Use of IV Iron to Reduce Transfusions in Orthopedic Surgery

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The speaker has no actual or potential conflict of interest in relation to this presentation.
Postoperative Blood Transfusions

• Estimated total cost of a red blood cell (RBC) transfusion = $522-$1183

• Transfusion protocol
  – 1 unit PRBC
    • Hgb <7 g/dL
    • Hgb <8 g/dL in patients with cardiovascular comorbidities

• Effects
  – 1 unit PRBC = 1 g/dL increase in Hgb
  – 1 unit PRBC contains approximately 200 mg of iron

Transfusion Related Concerns

Pros

Cons

Correction of anemia

Infection

Transfusion Reactions

Cost

Preoperative Anemia

- Poor outcomes
- Increased length of stay
- Surgical complications
- Postoperative transfusions

IV Iron Benefits

- Correction of preoperative iron deficiency anemia (IDA)
- Reduced need for postoperative transfusion
- Improved recovery from postoperative anemia

Perioperative IV Iron Concerns

• Time for iron absorption into bone marrow
• Blood loss during surgery = iron loss?
• Utility of iron studies obtained postoperatively
• Contraindications to use
• Benefit in non-iron deficient patients

<table>
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<tr>
<th>Study</th>
<th>Patient Population (n)</th>
<th>IV Iron Regimen</th>
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| Cuenca et al. *Transfusion* 2004;44:14 47-1452. | Petrochanteric hip fracture repair in adults >65 years (n=157) | Iron sucrose 100-200 mg IV if Hgb <12 g/dL | -12.1% absolute reduction in transfusions with iron (p=NS*)  
-Patients with admission Hgb >12g/dL (n=101): 15% absolute reduction in transfused patients (p<0.05) | Lower infection rate with iron, no side effects reported |
| Serrano-Trenas et al. *Transfusion* 2011;51:97-104. | Hip fracture repair in adults >65 years (n=200) | Iron sucrose 600 mg IV preoperatively (200 mg x 3 doses) | -8% absolute reduction in number transfused with iron- (p=NS*)  
-Patients with admission Hgb >12g/dL (n=110): 17.7% absolute reduction in mean transfusions (p=0.049) | No difference in infection rates, LOS |

LOS=length of stay, NS=not significant  
*not significant p-values not reported
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<tbody>
<tr>
<td>Munoz et al.</td>
<td>Elective lower limb arthroplasty (n=1186) or hip fracture repair (n=1361)</td>
<td>Iron sucrose 100-200 mg IV up to 3 doses preoperatively*</td>
<td>-12.7% absolute reduction in transfusion rate with iron +/- rHuEPO (p=0.001)</td>
<td>No significant adverse effects reported</td>
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<td>-1.5 days absolute reduction in LOS (p&lt;0.01)</td>
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<td>Rogers et al.</td>
<td>Elective total hip repair patients (n=322)</td>
<td>Oral iron supplementation (not specified) in patients with Hgb &lt;12 g/dL for average of 24.5 weeks</td>
<td>-24% absolute reduction in transfusion rate for patients whose Hgb improved with PO iron (n=26) (p&lt;0.05)</td>
<td>No significant adverse effects reported</td>
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*plus ferric carboxymaltose 600 mg IV x 1 dose postoperatively +/- rHuEPO
rHuEPO=recombinant human erythropoietin, LOS=length of stay
Assessment Question

- Which of the following patients would most likely benefit from the use of IV iron?

A. A trauma surgery patient with a baseline Hgb of 12.1g/dL
B. A trauma surgery patient with a baseline Hgb of 7.1g/dL
C. A hip fracture patient with a baseline Hgb of 7.8g/dL
D. A total knee arthroplasty patient with a baseline Hgb of 13.5g/dL
IV Iron Formulations

- Iron sucrose
- Sodium ferric gluconate
- Iron dextran
- Ferumoxytol
- Ferric carboxy-maltose
Remaining Questions

• Patient populations with unknown benefit?
  – Trauma
  – Emergent surgeries

• Target iron or hemoglobin levels?

• Oral supplementation?
General Recommendations

Preoperative workup for IDA for elective joint replacements

Hgb <12 g/dL with IDA
- Supplement with PO iron prior to surgery
- If minimal time prior to surgery consider IV iron

Hgb >12 g/dL
- Practice alternative blood saving techniques

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