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Adnexal torsion in pregnancy

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ABSTRACT

This review has the purpose to evaluate and report clinical characteristics, treatment, and obstetric outcomes of adnexal torsion in pregnant women in order to raise awareness of the need for prompt diagnosis and surgical intervention.
Adnexal torsion (AT) in pregnancy is a rare event but is a surgical emergency that needs prompt intervention. Misdiagnosis or delay in treatment can lead to loss of ovarian function with an effect on future fertility and loss of the pregnancy. The use of assisted reproductive technology is associated with an increased risk of AT. Diagnosis of AT is very challenging due to its nonspecific signs and symptoms such as abdominal pain, nausea, vomiting, and abdominal tenderness. Furthermore, pregnant women with AT present with specific characteristics, and these common signs and symptoms may be caused by other obstetric and non-obstetric conditions. Ultrasound examination may not be as valuable as in non-pregnant women. MRI can assist in making the diagnosis in pregnant women. Clinical suspicion of AT should not delay treatment if the imaging evaluation is not clarifying. In standard practice, the surgical treatment of AT is performed by laparoscopy which is safe for pregnant patients regardless of the trimester. The treatment is based on a conservative approach by preserving the adnexa although initially, the ovary may seem necrotic. During the intervention the adnexa is de-twisted, and cystectomy or cyst aspiration is performed, if any adnexal mass is present, to reduce the recurrence risk. Surgery during pregnancy for suspected AT does not lead to adverse obstetrical outcomes.
Given the difficulties of the diagnosis of AT in pregnancy, it is of great importance that clinicians are familiar with this complication in pregnancy and are aware of the need for prompt intervention.

Keywords: pregnancy, adnexal torsion, diagnosis, management

INTRODUCTION

Adnexal torsion in pregnancy represents a surgical emergency and it can endanger the lives of both mother and fetus. Therefore, early diagnosis and prompt treatment are mandatory in order to prevent loss of the ovary and spontaneous abortion.

Adnexal torsion represents a true emergency accounting for about 3% of all gynecological surgical emergencies (1). The incidence of AT in pregnancy varies widely. However, it is considered a rare surgical emergency in pregnancy with an estimated incidence of 1 to 5 per 10.000 cases (2).

During pregnancy, AT occurs mostly in the first trimester possibly because the free space in the pelvis decreases along the pregnancy and the functional ovarian cysts gradually regress after the first trimester. However, AT has been reported to arise at any gestational age (3).

Due to the increase of pregnancies resulting from IVF the incidence of AT in pregnancy is rising (4). It has been reported that adnexal torsion complicates 1 in 5,000 natural pregnancies (5). The incidence increases to 0.1% after ART and rises at approximately 6% to 16% in pregnant women with ovarian hyperstimulation syndrome (4).

Almost 20% of cases of AT are diagnosed in pregnant women (6). Due to the increased progesterone stimulation during pregnancy, ovarian masses and enlarged corpus luteum cysts are more likely to occur (7). These masses predispose the ovary to rotate

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on the axis of the infundibulopelvic and utero-ovarian ligaments. Therefore, the risk of torsion is increased during pregnancy. It has been estimated that about 2-10% of women will be diagnosed with adnexal masses during pregnancy, the most frequent type of mass being corpus luteum cysts (8). The risk of these masses to suffer torsion has been reported to be 0- 7%. Adnexal masses that are 5 cm in diameter or larger have an increased risk of torsion (8). In one retrospective study (9) of 174 pregnant women with known adnexal masses ≥4 cm, the incidence of AT was 15%; 60% of torsions happened between 10th and 17th weeks of gestation, whereas 5.9% happened after 20 weeks. Furthermore, the size of the adnexal masses represented a risk factor for torsion, meaning that adnexal masses with sizes between 6 and 8 cm were more likely to suffer torsion than larger masses. However, torsion also occurred in women with adnexal masses measuring 10 to 20 cm (9).

Furthermore, fertility treatments are a risk factor for torsion, by increasing the size of the ovaries through ovarian hyperstimulation (10). The rate of ovarian torsion after IVF treatment has been estimated to be 0.025-0.2% (11). The risk of torsion increases if the patient develops ovarian hyperstimulation syndrome and further increases if the patient becomes pregnant (1).

Diagnosis of AT is very challenging due to its nonspecific signs and symptoms. Furthermore, pregnant women with AT present with particular characteristics. The physical and sonographic examination is more difficult, and the most common signs and symptoms may be caused by other obstetric and non-obstetric conditions.

This review has the purpose to evaluate and report clinical characteristics, treatment, and obstetric outcomes of adnexal torsion in pregnant women in order to raise awareness of the need for prompt diagnosis and surgical intervention.

MATHERIALS AND METHODS

This review was performed through an electronic literature search for relevant studies in English on PubMed database. We used the following keywords for identification: adnexal torsion, pregnancy, diagnosis, management. There is limited data on AT in pregnancy because of the low incidence. Most of the studies in the literature regarding adnexal torsion in pregnancy are case reports and small case series. There are no prospective studies on the treatment of AT during pregnancy due to the urgency of this condition.

