Massive hemoperitoneum from a ruptured corpus luteum cyst masquerading as biliary colic

Justin B. Belsky, Jumana F. Nagarwala, Glenn F. Tokarski

ABSTRACT

Introduction: Corpus luteum cysts are functional cysts that secrete progesterone in preparation for pregnancy. If conception does not occur, they typically dissipate, however, they may collect with fluid or blood and form a cyst that can rupture. Although cyst rupture is generally benign, causing mild pain to the patient, it can result in massive hemoperitoneum requiring emergent surgical intervention.

Case Report: A 23-year old female presented to the emergency department after experiencing several hours of right upper quadrant abdominal pain. Emergency department evaluation included normal liver function studies and a negative urine and serum pregnancy test. Abdominal ultrasound revealed a large amount of intra-peritoneal fluid but no biliary disease was identified. While in the emergency department, she developed signs of acute hypovolemic shock. Serial hemoglobin revealed a four-gram drop after arrival in emergency department. She underwent emergent exploratory laparoscopy where massive hemoperitoneum (750 cm³ of blood) was identified. A ruptured corpus luteum cyst was identified as the source of acute blood loss.

Conclusion: We present the first known case of a ruptured corpus luteum cyst resulting in massive hemoperitoneum masquerading as biliary colic. It is paramount that clinicians consider a ruptured ovarian cyst in females with abdominal pain, regardless of the location of pain.

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CASE REPORT

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where massive hemoperitoneum (750 cm³ of blood) was identified. A ruptured corpus luteum cyst was identified as the source of acute blood loss. **Conclusion:** We present the first known case of a ruptured corpus luteum cyst resulting in massive hemoperitoneum masquerading as biliary colic. It is paramount that clinicians consider a ruptured ovarian cyst in females with abdominal pain, regardless of the location of pain.

Keywords: Corpus luteum cyst, Ectopic pregnancy, Hemoperitoneum, Right upper quadrant pain

How to cite this article

Belsky JB, Nagarwala JF, Tokarski GF. Massive hemoperitoneum from a ruptured corpus luteum cyst masquerading as biliary colic. Int J Case Rep Images 2015;6(3):168–172.

doi:10.5348/ijcri-201531-CR-10492

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Received: 22 December 2014

Accepted: 19 January 2015

Published: 01 March 2015

INTRODUCTION

The corpus luteum is a temporary hormone secreting remnant of a mature ovarian follicle after it ruptures to release an ovum into the fallopian tube. Its main function is to establish and maintain early pregnancy by secreting progesterone. If fertilization occurs the corpus luteum involutes at approximately 8–10 weeks of gestation and the placenta produces progesterone for the remainder of pregnancy. If fertilization does not occur, the corpus luteum involutes several days after ovulation (now referred to as the corpus albicans), shrinks and stops producing progesterone resulting in endometrial sloughing and menstruation. However, the corpus luteum may fill with blood or other fluids forming a cyst and rupture [1].

Abdominal pain caused by a ruptured corpus luteum cyst is a common complaint seen in the emergency department in a woman of childbearing age. They are seldom of any pathological consequence and are usually self-limited to pain. However, in rare cases they can lead to massive hemoperitoneum requiring surgical management.

CASE REPORT

A 23-year old female presented to the emergency department with abdominal pain. The patient reported colicky, non-radiating right upper quadrant (RUQ) pain with onset while eating approximately 15 hours prior to admission. Over the next several hours, she experienced several similar episodes of pain of variable intensity that were also associated with eating. Two episodes of non-bloody emesis occurred during this time but she denied other gastrointestinal symptoms. Her last menstrual period was nine days prior and normal in timing and duration. She was sexually active and did not use birth control. She had sexual intercourse less than 30 minutes prior to her first episode of pain. She denied vaginal bleeding and had no known gynecologic problems. She denied urinary symptoms and reported no previous abdominal surgeries.

Vital signs upon arrival revealed a temperature of 36.9°C, blood pressure 96/64 mmHg, heart rate 99 bpm, respiratory rate 16 bpm, and SaO₂ 100% on room air. Her abdominal examination was remarkable for diffuse tenderness throughout the entire abdomen but worse in the RUQ. Voluntary guarding with palpation was noted in the RUQ area but no peritoneal signs were present. Murphy's sign was negative and the patient did not have any masses or hepatosplenomegaly. The patient denied costovertebral tenderness. Her skin was pale without evidence of jaundice.

