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Accuracy of ultrasound in detecting retained products of gestation after second-trimester medical termination of pregnancy

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Objectives: To determine the diagnostic accuracy of ultrasound parameters in detecting retained products of gestation (RPOG) after second-trimester medical termination of pregnancy (MTOP) and to identify predictors of RPOG.
Methods: Medical records of women who underwent second-trimester MTOP, followed by ultrasound evaluation and surgical evacuation for suspected RPOG, at Queen Elizabeth Hospital, Hong Kong, between 1 January 2019 and 31 December 2024 were reviewed. Clinical features were documented, as were ultrasound features, including endometrial thickness, the presence of endometrial masses and heterogeneous echogenicity, and endometrial vascularity. The diagnostic accuracy of endometrial thickness in detecting RPOG was assessed using the area under the curve. Diagnostic performances of other ultrasound variables were also determined. Multivariate logistic regression was performed to determine predictors of RPOG.
Results: In total, 237 women were included in the analysis. Of these, 196 (82.7%) had histopathology-confirmed RPOG and 41 (17.3%) had no histological evidence of RPOG. The RPOG-positive group had a lower median gestational age at termination (16 vs 19 weeks, p=0.008), a higher percentage of women with prior surgical evacuation (27.6% vs 7.3%, p=0.006), and a greater median endometrial thickness (22.5 vs 21.0 mm, p=0.018). The area under the curve for endometrial thickness in diagnosing RPOG was 0.613. The highest Youden index (0.205) was observed at an endometrial thickness of 27.9 mm, yielding a sensitivity of 23% and specificity of 97.6%. The presence of intrauterine mass and heterogeneous echogenicity demonstrated high sensitivity (72.4% and 81.1%, respectively) but low specificity (22.0% and 7.3%, respectively). Among 11 women who underwent colour Doppler ultrasound, vascularity yielded a sensitivity of 90% and specificity of 100%. Multivariate logistic regression identified lower gestational age at termination (adjusted odds ratio [OR]=0.854, p=0.004), prior abortion requiring surgical evacuation (adjusted OR=5.993, p=0.016), and increased endometrial thickness (adjusted OR=1.104 per mm, p=0.003) as independent predictors of RPOG.
Conclusion: Increased endometrial thickness is an ultrasound predictor of RPOG after second-trimester MTOP, with high specificity but low sensitivity at a high cut-off value. The favourable diagnostic performance of vascularity supports routine use of colour Doppler ultrasound. Clinicians should adopt a comprehensive, individualised approach that integrates clinical and ultrasound parameters.

Keywords: Abortion, induced; Placenta, retained; Pregnancy trimester, second; Ultrasonography

Introduction

Retained products of gestation (RPOG) complicate 15% to 21% of second-trimester medical termination of pregnancy (MTOP) cases; these rates are substantially higher than those for first-trimester abortion[1,2]. Residual placental or fetal tissue within the uterus is associated with a considerably increased risk of maternal complications including haemorrhage and infection[3,4]. Surgical evacuation of RPOG can lead to uterine perforation, intrauterine adhesions, and infertility[5], highlighting the importance of accurate and timely diagnosis.

Ultrasound is the standard diagnostic modality for RPOG. Prior studies have predominantly involved first-trimester or postpartum populations, in which findings such as endometrial thickness, intrauterine mass, echogenicity, and vascularity are well established[6,7]. Endometrial thickness is the most widely used diagnostic criterion, with cut-off values ranging from 10 to 25 mm[8,9] and area under the curve (AUC) values ranging from 0.7 to 0.8[10,11]. However, evidence supporting the use of ultrasound to diagnose RPOG after second-trimester MTOP remains limited. This study aimed to determine the diagnostic accuracy of ultrasound parameters in detecting RPOG after second-trimester MTOP and to identify predictors of RPOG.

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Methods

Medical records of women who underwent second-trimester (13 to 23 weeks + 6 days of gestation) MTOP, followed by ultrasound evaluation and surgical evacuation for suspected RPOG, at Queen Elizabeth Hospital, Hong Kong, between 1 January 2019 and 31 December 2024 were reviewed. Cases with incomplete records or missing ultrasound or histopathology data were excluded.

