Case Report

Preoperative splenic artery embolization for splenic ectopic pregnancy

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\textbf{ABSTRACT}

Primary splenic pregnancy is an extremely rare form of extra tubal ectopic pregnancy. Transarterial embolization is emerging as an effective treatment for ectopic pregnancy. Here, we present a 34-year-old G4P3003 woman who presented with vaginal bleeding and elevated serum quantitative human chorionic gonadotropin (beta-hCG). After initial workup showed no intrauterine pregnancy, MRI of the abdomen showed an ectopic gestational sac at the splenic hilum. A preoperative splenic artery embolization was performed successfully prior to open splenectomy for removal of the ectopic pregnancy to minimize operative blood loss. By sharing our experience in this case, we contribute to the validation of trans-arterial embolization as an effective adjunctive measure in treating ectopic pregnancy.

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\textbf{BACKGROUND}

Ectopic pregnancies occur when a fertilized egg implants and grows outside the main cavity of the uterus, most commonly within the fallopian tube. Ectopic pregnancies account for 1.97% of pregnancies in North America and are the current leading cause of first trimester maternal mortality, based on data from the American Academy of Family Physicians. Initially, an ectopic pregnancy presents with similar signs of an uncomplicated pregnancy, including symptoms such as a missed menstrual period, tender breasts, or an upset stomach. However, as an ectopic pregnancy increases in size, serious symptoms such as sudden severe abdominal or pelvic pain, weakness, or fainting may develop, especially if associated with a fallopian tube rupture.

An ectopic pregnancy is most often diagnosed with a pelvic exam, ultrasound exam, and blood test for human chorionic gonadotropin (hCG). There are 2 common approaches for ectopic pregnancy management. Treatment with medication is most commonly done with methotrexate. However, if the fallopian tube has ruptured, emergency surgery is needed for ectopic pregnancy removal.

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Case report

A 34-year-old G4P3003 woman presented to the emergency department for evaluation of vaginal bleeding. Prior to presentation, she had intermittent vaginal bleeding consisting of a brown discharge for a couple of weeks. She was prompted to present to the ED once she started passing red bloody discharge and a blood clot for one day. She complained of associated intermittent nausea associated with lightheadedness. She stated she occasionally felt pressure in her lower abdomen, worse on the right side, but denied any other pain. Her symptoms prompted her to take an at-home pregnancy test, which resulted positive. Her last menstrual period was 63 days prior to presentation. Her beta-hCG value at presentation to the ED was 20,039.

Her medications at the time of presentation included cholecalciferol and folic acid. Her surgical history includes 3 uncomplicated c-sections, cholecystectomy, partial sleeve gastrectomy, partial sleeve gastrectomy. This was her first pregnancy since her tubal ligation reversal.

A transabdominal pelvic ultrasound was performed. Imaging findings showed no intrauterine gestation. However, a 1.3×1.4×1.3 cm ill-defined hypoechoic structure in the right adnexa adjacent to the ovary was found, which was likely a corpus luteum cyst. This ultrasound finding along with the quantitative beta-hCG value resulted in high concern for ectopic pregnancy. An MRI of the pelvis without contrast was performed due to the patient's ultrasound and elevated beta-hCG findings. However, no intrauterine gestation, gestational sac in the pelvis, or adnexal masses were seen. The only finding was a small cyst in the right ovary that may represent the corpus luteum.

Further imaging with MRI of the abdomen was performed showing a T2-hypertense, cystic structure measuring 2.1×1.3 cm adjacent to the splenic hilum with a focus of low signal centrally. This finding was not present on prior imaging, a CT obtained 2 months ago. This structure was adjacent to the splenic vein and artery at the hilum. Diffusion-weighted images demonstrated punctate diffusion restriction centrally correlating to a focus of low T2 signal (Fig. 1). This finding potentially represented a fetal pole within a gestational sac. Overall, these findings were highly suspicious for an intra-abdominal ectopic pregnancy—specifically a splenic ectopic pregnancy, given the clinical presentation of concurrent elevated beta hCG and imaging findings.

After multidisciplinary discussion, a joint decision was made to perform preoperative splenic artery embolization prior to an open splenectomy and removal of the ectopic pregnancy. Fortunately, she had not had a hemorrhagic event at that time. She was taken to angiography. Celiac and selective splenic arteriography showed a focal hypervascular blush surrounded by non-vasularity at the lower splenic hilum, corresponding to the fetal pole surrounded by fluid within the gestational sac. Mid splenic artery embolization was performed using a single 8 mm Amplatzer plug, resulting in focal occlusion of the mid splenic artery (Fig. 2). This was performed to reduce the perfusion pressure in the spleen with the goal of minimizing subsequent operative blood loss. Operative findings included a cyst consistent with ectopic pregnancy on the spleen (Fig. 3). Operative blood loss was 50 mL and hemostasis was achieved at the end of the surgery. Pathology findings from the splenectomy showed a benign spleen with hemorrhage and chorionic villi with fetal membranes, compatible with ectopic gestation.

According to the American Academy of Family Physicians, ectopic pregnancy occurs at a rate of 19.7 cases per 1000 pregnancies in North America and is the leading cause of maternal mortality in the first trimester. Surprisingly, only 1.3% of
Ectopic pregnancies are abdominal in location, compared to 95.5% located within the fallopian tube. Our patient presented with a high beta-hCG level and an absent gestational sac on pelvic imaging. These findings were highly suspicious for an abdominal ectopic pregnancy.

Primary splenic pregnancy is an extremely rare form of extra tubal ectopic pregnancy. Due to fertilized eggs being discharged into the abdominal cavity, strong peristalsis of the intestine, and spleen tissue that provides a smooth surface with rich blood, fertilized eggs may gravitate to splenic implantation [1]. Additionally, the gonad and spleen contain similar tissue types, as seen in the rare congenital anomaly of splenogonadal fusion where the spleen and gonadal tissue are fused [2]. This could provide an explanation of a successful ectopic pregnancy in the spleen, as the flat and smooth contour off the thin splenic capsule along with substantial vasculature provides a sustainable environment for blastocyst implantation [3]. However, the splenic parenchyma cannot expand to support the blastocyst growth, and most reported cases have presented with splenic rupture around the seventh to eighth week of gestation, resulting in an emergency splenectomy [3].

Although splenic pregnancy is a rare diagnosis, most reported cases have been treated as emergent with either laparoscopic or open splenectomy. Other methods such as injection of methotrexate into the embryonic sac [4] and image-guided termination of splenic pregnancy with methotrexate injection [5] have been performed as well. Methotrexate was not an option for our patient due to the size of implantation.

Selective splenic artery embolization could have been considered for our patient. However, further evidence is needed. To the best of our knowledge, there is only one case of splenic pregnancy that was treated with selective embolization of the feeding vessels [3]. Selective splenic artery embolization would be advantageous, as it would preserve the patient’s spleen and prevent an increased risk of infection and immunosuppression. Moreover, the benefits also include the avoidance of injury to adjacent structures, such as the stomach and pancreas, and the limitation of severe blood loss [3].

Our approach to perform a preoperative embolization prior to splenectomy was selected to reduce intraoperative bleeding. More evidence regarding the trans-arterial embolization of ectopic pregnancies is needed. Splenic ectopic pregnancy is a rare diagnosis and by sharing our experience in this case, we contribute to the validation of trans-arterial embolization as an effective adjunctive measure in treating ectopic pregnancy.

**Patient consent**

Informed consent for publication of this case was obtained from the patient.

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