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Case Series

Clinical spectrum and management outcomes of caesarean scar ectopic pregnancy: a case series

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ABSTRACT

Caesarean scar ectopic pregnancy (CSEP) is uncommon in routine obstetric practice, but when it occurs it can become rapidly dangerous. Implantation within a previous caesarean scar carries a real risk of severe haemorrhage, uterine rupture and loss of fertility if the diagnosis is missed or delayed. With rising caesarean section rates in India, clinicians encounter this condition more often, yet management remains individualized rather than protocol driven. We reviewed seven consecutive women diagnosed with CSEP at a tertiary care centre in India. All patients were haemodynamically stable at presentation. Diagnosis was based primarily on transvaginal ultrasound, with MRI used selectively when imaging was equivocal or myometrial thinning was significant. All women were initially offered medical management using methotrexate, with folinic acid and letrozole added in selected cases. Patients were followed with serial β-hCG measurements and repeat imaging. Surgical intervention was reserved for non-responders or those who developed clinical deterioration. Five of seven women (71.4%) responded well to conservative medical treatment, showing a gradual fall in β-hCG levels and resolution of the scar pregnancy on imaging. Two patients (28.6%) ultimately required surgery. One underwent laparoscopic excision of the scar ectopic with uterine repair, while the other required obstetric hysterectomy following uncontrolled bleeding during attempted hysteroscopic evacuation. Our experience suggests that stable women diagnosed early in the first trimester can often be managed successfully with medical therapy under close surveillance. Nevertheless, CSEP remains unpredictable and timely escalation to surgery is crucial when clinical or biochemical trends are unfavourable.

Keywords: Caesarean scar ectopic pregnancy, Methotrexate, Laparoscopic excision, Hysteroscopy, Uterine scar pregnancy

INTRODUCTION

Caesarean scar ectopic pregnancy (CSEP) is being recognized more frequently in contemporary obstetrics, largely because caesarean delivery rates continue to rise across India. Although still relatively rare, its clinical importance lies in the potential for catastrophic bleeding and uterine rupture if not identified early.[1,2] Unlike tubal ectopic pregnancy, CSEP implants directly within a weakness in the previous uterine scar. This allows trophoblastic tissue to invade deeply into the myometrium, leading to progressive thinning of the uterine wall. As gestation advances, the risk of rupture and massive haemorrhage increases substantially, sometimes necessitating emergency hysterectomy. Transvaginal ultrasound remains the most reliable diagnostic tool, particularly when attention is paid to sac location, myometrial thickness and doppler vascularity.[3] Serum β-hCG trends help distinguish resolving from progressive disease, while MRI is useful when ultrasound findings are unclear or when surgical planning is required.[3] Management options range from medical treatment with

methotrexate to minimally invasive procedures such as hysteroscopic evacuation or laparoscopic scar excision.[1] Clinically, CSEP can be deceptive. Some women present with mild spotting, others with lower abdominal pain and a few are completely asymptomatic.[4] In early pregnancy, the gestational sac may be mistaken for a low intrauterine pregnancy or an incomplete miscarriage unless imaging is carefully interpreted.[2-4] In severe cases with uncontrolled bleeding, hysterectomy may be unavoidable. The choice of treatment must consider gestational age, viability, β-hCG levels, scar thickness, clinical stability and the woman's desire for future fertility. The incidence of CSEP is closely linked to the number of previous caesarean sections, with studies showing that women with prior caesarean delivery have a 2.59 times higher risk of subsequent ectopic pregnancy compared to those who had vaginal deliveries.[5,6] Treatment modalities include medical management with methotrexate, surgical options such as laparotomy or laparoscopy, and interventional procedures like uterine artery embolization.[2,3] Medical treatment is often preferred for hemodynamically stable patients, although it carries a significant failure rate, leading to the need for surgical intervention in many cases.[3] Laparotomy is more frequently performed than laparoscopy, especially in cases with severe symptoms or failed medical therapy.[7] Due to the potentially life-threatening complications, including uterine rupture and massive haemorrhage, prompt and accurate diagnosis is essential.[8] Given the scarcity of large trials, real-world case series remain valuable for guiding clinical practice. Through our experience with seven women, we aim to share practical insights into diagnosis, decision-making and outcomes in CSEP management.

