Lung symptoms, Pregnancy and the ICU

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Overview

Pregnant patients differ from non-pregnant patients with regard to:

- Physiology
- Conditions requiring ICU care
- Symptoms
- Physical examination
- Presence of a fetus
- Lack of evidence to guide Rx
Overview

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Overview

Case presentation

Symptoms:
- Effects of altered physiology
- Respiratory symptoms
- Other alterations in symptoms
- Symptoms of pregnancy-specific disease
- Analgesia and sedation in pregnancy
Septic shock in pregnancy

- 28 yr old woman, 27 weeks pregnant
- Subtotal colectomy for ulcerative colitis
- Now presents with:
  - Dyspnea, RR 24, HR 108
  - Warm peripheries
  - Delirium
  - Thrombocytopenia
  - Soft abdomen
- Fetus stable
Anatomic effects

Functional effects
Anatomic effects

- airway edema,
- friability

- widened AP and transverse diam.

- elevated diaphragm

- widened subcostal angle

- enlarging uterus

Functional effects
Airway edema, friability

Widened AP and transverse diam.

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Widened subcostal angle

Enlarging uterus

Anatomic effects

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- Airway edema,
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Functional effects

- Increased respiratory drive
- Minimal change in TLC
- Increased VT
- Reduced FRC
- Normal diaphragmatic function
- Increased $O_2$ consumption and $CO_2$ production
Anatomic effects

- airway edema
- friability
- widened AP and transverse diam.
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Functional effects

- increased respiratory drive
- minimal change in TLC
- increased Vt
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- normal diaphragmatic function
- increased $O_2$ consumption and $CO_2$ production
Dyspnea in Pregnancy
Dyspnea in Pregnancy

- Common complaint:
  - 15% by 12 weeks
  - 50% by 19 weeks
  - 75% by 31 weeks
Dyspnea in Pregnancy

Mechanism:

- Mechanical/muscular factors play no role
- Chronic respiratory alkalosis causes increased respiratory centre output for any given level of CO₂ - not related to chemoreceptor sensitivity
- Not fully explained by awareness of increased ventilation

Jensen D, O'Donnell DE, et al:
Respir Physiol Neurobiol. 2010 Sep 17.
Respir Physiol Neurobiol. 2010 Apr 30;171(2):75-82
J Physiol. 2008 Oct 1;586(Pt 19):4735-50
Dyspnea in Pregnancy

- Isolated symptom
- Normal history & physical
- Does not interfere with daily activities

Differential: cardiorespiratory diseases
Cardiovascular Changes

- increased blood volume (up 40% by third trimester)
- increased cardiac output
  - 30 – 50% by 25 – 32 weeks
- decrease in blood pressure
  - 10 – 20%, nadir 28 weeks
- decreased SVR
- increased LV mass and LV ED dimension
### PA-line measurements in late pregnancy

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean Value</th>
<th>Change from Non-Pregnant</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAP</td>
<td>90±6</td>
<td>minimal change</td>
</tr>
<tr>
<td>PCWP</td>
<td>4±2.5</td>
<td>no change</td>
</tr>
<tr>
<td>SVR</td>
<td>1200±260</td>
<td>20 - 30% decrease</td>
</tr>
<tr>
<td>PVR</td>
<td>75 ±22</td>
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*Clark et al, Am J Obstet Gynecol 1989*
% change from baseline
% change from baseline

- Functional residual capacity
- Minute ventilation
- Cardiac output
- Blood volume

Weeks  8  16  24  32  Delivery
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Normal or BAD?
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Intraabdominal disease in pregnancy

- altered anatomy can affect pain location
- stretched peritoneum may reduce guarding, rebound
- reluctance to perform CT abdomen
Septic shock in pregnancy

Case continued:

- CT abdomen - rectal stump leak
Septic shock in pregnancy

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Septic shock in pregnancy

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- CT abdomen - rectal stump leak
- Urgent laparotomy
- Pre-OR obstetric U/S: fetal demise
Septic shock in pregnancy

Case continued:

- CT abdomen - rectal stump leak
- Urgent laparotomy
- Pre-OR obstetric U/S: fetal demise
- Laparotomy and revision of stump
- Spontaneous delivery of SB post-op
Septic shock in pregnancy

Case continued:

- Subsequent development of a pelvic abscess
- Required CT again x 2, IR drainage
- Ultimately full recovery and discharged well
Pregnancy-specific conditions
Critical illness in pregnancy

- Pregnancy-specific
- Aggravated by pregnancy
- Non-specific
Critical illness in pregnancy

- Pregnancy-specific
- Aggravated by pregnancy
- Non-specific
Critical illness in pregnancy

- Pregnancy - specific
  - Preeclampsia
  - Amniotic fluid embolism
  - HELLP syndrome
  - Acute fatty liver of pregnancy
  - Obstetric sepsis (eg. chorioamnionitis)
  - Trophoblastic embolism

- Aggravated

- Non - specific
Critical illness in pregnancy

- Pregnancy-specific
- Aggravated by pregnancy
- Non-specific
Critical illness in pregnancy

- Pregnancy-specific
  - Gastric acid aspiration
  - Venous thromboembolism
  - Pyelonephritis (producing ARDS)
  - Pneumonia (varicella, fungal)
  - Connective tissue disease
  - Cardiac disease
  - Diabetes

- Aggravated by

- Non-specific
Critical illness in pregnancy

- Pregnancy - specific
- Aggravated by pregnancy
- Non - specific
Critical illness in pregnancy

- Pregnancy-specific
- Aggravated by pregnancy
- Non-specific
  - Trauma
  - Non-obstetric infections
  - Chronic respiratory failure
  - and others
Symptoms of Preeclampsia

- Syndrome of hypertension, proteinuria after 20 wks

Presentation:
- Hypertension
- Worsening edema
- Epigastric pain (may be severe)
- Headache, neurological symptoms/signs, seizures
Presentation of amniotic fluid embolism

- "Anaphylactoid syndrome of pregnancy"

- Presentation:
  - Acute dyspnea and cyanosis
  - Hypotension
  - Cardiac arrest
  - Seizure
  - Acute fetal distress
  - Followed by DIC and ARDS
Symptoms of acute fatty liver of pregnancy

- Late third trimester
- Early presentation with:
  - Nausea, vomiting, anorexia
  - Epigastric pain
  - Jaundice
- Late presentation with:
  - Fulminant hepatic failure
  - ARDS, renal failure
Sedation and analgesia in pregnancy
Sedation and analgesia in pregnancy

- No ideal drugs

- Fetus will be sedated:
  - Makes fetal assessment difficult
  - May need ventilation after delivery

- Altered:
  - Volume of distribution
  - Drug clearance
Sedation and analgesia in pregnancy

- Benzodiazepines:
  - Probably no increased risk of birth defects
  - Fetus will be sedated
  - Risk of fetal withdrawal syndromes
  - Variable transfer to fetus
    - Diazepam has highest placental transfer

- Opiates
  - Similar concerns: resp depression, withdrawal
  - Shorter acting probably better
Sedation and analgesia in pregnancy

- **Propofol:**
  - Most data short term for C-section: safe
  - Limited long term data
  - Reports of progressive NAG acidosis

- **Neuromuscular blocking agents**
  - Likely safe, fetus will be paralyzed
  - Limited reports of long-term use

CONCLUSION

Are pregnant patients different?

Not really, but consider:
CONCLUSION
Are pregnant patients different?

Not really, but consider:

- The altered physiology
- Pregnancy-specific diagnoses
- Risks to fetus