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Review Article

A review of ovary torsion

*Ci Huang[a], Mun-Kun Hong[a,b], Dah-Ching Ding[a,b]**

[a]Department of Obstetrics and Gynecology, Buddhist Tzu Chi General Hospital and Tzu Chi University, Hualien, Taiwan, [b]Institute of Medical Sciences, Tzu Chi University, Hualien, Taiwan

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Abstract

Ovarian torsion is a rare but emergency condition in women. Early diagnosis is necessary to preserve the function of the ovaries and tubes and prevent severe morbidity. Ovarian torsion refers to complete or partial rotation of the adnexal supporting organ with ischemia. It can affect females of all ages. Ovarian torsion occurs in around 2%–15% of patients who have surgical treatment of adnexal masses. The main risk in ovarian torsion is an ovarian mass. The most common symptom of ovarian torsion is acute onset of pelvic pain, followed by nausea and vomiting. Pelvic ultrasonography can provide information on ovarian cysts. Once ovarian torsion is suspected, surgery or detorsion is the mainstay of diagnosis and treatment.

Keywords: *Abdominal pain, Ovarian cyst, Ovarian torsion, Pelvic pain, Ultrasound*

Introduction

Ovarian torsion, which affects females of all ages, is a gynecological emergency [1-3]. It refers to a complete or partial rotation of the adnexal supporting organ, resulting in ischemic changes in the ovary. Torsions more commonly involve both the ovary and fallopian tube, and there are fewer cases of isolated torsion involving either one (one in 1.5 million women) [4-6]. Torsion involving paratubal or paraovarian cysts has also been found [2,7,8]. Early diagnosis and surgery are essential to protect ovarian and tubal function and prevent severe morbidity [9,10].

Infundibulopelvic and utero-ovarian ligaments

The infundibulopelvic ligaments suspend the movable ovary, allowing the ovary to position laterally or posteriorly to the uterus. The ovarian vessels travel along the infundibulopelvic ligaments which attach to the pelvic sidewall. Because adnexal tissue is not fixed, a big leading point, such as tumorous growth, can induce twisting. The other side of the ovary is connected to the uterus by the utero-ovarian (UO) ligament. The UO ligament is composed of muscular and fibrous tissue. The function of the UO ligament is to connect the ovary to the uterus and support it, and it also supplies blood from the uterine artery to the ovary [11].

Pathogenesis

Ovarian torsion occurs when an ovarian cyst or mass presents and rotates both the infundibulopelvic ligament and the UO ligament. The cyst or mass is usually a benign lesion over 5 cm in diameter [12-15]. Torsion can also occur in normal ovaries, however, particularly in premenarchal girls who have elongated infundibulopelvic ligaments [16-18]. However, the occurrence of ovarian torsion may decrease thereafter because the ligament shortens when premenarchal girls mature to puberty.

Epidemiology

A 10-year review of 128 patients with adnexal torsion states that 2.7% of emergency surgery cases involved ovarian torsion [19]. Another 10-year study showed that 15% of 135 patients with surgically treated adnexal masses had torsion [20]. Totally, around 2%–15% of patients who had surgical treatment of adnexal masses had ovarian torsion. Most ovarian torsion occurs in the reproductive age group, and it is less common in premenarchal girls and postmenopausal women (17.2% of cases) [21].

Risk factors

More than 80% patients with ovarian torsion had ovarian masses of 5 cm or larger, indicating that the primary risk in ovarian torsion is an ovarian mass [12,15,22]. The sizes of ovarian masses are correlated with the risk of the torsion. Ovarian torsion has been reported to occur with masses from 1 to 30 cm (mean 9.5 cm) [15], but it can happen with any size mass. Ovulation induction for treatment of infertility may cause multiple large ovarian follicular cysts; the large cysts carry an increased risk of torsion [23].

Address for correspondence:
Dr. Dah-Ching Ding,
Department of Obstetrics and Gynecology, Buddhist Tzu Chi General Hospital, 707, Section 3, Chung-Yang Road, Hualien, Taiwan.
E-mail: dah1003@yahoo.com.tw

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Benign and malignant tumors in ovarian torsion

Ovarian torsion is more likely to occur with a benign tumor than in a malignancy. The incidence of ovarian torsion with ovarian malignancy was <2% in reported case series [13,22,24,25].

Ovarian torsion in the premenarchal population

Compared with older women, premenarchal girls with ovarian torsion are more commonly found to have a normal ovary [26]. More than 50% of patients under 15 years old with torsion have normal ovaries [24,27]. Torsion occurred more in patients with normal adnexa (7/11) than those with abnormal adnexa (4/46) [14].

Ovarian torsion in pregnancy

About 10%–22% of ovarian torsion occurred in pregnancy [15,22,24,28]. The incidence is higher at 10–17 weeks of gestation with ovarian masses larger than 4 cm [29,30]. Pregnant women with adnexal masses 4 cm or greater had a 1%–6% lower incidence of torsion compared with nonpregnant women [31,32].

Summary of epidemiology and risk factors

The incidence of ovarian torsion ranges from 2% to 15% in patients who have surgical treatment of adnexal masses. Ovarian tumors larger than 5 cm carry a risk of ovarian torsion. About 10%–22% of ovarian torsion occurs in pregnant women.

