canal; and (3) a gestational sac implanted at the previous lower-segment cesarean scar. Fetal cardiac activity, sac size or crown-rump length, residual myometrial thickness, and haemoperitoneum were recorded where available. The available data set did not contain colour Doppler vascularity, niche dimensions, sac-to-bladder distance, or a formal CSP sub-type.

Variables and outcomes

Extracted variables included age, gravidity, parity, abortion history, number and indication of previous cesarean deliveries, interval from the last cesarean delivery, prior dilatation and curettage, mode of conception, gestational age, presenting symptoms and vital signs, haemoglobin, beta-hCG, blood group, ultrasound findings, treatment modality, MTX route and dose, surgical procedures, operative findings, transfusion, recorded complications, intensive care admission, and hospital stay. Patient names were removed and replaced by study case numbers.

The principal descriptive outcomes were type of initial management, need for surgical intervention, hysterectomy, transfusion, intensive care admission, recorded postoperative complications, and length of hospital stay. Serial beta-hCG values, time to sonographic resolution, readmission, delayed haemorrhage, subsequent fertility, and recurrence were not available in the source file and therefore were not analysed.

Statistical analysis

Continuous variables are reported as mean +/- standard deviation when approximately symmetric and as median with range when skewed. Categorical variables are reported as number and percentage. Because of the small sample size and descriptive objective, no hypothesis testing was performed.

Ethical considerations

Ethics approval: All manuscript tables use anonymize case identifiers and contain no direct patient identifiers.

3. Results

Baseline characteristics and clinical presentation

The series included 12 women with a mean age of 31.8 +/- 3.6 years (range 27-39). Five (41.7%) had one previous cesarean delivery and seven (58.3%) had two. The median interval from the most recent cesarean delivery was 3 years (range 1-10); six women (50.0%) had at least one previous dilatation and curettage. All conceptions were recorded as spontaneous.

Vaginal bleeding was the most frequent symptom (7 (58.3%)), followed by abdominal pain (6 (50.0%)). Five women (5 (41.7%)) were diagnosed incidentally. Three (3 (25.0%)) had pallor. No woman had syncope, shock, abdominal tenderness, or sonographic haemoperitoneum at presentation. Mean haemoglobin was 11.9 +/- 1.7 g/dL (range 8.2-14.1).

Ultrasound and biochemical findings

All 12 cases had the diagnostic triad of an empty uterine cavity, an empty cervical canal, and a gestational sac at the previous cesarean scar. Median gestational age was 6+4 weeks (range 5+3-9+5). Fetal cardiac activity was present in 4 women (33.3%). Median beta-hCG was 7,501 IU/L (range 207-111,505), and median residual myometrial thickness was 3.0 mm (range 2.0-10.0).

Treatment and short-term outcomes

Eight women (66.7%) received primary medical management with systemic MTX; five received a single dose and three received two doses. Four women (33.3%) underwent surgical or combined management. Two of these four also received systemic MTX. Overall, systemic MTX was used in 10 women (83.3%): five received a single dose and five received two doses.

The median beta-hCG concentration was 4,126 IU/L in the primary medical group and 60,878 IU/L in the surgical/combined group. Fetal cardiac activity was present in 1/8 medically managed cases and 3/4 surgically managed cases. Median hospital stay was 6 days in the medical group and 14 days in the surgical/combined group. These comparisons are descriptive and were not subjected to statistical testing.

Surgical procedures included laparoscopy in 3 cases, laparotomy in 1, suction evacuation in 2, UAE in 1, Foley balloon tamponade in 1, scar repair in 1, and hysterectomy in 1. Scar bulging was documented in three surgical cases, scar dehiscence in two, and bladder adhesions in all four. No scar rupture or active intraoperative bleeding was recorded. One woman required blood transfusion. No intensive care admission or postoperative complication was documented. Median hospital stay for the entire cohort was 11 days (2-20).

