

CASE REPORT

The Critical Role of Serial β -hCG Monitoring in Diagnosing Bilateral Tubal Pregnancy Following Conservative Surgery

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ABSTRACT

Background: Bilateral tubal pregnancy (BTP) is a rare and diagnostically challenging form of ectopic pregnancy. This report emphasizes the critical importance of serial beta-human chorionic gonadotropin (β -hCG) surveillance following conservative tubal surgery.

Methods: A 29-year-old patient underwent laparoscopic salpingostomy for a right tubal pregnancy. Serial β -hCG measurements were performed postoperatively to monitor trophoblastic activity.

Results: Instead of the expected decline, β -hCG levels rose postoperatively (from 809.29 mIU/mL to 942.47 mIU/mL by day 3). This abnormal trend prompted re-evaluation, leading to the identification of a contralateral tubal pregnancy via ultrasonography. Surgical intervention confirmed the diagnosis of BTP. Following the second procedure, β -hCG levels normalized within one month.

Conclusions: Systematic postoperative β -hCG monitoring is essential for the early detection of persistent ectopic pregnancy and rare conditions like BTP. This case demonstrates that vigilant laboratory surveillance can trigger crucial clinical reassessment, thereby preventing diagnostic oversight and guiding effective management.

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KEYWORDS

bilateral tubal pregnancy, persistent ectopic pregnancy, beta-human chorionic gonadotropin, BTP, PEP, β -hCG

INTRODUCTION

Ectopic pregnancy (EP) is a common cause of acute abdomen in pregnant women. Serum β -hCG serves as a specific marker for trophoblastic activity, and its quantitative detection and dynamic change analysis are central to the diagnosis, treatment selection, and prognosis assessment of EP [1]. Typically, serum β -hCG levels should decline logarithmically following successful EP surgery [2]. A delayed decline (e.g., less than 20% by postoperative day 3) or a persistent elevation highly suggests the presence of a persistent ectopic pregnancy (PEP). Bilateral tubal pregnancy (BTP) is an extremely rare type of EP and is difficult to diagnose preoperatively. It carries a higher risk of PEP [3]. This case re-

port details of a patient who underwent salpingostomy for an EP but continued to have progressively rising β -hCG levels. The case demonstrates how rigorous dynamic β -hCG monitoring successfully alerted clinicians and aid-ed in diagnosing a bilateral tubal pregnancy.

CASE PRESENTATION

Clinical history and initial evaluation

A 29-year-old female, gravida 5 para 1 (G5P1), presented to the gynecological emergency department with "48 days of amenorrhea, accompanied by scant vaginal bleeding and lower abdominal dull pain for 7 days". The patient had a regular menstrual cycle of 28 - 30 days, with a clear last menstrual period. She experienced no significant early pregnancy symptoms after amenorrhea. Seven days prior, she had developed scant, dark red, spotty vaginal bleeding without an obvious cause, along with persistent lower abdominal dull pain. Her medical history was unremarkable, with no chronic diseases, history of tubal surgery, or use of assisted reproductive technology. Her last pregnancy was a full-term cesarean section three years ago.

Gynecological examination revealed normal development of the vulva, parous type; the vagina was patent with a small amount of dark red accumulated blood; the uterus was anteverted, approximately 5 cm x 4 cm x 3 cm in size, without tenderness; there was significant tenderness in the right adnexal area; the left adnexal area was non-tender.

Imaging findings

Transvaginal ultrasound revealed an empty uterine cavity with decidualized endometrium (0.8 cm thick). A 3.2 x 3.8 cm mixed-echo mass in the right adnexa, containing a 0.6 cm anechoic area and scattered echoes, suggested ectopic pregnancy. The left adnexa appeared normal, with no free pelvic fluid.

Laboratory investigations

Serum beta-human chorionic gonadotropin (β -hCG) was 809.29 mIU/mL, measured by chemiluminescence immunoassay (Abbott I2000 analyzer). The reference range for non-pregnant women is < 5.0 mIU/mL. Progesterone was 11.30 nmol/L (reference range in early pregnancy: 8.9 - 468.4 nmol/L). Other routine tests: Complete blood count showed a white blood cell count of $5.6 \times 10^9/L$, hemoglobin 128 g/L, and platelet count $235 \times 10^9/L$, all within normal range, suggesting no signs of acute blood loss or infection. Coagulation profile and liver/kidney function tests were within normal reference intervals, ruling out major organ dysfunction or coagulation disorders, thus providing a safe basis for surgical treatment.

Based on the patient's history of amenorrhea, clinical symptoms, gynecological examination, ultrasound, and β -hCG results, a preliminary diagnosis of "right tubal pregnancy" was made. With no clear surgical contrain-

dications, laparoscopic minimally invasive surgery was planned.