METHODS

Study design and setting

This observational case series was conducted in a tertiary care teaching hospital in India. We included seven women diagnosed with CSEP over the study period. All were haemodynamically stable at presentation.

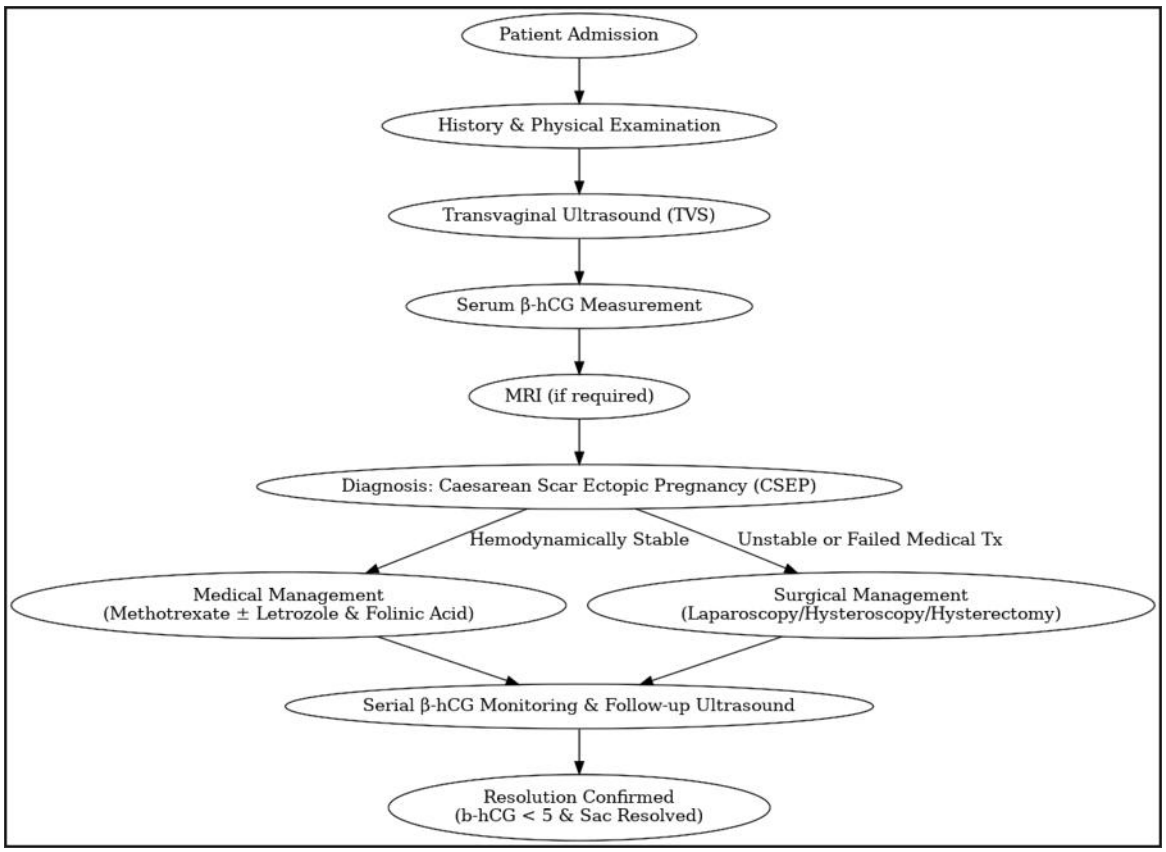

Figure 1: Flowchart for scar ectopic management.

Diagnostic approach

Diagnosis was based on transvaginal ultrasound findings, including a gestational sac located in the anterior lower uterine segment at the scar site, thinning of the myometrium between the sac and bladder and increased peri trophoblastic blood flow on doppler imaging. MRI was used selectively in cases where ultrasound was inconclusive, when myometrial thinning was marked, or when surgical planning was anticipated.

Baseline evaluation

At presentation, all women underwent detailed obstetric history and clinical examination, complete blood count

(CBC) and liver function tests (LFT) and quantitative serum β-hCG measurement.

Treatment protocol

Because all patients were stable, initial management was medical. Treatment included intramuscular methotrexate (1 mg/kg) administered as single-dose or multidose protocol, folinic acid (0.1mg/kg) on alternate days in multidose regimens and oral letrozole (2.5mg twice daily) in selected cases.

