

# ADNEXAL TORSION

---

Maria Giroux, HBSc, MD

# Sources

## SOGC CLINICAL PRACTICE GUIDELINE

No. 341, February 2017

### No. 341-Diagnosis and Management of Adnexal Torsion in Children, Adolescents, and Adults

This Clinical Practice Guideline has been prepared by the Canadian Paediatric and Adolescent Gynaecology and Obstetrics (CANPAGO) Committee; reviewed by the Clinical Practice-Gynaecology, Diagnostic Imaging, and Guideline Management and Oversight committees; and approved by the Board of the Society of Obstetricians and Gynaecologists of Canada.

#### PRINCIPAL AUTHORS

Sari Kives, MD, Toronto ON  
Suzy Gascon, MD, Montreal QC  
Élise Dubuc, MD, Montreal QC  
Nancy Van Eyk, MD, Halifax NS

#### CANPAGO COMMITTEE

Lisa M. Allen, MD, Toronto ON  
Philippa H. Brain, MD, Calgary AB  
Élise Dubuc, MD, Montreal QC  
Julie C.-E. Hakim, MD, Ottawa ON  
Debra M. Millar, MD, Vancouver BC  
Deanna M. Murphy, MD, St. John's NL

**Key Words:** Torsion, ovary, adnexa disease, ovary disease, uterine tube disease

<http://dx.doi.org/10.1016/j.jogc.2016.10.001>

J Obstet Gynaecol Can 2017;39(2):82-90

Copyright © 2017 Published by Elsevier Inc. on behalf of The Society of Obstetricians and Gynaecologists of Canada/La Société des obstétriciens et gynécologues du Canada

This document reflects emerging clinical and scientific advances on the date issued and is subject to change. The information should not be construed as dictating an exclusive course of treatment or procedure to be followed. Local institutions can dictate amendments to these opinions. They should be well documented if modified at the local level. None of these contents may be reproduced in any form without prior written permission of the publisher.

Women have the right and responsibility to make informed decisions about their care in partnership with their health care providers. In order to facilitate informed choice, women should be provided with information and support that is evidence based, culturally appropriate, and tailored to their needs. The values, beliefs, and individual needs of each woman and her family should be sought, and the final decision about the care and treatment options chosen by the woman should be respected.

82 • FEBRUARY JOGC FÉVRIER 2017

Rachel Spitzer, MD, Toronto ON

Disclosure statements have been received from all principal authors.

#### Abstract

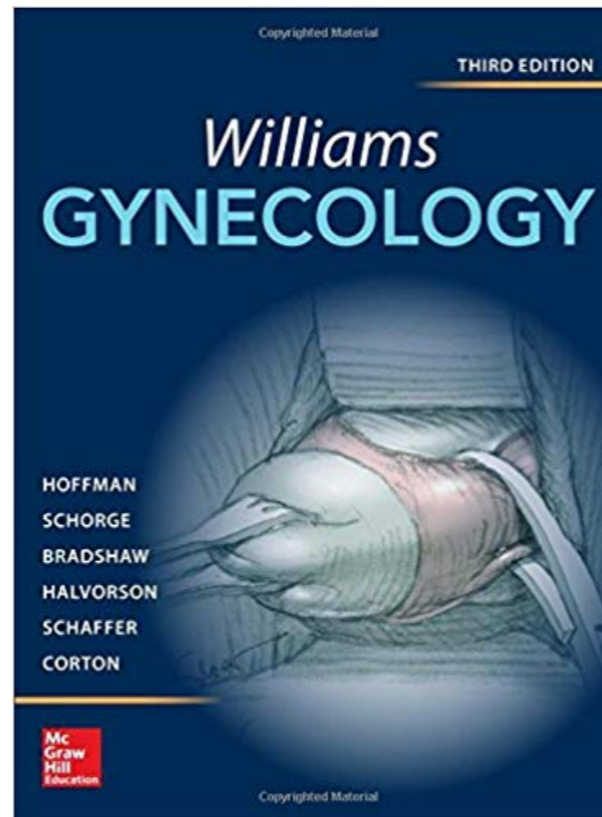
**Objective:** To review the evidence and provide recommendations on the diagnosis and management of adnexal torsion in children, adolescents, and women.

**Outcomes:** Elements evaluated include the risk factors, diagnostic accuracy, management options, and outcomes of adnexal torsion.

**Evidence:** Published literature was retrieved through searches of MEDLINE, Embase, CINAHL, and the Cochrane Library using appropriate controlled vocabulary and key words ("adnexal torsion," "ovarian torsion"). Results were restricted to systematic reviews, randomized control trials/controlled clinical trials, and observational studies. Searches were updated on a regular basis and new material incorporated in the guideline to December 2014. Grey (unpublished) literature was identified through searching the websites of health technology assessment and related agencies, clinical practice guideline collections, clinical trial registries, and national and international medical specialty societies.

**Values:** The evidence obtained was reviewed and evaluated by the Canadian Paediatric and Adolescent Gynaecology and Obstetrics Committee of the Society of Obstetricians and Gynaecologists of Canada (SOGC) under the leadership of the principal authors. Recommendations were made according to guidelines developed by the Canadian Task Force on the Periodic Health Examination.

**Benefits, Harms and Costs:** Guideline implementation should assist the practitioner in developing an optimal approach to the diagnosis and management of adnexal torsion while minimizing harm and improving patient outcomes.

