Journal of Gynecology and Maternal Health
ISSN: 3068-3696
ScitechJournals
Open Access

Caesarean Scar Pregnancy – A Malady of the Millennium Diagnostic and Management Challenges

Abstract

Caesarean scar pregnancy (CSP) is an uncommon but potentially catastrophic form of ectopic pregnancy in which the gestational sac implants partially or completely within a previous caesarean section scar. Its incidence has risen with increasing caesarean delivery rates and widespread early first-trimester transvaginal ultrasonography [1,4]. CSP may present with painless bleeding, abdominal pain, or be incidentally detected [1,2,10]. Delayed diagnosis can result in uterine rupture, massive hemorrhage, placenta accreta spectrum disorders, and hysterectomy [5,6,9]. Transvaginal ultrasonography with color Doppler is the diagnostic cornerstone [2,4,10]; MRI is an adjunct when anatomy is unclear or surgical planning is required [11]. Management remains individualized because randomized evidence is limited and practice varies by expertise and resources [1,9,11]. Options include local or combined medical therapy, ultrasound-guided aspiration, hysteroscopic or laparoscopic resection with scar repair, interventional radiology (uterine artery embolization), and hysterectomy for life-threatening hemorrhage [9-15]. This review summarizes current concepts in classification, pathogenesis, clinical presentation, diagnostic criteria, differential diagnoses, treatment strategies, and follow-up, emphasizing early detection and multidisciplinary care to optimize maternal safety and preserve fertility when feasible.

Keywords: Caesarean scar pregnancy, Caesarean scar ectopic pregnancy, Caesarean scar defect, Residual myometrial thickness, Placenta accreta spectrum, Genetic counseling, Ectopic pregnancy

Review Article

Dr. Sunita Ghike[1]*, Dr. Narendra Ghike[2], Dr. Sireesha Edamadka[3], Dr. Kishwar Bhamani[3], Dr. Meera Esha[3], Dr. Shabana Iqbal[3], Dr. Babita Shetty[4]

[1]Senior Consultant Gynecologist, National Cancer Institute, Nagpur, Maharashtra, India

[2]Senior Consultant Radiologist, National Cancer Institute, Nagpur, Maharashtra, India

[3]Specialist Obstetrics & Gynecology, NMC Speciality Hospital, Al Nahda 2, Dubai, UAE

[4]Specialist Obstetrics & Gynecology; Senior Manager – Quality and Lead Coordinator, Women's Healthcare, Aster DM Healthcare, Dubai, UAE

***Correspondence:** Dr. Sunita Ghike, Senior Consultant Gynecologist, National Cancer Institute, Nagpur, Maharashtra, India. E-mail: sunita_dr@yahoo.co.in

Received: 06 Feb, 2026; **Accepted:** 19 Feb, 2026; **Published:** 25 Feb, 2026.

Introduction

Caesarean scar pregnancy is a rare implantation of an early pregnancy within the myometrial defect of a previous caesarean incision [1,2]. Although historically considered exceptional, CSP is now increasingly encountered in early pregnancy assessment units [1,3,4]. CSP is clinically important because it can cause severe bleeding in the first trimester and may evolve into placenta accreta spectrum disorders (PAS) when the pregnancy continues [5,6]. Because presentation is often mild or absent, systematic early screening of pregnant women with prior caesarean delivery using transvaginal ultrasound (TVUS) has become central to prevention of morbidity [4].

Historical Perspective

CSP was first reported in 1978 [7]. Subsequent reports and larger series established it as a distinct clinical entity and clarified key ultrasound features [2,3,8,9]. The expansion of high-resolution TVUS, color Doppler, and 3-dimensional ultrasound (3D US) has improved early recognition and enabled conservative and minimally invasive treatments [9-11].

Epidemiology and Burden

Reported prevalence ranges approximately from 1 in 1,800 to 1 in 2,500 pregnancies in settings with established early pregnancy imaging services [1,9]. Among women with

at least one prior caesarean section, CSP constitutes a meaningful subset of ectopic pregnancies [3,9]. The true rate likely varies by population, diagnostic intensity, and caesarean section rates [1,9].