Monitoring and outcome assessment

Patients were followed with serial β-hCG level measurements and repeat ultrasound examinations. Medical management was considered successful when there was a sustained decline in β-hCG accompanied by radiological regression or disappearance of the gestational sac.

Criteria for surgical intervention

Surgery was considered when there was rising or plateauing β-hCG despite methotrexate, persistent fetal cardiac activity, clinical deterioration (new onset abdominal pain, tachycardia, or suspected rupture) or patient preference for definitive treatment. Surgical options included hysteroscopic evacuation, laparoscopic scar excision with uterine repair, or obstetric hysterectomy in life-threatening situations.

CASE SERIES

Case 1

A 30-year-old woman (G3P1L1A1) presented at 8+3 weeks of gestation by last menstrual period with a suspected caesarean scar ectopic pregnancy. Her obstetric history was complex, she had undergone a hysterotomy at 16 years of age following blunt abdominal trauma, followed by a lower segment caesarean section eight years later for obstetric indications. At presentation, she was completely asymptomatic, with no abdominal pain, vaginal bleeding, or systemic complaints. On clinical examination, she was hemodynamically stable, with a bulky uterus and no tenderness or peritoneal signs. A prior transvaginal ultrasound had shown a live gestation implanted within the lower uterine segment scar, occupying more than 50% of the myometrial thickness without serosal bulge. Given the potential risk of progression, she was admitted for further evaluation. Baseline investigations revealed a serum β-hCG level of 9,050 mIU/ml with normal complete blood count and liver function tests. A repeat pelvic ultrasound performed at our centre showed absence of foetal cardiac activity, with the gestational sac measuring 1.2×0.9 cm and CRL corresponding to approximately 6 weeks 5 days. Considering her stable condition and early gestational age, she was initiated on a multidose methotrexate regimen (1 mg/kg intramuscularly on alternate days), supplemented with folinic acid (0.1 mg/kg on intervening days) and oral letrozole 2.5 mg twice daily for 10 days. Serial β-hCG monitoring demonstrated a gradual downward trend: 9,194 mIU/ml on day 4 and 6,084 mIU/ml on day 7. Follow-up ultrasound showed persistence of the gestational sac but no cardiac activity, indicating a favorable response. She was discharged in stable condition with close outpatient follow-up. β-hCG levels continued to decline steadily, reaching 18 mIU/ml by day 58, with radiological regression of the sac confirming successful conservative management. This case reinforced for us that early diagnosis and close follow-up can allow safe conservative management even when initial imaging appears concerning.

Case 2

A 40-year-old woman (G3P2L2) with two previous LSCS deliveries presented at 5+4 weeks of gestation with amenorrhea and minimal vaginal spotting. She was a known diabetic on oral hypoglycaemic agents. She was hemodynamically stable with a uterus corresponding to six weeks size and no tenderness. Transvaginal ultrasound confirmed a gestational sac implanted at the caesarean scar site measuring 6.5×8×7.2 mm. Initial serum β-hCG was 520.64 mIU/ml; CBC and LFT were normal.

Given the early gestation and low β-hCG, she was treated with a single dose of intramuscular methotrexate along with oral letrozole 2.5 mg twice daily for 10 days. Repeat β-hCG on day 4 dropped to 341.42 mIU/ml, and follow-up ultrasound showed reduction in sac size, confirming treatment response. She was discharged with advice for serial β-hCG monitoring, which showed a progressive decline to 8.6 mIU/ml by day 26, confirming complete resolution. This case illustrated that carefully selected early CSEP can respond well to single-dose therapy.

Case 3

A 32-year-old woman (G3P1) presented with two months of amenorrhea, lower abdominal pain and intermittent vaginal bleeding. She had undergone an LSCS six years earlier for foetal distress and had a previous mid-trimester termination for foetal anencephaly. On examination, she was stable with minimal vaginal bleeding and a closed cervix. Initial β-hCG was 4,408.8 mIU/ml. Ultrasound revealed two gestational sacs one intra-myometrial with foetal bradycardia (6.2 weeks) and another smaller sac without a foetal pole. MRI confirmed CSEP with significant myometrial thinning of only 3 mm in the anterior lower uterine segment. After counselling regarding risks, especially that of rupture with such thin myometrium and providing extensive options, she opted for medical management. She received a single dose of methotrexate followed by leucovorin. Serial ultrasounds showed gradual regression of both sacs, and β-hCG declined to 17.2 mIU/ml by the fourth week. By the eighth week, imaging confirmed complete resolution. This case

highlighted that even with marked thinning, careful monitored medical treatment can be successful in stable patients.