Pelvic ultrasound (transabdominal, transvaginal, or both) was routinely performed within 24 hours of abortus passage. Endometrial thickness (maximum longitudinal anteroposterior diameter) and the presence of endometrial masses and heterogeneous echogenicity were documented. When necessary, colour Doppler ultrasound was performed to assess endometrial vascularity[12]. Ultrasound findings were classified as 'suspected RPOG' or 'normal' by the attending physician.

Women with suspected RPOG were counselled regarding management options, including expectant management, medical evacuation via misoprostol, and surgical evacuation. Follow-up ultrasound was arranged 1 week after expectant management or medical evacuation. Surgical evacuation was arranged for those in whom conservative management had failed. Curetted tissue was sent for histopathological examination; the presence of chorionic villi or trophoblastic tissue confirmed RPOG.

The diagnostic accuracy of endometrial thickness in detecting RPOG was assessed using the AUC. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of other ultrasound variables (eg, intrauterine mass, echogenicity, and vascularity) were also determined. RPOG-positive and -negative cases were compared using the Student's *t* test for continuous data and the Chi-squared test or Fisher's exact test for categorical data. Univariate analysis was performed to identify ultrasound and clinical variables with $p<0.2$. Multivariate logistic regression was performed to determine predictors of RPOG. A p value of <0.05 was considered statistically significant. Statistical analyses were performed using SPSS (Windows version 29.0; IBM Corp, Armonk [NY], United States).

Results

In total, 237 women were included in the analysis. Of these, 196 (82.7%) had histopathology-confirmed RPOG and 41 (17.3%) had no histological evidence of RPOG (Table 1). The two groups were comparable, except that the RPOG-positive group had a lower median gestational age at termination (16 vs 19 weeks, p=0.008), a higher percentage of women with prior surgical evacuation (27.6% vs 7.3%, p=0.006), and a greater median endometrial thickness (22.5

Table 1. Characteristics and outcomes of participants who underwent surgical evacuation of retained products of gestation (RPOG) after second-trimester medical termination of pregnancy.

Characteristics	RPOG*		p Value
	Yes (n=196)	No (n=41)	
Age, y	34 (31-37)	33 (29-35)	0.220
Gestational age, wk	16 (14-19)	19 (15-21)	0.008
Gravidity	2 (1-3)	2 (1-2)	0.690
Parity	1 (0-1)	0 (0-1)	0.326
Prior abortion	79 (40.3)	11 (26.8)	0.106
Prior abortion with surgical evacuation	54 (27.6)	3 (7.3)	0.006
Twin pregnancy	5 (2.6)	0	0.591
Vaginal bleeding during surgical evacuation	194 (99.0)	40 (97.6)	0.460
Major bleeding (>500 mL) before surgical evacuation	5 (2.6)	2 (4.9)	0.424
Endometrial thickness, mm	22.5 (19-27)	21.0 (17-25.4)	0.018
Intrauterine mass	142 (72.4)	32 (78.0)	0.46
Echogenicity	159 (81.1)	38 (92.7)	0.072
Vascularity	n=10	n=1	0.182
Present	9 (90.0)	0	
Absent	1 (10.0)	1 (100.0)	

* Data are presented as median (interquartile range) or No. (%) of participants

vs 21.0 mm, p=0.018). The AUC for endometrial thickness in diagnosing RPOG was 0.613 (Figure). The highest Youden index (0.205) was observed at an endometrial thickness of 27.9 mm, yielding a sensitivity of 23% and specificity of 97.6%.

An intrauterine mass was identified in 142 RPOG-positive women and 32 RPOG-negative women, yielding a sensitivity of 72.4%, specificity of 22.0%, PPV of 81.6%, and NPV of 14.3%. Echogenicity was identified in 159 RPOG-positive women and 38 RPOG-negative women, yielding a sensitivity of 81.1%, specificity of 7.3%, PPV of 80.7%, and NPV of 7.5%. Although these ultrasound variables were sensitive for detection of RPOG, their low specificity hindered independent diagnostic utility. Among 11 women who underwent colour Doppler ultrasound, vascularity was present in nine RPOG-positive women and zero RPOG-negative women, yielding a sensitivity of 90%, specificity of 100%, PPV of 100%, and NPV of 50%.