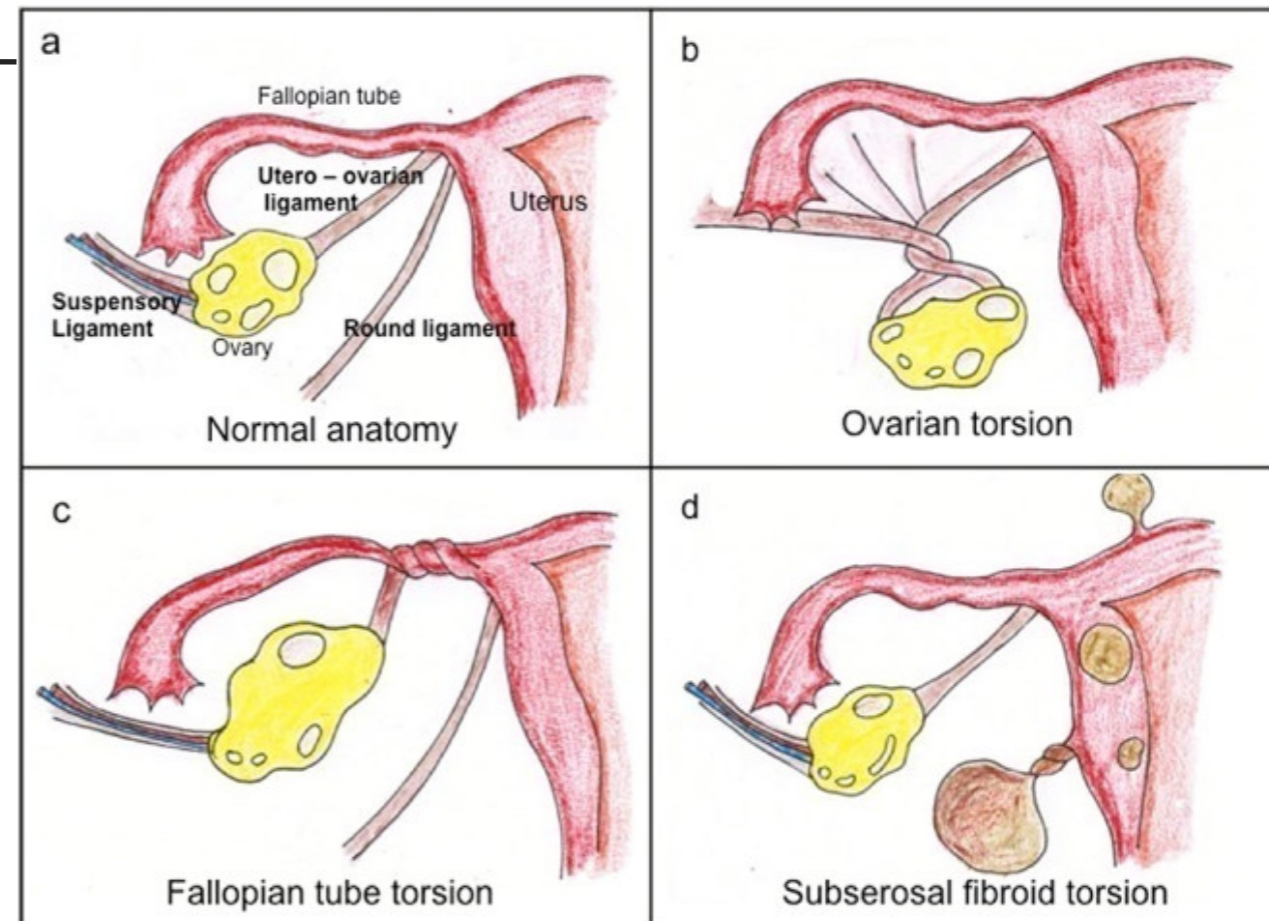


Hoffman, B., Schorge, J., Bradshaw, K., Halvorson, L., Schaffer, J., & Corton, M. (2016, April 22). Williams's Gynecology [Digital image]. Retrieved from <https://www.amazon.ca/Williams-Gynecology-Third-Barbara-Hoffman/dp/0071849084>

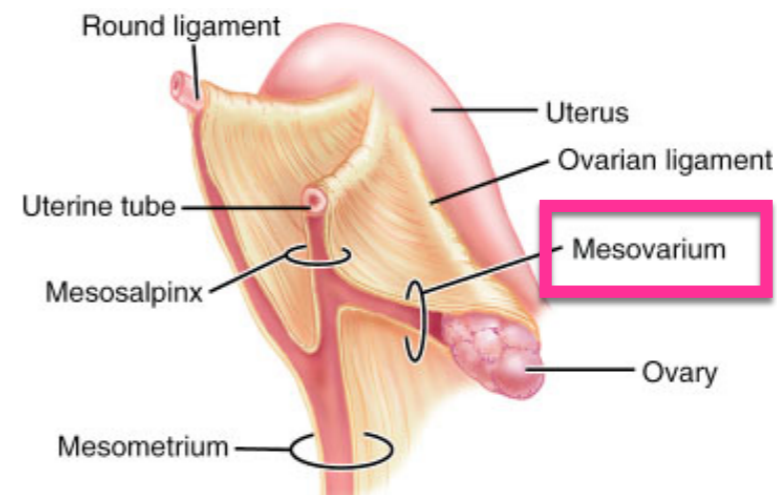
Kives, S., Gascon, S., Dubuc, E., Van Eyk, N. (2017, February). No.341-Diagnosis and Management of Adnexal Torsion in Children, Adolescents, and Adults [Digital image]. Retrieved from [https://www.jogc.com/article/S1701-2163\(16\)39725-0/fulltext](https://www.jogc.com/article/S1701-2163(16)39725-0/fulltext).

# Adnexal Torsion

- Partial or complete rotation of adnexa on its vascular peduncle
- May involve ovary, fallopian tube, or both
  - Most often, the ovary and fallopian tube twist together
  - Less commonly, ovary can rotate on its mesovarium
  - Isolated fallopian tube torsion on mesosalpinx is rare at any age group



Patil, A., Nadikoor, S., & Basappa, S. (2015). (a) Normal ovarian anatomy. The suspensory ligament carries the ovarian vessels. (b) Torsion of normal ovary. (c) Fallopian tube torsion. (d) Torsion of subserosal fibroid. [Digital image]. Retrieved from <https://www.semanticscholar.org/paper/Multimodality-imaging-in-adnexal-torsion.-Patil-Nandikoor/e0d2e078683f15ab5816d720f1f8fff4854d4ec9>

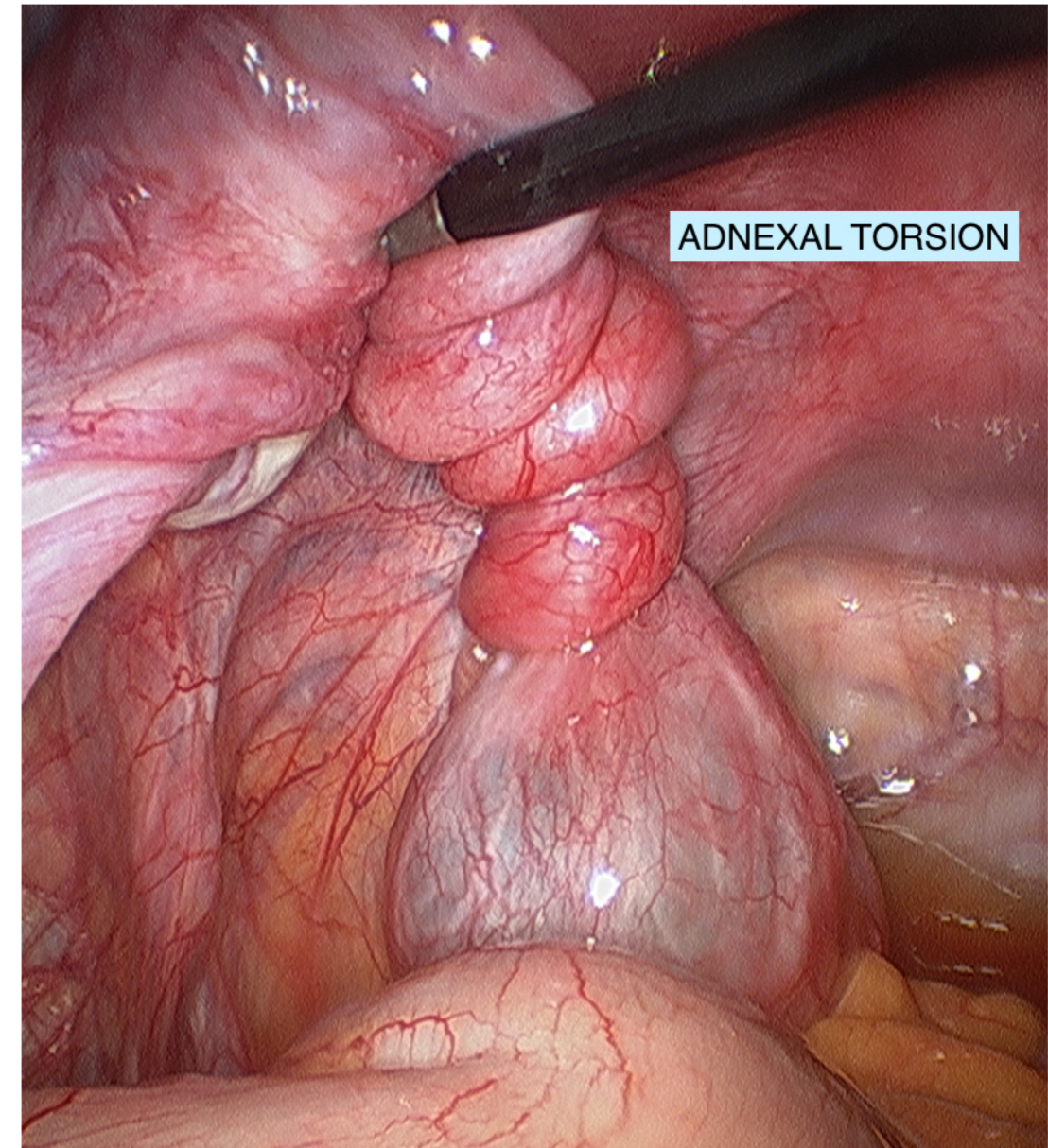


Mesovarium Image [Digital image]. (n.d.). Retrieved from <https://www.knowyourbody.net/mesovarium.html>