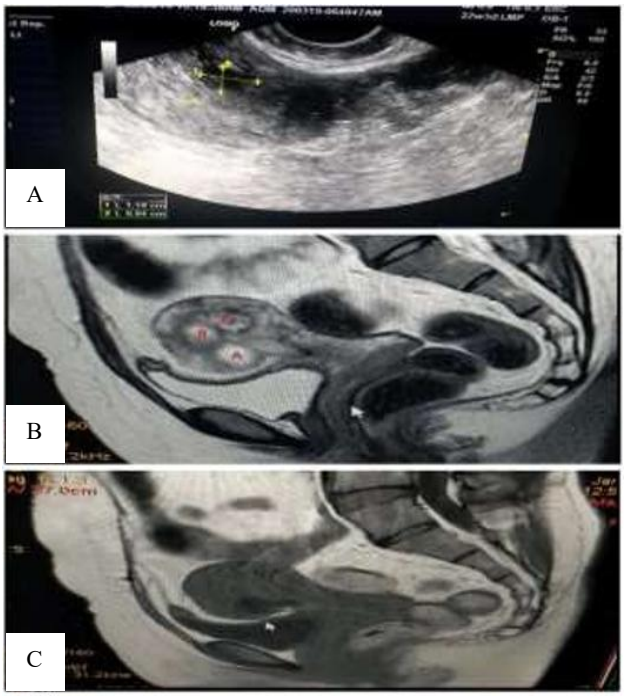

Figure 2: (A) showing ultrasound findings, (B) the myometrium in the anterior uterine wall which corresponded to the lower uterine segment was noted to be thinned out and measured 3 mm in maximum thickness and (C) sagittal T2-weighted MRI image showing a caesarean scar ectopic pregnancy (CSEP).

Case 4

A 26-year-old woman (G2P1L1) with one prior LSCS was referred for medical termination at six weeks of gestation. Initial ultrasound suggested a low-lying gestational sac at the scar site with good trophoblastic reaction and cardiac activity. MRI confirmed a viable CSEP at 6+3 weeks. Baseline β-hCG was 13,208 mIU/ml.

She was treated with multidose methotrexate, folinic acid, and letrozole. Although β-hCG initially rose to 39,837 mIU/ml on day 5, the patient remained asymptomatic. Rather than rushing to surgery, we continued close monitoring.

Over the following weeks, β- hCG levels showed steady decline: 22,537 mIU/ml on day 10 and 1,601 mIU/ml on day 20. Repeat ultrasound showed absence of cardiac activity by day 5 and regression of the sac to a heterogeneous lesion by day 20. β-hCG reached 24 mIU/ml by day 54, confirming successful resolution.

This case underscored that early biochemical rise does not necessarily indicate treatment failure, if the patient remains clinically stable.

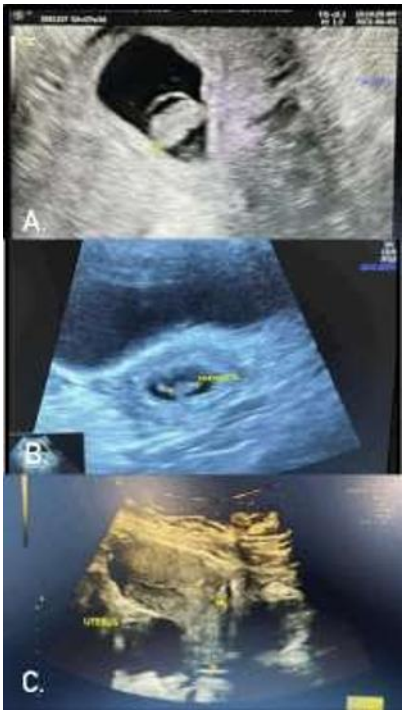

Figure 3: (A) USG-day 1 gestational sac at scar site with CRL 9 mm~6 weeks 6 days, (B) USG day 4-TAS showing gestational sac with fetal pole. Size reduced to CRL 7.5 mm and (C) USG-day 20 after first inj. methotrexate (no gestational sac visible on ultrasound).

