

CASE REPORT

Peritoneal pregnancy with massive hemoperitoneum in early gestation: two case reports

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Introduction

Peritoneal pregnancy is a rare and serious type of extra-uterine pregnancy with an incidence of approximately one in 10,000 pregnancies [1]. It is a life-threatening condition that leads to high maternal morbidity and mortality rates, the latter reaching 0.5–18.0% [2]. Although a primary peritoneal pregnancy is defined as an ectopic pregnancy usually involving implantation on a peritoneal surface, most peritoneal pregnancies are thought to follow early tubal rupture or abortion [3]. Peritoneal pregnancy is classified as either primary or secondary. In 1942, Studdiford established three criteria for diagnosis of a primary peritoneal pregnancy: (1) the presence of normal tubes and ovaries, (2) no evidence of an uteroperitoneal fistula, and (3) the presence of a pregnancy related exclusively to the peritoneal surface and early enough in gestation to eliminate the possibility of secondary implantation after primary nidation of the tube [4]. Watrowski et al. [5] recently expanded the classic Studdiford criteria. They reported a case of an omental pregnancy invading the peritoneum of the Douglas pouch. Thus, secondary peri-

Key Clinical Message

Peritoneal pregnancy may cause severe abdominal bleeding without genital bleeding as early as the fifth week of gestation. Awareness that pregnancy can exist in unusual locations is imperative.

Keywords

Diagnosis, early pregnancy, human, primary peritoneal pregnancy.

toneal pregnancy implantation can occur not only after tubal rupture or expulsion of a tubal ectopic pregnancy, but also after primary implantation at any other ectopic site.

Management of a peritoneal pregnancy must be meticulous because of the high risk of fetal and maternal morbidity and mortality. This is true despite the fact that appropriate preoperative planning has decreased the mortality rate associated with peritoneal pregnancy from approximately 20% to <5% during the past 20 years [6]. Early diagnosis of peritoneal pregnancy is difficult but important because of the life-threatening nature of this complication. Several recent reports have demonstrated the effectiveness of laparoscopy in the diagnosis and treatment of peritoneal pregnancy [5, 7–15].

Until 7 weeks of gestation, massive hemoperitoneum is rare in tubal pregnancies, which is the most common implantation site among ectopic pregnancies [16]. There are no reported cases of massive hemoperitoneum associated with peritoneal pregnancy at 5 weeks of gestation except in the omentum [17] and the uterosacral ligament [10, 11]. We recently encountered two unique cases of

primary peritoneal pregnancy with severe bleeding at a very early gestational age. These cases suggest that the implantation site may affect the onset of bleeding. This is the first report to discuss the relationship between the onset of bleeding and the implantation site. We herein report these two cases with a brief review of the literature.

Case Presentation

Case 1

A 43-year-old woman (gravida 1, para 1) was admitted to the emergency department with a 5-week history of amenorrhea and a 3-day history of lower abdominal pain. Her menstrual cycle had been regular with a length of 30 days. The patient had an obstetric history of a cesarean delivery and was negative for fertility treatments, use of intrauterine devices, and sexually transmitted diseases. She was afebrile and lucid, although her blood pressure was 80/20 mmHg. Diffuse abdominal tenderness, guarding, and rebound tenderness were present on physical examination. The result of a urine-based pregnancy test that could identify the presence of human chorionic gonadotropin (hCG) with serum concentrations as low as 25 mIU/mL was positive. The patient's uterine size was normal with no genital bleeding seen on pelvic examination. Ultrasonography demonstrated massive intraperitoneal bleeding and a left luteal cyst with no gestational sac in the uterine cavity and no adnexal lesions. The patient's hemoglobin level and hematocrit (Hct) were 8.2 g/dL and 25.6%, respectively. Emergency laparotomy was performed under suspicion of a ruptured ectopic pregnancy.