Classification / Types

Two practical phenotypes are commonly described based on direction of growth [6,11].

Type	Alternative term	Typical growth pattern	Key risks	Approximate prevalence
Type I	Endogenic	Grows toward cervico-isthmic space and/or uterine cavity	Progression to ongoing pregnancy with PAS; mid-trimester rupture/hemorrhage	~70–80% [11]
Type II	Exogenic	Deeply implanted into scar defect; grows outward toward bladder/abdominal cavity	Early rupture; severe first-trimester hemorrhage; hysterectomy risk	~20–30% [11]

Table 1: Classification of caesarean scar pregnancy phenotypes based on direction of growth, typical pattern, and key risks

Pathogenesis

The pathogenesis is multifactorial and incompletely understood. A prevailing hypothesis is that the blastocyst implants through a microscopic tract or niche within the fibrous caesarean scar, where endometrial–myometrial disruption and impaired decidualization permit abnormal trophoblastic invasion [5,6,9]. Similar tracts may occur after other uterine trauma, including dilatation and curettage, myomectomy, hysteroscopy, metroplasty, and manual removal of placenta [9].

Clinical Presentation (Symptoms and Signs)

CSP can present from as early as 5–6 weeks up to the late first trimester or early second trimester [2,10].

- Asymptomatic incidental diagnosis during early pregnancy scan [2,10].
- Light painless vaginal bleeding [1,2,10].
- Lower abdominal or pelvic pain (with or without bleeding) [1,2,10].
- Acute abdomen and hemodynamic instability are uncommon and usually indicate scar rupture with major haemorrhage [5].

Investigations and Diagnosis

Ultrasound (Primary tool)

Combined transabdominal and transvaginal ultrasonography with color Doppler provides high diagnostic accuracy when CSP is considered [2,9,10].

Commonly used TVUS diagnostic criteria include [2,9,10]:

- Empty uterine cavity and closed/empty cervical canal.
- Gestational sac located in the anterior lower uterine segment at the level of the prior caesarean scar.
- Triangular or oval sac filling the scar niche in early gestation.
- Thin or absent myometrium between the gestational sac and the bladder.
- Peri trophoblastic/placental vascularity on color Doppler around the sac.
- Negative ‘sliding organ sign’ (sac does not slide with gentle probe pressure).

Doppler and Advanced Imaging

- Color Doppler demonstrates a circular peri trophoblastic flow pattern and helps define relationship to bladder [9,10].
- 3D ultrasound can improve spatial orientation and evaluation of the scar niche and sac position [11].
- MRI may be useful when ultrasound findings are equivocal or when detailed preoperative mapping is required [11].

Residual Myometrial Thickness and ‘Niche’ Concept

Residual myometrial thickness (RMT) between the sac/placenta and the serosa–bladder interface is clinically important. Very thin RMT (commonly cited <2 mm in early gestation) is associated with higher risk of rupture and later PAS if pregnancy continues. A caesarean scar defect (‘niche’) refers to an indentation at the scar with reduced myometrial thickness; large defects are characterized by marked thinning on TVUS.

Differential Diagnosis

Condition	Key distinguishing features (typical)
Cervical pregnancy	Sac within cervical canal; cervical ‘barrel’ shape; different vascular pattern
Inevitable/incomplete abortion	Products in cervical canal; positive sliding sign; limited peritrophoblastic flow
Very low intrauterine pregnancy	Sac in uterine cavity with preserved myometrium; sac moves with pressure

Cervico-isthmic pregnancy	Implantation at cervico-isthmic junction but not within scar niche
Gestational trophoblastic disease	Disproportionately high β-hCG; diffuse intrauterine echogenicity/vascularity

Table 2: Differential diagnosis of caesarean scar pregnancy and key distinguishing clinical/ultrasound features

Management

There is no single universally accepted treatment strategy. Management should prioritize maternal safety and be individualized based on hemodynamic status, gestational age, viability, β-hCG level, RMT, CSP type, fertility wishes, and local expertise/resources [1,5,9]. Multidisciplinary involvement (early pregnancy unit, minimally invasive gynecologic surgery, interventional radiology, anesthesiology, and blood bank support) is recommended for higher-risk cases [5,11].