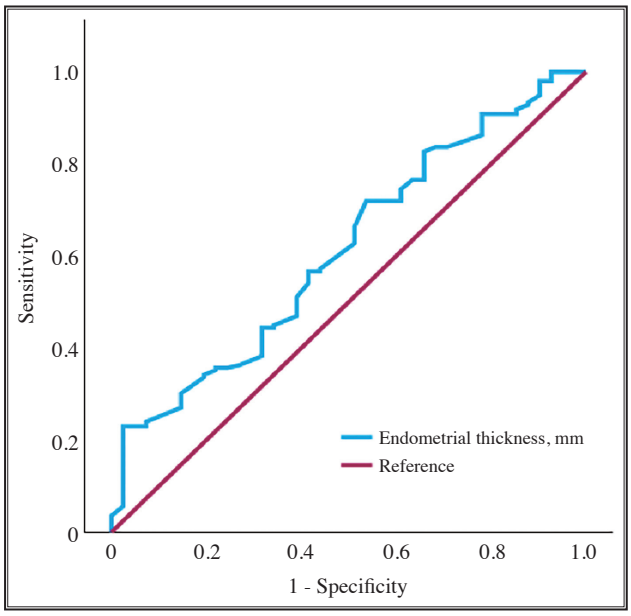


Figure. Receiver operating characteristic curve for endometrial thickness showing an area under the curve of 0.613. The highest Youden index (0.205) occurs at an endometrial thickness of 27.9 mm, yielding a sensitivity of 23% and specificity of 97.6%.

Multivariate logistic regression identified lower gestational age at termination (adjusted odds ratio [OR]=0.854, p=0.004), prior abortion requiring surgical evacuation (adjusted OR=5.993, p=0.016), and increased endometrial thickness (adjusted OR=1.104 per mm, p=0.003) as independent predictors of RPOG (Table 2).

Discussion

Increased endometrial thickness was identified as an ultrasound predictor of RPOG, with an AUC of 0.613, which is substantially lower than that reported in other studies[10,11]. Its clinical utility was limited by low sensitivity (23%), despite high specificity (97.6%) at the high cut-off of 27.9 mm. Other ultrasound variables demonstrated poor diagnostic performance, except for vascularity, which showed high sensitivity and specificity; however, vascularity was assessed in only 11 women. Additional predictors of RPOG included lower gestational age at termination and prior surgical evacuation.

Our findings substantially differ from those in studies of first-trimester abortion. Among 193 patients with suspected RPOG, the sensitivity and specificity of ultrasound in detecting RPOG were 75.22% and 72.50%, respectively, and the mean endometrial thickness was 13.5 mm in individuals with histopathologically confirmed

Table 2. Predictors of retained products of gestation after second-trimester medical termination of pregnancy.

Variable	Univariate analysis	Multivariate analysis	
	p Value	Adjusted odds ratio (95% confidence interval)	p Value
Gestational age	0.008	0.854 (0.767-0.951)	0.004
Prior abortion	0.109	0.761 (0.296-1.96)	0.572
Prior abortion with surgical evacuation	0.011	5.993 (1.394-25.774)	0.016
Endometrial thickness	0.015	1.104 (1.035-1.178)	0.003
Intrauterine mass	0.462	-	-
Echogenicity	0.085	0.313 (0.088-1.121)	0.074
Vascularity*	0.028	-	-

* Excluded from multivariate analysis due to small sample size.

RPOG[13]. Similarly, an endometrial thickness cut-off of 14.9 mm yielded a sensitivity of 78.7% and specificity of 77.8% in predicting RPOG after abortion or delivery, with an AUC of 0.808[11]. A meta-analysis concluded that variability in cut-off thresholds and limited specificity hinder diagnostic reliability, although an endometrial thickness of ≥15 mm is frequently used to identify RPOG[9].

Several factors may explain the poor discrimination of ultrasound variables in our cohort. First, the high prevalence of RPOG (82.7%) may have reduced variability in endometrial thickness and compressed the AUC towards chance performance. Second, second-trimester MTOP involves more extensive endometrial disruption and bleeding than first-trimester abortion, potentially resulting in higher post-abortion endometrial thicknesses among RPOG-positive and RPOG-negative populations. Third, most ultrasound examinations were performed within 24 hours post-abortion, which may have captured an intermediate state in which the endometrium remains globally thickened due to a mixture of blood and tissue debris. The interval between abortion and ultrasound assessment strongly influences findings; earlier scans increase the likelihood of false-positive results[14].

