

Ovarian Torsion: A Fifteen-Year Review

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Received for publication August 16, 2000. Revision received December 1, 2000. Accepted for publication December 18, 2000.

Presented at the American College of Emergency Physicians Research Forum, Philadelphia, PA, October 2000.

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0196-0644/2001/\$35.00 + 0

47/1/114303

doi:10.1067/mem.2001.114303

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Study objective: Our purpose was to describe the history, physical, and laboratory findings in women with ovarian torsion (OT).

Methods: A retrospective chart review was conducted at 2 urban teaching hospitals. All women admitted from 1984 to 1999 with surgically proven OT were included in the study.

Results: The 87 women ranged in age from 14 to 82 years (mean 32 years). Twelve were pregnant, 15 were postmenopausal, and 7 were posthysterectomy. Thirty-five (40%) had prior pelvic surgery; 18 of these (21% of the total) had undergone tubal ligation. Twenty-two (25%) women had a history of an ovarian cyst. Sixty-five (75%) patients were seen in the emergency department. Pain characteristics were variable: the onset was sudden in 51 (59%); "sharp" or stabbing in 61 (70%); and radiated to the flank, back, or groin in 44 (51%) patients. Only 3 had peritoneal signs at presentation. The majority of patients (70%) had nausea or vomiting. Fever was rare (2 patients). OT was considered in the admitting differential diagnosis in 41 (47%) patients. An enlarged ovary (>5 cm) was found in 77 (89%) patients at surgery. Only 26 patients had surgery within 24 hours. In 8 (9%) patients, detorsion was possible; of these, 3 had surgery within 24 hours.

Conclusion: The diagnosis of OT is often missed and ovarian salvage is rare. Pain characteristics are variable and objective findings are uncommon in OT.

[Houry D, Abbott JT. Ovarian torsion: a fifteen-year review. *Ann Emerg Med.* August 2001;38:156-159.]

INTRODUCTION

Ovarian torsion (OT) is a well-known yet poorly recognized clinical entity that can involve the tube, ovary, and ancillary structures either separately or together.¹ It is the fifth most common gynecologic emergency, with a reported incidence of 3% in one series of acute gynecologic complaints.^{1,2} However, the diagnosis of OT can be difficult to make.

The majority of women with OT are seen in the emergency department with an acute onset of abdominal pain.²⁻⁵ A large subset of these patients will also have associated nausea or vomiting.^{5,6} The differential diagnosis for OT is broad and includes many other emergency causes for abdominal pain, such as ectopic pregnancy, pelvic inflammatory disease, appendicitis, diverticulitis, ovarian cyst, and renal colic.^{1,6}

Early diagnosis and laparoscopic treatment is recommended for suspected OT, particularly to salvage the ovary and adnexa in women desiring to maintain fertility. Yet, an ovarian salvage rate of less than 10% has been reported.^{1,4} Although ovarian necrosis could potentially be fatal, no deaths resulting from a missed diagnosis have been reported. However, if nonspecific but severe pain is seen, OT can be an important differential consideration in the evaluation of a potentially surgical abdomen.

The purpose of this study was to describe the history, physical, and laboratory findings in women with surgically proven OT.

METHODS

This retrospective chart review was conducted at 2 urban hospitals. Both hospitals are associated with residency training programs. There are approximately 35,000 to 60,000 annual ED visits at each facility.

All women admitted from January 1, 1984, to December 31, 1999, with surgically proven OT were included in this study. Patients who were seen at an outside facility and transferred to one of the study hospitals were included if records from the initial visit were available. Women with a diagnosis of OT who did not have torsion confirmed surgically were not included in this study. Additionally, women with fetuses diagnosed in utero with OT were not included.

A standardized review form was developed and used by data abstractors. A single author reviewed each chart and abstracted data. This abstractor was formally trained and did "practice runs" before collecting data for the study. Missing data in the charts such as an absent abdominal or pelvic examination were characterized as "not docu-

mented." In addition, another author reviewed 10 randomly selected charts to assess interrater reliability. The κ coefficient was 0.778 for the charts reviewed by both authors. Both abstractors were not blinded to the study purpose or to the patients' final diagnoses.