Domain	Key Factors	Clinical Implications
Patient-related	Hemodynamic stability; symptoms; age; comorbidities; desire for future fertility	Determines urgency, suitability of conservative treatment, and fertility-preserving options
CSP-related	Gestational age; viability; β-hCG level; CSP type (endogenic/exogenic); residual myometrial thickness	Guides choice between medical, surgical, or combined approaches
Facility-related	Availability of interventional radiology; hysteroscopy/laparoscopy expertise; blood bank support	Influences safest and most effective management strategy

Table 3: Factors Influencing Management of Caesarean Scar Pregnancy

Expectant Management

Expectant management carries substantial risk and is generally discouraged for caesarean scar ectopic pregnancy [5,9]. Rarely successful; reported success rates are <10% without major complications [5]. If a patient declines termination and continues the pregnancy, close surveillance is essential because of high risks of severe hemorrhage, rupture, and PAS [5,6].

Medical Management

Medical approaches include intragestational therapy with or without adjunct systemic treatment [1,9,11]:

- Intragestational methotrexate (MTX) injection ± embryocide (e.g., potassium chloride for fetal cardiac activity) [11].
- Combined local and systemic MTX protocols guided by serial β-hCG trends [1,11].
- Systemic MTX alone is generally not preferred because of lower efficacy in CSP compared with other ectopic pregnancies [9,11].

Interventional Radiology–Assisted Approaches

- Uterine artery embolization (UAE) used as an adjunct to reduce bleeding risk before aspiration or curettage [11,15].
- Chemoembolization protocols have been reported in some centers (availability dependent) [11].

Surgical Management

Surgical options vary with gestational age, RMT, and resources [1,9,11]:

- Ultrasound-guided uterine aspiration/suction evacuation (preferred over sharp curettage alone) [12,13].
- Hysteroscopic resection in selected cases with adequate RMT and clear endocavitary access [11,14].
- Laparoscopic resection of CSP with scar repair (useful for exogenic type or very thin RMT; allows reconstruction) [11,14].
- Transvaginal excision and repair in experienced hands [11].
- Laparotomy for unstable patients, advanced gestation, extensive invasion, or when minimally invasive options are not feasible [5].
- Hysterectomy for uncontrolled hemorrhage or completed childbearing with life-threatening bleeding [5,9].

Suggested Practical Treatment Selection (Summary Table)

Suggested options are center-dependent and should be tailored to risk and resources [2,14].

Scenario (typical)	Reasonable first-line options (center dependent)	Key precautions
Stable, early gestation; non-viable; low/moderate β-hCG	Intragestational MTX ± aspiration	Serial β-hCG/US; counsel re bleeding
Stable; viable embryo or higher vascularity	Intragestational KCl + MTX; UAE + aspiration (selected)	Prepare for hemorrhage; blood available

Very thin RMT / exogenic type	Laparoscopic (or transvaginal) resection with scar repair ± UAE	Bladder dissection expertise; cystoscopy if needed
Hemodynamic instability / suspected rupture	Emergency laparotomy ± hysterectomy	Massive transfusion readiness

Table 4: Practical treatment selection framework for caesarean scar pregnancy based on stability, viability, vascularity, RMT and CSP type

Placenta Accreta Spectrum Continuum and Caesarean Scar Pregnancy

Caesarean scar pregnancy is increasingly recognized as part of a continuum with early placenta accreta spectrum disorders [5,6]. Implantation within or adjacent to a scar niche may allow abnormal trophoblastic invasion beyond the decidua and into the myometrium, resembling early accreta/increta physiology [5,6]. When pregnancy continues, the risk of morbidly adherent placenta and massive obstetric hemorrhage rises substantially, with downstream consequences including preterm delivery, complex surgery at delivery, and hysterectomy [5,6]. Recognizing this continuum supports early counselling, structured surveillance, and timely referral to centers with expertise in PAS care [5,9].

