

Primary Omental Pregnancy: a case report of preoperative warning and systematic laparoscopic management

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Case Report

Keywords: Omental pregnancy, Abdominal pregnancy, Ectopic pregnancy, Laparoscopy

Posted Date: June 21st, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-9967873/v1>

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Additional Declarations: No competing interests reported.

Abstract

Primary Omental Pregnancy is extremely rare and its preoperative diagnosis is very difficult; most cases are discovered incidentally during surgery. We report a case that was successfully diagnosed and treated by laparoscopy after preoperative warning, with emphasis on the diagnostic clues and surgical strategy.

Background

Ectopic pregnancy accounts for approximately 1–2% of all pregnancies and is a leading cause of early pregnancy-related maternal mortality [1]. Abdominal pregnancy is a rare subtype of ectopic pregnancy, accounting for less than 1% of all ectopic pregnancies [2][3], with an incidence of about 9.2 per 1000 ectopic pregnancies, or 1 per 10,000–25,000 deliveries [4]. Omental Pregnancy (OP) is one of the rarest forms of abdominal pregnancy. In a review from 1958 to 2012, Maiorana et al. identified only 16 reported cases [5]. Yu and Li reviewed Chinese literature from 1978 to 2015 and included 46 cases of primary abdominal pregnancy, of which 36 were omental pregnancies [6]. OP lacks the typical sonographic features of tubal ectopic pregnancy, and the lesion is located far from the pelvis, often leading to misdiagnosis or delayed diagnosis, and is usually discovered incidentally during laparotomy or laparoscopy [7][8]. If rupture occurs or treatment is delayed, it may result in life-threatening intra-abdominal hemorrhage; the global maternal mortality rate for abdominal pregnancy is reported to be 2–30% [2][9]. The diagnosis of primary abdominal pregnancy must satisfy the Studdiford criteria: normal bilateral fallopian tubes and ovaries, absence of a utero-peritoneal fistula, pregnancy related only to the peritoneal surface, and sufficiently early occurrence to exclude secondary implantation [9][10]. With the widespread use of assisted reproductive technology, non-tubal ectopic pregnancies including OP have also been reported after frozen-thawed embryo transfer [11]. Here we report a case of Primary Omental Pregnancy that was successfully diagnosed and treated by systematic laparoscopic exploration, with simultaneous management of a left ovarian corpus luteum cyst, and review the relevant literature.

Case presentation

A 19-year-old unmarried woman with a history of sexual activity, gravida 0 para 0, presented with “57 days of amenorrhea and a positive home urine pregnancy test” on April 17, 2025. Her menstrual cycles were regular (5/30 days) with moderate flow and dysmenorrhea, with a Visual Analogue Scale (VAS) score of 8. Her last menstrual period was February 20, 2025. She denied nausea, vomiting, abdominal pain, or vaginal bleeding. She was sexually active with barrier contraception but not consistently. Her past medical history was unremarkable, with no history of surgery or pelvic inflammatory disease. She had a 1-year smoking history of about 5 cigarettes per day, and had quit smoking 2 days before presentation. Family history: her mother and one elder sister both had polycystic ovary syndrome.

Physical examination: temperature 37.1°C, pulse 93 beats/min, respiration 18 breaths/min, blood pressure 112/75 mmHg. Abdomen was soft and non-tender. Pelvic examination: external genitalia were

normal; vagina was patent with a small amount of discharge; cervix was normal size with mild ectropion, no contact bleeding, no cervical motion tenderness; uterus was anteverted, normal size, mobile, non-tender; bilateral adnexa were thickened but non-tender.

Investigations: On April 17, 2025, serum beta-human chorionic gonadotropin (β -hCG) was 4198.00 mIU/mL. Transvaginal ultrasound showed: uterus anteverted, size 4.8×4.2×3.1 cm, a 1.0×0.5 cm hypoechoic nodule in the anterior wall (suspected small fibroid); endometrial thickness 8.8 mm, no gestational sac in the cavity. Left ovary: a 3.7×2.6 cm cystic mass with septations and flocculent echoes, no significant flow on color Doppler; adjacent to the left ovary a 1.9×1.6 cm heterogeneous hypoechoic area with slightly rich blood flow (RI 0.53) (Fig. 1). Right ovary: 3.6×1.5 cm with ≥ 12 small anechoic areas (polycystic-like change). The pouch of Douglas contained a 2.8×1.1 cm fluid collection. On April 18, 2025, repeat serum β -hCG was 4236.00 mIU/mL. Repeat ultrasound showed: left ovarian cyst 3.5×2.4 cm with persistent septations and flocculent echoes; the heterogeneous area adjacent to the left ovary was unchanged; pelvic fluid had increased to 5.7×2.3 cm.

