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Systematic Review

Spontaneous uterine rupture in early pregnancy: a systematic review of case reports and clinical outcomes

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ABSTRACT

Spontaneous uterine rupture in early pregnancy is rare but life-threatening complication. First-trimester ruptures often present atypically and are under-represented in literature. This review aims to analyze reported cases of uterine rupture occurring before 16 weeks of gestation to identify clinical features, diagnostic challenges, management strategies and maternal outcomes. A comprehensive search was conducted using PubMed, Scopus, Embase, Cochrane Library and Google Scholar databases including articles published up to March 2025. Data on patient demographics, prior uterine surgeries, presenting complaints, imaging findings, surgical intervention, histopathology and clinical outcomes were extracted. Original case reports or case series in English language reporting spontaneous uterine rupture occurring before or at 16 weeks with adequate details were included in the study. Data was extracted independently by two reviewers using a standardized Excel spreadsheet. Descriptive statistics including means, frequencies and percentages were calculated. Eleven studies comprising 12 patients were included. Mean age was 31 years, with most patients being multiparous. Prior caesarean section or uterine surgery was identified in four patients and eight cases had unscarred uteri. Fundal rupture was most common site. Hemoperitoneum on ultrasonography and acute abdominal pain were common presenting features. Eight patients underwent uterine repair and four required hysterectomy. No maternal deaths were reported. This review emphasizes need for high clinical suspicion and prompt surgical intervention in early pregnancy rupture, even in absence of traditional risk factors.

Keywords: Rupture uterus, Spontaneous uterine rupture, Early pregnancy rupture, Haemoperitoneum in pregnancy, Systematic review of uterine rupture

INTRODUCTION

Uterine rupture is complete division of all three layers of the uterus: the endometrium, myometrium, and perimetrium and can cause significant morbidity and mortality.[1,2] The greatest risk factor is either due to a prior caesarean delivery or other myometrial surgical incision.[3] Most ruptures occur in the third trimester at the onset of the contractions and especially in a previously scarred uterus and rupture in the first or even in the early second trimester is very rare.[4,5] Studies have highlighted the growing incidence of uterine rupture attributed to the rising rate of caesareans and myomectomies, especially in pregnancies among older gravid patients.[6] Nonetheless, several cases have been documented in unscarred uteri, indicating that rupture can occur even in the absence of classical risk factors. The classical symptoms of uterine rupture are sudden onset severe abdominal pain with vaginal bleeding. The patients may have hemodynamic instability with hypotension and tachycardia.[7] The differential diagnosis include: ruptured ectopic or heterotopic pregnancy, ruptured corpus luteal cyst, adnexal torsion, and threatened, missed, or complete abortion.[8] According to a systematic review conducted by

the World Health Organization (WHO), the prevalence globally ranges from 0.31 to 2.9%, the average being 1.6%.[9] However, first trimester ruptures are particularly uncommon and the reports of its presentation, risk factors and management are limited.[10]

As the available data are limited to case reports and small case series, there is a lack of consolidated evidence regarding its clinical course and outcomes, which in turn hinders the development of standard diagnostic and therapeutic strategies.

The present systematic review aims to synthesize the existing literature on spontaneous uterine rupture occurring before 16 weeks of gestation. We aim to identify consistent patterns in presentation, explore risk factors, surgical management and outcomes to assist clinicians in early recognition and timely management.

Hypothesis

Spontaneous uterine rupture can occur in early pregnancy-even in the absence of classic risk factors such as prior cesarean section or uterine surgery-and presents with identifiable clinical and imaging features that, when recognized promptly, can lead to favorable maternal outcomes with timely surgical intervention.

Objective

The objective is to critically analyze published case reports and small case series of spontaneous uterine rupture occurring in early pregnancy (≤16 weeks gestation). The review aims to identify: common clinical presentations, underlying risk factors, intraoperative findings and preferred surgical strategies and maternal outcomes, to improve clinician awareness and guide early recognition and management of this condition.

METHODS

Eligibility criteria

Documented cases of spontaneous uterine rupture occurring before or at 16 weeks of gestation. Only the original case reports or case series that provided adequate clinical, diagnostic, surgical, and outcome details were included. Also, only English articles were included. On the other hand, Uterine ruptures reported after 16^{+6} weeks of gestation or resulting from instrumentation, trauma, illegal abortion or complete molar pregnancy were excluded from this study. Also, reports of ruptured uterus involving uncorrected congenital uterine anomalies were excluded.