Case 2

A 36-year-old woman (gravida 1, para 1) was admitted to the emergency department with a 5-week 3-day history of amenorrhea and lower abdominal pain that had started on the afternoon of admission. Her menstrual cycle had been regular with a length of 28 days. Her medical history included a spontaneous delivery 1 year previously, and she was negative for fertility treatments, use of intrauterine devices, sexually transmitted diseases, and previous surgery. The patient was afebrile and lucid with a blood pressure of 92/52 mmHg. Diffuse abdominal tenderness, guarding, and rebound tenderness were present on physical examination. The result of a urine-based pregnancy test was positive. The patient's uterine size was normal with no genital bleeding on pelvic examination. Ultrasound examination revealed intraperitoneal bleeding in the pouch of Douglas and a right theca lutein cyst with no gestational sac in the uterine cavity and no adnexal

lesions. The patient's hemoglobin level and Hct were 14.1 g/dL and 41.3%, respectively. Because the patient was hemodynamically stable, we suspected the presence of ovarian hemorrhage or a tubal abortion in early pregnancy. She was hospitalized for management. The day after admission, her serum hemoglobin level and Hct had decreased to 8.9 g/dL and 25.8%, respectively. Ultrasound examination revealed a remarkable increase in the intraperitoneal bleeding. Her serum hCG level was 2046 mIU/mL. Laparoscopic surgery was performed for both diagnosis and treatment of the hemoperitoneum.

Outcome and Follow-Up

Case 1

The abdominal cavity was opened by a vertical incision of the lower abdomen with the patient under general endotracheal anesthesia. After aspiration of 1900 mL of hemoperitoneal fluid, exploration of the abdominal cavity revealed no signs of uterine perforation or ectopic pregnancy around the bilateral adnexae or pouch of Douglas. After further exploration, bleeding tissue was found on the vesicouterine peritoneum and resected (Fig. 1). The patient received an intraoperative blood transfusion of 8 U of packed red blood cells. Because both the aPTT and PT-INR were reasonable (20.7 sec and 0.97, respectively), fresh frozen plasma was not indicated. Although the existence of villi within the excised tissue was macroscopically unclear, the operation was finished with confirmation of no other bleeding lesions in the abdominal cavity. The postoperative course proceeded uneventfully. The hCG level in the serum preserved on the operative

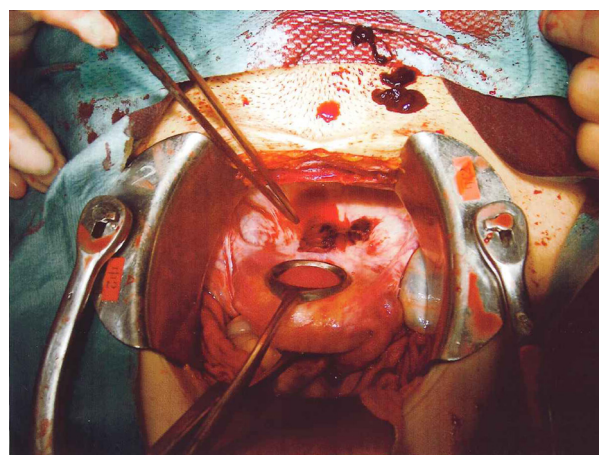


Figure 1. In Case 1, a peritoneal pregnancy was diagnosed by laparotomy. Intraoperative findings showed a reddish mass with active bleeding on the peritoneum of the vesicouterine pouch.

day was 3531 mIU/mL and decreased to 1601 mIU/mL on postoperative day 1 and to 171 mIU/mL on postoperative day 6. The serum Hb level and Hct were 10.2 g/dL and 30.0%, respectively, immediately after surgery and had increased to 11.6 g/dL and 33.8% by postoperative day 6. Histopathological examination of the excised tissue revealed the presence of trophoblastic and decidual tissues within blood clots.