Given the persistently elevated β -hCG, persistently empty uterine cavity, and sonographic findings atypical for tubal ectopic pregnancy, consultation with the ultrasonographer led to the suspicion that the ectopic pregnancy was located outside the fallopian tube, likely a non-tubal ectopic pregnancy. Because of the risk of rupture and intra-abdominal bleeding, after thorough discussion with the patient and her family, diagnostic laparoscopy was performed under general anesthesia on April 18, 2025. Intraoperative findings and procedure: Laparoscopy revealed approximately 50 mL of hemoperitoneum. First, both fallopian tubes and ovaries were carefully inspected and found normal, with no gestational tissue. The vesicouterine fold, pouch of Douglas, and pelvic sidewalls were also normal. The exploration was extended to the upper abdomen, where a bluish-purple, friable mass of about 2 cm in diameter, covered with a small amount of blood clot, was found on the omental surface-confirming OP. Bipolar coagulation was applied to precoagulate the omentum approximately 1 cm around the lesion, and the gestational tissue was completely resected along the precoagulated margin, with no bleeding. The left ovary was then explored; it was enlarged to about 5 cm with a smooth surface. The ovarian cortex was incised, the corpus luteum cyst was exposed and completely enucleated, and the ovary was reconstructed with 2-0 absorbable suture. OP specimen and the cyst wall were placed in an endoscopic bag. The abdominopelvic cavity was irrigated with warm saline, and after confirming no active bleeding, the bag was removed through the umbilical port. The CO₂ was evacuated and the incisions were closed. The patient's intraoperative course was uneventful, with intraoperative blood loss of about 10 mL, infusion of 1000 mL, and urine output of 100 mL. Postoperative recovery: The patient recovered uneventfully, without abdominal pain or fever. Methotrexate was not given. Serial serum β -hCG measurements: postoperative day 1 (April 19) 1259.33 mIU/mL (70.3% decrease from preoperative 4236 mIU/mL); day 4 (April 22) 197.68 mIU/mL (95.3% decrease); day 19 (May 7) 2.22 mIU/mL; day 25 (May 13) 0.98 mIU/mL; day 38 (May 26) 0.76 mIU/mL. Menstruation resumed on May 16 (postoperative day 28) with normal cycle and flow (Fig. 2).

Description of tissue specimen morphology: Left ovarian cyst specimen: fragmented cystic wall, total size 2.5×2.5×1 cm, wall thickness 0.1–0.2 cm, gray-white to gray-yellow, partly gray-brown, soft to firm. Omental specimen: irregular tissue, total size 4.5×2×0.6 cm, gray-yellow to gray-brown, with villus-like structures, soft. Pathology: Omental specimen consistent with omental ectopic pregnancy, showing chorionic villi and trophoblast (Figs. 3 and 4). Microscopic diagnosis: Left ovarian cyst consistent with corpus luteum cyst with hemorrhage and ovarian follicular cyst (Fig. 5). The patient was followed up regularly after surgery. Menses remained normal during the follow-up period, and she reported no discomfort. She expressed a desire for future fertility and received appropriate fertility counseling from our team. Further evaluation, such as tubal patency testing or referral for assisted reproductive technology, may be pursued as needed. At the last follow-up visit, the patient remained in good condition and reported no specific complaints.

Discussion

OP is an extremely rare subtype of abdominal pregnancy. Maiorana et al. identified only 16 reported cases between 1958 and 2012[5], and a Chinese review from 1978 to 2015 included only 36 cases[6]. In a single-center retrospective analysis of 836 laparoscopic surgeries for ectopic pregnancy from 1991 to 2019, Sato et al. detected 13 abdominal pregnancies, of which only one was OP, highlighting its extreme rarity [12]. In recent years, isolated cases have been reported by Koniarets et al. [11], Terrinoni et al. [13], and Wang et al. [14], further confirming the rarity. Most cases are diagnosed during emergency surgery for acute abdomen, but the uniqueness of our case lies in the successful preoperative warning based on atypical clinical and sonographic findings, followed by planned systematic laparoscopic exploration leading to timely diagnosis and treatment.