Information source and search strategy

This review was conducted in accordance with preferred reporting items for systematic reviews and meta-analyses (PRISMA) 2020 guidelines. A comprehensive literature search was carried out using five databases: PubMed, Scopus, Embase, Cochrane Library, and Google Scholar, covering all studies published up to March 2025. The following Boolean search string was used (adapted appropriately for each database's syntax): ("uterine rupture" OR "spontaneous uterine rupture") AND ("first trimester" OR "early pregnancy" OR "≤16 weeks" OR "less than 16 weeks") AND ("case report" OR "case series"). In PubMed, additional medical subject headings (MeSH) were used where applicable, including: “Uterine Rupture” [MeSH] “Pregnancy Trimester, First” [MeSH] “Case Reports” filters applied during the search included: article type: case report, case series, language: English, population: human studies.

Study selection

The study selection process adhered to the PRISMA flow diagram (Figure 1).

Data extraction and assessment of bias

Data were extracted independently by two reviewers using a standardized Excel spreadsheet. Extracted variables included: author(s), year of publication, maternal age, gravidity and parity, gestational age at rupture, prior uterine surgery, presenting symptoms, vital signs at admission, imaging findings, surgical management (laparotomy/laparoscopy, uterine repair versus hysterectomy), rupture site and size, blood transfusion requirement, postoperative complications, histopathological findings and final maternal outcomes.

The methodological quality of included studies was assessed using the Newcastle-Ottawa scale (NOS), which is suitable for evaluating non-randomized and observational studies.[11] All studies scored between 8 and 10, indicating moderate to high quality (Table 1). Any discrepancies in interpretation were resolved by discussion between reviewers.

Table 1: Newcastle-Ottawa scale for quality assessment of included studies.

Authors	Representativeness of the sample	Pre op ascertainment of uterine rupture	Assessment of the maternal outcome	Quality score
Park et al[12]	10	9	9	9
Jang et al[13]	10	8	10	10
Jain et al[14]	10	9	8	9
Bosire et al[15]	10	9	8	9
Sarkar et al[16]	10	10	9	9

Continued.

Authors	Representativeness of the sample	Pre op ascertainment of uterine rupture	Assessment of the maternal outcome	Quality score
Mosad et al[17]	10	9	8	9
Miski et al[18]	10	9	8	9
Cecchini et al[19]	10	10	9	9
Katwal[20]	10	9	10	10
Amro et al[21]	10	9	10	10
Esmans et al[22]	10	9	10	10

