Blood Transfusion in the Context of Trauma in Older People

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Introduction – “me”

Consultant Orthogeriatrician – 2009 –current

“Jobbing Geriatrician”

Clinical Lead for Geriatrics UHS – 2010 – 2013

Clinical Lead for Major Trauma Rehabilitation – 2013 – present

Director of Major Trauma – 2016 to present

Chair of TARN – major trauma in older people working group
Principles

1. Complexity is our new reality
2. Frailty and multi-morbidity are not the same
3. Older people are a heterogeneous group
4. Older People benefit from aggressive management
5. Individualised care
Background – Trauma in Older People

Hip Fracture - > 70,000 cases per year

Major Trauma
- Defined as an Injury Severity Score >15
- Growing problem

Lower intensity “major Trauma”
- ISS 9-15
Background

Hip Fracture is a “Frailty” presentation

Hip fracture patients have multiple co-morbidities
  ◦ Managed need

Aggressive, integrated care reduces the risk of complications

Dementia and delirium are prevalent in this patient group
Figure 3: Estimated and projected population aged 70 and over, United Kingdom, mid-2012 and mid-2037.
Figure 1: Population aged 90 and over, 1981-2012, England and Wales

Source: Office for National Statistics
ISS > 15
n = 737

All children in the TARN database
n = 4720

All children attending ED with injury

Figure 1 (2012 data)
TARN Older People

8,000 ISS > 15 (X10 of age 0-16)

Commonest group of major trauma patients are now female, over 60 and suffer a low energy accident, usually a fall from less than 2m

8,000
Blood Transfusion - Background

One of the most controversial areas of hip fracture care

Many crossovers with major trauma

- Initial resuscitation
- Pre-operative optimisation
- Peri-operative care
- Post-operative care
  - Complications
  - Rehabilitation
  - Delirium
Frailty

There are 2 main schools of thought for frailty

- Rockwood – Cumulative deficit model
  - An accumulation of “deficits” with ageing incorporating medical, social aspects lead to a “Frailty Index” which correlates to outcome

- Fried – Phenotype model
  - Physical characteristics associated with frailty
    - (unintentional weight loss, reduced muscle strength, reduced gait speed, self-reported exhaustion and low energy expenditure)
<table>
<thead>
<tr>
<th>Co morbidity</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular Disease</td>
<td>24%</td>
</tr>
<tr>
<td>Stroke</td>
<td>13%</td>
</tr>
<tr>
<td>Respiratory disease</td>
<td>14%</td>
</tr>
<tr>
<td>Renal Disease</td>
<td>3%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>9%</td>
</tr>
<tr>
<td>Rheumatoid Disease</td>
<td>3%</td>
</tr>
<tr>
<td>Parkinson's Disease</td>
<td>4%</td>
</tr>
<tr>
<td>Malignancy</td>
<td>8%</td>
</tr>
<tr>
<td>Paget's Disease</td>
<td>1%</td>
</tr>
<tr>
<td>Current Smokers</td>
<td>10%</td>
</tr>
<tr>
<td>Enteral Steroids</td>
<td>1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No of Co morbidities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35%</td>
</tr>
<tr>
<td>2</td>
<td>17%</td>
</tr>
<tr>
<td>3 or more</td>
<td>7%</td>
</tr>
</tbody>
</table>

Adapted from Roche et al.
Triage

Often not recognised

3% from within hospitals

Treatment often delayed

Delayed or no transfer to MTC

Who is treating these patients?
Grade of most senior clinician treating patients on arrival

Figure 10: Age and seniority of initial treating clinician (Appendix 2, Table 10)
Initial resuscitation

Massive transfusion covered in a later talk

High use of anti-platelet and anti-coagulant medication in this patient group (ferrigno et al)
  ◦ ^ transfusion requirements
  ◦ ^ LOS

Higher use of Blood Products in Older Level 1 trauma (Rizoli et al)
  ◦ ?? Related to altered coagulopathic response
  ◦ ? Anticoags and antiplatelets

Higher Rate of “missed bleeding” on primary survey

MTP – survival comparable to younger people (Murray et al)
Pre-operative management