1.Diagnostic pitfalls and preoperative warning clues: Preoperative diagnosis of OP is very challenging. Typical tubal ectopic pregnancy often presents with cervical motion tenderness and adnexal tenderness [1], Our patient had bilateral adnexal thickening but no tenderness, which is atypical for tubal ectopic pregnancy. Furthermore, on ultrasound, when β -hCG exceeds 1500-2000 mIU/mL, an intrauterine gestational sac should usually be visible [1], however, the uterine cavity remained persistently empty in our patient. Because the omentum is located high in the abdomen and is often obscured by bowel gas, transvaginal ultrasound has low sensitivity and rarely directly visualizes the lesion [3]. Nevertheless, our case provided key warning clues: empty uterine cavity, persistent non-tubal adnexal heterogeneous mass, and progressively increasing pelvic fluid. This “triad” is distinctly different from the sonographic findings of typical tubal pregnancy and should prompt clinicians to broaden the differential diagnosis to include abdominal pregnancy. We emphasize that when β -hCG continues to rise and repeated ultrasound fails to locate the pregnancy intrauterine or in the fallopian tube, close communication with the ultrasonographer is essential, and active scanning of the abdominal cavity should be performed to look for rare implantation sites such as the omentum. Although magnetic resonance imaging (MRI) can be valuable for preoperative diagnosis of rare-site ectopic pregnancies [15][16], our patient underwent direct surgical exploration because the progressive increase in fluid suggested possible active bleeding, a decision that is consistent with the principles of emergency management of ectopic pregnancy [1].

2. Systematic laparoscopic exploration is the key to avoid missed diagnosis: When pelvic exploration does not reveal a tubal pregnancy, surgeons may be tempted to stop there, leading to missed diagnosis of an abdominal pregnancy at a rare site. Sato et al. showed that implantation sites can include the pouch of Douglas, the vesicouterine fold, and the omentum [12]. Lee et al. reported three cases of atypical ectopic pregnancies (including one OP) and noted that when pelvic exploration is negative, systematic exploration of the entire abdominal cavity is necessary to avoid missed diagnosis [17]. Terrinoni et al. also emphasized this principle [13]. More recently, Minis et al. in a paper specifically summarizing the “lessons” of laparoscopic management of OP, reiterated the extreme importance of systematic exploration, particularly noting that the upper abdomen should not be omitted [18]. The title of that paper reveals its core message: the key lesson from a rare case is thorough abdominal exploration. In our case, after confirming that both tubes, ovaries, and the pelvis were free of gestational tissue, we extended the exploration to the upper abdomen and eventually found the lesion on the omentum. This systematic approach—from pelvis to upper abdomen, from reproductive organs to peritoneal surface—should become the standard step in laparoscopic surgery for ectopic pregnancy, especially when the adnexal findings are negative.

3. Limitations of conservative treatment: Methotrexate (MTX) is a commonly used conservative treatment for hemodynamically stable unruptured ectopic pregnancy [1]. The 2025 RANZCOG guideline covers the management of non-tubal ectopic pregnancies [19]. However, evidence on the efficacy of MTX specifically for OP is extremely limited. For example, Koniarets et al. reported a case of OP after frozen-thawed embryo transfer in which β -hCG continued to rise after MTX treatment, eventually requiring surgery [11]. You et al. also reported a case of OP complicated by massive hemoperitoneum [20]. Mohanraj et al. proposed a treatment algorithm based on non-tubal ectopic pregnancies, but that series did not include OP [21]. In our patient, β -hCG had already reached 4236 mIU/mL with an upward trend and pelvic fluid was increasing progressively, indicating active intra-abdominal bleeding, which clearly exceeded the safety range for conservative treatment. Given the reported failures of MTX, we believe that laparoscopic complete resection should be the first-line treatment for OP rather than attempted conservative therapy.

4. Risk factors and fertility outcomes: The etiology of OP is not fully understood. Our patient lacked traditional risk factors such as pelvic inflammatory disease or abdominal surgery, but she had a smoking history and a family history of polycystic ovary syndrome, with polycystic-like ovaries. Smoking is a well-established risk factor for tubal ectopic pregnancy [1], but its relationship with primary abdominal pregnancy requires further study. Although the patient had significant dysmenorrhea (VAS score of 8) and bilateral adnexal thickening on examination, systematic exploration of the abdominal and pelvic cavities did not reveal typical endometriotic lesions; however, the presence of microscopic or subtle peritoneal endometriosis could not be definitively excluded. Nevertheless, Sato et al. have suggested that endometriosis may be a potential risk factor for abdominal pregnancy, possibly through chronic peritoneal inflammation and surface defects that create a receptive environment for embryo implantation [12]. In our case, even though no definite endometriosis was found, the clinical features of dysmenorrhea and adnexal thickening still suggest a possible subclinical inflammatory environment in

the pelvis, which warrants further attention. Koniarets et al. pointed to assisted reproductive technology as a possible trigger [11], and OP has also been reported in multiparous women [22]. This case demonstrates that OP can occur spontaneously even in healthy young women without traditional risk factors, highlighting the heterogeneous background of this condition. Regarding fertility outcomes, Sato et al. reported that among 7 patients desiring pregnancy, 6 achieved pregnancy postoperatively and 5 had live births [12]. Our patient resumed normal menstruation postoperatively, and ovarian function was well preserved, but long-term fertility outcomes await follow-up.