Clinical presentation

Ovarian torsion due to an adnexal mass causes various symptoms and signs on clinical presentation. The most common symptom is acute onset of lower abdominal pain, followed by nausea and vomiting [15,22,24,33-35]. Some patients experience waves of nausea with or without vomiting [15,22,24,33]. The abdominal pain is usually off and on with a sudden onset. Most reported patients presented for evaluation 1 or more days up as late as 210 days after pain onset [15,22,36,37]. Premenarchal patients tended to mention diffuse pain because it was difficult for them to localize the pain [38]. The uncomfortable symptoms and signs were considered to be caused by the adnexal torsion. Ovarian torsion without infective disease resulting in a low-grade fever has been found in some patients [15,22,24,33].

Evaluation and diagnosis

On clinical presentation, the first approach to a patient is a medical history and physical examination. The medical history should include any recent diagnosis of an adnexal mass, recurrent abdominal pain, and low-grade fever. The physical examination should include a search for a pelvic mass or pain. Laboratory evaluation should include serum human chorionic gonadotropin, a hematocrit, white blood cell count, and electrolyte panel.

There is no serum marker for a diagnosis of adnexal torsion. Several serum markers can hint at an adnexal tumor type. Serum human chronic gonadotropin can reveal pregnancy or an ovarian germ cell tumor. CA-125 may indicate a malignant ovary tumor or endometrioma. Some studies have found an association between an increased level of serum interleukin-6 and ovarian torsion [39,40], although further research such as oxidative stress during ovarian torsion is needed [41].

Imaging studies are the most important when evaluating a pelvic mass [42]. Ultrasonography is the first-line diagnostic assessment. A torsed ovary may be rounded and enlarged compared with the contralateral ovary, because of edema or vascular and lymph engorgement [43,44]. An ultrasound can easily distinguish an ovarian mass by its components, location, density, Doppler flow, and size. There can be decreased or absent Doppler flow in the vessels of a torsed ovary [45-47]. One prospective study reported that Doppler flow has high sensitivity and specificity [48]; another retrospective study showed low sensitivity and high specificity in the diagnosis of ovarian torsion [26]. It is not the gold standard for diagnosis, but it is a good tool. Two other studies suggested that a whirlpool sign is highly sensitive for ovary torsion [49,50]. The whirlpool sign shows a twisted vascular pedicle, and a Doppler sonogram reveals circular vessels within the mass. However, further study on the diagnosis of ovarian torsion is necessary to determine the usefulness of this sign in ovary torsion.

Magnetic resonance imaging (MRI) is expensive but helpful in diagnosing ovarian torsion if findings on ultrasound are equivocal [51-57]. MRI can demonstrate the components of a mass in more detail than an ultrasound. Computed tomography (CT), however, is not typically used in ovary torsion because of radiation and density, but patients with acute abdominal or pelvic pain need to undergo CT to exclude diagnoses such as appendicitis, diverticulitis, and others.

Finally, direct visualization is needed for a definitive diagnosis of ovary torsion. Hence, the diagnosis needs to be surgical proven for early rescue of ovary function.

Management

The gold standard to treat ovary torsion is surgery, and this is also the only way to confirm the torsion. There are two surgical methods, laparoscopy and laparotomy. A laparoscopic approach has become a popular procedure. However, if cancer of the ovary or fallopian tube is suspected, a laparotomy should be done [58,59]. While performing the surgery, it is necessary to assess ovarian viability and preserve its function. The only way to determine the viability of a torsed ovary during surgery is by gross visual inspection. In the conventional view of point, dark and enlarged ovaries may have vascular and lymphatic congestion, and may seem nonviable. However, multiple studies have suggested that even those black or blue-like ovaries may retain ovarian function following detorsion [60-67]. Postoperative follow-up with ultrasound showed over 80% of patients had normal follicular development after detorsion [55,63,66,67]. Animal study showed that there may not be total occlusion of the artery in ovarian torsion even with venous and lymphatic congestion [68]. In recent years, the mainstay of the treatment for ovarian torsion has been surgical evaluation and preserving ovarian function. There are many ways to perform the surgery and detorsion and ovarian conservation are almost always recommended now rather than salpingo-oophorectomy [69]. An ovarian

cystectomy is often performed for a benign ovarian mass. If malignancy is highly suspected, a salpingo-oophorectomy is needed. According to many observational studies, detorsion is associated with preserved ovarian function [60-64]. The earlier the approach to torsion, the higher is the chance to preserve function. An animal study showed that necrosis might develop after occlusion of ovarian vessels for 36 h or longer [68]. After the symptoms have developed, ovarian conservation reportedly decreases with time [27,65]. No evidence suggests that detorsion increases adverse events postoperatively [70]. Management in pregnant women is similar to that in nonpregnant patients, and laparoscopic surgery is safe for torsion in pregnant women [28,71-73]. Neonates with ovarian torsion often present with irritability and the condition can be treated with laparoscopic surgery [74-76].

Prevention of recurrence

There is a risk of recurrence after detorsion, but the incidence and causes are unknown [14,17,77-79]. According to recent research, several methods can be used to decrease the risk of recurrence. One method is suppression of ovarian cysts by oral contraceptives [80-83]. Another method is an oophoropexy [72,84,85]. However, both approaches lack long-term follow-up and systematic study.

Conclusion

Although the diagnosis of ovarian torsion is difficult and challenging, careful analysis of presenting symptoms (such as sudden onset of lower abdominal pain) is very critical. Pelvic ultrasonography can provide information on ovarian cysts. Once ovarian torsion is suspected, surgery is the mainstay of diagnosis and treatment. Ovarian cystectomy, oophorectomy, or conservative treatment with detorsion can be the treatment of choice.

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Conflicts of interest

There are no conflicts of interest.

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