Initial surgical treatment and abnormal postoperative β -hCG monitoring

The patient underwent laparoscopic exploration. The procedure confirmed a right ampullary tubal pregnancy, and a salpingostomy was performed. Postoperative pathology confirmed the presence of chorionic villi in the right fallopian tube. The patient's serum β -hCG was dynamically monitored. Normally, β -hCG levels should decline logarithmically after successful EP surgery. However, this patient's serum β -hCG trend was abnormal: the preoperative baseline was 809.29 mIU/mL, rising to 826.53 mIU/mL on postoperative day 1 (rate of change: +2.1%), and further increasing to 942.47 mIU/mL on postoperative day 3 (rate of change: +14.0%). Based on this trend, the laboratory immediately issued a report via the Laboratory Information System (LIS). A laboratory physician communicated by phone with the attending clinician, detailing the results, the changing trend, and the basis for the PEP alert. A β -hCG dynamic change curve was provided for clinical reference, and the communication was documented.

Re-evaluation, diagnosis of left-sided lesion, and treatment

Based on the laboratory alert, the clinical team immediately re-evaluated the patient. Compared to the initial imaging, an ultrasound performed 4 days later revealed an approximately 1.0 cm x 0.8 cm hypoechoic nodule in the left ampullary tube, with clear borders and visible punctate blood flow signals (RI = 0.45), consistent with an early ectopic pregnancy lesion. The right fallopian tube appeared normal post-surgery, with no obvious residual lesion. Considering the surgical history, dynamic β -hCG changes, and the second imaging results, and after excluding other causes of elevated β -hCG such as gestational trophoblastic disease or retained pregnancy tissue, the diagnosis was revised to "Bilateral Tubal Pregnancy, Persistent Ectopic Pregnancy on the Left Side". After discussion, a decision was made to perform laparoscopic removal of the left tubal lesion.

Postoperative consolidation treatment and outcome

The subsequent β -hCG trend was as follows: levels decreased to 765.22 mIU/mL on day 7, 320.15 mIU/mL on day 10, 89.73 mIU/mL on day 14, 5.2 mIU/mL on day 21, and returned to the normal non-pregnant level (3.8 mIU/mL) by day 30. The patient's lower abdominal pain resolved completely within one week postoperatively.

Follow-up results: A gynecological ultrasound at 42 days post-surgery showed normal morphology of both fallopian tubes and no abnormalities in the pelvic cavity. At the 3-month follow-up, the patient's menstrual cycle had returned to normal (28 days), and β -hCG remained within the normal range.

DISCUSSION

Bilateral tubal pregnancy (BTP) is a rare and high-risk type of ectopic pregnancy. The incidence of such cases without prior ovulation stimulation is 1 out of 200,000 pregnancies and an estimated 1 out of 725 to 1 out of 1,580 ectopic pregnancies [4]. Its pathogenesis is associated with factors such as bilateral salpingitis, pelvic adhesions, and the use of assisted reproductive technology. The absence of clear risk factors in this case suggests possible individual differences in the pathogenesis of BTP, which is consistent with reports by Wali AS et al. [5]. The diagnostic and therapeutic process in this case highlights the core value of the "dynamic β -hCG monitoring - rapid clinical response" model in managing complex ectopic pregnancies, while also providing important practical evidence for avoiding missed diagnoses in clinical practice.

The core reasons for the missed diagnosis of the left-sided lesion during the initial preoperative assessment include the occult nature of the lesion, limitations of hormonal levels, and clinical diagnostic momentum. The left-sided lesion was at an early stage, measuring only 1.0 cm x 0.8 cm, and had not formed a typical mixed-echo mass or a bluish nodule, making it difficult to identify with conventional ultrasound resolution. Furthermore, the β -hCG secreted by a unilateral lesion was sufficient to confirm a pregnancy state; a single measurement cannot distinguish the number of lesions. The preoperative β -hCG of 809.29 mIU/mL in this case only suggested a possible ectopic pregnancy but could not reflect its bilaterality [6]. The presence of a clear right-sided lesion during the initial examination easily led to the neglect of a contralateral lesion, creating a diagnostic inertia towards a "single lesion".

CONCLUSION

Timely laboratory recognition of abnormal β -hCG trends was crucial for diagnosing persistent ectopic pregnancy (PEP). Beyond reporting numerical values, the laboratory provided clinical interpretation and decision support. Establishing a collaborative lab-clinical mechanism was key, implemented through an LIS module that has automated trend analysis and alerts for PEP criteria. This case demonstrates that laboratory expertise in accurate testing, trend interpretation, and close collaboration is indispensable for early diagnosis and intervention in complex ectopic pregnancy management.

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Declaration of Interest:

All authors declare that they have no competing interests.

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