Case 2

A 30-mm actively bleeding mass of tissue was observed on the left side of the vesicouterine pouch peritoneum (Fig. 2A). There were no other findings suggesting an ectopic pregnancy anywhere in the pelvis. Although a

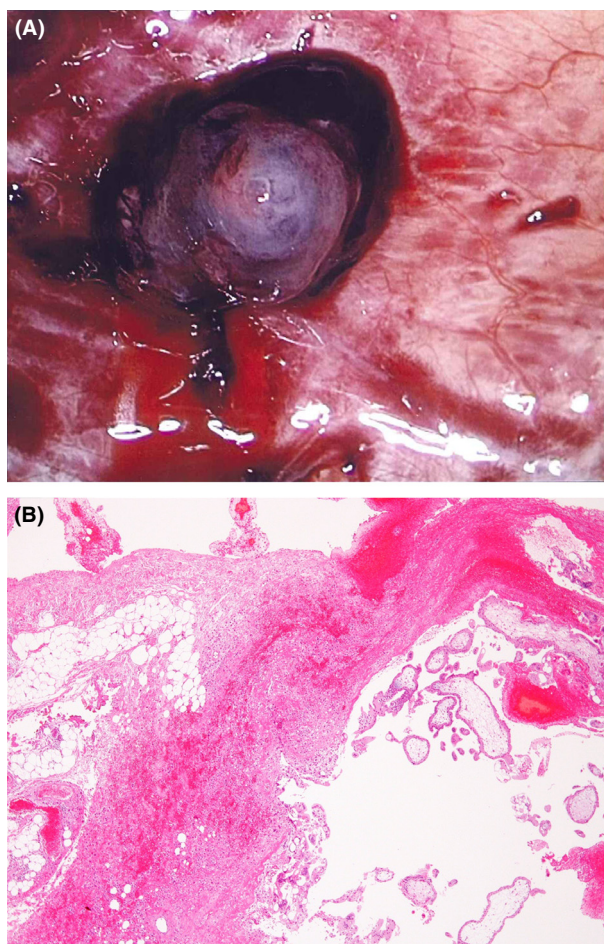


Figure 2. In Case 2, a peritoneal pregnancy was diagnosed by laparoscopy. (A) Laparoscopic findings. A reddish mass with active bleeding was detected on the left side of the vesicouterine pouch peritoneum. (B) Histopathological examination of the excised masses. A cystic mass on the left side of the vesicouterine pouch peritoneum showed villi and decidual tissue within blood clots (hematoxylin and eosin staining, $\times 40$).

right luteal cyst was identified, no ovarian hemorrhage was present. The mass was resected together with the adjacent peritoneum. We aspirated 910 mL of blood and reinfused 433 mL by an intraoperative autologous blood transfusion, eliminating the need for an allogeneic blood transfusion. The operative findings fulfilled Studdiford's criteria of a primary peritoneal pregnancy [4]. The patient's postoperative course was uneventful. The patient's serum hCG level decreased to 1384 mIU/mL on postoperative day 1 and to 92 mIU/mL on postoperative day 7. The serum hemoglobin level and Hct were 10.1 g/dL and 30.5%, respectively, on postoperative day 1 and had increased to 10.2 g/dL and 31.6% by postoperative day 7. Histopathological examination of the excised tissue revealed trophoblastic villi and decidual tissue within blood clots (Fig. 2B).

Discussion

We have reported two cases of peritoneal pregnancy associated with massive hemoperitoneum at 5 weeks of gestation. Hemoperitoneum at 5 weeks of gestation is an unusual symptom of peritoneal pregnancy and is rare in tubal pregnancies before 7 weeks of gestation. Peritoneal pregnancy is a rare event, occurring in approximately 0.6–1.6% of all ectopic pregnancies [18]. Peritoneal pregnancy is associated with a maternal mortality rate eight times higher than that associated with other types of ectopic pregnancies [9]. Because of the high maternal and fetal morbidity and mortality rates, such a pregnancy should be terminated as soon as it is diagnosed.

The diagnosis of peritoneal pregnancy is usually made intraoperatively during diagnostic laparoscopy or laparotomy [19]. Because of advances in various imaging techniques, computed tomography, high-resolution ultrasonography, or magnetic resonance imaging may play roles in early diagnosis. Advanced peritoneal pregnancy may be caused by fetal malpresentation, malformation, or oligohydramnios [20, 21]. Lateral-projection ultrasonography and radiography are helpful in such cases. Serum beta hCG concentrations of >6475 mIU/mL reportedly have high sensitivity and specificity for predicting trophoblastic invasion [22]. Although many diagnostic techniques are available for peritoneal pregnancy, diagnosis of a peritoneal pregnancy during early gestation remains difficult. Many diagnostic pitfalls have been described [23–25], with the main drawback being that neither clinicians nor ultrasonographers readily bear in mind the possibility of this rare condition. In our patients, substantial bleeding began at 5 weeks of gestation, a time at which the rupture of a tubal pregnancy is uncommon [16]. It was difficult to identify the location of the ectopic implantation because of the small size of the mass and the

Table 1. Summary of clinical features of primary abdominal pregnancies showing severe abdominal bleeding of more than 300 mL during early pregnancy (up to 11 gestational weeks).

