Background & Significance

- Acute pelvic pain, in the presence or absence of other symptoms, is a common cause of ED visits
- Differential diagnosis is broad
- Inclusive of gynecologic, gastrointestinal, urologic, musculoskeletal, vascular and/or other disorders
- Essential for ED practitioners to be fully comfortable in the basic diagnostic evaluation and management
  - Identify patients requiring urgent surgical or medical intervention
  - Promote efficient use of imaging and other diagnostic studies as well as consultant services
  - Provide the most optimal therapy as well as plan appropriate follow-up

Educational Objectives

- Reinforce important concepts in the evaluation and care of women presenting to the ED with acute pelvic pain
- Review pathophysiology, diagnosis, and contemporary management of five important gynecologic causes of acute pelvic pain
  - Ectopic pregnancy
  - Adnexal torsion
  - Hemorrhagic ovarian cyst
  - Pelvic inflammatory disease
  - Tuboovarian abscess

History & Patient Encounter

- Triage of unstable patients requiring emergent management
- Thorough history will help focus the differential diagnosis and guide further evaluation of stable patients
- History of pain
  - Location
  - Onset & duration
  - Character
  - Inciting and alleviating factors
  - Prior history
- Gynecologic and complete sexual history should be elicited in a sensitive manner and appropriate setting
- Open communication with patients and families is essential; patient concerns should be respected
- Careful and detailed articulation of menstrual history
Pathophysiology of Pelvic Pain

• Visceral pain
  – Receptors located in serosa, mesentery, or within walls of pelvic viscera
  – Capsular distention, ischemia, inflammation, spasm
  – Imprecise localization of pain due to low density of nociceptive nerve endings

• Somatic pain
  – Parietal peritoneum and abdominal-pelvic muscles
  – Constant and achy in character
  – Exacerbation with movements that place tension on peritoneum

• Referred pain
  – Overlap of neural pathways in spinal segments or within structures causing viscerosomatic convergence

• Neurogenic pain

Physical Examination

• Global impression of the patient
• Pelvic examination is requisite
• Careful attention in set-up and examination to optimize patient comfort and privacy
• Speculum examination
  – Discharge, evidence of infection
  – Presence of incomplete or completed miscarriage
  – Prolapsing or necrotic mass
• Bimanual examination
  – Tenderness of cervix, uterine fundus, and/or adnexa
  – Patency of cervical os, uterine enlargement or pathology
  – Adnexal fullness or masses
  – Consider pelvic assessment through rectal examination in virginal patients where clinically indicated
Diagnostic Evaluation

- All reproductive-age women should receive a screening pregnancy test independent of reported sexual history
  - Threshold detections levels of most urine assays at 25 - 35 mIU/ml
  - Quantitative serum hCG assay if pregnancy not established
  - Positive hCG does not exclude diagnosis of other gynecologic or non-gynecologic etiologies

- Basic laboratory testing
  - Complete blood count with differential
  - Urine analysis
  - Nucleic acid PCR testing for N. gonorrhoeae and C. trachomatis
  - Remainder of testing guided by differential diagnosis

- Imaging modalities
  - Pelvic sonography (transvaginal, transabdominal)
  - Abdominal-pelvic CT or MRI
  - Imaging of other structures as clinically indicated

Five Important Gynecologic Causes of Acute Pelvic Pain

- Ectopic pregnancy
- Adnexal torsion
- Hemorrhagic ovarian cyst
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- Tuboovarian abscess

Ectopic Pregnancy (EP)

- Implantation of the fertilized oocyte outside of the endometrial cavity
- 98% of ectopic gestations are tubal (78% ampullary)
- Other sites much less common but often associated with greater morbidity
- 1.5 – 2.0% of spontaneous pregnancies
- Remains leading cause of maternal death in 1st trimester (6-9% of all maternal deaths)
Ectopic Pregnancy

Epidemiology

- Risk factors [Tulandi et al. UpToDate 2009]
  - Prior ectopic gestation (OR 9.3 – 47)
  - Previous tubal surgery (OR 6.0 – 11.5)
  - Tubal ligation (OR 3.0 – 139)
  - Pelvic inflammatory disease (OR 2.1 – 3.0)
  - Infertility and ART (OR 1.1 – 28)
  - Smoking (OR 2.3 – 3.9)
- 50% of patients with ectopic gestations have no identifiable risk factors [Barnhart et al. Fertil Steril 2006]

Impact of Assisted Reproductive Technologies

- In vitro fertilization accounts for 1 - 3% live-births in United States
- ED practitioner should be aware of special challenges in the evaluation and management of EP in setting of assisted reproductive technologies
- Infertility and use of assisted reproductive technologies are each independent risk factors for EP
- Traditional diagnostic algorithms for EP based on premise of a single conceptus
- Heterotopic gestations
  1 / 10 - 30,000 spontaneous pregnancies
  1 / 100 of IVF pregnancies
- Symptomatic adnexal enlargement and free fluid in pelvis common following controlled ovarian hyperstimulation
- IVF pregnancies are consistently highly desired pregnancies
- Advantage of precise dating of pregnancy