# Adnexal Torsion

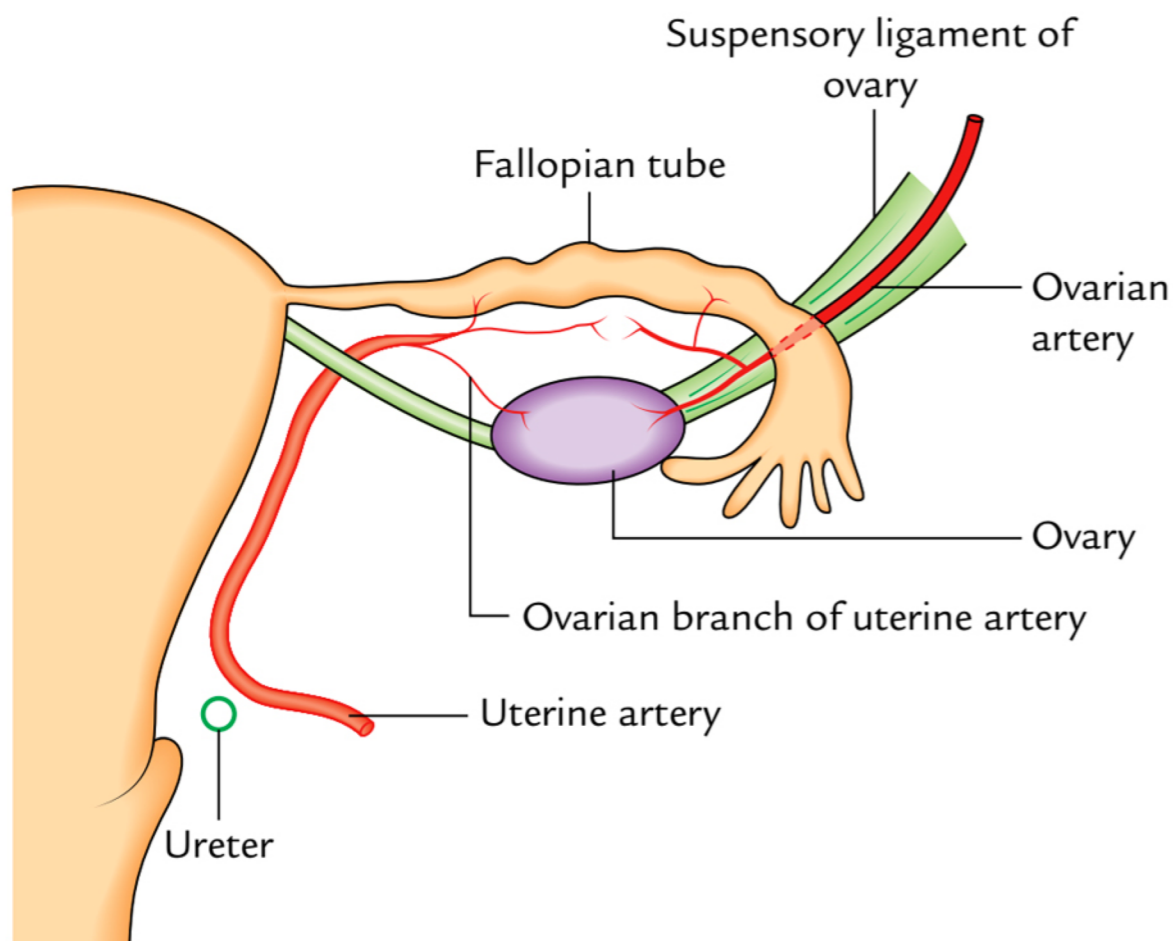
- Right side is more common than left side
  - 66% occur in the right side
  - Mobility of L adnexa is limited by sigmoid colon
- 3% of gynecologic operative emergencies in adults
- 2.7% of cases of abdo pain in children



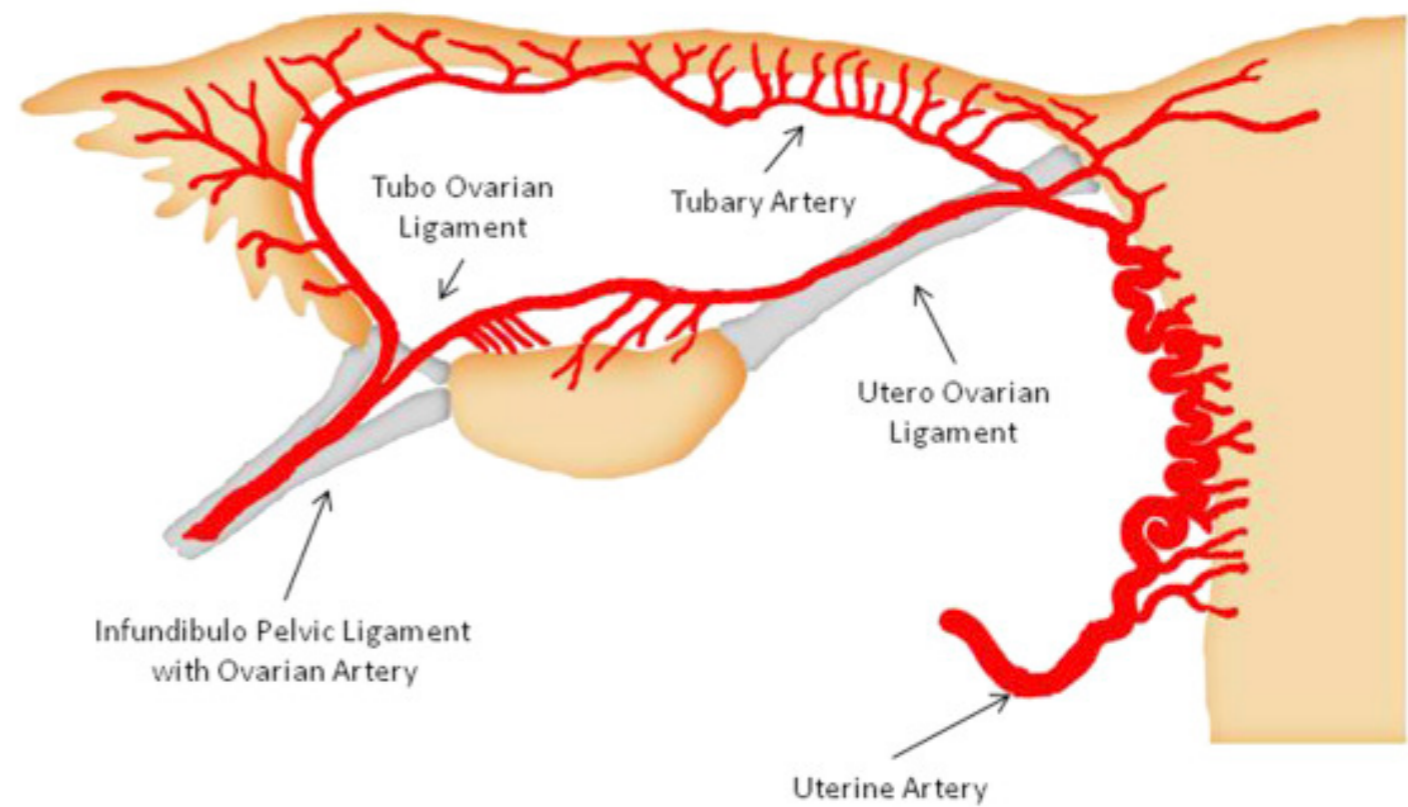
[Digital image]. (n.d.). Retrieved from <https://www.google.ca/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKewjz3Lek06vXAhWL4lMKHc4uD78QjhwIBQ&url=http://aefafem.com.au/welcome/adnexal-masses-ovarian-cysts-pregnancy/&psig=AOvVaw0f7e0hfGOZJhd9GXPINwV7&ust=1510116169459138>