5. Postoperative monitoring and follow-up: Close monitoring of β -hCG until normalization is the gold standard for assessing treatment completeness. In our patient, β -hCG decreased by 70.3% on day 1 and 95.3% on day 4, falling below the upper limit of normal (5 mIU/mL) by day 19 (2.22 mIU/mL), and continued to decline to 0.98 mIU/mL by day 25, with no plateau or rebound, strongly confirming complete resection. This rapid decline pattern is consistent with previous reports after complete laparoscopic excision [13][23] and may provide a reference for postoperative monitoring intervals.

6. Limitations: The limitations of this study include: (1) preoperative MRI was not performed; although it did not affect the decision for emergency surgery, it may limit the completeness of imaging data; (2) the follow-up period is relatively short, and long-term fertility outcomes and comprehensive assessment of ovarian function require further follow-up; (3) as a single case report, the generalizability of the conclusions is limited.

Conclusion

OP is extremely rare, with atypical clinical and imaging features, making diagnosis very challenging. When β -hCG is persistently elevated, the uterine cavity is empty, and the adnexal sonographic findings are atypical, clinicians should include abdominal pregnancy in the differential diagnosis. Progressive increase of pelvic fluid is an important warning signal for urgent surgical intervention. Laparoscopic exploration must follow a systematic approach, extending from the pelvis to the upper abdomen, to thoroughly inspect rare implantation sites such as the omentum. Complete resection of the lesion is safe and effective, and it appears superior to conservative treatment. Benign ovarian lesions can be safely managed at the same time to maximize fertility preservation.

Abbreviations

OP: Omental Pregnancy

VAS: Visual Analogue Scale

β -hCG: beta-human chorionic gonadotropin

MTX: methotrexate

MRI: magnetic resonance imaging

Declarations

Acknowledgements

The authors thank the ultrasonographer and pathologist at Shunyi Maternal and Children's Hospital of Beijing for their assistance with this case.

Authors' contributions

JS and XQ were involved in drafting the manuscript. CJ, SL, and XZ contributed to the clinical management of the case and data collection. WL supervised the study and revised the manuscript critically. All authors read and approved the final version of the manuscript.

Funding

No funding was available.

Data availability

Data sets used and/or analyzed in the current study are available from the corresponding author by request.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Written informed consent has been received from the patient for potentially descriptive information to be published in this article.

Competing interests

The authors declare no competing interests.