The ED resident and attending physician note, surgical or obstetric-gynecologic consultation note, and resident admitting history and physical examination were reviewed for abstraction. Pain characteristics such as "sharp," "colicky," and "peritoneal" were recorded as positive if these exact terms were charted on one of the above notes. Absence of a specific descriptor (eg, "sharp") was characterized as negative if not recorded on any of the notes.

The patient's name, medical record number, and age were noted on the standardized form. Additional information abstracted included patient characteristics such as prior surgeries, history of ovarian cysts, and fertility status. Pain characteristics such as duration, radiation, and associated symptoms were recorded as coded responses. Objective findings such as presenting temperature, WBC count, and final dictated ultrasonographic results were recorded. Finally, operative and pathologic findings were reviewed and documented.

Statistical analysis (mean, median, frequencies) was performed with use of SPSS (SPSS, Chicago, IL) statistical software. This study was approved by the institutional review boards of the 2 hospitals.

RESULTS

One hundred one charts were identified by discharge coding as OT. Of these, 5 patients did not have surgically proven OT, 2 transferred patients did not have original encounter records, and 2 patients left against medical advice before surgery. An additional 5 charts could not be located.

A total of 87 women were identified with surgically proven OT. Their ages ranged from 14 to 82 years (mean 32 years, median 28 years). Sixty-five patients (75%) initially presented to one of the EDs for evaluation, 10 (12%) patients were triaged to the walk-in clinic, 9 (10%) patients presented to the obstetric-gynecologic clinic, and 3 (3%) patients were outside referrals. Fifteen patients were postmenopausal, including 7 posthysterectomy patients. Twelve patients were pregnant, 5 first trimester, 4 second trimester, and 3 third trimester. Table 1 details other historic characteristics of these patients.

Pain characteristics were variable. The median time from onset of pain to presentation was 1 day (range 0 to 210 days, mean 7.8 days). Thirty-nine patients (45%)

presented to the ED within 12 hours of onset of pain. Two patients with a presumptive diagnosis of “cyst” and “chronic pelvic pain” had 150 and 210 days of pain, respectively, before evaluation at the obstetric-gynecologic clinic. Table 2 lists additional characteristics of pain in these patients with OT.

Three patients had peritoneal signs on presentation. Thirty (35%) patients had mild tenderness on abdominal examination; 15 (17%) had severe tenderness. Twenty-five (29%) patients had no tenderness on pelvic examination; 16 (18%) had severe tenderness. A pelvic mass was palpable on examination in 41 (47%) patients. Fever was rare (2 patients). Thirteen (16%, n=13/84) patients had a WBC count above 15,000. Seventy (93%) of 75 patients who underwent ultrasonography had abnormal results (increased ovary size, cyst, or mass). Nine recent patients had Doppler flow recorded on ultrasonography, 6 had decreased or absent flow, and 3 had normal flow.

OT was considered in the admitting differential diagnosis in 41 (47%) patients; other leading diagnoses included cyst/mass (26%), appendicitis (14%), abdominal pain of unknown etiology (7%), pelvic inflammatory disease (5%), and cholecystitis (1%). Only 26 patients had surgery within 24 hours; the mean time to surgery from presentation was 5.8 days (range 0 to 120 days, median 30 hours). Salpingo-oophorectomy was performed in 76 (87%) patients. One patient also had a cholecystectomy; 7 patients had appendectomies performed. In 8 (9%) patients detorsion was performed; only 3 of these patients had surgery within 24 hours. The subsequent ovarian viability in these patients is unknown, but no repeat surgery was needed in any patients.

The mean size of the torsed ovary at surgery was 9.5 cm (range 1 to 30 cm); 77 (89%) patients had an ovary greater than 5 cm. The 3 most common pathologic conditions were hemorrhagic cyst (25 patients), benign teratoma (19 patients), and serous cystadenoma (11 patients). Only one mucinous cystadenoma was of borderline malignant potential.

Table 1.

Historical characteristics of patients with OT.