Case 5

A 27-year-old woman (G2P1L1) presented at 9+6 weeks by dates with spotting. She had not undergone a prior ultrasound. Transvaginal ultrasound revealed a 10.1 mm gestational sac adjacent to the caesarean scar, corresponding to approximately 5+4 weeks suggestive of CSEP. Initial β-hCG was 14,888 mIU/ml. She received multidose methotrexate with folinic acid. Serial β-hCG levels declined steadily to 32 mIU/ml by day 28, with ultrasound confirming complete resolution. This case emphasized the value of early ultrasound in women with prior caesarean sections, even when symptoms are minimal.

Case 6

A 34-year-old woman (G3P2L2) with two prior LSCS presented at 7+4 weeks with a viable scar pregnancy. Initial β-hCG was 7,456 mIU/ml. She was started on methotrexate; but despite of this, on day four, she developed increasing lower abdominal pain and tachycardia with β-hCG rising to 10,783 mIU/ml raising suspicion of impending rupture. Emergency hysteroscopic evacuation was attempted, but there was severe uncontrolled bleeding, which could not be controlled conservatively. To save her life, an emergency obstetric hysterectomy was performed. She received blood transfusion, was monitored in ICU and recovered well.

This case reminded us that CSEP can deteriorate rapidly, and that timely surgical intervention is crucial when warning signs appear.

Case 7

A 33-year-old Rh-negative woman (G2P1L1) presented at 7+6 weeks with a low-lying scar gestation. She had already received two doses of methotrexate at another hospital with inadequate response. At our centre, a third dose was administered, but β-hCG remained elevated at 10,868 mIU/ml. After counselling, the patient preferred definitive surgical management.

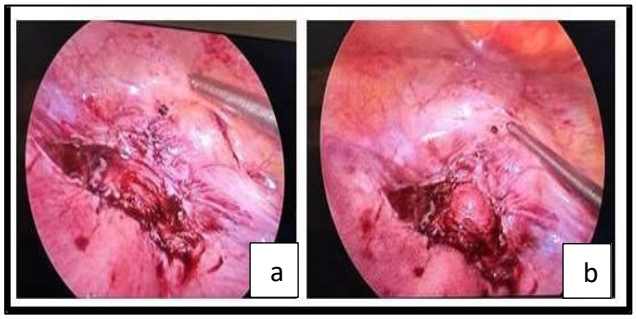

Figure 4 (a and b): Laparoscopic images showing the caesarean scar ectopic pregnancy.

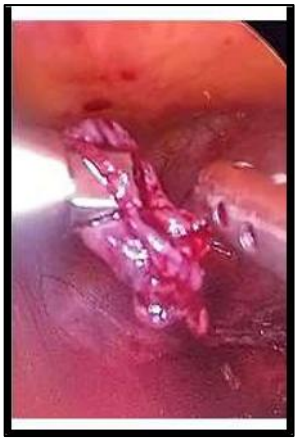

Figure 5: Laparoscopic view of the excised ectopic gestational sac.

Laparoscopy revealed a 2×2 cm bulge at the scar site with markedly thinned myometrium. We excised the ectopic gestation completely and repaired the uterine defect with barbed sutures. Her postoperative course was uneventful, and β-hCG declined appropriately. This case demonstrated that laparoscopic scar excision can be a safe fertility-preserving option in selected non-responders to medical therapy.

Table 1: Summary of case reports.

Case no.	US exam	Diagnosis	Treatment	Outcome
Case 1	Gestational sac in cesarean scar, >50% myometrial thinning, no cardiac activity on repeat scan	Cesarean scar ectopic pregnancy	Methotrexate+folinic acid+letrozole	Resolved with β-hCG drop to 18 mIU/ml by Day 58
Case 2	Scar gestation, 6.5×8×7.2 mm, Resolved in follow-up scan	CSEP	Single-dose methotrexate+ letrozole	Resolved with β-hCG drop to 8.6 mIU/ml by Day 26
Case 3	Two sacs, one myometrial with bradycardia, MRI: 3 mm myometrial thinning	CSEP	Single-dose methotrexate+ leucovorin	Resolved, residual sac 1.1×0.8 cm, β-hCG 17.2 mIU/ml at 4 weeks
Case 4	CRL 9 mm with cardiac activity, no cardiac activity by day 5, sac regressed by day 20	CSEP	Multidose methotrexate+folinic acid+letrozole	Resolved, β- hCG 24 mIU/ml by day 54
Case 5	Gestational sac 10.1 mm near scar, resolved by day 28	CSEP	Multidose methotrexate+folinic acid	Resolved, β- hCG 32 mIU/ml by day 28
Case 6	Scar pregnancy with cardiac activity, increasing β-hCG, surgery required	CSEP	Methotrexate, then hysteroscopic evac.+ hysterectomy	Resolved surgically, stable post-op
Case 7	Scar site sac, poor vascularity, no embryo; 2×2 cm bulge seen laparoscopically	CSEP	Methotrexate (3 doses), then lap.+ hysteroscopic excision	Resolved surgically, β- hCG 1227 mIU/ml

