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Tailored Approaches for Management of Cesarean Scar Pregnancy with Early Signs of Marked Vascularization: A Case Series on the Potential Development of Placenta Accreta Spectrum Disorder

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ABSTRACT

Cesarean Scar Pregnancy (CSP) is a condition where an embryo implants in the scar of a prior cesarean section. CSP is becoming more prevalent with rising cesarean rates, and early diagnosis is critical to avoid severe complications such as uterine rupture, hemorrhage, and Placenta Accreta Spectrum Disorder (PASD). This case series reports two cases of CSP managed at a tertiary hospital. The first case involved a 35-year-old woman at 8 weeks of gestation, and the second was a 28-year-old woman at 10 weeks of gestation. One case was complicated by PASD, while the other was not. Both cases highlight the importance of early recognition and tailored management strategies. Ultrasound was key in diagnosing CSP, and surgical management was adapted based on the presence of PASD. The outcomes underscore the need for individualized approaches in CSP management to minimize maternal morbidity and preserve fertility when possible.

Keywords: Cesarean scar pregnancy, Placenta accreta, Ultrasound diagnosis, Multidisciplinary approach, Individualized management

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1. Introduction

Cesarean scar pregnancy is a condition in which an embryo attaches to the scar tissue from a previous cesarean section. This condition is categorized into different types based on ultrasound findings. Type I CSP is partially located in the scar with a myometrial thickness of greater than 3 mm, while Type II CSP involves partial implantation in the scar with a myometrial thickness of 3 mm or less. Type III CSP is entirely within the scar and has a myometrial thickness of 3 mm or less **(1,2)**. Additionally, CSP can be classified based on its location as “on the scar” (endogenic) or “in the niche” (exogenic), which reflects the depth of implantation and potential risk of complications **(3)**.

CSP poses significant health risks, including uterine rupture, massive hemorrhage, and severe maternal morbidity or mortality. Women diagnosed with CSP are at an increased risk of hysterectomy and adverse reproductive outcomes, affecting their overall quality of life **(4)**. cesarean section rates have doubled in developing countries since 2000 and CSP is becoming an emerging public health concern. The incidence range varies from 1 per 1800 to 1 per 2216 pregnancies. CSP is increasingly prevalent, especially in women with a history of Cesarean Sections (SC), approximately 1.15% of all ectopic pregnancies. CSP can progress into Placenta Accreta Spectrum Disorder (PASD), particularly when there are early signs of neovascularization at the scar site, which may lead to spontaneous rupture. This risk is heightened in cases of emergency SC or those performed without clear medical indications, which exacerbate niche formation and the prevalence of PASD **(5)**.

The rising incidence of CSP is directly linked to an increase in cesarean deliveries worldwide, with over 72% of cases occurring in women with more than two

prior SC. Contributing factors to the rising prevalence of CSP include expanded indications for primary cesarean sections, a decline in Vaginal Birth After Cesarean (VBAC), and maternal requests for cesarean deliveries without medical indications. In South America, the average C-section rate is approximately 42.9%, with countries like Brazil reporting rates up to 55.7%. In Asia, the average rate is about 19.2%, with Eastern Asia experiencing the highest rates at 63.4%. These elevated rates contribute to a higher incidence of CSP, underscoring the need for tailored management approaches in these regions **(6)**.

The etiology of CSP is multifactorial, involving various risk factors such as multiple previous uterine surgeries, a short interval between cesarean delivery and conception, assisted reproductive technologies, and inadequate healing of the uterine scar **(7)**. The most widely accepted theory is that the blastocyst implants into a microscopic dehiscent tract in the uterine scar, leading to abnormal placental invasion. In the absence of timely intervention, CSP can progress to placenta accreta, increasing the likelihood of life-threatening complications **(8)**.

Given the alarming rise in CSP cases, early recognition and accurate diagnosis are critical in preventing severe maternal outcomes. Misdiagnosis can result in delayed intervention, leading to an increased risk of maternal mortality. This case series reports two cases of CSP managed at a tertiary hospital. The study aims to explore various clinical presentations, diagnostic challenges, management approaches, and the potential outcomes of CSP to enhance clinical decision-making and improve patient care.