Case no.	Authors	Year	Age	GA (weeks, days) at first treatment	Lower abdominal pain	Vaginal bleeding	Operative method	Blood loss containing abdominal fluid (mL)	Implantation site	hCG level (mIU/mL)	Note
1	Present report, Case 1	2014	43	5 weeks	Present	Undetectable	Laparotomy	2070	Vesicouterine peritoneum	3531	
2	Present report, Case 2	2014	36	5 weeks, 3 days	Present	Undetectable	Laparoscopy	910	Vesicouterine peritoneum	2046	
3	Hornemann et al. [28]	2009	25	Day 24 of menstrual period	Present	Undetectable	Laparoscopy	500	Omentum	857	Current IUD use
4	Tanase et al. [10]	2013	32	Day 31 of menstrual period	Present	Undetectable	Laparoscopy	300	Uterosacral ligament	8160	Operative history, 5-month history of secondary infertility
5	Gundabattula et al. [11]	2014	30	No preceding amenorrhea	Present	Not defined	Laparoscopy	~1000	Uterosacral ligament	5699	
6	Martelli et al. [17]	2013	34	5 weeks, 3 days	Present	Undetectable	Laparoscopy + laparotomy	200 (laparoscopy) + 1500 (laparotomy 3 days after laparoscopy)	Omentum	15,620	
7	Shaw et al. [29]	1996	27	6 weeks	Present	Not defined	Laparotomy	475	Cul-de-sac	Not defined	Oral contraceptive pills for last 3 years
8	Chang et al. [12]	2008	33	Last menstruation 2 weeks previously	Present	Not defined	Laparoscopy	1700	Paracolic sulcus	Not defined	Endometriosis, 6-months GnRHa
9	Chopra et al. [30]	2008	29	6 weeks	Present	Undetectable	Laparotomy	1000	Omentum	Not defined	
10	Lo and Lau [13]	1997	33	6 weeks	Present	Undetectable	Laparoscopy + laparotomy	1000	Uterosacral ligament	Not defined	
11	Lo and Lau [13]	1997	32	7 weeks	Present	Small amount	Laparoscopy	1000	Uterosacral ligament	Not defined	
12	Hong et al. [14]	2008	25	8 weeks	Present	Undetectable	Laparoscopy	500	Omentum	19,213	
13	Shaw et al. [29]	1994	29	8 weeks	Present	Not defined	Laparotomy	950	Cul-de-sac	Not defined	
14	Watrowski et al. [5]	2014	25	8 weeks	Present	Undetectable	Laparoscopy	500	Omentum	33,600	
15	Shin et al. [31]	2000	28	8 weeks	Present	Not defined	Laparotomy	1000	Uterosacral ligament	Not defined	
16	Nakamura et al. [32]	2001	27	8 weeks	Present	Undetectable	Laparotomy	1000	Rectum wall	6400	Complicated by ovarian hyperstimulation syndrome, urinary hCG titer
17	Dasari and Devi [33]	2000	22	Day 58 of menstrual period	Present	Present	Laparotomy	More than 2000	Uterosacral ligament	Not defined	Current IUD use
18	Shaw et al. [29]	1995	39	9 weeks	Present	Not defined	Laparotomy	1400	Cul-de-sac	Not defined	Laparoscopic operation was performed twice
19	Yi et al. [15]	2007	28	9 weeks	Present	Not defined	Laparoscopy	1500	Omentum	15,814	
20	Shaw et al. [29]	1995	30	11 weeks	Present	Not defined	Laparotomy	1900	Omentum	Not defined	

GA, gestational age; IUD, intrauterine device; GnRHa, gonadotrophin-releasing hormone analog.

presence of hemoperitoneum with blood clots. Neither pregnancy was diagnosed preoperatively.