Pertinent laboratory results included white blood cell count 16.5 K/uL (normal 3.8–10.6 K/uL) with absolute neutrophil count 14.51 K/uL (normal 1.0–7.70 K/uL), hemoglobin 10.3 g/dL (normal 12.0–15.0 g/dL). Serum electrolytes, liver function tests, lipase and urinalysis were normal. Urine pregnancy test was negative and serum beta-HCG was <10 IU (non-pregnant <10 IU). Abdominal ultrasound revealed no gallstones or biliary dilatation, however, a large amount of intra-peritoneal fluid was observed. Transvaginal ultrasound revealed a complex mass in the left ovary and a large amount of intra-peritoneal fluid was again described, consistent with an ectopic pregnancy (Figure 1).

The negative pregnancy markers were not consistent with the ultrasound findings of a ruptured ectopic pregnancy and the history, examination and normal liver function tests not consistent with ascites so the studies were re-examined with an independent ultrasound radiologist. A complex left adnexal mass and large amount of peritoneal fluid were again identified.

Computed tomography (CT) scan of the abdomen/pelvis was recommended to better delineate possible intra-abdominal and/or pelvic pathology. This study revealed a complex left ovarian mass and a large amount of intra-peritoneal fluid with a radiodensity of blood – findings again suggestive of a ruptured ectopic pregnancy (despite the negative urine and serum pregnancy tests) (Figure 2).

An emergent OB-GYN consultation was obtained. After examining the patient and reviewing the laboratory, ultrasound and CT studies the consultant diagnosed a possible ruptured ovarian cyst and recommended admission to the observation unit for symptom control, repeat examinations and hemoglobin monitoring.

Shortly, after OB-GYN evaluation the patient again complained of severe RUQ pain. Repeat vital signs revealed a heart rate 131 bpm and blood pressure 114/57 mmHg. Examination demonstrated diffuse abdominal pain worse in the RUQ and rebound tenderness was now present. Volume resuscitation was initiated and the OB-

Figure 1: Transvaginal ultrasound of left adnexa. Adjacent to the left ovary there is a 8.9x5.6x6 cm complex mass which contains a 2.2–2.2 mm anechoic structure.

Figure 2: Computed tomography scan with contrast of the pelvis: A 3-cm cystic focus present in the left adnexa with surrounding hyperdense material most consistent with acute blood products.

GYN consultant recalled. Repeat hemoglobin was found to be 8.4 g/dL (down from 10.3 g/dL 5 hours prior). The patient was taken for emergent exploratory laparoscopy.

Upon exploration of the abdomen, 750 cm³ of intra-abdominal blood was identified. The liver and abdominal organs were normal. A ruptured corpus luteum cyst was identified in the left ovary and was felt to be the source of the intra-abdominal hemorrhage. An intraoperative hemoglobin was found to be 6.0 g/dL so blood was transfused. Postoperative hemoglobin levels remained stable and pain improved. The patient was discharged on the second postoperative day. When seen in the OB-GYN clinic two weeks later she was symptom-free and her hemoglobin level was similar to the day of hospital discharge.

DISCUSSION

During the follicular phase of a normal menstrual cycle a single ovarian follicle is stimulated to grow by follicle stimulating hormone and luteinizing hormone (LH). A mid-cycle surge of LH stimulates the mature follicle to rupture and release the ovum into the fallopian tube. The remnants of the ruptured ovarian follicle is now referred to as the corpus luteum. The corpus luteum functions during the luteal phase of the menstrual cycle by synthesizing and releasing multiple hormones of which progesterone is the most important (responsible for the maintenance of the highly vascular and glandular endometrium). If fertilization occurs, the corpus luteum involutes at approximately 8–10 weeks of gestation and the placenta produces progesterone for the remainder of pregnancy. If fertilization does not occur, the corpus luteum involutes several days after ovulation (now referred to as the corpus albicans), shrinks and stops producing progesterone resulting in endometrial sloughing and menstruation.