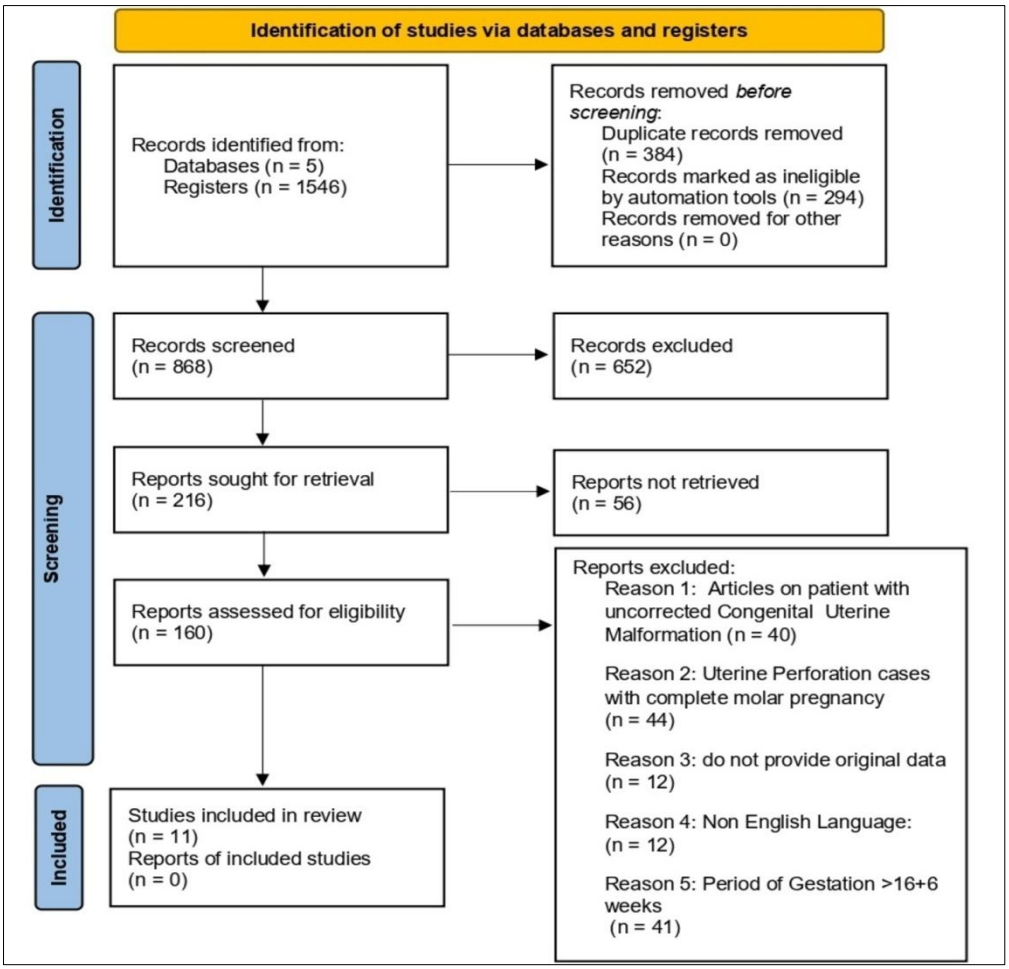

Figure 1: PRISMA flow diagram showing the study selection process for the systematic review.

Data synthesis and statistical analysis

Given the descriptive nature and heterogeneity of included cases, a narrative synthesis was performed. Descriptive statistics including means, frequencies and percentages were calculated. No meta-analysis was conducted due to small sample size and lack of uniform outcome measures. A Chi-square goodness-of-fit test was used to assess whether the distribution of rupture sites differed significantly from a uniform distribution. A p value of <0.05 was considered statistically significant.

RESULTS

Table 2 describes the study characteristics of the included studies.

Demographic and obstetric profile

Among the 12 patients, maternal age ranged from 19 to 40 years, with mean of 31 years. Multiparity was common, with 11 out of 12 patients (91.6%) being para 1 or more. A history of previous caesarean section was identified in 4 patients (33.33%), while 4 patients (33.33%) had undergone other types of uterine surgeries like salpingectomy or uterine correction for congenital anomalies. Notably, spontaneous rupture occurred in 1 primigravida (8.33%) with unscarred uteri, highlighting that rupture can occur even in the absence of conventional risk factors (Figure 2).[22]

The gestational age at the time of rupture ranged from 5.5 to 16 weeks. Most ruptures occurred between 10 and 13

weeks, representing a critical window of risk in early pregnancy similar to the findings of Perdue et al.[23] The distribution of cases by gestational age range is shown in the Figure 3.

Table 2: Study characteristics of included studies.

Author(s)	Year of publication	Study design	No. of past uterine scar(s)	Gestational age at presentation	Maternal outcome
Park et al[12]	2005	Case report	0	10 weeks	Not mentioned
Jang et al[13]	2011	Case report	0	14 weeks	Discharged
Jain et al[14]	2012	Case report	1	15 weeks	Not mentioned
Bosire et al[15]	2015	Case report	1	12 weeks	Discharged
Sarkar et al[16]	2013	Case report	1	16 weeks	Discharged
Mosad et al[17]	2017	Case report	0	11 weeks	Discharged
Miski et al[18]	2021	Case report	0	9 weeks	Discharged
Cecchini et al[19]	2020	Case report	2	11+6 weeks	Discharged
Katwal [20]	2021	Case report	0	11 weeks	Discharged
Amro et al[21]	2019	Case series	0	12 weeks and 5+5 weeks	Discharged
Esmans et al[22]	2004	Case report	0	16 weeks	Discharged