Contrary to suggestions that echogenic intrauterine masses are among the most sensitive and specific ultrasound features for RPOG[9,15], the present study revealed that both echogenicity and the presence of an intrauterine mass had poor diagnostic performance; neither was a predictor of RPOG. The low specificity reflects their high prevalence in the immediate post-abortion period, when both clotted blood and placental tissue may appear as an echogenic intrauterine mass, particularly when ultrasound is routinely performed irrespective of clinical symptoms.

Colour Doppler ultrasound demonstrated high diagnostic performance of endometrial vascularity in detecting RPOG[16]. Endometrial vascularity is strongly correlated with RPOG; moderate to marked vascularity exhibits a PPV of 100%[17]. Enhanced myometrial vascularity and structured Doppler classification systems (eg, the Gutenberg classification) may improve risk stratification for bleeding and guide management decisions[18]. Nevertheless, operator variability and the lack of standardised protocols for colour Doppler ultrasound may affect its diagnostic performance.

Multivariate logistic regression identified lower gestational age at termination and prior surgical evacuation as predictors of RPOG. Lower gestational age is associated with incomplete placental development and less efficient placental separation[2], whereas prior uterine instrumentation predisposes to abnormal myometrial involution and impaired expulsion of subsequent pregnancy products[19,20].

Ultrasound alone showed limited utility in detecting or excluding RPOG after second-trimester MTOP. This finding contrasts with studies of first-trimester abortion or postpartum settings, in which ultrasound has higher diagnostic precision. In second-trimester MTOP, the larger placental mass, more extensive decidualisation, and deeper trophoblastic invasion of the myometrium result in distinct pathophysiological features. Second-trimester MTOP—particularly when protracted or incomplete—may result in fragmented placental remnants, haemorrhagic infiltration of the endometrial cavity, and reactive myometrial changes, all of which confound ultrasound interpretation. The absence of standardised diagnostic criteria and operator-dependent variability further limit accuracy. Diagnosing RPOG through ultrasound alone remains challenging due to heterogeneous imaging findings and inter-observer variability; a multimodal approach integrating greyscale and Doppler findings, along with clinical evaluation, is advocated[21].

This study had several limitations. First, the retrospective design may have introduced selection bias. Only women who underwent surgical evacuation for RPOG with available histopathology were included. Thus, the findings may not be generalisable to the broader post-MTOP population, including individuals who received expectant or medical management. Second, ultrasound was routinely performed within 24 hours of abortus passage, which may have contributed to over-referral for surgical treatment. The uterine cavity typically contains a mixture of blood clots and tissue debris that may spontaneously resolve without intervention. Third, histopathological confirmation of RPOG does not establish that surgical intervention was absolutely indicated. Conversely, the absence of trophoblastic tissue on histology does not exclude pre-existing RPOG, given that sampling error or tissue fragmentation and degradation can yield false-negative results. Fourth, the classification of suspected RPOG was based on the physician's assessment rather than a validated scoring system, potentially introducing inter-observer variability. Finally, the small sample size for vascularity assessment precludes definitive conclusions regarding this parameter.

Conclusion

Increased endometrial thickness is an ultrasound

predictor of RPOG after second-trimester MTOP, with high specificity but low sensitivity at a high cut-off value. The favourable diagnostic performance of vascularity supports routine use of colour Doppler ultrasound. Clinicians should adopt a comprehensive, individualised approach that integrates clinical and ultrasound parameters.

Contributors

Both authors designed the study, acquired the data, analysed the data, drafted the manuscript, and critically revised the manuscript for important intellectual content. Both authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

Both authors have disclosed no conflicts of interest.

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Data availability

All data generated or analysed during the present study are available from the corresponding author on reasonable request.

Ethics approval

This study was approved by the Central Institutional Review Board of Hospital Authority (reference: CIRB-2025-345-2). All patients were treated in accordance with the tenets of the Declaration of Helsinki. The patients provided informed consent for all treatments and procedures and for publication.