2. Case Presentation

Case 1

A 35-year-old woman (G2P1001) at 8 weeks of gestation presented to the Emergency Department of a tertiary hospital after being referred from an obstetrics and gynecology clinic, with complaints of post-coital bleeding. The patient had previously visited a local health center for pregnancy check-up and reported experiencing amenorrhea for the past five months, with a positive result from a home pregnancy test. An initial abdominal ultrasound at 8 weeks of gestation showed a gestational sac without a visible fetus. Two days later, the patient was referred to the tertiary hospital after vaginal bleeding and abdominal pain at the site of a previous cesarean section scar following sexual intercourse. A diagnosis of cesarean scar pregnancy was made after a transvaginal ultrasound which showed a blood clot at the site of the previous cesarean section scar. The patient had a history of a cesarean section 10 years ago due to post-date pregnancy and oligohydramnios. She had no significant medical history and not taking any medications.

Upon physical examination, the patient's vital signs were as follows: blood pressure 120/95 mmHg, pulse 102 beats per minute, respiratory rate 20 breaths per minute, oxygen saturation 99%, and temperature 36.5°C. General examination revealed no signs of anemia, with normal heart sounds and no murmurs or gallops. The lung sounds were vesicular bilaterally, with no wheezing or ronchi. Abdominal examination showed a soft abdomen with tenderness on palpation. The liver and spleen were not enlarged. The patient's extremities were warm, with a capillary refill time of less than 2 seconds and no edema. Vaginal examination revealed dried discharge on the vulva, no fluor, and a smooth and closed portio. The size of the uterus was appropriate for gestational age, and no masses were palpated in the adnexa or parametrium. Laboratory results showed a hemoglobin level of 13.60 g/dL, hematocrit 40.40%, within normal limits, with an elevated white blood cell count of 15,000/µL. Transvaginal ultrasound showed a cesarean scar pregnancy with a defect measuring 1.22 cm, and a mass, likely placental tissue, measuring 2×2 cm with minimal vascularization (Figure 2A).

After informing the patient about the imaging findings and potential complications of cesarean scar pregnancy, the patient provided informed consent for two days of hospitalization to manage her symptoms and prepare for elective surgery. Meloxicam 7.5 mg was prescribed every 12 hours and paracetamol 1000 mg every 6 hours. The patient then underwent laparotomy to perform resection of the uterus from the placental attachment and repair the defect in the cesarean scar. During the operation, a bulging placentawas found on the right side of the uterus that measuring 2x2 cm without an adhesion. Microscopic analysis showed areas of necrosis within the fibrous connective tissue stroma, accompanied by mononuclear inflammatory cell infiltration, vascular proliferation, dilation, and focal hemorrhage. The patient underwent post-operative care and was discharged on the second day after the surgery in stable condition with a scheduled follow-up (Figure 1).

Case 2

A 28-year-old woman (G4P2012) at 12 weeks of gestation presented to the Emergency Department of a tertiary hospital with complaints of prolonged vaginal bleeding. The patient had experienced irregular vaginal bleeding for the past two months and had conducted a home pregnancy test, which showed a positive result. Currently, the patient reported only a small amount of fresh red spotting, and she changed her sanitary pad 3-4 times a day. She has a history of two previous caesarean deliveries due to Cephalopelvic Disproportion (CPD) and underwent curettage during her third pregnancy (Figure 3). The patient denied experiencing abdominal pain, weakness, dizziness, or fever.

On physical examination, the patient's vital signs were as follows: blood pressure 100/50 mmHg, pulse

84 beats per minute, respiratory rate 20 breaths per minute, oxygen saturation 99%, and temperature 36.6°C. General examination revealed anemic conjunctiva. Heart sounds were normal, with no murmurs or gallops. Bilateral vesicular breath sounds were heard, with no wheezing or ronchi. Abdominal examination revealed a soft abdomen with no tenderness. No liver or spleen enlargement was palpated. The patient's extremities were warm, with a capillary refill time of less than 2 seconds, and no edema. Hemoglobin was 9.4 g/dL, and the white blood cell count was elevated to $10.8\times10^3/\mu L$. An ultrasound revealed a suspected fibroid or niche at the cesarean scar, measuring 3×3 cm. Additionally, a Transvaginal Ultrasound (TUVS) identified a cesarean scar pregnancy with a defect measuring 1.22 cm and a 2×2 cm mass, likely placental tissue, with minimal vascularization (Figure 2B).