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Figures

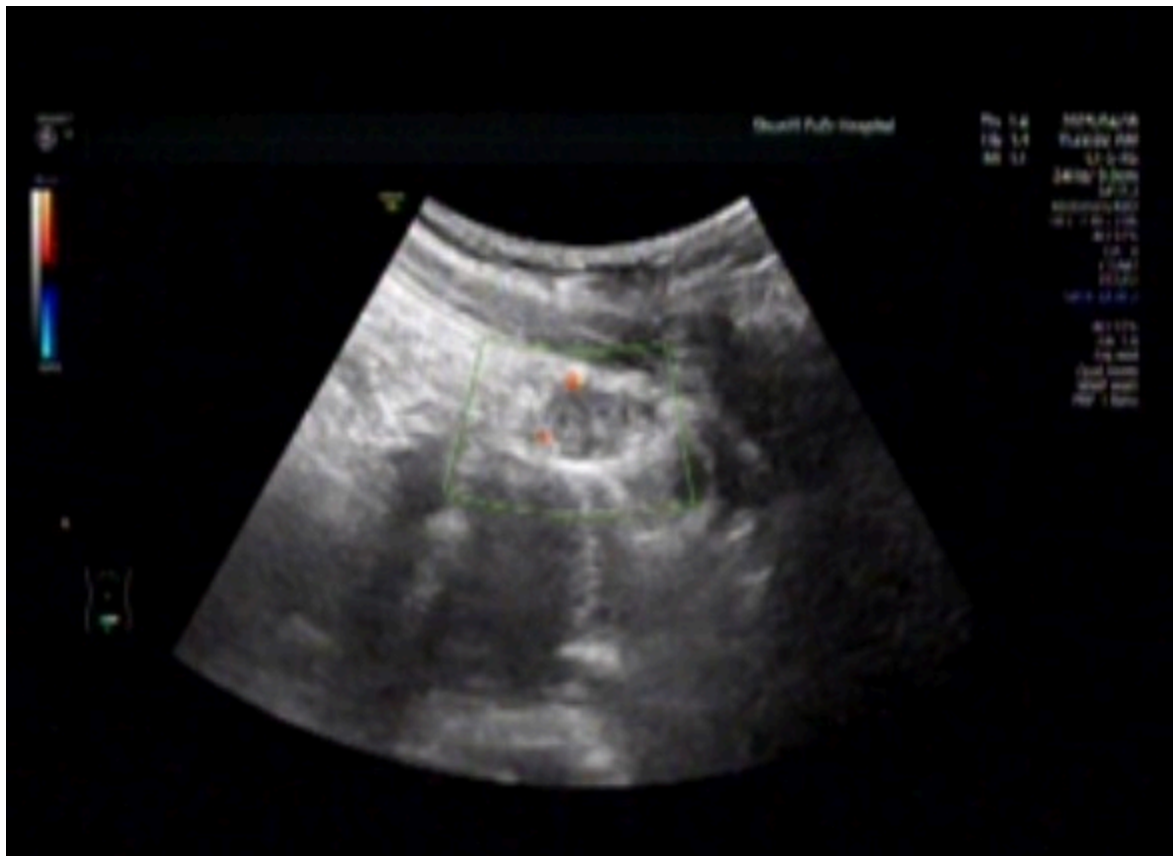


Figure 1

Preoperative transvaginal ultrasound image.

The arrow indicates a heterogeneous hypoechoic area adjacent to the left ovary, measuring approximately 1.9×1.6 cm, with slightly increased blood flow (resistive index 0.53). The findings were inconsistent with the typical "tubal-ring" sign of tubal ectopic pregnancy, raising a high preoperative suspicion for an ectopic pregnancy at an unusual site.