References

1. Zeng WJ, An SL, Huang H, et al. Expectant therapy versus curettage for retained products of conception after second trimester termination of pregnancy: analysis of outcomes and complications [in Chinese]. Nan Fang Yi Ke Da Xue Xue Bao 2017;37:569-74. Crossref
2. Noguchi T, Shiro M, Nanjo S, et al. Risk factors of retained products of conception after miscarriage or termination with gemeprost in the second trimester of pregnancy: a retrospective case-controlled study in Japanese population. J Obstet Gynaecol 2022;42:501-4. Crossref
3. Kurakazu M, Kurakazu M, Kiyoshima C, et al. Clinical prediction of retained products of conception: combining obstetric history and ultrasound for improved accuracy in severe postpartum hemorrhage. Cureus 2024;16:e53651. Crossref
4. Sellmyer MA, Desser TS, Maturen KE, Jeffrey RB Jr, Kamaya A. Physiologic, histologic, and imaging features of retained products of conception. Radiographics 2013;33:781-96. Crossref
5. Pateisky P, Mikula F, Adamovic M, et al. Evaluation of the management and outcome of patients with retained products of conception after gestational week 23+0: a retrospective cohort study. J Clin Med 2024;13:4439. Crossref
6. Blyth U, Fourie H, Akinola L, Smith C, Melo P, Granne I. Definition and diagnostic criteria of retained products of conception following first-trimester pregnancy loss: a systematic review. Hum Fertil (Camb) 2025;28:2522054. Crossref
7. Matijevic R, Knezevic M, Grgic O, Zlodi-Hrsak L. Diagnostic accuracy of sonographic and clinical parameters in the prediction of retained products of conception. J Ultrasound Med 2009;28:295-9. Crossref
8. Hamel CC, van Wessel S, Carnegy A, et al. Diagnostic criteria for retained products of conception: a scoping review. Acta Obstet Gynecol Scand 2021;100:2135-43. Crossref
9. Sundararajan S, Roy S, Polanski LT. The accuracy of ultrasound scan in diagnosing retained products of conception: a systematic review and meta-analysis. Am J Obstet Gynecol 2024;230:512-31.e3.
10. Kalendaryov A, Sharon A, Sgayer I, Mikhail SM, Lowenstein L, Aiob A. Diagnostic accuracy of endometrial thickness in identifying retained products of conception and tailored hysteroscopic management: a retrospective study. Gynecol Obstet Invest 2025;90:641-6. Crossref
11. Aiob A, Mikhail SM, Sgayer I, et al. Diagnostic accuracy and characteristics of symptomatic versus asymptomatic retained products of conception: a retrospective cohort study. Eur J Obstet Gynecol Reprod Biol 2024;299:278-82. Crossref
12. Dewilde K, Groszmann Y, Van Schoubroeck D, et al. Enhanced myometrial vascularity secondary to retained pregnancy tissue: time to stop misusing the term arteriovenous malformation. Ultrasound Obstet Gynecol 2024;63:5-8. Crossref
13. Iqbal H, Khan MS, Muneeb A, Mirza WA. Diagnostic accuracy of ultrasound in detecting retained products of conception: a study from a tertiary care hospital in Karachi, Pakistan. Cureus 2018;10:e3564. Crossref
14. Amer-Alshiek J, Shiekh O, Agmon A, Grisaru D. What is the right timing for ultrasound evaluation after pregnancy termination with mifepristone? Eur J Obstet Gynecol Reprod Biol 2015;189:24-6. Crossref
15. Atri M, Rao A, Boylan C, Rasty G, Gerber D. Best predictors of grayscale ultrasound combined with color Doppler in the diagnosis of retained products of conception. J Clin Ultrasound 2011;39:122-7. Crossref

16. Ashkar Majadla N, Abu Shqara R, Haj S, et al. Sonographic evaluation of retained products of conception within 48 h following delivery: a retrospective cohort study. Arch Gynecol Obstet 2025;311:367-73. Crossref
17. Kamaya A, Petrovitch I, Chen B, Frederick CE, Jeffrey RB. Retained products of conception: spectrum of color Doppler findings. J Ultrasound Med 2009;28:1031-41. Crossref
18. Alonso Pacheco L, Timmons D, Saad Naguib M, Carugno J. Hysteroscopic management of retained products of conception: a single center observational study. Facts Views Vis Obgyn 2019;11:217-22.
19. Chawla S, Sharma R. Retained products of conception (RPOC): diagnosis, complication & management. J Obstet Gynaecol India 2023;73:374-80. Crossref
20. Smorgick N, Mittler A, Ben-Ami I, Maymon R, Vaknin Z, Pansky M. Retained products of conception: what is the risk for recurrence on subsequent pregnancies? Eur J Obstet Gynecol Reprod Biol 2018;224:1-5. Crossref
21. Incognito GG, Ettore C, De Tommasi O, Tozzi R, Ettore G. Ultrasound assessment of retained products of conception (RPOC): insights from the current literature. J Clin Med 2025;14:5864. Crossref