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A Case Report of Tubal Pregnancy Complicated with Ipsilateral Corpus Luteum Rupture

Qian Huang, Chaoyan Qu
Meitan County Hospital of Integrated Traditional Chinese and Western Medicine, Zunyi 564100, Guizhou, China

Abstract: Objective: To explore the clinical diagnostic and therapeutic characteristics,key surgical management points, and differential diagnosis approaches of tubal pregnancy complicated with ipsilateral corpus luteum rupture, so as to provide a case reference for the emergency treatment of such rare acute conditions. Methods: The clinical data, auxiliary examination results, surgical procedures, pathological reports, and postoperative follow-up of 1 patient with tubal pregnancy complicated with ipsilateral corpus luteum rupture were retrospectively analyzed and discussed in conjunction with relevant literature. Results: The patient was admitted emergently due to abdominal pain with vaginal bleeding after menopause, and diagnosed via serum human chorionic gonadotropin (hCG) detection, gynecological ultrasound, and laparoscopic exploration. Laparoscopic procedures including right ovarian corpus luteum cystectomy, right tubal pregnancy lesion clearance, local methotrexate injection, and intrauterine device removal were performed. Postoperative pathology confirmed right tubal pregnancy (abortive type) and right ovarian corpus luteum cyst. The patient recovered well postoperatively with no abnormalities during 3 months of follow-up. Conclusion: Tubal pregnancy complicated with ipsilateral corpus luteum rupture presents overlapping clinical symptoms, making missed diagnosis likely. Emergency diagnosis requires comprehensive judgment based on medical history, physical examination, and auxiliary examinations. Laparoscopic surgery is the preferred approach, and timely, standardized intervention can significantly improve patient prognosis.

Keywords: Ectopic pregnancy; Corpus luteum rupture; Laparoscopic surgery; Case report

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1. Case Data

1.1. General Information

Yang, a 30-year-old female of childbearing-age (G2P1), with her last menstrual period on September 22, 2025, was admitted to our department from the emergency department on October 30, 2025, due to “38 days of amenorrhea, 3 days of abdominal pain with vaginal bleeding, and aggravation for 2 hours”. She had a history of thalassemia for several years, a cesarean section (scarred uterus) 6 years prior, and denied other chronic diseases or drug allergies. She had a normal sexual life and used an intrauterine device for contraception.

1.2. Clinical Manifestations

Thirty-eight days after menopause, the patient developed persistent lower abdominal distension and pain accompanied by

anal distension, which was intolerable, along with a small amount of dark red vaginal bleeding without blood clots. The symptoms showed no significant improvement after rest.

1.3. Physical Examination

Vital signs: Temperature 36.3°C, pulse 78 beats/min, respiratory rate 20 breaths/min, blood pressure 104/82 mmHg. On admission, the patient was conscious with an acute illness demeanor. There was obvious tenderness and rebound tenderness in the lower abdomen without significant muscle tension. Gynecological examination: Married-type vulva; a small amount of dark red blood in the vagina; positive cervical motion tenderness and rebound tenderness; anterior-positioned uterus of normal size; significant thickening of the right adnexal area with marked tenderness and rebound tenderness; and full vaginal posterior fornix.

1.4. Auxiliary Examinations

① Laboratory tests: Serum hCG 3707.420 mIU/mL; Blood routine: White blood cell count 9.61×10^9/L, hemoglobin 93 g/L; Blood group: Type O, Rh (+); Coagulation function, blood glucose, liver and kidney function, and four infectious disease markers were all within normal ranges. ② Imaging examination: Gynecological ultrasound revealed an endometrial thickness of 6.6 mm with uniform echo; a V-shaped intrauterine device echo in the uterine cavity with normal positioning; no obvious abnormalities in the cervix; a mixed echo mass of approximately 20 mm×16 mm in the right adnexal area, with a relatively regular shape and heterogeneous internal echo, and no significant abnormal blood flow signals detected by CDFI; a free fluid dark area in the pelvic cavity, with the widest part measuring about 27 mm and poor sound transmission. The ultrasound suggested a mixed echo mass in the right adnexal area (high suspicion of ectopic pregnancy rupture), pelvic effusion, and normal positioning of the intrauterine device. ③ Posterior fornix puncture: 5 mL of non-coagulable blood was aspirated.

