Massive Haemorrhage – the Clinicians Perspective

A Case Study

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Case Study

- Highlight many of the problems faced in these more complex cases
- Identify some of the clinical issues associated with these cases
- Facilitate discussion in a more relaxed forum
Case Study

66 year old man admitted to local hospital with sudden onset of chest pain and collapse

- Treated as Acute Coronary Syndrome
  - Loaded with aspirin and clopidogrel

- Subsequently had CT scan
Diagnosis
Diagnosis
TOE

Freq.: 3.0 MHz/6.0 MHz
FPS: 69.1

CMFT July 2012
Aortic Dissection – Stanford Classification

- **Type A**   Involves ascending aorta
- **Type B**   Does not involve ascending aorta

All ascending aorta dissection require surgery
Michael deBakey

Classified Aortic dissection

- **Type 1**
  - Originates in ascending aorta and extends at least to aortic arch  60% of total

- **Type 2**
  - Confined to ascending aorta  15% of total

- **Type 3**
  - Originates in descending aorta  25% of total
## Baseline clotting

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<tr>
<th>Test</th>
<th>Value</th>
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<tbody>
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**Developing coagulopathy**

**Loaded with anti-platelets**
Patient transferred by Ambulance

- Condition deteriorated during transfer
  - Blood pressure 67 systolic
  - Oxygen saturation 92%

- Transferred straight to theatre 22.50
Proceeded to surgery

- Replacement of ascending aorta using deep hypothermia and circulatory arrest
  - Cooled to 18°C
  - Circulation stopped for 30 minutes
  - 2 bypass runs
  - Total bypass time: 3 hours 47 minutes
  - Total surgery time: 6 hours 30 minutes

- Total dose heparin used to facilitate bypass
  - 44,000 units
Strategies to reduce coagulopathy

- Loaded with Aprotinin
  - 2 million units loading
  - 2 million units in bypass circuit
  - 500,000 units per hour for duration of surgery
Aprotinin (Trasylol)

- Controversial drug
  - Licence suspended 2008 following BART study
  - Complex political agenda
  - Licence restored February 2012

- Competitive serine protease inhibitor
ACT V Heparin levels on bypass

Strategies to reduce coagulopathy

- Monitor heparin levels - Hepcon device

- Measures heparin levels using protamine titration
- Allows calculation of protamine dose
The Impact of Heparin Concentration and Activated Clotting Time Monitoring on Blood Conservation

- Randomised controlled trial
- 2 groups – 127 in each group

ACT v Heparin assay
# The Impact of Heparin Concentration and Activated Clotting Time Monitoring on Blood Conservation


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<th></th>
<th>ACT</th>
<th>Assay</th>
<th>p value</th>
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<tr>
<td>Heparin dose</td>
<td>462 IU/ kg</td>
<td>612 IU/ kg</td>
<td>&lt; 0.0001</td>
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<tr>
<td>RBC transfusion</td>
<td>2.7 ± 4.7</td>
<td>1.8 ± 1.9</td>
<td>&lt; 0.06</td>
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<tr>
<td>Platelets</td>
<td>3.7 ± 6.7</td>
<td>1.7 ± 3.6</td>
<td>&lt; 0.003</td>
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<tr>
<td>FFP</td>
<td>1.4 ± 2.5</td>
<td>0.4 ± 1.3</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Cryoprecipitate</td>
<td>0.2 ± 1.2</td>
<td>0.0 ± 0.0</td>
<td>&lt; 0.06</td>
</tr>
<tr>
<td>Closure time</td>
<td>102 ± 34</td>
<td>92 ± 32</td>
<td>&lt; 0.02</td>
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Adjuncts to haemostasis

- Surgicel
  - cellulose based surface activation

- Tisseal
  - Fibrin based spray on film

- Floseal
  - Gelatin granules coated in thrombin based sealant
Strategies to Reduce Transfusion Requirements - Cell saver

- Total cell saver reinfused
  - 2000ml

- Units of donor blood transfused in theatre
  - 4 units
Blood Products in Theatre

- Packed cells        4 units
- Fresh Frozen Plasma 8 units
- Platelets           4 doses
Transferred to ITU  05:30

- Continues to bleed
  - 400ml first half hour
  - 1550ml next hour
Transferred to ITU  05:30

Other issues:
- Acidosis
- Hypothermia
- Hypocalcaemia
- Fibrinolysis
- Residual heparin
Coagulation screen 06:39

- PT 20.3 s
- APTT 87.5 s
- Fibrinogen 1.4 g.dl⁻¹
- Platelet count 110
Laboratory results

- **Platelets**
  - Platelets < 100 x 10^9/l
  - Platelets ≥ 100 x 10^9/l

- **PT**
  - PT < 20 secs
  - PT ≥ 20 secs

- **APTT**
  - APTT < 55 secs
  - APTT ≥ 55 secs

- **Fibrinogen**
  - Fibrinogen < 1 g/l
  - Fibrinogen ≥ 1 g/l

**TEG**

- R < 15
- R ≥ 15
  - MA < 40
  - MA ≥ 40

**Heparinase TEG**

- Worse than Kaolin TEG
- Better than Kaolin TEG

**Protamine 50mg**

**Cryoprecipitate**

**If LY30 > 7.5%**

- Consider Tranexamic acid if not already given (dosage as above)

**Consider reopening or Consultant Surgeon/Intensivist to contact haemostasis Consultant on call regarding possible treatment with recombinant Factor VIIa**
Reduced FFP transfusions
- 4/53 v 16/52 (p < 0.002)

Reduced platelet transfusions
- 7/53 v 15/52 (p < 0.05)
Postoperative Management

- Cryoprecipitate

- Factor VIIa
  - Normalise clotting factors
  - Surgeon on standby
  - Bleeding controlled
Post operative course

- Day 1  Multi-organ failure

- Day 2  Developed large bowel ischaemia
  - Right hemicolecction
  - PT 24 seconds
  - APTT 130 seconds
  - Further 4 units FFP and 1 unit blood

- Gradually started to recover and wean from ventilation

- Day 14  Abdominal wound dehiscence
Post operative course

- Day 18
  - Further episode of bowel ischaemia
  - Treatment withdrawn
Discussion

- Should he have had surgery given the preoperative events?
- Should we have a lower threshold for using cryo/fibrinogen
  - Should we use more fibrinogen?
- Is there a place still for Factor VIIa?
- Should anything have been done differently?