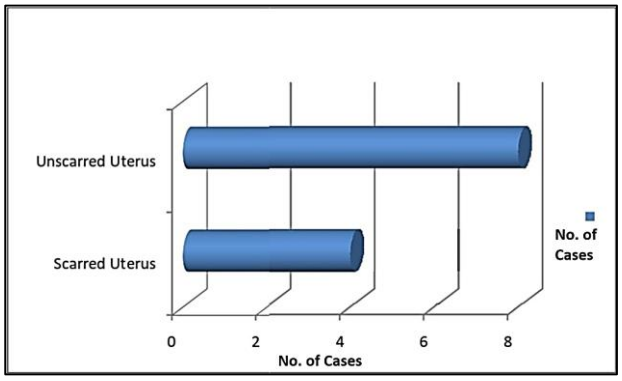

Figure 2: Distribution of cases according to presence of prior uterine scar.

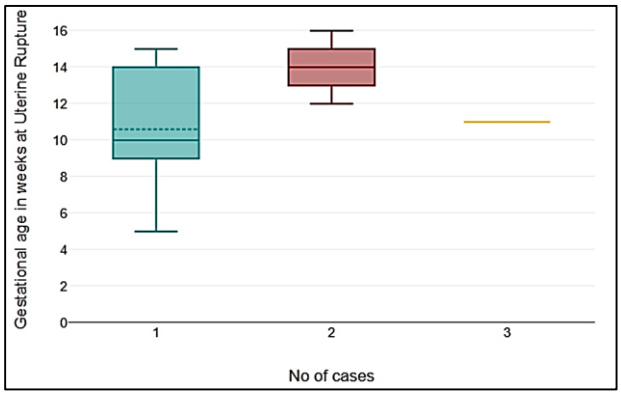

Figure 3: Distribution of cases according to the gestational age at the time of uterine rupture.

Clinical presentation and diagnostic findings

All patients (100%) presented with acute abdominal pain, which was the most consistent symptom. Three patients (27.27%) had associated vaginal bleeding and five (45.45%) exhibited signs of hemodynamic compromise, including hypotension, tachycardia or syncope, consistent with findings of Abdulwahab et al.[24] Physical examinations frequently revealed generalized abdominal tenderness, guarding and signs of peritonitis.

Ultrasonography was the initial diagnostic modality used. Hemoperitoneum or significant free fluid was noted in 9 cases (81.81%). In none of the cases, adherent Placenta was suspected in imaging, however, 3 patients were diagnosed with morbidly adherent placenta on HPE. This shows placenta accreta spectrum is difficult to diagnose in first trimester and the accuracy of diagnosis is low, also suggested by Kalthe et al.[25] Several cases were initially misdiagnosed as ectopic pregnancy, ruptured corpus luteum cyst or appendicitis, underscoring the diagnostic ambiguity. This shows that diagnosis of uterine rupture in early pregnancy is difficult as diagnosis is made based on non-specific signs like found in other clinical scenarios.[26]

Intraoperative and surgical management

All patients underwent emergency exploration either via laparotomy (most cases) or laparoscopy. Intraoperatively, rupture of uterine wall was confirmed. Uterine repair was performed in 8 patients (66.66%), while hysterectomy was necessary in 4 patients (33.33%) due to uncontrolled hemorrhage or extensive placental invasion.

The site of rupture varied, with fundus being the most common (7 cases, 58.33%), followed by scar site (2 cases, 16.66%) and posterior wall and anterior lower uterine wall (1 case each) i.e. 8.33% each. This is different from findings of Vernekar et al, who found that rupture site involved mostly lower segment in cases of unscarred uterus and site of the anterior uterine scar in cases of scarred uterus (reported by Miski et al).[18,27] This difference may be due to small number of studies available.

The anatomical distribution of rupture sites is depicted in Figure 4.

Estimated blood loss during surgery ranged from 800 to 3000 ml. Eight patients (66.66%) required transfusion with two or more units of packed red blood cells, reflecting significant hemorrhagic risk associated uterine rupture even in early pregnancy. Duration of hospital stay ranged from 3 to 11 days, with most patients being discharged by day 5-7 post-operatively. A comparison of intraoperative blood loss between uterine repair and hysterectomy is shown Figure 5.