1.5. Preoperative Diagnosis

(1) Abdominal pain of unknown etiology: Tubal pregnancy rupture with bleeding?
(2) Intrauterine device
(3) Scarred uterus
(4) Thalassemia

2. Surgical Procedures

After completing preoperative preparations and excluding surgical contraindications, emergency laparoscopic exploration was performed. Intraoperative findings: Approximately 400 mL of hematocele and blood clots in the abdominal cavity; thickening of the right fallopian tube ampulla with a small amount of pregnancy-like tissue attached to the fimbriae; thickening of the right ovary (size approximately 5 cm×4 cm) with a 1.0 cm-long rupture, from which fresh blood and corpus luteum tissue were observed (consistent with right ovarian corpus luteum rupture); no abnormalities in the uterus or contralateral adnexa.

Surgical steps: ① Laparoscopically, the pregnancy tissue at the fimbriae of the right fallopian tube was removed using a spoon forceps. After confirming no residual tissue via bipolar compression of the fallopian tube, 50 mg of methotrexate was diluted and injected intraperitoneally into the right fallopian tube ampulla, with no active bleeding identified. ② Following full communication with the patient's family, laparoscopic right ovarian corpus luteum cystectomy was performed, and the ovarian rupture was intermittently sutured with absorbable sutures to achieve thorough hemostasis. ③ At the patient's request, the intrauterine device was removed. ④ The abdominal cavity was irrigated, and hematocele was aspirated. After reconfirming no active bleeding, an abdominal drainage tube was placed. Postoperative specimens were sent for pathological examination.

Postoperative diagnosis: 1. Right tubal pregnancy (abortive type); 2. Rupture of right ovarian corpus luteum cyst; 3. Intrauterine device; 4. Scarred uterus; 5. Thalassemia; 6. Moderate anemia.

The patient returned to the ward safely postoperatively and received symptomatic and supportive treatments including infection prevention, hemostasis, and fluid replacement.

3. Pathological Results

Tubal pregnancy lesion specimen: Placental villous tissue was observed under a microscope. Ovarian rupture specimen: Corpus luteum cyst.

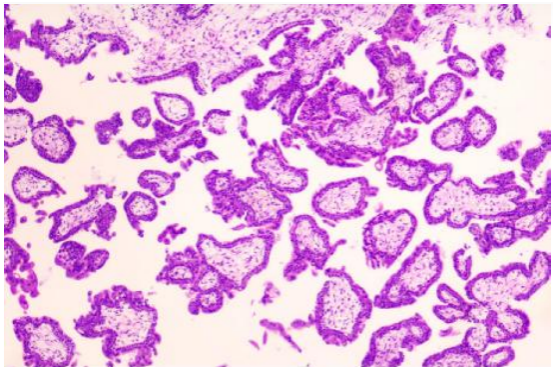

Figure 1

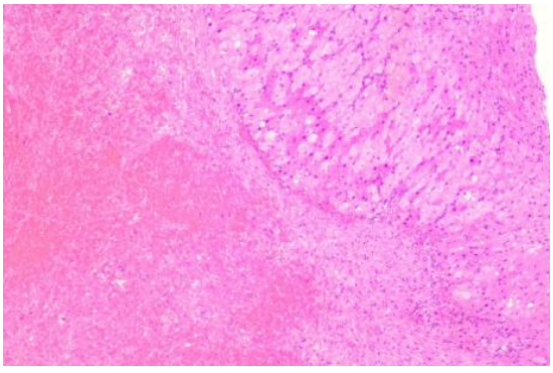

Figure 2

Figure 1 Microscopic view of the right tubal pregnancy lesion: Placental villi consist of villous lobules, surrounded by trophoblast cells on the surface, with interstitial edema. Figure 2 Microscopic view of the right ovarian corpus luteum cyst: The cyst wall is lined with luteal cells, with blood clots visible inside.

4. Postoperative Management and Follow-up

Vital signs and abdominal signs were continuously monitored postoperatively, and symptomatic and supportive treatments such as infection prevention, hemostasis, and fluid replacement were administered. Reexamination on the first postoperative day: Serum hCG 1923.830 mIU/mL, hemoglobin 82 g/L, white blood cell count 11.75×10^9/L, neutrophil percentage 91.70%, D-dimer 1.02 mg/L, and electrolytes within normal ranges. The abdominal drainage tube was removed on the second postoperative day, with the incision healing well and no redness, swelling, or exudation. Reexamination on the third postoperative day: Serum hCG 1297.550 mIU/mL, which was significantly lower than the preoperative level.