Table 2: Diagnostic criteria for caesarean scar ectopic pregnancy (CSEP).

Step	Criteria/findings
Clinical history	History of previous caesarean section(s) Symptoms: amenorrhea, vaginal spotting/bleeding, lower abdominal pain

Continued.

Step	Criteria/findings
Initial assessment	Hemodynamic stability evaluation bimanual and speculum examination
Ultrasound (TVS/transabdominal)	Empty uterine cavity and closed internal OS Gestational sac located in the anterior lower uterine segment at the level of scar Thin or absent myometrial layer between bladder and sac High-velocity, low-impedance peritrophoblastic blood flow on color doppler
Serum β-hCG	Quantitative beta-hCG to confirm pregnancy and track treatment response
MRI (if needed)	Used for equivocal ultrasound findings or complex cases Helps assess myometrial thinning and scar integrity
Exclusion of other sites	No intrauterine pregnancy No adnexal ectopic pregnancy No evidence of miscarriage in progress

DISCUSSION

Pathophysiology

CSEP is thought to arise when the blastocyst implants through a microscopic defect in a poorly healed caesarean scar. This defect allows early invasion of the blastocyst into the myometrium rather than the endometrial cavity. Two patterns of growth are commonly described. Type 1 (endogenic) grows toward the uterine cavity and is usually less hazardous and type 2 (exogenic) grows toward the serosa and bladder and carries a higher risk of rupture and severe bleeding.

The precise determinants of CSEP remain uncertain, although several predisposing factors have been described. These include inadequate healing or dehiscence of a previous caesarean scar, differences in surgical techniques used for uterine incision closure and a short interpregnancy interval following caesarean delivery.[9] The use of assisted reproductive technologies, particularly in vitro fertilization (IVF), has also been associated with an increased risk. Furthermore, altered vascular patterns within the caesarean scar niche, compared with the surrounding endometrial and myometrial tissue, may facilitate implantation within the scar.[10] In our series, cases with marked myometrial thinning required closer monitoring and careful decision-making.

Diagnostic criteria

Transvaginal ultrasound remains the primary diagnostic tool for CSEP, with sensitivity exceeding 85% and subsequent studies have outlined specific criteria: an empty uterine cavity and cervical canal, a gestational sac located in the anterior lower uterine segment at the site of the previous scar, a thin or absent myometrium between the sac and bladder (often <5 mm), absence of the 'sliding organ sign', and peritrophoblastic flow on doppler imaging. MRI can be used for equivocal cases or for surgical planning.[11]

Management was individualized based on gestational age, β-hCG levels, viability, myometrial thickness and fertility wishes. Expectant management is rarely pursued due to risks of haemorrhage and uterine rupture. We preferred medical therapy in stable early pregnancies with limited vascularity. Multidose methotrexate was chosen for higher β-hCG levels or viable gestations, while single-dose therapy was sufficient in early, low β-hCG cases.

Uterine artery embolization (UAE) has been used as an adjunctive procedure to decrease the risk of haemorrhage in patients undergoing medical or conservative surgical treatment. Studies have shown that performing UAE prior to treatment can reduce intraoperative blood loss and shorten hospital stay. However, women who wish to conceive in the future should be counselled about possible risks in subsequent pregnancies, such as miscarriage, malpresentation, preterm labor, and postpartum haemorrhage. Because of its higher failure and complication rates and the potential impact on future fertility, UAE is generally not considered a first-line treatment option for women desiring future pregnancies.[12] Surgery was reserved for women who did not respond to medical therapy, developed concerning symptoms, or preferred definitive treatment. Serial β-hCG monitoring and repeat imaging were essential throughout follow-up.