Role of Imaging in Risk Stratification and Surgical Planning

Beyond confirming the diagnosis, imaging is central to risk stratification and procedural planning [6,10,11]. Residual myometrial thickness, vascularity patterns on color Doppler, and the relationship of the gestational sac to the bladder are practical predictors of rupture risk and operative difficulty [5,6,10]. Three-dimensional ultrasound may improve spatial understanding of the scar niche and implantation plane [11]. MRI is best reserved for equivocal cases or where detailed mapping of invasion is required, particularly when bladder interface is unclear or when planning surgical excision and reconstruction [11]. Standardized reporting of these imaging parameters improves multidisciplinary decision-making and communication [4,11].

Comparative Effectiveness of Management Strategies

No single strategy is optimal for all presentations [1,9,11]. Medical therapy is minimally invasive and may be suitable for early, stable cases, but resolution can be prolonged, requiring careful follow-up and exposing patients to delayed bleeding [1,11]. Surgical treatment provides definitive removal and, when combined with scar repair, may reduce the niche that predisposes to recurrence; however, it requires expertise and carries procedural risks [11,14,15]. UAE and other interventional techniques can reduce vascularity and blood loss and may be particularly useful when aspiration or resection is planned [11,14]. Ultimately, the best outcomes arise when the chosen approach aligns clinical risk (viability, RMT, vascularity, type) with institutional capability and the patient's reproductive goals [1,11].

Long-Term Reproductive Outcomes and Psychosocial Considerations

CSP can affect reproductive planning and emotional well-being [9,14]. Even when fertility is preserved, women may have anxiety about recurrence and fear of complications in future pregnancies [15]. Counselling should therefore address both medical and psychosocial aspects: expected time to β-hCG resolution, warning symptoms for hemorrhage, contraceptive planning, and the need for early ultrasound in subsequent pregnancies [4,15]. In women with significant scar defects, discussion of niche assessment and potential repair prior to conception may be appropriate in selected cases [15]. Clear follow-up pathways can reduce uncertainty and improve patient confidence [15].

Detailed Management Considerations: Medical, Surgical, and Hybrid Approaches

Selection of management remains challenging due to heterogeneity in presentation and limited comparative trials [1,9,11]. Intragestational methotrexate, with or without systemic therapy, may be considered when the patient is stable, gestation is early, and vascularity is acceptable [1,11]. In viable pregnancies, embryocide (e.g., potassium chloride) may be used alongside local therapy in selected settings [11]. However, clinicians should counsel about prolonged follow-up and the possibility of secondary hemorrhage [1,11]. Hysteroscopic approaches are often best when the implantation is predominantly endogenic with an accessible intracavitary component [11,14]. Laparoscopic or transvaginal excision with scar repair is particularly valuable for exogenic CSP and very thin RMT because it allows definitive removal and reconstruction of the defect, potentially reducing recurrence risk [11,14,15]. Hybrid pathways (e.g., UAE followed by aspiration or resection) can improve procedural safety in highly vascular cases, but require coordination and immediate access to blood products and surgical backup [11,14].

Recurrence Risk and Surveillance in Subsequent Pregnancies

Recurrence rates vary across studies and likely depend on underlying scar morphology and the type of treatment received [9,15]. Persistently large niches may increase susceptibility to re-implantation [6]. For subsequent pregnancies, early first-trimester transvaginal ultrasound should be

arranged to confirm the implantation site and to assess the lower uterine segment [4]. Patients should be advised to seek care promptly after a positive pregnancy test, and clinicians should document scar location carefully [4]. If a low-lying sac is identified early, timely referral and shared decision-making can prevent progression to rupture or PAS [4-6]. Where appropriate and feasible, niche evaluation outside pregnancy may be considered, particularly for women with prior CSP or symptoms suggestive of a large defect [5].