After discussing the imaging findings, potential complications from a cesarean scar pregnancy, and reproductive goals, the patient agreed to undergo permanent sterilization. She underwent laparotomy with niche repair. During the operation, an enlarged uterus was found with adhesion on peritoneum, bladder and uterus with a scar defect on the left side of lower uterine segment. The uterus was freed from the placental attachment with adhesiolysis, followed by resection of the retained placental tissue and pathological examination of the specimen. The surgical site was closed layer by layer (Figure 4).

Comparison Between Case 1 and Case 2

Case 1 and Case 2 both presented with cesarean scar pregnancy, but they differed in clinical presentation, surgical approach, and histopathological findings. Case 1 did not involve placental invasion and managed with resection and repair of the scar defect, whereas Case 2 involved placenta accreta, leading to the decision for permanent sterilization and did not involve placental invasion and managed with resection and repair of the scar defect (Figure 4). Case 1 experienced acute post-coital bleeding, while Case 2 had prolonged vaginal bleeding for two months. Both cases underwent laparotomy but had different histopathology results Case 1 showed no malignancy or decidual cells, while Case 2 exhibited necrosis and inflammatory cells. Despite these differences, both patients had stable post-operative outcomes and discharged on day 2 with scheduled follow-ups. This comparison highlights the importance of individualized surgical management based on ultrasound findings and clinical presentation in cesarean scar pregnancies (Table 1).