Table 1: Baseline characteristics, presentation, ultrasound findings, and outcomes (N=12)

Characteristic	Value
Age, years, mean +/- SD	31.8 +/- 3.6
One previous cesarean delivery	5 (41.7%)
Two previous caesarean deliveries	7 (58.3%)
Interval since last cesarean, years, median (range)	3 (1-10)
Previous dilatation and curettage	6 (50.0%)
Gestational age, weeks+days, median (range)	6+4 (5+3-9+5)
Abdominal pain	6 (50.0%)
Vaginal bleeding	7 (58.3%)
Incidental diagnosis	5 (41.7%)
Pallor	3 (25.0%)
Haemoglobin, g/dL, mean +/- SD	11.9 +/- 1.7

beta-hCG, IU/L, median (range)	7,501 (207-111,505)
Fetal cardiac activity present	4 (33.3%)
Residual myometrial thickness, mm, median (range)	3.0 (2.0-10.0)
Primary medical management	8 (66.7%)
Surgical/combined management	4 (33.3%)
Systemic methotrexate used	10 (83.3%)
Blood transfusion	1 (8.3%)
Hysterectomy	1 (8.3%)
ICU admission	0 (0.0%)
Hospital stay, days, median (range)	11 (2-20)

Data are n (%) unless otherwise stated. beta-hCG, beta-human chorionic gonadotropin; ICU, intensive care unit; SD, standard deviation.

4. Discussion

This 12-case series demonstrates that CSP may be detected before haemodynamic deterioration when clinicians maintain a high index of suspicion and perform early transvaginal ultrasound in women with a prior cesarean delivery. Although vaginal bleeding and abdominal pain were common, 41.7% of cases were found incidentally, and none presented with shock, syncope, or haemoperitoneum. This finding reinforces the value of actively documenting implantation site during early pregnancy scanning rather than relying on symptoms alone.

The ultrasound records were consistent across the cohort for the core diagnostic triad: an empty uterine cavity, an empty cervical canal, and a gestational sac at the cesarean scar. These features align with established descriptions of CSP.1,2,5 However, modern reporting systems recommend additional measurements, including the relationship of the sac to the niche and endometrial cavity, residual myometrial thickness, sac protrusion toward the bladder or uterine cavity, vascularity, and viability.5,6 Residual myometrial thickness in this series was only 2-4 mm in 11 of 12 cases, suggesting a potentially high risk of haemorrhage or dehiscence in many patients; nevertheless, a formal CSP subtype could not be assigned because sac growth direction and niche measurements were unavailable.

Treatment in this series was heterogeneous and appeared to be tailored to clinical and ultrasound risk. The surgically managed group had a substantially higher median beta-hCG concentration and more frequent fetal cardiac activity than the medically managed group. Three of the four surgical cases were viable, and all four had bladder adhesions; scar bulging or dehiscence was also common. These observations are clinically plausible, but the sample is too small for causal inference. Contemporary reviews emphasise that no single modality is universally superior and that treatment choice should integrate haemodynamic status, viability, beta-hCG, residual myometrium, vascularity, fertility preference, and local expertise. (7, 8, 10)

Systemic MTX was the dominant medical therapy in the cohort, including use as sole initial treatment in eight patients. This practice deserves cautious interpretation. The 2022 SMFM consult recommends against systemic MTX alone and suggests intragestational MTX, operative resection, or ultrasound-guided aspiration, with adjunctive measures when appropriate. (3)

A 2024 meta-analysis reported lower primary success for systemic MTX than for several surgical approaches, although the underlying evidence remains heterogeneous and largely observational. (8) The present source file contains inpatient treatment and discharge data but not serial beta-hCG decline, time to complete sonographic resolution, delayed bleeding, or reintervention. Therefore, absence of an inpatient complication cannot be considered definitive treatment success. These follow-up outcomes should be added before journal submission.

Three of four surgical patients retained the uterus. One required laparotomy with scar repair and transfusion, one underwent suction evacuation with laparoscopy and Foley balloon tamponade, and one received MTX followed by suction evacuation, laparoscopy, and UAE. The remaining patient underwent hysterectomy after MTX and laparoscopy. This spectrum illustrates how CSP management often requires escalation or multi modal treatment and highlights the importance of access to experienced endoscopic surgeons, interventional radiology, blood products, and contingency planning for hysterectomy. The main strengths of this series are the inclusion of granular case-level clinical, laboratory, ultrasound, operative, and short-term outcome data and consistent anonymisation.