Postoperative follow-up: Serum hCG was rechecked weekly until normalization. At the 3-month postoperative follow-up, the patient's menstruation had returned to normal with no abdominal pain or other discomfort.

5. Discussion

The specific mechanism by which oocytes are picked up by the fallopian tube and transported thereafter has not been fully elucidated to date. The complexity of this physiological process is not only a research focus in reproductive medicine but also relevant to the pathogenesis of gynecological acute conditions such as ectopic pregnancy and corpus luteum rupture. In the development of reproductive medicine, the theory of oocyte transport has gradually advanced from classical anatomical cognition to modern imaging verification; however, many unsolved mysteries remain regarding its specific regulatory mechanisms. Based on observations of static human anatomical structures, classical anatomical theory proposes that oocytes released from the ovarian surface are picked up by the fimbriae of the ipsilateral fallopian

tube through the synergistic effects of ciliary beating, fallopian tube peristalsis, and peritoneal fluid flow. This view has long been widely accepted as the fundamental theory of reproductive physiology. Nevertheless, with the application of in vivo anatomical techniques such as laparoscopy and three-dimensional ultrasound, studies have revealed that oocytes are not directly captured by the ipsilateral fallopian tube after release but are first discharged into the peritoneal fluid. Their diffusion range within the abdominal cavity can extend to the pelvic cavity and even the lower abdomen, and the fimbriae of both fallopian tubes possess the ability to capture free oocytes. The discovery of this anatomical characteristic has overturned the traditional single "ipsilateral pickup" model and provided a key morphological basis for the occurrence of tubal pregnancy[1,2]. Under normal physiological conditions, the corpus luteum formed after ovulation is located on the ovarian surface, with a cyst wall composed of theca cells, granulosa cells, and connective tissue, which is relatively tough. Approximately one week after ovulation, the corpus luteum reaches its peak development, appearing as a cyst with a thin wall and abundant blood vessels. If minor bleeding occurs due to the rupture of internal capillaries, blood accumulation increases the pressure within the cyst cavity, thereby elevating the tension of the corpus luteum cyst wall and laying the groundwork for subsequent rupture. Additionally, fluctuations in hormone levels after ovulation may affect the stability of corpus luteum tissue, rendering it more fragile and increasing the risk of concurrent ovarian corpus luteum rupture[3].

The combined occurrence of tubal pregnancy and ipsilateral ovarian corpus luteum rupture is essentially the result of the interaction between pathological factors and physiological states. Lesions such as salpingitis, surgical history, or congenital developmental abnormalities can cause tubal lumen narrowing and ciliary dysfunction, hindering the transport of fertilized eggs to the uterine cavity and leading to their implantation in the fallopian tube, resulting in tubal pregnancy. The spread of inflammation or surgical injury may involve the ipsilateral ovary, causing ovarian tissue congestion and increased brittleness, providing a pathological basis for corpus luteum rupture. Meanwhile, hCG secreted by embryonic trophoblast cells after fertilized egg implantation promotes the continuous development of the ipsilateral ovarian corpus luteum into a corpus luteum of pregnancy. Some corpus lutea undergo excessive hyperplasia to form cysts due to hormonal stimulation, with thin and tense cyst walls that can rupture spontaneously without obvious external force or under minor external force. Furthermore, external impacts such as sexual intercourse and strenuous exercise may not only directly induce rupture and bleeding at the tubal pregnancy site but also act directly on the corpus luteum or corpus luteum cyst of the ipsilateral ovary, further facilitating the combined occurrence of these two acute conditions. Systemic factors such as coagulation dysfunction and anemia, although not directly inducing these two acute diseases, significantly increase the risk of bleeding and exacerbate disease severity[4].