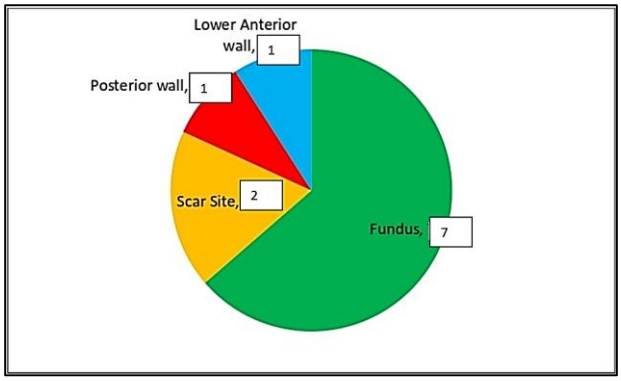

Figure 4: Anatomical distribution of rupture sites among the cases (numbers represent the number of cases at each site mentioned alongside).

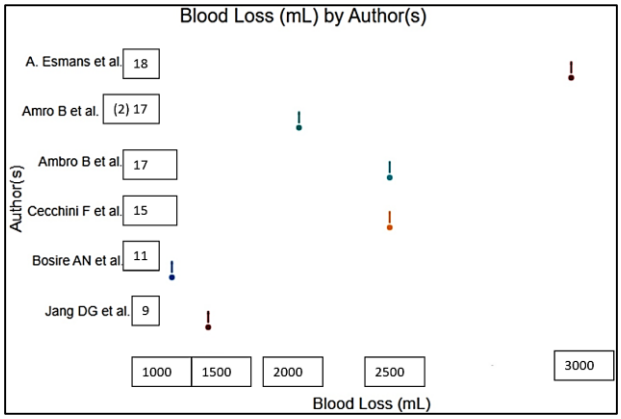

Figure 5: Comparison of blood loss among the different cases included in the study.

Histopathology and intraoperative findings

Histopathological examination was done in 10 cases. Morbidly adherent placenta was confirmed in 3 cases, accounting for 25% of cohort. One case was diagnosed as partial molar pregnancy and six others demonstrated normal myometrial tissue with no specific pathology, suggesting purely mechanical rupture in structurally compromised uterine walls.

Maternal outcomes

All patients survived and were discharged successfully. One patient developed a mild postoperative febrile illness, which resolved with conservative treatment.

A chi-square test was conducted to assess whether the frequency of rupture site distribution (fundus, scar site, posterior wall, lower segment) significantly deviated from a uniform pattern. The result was not statistically significant ($p=0.29$), suggesting that, while fundus was most frequently involved, the variation could be due to chance given the small sample size.

DISCUSSION

This systematic review highlights the clinical spectrum, diagnostic challenges, and surgical management of spontaneous uterine rupture in early pregnancy (≤16 weeks)-a rare but potentially fatal obstetric emergency.

Clinical and demographic patterns

The review found that multiparous women in their early 30s represented the majority of cases, aligning with previous reports suggesting uterine rupture risk increases with parity and maternal age.[6] However, a notable finding was that 66.66% of cases occurred in unscarred uteri, reinforcing that prior uterine surgery, while a major risk factor, is not a prerequisite for rupture. This observation aligns with previous studies, who noted that uterine rupture may present in unscarred uterus also and even in primigravida women.[28]

The mean gestational age at rupture was 11.4 weeks, with most events occurring between 10 and 13 weeks. All patients presented with acute abdominal pain, underscoring its reliability as a clinical red flag, especially when coupled with hemodynamic instability or free peritoneal fluid on ultrasonography. This aligns with previous study that reports, free fluid in the peritoneum with an intrauterine gestation is the most commonly observed finding on sonography in cases of uterine rupture.[29]

Diagnostic challenges and imaging dilemmas

In several cases, rupture was initially misdiagnosed as ectopic pregnancy, ruptured ovarian cyst, or appendicitis. Ultrasonography although the first-line imaging tool, has limited specificity in early pregnancy rupture. Misinterpretation of viable intrauterine pregnancy often delays definitive surgical exploration. The presence of hemoperitoneum, disrupted gestational sac or placenta percreta features should prompt consideration of rupture, even in the first trimester.