# Relevant Anatomy



Perez, M., Magrina, J., Garcia, A., & Lopez, J. (2015, December). [Digital image]. Retrieved from <https://www.sciencedirect.com/science/article/pii/S096074041530030X>



Perez, M., Magrina, J., Garcia, A., & Lopez, J. (2015). [Digital image]. Retrieved from <https://www.sciencedirect.com/science/article/pii/S096074041530030X>

# Risk Factors

---

- Most likely to occur in children, adolescents, and reproductive age women
  - Average age: 26yo
  - Postmenopausal pts may also be affected

## Risk factors:

- Age: children, adolescents, reproductive age
- Adnexal mass- ovarian mass (benign common, malignant rare), tubal/paratubal cyst
  - Higher rates of torsion in adnexal masses with increased mobility
  - **Ovaries with diameter >6cm** rise from true pelvis → increased risk of torsion
  - **Highest risk in adnexal masses 6-10cm**
- Peds:
  - **Congenitally long uteroovarian ligament**
  - Unusual laxity of pelvic ligaments
- Pregnancy
  - Disproportionally high number of adnexal torsion occur in pregnant pts
  - Risk is highest in the 1<sup>st</sup> trimester and if Hx of ovulation induction

# Causes: Peds

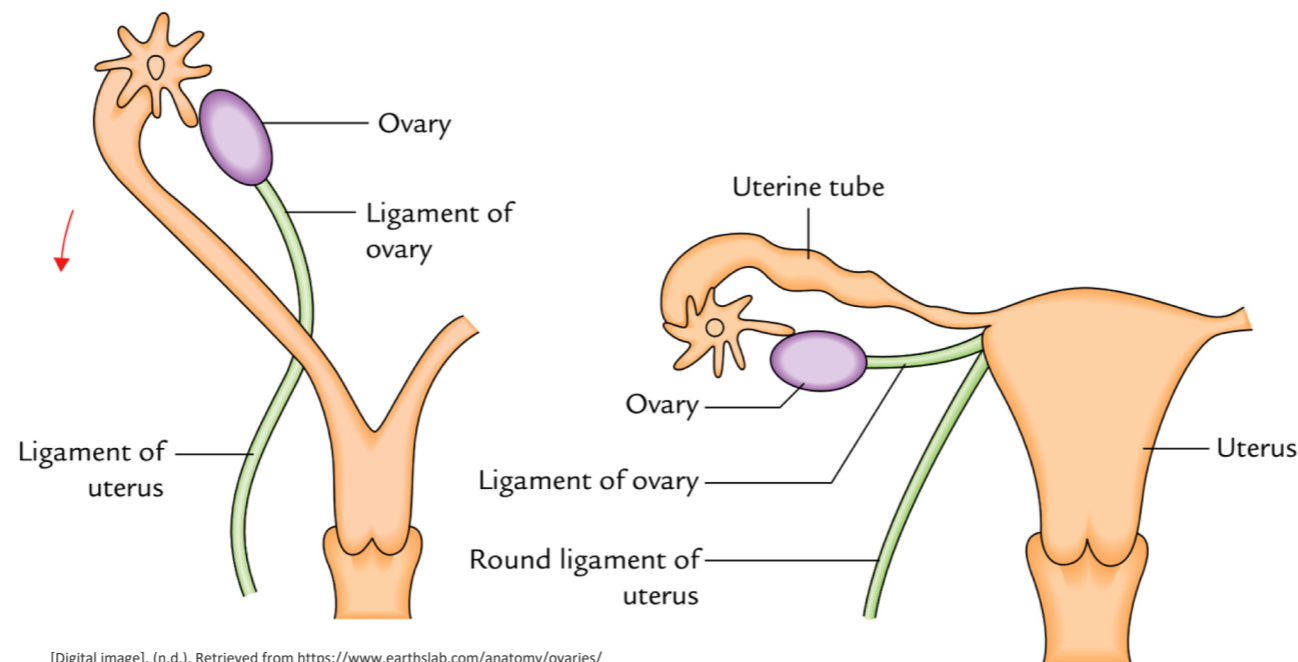
## Causes

### 1. Adnexal mass

- Most common:
  - Benign ovarian cyst (25%)
  - Benign teratoma (30%)
- Ovarian/tubal malignancy is extremely rare: 0-6% of peds cases
- **15-50%** of peds with ovarian torsion normal ovaries

### 2. Congenitally long uteroovarian ligament or unusual laxity of pelvic ligaments

- Increased mobility of mesovaria or fallopian tubes



[Digital image]. (n.d.). Retrieved from <https://www.earthslab.com/anatomy/ovaries/>



# Causes: Adults

---

- **50-80%** of pts with adnexal torsion have unilateral adnexal mass
- **8-18%** of adults with ovarian torsion have no adnexal pathology

## Causes:

### 1. Adnexal mass

- Most common: benign ovarian mass, tubal cyst, para-ovarian cyst
  - 60% are cystic teratomas (dermoid cyst)
  - 30% are cystadenomas
- Malignant are rare: 3% of adult cases, 22% of post-menopausal
  - CA is less likely to tort since it causes more fibrosis → ovary adheres to surrounding structures