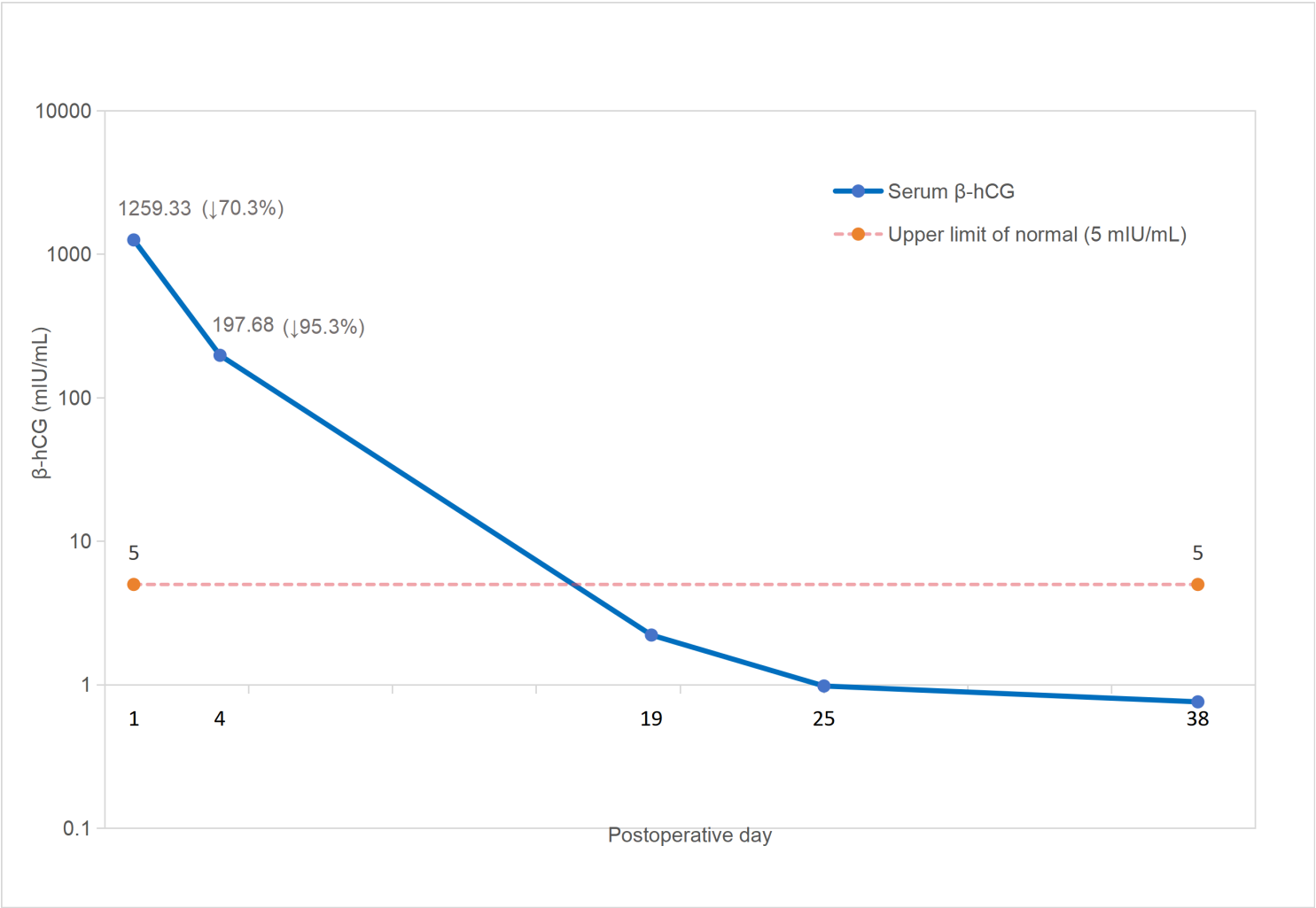


Figure 2
Postoperative serum β -hCG trend on a logarithmic scale.

The preoperative baseline β -hCG was 4236 mIU/mL (not shown). Serum β -hCG declined sharply to 1259.33 mIU/mL on postoperative day 1 (70.3% decrease) and 197.68 mIU/mL on day 4 (95.3% decrease). It fell below the upper limit of normal (5 mIU/mL) by day 19 (2.22 mIU/mL) and continued to decline to 0.98 mIU/mL by day 25, remaining low at 0.76 mIU/mL on day 38. The dashed line indicates the upper limit of normal (5 mIU/mL). No plateau or rebound was observed.