PATHOPHYSIOLOGY

Because the ovary is suspended by the infundibulopelvic ligament and is not fixed, the ovary can rotate around both the infundibulopelvic and the utero-ovarian ligament resulting in AT. The rotation of the infundibulopelvic ligament causes compression of the ovarian vessels. Initially, the arterial perfusion to the ovary is maintained and the venous and lymphatic outflow is compromised, resulting in ovarian edema and further vascular compression. This leads to ovarian ischemia and necrosis which afterward can cause sepsis (12). It appears that the right ovary is more likely to undergo torsion than the left ovary. The right utero-ovarian ligament is longer than the left one. Additionally, the presence of the sigmoid colon on the left side may help prevent torsion of the left adnexa (13).

DIAGNOSIS

The diagnosis of AT is often a challenge because the patient presents with nonspecific signs and symptoms. However, early diagnosis and prompt intervention are critical to salvage ovarian tissue and the wellbeing of the pregnancy. Especially in pregnancy, the diagnosis of AT is even more difficult since the physical and ultrasound examination of the ovaries is challenging because of the enlarged gravid uterus (14). The definitive diagnosis of AT is made at the time of the surgery by direct visualization of the ovary.

The most frequent presentation of ovarian torsion is acute onset of moderate to severe pelvic pain, associated with nausea and vomiting. A retrospective study (14) that analyzed clinical characteristics of confirmed AT cases in pregnant women reported that the most common symptoms and signs were sudden pelvic pain (100%), presence of palpable adnexal masses (97.6%), and nausea with vomiting (61%).

Differential diagnosis of AT in pregnancy is more difficult, in particular in the second and third trimesters. Abdominal pain in pregnancy may be caused by labor, abruptio placentae, HELLP syndrome, and uterine rupture. Other diagnoses should be taken into consideration such as pyelonephritis, appendicitis, and necrosis of uterine leiomyoma (15).

Findings on physical examination include abdominal tenderness, normal temperature to low-grade fever, and tachycardia. However, 30% of patients may have no pain on examination (16). Peritoneal signs and low-grade fever may be markers of adnexal necrosis (12). Laboratory findings are often normal and are not helpful for the diagnosis, especially in pregnancy when white blood cells are physiologically elevated (17). Adnexal necrosis may cause slight leukocytosis and raise inflammatory markers (18).

Ultrasonography is the primary imaging modality for the evaluation of AT. The affected ovary may

be enlarged, have a heterogeneous aspect compared to the other ovary, and may present follicles at the periphery because of the edema (19). Moreover, the presence of an ovarian mass, abnormal adnexal position, free fluid in the pouch of Douglas, the whirlpool sign, and absent/decreased blood flow in the ovary are other sonographic signs that may appear in adnexal torsion (7).

Color Doppler sonography is a useful tool for diagnosis. Doppler flow of a twisted ovary may be normal, decreased, or absent. In case of incomplete vascular occlusion, Doppler flow may be normal and does not exclude the diagnosis of torsion. A study revealed that absent venous Doppler flow had a positive predictive value of 94%, but arterial Doppler flow persisted in 60% of cases with torsion (20). The absence of vascular flow may occur as a late finding and may show that the ovary already suffered necrosis and is not viable anymore (19).

Particularly in pregnancy, Doppler evaluation of the twisted ovary is limited because of the physiologic increase in adnexal blood flow (7). One study reported that Doppler flow was falsely normal in 61% of pregnant women compared to 45% of non-pregnant women (21). Therefore, the diagnosis of AT is mainly a clinical one with ultrasound providing supportive information. Additionally, the gravid uterus may dislocate the twisted adnexa and the mass may not be distinguishable. In this setting, MRI evaluation may be useful, especially when appendicitis cannot be ruled out (22). If MRI is not available, CT with low exposure techniques can be used, provided that the patient is properly counseled (23).

MANAGEMENT

The moment AT is diagnosed, surgical intervention should not be delayed in order to prevent the loss of ovarian tissue due to necrosis. Currently, laparoscopy is the surgical treatment of choice for both pregnant and non-pregnant women (2).

Laparoscopy can be performed safely in all trimesters (24). However, laparoscopy during pregnancy requires consideration of specific intraoperative risks. Technical aspects taken into consideration during laparoscopy in pregnant patients are: the patient should be positioned in a leftward tilt in the third trimester, to prevent compression of the inferior vena cava; for optimal visualization, the entry should be made several centimeters above the uterine fundus; the pressure of the pneumoperitoneum should be less than 12 mmHg (24). Benefits of laparoscopy are similar to non-pregnant patients and include shorter hospital stay, shorter recovery time, decreased postoperative pain, less risk of wound complications, and venous thromboembolism (24).