Ectopic Pregnancy

Clinical Presentation

- Classic triad: abdominal pain, vaginal bleeding in setting of amenorrhea
- Variable presentation: [McWilliams et al. Surg Clin N Am 2008]
  - Abdominal pain (56-100%)
  - Amenorrhea (62-84%)
  - Vaginal bleeding (55-84%)
  - Dizziness or fainting (17-31%)
  - Passage of tissue (5-10%)
- Differential includes threatened or spontaneous miscarriage (15-20% of clinically-evident pregnancies) and normal, viable intrauterine pregnancy [Bamhart N Engl J Med 2009]

Diagnostic Evaluation

- Serum hCG, CBC, Rh typing
- Transvaginal pelvic ultrasound
- Discriminatory zone (~1500 – 3000 mIU/mL) dependent on institution
Sonographic Findings in Early Pregnancy: What is Normal?

- **4.0 – 5.0 wks from LMP** → possible small, eccentric gestational sac (difficult to see)
- **5.0 wks from LMP** → two echogenic rings surrounded by intrauterine fluid collection
- **5.5 wks from LMP** → yolk sac visualized within the gestational sac [definitive confirmation of intrauterine pregnancy]
- **6.0 wks from LMP** → embryonic pole should be visualized
- **6.5 wks from LMP** → presence of fetal cardiac activity

Ultrasound Findings of Early Pregnancy: What is Abnormal?

- **Anembryonic gestation** → gestational sac with mean diameter of > 2 cm without fetal pole.
- **Embryonic demise** → Crown-rump length of 0.5 cm without fetal cardiac activity

Ectopic Pregnancy

- Minimize performing interventions (e.g., methotrexate or diagnostic uterine evacuation) in the ED based on a single hCG value or ultrasound report
- Most stable patients will be candidates for outpatient management and surveillance with serial hCG assessments

Five Important Gynecologic Causes of Acute Pelvic Pain

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Adnexal Torsion

- Twisting of the ovary and/or fallopian tube on its ligamentous supports
- Ovarian congestion and enlargement from relative outflow obstruction
- Ischemia, necrosis, local hemorrhage, peritonitis

Image adapted from Netter 1965

Adnexal Torsion

- Occurs among all age groups, however, 80% of cases diagnosed in women less than age 50
- 94% of cases occur in presence of adnexal pathology (classically dermoid cysts) [Vargas et al. Clin Exp Obstet Gynecol 2004]
- Malignancy
- 50% of pediatric torsions occur in absence of adnexal pathology [Anders Arch Pediatr Adolesc Med 2005]
- Increased risk of torsion in early pregnancy (6-14 wks) [Webb et al. Radiol Clin N Am 2004]

Adnexal Torsion

Clinical Presentation

- Acute onset of severe abdominal pain accompanied by waves of nausea, emesis
- Variable presentation dependent on time course of clinical presentation
- Pelvic ultrasound is best diagnostic modality
- Enlarged heterogeneous ovary and free fluid are the most common sonographic findings [Servaes et al. Pediatr Radiol 2007]
- Abdominal-pelvis CT [Hiller et al. Am J Roentgenol 2007]
  - Enlarged adnexa (100%)
  - Pelvic ascites (40%)
  - Spiral appearance of vascular pedicle (6%)
- Ovarian torsion remains a clinical diagnosis

Adnexal Torsion

Clinical Management

- Prompt evaluation and gynecologic consultation if suspicion for torsion
- TIME = OVARY
- Contemporary literature favors ovarian salvage with laparoscopic reduction and cystectomy in event of adnexal pathology
- Animal studies support preservation of ovarian histologic structure and function up to 24 hours [Taskin et al. Hum Reprod 1998]
- Majority of ovaries retain functionality even if appear intraoperatively dark and ischemic [Oelsner et al. Hum Reprod 2003]
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Hemorrhagic Ovarian Cyst

- Common gynecologic cause of ED presentation for acute pelvic pain
- Two clinical entities:
  - Rupture of the cyst with resultant irritation of peritoneum from blood
  - Visceral discomfort from acute stretching of ovarian cortex from contained intra-luminal hemorrhage
- Corpus luteum has highest blood flow per unit area of any structure in the body [Speroff & Fritz Clin Gynecol Endo Infertil 2005]
- Neovascularization of corpus luteum (peak day 8 or 9 post-ovulation)
- Peritonitis from other adnexal pathology (ruptured endometrioma, mature teratoma, malignancies)

Hemorrhagic Ovarian Cyst

- Acute onset of unilateral abdominal pain, often severe, often accompanied by nausea and emesis
- Classically mimics ovarian torsion
- Profound vasovagal response may suggest hypovolemic instability and concern for ruptured ectopic pregnancy
- Residual functional corpus luteum at end of menstrual cycle may mimic an unruptured ectopic pregnancy
- Halban’s syndrome = delay in onset of menses, vaginal spotting, unilateral pelvic pain, small and tender adnexal mass

