“A change in philosophy is required, from performing testing only when there is an obvious bleeding problem, towards the concept of routinely monitoring high-risk patients throughout the surgical procedure.”

*Mallett & Armstrong, Anaesthesia 2015, 70 (Suppl. 1), 73–77*
Improving practice around acute transfusions

ROTEM seems useful – I wonder if it can help?

- **2016**
  - RCHT ‘massive’ Haemorrhage Audit June 2016

- **2017**
  - RCHT AAA Haemorrhage & Monitoring Audit

- **2018**
  - RCHT Cytoreductive Haemorrhage & monitoring Audit

**AutoClot Study**

**ROTEM Pilot**
AutoClot

• (Pritchett + ROTEM) + (Ralph + ICS) x (Tagell + Sullivan) = AutoClot idea

• Why is it patients seem to bleed less after Tx of cell salvage (ICS) blood compared to Tx of donor blood?
  – Is there something in ICS blood that confers an advantage?
  – Or is donor blood just awful?

• Lets find out (with a TEG + some haem lab geniuses)!
Use of ICS at RCH

Allogeneic and Autologous Blood Transfusion Rates

- Total obstetric patients transfused ALLOGENEIC
- Total Delivery Suite patients transfused ALLOGENEIC
- Cell salvage cases

NO. OF CASES

AutoClot - Overview

- All Elective LSCS women
- Those who have enough ICS processed
- Post op Baseline TEG
- ICS Blood TEG
- Post ICS Infusion TEG
- ICS Blood Mixed with FFP & Plts TEG
- Donor Blood Mixed with FFP & Plts TEG
ROTEN seems useful – I wonder if it can help?

Improving practice around acute transfusions

- 2016: RCHT Haemorrhage Audit
- 2017: RCHT AAA Haemorrhage & Monitoring Audit
- 2017: RCHT Cytoreductive Haemorrhage & monitoring Audit

- AutoClot Study
- ROTEM Pilot
RCH Acute Haemorrhage Audit

Total Patients included

- June 2015 – June 2016
- 72 patients, >4 units req
- 60 actually Tx

Conclusions

- Established baseline of ‘big’ bleeds
- We probably see enough to warrant trialling a ROTEM
AAA Haemorrhage & monitoring audit
80 AAA patients undergoing a repair procedure between Jan 15 - Sept 16

- 57% Endovascular
- 43% Open (approx 2/ month)
Average Reinfusion of ICS Blood

Of 21 missing records:
- 19 elective endo
- 1 emergency open
- 1 open elective

Take Home: If you have an open AAA, you’ll get a lot of ICS re-infused!
Use of Donor Blood Products

Patients receiving any donor blood products

- 85%
- 15%

1 platelet
4.1 RBC
2.67 FFP
1.5 RBC
4 FFP

10/18 emergency procedures received donor blood products

Take Home: If you have an emergency AAA you’ll likely get donor blood products
**Take Home:** If you have an open AAA, we don’t monitor for coagulopathy

**Conclusions**

- Open AAA get lots of ICS
- Emergency open AAA get donor blood products
- We don’t monitor for coagulopathy
Results – How many we do

Listed Procedures (39)

- Ovarian tumour: 19
- Cytoreductive/ debulking/ complete cytoreduction: 6
- Uterine tumour (non fibroid): 2
- Hypovolaemic Shock: 2
- Othr (laparotomy & various specified removal of organ/s): 10

Take Home: We do 0.75 patients every week
Blood Use - Overview

Transfusion Use (n=39)

- ICS + Tx: 26%
- ICS only: 31%
- Tx only: 25%
- No Blood: 18%

- Only 18% avoid transfusion of either ICS or donor blood
- Over half of all pts receive donor blood at some point in their peri-operative journey
ICS Use

ICS used in 29 cases – but not all processed

ICS Use

- Used: 29
- Not used: 10

Processing of ICS Blood

- Processed: 5
- Not Processed: 24

Average Volume re-infused: 283mls

- Biggest Volume: 851mls
- Smallest Volume: 114mls

ICS Use Grouped by volume

- 0-200 ml: 10 patients
- 200-500 ml: 10 patients
- >500 ml: 3 patients

3 patients received >500mls
- Pt 1: 603 ml +2 RBC
- Pt 2: 603 ml +4 RBC, 4 FFP (and 7 RBC post-op)
- Pt 3: 851 ml (nil else)
20 of 39 pts received donor blood products (51%)
- 10 intra operatively (32 units)
- 13 post operatively (29 units)
Coagulation monitoring

Peri-operative coagulation monitoring

3 pts received FFP +/- Cryo
• 2 had intra op FBC, Coag & Fib
• 2 did not have post op fibrinogen
  • 1 went on to have another 7 units of RBC
  • ?Coagulopathic (post op Hb 108)

- Not as bad as it first appears...but should be better
- Looking at blood product usage we would expect in the region of 3-13 pts to have had intra operative FBC, Coag & Fib samples sent
Cautious interpretation:
- Only included pts with both pre & post op Hb (smaller number)
- May well be skewed by size of operation (not differentiated)

However: Suggestion of over transfusion post op in those receiving donor blood products
Conclusions

• 39 ‘big’ CRS cases in 2016/17

• 82% CRS pts receive a blood transfusion
  – 57% receive ICS blood
  – 51% receive donor blood products

• 2 pts had intra operative coag monitoring

• Average post-op Hb is significantly higher than 70
  – Pts receiving donor products alone finished with a higher post-op Hb (on average)!
ROTEM Pilot (so far)

• 6 Questionnaires
  – 2 Major trauma (same case)
  – 2 elective AAA
  – 1 Ruptured ectopic
  – 1 variceal bleed

• 5 report logistical difficulties in getting samples to lab
Summary

• Moving away from clinically guided transfusions is a must

• Currently
  – Poor intra-operative coag monitoring in patients at high risk of blood loss
  – Likely overuse of blood products in liver patients
  – Difficulty in getting samples to lab reported
    • Time consuming to log on and print off forms
    • Unable to reliably spare runners & get frequent samples to lab
    • Anaesthetists find process distracting and difficult to manage whilst managing the haemorrhaging patient
Moving forwards

• Ongoing work
  – ROTEM Pilot questionnaire data processing
  – Blood sampling clinical system review
    • New printers ordered for theatres
    • Blood bottles and forms in MHP
  – Networking with other hospitals in our region
    • Derriford
    • RD&E
Massive Obstetric Haemorrhage - ROTEM guided pathway

Have you given Tranexamic Acid 1g?

Order +/- give 4 units RBC
Run FibTEM & ExTEM—send FBC & Coag to lab

ExTEM CT > 100s

Active Bleeding?

Order FFP & give when ready

FibTEM A5 result

FibTEM <7mm

Give fibrinogen concentrate 6g

Repeat ROTEM at 10 min

FibTEM 8-12mm

Give fibrinogen concentrate 4g

Repeat ROTEM at 10 min

FibTEM 12-15mm

Active or high risk of bleeding
ORDER FFP

FibTEM >15mm

Do not order FFP

On-going Bleeding?

Yes

No

Re-assess ROTEM in 1 hour if clinically needed

Remember—optimise your patient!

- Temp >36°C
- Hb >80g/L
- Platelets >75 x 10⁶/L
- pH >7.2
- Ionised Ca²⁺ >1 mmol/L
"A change in philosophy is required, from performing testing only when there is an obvious bleeding problem, towards the concept of routinely monitoring high-risk patients throughout the surgical procedure“

Mallett & Armstrong, Anaesthesia 2015, 70 (Suppl. 1), 73–77