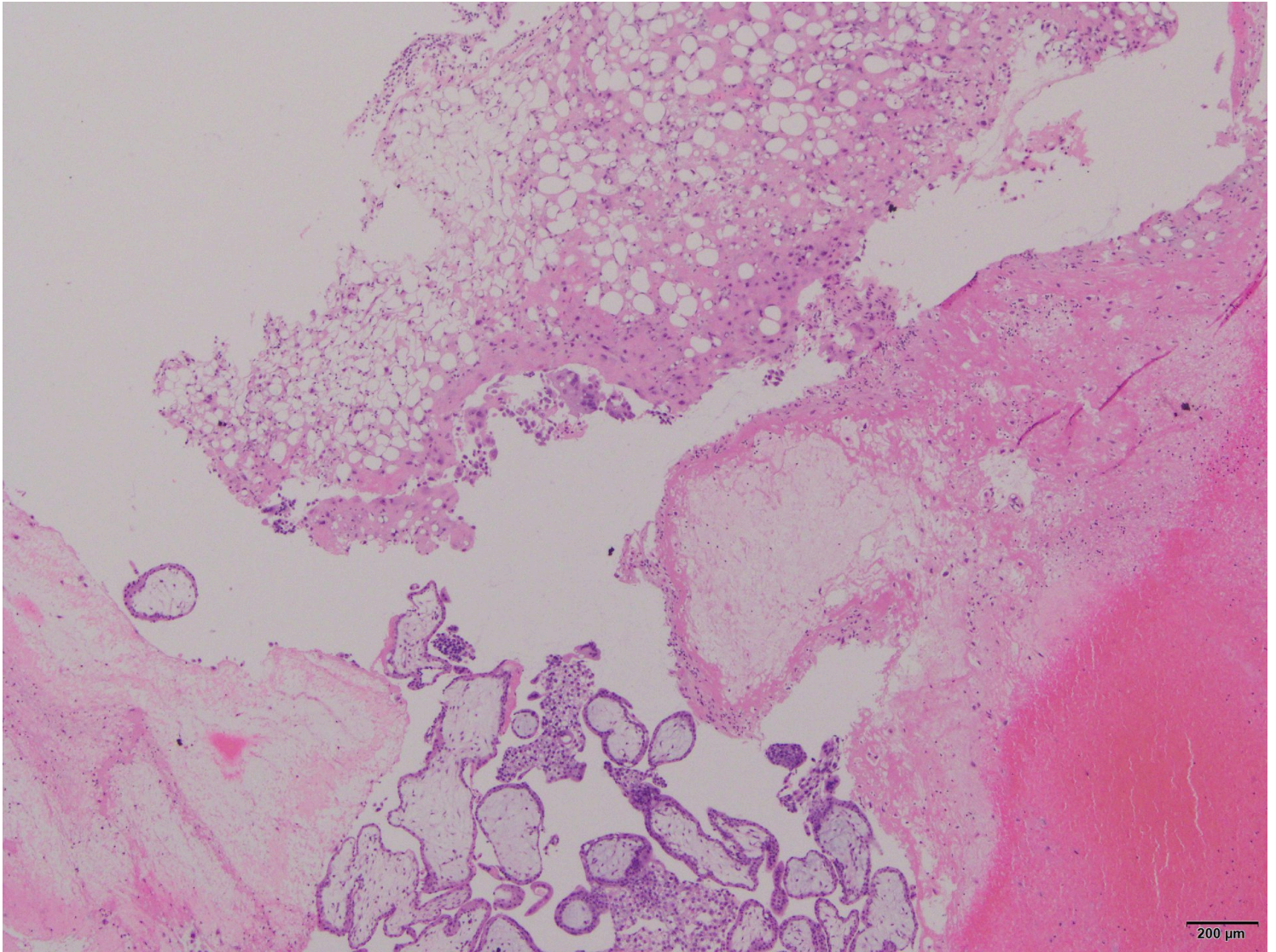


Figure 3

Histopathological section of the omental pregnancy (hematoxylin and eosin staining, ×40).

Chorionic villi and trophoblastic cells are visible, consistent with the diagnosis of omental ectopic pregnancy.

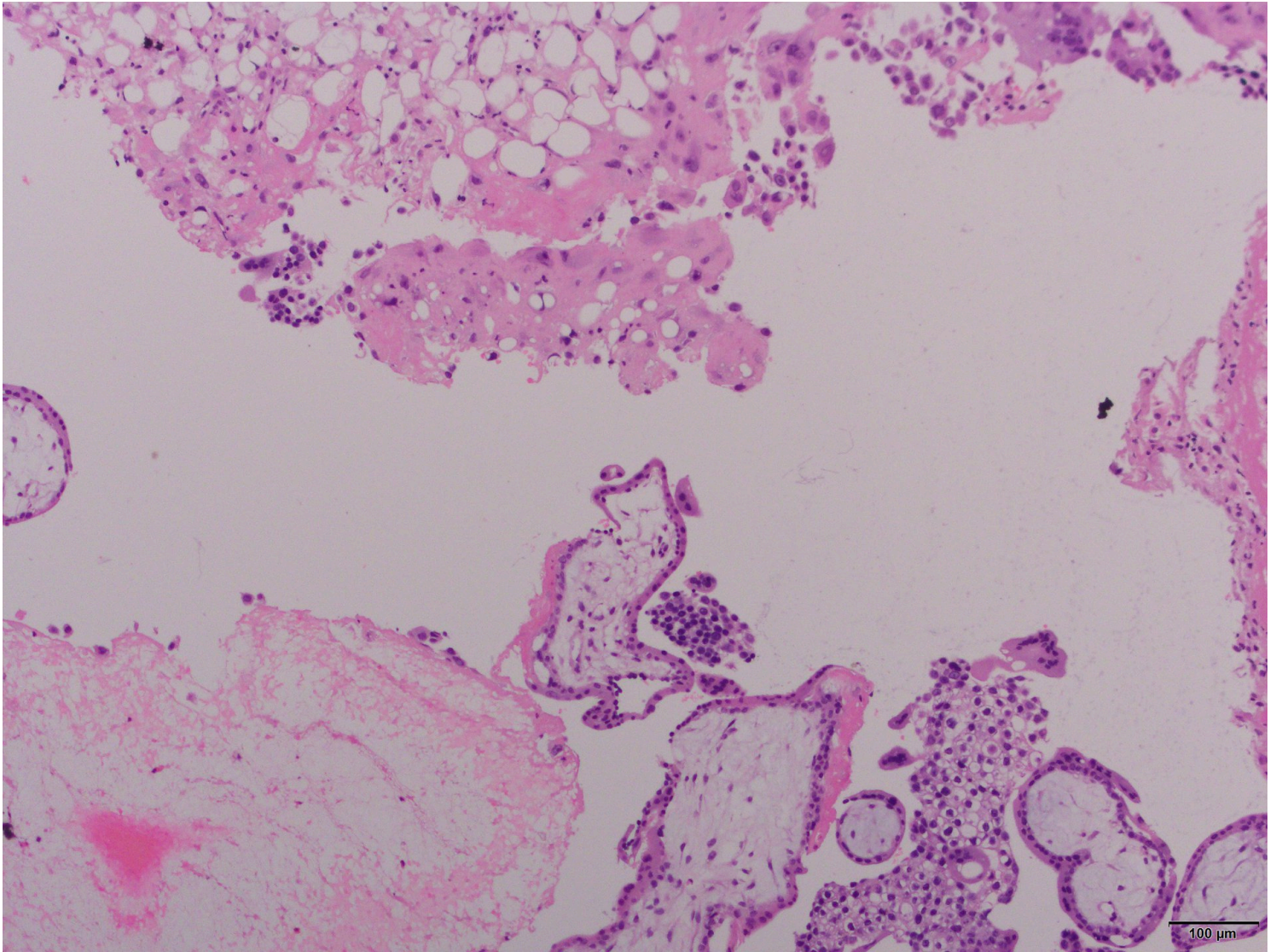


Figure 4

Histopathological section of the omental pregnancy (hematoxylin and eosin staining, ×100).Higher magnification further confirms the morphology of chorionic villi and trophoblastic cells.