Hemorrhagic Ovarian Cyst

- Pelvic ultrasound
  - Periadnexal free fluid and/or in pelvis
  - Decompression of cyst may result in normal appearance of ovary
- Supportive care and analgesic control
  - Serial assessment of hematocrit levels and hemodynamic status
- Gynecologic consultation
  - Concern for adnexal torsion or other pathology
  - Hemodynamic instability or continued decline in hematocrit
  - Severe hemorrhage is rare and often occurs in setting of congenital and acquired bleeding diatheses
  - Surgical evacuation and management
- Outpatient follow-up for repeat ultrasound and consideration of initiation of monophasic OCP
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Pelvic Inflammatory Disease (PID)

- Ascending infection of the upper genital tract
- Decline of number of cases and hospitalizations over the past decade (US Dept Health & Human Services 2007)
- 168,837 cases in 2003 (National Ambulatory Medical Care Survey)
- Challenging diagnosis due to the wide variability of presentation and severity of symptoms
- Acute or sub-clinical
- Significant morbidity as well as long term sequelae
- infertility occurs 15% after initial episode of PID; 75% following 3 or more episodes

Pelvic Inflammatory Disease Clinical Presentation

- Lower abdominal pain, fever (50%), abnormal uterine bleeding (33%), vaginal discharge
- PPV of examination findings 65-90% in comparison to laparoscopy; dependent on risk-profile of population
- No single or combination of laboratory tests is both sensitive and specific for diagnosis of PID [Kahn et al. JAMA 1991]
- CDC 2006:
  - “Health care providers should maintain a low threshold for the diagnosis of PID”
  - “Empiric treatment should be initiated in young women at risk for STDs if no other cause for PID can be identified”

CDC Diagnostic Criteria for PID

- One or more of the following criteria are present:
  - Cervical motion tenderness OR uterine tenderness OR adnexal tenderness
- Following criteria enhanced specificity of the minimum criteria:
  - Oral temperature > 101°F (38.3°C)
  - Abnormal cervical or vaginal micropurulent discharge
  - Presence of abundant WBC on saline microscopy of vaginal secretions
  - Elevated ESR and/or CRP
  - Laboratory documentation of cervical infection with N. gonorrhoeae or C. trachomatis
CDC Treatment Guidelines - Oral Regimens (2007)

**Recommended Oral Regimen**

- **Ceftriaxone 250 mg IM in a single dose**
  - PEX
- **Tetracycline 500 mg every 12 hours for 14 days**
  - WITH OR WITHOUT
  - Microbiologic monitoring every 3-4 days

**CDC Criteria for Inpatient Management of PID**

- Surgical emergencies (e.g. appendicitis) cannot be excluded
- Pregnancy
- Failure of response to oral antimicrobial therapy
- Inability to tolerate oral regimen or non-compliance to outpatient therapy
- Severe illness, nausea, emesis, high fever
- Tuboovarian abscess

**Five Important Gynecologic Causes of Acute Pelvic Pain**

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Tuboovarian Abscess (TOA)

- Serious sequela of PID
- Reported to occur as frequently as 34% of patients diagnosed with PID [Landers et al. Am J Obstet Gynecol 1985]
- Identified in up to 80% of treatment failures
- Mean age 20 - 40s, however, all age groups may be affected including children & adolescents
- Historically, rupture of TOA was associated with 30-80% mortality [Pedowitz & Bloomfield Am J Obstet Gynecol 1964]
- 3.7% mortality in modern series with use of broad-spectrum antibiotics and surgical therapy

Tuboovarian Abscess Classification & Pathogenesis

- Primary TOA
  - PID > 95% of cases
  - Pelvic surgeries or procedures
- Secondary TOA
  - Intraperitoneal spread from primary source (e.g., diverticulitis, appendicitis)
  - Malignancy
- Polymicrobial anaerobic infection following initial ascending infection and tubal endothelial damage

Tuboovarian Abscess Imaging

- Tubovarian complex (TOC) – inflammatory pelvic mass that is edematous and adherent with sinus tracts containing purulent material but no organized collection
- TOC is considered more responsive to medical therapy [Rosen Obstet Gynecol 1983]
- Abdominal-pelvis CT findings
  - Low attenuation septated tubular masses with a thick enhancing wall [Ellis et al. J Comput Assist Tomogr 1991]
- MRI is emerging modality and may have sensitivity and specificity comparable to sonography [Tukeva et al. Radiology 1999]

Tuboovarian Abscess

- Clinical presentation: [Rosen et al. Obstet Gynecol Survey 2009]
  - Abdominal / pelvic pain ( >90 %)
  - Fever (60-80%)
  - Leukocytosis (66-80%)
  - Presence of an adnexal mass an unreliable finding (variable, some studies report ~ 20%)
- All patients evaluated for PID should undergo a pelvic ultrasound
Tuboovarian Abscess Management

- Medical therapy is generally first line with 68-75% expected response
- Limited consensus or established guidelines on treatment regimen or duration; few randomized controlled trials
- Anaerobic coverage essential
- >8 cm and bilateral abscesses risk factors for failure of medical therapy
- IR-guided drainage, laparoscopic drainage

Acknowledgements

- Registrants, Fellow Presenters, & Guests
- Dr. Barbara Kilian
- Dr. Christopher Fee
- Department of Emergency Medicine
  University of California, San Francisco

Questions