# Pregnancy

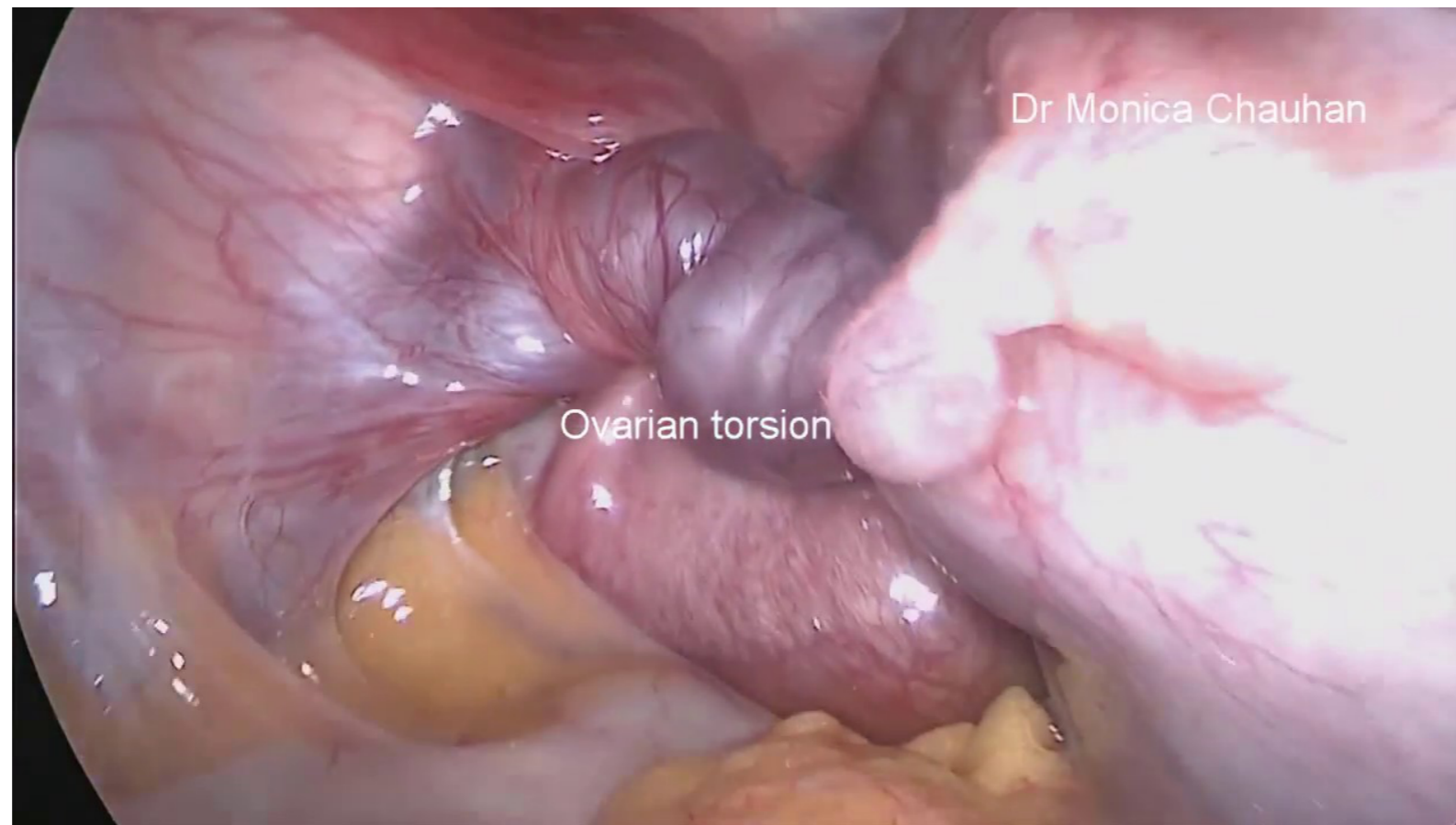
---

- **20-25%** of adnexal torsion occur during pregnancy
  - SOGC: up to 20%
- Risk is highest in 1<sup>st</sup> trimester and if Hx of ovulation induction
  - 1<sup>st</sup> trimester: 55%
  - 2<sup>nd</sup> trimester: 35%
  - 3<sup>rd</sup> trimester: 11%

# Pathophysiology

---

- Adnexal structures twist on their vascular pedicle → venous and lymphatic flow is affected 1<sup>st</sup> → congestion, adnexal edema → then arterial (high pressure) flow is compromised → ischemia → necrosis → loss of ovarian function and fertility



Chauhan, M. (2017). Ovarian torsion in early pregnancy [Digital image]. Retrieved from <https://www.youtube.com/watch?v=L17o3lw5o08>



# Complications

---

- Early diagnosis and management are important due to loss of ovarian function
  - Most common in young women, who are most at risk of detrimental effects of ovarian function and fertility
- Duration of ischemia required to cause irreversible damage is **unknown**

## Patient

- Loss of ovarian function and fertility
  - Presence of flow on Dopplers may help predict viability of adnexal structures
- Recurrence of ovarian torsion → higher risk if normal adnexa
  - Normal adnexa: 63.6%
  - Abnormal adnexa: 8.7%
  - More common after detorsion only
  - Cyst drainage decreases risk by 50%
  - Cystectomy decreases risk by 75%

## Clinical Presentation

---

*Clinical characteristics have low sensitivity and specificity*

*Consider in all women presenting with acute abdo pain!*

- Acute unilateral lower abdo pain (R more common than L)
  - Stabbing (70%) or sharp (60%) pain
  - Intermittent pain if partial torsion with spontaneous reversal
  - May present with intermittent abdo pain for several months before adnexal torsion (common)
- N/V (60-70%)
- Fever (10%)
  - Late finding, due to presence of necrotic tissue
- Palpable adnexal mass (60-90% adults, 20-36% peds)
- Peritoneal signs (rare, 3-27%)

### **DDx:**

- Non-torted adnexal mass
- PID
- Ectopic pregnancy
- Appendicitis
- Diverticulitis
- Urolithiasis

# Diagnosis

---

- Early diagnosis and management are important
- Diagnosis is challenging, important to maintain high index of clinical suspicion
  - Clinical presentation has low sensitivity and specificity
  - No specific blood test to assist in diagnosis
  - Diagnosis should be considered in all women presenting with acute abdo pain



# Investigations

---

- ↑ WBC ( $>12 \times 10^9$ ) (20-56%)
  - Nonspecific, WBC may be normal on initial presentation
  - More likely to be ↑ with appendicitis than adnexal torsion
- ↑ CRP
  - If necrosis is present
  - Nonspecific
  - More likely to be ↑ with appendicitis than adnexal torsion

## Other markers:

*TNF and other inflammatory markers are not useful*

- ↑ IL6
  - Also ↑ in appendicitis
- ↑ CD64 (infection marker)
  - Higher in appendicitis
- ↑ D-dimer (↑ in animal studies, has not been expanded to humans)

# Ultrasound with Dopplers

---

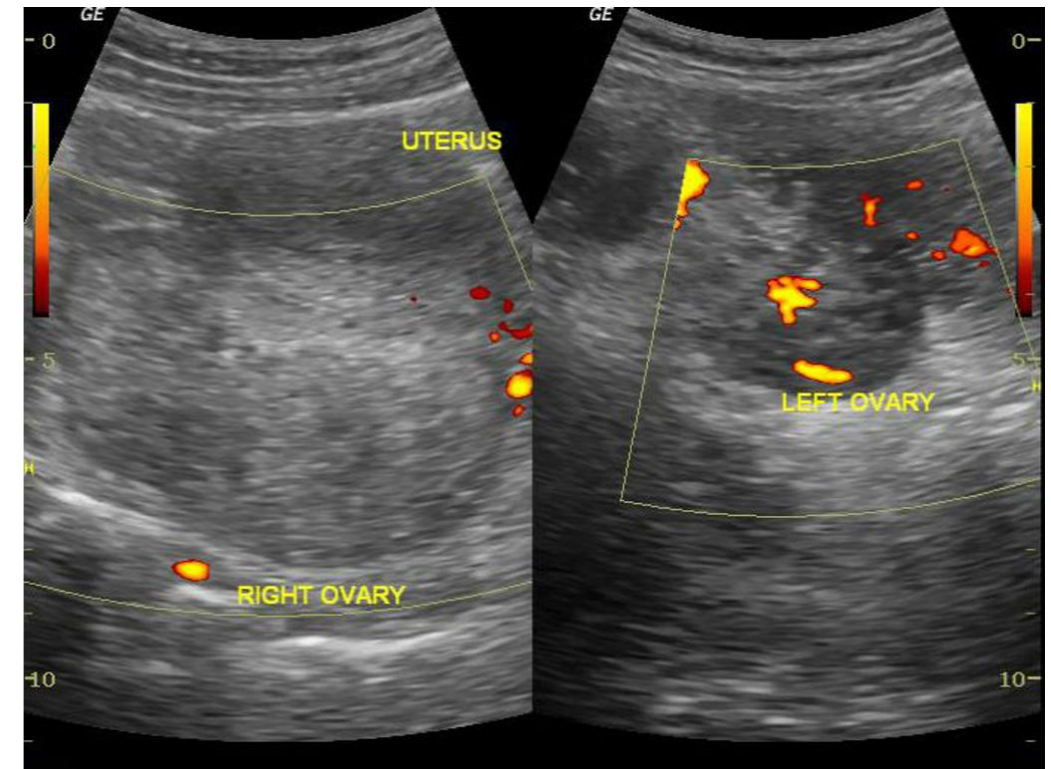
## B-mode ultrasound with Dopplers

- Imaging modality of choice for suspected adnexal torsion
- **Most sensitive and specific**
- TVUS is better than TAUS (but may not be feasible in peds pts)
  - Transabdominal US has higher false + rate → higher rate of negative surgical explorations
    - Transabdominal: PPV= 19%- 34% (high false+), NPV= 96.3-99.5%
    - TVUS: PPV= 94%