This case series provides meaningful clinical insights into the management of caesarean scar ectopic pregnancy in a real-world tertiary care setting. However, treatment must be individualized based on gestational age, β-hCG levels, viability, and myometrial thickness. Out of seven patients, five (71.4%) were successfully managed with conservative medical therapy, while two (28.6%) required surgical intervention. This high rate of medical success reflects the importance of early diagnosis, careful patient selection, and structured monitoring.

A key factor influencing favorable outcomes was gestational age at diagnosis. All five medically managed patients were identified within the first trimester (5-8 weeks), when the gestational sac was relatively small and vascularity was limited. These features likely contributed to better responsiveness to methotrexate. In Cases 1, 2, 3, 4, and 5 early detection and careful monitoring allowed us to avoid surgery while preserving fertility. Another important observation was the role of β-hCG trends rather than absolute values alone. In some cases (such as Case 4), initial β-hCG levels rose before declining, but continued medical management was justified based on clinical stability and subsequent biochemical response.

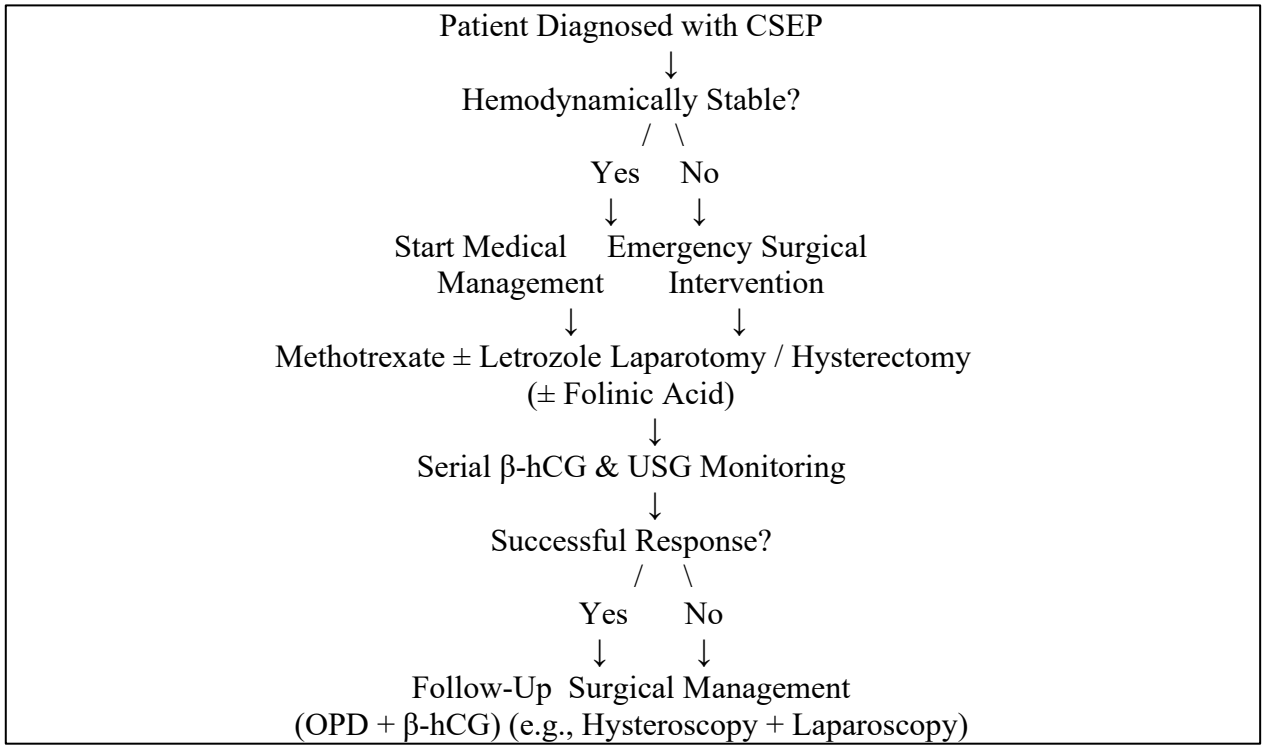

Figure 6: Management flowchart of caesarean scar ectopic pregnancy (CSEP).