Transfusion and Low Hb both predictors of poor outcome

Restrictive Vs Liberal Transfusion Protocol

<7g/dl vs <10 g/dl

Relevance of fracture Site

Complications of Transfusion

- Infection
- Circulatory overload

Intolerance of anaemia

- Frailty
- Co-morbidities
Transfusion Triggers

Confusing picture

Cochrane review relies heavily on a couple of studies

FOCUS
<table>
<thead>
<tr>
<th>Variable</th>
<th>Liberal Strategy (N=1007)</th>
<th>Restrictive Strategy (N=1009)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin level — g/dl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before surgery</td>
<td>11.3±1.5</td>
<td>11.3±1.5</td>
<td>0.70</td>
</tr>
<tr>
<td>During eligibility screening</td>
<td>9.0±0.8</td>
<td>9.0±0.8</td>
<td>0.98</td>
</tr>
<tr>
<td>Before transfusion</td>
<td>9.2±0.5</td>
<td>7.9±0.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Estimated blood loss during surgery — ml†</td>
<td>209±179</td>
<td>232±257</td>
<td>0.03</td>
</tr>
<tr>
<td>Transfusions before randomization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 units — no./total no. (%)</td>
<td>754/1006 (75.0)</td>
<td>720/1008 (71.4)</td>
<td></td>
</tr>
<tr>
<td>≥1 unit — no./total no. (%)</td>
<td>252/1006 (25.0)</td>
<td>288/1008 (28.6)</td>
<td>0.07</td>
</tr>
<tr>
<td>Total no. of units</td>
<td>452</td>
<td>531</td>
<td></td>
</tr>
<tr>
<td>Transfusions after randomization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 units — no./total no. (%)</td>
<td>33/1003 (3.3)</td>
<td>594/1007 (59.0)</td>
<td></td>
</tr>
<tr>
<td>1 unit — no./total no. (%)</td>
<td>420/1003 (41.9)</td>
<td>246/1007 (24.4)</td>
<td></td>
</tr>
<tr>
<td>2 units — no./total no. (%)</td>
<td>346/1003 (34.5)</td>
<td>127/1007 (12.6)</td>
<td></td>
</tr>
<tr>
<td>3 units — no./total no. (%)</td>
<td>132/1003 (13.2)</td>
<td>24/1007 (2.4)</td>
<td></td>
</tr>
<tr>
<td>≥4 units — no./total no. (%)</td>
<td>72/1003 (7.2)</td>
<td>16/1007 (1.6)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Total no. of units</td>
<td>1866</td>
<td>652</td>
<td></td>
</tr>
<tr>
<td>Storage of units transfused after randomization — days§</td>
<td>22.0±9.5</td>
<td>22.1±9.9</td>
<td>0.83</td>
</tr>
<tr>
<td>Leukoreduced units transfused after randomization — %‡</td>
<td>90.2</td>
<td>88.6</td>
<td>0.25</td>
</tr>
<tr>
<td>Major protocol violation — no./total no. (%) ¶</td>
<td>91/1006 (9.0)</td>
<td>56/1007 (5.6)</td>
<td>0.003</td>
</tr>
<tr>
<td>Transfusion because of symptoms — no./total no. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid bleeding</td>
<td>5/1006 (0.5)</td>
<td>14/1007 (1.4)</td>
<td>0.04</td>
</tr>
<tr>
<td>Chest pain</td>
<td>4/1006 (0.4)</td>
<td>9/1007 (0.9)</td>
<td>0.17</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>1/1006 (0.1)</td>
<td>10/1007 (1.0)</td>
<td>0.007</td>
</tr>
<tr>
<td>Tachycardia or hypotension</td>
<td>43/1006 (4.3)</td>
<td>123/1007 (12.2)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Restrictive versus Liberal Transfusion Strategy in the Perioperative and Acute Care Settings

A Context-specific Systematic Review and Meta-analysis of Randomized Controlled Trials

Frédérique Hovaguimian, M.D., M.Clin.Res.Meth.,

ABSTRACT

Background: Blood transfusions are associated with morbidity and mortality. However, restrictive thresholds could harm patients less able to tolerate anemia. Using a context-specific approach (according to patient characteristics and clinical settings), the authors conducted a systematic review to quantify the effects of transfusion strategies.

Methods: The authors searched MEDLINE, EMBASE, CENTRAL, and grey literature sources to November 2015 for randomized controlled trials comparing restrictive versus liberal transfusion strategies. They included trials with adult patients, at least one control arm, and at least one exposure arm. They extracted data on transfusion rates and adverse outcomes. The unpublished core outcomes (at the time of the search) were death, and acute kidney injury (AKI), but not chronic kidney disease (CKD). The authors used a random-effects model to calculate risk ratios (RR) with 95% confidence intervals (CI).

Results: Twelve trials met the inclusion criteria. The pooled RR for death was 1.00 (95% CI: 0.71-1.43), and for AKI was 1.24 (95% CI: 1.00-1.54) for the restrictive compared to the liberal strategy. The heterogeneity was low for death (I² = 0%) and moderate for AKI (I² = 32%).

Figure: The funnel plot of the RR for death showed some asymmetry, indicating potential publication bias. The funnel plot for AKI was more symmetrical.

Conclusion: The restrictive transfusion strategy is not associated with a reduction in death compared to the liberal strategy, but it may be associated with an increase in AKI with moderate heterogeneity. The authors recommend further research to clarify the impact of restrictive transfusion strategies on patient outcomes.
Pre-operative Optimisation

Routinely lose 2g/dl

Relevance of surgical procedure

Aim for Hb >10 in all patients pre-operatively
  ◦ High Rate of intra/post operative hypotension

Haemacue/VBG in recovery
  ◦ Aim Hb >10 in all
Peri-operative Care

Close monitoring of Hb 72 hours peri-operatively;
- Circulatory overload
- Delayed decrease in Hb
- Stress Ulceration
Post Operative Care

Even more controversial

Very Limited evidence of “best practice”
- Rehabilitation
- Delirium prevention

Heterogenous group
- Personalised management
The Future

Erythropoiesis stimulation
Iron infusions to reduce ABT use
Tranexamic acid peri-operatively
Summary

Early & Aggressive intervention

Aggressive pre-optimisation

“At present” – Liberal peri-operative transfusion policy

More work in post-op phase
Thank You

ANY QUESTIONS