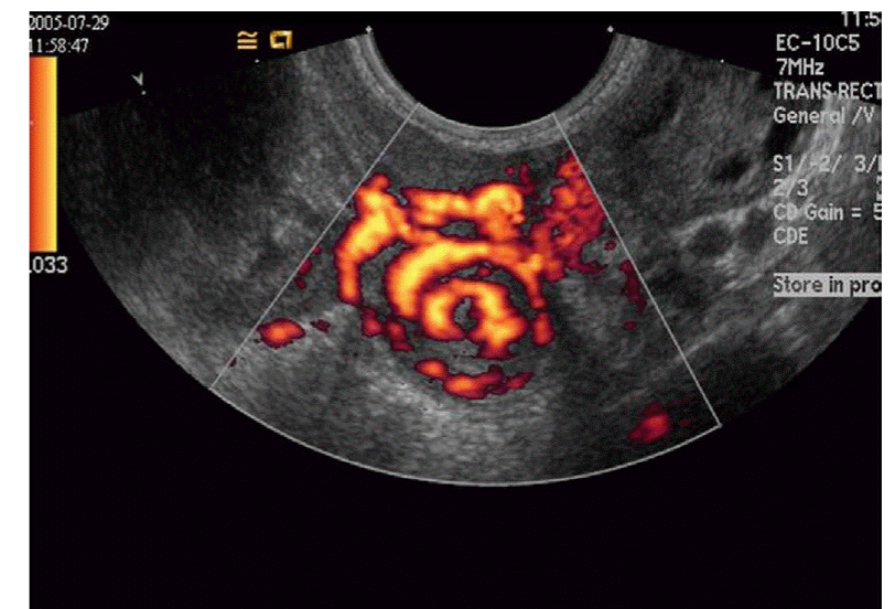
# Ultrasound

## US findings:

- Most common findings:
  - Decreased/absent Doppler flow
  - Ovarian enlargement
- **Decreased/absent Doppler flow**
  - Normal flow may be present if the ovary partially torsed or transiently detorsed or early in torsion (arterial flow is preserved, venous and lymphatic drainage are obstructed)
  - Presence of venous flow correlates with ovarian tissue viability (less likely to have embolism and necrosis)
  - Even with abnormal blood flow, ovarian function may return
- **Ovarian enlargement** (increased total ovarian volume)
  - Significant adnexal asymmetry- abnormal adnexal volume ratios
  - Specific, not sensitive
  - **Adnexal volume ratio >20** (volume of affected ovary/volume of unaffected ovary)
    - High PPV for menarchal females



Patel, M. (n.d.). Ovarian Torsion US [Digital image]. Retrieved from <https://coreem.net/core/ovarian-torsion/>



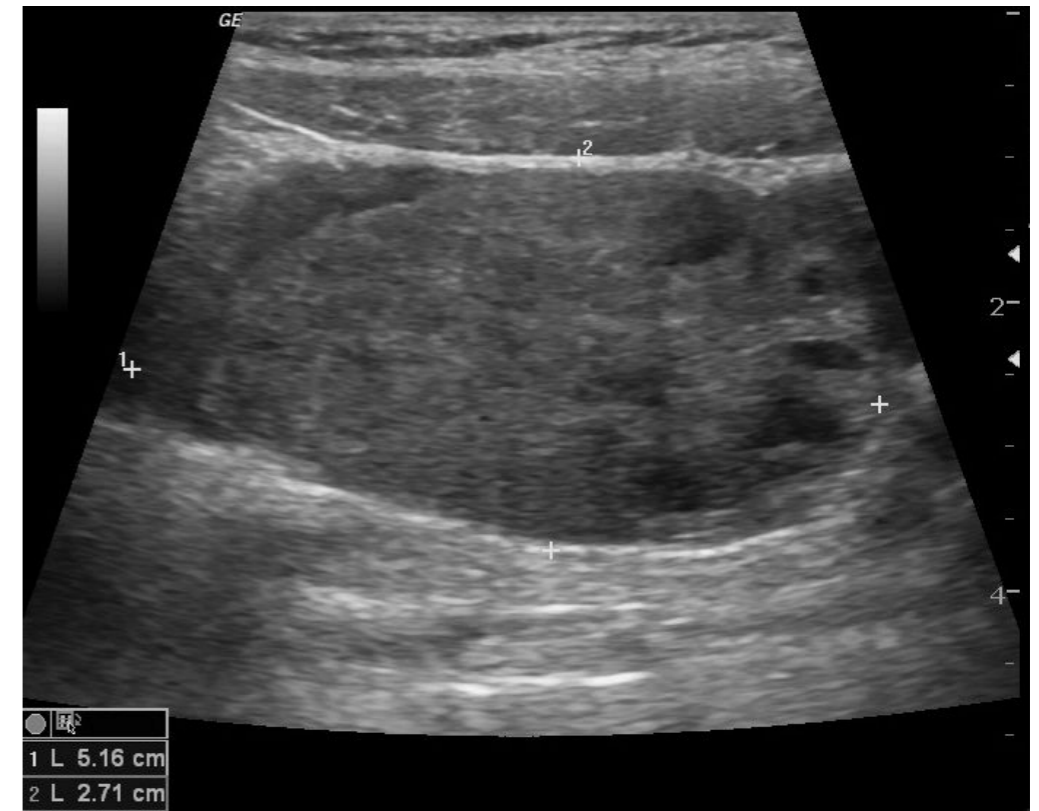
B

Lee, E. (2015). A 16-year-old female with acute onset pelvic pain [Digital image]. Retrieved from <https://www.e-ultrasonography.org/journal/view.php?number=5>

# Ultrasound

## US findings:

- **Solid mass with multiple peripheral cysts 8-12mm in diameter**
  - High specificity, moderate sensitivity
  - Due to congestion of ovary and transudation of fluid into follicles
- **Intraperitoneal free fluid**
  - Due to leakage of interstitial fluid from twisted ovary



[Digital image]. (n.d.). Retrieved from <https://coreem.net/core/ovarian-torsion/>



# CT

- **Used to rule out other causes of abdominal pain**, does not evaluate blood flow to ovary
  - For patients presenting with nonspecific abdominal pain
- Not recommended for workup of adnexal torsion
  - Low sensitivity
- Well visualized normal appearing ovaries can rule out ovarian torsion
- Need more evaluation if unable to visualize ovaries or have abnormal pelvic findings



