Blood transfusion and cardiac surgery – Scansect 25.10.14

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Major blood loss is dangerous

Is blood transfusion beneficial?

Anaemia increases complications in cardiac patients

- Increased mortality
- Heart failure, cardiogenic shock and reinfarction
- Renal failure

Preoperative anaemia and outcome cardiac surgery

Increases:
- Mortality
- ICU-stay
- Renal failure
- Stroke
- Postoperative delirium
- Hospital LOS

Perioperative anaemia and outcome

Preoperative anaemia increases perioperative complications

- Should we correct anaemia by transfusing RBC
- Your own haematocrit of 30% is better than a transfused haematocrit of 30%
Aim of transfusion

- Improve oxygen delivery
- Improve organ function
- Prevent organ damage

Is blood transfusion any good??

From Steven Frank

Table 1. P<0.001

The Evidence for Transfusion-Related Morbidity

- Retrospective Studies
  Blood is bad — hundreds of studies
- Randomized Clinical Trials
  5 big randomized trials
  Hb Triggers > 7-8 don’t help and may hurt

Problem with retrospective transfusion studies

In an uncontrolled setting, transfusion is inextricably tied to anemia, hemorrhage, and multiple comorbidities.

Thus, “sicker” patients having “bigger” procedures, are the ones who get transfused.
TRICC Trial

The New England Journal of Medicine
A MULTICENTER, RANDOMIZED, CONTROLLED CLINICAL TRIAL OF TRANSFUSION REQUIREMENTS IN CRITICAL CARE
PAUL C. HEBERT, M.D., GEORGE WILCOX, Ph.D., MARGARET A. BADGER, M.D., JOHN MARSHALL, M.D., CLAUDE MARTEL, M.D., GIUSEPPE PAOLUZZI, M.D., MARVIN THEISEN, M.D., Ph.D., JANNE VAHLQUIST, M.D., ELIZABETH YEAH, M.D., AND THE TRANSFUSION REQUIREMENTS IN CRITICAL CARE INVESTIGATORS FOR THE CANADIAN CRITICAL CARE TRIAL GROUP

838 critically ill randomized to:

Hgb thresholds of 7 vs. 10 g/dL

Maintained between Hgb 7-9 g/dL and 10-12 g/dL

1st outcome — death within 30 days
2nd outcome — death within 60 days or during hospitalization
organ failure/dysfunction

27-11-2014
Blood transfusion and infection after cardiac surgery

- Prospective study
- US and Canada
- 5158 patients
- 298 infections (5.8%)
- 65 days follow up


Blood transfusion ...

Infections:
- Pneumonia: 3.59% / 1.23%
- Bloodstream: 1.93% / 0.26%
- Clostridium difficile colitis: 1.33% / 0.64%

Metaanalysis Rohde 2014
Scandinavian multicenter RCT
Severe sepsis and Hb < 9.0 g/dl
Tx trigger 7.0 or 9.0 g/dl (4.1 / 5.3 mmol/l)

• No difference in mortality, lifesupport or ischemic events

Immunomodulation
Nosocomial Infection
Cancer recurrence

“Blood transfusion is actually a tissue of transplant, and as such, it carries a lot of immunologic implications for the recipient”
Mark Brehm MD, May, 2011 AnnSurgery

From Steven Frank
“Storage Lesion”
What happens to RBCs over 42 days of storage?
Why your own Hb of 9 is better than a transfused Hb of 9

Future

TITRE 2 trial 2014
- Multicenter RCT UK
- 3471 pt. Accept
- Tx trigger 7.5 g/dl vs 9.0 g/dl
- 53% tx i restrictive
- 92% tx in liberal
- Primary infection or ischemic event
- Secondary mortality

- Primary outcome no difference
- Sec. Trend toward lesser mortality in liberal group
- Restrictive strategy not superior

Future

- RECESS trial

Case
- 62 year male
- AVR
- Bleeding 950 ml
- Reoperation tamponade defect in the aortotomy
- Hb 4.9 mmol/l (8.3 g/dl)
Severe anemia is dangerous

- 303 children Hb < 5.0 g/L (2.95 mmol/l)
- 116 no RBC mortality 41.4 %
- 187 + RBC mortality 21.4 %

Critical state / value

CONCLUSION 1

- The optimal hemoglobin value to trigger transfusion is not exactly known – around 7 g/dl ?
- Cardiac patients might need a little higher value
- Consider the patients status and the context
- Reduce bloodloss and hemodilution
- Optimise preoperative Hb

CONCLUSION 2

- We haven’t evidence that blood transfusion kills ….

JAMA editorial 2010

- "when evaluating a hemoglobin level treating physicians must resist the temptation to "first do something" and temper this temptation with a philosophy of "first do no harm" to achieve the optimal balance of providing the best risk-benefit of transfusion"
History

• 1667 France 100 ml blood from a gentle calf injected to Mauroy - "a bad boy".
• Pain in his arm - lost consciousness - black urine

History

• 1818 first transfusion of blood from human to human
• 1901 - 1909 Karl Landsteiner discovered the ABO blood types
• 1. World war - anticoagulating buffer solution.
• 1932 first blood bank St. Petersborg
• 2. World war