Venous Thromboembolism in Pregnancy

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Disclosure: Speaker for NovoNordisk
VTE & Pregnancy

• Background
• Diagnostic pathways
• Patient involvement
• Massive/submassive PE
• Practical considerations
  Placement of patients
  Implications for future pregnancies
Pathogenesis

– **Venous Stasis**
  Pooling/incompetence

– **Endothelial Injury**
  Delivery
  Instrumentation

– **Hypercoagulable State**
  Decrease Protein S
  Increased Protein C Resistance
  Increased coagulation factors
  Inherited Thrombophilia
  Factor V Leiden
  Antiphospholipid Antibody
Other Risk Factors

**Personal factors**
- Age 15-19, >35
- Travel
- Immobility
- Family History
- Previous history
- Obesity (BMI>30)
- OCP (after delivery)

**Pregnancy**
- Hyperemesis
- Hemorrhage
- Ovarian Hyperstimulation
- Pre-Eclampsia

**Highest Incidence:** 1\textsuperscript{st} and 2\textsuperscript{nd} week post-partum
- VTE Risk: 3.6% and 1.5%
- Hip Replacement: 2.0%

CEMD 2007
Overall Incidence is decreasing

- Earlier mobilization of mother, shorter hospitalizations
But...
41 VTE Deaths
33 PE,
8 Cerebral vein
Thrombosis

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<td>Direct deaths</td>
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<td>Thrombosis and thromboembolism</td>
<td>32</td>
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<td>Pre-eclampsia and eclampsia*</td>
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<td>Haemorrhage*</td>
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<td>Amniotic fluid embolism</td>
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Summary 2003-2005
Summary 2003-2005

41 VTE Deaths
  33 PE,
  8 Cerebral vein Thrombosis

PE Mortality Rate: 1.56 per 100,000 maternities
Women still die

4-5 women annually die antenatally
   60% FIRST trimester

Similar number post-natally
   Identifiable risk factors
Case 1.

- 32 year primip.
- Ex 12 pack year smoker
- BMI 31
- 14 weeks pregnant.
- One week history of cough, SOB, pleuritic pain.
Case 1.

- Pulse 90 – BP 110/70
- Saturation 96%
- Clear chest
- No leg swelling
- Not febrile

- ECG sinus rhythm, WCC normal, CRP 30
Diagnostic Challenges

• Non-thrombotic leg/respiratory symptoms are COMMON in pregnancy
  Clinical diagnosis is inaccurate

• D Dimer – useful?

• Diagnosis requires radiation exposure

• Radiological tests may be technically difficult
How best to investigate?
• British Thoracic Society 2003
• NICE CG 144 2012 – no guidance

• RCOG Green-top guidelines 2007
  – CXR then leg dopplers
  – No recommendation on CTPA or V/Q scan
  – D Dimer not helpful

Scoring systems using d dimer developed in LOW risk populations
¼ positive in first trimester, ½ in third
The issue of radiation;

Radiation Proof Pregnancy Wear $99.95
Maternity Clothes, Pregnant
Maternity Jumper Skirt 3 Colors

MummyWrap Protective Singlet
NZ$ 82.50
• Stylish, comfortable radiation shielding garment
• Elasticized back panel
• Patented Swiss-Shield® technology
• FREE worldwide delivery within 14 days
Fetal Radiation Exposure

Effects depend on dose and gestational age.

Risk is considered significant above 50mGy.

Foetal radiation from CXR=0.02mGy

McCulloch CH, Schueler BA et al, Radiographics 2007;27;909
## Source of Exposure

<table>
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<tr>
<th>Source</th>
<th>Radiation Dose (mGy)</th>
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<tr>
<td>UK annual radiation dose</td>
<td>2.7</td>
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<tr>
<td>USA annual radiation dose</td>
<td>6.2</td>
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<tr>
<td>Annual radon dose to people in Cornwall</td>
<td>7.8</td>
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<tr>
<td>135g bag of Brazil nuts</td>
<td>0.005</td>
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<tr>
<td>Transatlantic flight</td>
<td>0.07</td>
</tr>
<tr>
<td>Chest X-ray</td>
<td>0.02</td>
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[WWW.HPA.org.uk](http://WWW.HPA.org.uk)
<table>
<thead>
<tr>
<th>Modality</th>
<th>Maternal breast</th>
<th>Maternal lung</th>
<th>Foetus</th>
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<tbody>
<tr>
<td>VQ</td>
<td>5.7-13.5mGy</td>
<td>0.98-1.07mGy</td>
<td>0.1-0.37mGy</td>
</tr>
<tr>
<td>CTPA</td>
<td>39.5mGy</td>
<td>10-60mGy</td>
<td>0.03-0.13mGy</td>
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</tbody>
</table>

Cook JV, Kyriou J. BMJ 2005 331;350
Patient involvement

1. SAM and Maternal Medicine specialists
   PE in pregnancy questionnaire 2009
   131 SAM responses
   64 BMFMS


2. Qualitative study of women who
   underwent investigation in PHT 2011-2012

   Crossman C, Albon L 2013, unpublished
Do you Give Documentation to the Pregnant Woman Explaining the Advantages / Disadvantages of Each Procedure?

- **Acute Medicine**
  - Not Sure: 9.4%
  - Yes: 14.0%
  - No: 76.6%

- **BMFMS**
  - Not Sure: 11.1%
  - Yes: 9.3%
  - No: 79.6%

Does the Pregnant Woman Sign a Consent Form Agreeing to the Procedure?