Despite the limitations, this series provides a useful institutional snapshot and shows that early recognition can permit treatment before shock or rupture. The occurrence of one hysterectomy and one transfusion, even in a haemodynamically stable cohort, underscores the potentially serious nature of CSP.

5. Conclusion

Caesarean scar pregnancy should be actively excluded during early ultrasound in women with a previous cesarean delivery. In this series, all patients were diagnosed before haemodynamic compromise, but treatment ranged from systemic MTX to multi modal surgery, with one transfusion and one hysterectomy. Standardised ultrasound assessment, risk-based multidisciplinary management, and complete follow-up to biochemical and sonographic resolution are required to improve care and generate comparable evidence.

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Table 2: Case-level clinical and diagnostic characteristics

Case	Age	G/P/A	Prior CS	Interval (y)	GA	Presentation	beta-hCG (IU/L)	FCA	RMT (mm)
1	27	03-01-2001	1	1	5+3	Incidental	10,858	Absent	2.7
2	30	03-02-2000	2	7	7+4	Bleeding	207	Absent	3
3	34	03-02-2000	2	2	6+3	Pain, Bleeding, Incidental	771	Absent	3.2
4	39	04-02-2001	2	10	6+5	Pain, Bleeding	10,440	Absent	10
5	30	03-02-2000	2	1	9+5	Pain, Bleeding	38,998	Present	2
6	32	03-02-2001	2	2	5+5	Incidental	4,563	Absent	4
7	34	02-01-2000	1	8	6+2	Pain, Bleeding	2,026	Absent	3
8	34	02-01-2000	1	4	6+1	Incidental	3,690	Absent	3
9	27	03-01-2001	1	2	6+6	Pain	58,534	Present	3.5
10	28	02-01-2000	1	2	8+0	Incidental	814	Absent	3.2
11	32	03-02-2000	2	5	7+5	Pain, Bleeding	1,11,505	Present	2.7
12	35	04-02-2001	2	4	6+4	Bleeding	63,221	Present	3

A, abortions; CS, caesarean delivery; FCA, fetal cardiac activity; GA, gestational age in weeks+days; G/P/A, gravida/parity/abortions; RMT, residual myometrial thickness.

Table 3: Case-level management and short-term outcomes

Case	Initial category	MTX regimen	Procedures	Operative findings	Transfusion	Hysterectomy	ICU	Stay (days)
1	Medical	Systemic; 2 doses, 65 mg	None	None recorded	No	No	No	5
2	Medical	Systemic; 1 dose, 74 mg	None	None recorded	No	No	No	2
3	Surgical	None	Laparotomy; Scar repair	Scar bulge; Dehiscence; Bladder adhesions	Yes	No	No	13
4	Medical	Systemic; 1 dose, 64 mg	None	None recorded	No	No	No	15
5	Medical	Systemic; 1 dose, 50 mg	None	None recorded	No	No	No	11
6	Medical	Systemic; 2 doses, 65 mg	None	None recorded	No	No	No	17
7	Medical	Systemic; 1 dose, 50 mg	None	None recorded	No	No	No	7
8	Medical	Systemic; 2 doses, 50 mg	None	None recorded	No	No	No	4
9	Surgical	None	Suction evacuation; Laparoscopy; Foley balloon	Bladder adhesions	No	No	No	11
10	Medical	Systemic; 1 dose, 40 mg	None	None recorded	No	No	No	5
11	Surgical	Systemic; 2 doses, 44 mg	Laparoscopy; Hysterectomy	Scar bulge; Dehiscence; Bladder adhesions	No	Yes	No	15
12	Surgical	Systemic; 2 doses, 50 mg	Suction evacuation; Laparoscopy; UAE	Scar bulge; Bladder adhesions	No	No	No	20

ICU, intensive care unit; MTX, methotrexate; UAE