Case 1 illustrated that even when the sac occupied more than 50% of the myometrial thickness, conservative management could succeed if the patient was stable and cardiac activity had ceased. Case 2 showed that very early, low β-hCG pregnancies can resolve with single-dose methotrexate. Case 3 reminded us that even with significant myometrial thinning, medical therapy can be effective when vigilantly monitored. Case 4 emphasized the importance of not abandoning medical therapy solely based on an early β-hCG rise if the patient remains clinically well. In contrast, Case 6 demonstrated the limits of medical management; pain, tachycardia, and rising β-hCG signalled impending rupture, making hysterectomy unavoidable.

Multidose methotrexate regimens appeared more effective in cases with higher β-hCG levels or evidence of viability, whereas single-dose therapy worked well in early, low β-hCG pregnancies. Close biochemical and radiological surveillance was critical in identifying non-responders early and preventing complications. The addition of letrozole in selected cases may have contributed to improved medical outcomes by reducing estrogen support to trophoblastic tissue, although this requires further study.

The two surgical cases illustrate that medical therapy has clear limitations. Surgical intervention, although more invasive, was lifesaving in one case and fertility-preserving in another. Laparoscopic scar excision with uterine repair appears to be a safe and effective option in selected patients who fail medical therapy. In Case 6, rising β-hCG with clinical symptoms signalled impending rupture, necessitating emergency intervention. This case emphasizes that CSEP can deteriorate rapidly, even in early gestation. In Case 7, patient preference played a major role in management, highlighting the importance of shared decision-making in CSEP. Case 7 emphasized on the role of laparoscopy as a fertility-preserving surgical option in non-responders to methotrexate.

Time to resolution varied from three to eight weeks, emphasizing the need for prolonged follow-up and the patient compliance. Importantly, none of the patients presented with uterine rupture or hemoperitoneum at diagnosis suggesting that early ultrasound screening in women with prior caesarean delivery can prevent catastrophic complications. Overall, this series highlights that there is no “one-size-fits-all” approach to CSEP management. Taken together, these cases reinforce that CSEP management must be individualized, dynamic and guided by both imaging and clinical evolution rather than fixed protocols.

In our experience, β-hCG trends were more informative than single measurements when assessing treatment response. In one case, β-hCG levels initially increased following treatment but subsequently declined with continued conservative management. Similar observations have been reported in studies evaluating medical management of scar ectopic pregnancy, where early biochemical fluctuations did not necessarily indicate treatment failure.[2] Methotrexate-based therapy remains one of the most widely used conservative treatment options for CSEP. In our series, both single-dose and multidose methotrexate regimens were used depending on gestational age, β-hCG levels, and the presence of fetal

cardiac activity. Laparoscopic management allows removal of the gestational tissue with simultaneous repair of the scar defect and has been reported to be a safe fertility-preserving option in selected patients.[7] Previous reports have also demonstrated favourable outcomes with methotrexate in carefully selected patients when close follow-up is ensured.[8] Our findings align with prior studies such as Harzif et al and Jurkovic et al, which emphasizes the utility of ultrasound and systemic methotrexate for hemodynamically stable patients.[13,11] Harzif et al reported success with medical therapy in patients with β-hCG <5000 and myometrial thickness >2 mm, though emphasized the risk of rupture. In our series, even patients with higher β- hCG values responded to multidose regimens, indicating that individualized treatment may expand the threshold for conservative management. Surgical intervention, as in Case 6, was essential when symptoms of rupture emerged, reinforcing the need for vigilant monitoring.

This study is limited by its small sample size and retrospective nature. Variability in treatment regimens and follow-up intervals limits generalizability. Larger multi-centre studies are needed to better define predictors of medical success and to standardize treatment strategies. Future studies should focus on standardized treatment protocols, optimal methotrexate regimens and predictors of medical therapy failure. Comparative trials between surgical and medical interventions for similar risk profiles would enhance evidence-based decision-making in CSEP.

CONCLUSION

Caesarean scar ectopic pregnancy is a high-risk condition that demands early detection and individualized care. In stable early cases, methotrexate-based therapy can be effective and fertility-preserving. Early first-trimester ultrasound in women with previous caesarean delivery plays a crucial role in preventing life-threatening complications. However, clinicians must remain vigilant for treatment failure and be prepared for timely surgical intervention when necessary.

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