Characteristic	No. of Patients (n=87) (%)
Prior pelvic surgery (including tubal ligation)	35 (40)
Prior tubal ligation	18 (21)
Posthysterectomy	7 (8)
History of ovarian cyst	22 (25)
Previous pelvic inflammatory disease	13 (15)

DISCUSSION

The diagnosis of OT is often missed. OT was considered in the initial differential diagnosis in less than half the cases in this study. One series of 13 patients with OT showed that appendicitis was the most common preoperative diagnosis; OT was only considered in 1 patient.⁴ However, an erroneous preoperative diagnosis of appendicitis will not delay surgical therapy. In contrast, Hibbard¹ reported that 31 patients with minimal pelvic and abdominal pain were found to have torsion and infarction of the ovary at the time of an elective operation for a presumptive diagnosis of tumor or cyst. These minimally symptomatic patients accounted for 24% of patients with surgically diagnosed OT over a 9-year period at that institution.¹ Thus, it appears from many series, including ours, that the majority of patients with OT have a delayed diagnosis as a result of failure to consider the possibility of OT at presentation.

Torsion should be suspected in patients with an enlarged ovary or with a history of pelvic surgery, particularly tubal ligation, who have abdominal or pelvic pain. Forty percent of patients with OT in our study had a history of pelvic surgery; more than half these were tubal ligations. Tubal ligation has previously been cited as a cause of OT.⁴ The speculation is that postsurgical adhesions may provide a nonmobile nidus that allows the ovarian pedicle to twist around them, although the exact pathogenesis is unknown. Additionally, 25% of our study patients had a history of a known ovarian cyst or mass. This is consistent with Hibbard's study,¹ which reported that 22% of patients diagnosed with OT had a history of known ovarian cyst or mass at surgery. The enlarged ovary apparently has a polarity that allows it to torse along the pedicle. Other studies have also reported the increased risk of torsion in cystic or enlarged ovaries. Malignancy is rare as a source of the enlargement in most series.^{6,7}

Table 2.

Pain characteristics of OT.

Characteristic	No. of Patients (n=87) (%)
Sudden onset	51 (59)
Nausea and/or vomiting	61 (70)
Sharp/stabbing pain	61 (70)
Crampy/colicky pain	38 (44)
Radiation of pain to flank, back, or groin	44 (51)
Lower quadrant pain	80 (90)
Prior episodes of pain	37 (43)
Moderate to severe pain	71 (82)

Physical findings and characteristics of pain in OT are variable. The “classic” history in OT is the abrupt onset of colicky pain in a lower quadrant, with radiation to the flank or groin, mimicking renal colic. Only 44% of patients in this study had such crampy or colicky pain. Additionally, just over half (51%) of patients had radiation of pain to the flank, back, or groin. Fifty-nine percent of patients had abrupt onset of pain; 43% of patients had prior episodes of this pain. Thus, although such a history, particularly in the absence of peritoneal findings, may be characteristic,^{2,6} it is not sensitive. The majority of patients had nausea and vomiting (70%) and lower quadrant pain (90%), but these findings can mimic many other abdominal causes of pain and are not specific for OT. Almost half of patients (47%) had a palpable mass on examination, but more than half these patients (53%) had a known history of ovarian cyst or mass. One third of patients had only mild tenderness on abdominal examination and 29% had no tenderness on pelvic examination. Thus, OT can be present with a relatively benign clinical picture.

Objective findings are also variable and rarely impressive in patients with OT. In fact, this paucity of objective findings may be a clue that OT should be considered. Temperature and WBC count were unremarkable in the majority of patients in our study. Peritoneal findings were rare. Ultrasonography frequently but not invariably showed an enlarged ovary, but the sensitivity of Doppler flow studies of the ovaries has yet to be determined.^{8,9} Although Doppler flow imaging with morphologic assessment (eg, ovarian masses) has been reported to improve the accuracy of diagnosing OT,^{8,9} our study found that Doppler flow still missed 3 of 9 patients with OT.