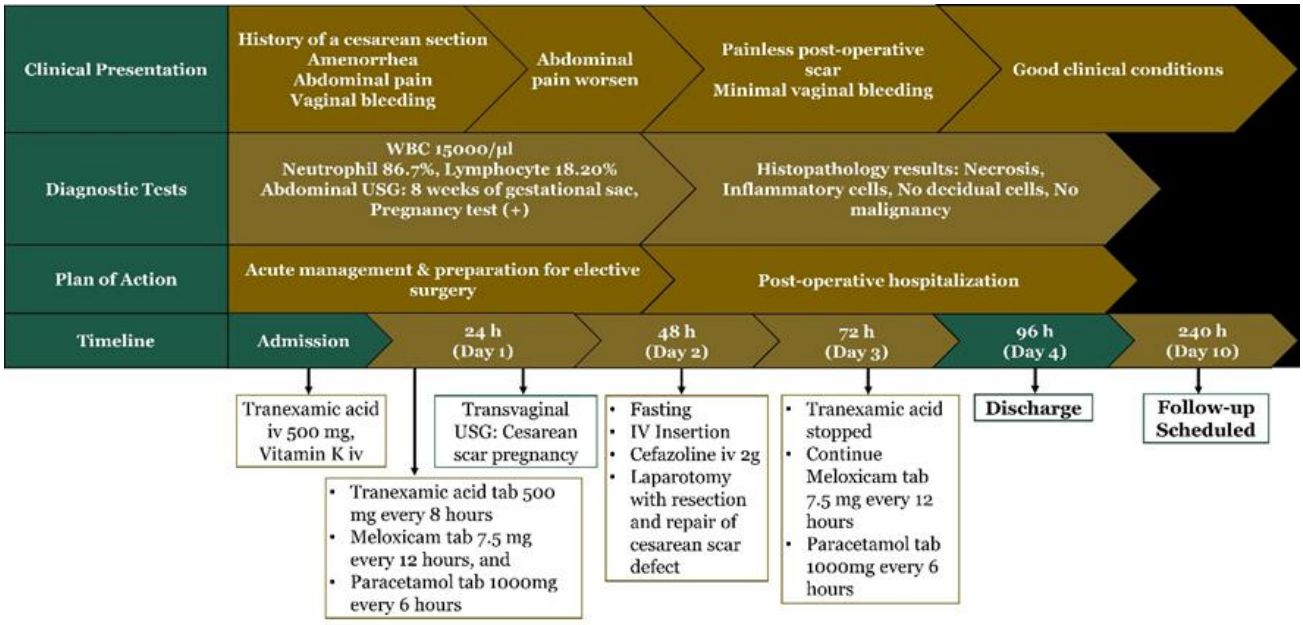


Figure 1. Follow up of patient 1

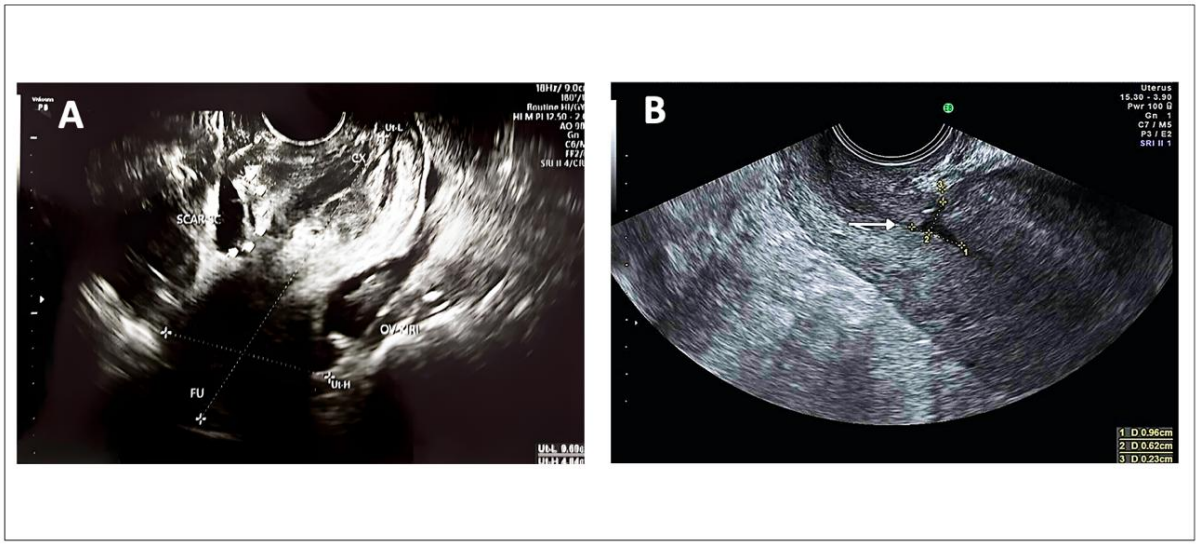


Figure 2. **USG Findings (A) Mrs. I show a hypoechoic mass on scar cavity located on superior fundus uteri with 8 weeks of gestational ages and (B) Mrs.P show a hypoechoic mass on scar cavity located on postero superior fundus unteri with 12 weeks of gestational age**