Three patients in this series had placenta percreta, a well-known risk factor for early rupture. The diagnosis of Placenta accreta may be confirmed by Ultrasound which has 41% sensitivity and 88% specificity in detection of placenta accreta in the first trimester. This highlights importance of careful ultrasound scan in patients with risk factors.[30] Placental pathologies-such as abnormal trophoblastic invasion-may play a greater role in early ruptures than previously assumed.

Surgical management and hemorrhagic risk

All patients underwent emergency surgical management, with uterine repair in 66.66% and hysterectomy in 33.33%. The choice of procedure was determined by rupture size, site, and presence of morbid placentation. The fundus was commonly involved site (58.33%), followed by scar sites and posterior uterine wall. This pattern suggests fundal region may be structurally vulnerable during early trophoblastic expansion. Intraoperative blood loss ranged from 800 to 3000 ml, with two-thirds of patients requiring transfusions, reflecting significant hemorrhagic burden even in early gestation.

Maternal outcomes and prognosis

Despite the severity of condition, no maternal deaths occurred. This is reassuring and indicates that with prompt surgical intervention can have favorable outcomes.

Limitations

This review is subject to limitations typical of rare-event syntheses. The reliance on case reports and small case series limits the generalizability of findings. There are also publication bias-severe or novel cases are more likely to be published. Additionally, long-term follow-up data on reproductive outcomes is lacking.

Future directions

Larger cohort studies are needed to evaluate: incidence in high-risk and low-risk populations, role of early ultrasound, comparative outcomes of uterine repair vs hysterectomy and impact on future fertility.

CONCLUSION

Spontaneous uterine rupture in early pregnancy is rare and poses a significant threat to maternal health. This review demonstrates that rupture can occur even in the absence of classic risk factors. Majority of patients present with acute abdominal pain and signs of hemodynamic instability. Ultrasound findings such as hemoperitoneum and abnormal gestational sac features should prompt consideration of rupture. Early surgical intervention remains lifesaving.

Given the diagnostic challenges, clinicians should maintain a high index of suspicion, particularly between 10 to 13 weeks of gestation. Future research is needed to better define risk stratification, improve early detection through imaging, and evaluate long-term reproductive outcomes.

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REFERENCES

1. Togioka BM, Tonismae T. Uterine Rupture. StatPearls: Treasure Island (FL): StatPearls Publishing. 2023.
2. Gibbins KJ, Weber T, Holmgren CM, Porter TF, Varner MW, Manuck AT. Maternal and fetal morbidity associated with uterine rupture of the unscarred uterus. Am J Obstet Gynecol. 2015;213:382-1.
3. Saghafi N, Maleki A, Ayati S, Shirinzadeh L. First Trimester Uterine Rupture, a Rare but Life-Threatening Event: A Case Report. Iran J Med Sci. 2019;44:422-6.
4. Revicky V, Muralidhar A, Mukhopadhyay S, Mahmood T. A Case Series of Uterine Rupture: Lessons to be Learned for Future Clinical Practice. J Obstet Gynaecol India. 2012;62:665-73.
5. Abbas AM, Hussein RS, Ali MN, Shahat AM, Mahmoud AR. Spontaneous first trimester posterior uterine rupture in a multiparous woman with scarred uterus: A case report. Middle East Fertil Soc J. 2018;23:81-3.
6. Zirqi A, Stray-Pedersen B, Forsén L, Daltveit AK, Vangen S. Uterine rupture: trends over 40 years. BJOG. 2016;123:780-7.
7. Mutiso SK, Oindi FM, Mundia DM. Uterine rupture in the first trimester: a case report and review of the literature. J Med Case Rep. 2024;18:5.
8. Perdue M, Felder L, Berghella V. First-trimester uterine rupture: a case report and systematic review of the literature [J]. Am J Obstet Gynecol. 2022;227:209-17.
9. Hofmeyr GJ, Say L, Gülmezoglu AM. WHO systematic review of maternal mortality and morbidity: the prevalence of uterine rupture. BJOG. 2005;112:1221-8.
10. Bolla D, Raio L, Favre D, Papadia A, In-Albon S, Mueller MD. Laparoscopic Ultrasound-Guided Repair of Uterine Scar Isthmocele Connected With the Extra-Amniotic Space in Early Pregnancy. J Minim Invasive Gynecol. 2016;1:261-4.
11. Wells GA, Shea B, O'Connell D, Peterson J, Welch V, Losos M, et al. The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses. Ottawa Hospital Research Institute. 2000.
12. Park YJ, Ryu KY, Lee JI, Park MI. Spontaneous uterine rupture in the first trimester: a case report. J Korean Med Sci. 2005;20:1079-81.
13. Jang DG, Lee GS, Yoon JH, Lee SJ. Placenta percreta-induced uterine rupture diagnosed by