Fetal heart monitoring is performed before and after surgery. There is no consensus on prophylactic tocolysis during surgery (24). In the first 12 weeks of pregnancy, progesterone is produced in the corpus luteum and is essential for the wellbeing of the pregnancy. Therefore, in case of oophorectomy or cystectomy in the first 12 weeks of gestation, it is important to administer supplemental progesterone after surgery to prevent miscarriage (24).

A retrospective case-control study (25) compared the obstetric outcomes of pregnant women operated for AT to a control group with normal pregnancies and reported no differences between the two groups. There were no significant differences regarding gestational age at delivery, preterm labor, and neonatal outcomes. Other studies confirmed that laparoscopic treatment of AT in pregnancy does not lead to adverse obstetric outcomes (2,21).

The main goal of the surgical intervention is to de-twist the adnexa and to preserve the ovary. It was previously considered that untwisting the adnexa could dislodge a clot in the ovarian vein and cause embolism. Subsequently, the twisted adnexa was removed without untwisting it (12). Additionally, it was thought that preserving the ovary could lead to adverse outcomes such as hemorrhage and peritonitis from necrosis. Evidence suggests that conservative surgery for ovarian torsion is not associated with an increased risk for these complications (26).

If a truly necrotic ovary is preserved, this may lead to infection, and it may need to be removed in a second intervention. However, even if the twisted ovary looks necrotic on initial inspection, most ovaries (90%) are possibly still viable (23). On surgical evaluation, the ovary may appear dark, blue, enlarged, and with hemorrhagic lesions. This is due to vascular and lymphatic congestion and not necrosis (23). Following conservative treatment, most patients preserve ovarian function after de-torsion and present normal follicular growth with normal ovarian Doppler flow on ultrasound (23). Adnexectomy should be reserved for those patients in whom malignancy is suspected, or in whom adnexal necrosis is evident during surgery. Necrosis is suggested when the adnexa appear as a gelatinous or poorly defined structure (26).

Conservative treatment consists of adnexal detorsion and preservation of the ovary. In addition, if an ovarian mass is present, cystectomy should be performed. Because of edema, cystectomy may not be possible, thus cystotomy and cyst aspiration may be performed (23). If the cyst is not removed there is a remaining risk of torsion recurrence or sepsis due to necrosis of the ovary. One study that examined AT in pregnancy associated with functional ovarian cysts reported that the rate

of torsion recurrence was significantly higher in patients who underwent detorsion alone compared to patients who underwent detorsion and aspiration of the ovarian cysts (27). Although sepsis is a rare complication, postoperative care following conservative treatment should observe the patient for signs of peritonitis or sepsis such as fever, increasing abdominal pain, peritoneal signs, and hemodynamic instability (13).

The recurrence rate of AT in pregnancy has been reported as high as 14-19%, being more common in pregnant women than non-pregnant women (21,28). Ovariopexy can be performed to prevent recurrence of AT. The procedure consists in fixing the ovary by shortening the utero-ovarian ligament or suturing it to the utero-sacral ligament. However, data is scarce regarding the efficacy of this procedure and the long-term consequences on fertility (29). Additionally, there is limited data on ovariopexy performed during pregnancy. Nonetheless, most studies that address this procedure support adnexal fixation in pregnant women given the higher rate of recurrence in pregnancy and the risks associated with repeated surgery (15,21,28). According to Djavadian et al. (15) shortening the utero-ovarian ligament to avoid recurrence presented no technical difficulty and led to no complications. They suggest performing ovariopexy in cases of recurrence of adnexal torsion. Ginath et al. (28) performed ovariopexy in five pregnant women with recurrent episodes of AT and stated that this is a safe procedure. They stated that multicystic ovaries were more frequent in patients with recurrences. These persist after the first surgery because they are technically difficult to drain due to numerous cysts and enhanced vascularity. Hosny et al. (30) report that detorsion and ovariopexy are appropriate for ovarian torsions in pregnant women and patients with ovarian hyperstimulation syndrome.

CONCLUSIONS

AT in pregnancy is a rare event but is a surgical emergency that needs prompt intervention. With a growing number of ovarian stimulation treatments, adnexal torsion is becoming more frequent especially during pregnancy. Assisted reproductive technology treatments are a major risk factor for AT in pregnancy, thus a high level of alertness throughout pregnancy is recommended. AT occurs more commonly during the first trimester but may occur at any time during pregnancy. Early diagnosis and intervention are important to salvage both the mother and the fetus. Nonspecific signs and symptoms during the evaluation and the difficulties in sonographic examination in pregnant women tend to hinder the diagnosis. In standard practice, the surgical treatment of AT is performed by laparoscopy which is safe in pregnancy regardless of the trimester. The main goal of the surgery is to untwist the adnexa and to preserve the ovary. Regardless of previous beliefs, most of the time the twisted ovary is still viable and should not be excised. The surgical treatment of AT in pregnancy does not impose any serious risks to obstetrical outcomes. Given the difficulties of the diagnosis of AT in pregnancy, it is of great importance that clinicians are familiar with this complication in pregnancy and are aware of the need for prompt intervention.

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