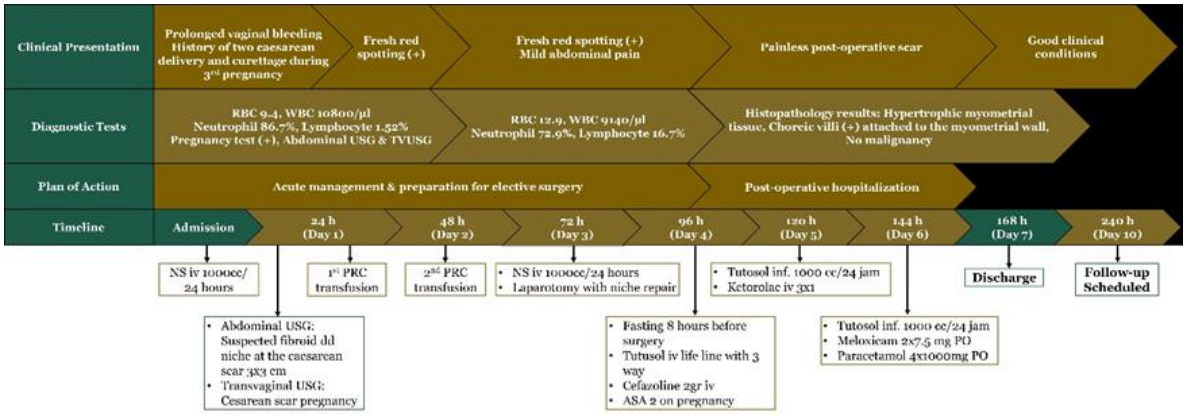


Figure 3. **Follow up of patient 2**

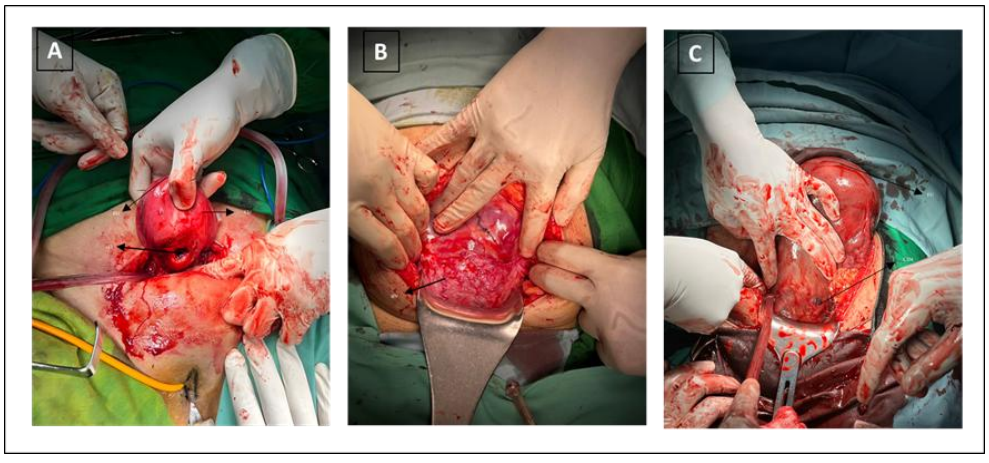


Figure 4. **Specimens obtained during surgery: (A) Caesarean section tissue with placenta accreta in a 12-weeks gestation case (Case 2); (B) Bridging vessels observed in Case 2; (C) Early neovascularization signs in cesarean scar tissue at 8 weeks gestation (Case 1)**

Table 1. Summary of Clinical Findings in Case 1 and Case 2

Characteristic	Case 1	Case 2
Patient Age & History	35 years old, G2P1001, History of one cesarean section	28 years old, G4P2012, History of 2 cesarean sections
Chief Complaint	Post-coital bleeding	Prolonged vaginal bleeding for 2 months
CSP Type	Type 2	Type 1
Ultrasound Findings	Pregnancy in cesarean scar, 1.22 cm defect, minimal vascularization	Pregnancy in cesarean scar, 1.22 cm defect, suspected fibroid/niche (3×3 cm)
Method Operation	Laparotomy with resection and repair of cesarean scar defect	Laparotomy with niche repair, Permanent sterilization
Outcome	Discharged on day 2, stable condition, Follow-up was scheduled	Discharged on day 2, stable condition, Follow-up scheduled
Histopathology Results	Necrosis, Inflammatory cells, No decidual cells, No malignancy	No decidual cells, No malignancy

3. Discussion

In this study, we presented two patients with history of cesarean deliveries diagnosed with CSP through transvaginal ultrasound subsequently undergoing surgical management. In the first case, a 35-year-old woman (G2P1001) at eight weeks of gestation presented with post-coital bleeding and localized pain at the previous cesarean scar site. Transvaginal ultrasound revealed a gestational sac implanted in the lower uterine segment with a hematoma at the previous cesarean scar. In the second case, a 28-year-old woman (G4P2012) at ten weeks of gestation reported prolonged vaginal bleeding without abdominal pain. Ultrasound examination identified a gestational sac without a visible embryo, and transvaginal ultrasound suggested a 3×3 cm myoma-like lesion with a differential diagnosis of a niche defect.

