Ovarian Hyperstimulation Syndrome

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November 2008
Agenda

- Ovarian hyperstimulation syndrome (OHSS)
  - Pathophysiology
  - Presentation
  - Risk factors
  - Severity grading
- Menu of tests
- Anatomy
- Case examples
- Treatment modalities
Our patient: Ms. IH

- CC: Intense RLQ pain and DOE x 2 days
- HPI: 35 year old undergoing infertility Rx
- hCG trigger, 43 oocytes retrieved week prior, no embryos implanted
- Labs:
  - hCG negative
  - Estradiol 9000 pg/mL
  - Hct 41 (hemoconcentrated)
  - ALT 30, AST 44 (slight elevation)
RLQ pain: Differential Diagnosis

- Gynecologic:
  - Ovarian torsion
  - Ruptured ovarian cyst
  - TOA
  - PID
  - Ectopic pregnancy

- Non-Gynecologic:
  - Appendicitis
  - Renal calculus
  - Hernia
  - Ileitis
Ovarian Hyperstimulation Syndrome (OHSS)

- Occurs after induction of ovulation with exogenous gonadotropins
- Ovarian enlargement, multifollicular development
- VEGF-induced perifollicular neovascularization, increased capillary permeability, massive fluid shifts
OHSS: Presentation

- 3rd spacing
  - Ascites
  - Hydrothorax
  - ARDS

- Intravascular hypovolemia
  - End-organ failure 2/2 hypoperfusion

- Hemoconcentration
  - Thromboembolic events
  - DIC
OHSS: Risk factors

- Young age
- High estradiol
- >8 follicles
Grades of OHSS

Grade I: Mild
Grade II: Moderate
Grade III: Severe
OHSS: Severity grading

- Grade I
  - Ovaries <5cm by US

- Grade II
  - Ovaries 5-10cm by US
  - Abdominal discomfort, GI symptoms
  - Sudden increase in weight > 3 kg

- Grade III
  - Ascites
  - Effusions
  - Hemoconcentration
  - Thromboembolic events
Menu of Tests

- Ultrasound
- MRI
- CT
Menu of Tests

- Ultrasound
  - No radiation, low-cost
  - Operator dependent
- MRI
  - No radiation
  - Expensive, time-consuming
- CT
  - Rapid
  - Expensive, radiation exposure
Menu of Tests: Ultrasound

- Ultrasound
  - Trans-abdominal
  - Trans-vaginal

- MRI
- CT
Imaging Modality of Choice

- Trans-abdominal US
- Trans-vaginal US

Images from: http://www.sonoguide.com/obgyn.html
Imaging Modality of Choice: Ultrasound

- **Ultrasound:**
  - Trans-abdominal
    - Greater penetration
    - Lower frequency, lower resolution
    - Larger field of view
    - Requires full bladder
  - Trans-vaginal
    - Lower penetration
    - Higher frequency, higher resolution
    - Smaller field of view
    - Post-void bladder
Companion Patient #1: Normal right ovary on trans-vaginal US

Image from: PACS, BIDMC
Companion Patient #1:
Normal ovary on trans-vaginal US

Image from: PACS, BIDMC

Sagittal view of right ovary

2.63 cm
2.05 cm
2.05 cm
2.63 cm

Sagittal view of right ovary
Ms. IH: Enlarged ovary on trans-abdominal US

Transverse view of enlarged right ovary

Image from: PACS, BIDMC
Ms. IH: Enlarged right ovary on trans-abdominal US

Sagittal view of enlarged right ovary

Enlarged follicle

10.44 cm

8.55 cm

Image from: PACS, BIDMC
Ms. IH: Enlarged left ovary on trans-abdominal US

Sagittal view of enlarged left ovary

Enlarged anechoic follicle

Image from: PACS, BIDMC
Ms. IH: Free fluid on trans-abdominal US

Transverse view of anechoic free fluid
Ms. IH: Normal color Doppler US

Multiple foci with blood flow

Normal pulsatile arterial flow tracing

Image from: PACS, BIDMC
Ms. I H: Ultrasound findings

- Bilateral enlarged ovaries
- Multiple enlarged follicles
- Free intra-abdominal fluid
- No evidence of torsion
  - Scattered blood flow signals throughout ovary
  - Pulsatile flow tracing between Doppler gates