laparoscopy in the first trimester. Int J Med Sci. 2011;8:424-7.
14. Jain A, Rathod GB, Parmar P. Uterine rupture due to placenta percreta in the first trimester of pregnancy: a rare case report. Int J Med Pharm Sci. 2012;3.
15. Bosire AN, Ogutu O, Olang PO. Spontaneous Rupture of the Caesarean Section Scar in the First Trimester: Case Report. East Afr Med J. 2015;2(92):147-9.
16. Sarkar M, Mandal J, Roy D, Halder M. Spontaneous unscarred fundal rupture of uterus at 16 weeks of pregnancy. J Evol Med Dent Sci. 2013;04(44):8578-80.
17. Mosad A, Altraigey A. Scar pregnancy and spontaneous rupture uterus—a case report. Ginekologia Polska. 2017;88:698-9.
18. Miski FE, Benjelloun AT, Bouab M, Lamrissi A, Fichtali K, Bouhya S. Spontaneous uterine rupture during the first trimester of a partial molar pregnancy in a scar uterus: A rare case report. Int J Surg Case Rep. 2021;85:106229-10.
19. Cecchini F, Tassi A, Londero AP, Baccarini G, Driul L, Xodo S. First Trimester Uterine Rupture: A Case Report and Literature Review. Int J Environ Res Public Health. 2020;24:2976-10.
20. Katwal P. Spontaneous unscarred uterine rupture in a primigravid patient at 11 weeks of gestation managed surgically: A rare case report. Int J Surg Case Rep. 2021;85:106251-10.
21. Amro B, Lotfi G. Spontaneous rupture of an unscarred uterus in early pregnancy: a rare but life-threatening emergency. BMJ Case Rep. 2019;28:228493-10.
22. Esmans A, Gerris J, Corthout E, Verdonk P, Declercq S. Placenta percreta causing rupture of an unscarred uterus at the end of the first trimester of pregnancy: Case report. Hum Reprod. 2004;19:2401-3.
23. Perdue M, Felder L, Berghella V. First-trimester uterine rupture: a case report and systematic review of the literature. Am J Obstet Gynecol. 2022;227:209-17.
24. Abdulwahab DF, Ismail H, Nusee Z. Second-trimester uterine rupture: lessons learnt. The. Malaysian J Med Sci. 2014;21:61-70.
25. Kalthe B, Kaur T, Mujalda A, Bisht R, Kaushik P. Placenta percreta in first trimester - A rarity and diagnostic dilemma. Indian J Obstet Gynecol Res. 2024;11:108-11.
26. Ijaz S, Mahendru A, Sanderson D. Spontaneous uterine rupture during the 1st trimester: a rare but life-threatening emergency. J Obstet Gynaecol. 2011;31:772.
27. Vernekar M, Rajib R. Unscarred Uterine Rupture: A Retrospective Analysis. J Obstet Gynaecol India. 2016;66(1):51-4.
28. Seca MS, Selvaggia BGS, Paola FP, Francesco CF, Patrizia DP, Paola AP. Uterine rupture in nulliparous woman without risk factors: a case report and literature review. BOHR J Obstet Gynaecol. 2023;1(1):23-8.
29. Attarde VY, Patil P, Chaudhari R, Zope N, Apte A. Sonographic findings of uterine rupture with expulsion of the fetus into broad ligament. J Clin Ultrasound. 2009;37:50-2.
30. Amza M, Loghin M, Vâlcea D, Nicolae G, Conea IM, Gorecki GP, et al. Life-Threatening Obstetrical Emergency: Spontaneous Uterine Rupture Associated with Placenta Percreta in the First Trimester of Pregnancy—Case Report and Literature Review. Reports (MDPI). 2024;71(21):10.

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