Similarly, Fatusic et al., reported a 38-year-old woman with a history of cesarean delivery three years prior presented at seven weeks of gestation with vaginal bleeding. Transvaginal ultrasound revealed two gestational sacs: one located supracervically with an 11 mm live embryo, and another in the uterine fundus without an embryo. The patient underwent vacuum aspiration and curettage; however, she returned one month later due to persistent bleeding, raising suspicion of retained placental tissue. The medical team conducted a thorough clinical evaluation, including repeat ultrasound imaging, and proceeded with appropriate management such as Dilation and Curettage (D&C) or surgical removal of the retained tissue to control the bleeding and prevent complications **(9)**. A comparable case was reported in Japan, involving a 28-year-old woman with a history of two prior cesarean deliveries. At 11 weeks of gestation, she was diagnosed with CSP via transvaginal ultrasound at a prior hospital at nine weeks of gestation. The gestational sac was implanted in the lower uterine segment at the previous cesarean scar. At 28 weeks of gestation, transvaginal ultrasound demonstrated placental adherence to the anterior uterine wall, with a placental edge located approximately 77 mm from the internal os. During the operation, a medusa head ilfiltration was found on the uterine surface by the placenta along the uterine wall, indicating the presence of PAS. The patient was discharged in good condition. Given these findings suggestive of placenta previa or accreta spectrum disorder, the patient was closely monitored with serial ultrasounds and planned for delivery in a tertiary care center. Management included counseling on potential risks such as bleeding and preterm labor, and preparation for possible surgical intervention, including cesarean delivery with multidisciplinary team involvement to minimize maternal and fetal complications **(10)**. These cases underscore the critical importance of early and accurate diagnosis in CSP, as most cases involve placental adherence that may result in significant maternal morbidity and mortality.

In our case series, a 35-year-old woman (G2P1001) at eight weeks of gestation presented with post-coital bleeding. Abdominal ultrasound identified an anembryonic gestational sac, prompting referral due to persistent vaginal bleeding and cesarean scar pain. Transvaginal ultrasound confirmed CSP with a 1.22 cm defect and a 2×2 cm suspected placental mass with minimal vascularization. Another case was reported by El Hilali et al., (2021) involved a 43-year-old woman (G5P2) with a history of three spontaneous abortions. She presented with heavy vaginal bleeding and pelvic pain. Transvaginal ultrasound identified a gestational sac implanted in the uterine isthmus, precisely at the previous cesarean scar. A viable embryo with a Crown-Rump Length (CRL) of 10.2 mm, corresponding to seven weeks and five days of gestation, was detected. The ovaries appeared normal, with no latero-uterine masses or effusions **(11)**. These cases highlight the importance of early transvaginal ultrasound imaging in diagnosing CSP, particularly in patients with prior cesarean deliveries.

A systematic review also analyzed pregnancy outcomes in CSP cases managed expectantly **(12)**. Also, another study on 47 patients reported that two had Type 1 CSP, both resulting in live births, though one developed placenta accreta and the other placenta increta. In Type 2 CSP, one live birth occurred at 20 weeks with placenta increta, while six other cases resulted in various placental pathologies: one with normal placentation, two with placenta increta, and three with placenta percreta **(13)**.

In this study, we presented two cases of CSP with distinct clinical presentations. Case 1 exhibited post-

coital bleeding and cesarean scar pain, with a 2×2 cm placental mass penetrating a niche defect, consistent with endogenic CSP. Case 2 presented with painless vaginal bleeding and a 3×3 cm placental invasion, suggesting a more advanced form of CSP. Case 1 aligns with Type 1 CSP, presenting with early symptoms and a smaller placental mass. Case 2 corresponds to Type 2 CSP, with more advanced symptoms and a larger placental invasion. Furthermore, a study by Vervoort et al., (2015) highlighted that the presence of a uterine niche, a defect in the uterine wall at the site of a previous cesarean section, can lead to complications such as CSP. The presence of a niche in Case 1 may contribute to the development of CSP, as the placental mass was observed to penetrate this niche **(14,15)**.