Detorsion was possible in 8 (9%) patients, although only 3 of these patients had surgery within 24 hours. In all, only 26 patients had surgery within 24 hours. Other studies have commonly reported an ovarian salvage rate of 0% to 7%,^{1,4} although more recent studies have proposed an aggressive approach to ovarian salvage.^{10,11} Cohen et al¹⁰ were able to preserve twisted ischemic adnexa encountered at laparoscopy in 58 women with bluish-black adnexa with minimal postoperative morbidity. Follicular activity was later shown in the ovaries in 54 of 58 women, and none required secondary surgery for complications. Animal studies have also suggested that antioxidant treatment might improve the survival of ovarian follicles by reducing ischemia-reperfusion injury.¹² If the trend toward increased ovarian salvage rates continues, then early diagnosis of OT is warranted. In a review by Lass,¹³ however, it is clear that most women do not have a reduced fertility potential with a single ovary. If this is indeed the case, the main significance of diagnosing OT

may rest in the exclusion of other diagnoses and the determination of etiology in patients with severe and potentially surgical abdominal pain of other causes.

Limitations of our study included the retrospective manner used to classify cases, sometimes based on incomplete data. Only surgically proven cases of OT were included in this study, and we may have missed patients with less “typical” presentations of OT who did not have surgery and therefore were not diagnosed with OT. Both abstractors were not blinded to the study’s purpose or the patients’ final diagnoses. Finally, consultants who examined the patient after other physicians had examined the patient were not blinded to previous notes and may have been influenced by the impressions of earlier physicians.

OT is an uncommon clinical entity. Only 87 cases were identified over 15 years in this study, or approximately 6 cases a year in 2 hospitals. The pain characteristics and objective findings in OT are much more varied than clinicians usually appreciate. Pain from OT can be severe and can mimic other more common clinical emergencies; for this reason, the diagnosis is important to the clinician. In itself, however, OT may not be a true surgical emergency because ovarian salvage remains elusive and the need for ovarian preservation in the majority of patients has not yet been demonstrated.

Author contributions: JTA conceived the study, and JTA and DH designed the study. DH collected all data and analyzed and interpreted the data. JTA randomly checked data and supervised the process. DH drafted the manuscript and JTA contributed substantially to its revision. JTA and DH take responsibility for the paper as a whole and approved the final version.

REFERENCES

- Hibbard LT. Adnexal torsion. *Am J Obstet Gynecol.* 1985;152:456-461.
- Burnett LS. Gynecologic causes of the acute abdomen. *Surg Clin North Am.* 1988;68:385-398.
- Azoury RS, Chehab RF, Mufarrij IK. The twisted adnexa. *Diagn Gynecol Obstet.* 1980;2:185-191.
- Haskins T, Shull BL. Adnexal torsion. *South Med J.* 1986;79:576-577.
- Koonings PP, Grimes DA. Adnexal torsion in postmenopausal women. *Obstet Gynecol.* 1989;73:11-12.
- Nichols DH, Julian PJ. Torsion of the adnexa. *Clin Obstet Gynecol.* 1985;28:375-380.
- Lee CH, Raman S, Sivanesaratnam V. Torsion of ovarian tumors: a clinicopathological study. *Int J Gynecol Obstet.* 1989;28:21-25.
- Tepper R, Zalel Y, Goldberger S, et al. Diagnostic value of transvaginal color Doppler flow in ovarian torsion. *Eur J Obstet Gynecol.* 1996;68:115-118.
- Davis LG, Gerscovich EO, Anderson MW, et al. Ultrasound and Doppler in the diagnosis of ovarian torsion. *Eur J Radiol.* 1995;20:133-136.
- Cohen SB, Oelsner G, Siedman DS, et al. Laparoscopic detorsion allows sparing of the twisted ischemic adnexa. *J Am Assoc Gynecol Laparosc.* 1999;6:139-143.
- Zweizog S, Perron J, Grabb D, et al. Conservative management of adnexal torsion. *Am J Obstet Gynecol.* 1993;168:1791-1795.
- Nugent D, Newton H, Gallivan L, et al. Protective effect of vitamin E on ischemia-reperfusion injury in ovarian grafts. *J Reprod Fertil.* 1998;114:341-346.
- Lass A. The fertility potential of women with a single ovary. *Hum Reprod Update.* 1999;5:546-550.