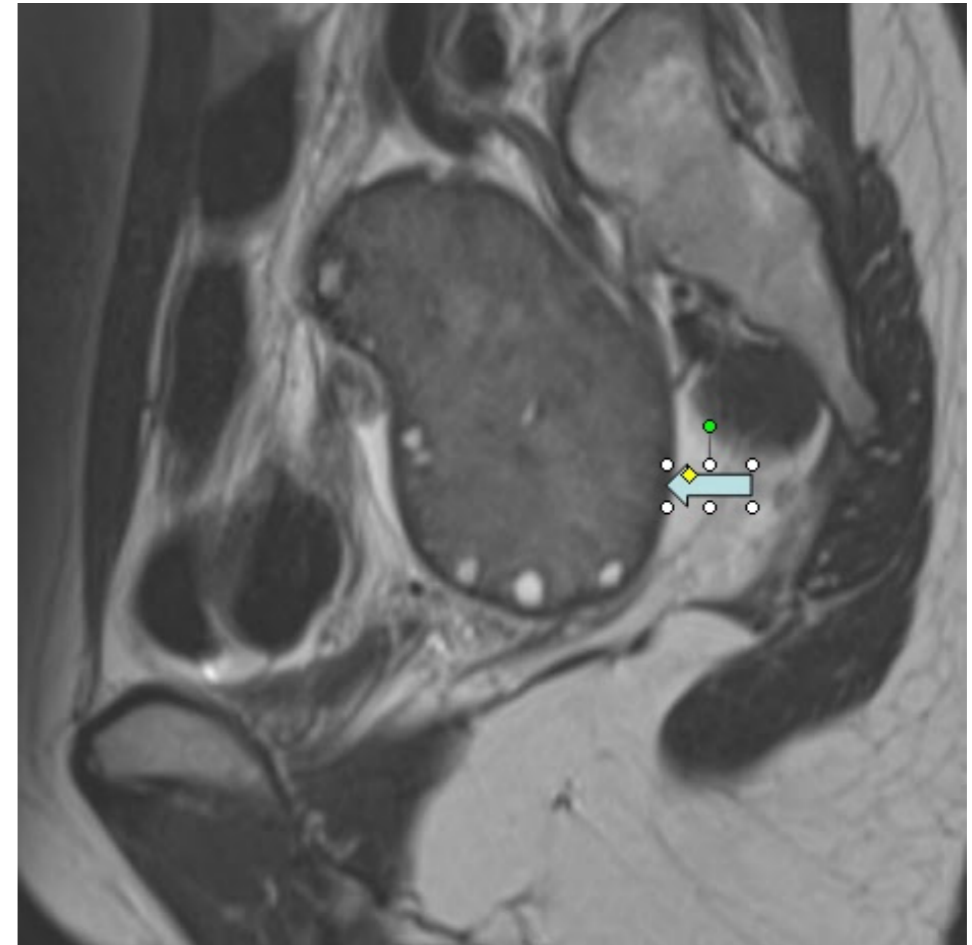
A remarkably bulky non-enhancing left ovary is seen, with some fluid in pelvis [Digital image]. (n.d.). Retrieved from <https://radiopaedia.org/cases/ovarian-torsion>

## CT findings

- Fallopian tube thickening (74%)
- Eccentric or concentric wall thickening (54%)
- Eccentric septal thickening (50%)

# MRI

- **Used to rule out other causes of abdominal pain, does not evaluate blood flow to ovary**
- Not specific



Jagdish. (2012, June 2). [Digital image]. Retrieved from <http://mricases.blogspot.com/2012/06/ovarian-torsion.html>

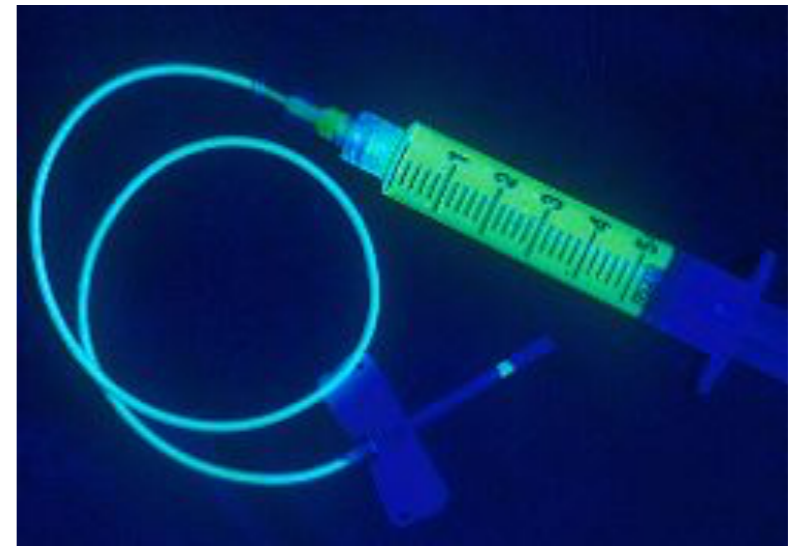
## MRI findings

- Abnormal T1 and T2 imaging
- Hemorrhagic infarction

# Pre-Op Fluorescein IV

---

- Experimental, limited evidence
  - Has not been described in peds population
- Confirms adequate perfusion to ovaries pre-op, may prevent removal of potentially salvageable ovaries
  - Perfused tissue appears fluorescent



[Digital image]. (n.d.). Retrieved from [http://rgony.com/fluorescein\\_and\\_icg\\_angiography/](http://rgony.com/fluorescein_and_icg_angiography/)

# MANAGEMENT

---

# Management

---

- **STAT surgical exploration → OR ASAP**
  - Decision to operate should not be based only on US findings
- **Time to surgery is important**
  - Decreased time to surgery decreases ischemia to ovary
  - Conservation of ovary occurred in 84% of pts within 24hrs of onset of symptoms vs 52% at >72hrs



Surgery penguin [Digital image]. (n.d.). Retrieved from [https://www.wpclipart.com/medical/surgery/surgeon/surgeon\\_penguin.png.html](https://www.wpclipart.com/medical/surgery/surgeon/surgeon_penguin.png.html)



# Surgery

---

- **Laparoscopy is preferred over laparotomy**
  - Less post-op fever, shorter hospitalization
  - Laparotomy may be needed if the surgeon is not skilled at laparoscopy, if large ovarian mass (>10cm), or CA

# Surgery

---

- Consent: Laparoscopy, detorsion, possible cystectomy, possible oophorectomy
  - **Prepubertal: detorsion +/- cystectomy +/- oophoropexy**
    - Oophoropexy- attach ovary to the abdominal wall to prevent recurrence
  - **Premenopausal: conservative surgery → detorsion +/- cystectomy**
    - Detort ovary, place it back into pelvis
    - Delay cystectomy 6-8w to allow resolution of edema
  - **Postmenopausal: oophorectomy/adnexectomy**
    - Oophorectomy due to risk of malignancy
- If delaying cystectomy, need to discuss the risk for additional surgery if ovarian torsion recurs before the initial surgery

# Surgery

---

- **Conservative approach is preferred** over oophorectomy
  - Classical teaching was to remove the ovary due to theoretical risk of PE when the ovary is detorted
    - Gynecologists continue to perform oophorectomy in 30-86% of patients
  - The risk of VTE after detorsion has not been found
    - 2012 literature review → 0.2% incidence of PE in pts with adnexal torsion, which occurred in pts with adnexectomy

# Surgery

---

- Adnexa appears to be enlarged and hemorrhagic
- **Try to leave the ovary in place**
  - **Regardless of timing of surgery**
  - **Even if it appears necrotic (blue-black)**
    - Blue-black due to venous-lymphatic stasis, not due to arterial ischemia
    - Ovary may recover despite appearing necrotic
    - The ovary may not return to normal colour immediately after detorsion → still do conservative management
  - **Even if abnormal blood flow on Doppler US**
  - **Regardless of absence of fluorescence**