However, further classification of each case based on the described CSP subtypes remains necessary. This finding is consistent with the cases presented, in which Case 1, with a gestational age of 8 weeks, exhibited a different outcome compared to Case 2, with a gestational age of 12 weeks. The outcome parameters assessed included preoperative Hemoglobin (Hb) levels, intraoperative findings, and histopathological examination results. The preoperative Hb level in Case 1 was 13.6 g/dL, whereas in Case 2, was 9.4 g/dL. Intraoperative findings in Case 1 revealed uterine enlargement measuring 8-9 cm, with a bulging placenta on the right side measuring 2×2 cm, while both adnexa were normal. In contrast, in Case 2, the uterus was enlarged to 8 cm, and while both adnexa appeared normal, peritoneal adhesions involving the SBR were observed. A 40-year-old woman from Dubai, with a history of two previous cesarean sections, presented with a cesarean scar pregnancy at 10 weeks gestation. Despite the growing prevalence of CSP, especially in women with prior cesarean sections, the management of this condition remains challenging, particularly in developing countries where diagnostic and treatment resources may be limited. In this case, after confirming the diagnosis via transvaginal ultrasound, she was treated with a combination of methotrexate and potassium Chloride (KCL) injections. This treatment approach is commonly used in developing countries due to its accessibility and lower cost compared to surgical interventions, such as hysterectomy. The success rate of medical management for CSP, particularly for non-viable pregnancies, has been reported to be high, with one study indicating a success rate of 100% for non-viable CSPs treated with methotrexate alone **(15)**.

The risk of developing Placenta Accreta Spectrum Disorders in CSP is a significant concern. PASD, including placenta accreta, increta, and percreta, occurs when the placenta invades the uterine wall, and is often linked to CSP due to the thin myometrial layer overlying the scar tissue. Studies have shown that the risk of PASD increases with the number of cesarean sections. One study revealed that women with a history of multiple cesarean sections have a much higher risk of developing PASD, with incidence of reaching up to 60% in cases where CSP is diagnosed later in pregnancy **(16)**. The risk of uterine rupture, another severe complication of CSP, is also elevated, particularly in patients who undergo vaginal delivery after a cesarean section. In a study by Kaelin Agten et al., (2023), surgical treatments such as suction evacuation and excision with niche repair achieved a success rate of over 90% in resolving cesarean scar pregnancy when performed in the first trimester, thereby significantly reducing the risk of complications such as uterine rupture **(14,16)**. This statistic highlights the importance of early diagnosis and timely intervention to avoid the progressive complications associated with CSP and PASD.

4. Conclusion

Cesarean Scar Pregnancy presents significant clinical challenges, requiring timely diagnosis and individualized management. In both cases in the present study, surgical intervention via laparotomy was necessary. In Case 1, the presence of placenta accreta was a primary factor influencing the decision for permanent sterilization to prevent severe hemorrhage and future obstetric complications, although other clinical considerations may have also played a role. In Case 2, scar repair was sufficient. Despite differences in clinical presentation, ultrasound findings, and histopathological results, both patients achieved stable post-operative outcomes with no malignancy detected. These cases emphasize the importance of early detection, tailored surgical approaches, and comprehensive post-operative care to ensure optimal maternal health outcomes.

5. Declarations

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Ethical Considerations

This study was conducted in accordance with the ethical standards of the institutional research committee. Ethical approval was obtained from the Ethics Committee of Airlangga University, with the reference number 91/12/COM/ETHICS/2025. All

participants provided informed consent before inclusion in the study, ensuring the protection of their privacy and confidentiality.

Authors' Contributions

P.G.A.S., A.S.A., M.R.R., and M.I. contributed to the conceptualization and design of the study. P.G.A.S. was responsible for data collection, analysis, and writing the original draft. A.S.A., J.K.D., K.E.S., and I.M.B.N.S. contributed to the methodology and investigation. M.R.R. and M.I. assisted with the validation of the study. B.G.d.L. and A.S. provided resources and supervised the research. D.D.C.H.R. was involved in the review and editing of the manuscript. All authors read and approved the final version of the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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