Early diagnosis of peritoneal pregnancy in early gestation is very difficult. The mean gestational age at the time of treatment of peritoneal pregnancy is reportedly 10 weeks [26]. Each of our patients was diagnosed with massive hemoperitoneum at 5 weeks of gestation. In contrast, Saxon *et al.* [16] reported that the mean gestational age of tubal pregnancies at the time of treatment was 6.9 ± 1.9 weeks (unruptured) and 7.2 ± 2.2 weeks (ruptured). Mol *et al.* [20] reported that patients with a gestational age of >7 weeks showed an increased risk of tubal rupture and/or active bleeding.

There are no previous reports of tubal pregnancy causing massive bleeding at five gestational weeks. Rupture of a tubal pregnancy at five gestational weeks is unusual, with a probability of 0.14 [27]. Both of our patients exhibited massive hemoperitoneum at 5 weeks of gestation; in particular, the patient in Case 1 exhibited more than 2000 mL of bleeding. Omental pregnancy and peritoneal pregnancy implanted on the uterosacral ligamentum are also known to cause massive bleeding at 5 gestational weeks, even at day 24 of menstruation (Table 1, Cases 3, 4 and 5) [10, 11, 28]. Thus, massive bleeding in early gestation, such as at 5 weeks in the present cases, may imply the presence of a peritoneal pregnancy.

Expectant management might be acceptable at such an early stage of ectopic pregnancy if the patient is hemodynamically stable. However, peritoneal pregnancy could cause sudden and serious bleeding even at earlier stages of pregnancy when a tubal pregnancy does not cause massive bleeding. Therefore, we reviewed the literature to evaluate the common symptoms of peritoneal pregnancy at 5 weeks of gestation [11–15, 17, 28–33]. Consistent with previous reports, we observed no genital bleeding or gestational sac within the uterus in spite of massive intraperitoneal bleeding and abdominal pain (Table 1). Thus, these symptoms provide a clue to the early diagnosis of a peritoneal pregnancy in early gestation.

Surgical management of a primary peritoneal pregnancy is standard. Laparoscopy is preferred for hemodynamically stable patients with peritoneal pregnancy whose implantation site does not involve a vascular area that may lead to uncontrolled bleeding [9, 29]. Laparoscopy for hemodynamically unstable patients with peritoneal pregnancy, however, remains controversial because of limited evidence. Recently Odejimi *et al.* [34] reported a prospective cohort study of laparoscopic surgery in hemodynamically unstable patients with ectopic pregnancy. Although the laparoscopy group required more blood transfusions (laparoscopy, 22 U of packed red blood cells; laparotomy, 10 U of packed red blood cells), they had a

shorter length of hospital stay than did the laparotomy group (mean, 3.3 vs. 7.5 days), and experienced operators had a 100% success rate at operative laparoscopy. Increasing advances in technology, laparoscopic instrumentation, hemodynamic monitoring, and operator skill could enable safer laparoscopy, leading to expansion of its indications.

The increase in the performance of assisted reproduction techniques increases the risk of ectopic pregnancies and thus implantation at unusual sites, which are associated with a difficult diagnosis and a high risk of life-threatening complications [35, 36]. The implantation site may also be missed by laparoscopy, and a secondary operation is required in such cases (Table 1, Case 6 and Case 19) [15, 17]. Such secondary operations are highly invasive and cause a diagnostic delay, potentially resulting in more bleeding. Although peritoneal pregnancy is a very rare condition, unusual locations such as the peritoneum should be carefully examined in patients with massive abdominal bleeding during early pregnancy when both the uterus and adnexa are normal on laparoscopic or laparotomic exploration.

Our experience shows that abundant abdominal fluid with low hCG levels and no genital bleeding in very early gestation are signs of a possible peritoneal pregnancy. Implantation into the peritoneum may cause massive bleeding even in the face of low hCG levels and very early gestation. Clinicians should always bear in mind that a pregnancy can exist in unusual locations and ensure thorough inspection of the abdominal cavity.

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Conflict of Interest

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