# Surgery

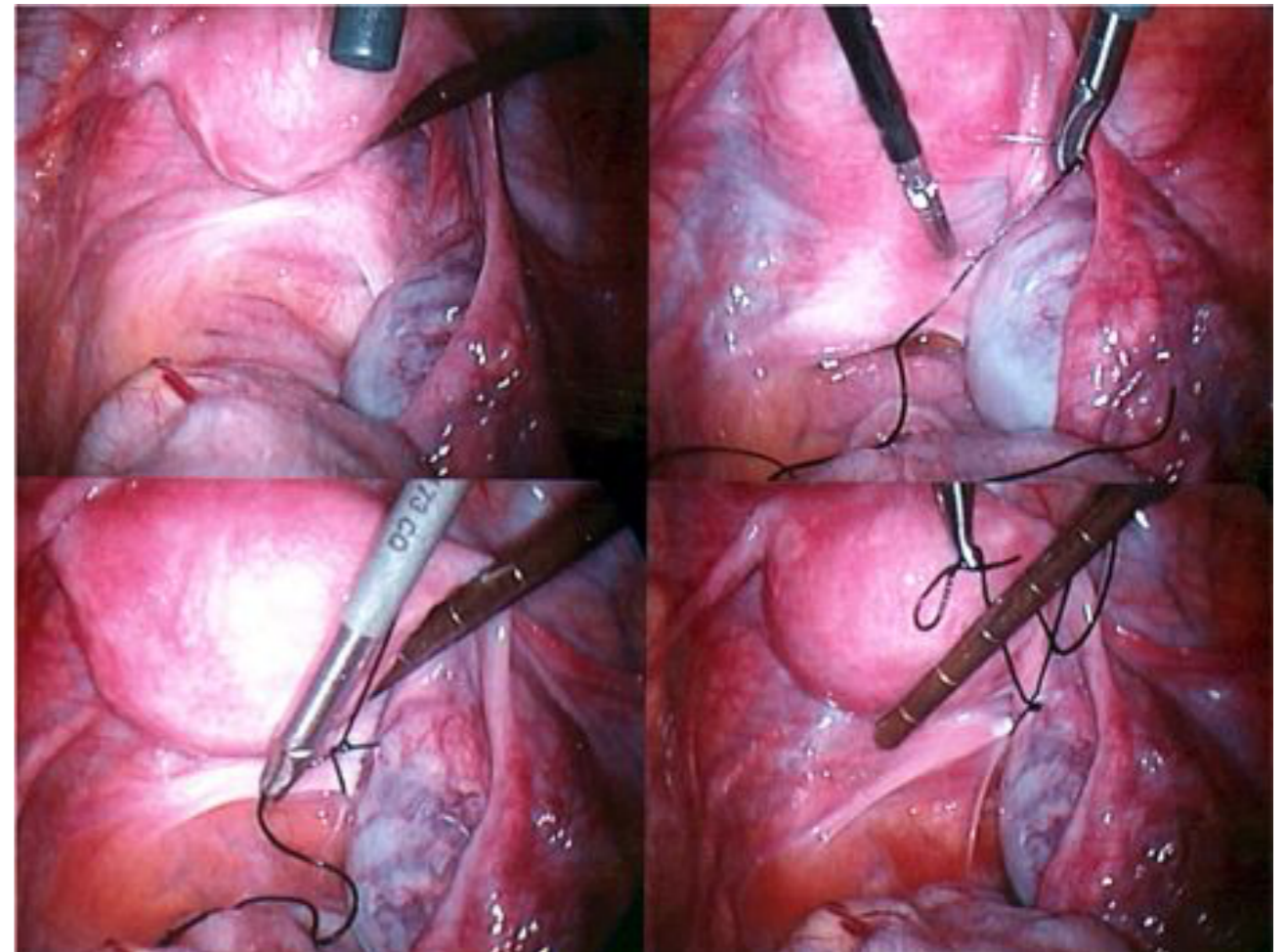
## Laparoscopic oophoropexy

- Fixate the detorted ovary +/- contralateral ovary to the pelvic side wall, back of uterus, or ipsilateral uterosacral ligament
  - Place suture through ovarian cortex
  - Use absorbable or nonabsorbable suture
- Low morbidity
- Long-term effects on fertility are unknown
- Not enough evidence about possible anatomic disturbance between ovary and fallopian tube

**Alternative:** shorten utero-ovarian ligament with endoloop

### Possible indications:

- Congenitally long ovarian ligament
- Recurrent ovarian torsion
- No obvious cause for ovarian torsion



Emans, S., Laufer, M., & Goldstein, D. (2011). Routine oophoropexy to prevent future ovarian torsion events is controversial but may have a role in the setting of previous salpingoophorectomy or anatomic factors, such as an elongated mesosalpinx. [Digital image]. Retrieved from <https://somepomed.org/articulos/contents/mobipreview.htm?38/22/39274>



# Surgery

- Ovarian function can return after detorsion
  - Even if ovary appears blue-black
  - Even if flow is abnormal on Doppler US
  - Even if there is no arterial or venous blood flow on US on POD1 → ovarian function may be normal long-term

**Table 2. Ovarian function following detorsion**

Author	n	Adnexal detorsion (%)	Loss to follow-up	Future follicular development (%)
Oelsner <sup>45</sup>	40	40 (100)	3	35 (88)
Shalev <sup>50</sup>	58	58 (100)	4	52 (90)
Cohen <sup>44</sup>	58	58 (100)	0	54 (93)
Pansky <sup>2</sup>	8	8 (100)	0	7 (88)
Aziz <sup>8</sup>	36	17 (47)	0	14 (82)
Galinier <sup>51</sup>	45	26 (58)	2	17 (21)
Celik <sup>47</sup>	14	14 (100)	0	13 (93)
Wang <sup>57</sup>	66	39 (59)	4	33 (95)
North <sup>49</sup>	6	6 (100)	0	4 (67)
Gocmen <sup>46</sup>	18	17 (94)	5	11 (65)
Beaunoyer <sup>48</sup>	80	10 (8)	0	10 (100)

Kives, S., Gascon, S., Dubuc, E., & Van Eyk, N. (2017). No.341-Diagnosis and Management of Adnexal Torsion in Children, Adolescents, and Adults. *J Obstetrics Gynaecol*, 39(2), 82-90.

# Surgery

---

- **Consider delaying ovarian cystectomy for 6-8 weeks to allow for resolution of edema**
  - The ovary may appear very edematous during laparoscopy → may be difficult to visualize a discrete cyst
  - Manipulating edematous, friable, and possibly compromised ovary can cause further damage
  - May need additional surgery if ovarian torsion recurs

# Surgery

---

- Ovarian bivalving at the time of detorsion
  - Limited evidence
  - Performed at the anti-mesenteric border during conservative management to release edema and pressure on the ovarian capsule

# Surgery

---

- Recombinant erythropoietin (EPO) IV
  - Experimental, limited evidence
  - Given intra-op and 72hrs post-op to decrease markers of oxidative damage

# Post-Op Management

---

## **Conservative surgery:**

- Often uneventful
- Fever
  - 14.9% laparoscopy, 28.6% laparotomy
  - Antipyretics, resolves on its own



# References

---

Hoffman, B., Schorge J., Bradshaw K., Halvorson L., Schaffer J., Corton M. (2016). *William's gynecology*. 3<sup>rd</sup> ed. New York. McGraw-Hill Education.

Kives, S., Gascon, S., Dubuc, E., & Van Eyk, N. (2017). No.341-Diagnosis and Management of Adnexal Torsion in Children, Adolescents, and Adults. *J Obstetrics Gynaecol*, 39(2), 82-90.