- Consistent with grade III/severe OHSS
OHSS: Complications

- Ovarian torsion
- Ovarian necrosis
- Thromboembolic events
- End-organ failure

Image from: http://radiology.uchc.edu/eAtlas/GYN/383b.htm
Companion Patient #2: Known OHSS on trans-vaginal US

Sagittal view of left ovary

Enlarged follicular cyst

Image from: PACS, BIDMC
Companion Patient #2: Ovarian torsion on color Doppler US

Central areas without flow

Irregular venous flow
Companion Patient #2: Ovarian torsion with normal comparison

Images from: PACS, BIDMC

Doppler US of ovary: normal venous flow

Irregular venous flow
OHSS: Treatment

- Grade I
  - Supportive

- Grade II
  - Bed rest, volume repletion

- Grade III
  - Volume repletion
  - Heparin
  - Paracentesis
OHSS: Treatment

- **Grade I**
  - Supportive

- **Grade II**
  - Bed rest, volume repletion

- **Grade III**
  - Volume repletion
  - Heparin
  - *Paracentesis*
Paracentesis

- Indications:
  - Diagnostic
  - Therapeutic
    - Large-Volume Paracentesis

- Approaches:
  - Trans-abdominal
  - Trans-vaginal
    - Outpatient

Image from: http://clinicalcases.blogspot.com/
Paracentesis: Procedure

- Sterile procedure
- Ultrasound guided
- Avoid overlapping cutaneous & peritoneal entry sites
  - Prevent ascitic leak

Paracentesis: Benefits

- Relieves symptoms
  - Even if < 1000cc removed
- Shortens hospital stay
- Hemodynamic improvement
  - Urinary output
  - Renal function
  - Cardiac output
Paracentesis: US guided

Anechoic free fluid

Aspiration needle

Image from: Archives of Gastroenterology (2002); 21(1): 45-47
Paracentesis: Contraindications

- **Absolute:**
  - DIC

- **Relative:**
  - Pregnancy
  - Organomegaly
  - Small Bowel Obstruction
Paracentesis: Complications

- Bleeding
- Localized infection
- Abdominal wall hematoma
- Intra-abdominal organ injury
- Post-paracentesis circulatory dysfunction
Ms. IH: Hospital Course

- Grade III/severe treatment
  - Fluid repletion, heparin, pneumoboots

- Therapeutic paracentesis recommended
  - Not enough ascitic fluid to tap

- Discharged home on hospital day 2
Ms. IH: Follow-up

- Returned to hospital in 1 week with acute RLQ pain
- US evidence of right ovarian torsion
- Emergent surgery
  - Right ovarian torsion, necrotic ovary
- Discharged on post-operative day 3
Ms. I H: Ovarian torsion on color Doppler US

- Sagittal view of R ovary
- Minimal venous flow, irregular arterial flow
- No central blood flow

Image from: PACS, BIDMC
Ms. IH: Ovarian torsion with normal comparison

Doppler US of ovary: normal venous flow

Minimal venous flow, irregular arterial flow

Images from: PACS, BIDMC
OHSS: Summary

- Increasing in frequency with popularity of IVF
- Diagnosis made with US findings and clinical picture
- High-risk group for ovarian torsion
- Ultrasound guided paracentesis highly effective treatment
References


Acknowledgements:

- Colin McArdle, MD
- Sachin Pandey, MD
- Dan Anghelescu, MD
- Gillian Lieberman, MD
- Maria Levantakis