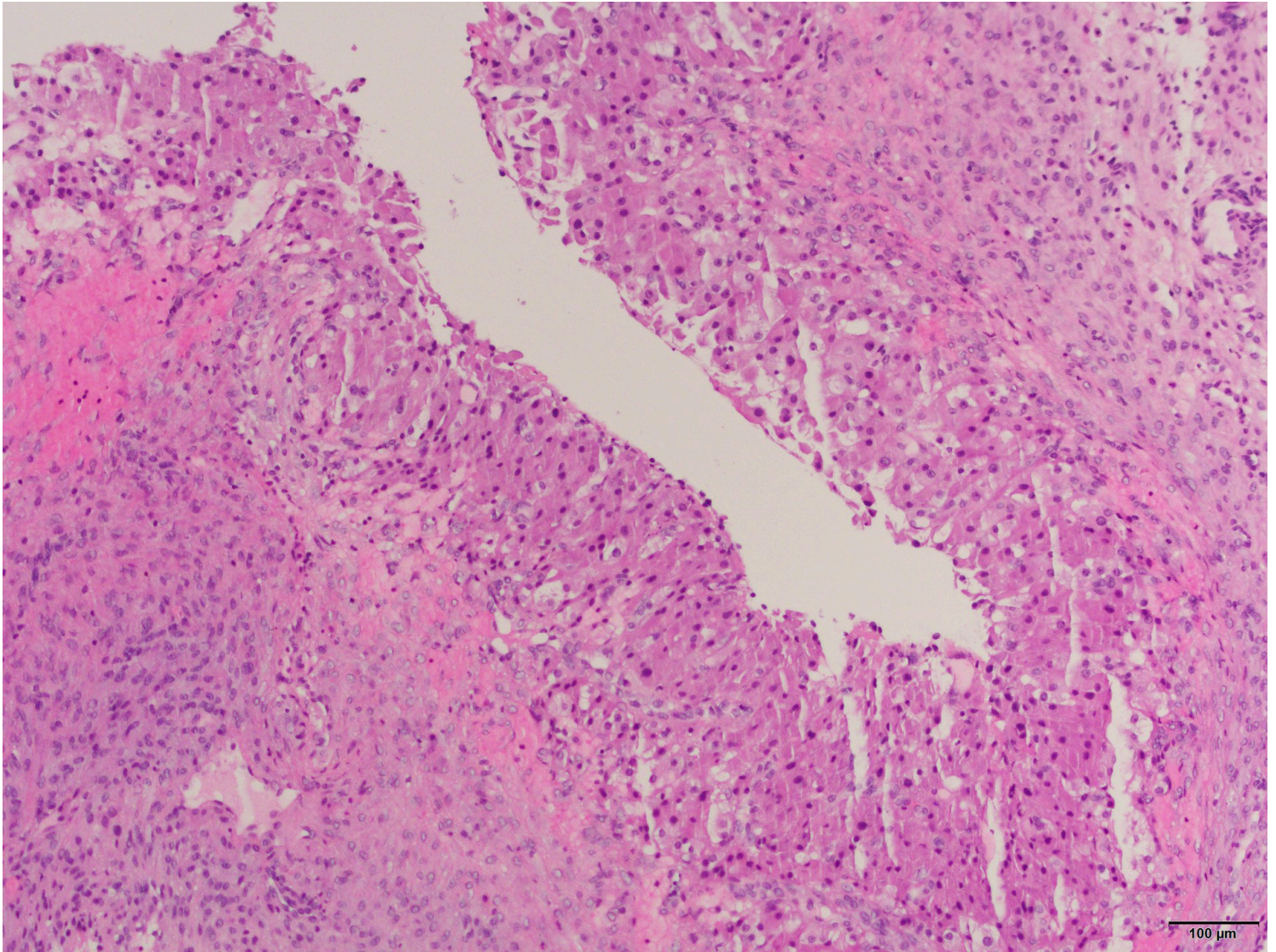


Figure 5

Histopathological section of the left ovarian corpus luteum cyst (hematoxylin and eosin staining, ×100).

The cyst wall and hemorrhagic changes are visible, consistent with a corpus luteum cyst with hemorrhage.