5.1. Analysis of Pathogenesis

This case involves a childbearing-age woman with a history of cesarean section (scarred uterus) and thalassemia, who was diagnosed with right tubal pregnancy (abortive type) complicated with ipsilateral ovarian corpus luteum cyst rupture while using an intrauterine device for contraception. This represents a rare complication of gynecological acute conditions, and its diagnostic and therapeutic process offers typical reference value. Intrauterine devices can only prevent fertilized egg implantation in the uterine cavity but cannot avoid tubal pregnancy; they may even increase the risk of fertilized egg implantation in the fallopian tube ampulla by affecting tubal peristaltic function, which is consistent with literature reports[5-6]. Although the patient's scarred uterus history did not directly cause ectopic pregnancy, the pelvic surgical history may have indirectly altered the pelvic internal environment, leading to impaired tubal ciliary function or mild tubal lumen adhesion, further hindering fertilized egg transport[7]. The occurrence of ipsilateral ovarian corpus luteum cyst rupture is directly related to fluctuations in pregnancy-related hormones. The patient's preoperative serum hCG level was 3707.420 mIU/mL, and this high hCG level stimulated the continuous development of the right ovarian corpus luteum into a corpus luteum of pregnancy, which underwent excessive hyperplasia to form a cyst and subsequently ruptured spontaneously. Intraoperative findings and pathological results confirmed this mechanism[8]. Additionally, the patient was complicated with thalassemia, with a preoperative hemoglobin level of 93 g/L that decreased to 82 g/L postoperatively. Although

coagulation function was normal, the long-term anemic state may have resulted in relatively fragile blood supply to the ovarian corpus luteum tissue, indirectly increasing the risk of rupture and bleeding. This factor has received little attention in similar complications and can serve as a reference for subsequent clinical research[9-10].

5.2. Diagnostic Points and Differential Diagnosis

The diagnostic challenge in this case lies in the high overlap of clinical manifestations between the two acute conditions, both characterized by menopause, abdominal pain, vaginal bleeding, and pelvic effusion, making missed diagnosis or misdiagnosis likely. The patient presented with 38 days of menopause accompanied by persistent lower abdominal pain, anal distension, and dark red vaginal bleeding. Gynecological examination revealed positive cervical motion tenderness and rebound tenderness, thickening and tenderness of the right adnexal area, aspiration of non-coagulable blood via posterior fornix puncture, and significantly elevated serum hCG. Gynecological ultrasound indicated a mixed echo mass in the right adnexal area and pelvic effusion. These manifestations are consistent with both tubal pregnancy rupture and ovarian corpus luteum rupture[4].

The key to diagnosing this case lies in the comprehensive analysis of multi-dimensional examination results: ① Elevated serum hCG is the core indicator distinguishing pregnancy-related acute conditions from simple corpus luteum rupture. Patients with simple corpus luteum rupture typically have negative serum hCG, while the patient in this case had a serum hCG level of 3707.420 mIU/mL, directly indicating a pregnancy-related disease. ② Gynecological ultrasound showed a mixed echo mass in the right adnexal area, with a normally positioned intrauterine device and no gestational sac in the uterine cavity, excluding the possibility of intrauterine pregnancy rupture and supporting the diagnosis of tubal pregnancy. ③ Laparoscopic exploration directly confirmed the presence of pregnancy tissue at the fimbriae of the right fallopian tube and a rupture of the ipsilateral ovarian corpus luteum cyst. The final diagnosis of the complication was confirmed by postoperative pathological verification of placental villous tissue and corpus luteum cyst[11].

5.3. Experience in Diagnosis and Treatment

① Diagnostic level: Emergency diagnosis should adhere to the “triple judgment principle” of medical history collection, physical examination, and auxiliary examinations. Menopause history, elevated serum hCG, ultrasound findings of a mixed echo mass in the right adnexal area, and non-coagulable blood from posterior fornix puncture are the core diagnostic bases, avoiding missed diagnosis of complications due to a single diagnosis. ② Selection of surgical methods: Laparoscopic surgery, with advantages such as minimal trauma, thorough hemostasis, and rapid postoperative recovery, is the preferred approach for such acute conditions. Surgical methods should be individualized based on the patient’s fertility needs. For patients desiring fertility, lesion clearance combined with tubal preservation surgery is preferred; for those without fertility needs, salpingectomy may be considered. Corpus luteum rupture is primarily managed by suture repair of the rupture to avoid excessive ovarian tissue damage and preserve ovarian function. ③ Prognosis management: Timely surgical hemostasis can reduce the risk of hemorrhagic shock. Postoperative standardized monitoring of serum hCG changes (weekly rechecks until normalization) and long-term follow-up can effectively prevent complications such as persistent ectopic pregnancy and pelvic adhesion, improving patient prognosis.

5.4. Limitations and Conclusions

The sample size of this case is single, and multi-center case accumulation is required for further verification of the diagnosis and treatment plan in the follow-up. Clinically, attention should be paid to the dual-pathogen screening of emergency abdominal pain in women of childbearing age to reduce missed diagnoses and misdiagnoses and improve patient prognosis.

Disclosure statement

The author declares no conflict of interest.

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