Global Perspective and Implications for Low- and Middle-Income Countries

The growing burden of CSP has particular relevance in low- and middle-income countries where access to early pregnancy assessment, advanced imaging, and minimally invasive or interventional radiology services may be limited [4,11]. Delayed diagnosis increases the probability of emergency presentations with heavy bleeding and higher hysterectomy rates [5,9]. Strengthening early antenatal pathways, improving availability and training for transvaginal ultrasound, and promoting rational caesarean delivery practices are key system-level strategies [4]. Even in resource-constrained settings, standardized early ultrasound for women with prior caesarean delivery can substantially improve detection and enable safer referral before complications occur [4].

Complications

- Early uterine scar dehiscence or rupture with life-threatening hemorrhage [5].
- Massive transfusion requirement; need for uterine tamponade or surgical hemostasis [5].
- Placenta accreta spectrum disorders in continuing pregnancies [5,6].
- Injury to bladder/adjacent organs during surgery in deeply invasive cases [11,14].
- Need for hysterectomy and loss of fertility [5,9].
- Recurrence in subsequent pregnancies (reported variably) [9,15].

Recurrence and Future Pregnancy Counselling

Reported recurrence rates vary across studies and populations [9,15]. Risk may be higher after certain conservative treatments and in the presence of a persistent large niche [6,15]. Patients should be counselled regarding early ultrasound in future pregnancies, potential recurrence, and contraceptive options [4,15]. Where feasible, evaluation and repair of a significant niche before future conception may be considered in selected patients [6].

Prevention

- Reduce primary caesarean section rates by evidence-based labor management [4].
- Optimize uterine closure technique and postoperative infection prevention [11].
- Ensure early first-trimester TVUS for women with previous caesarean section to identify low-lying sacs and CSP early [4].

Clinical Flow Chart for Early Pregnancy Assessment in Women with Previous Caesarean Section

Positive pregnancy test + history of prior CS → Early TVUS + color Doppler (5–7 weeks) → If CSP criteria met: assess viability, RMT, vascularity, type (I vs II), hemodynamic status → Stable: choose medical / aspiration / hysteroscopy / laparoscopy ± UAE based on risk & expertise → Unstable or suspected rupture: emergency laparotomy ± hysterectomy → Follow-up: serial β-hCG + TVUS until resolution; counsel early scan in next pregnancy [4].

Conclusion

Caesarean scar pregnancy is a modern obstetric challenge driven by increasing caesarean delivery rates [1,4]. Early diagnosis with TVUS and color Doppler is essential to prevent catastrophic hemorrhage and preserve reproductive potential [2,4,10]. Because management evidence is limited and resources vary, individualized treatment within a multidisciplinary framework remains the pragmatic approach [1,11]. Standardized reporting, registries, and high-quality comparative studies are needed to refine algorithms, assess recurrence prevention strategies, and develop robust guidelines [4,11].

Declarations

Conflict of Interest: The authors declare no conflict of interest.

Acknowledgment: The authors gratefully acknowledge the support and cooperation of the management of National Cancer Institute, Nagpur, India; NMC Speciality Hospital, Al Nahda, Dubai, UAE; and Aster DM Healthcare, Dubai, UAE.

Funding/Financial Support: No financial aid or funding was received.