The corpus luteum is a highly vascular structure. The rate of blood flow to the corpus luteum exceeds any other adult organ (per unit of tissue); the increased blood flow is needed to deliver substrates for hormone production and to nurture the rapidly dividing luteal cells [2]. The highly vascular nature of the corpus luteum is reflected by its oxygen consumption which is estimated to be 2–6 times that of the liver, kidney and heart (per unit of tissue) [1, 2]. If pregnancy occurs, the corpus luteum grows to 3–5 cm in size. Marked angiogenesis occurs in the corpus luteum of pregnancy; 50–70% of all cells in the mature corpus luteum are endothelial cells or microvascular pericytes and capillary lumina account for 22% of the size of the corpus luteum.

Ovarian cysts occur commonly in menstruating women ages 18–35 years and are commonly identified by ultrasound. The minimum size to be considered a cyst is 2.5–3.0 cm [3]. Two types of functional ovarian cysts are described. Follicular cysts arise from ovarian follicles

that do not mature into the primary follicle. They are of variable size, thin walled and usually contain clear cystic fluid. Pain may result from stretching of the ovarian capsule, bleeding into the cyst or spontaneous rupture and local peritoneal irritation. Most follicular cysts will spontaneously regress and medical intervention is usually limited to symptomatic control.

Corpus luteal cysts arise due to the rapid growth and high vascularity of the corpus luteum resulting in intra-luteal hemorrhage and the formation of a hemorrhagic cyst. Ongoing bleeding into the cyst can result in rapid enlargement, spontaneous rupture and leakage of blood into the peritoneal cavity. Abdominal and/or pelvic pain may occur with any of these complications.

Hemoperitoneum resulting from ruptured corpus luteum cyst have been described since the early 1900s and is frequently misdiagnosed as ruptured ectopic pregnancy, acute appendicitis, ovarian torsion and endometriosis [4, 5]. The incidence of this complication is not reported; practicing gynecologists relate this as rare but recognized. More recent case reports of massive hemoperitoneum from a ruptured corpus luteum cyst are associated with systemic anticoagulation, coagulation disorders, von Willebrand disease, and sickle cell anemia [6–9]. Symptoms presenting following sexual intercourse, such as those described by our patient, are also described in literature [10, 11]. It is possible that the changes in intraluminal pressure created during sexual intercourse was a catalyst for cyst rupture.

Corpus luteal cysts are commonly identified as incidental structures on pelvic ultrasound studies. Corpus luteum cyst rupture with intra-abdominal hemorrhage may appear ultrasonographically identical to a ruptured ectopic pregnancy as in our case a negative serum pregnancy test may be a discerning feature [11, 12]. Computed tomography scan of the abdomen/pelvis is of limited value and usually supports the diagnosis of ruptured ectopic pregnancy—again a negative serum pregnancy test should suggest an alternate diagnosis [13].

Therapy for ruptured corpus luteal cysts with intra-abdominal hemorrhage must be tailored to the patient. Observation, pain control and serial hemoglobin monitoring may be appropriate for select cases but signs of blood loss or hypovolemic shock should prompt immediate surgical intervention.

Our patient presented with symptoms and findings suggestive of acute biliary colic but testing revealed no biliary disease. Gynecologic causes of RUQ pain include perihepatitis and adhesions between the liver and abdominal wall due to gonococcal and chlamydial salpingitis (Fitzhugh–Curtis syndrome). Other common differentials for a young female with abdominal pain include, gastritis, peptic ulcer disease, gastroesophageal reflux disease, ectopic pregnancy, pyelonephritis, pancreatitis, and ovarian related conditions such as pelvic inflammatory disease, ovarian torsion, and cyst rupture.

CONCLUSION

Massive hemoperitoneum resulting from a ruptured corpus luteum cyst is rare, but potentially life-threatening if not diagnosed and treated emergently. We could identify no other reports of hemoperitoneum from a ruptured corpus luteum cyst with a similar presentation. We hypothesize that our patient's right upper quadrant pain was secondary to accumulation of blood into Morison's pouch. Abdominal pain in a young female is a frequent complaint in the emergency department and massive hemoperitoneum from a ruptured corpus luteum cyst should be in the differential diagnosis for all females presenting with abdominal pain, regardless of the location.

Author Contributions

Justin Belsky – Substantial contributions to conception and design, Analysis and interpretation of data; Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published.

Jumana Nagarwala – Substantial contributions to conception and design, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published.

Glenn Tokarski – Substantial contributions to conception and design, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published.

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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