- **Acute Medicine**
  - Not Sure: 11.3%
  - Yes: 16.0%
  - No: 72.7%

- **BMFMS**
  - Not Sure: 24.1%
  - Yes: 16.6%
  - No: 59.3%

Evaluation of Suspected Pulmonary Embolism in Pregnancy

Leung A N et al. Radiology 2012;262:635-646
Outcome

- Patient given LMWH bd according to pre pregnancy weight.
- Taught how to self inject
- Given advice on what to do if worsened
- Sent home to await further investigation.
Are Pregnant Women Ever Investigated as an Outpatient?

- **Acute Medicine**
  - Not Sure: 12.1%
  - No: 40.2%
  - Yes: 47.7%

- **BMFMS**
  - Not Sure: 1.8%
  - No: 80.0%
  - Yes: 18.2%
Qualitative Study

• 2 structured telephone interviews
• 6 AMU
• 6 O/G

Generally felt given verbal info, none remembered written info, none gave written consent.
Outcome for the patient

- Negative scan
- Patient reassured

“The worst thing was seeing the posters in the X Ray department – they made me so upset I was in tears”
Q Scan equivocal?
“Why not just treat anyway?”

Diagnosis has implications for future pregnancies
  risk of recurrence  2-3% cf 0.1%
Treatment expensive, painful and could give rise to complications
What to do regarding Thromboembolic stockings
Thromboprophylaxis in pregnancy

RCOG guidelines

“Consider thromboprophylaxis if:

>=3 risk factors antenatally + outpatient management

>=2 risk factors antenatally + inpatient management or any postnatal woman who is within 6 weeks of delivery"

Obesity Score 1 for BMI > 30 kg/m2;
2 for BMI > 40 kg/m2 (BMI based on booking weight)


Evaluation of Suspected Pulmonary Embolism in Pregnancy

Suspected PE in Pregnancy

- Present: Leg Symptoms
- Absent: CXR

Leg Symptoms

- Negative: CTPA
  - Abnormal: V/Q
  - Normal: CUS, CTPA, TREAT

- Positive: TREAT

CUS

CXR

CTPA

V/Q

STOP

Leung A N et al. Radiology 2012;262:635-646
Case 2

- 26 year old woman 34/40 pregnant
- Pregnancy complicated by hyperemesis
- Presented to ED, acute SOB and presyncope.
- No previous VTE, non smoker, BMI 26

- Dyspnoeic RR 28
- Tachycardic p110, BP 85/60
- Saturations 90%
Investigations

RBBB

Normal CXR

Complex and fraught – 10pm on Saturday night
Issues..

Where should such patients be treated
In advancing pregnancy
When severely unwell

Should we thrombolyse pregnant women with massive PE?
Is There a Gestational Threshold for Which Department the Woman is Referred To?

- **Acute Medicine**
  - Not Sure: 15.3%
  - Yes: 33.6%
  - No: 51.1%

- **BMFMS**
  - Not Sure: 24.2%
  - Yes: 3.2%
  - No: 72.6%
Should we thrombolyse this patient?
Thrombolysis in pregnancy

- No good evidence
- Case reports only
- Most use rTPA (doesn’t cross barrier)
- Older reports uro and streptokinase
- Small number of pre term deliveries
- Bleeding less of a problem
- Foetal death reported but rare

Outcome

• Initially housed on AMU, given treatment dose enoxeparin.
• Immediate CTPA unavailable
• midwife came and checked foetus
• Cardiologist came in, ECHO highly suggestive
• Obstetrician came in
• So did critical care
• And local cardiothoracic unit was consulted…. thrombolysis? direct/mechanical?
Ultimately

- Transferred to tertiary centre
- Given peripheral IV heparin then LMWH
- Delivered healthy girl via planned induction at 38 weeks.
- Anticoagulation continued for a total of 3 months
- Susbequently found to have inherited thrombophilia
- Anticoagulated throughout a successful second pregnancy.
“I wish I had known what to look for – I might not have ignored the warning signs”

How much information are women given at booking regarding VTE?
PHT Policy for PE in pregnancy/puerperium.

1. Gestational age: 28 weeks = O/G <28+AMU

2. In-patient or out-patient investigation?

3. In-patient: Stable or not stable?

4. Stable: 28+ = Obstetric unit: nursing site manager

<28w = AMU Obs Consultant, senior Midwife

5. Unstable: Appropriate care area:

CCU, ITU, Respiratory high care

Medical, Obstetric and ITU Consultant
Med and Obs/Gynae SpR,
ITU outreach, senior midwife
Massive DVT.

• High risk of post thrombotic syndrome

• NICE CG 144 recommends catheter directed thrombolysis if:
  Symptoms <14 days
  Good functional status
  Low risk of bleeding

• ? Safe in pregnancy?
• Case series from Ohio 13 patients
• Mean age 26 and mean duration pregnancy 26/40 (8-34/40)
• Treated with intravascular and/or mechanical clot lysis
• 12 healthy infants (one termination)
• Follow up 1.2 years, good outcome

Summary

• PE still kills women: risk factors are rising.
• Non thrombotic symptoms are common
• ATS diagnostic algorithm sensible
• PE has implications for future pregnancies.
• Consider joint policies AMU and O/G with written information for women
• Policies should address placement of patients and cover massive PE.
• Area for potential SAM collaboration/data pooling?
Acknowledgements

- **PHT PE Pathway group:**
  - Prof A Chauhan
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