References

1. Ash, A., A. Smith, and D. Maxwell. “Caesarean scar pregnancy.” BJOG: An International Journal of Obstetrics & Gynaecology 114, no. 3 (2007): 253-263.
2. Jurkovic, D., Kh Hillaby, B. Woelfer, A. Lawrence, R. Salim, and C. J. Elson. “First-trimester diagnosis and management of pregnancies implanted into the lower uterine segment Cesarean section scar.” Ultrasound in Obstetrics and Gynecology: The Official Journal of the International Society of Ultrasound in Obstetrics and Gynecology 21, no. 3 (2003): 220-227.
3. Maymon, R., R. Halperin, S. Mendlovic, D. Schneider, Z. Vaknin, A. Herman, and M. Pansky. “Ectopic pregnancies in Caesarean section scars: the 8 year experience of one medical centre.” Human Reproduction 19, no. 2 (2004): 278-284.
4. Timor-Tritsch, Ilan E., Ana Monteagudo, and Steven R. Goldstein. “Early first-trimester transvaginal ultrasound screening for cesarean scar pregnancy in patients with previous cesarean delivery: analysis of the evidence.” American Journal of Obstetrics and Gynecology 231, no. 6 (2024): 618-625.
5. Timor-Tritsch, Ilan E., and Ana Monteagudo. “Unforeseen consequences of the increasing rate of cesarean deliveries: early placenta accreta and cesarean scar pregnancy. A review.” American journal of obstetrics and gynecology 207, no. 1 (2012): 14-29.
6. Agten, Andrea Kaelin, Giuseppe Cali, Ana Monteagudo, Johana Oviedo, Joanne Ramos, and Ilan Timor-Tritsch. “The clinical outcome of cesarean scar pregnancies implanted “on the scar” versus “in the niche”.” American journal of obstetrics and gynecology 216, no. 5 (2017): 510-e1.
7. Jv, Larsen. “Pregnancy in a uterine scar sacculus-an unusual cause of postabortal haemorrhage.” S Afr Med J 53 (1978): 142-143.
8. Herman, A., Z. Weinraub, O. Avrech, R. Maymon, R. Ron□ El, and Y. Bukovsky. “Follow up and outcome of isthmic pregnancy located in a previous caesarean section scar.” BJOG: An International Journal of Obstetrics & Gynaecology 102, no. 10 (1995): 839-841.
9. Rotas, Michael A., Shoshana Haberman, and Michael Levgur. “Cesarean scar ectopic pregnancies: etiology, diagnosis, and management.” Obstetrics & Gynecology 107, no. 6 (2006): 1373-1381.
10. Timor-Tritsch, Ilan E., Nizar Khatib, Ana Monteagudo, Joanne Ramos, Robert Berg, and Sándor Kovács. “Cesarean scar pregnancies: experience of 60 cases.” Journal of Ultrasound in Medicine 34, no. 4 (2015): 601-610.
11. Hameed, Mohamed Siraj Shahul, Ann Wright, and Bernard Su Min Chern. “Cesarean scar pregnancy: current understanding and treatment including role of minimally invasive surgical techniques.” Gynecology and Minimally Invasive Therapy 12, no. 2 (2023): 64-71.
12. Elzawawi NM, Salih A, Khalid H, et al. Caesarean scar ectopic pregnancy: ultrasound-guided suction evacuation experience. Cureus. 2015;7:e386.
13. Karahasanoglu, Ayşe, Işıl Uzun, Ayşegül Deregözü, and Mucize Ozdemir. “Successful treatment of cesarean scar pregnancy with suction curettage: our experiences in early pregnancy.” Ochsner Journal 18, no. 3 (2018): 222-225.
14. Wang, Chin-Jung, An-Shine Chao, Leung-To Yuen, Chia-Wei Wang, Yung-Kuei Soong, and Chyi-Long Lee. “Endoscopic management of cesarean scar pregnancy.” Fertility and sterility 85, no. 2 (2006): 494-e1.
15. Seow, Kok-Min, Jiann-Loung Hwang, Yieh-Loong Tsai, Lee-Wen Huang, Yu-Hung Lin, and Bin-Chwen Hsieh. “Subsequent pregnancy outcome after conservative treatment of a previous cesarean scar pregnancy.” Acta obstetricia et gynecologica Scandinavica 83, no. 12 (2004): 1167-1172.

Citation: Sunita Ghike, Dr. Narendra G, and Dr. Sireesha E et al. “Caesarean Scar Pregnancy – A Malady of the Millennium Diagnostic and Management Challenges.” J Gynecol Matern Health (2026): 131. DOI: 10.59462/3068-3696.4.1.131.