Blood Management in Total Joint Arthroplasty

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Disclosures

- DJO - consulting and royalties
- Smith Nephew - consulting

Problem

- Total joint arthroplasty has increased
- Aging population
- Increased demand for quality of life
Surgery associated with blood loss

• Transfusions result in increased cost
• INFECTION - 9% increased risk infection with each unit
• Delayed recovery
• Longer hospital stays
• Increased mortality

Blood conservation and management is critical

Other transfusion problems

• Clerical error
• Transfusion reactions
The solution begins with preoperative planning

Preoperative Assessment
- Physiologic Status
- Nutritional Status
  - Hemoglobin - medicare mandate
  - Body weight
  - Cardiovascular status

Preoperative Solutions
- Vitamins and minerals - iron, folate, B12
- Erythropoetin (EPO)
- Preoperative autologous donation (PAD)
Vitamins and Minerals

- Iron - 256 mg/day
- Vitamin C - 1000 mg/day
- Folate 5 mg/day
- Limited data to support supplementation above normal recommended levels

EPO

- Natural glycoprotein produced in kidneys
- Stimulates RBC production in bone marrow
- Epoetin Alpha is recombinant form used
- Definite increase in preoperative HGB levels

EPO Dosing

- 600 iu/kg - 4 doses preop day 21,14,7,0
- 300 iu/kg - 15 doses: daily - preop day 10 to post op day 4
- 150 iu/kg - 9 doses: daily preop day 5 to post op day 3
EPO Problems

- Cost - same as 2-3 units PAD or 3-4 units allogenic
- Delivery

EPO Indications

- High risk for transfusion
- Revision surgery
- Preop HGB<13
- Low body weight <50kg
- Bilateral surgery

Preoperative Autologous Donation

- Donate 1 or 2 units at least 3 weeks preop
- Rarely done any longer
- Lowers HGB
- Cost
- Most blood wasted
- Transfusion reactions and complications
Intraoperative Measures

- Hemodilution
- Tourniquet
- Cautery: Bipolar sealants
- Argon Beam
- Antifibrinolytic Agents

Hemodilution

- Blood harvested at time of surgery and replaced with colloid
- Cumbersome, expensive, time consuming
- Jehovah's witness?

Tourniquet TKR

- Bloodless surgical field, improved cement interdigitation, decreased surgical time
- Higher rate thromboembolic events
- ? use severe PVD
- Thigh pain
Electrocautery: Bipolar Sealants

- Collagen shrinkage in blood vessels
- Continuous flow saline - maintains cool temp
- Increased cost
- No proof decreased blood loss or transfusion

Argon-beam Coagulation

- Argon gas delivers radio-frequency cautery
- Argon gas blows away blood - better visibility and decreased local tissue damage
- No literature re: arthroplasty
- Cheap $4

Antifibrinolytics

- Tranexamic acid (TA)
- e-aminocaproic acid - little literature TJR
- aprotinin - little literature TJR
- Decrease effect of plasmin - decrease fibrinolysis and stabilize fibrin clots
Tranexamic Acid

- Game changer - less blood loss and transfusion
- Decreases plasmin-binding sites on fibrin - decreases fibrinolysis
- Safe with all DVT prophylaxis
- Contraindications - Hx stroke, DVT, allergy, CAD

TA Dosing

- Only controversy
- IV or topical
- Topical 1.5 gr in 50 cc saline into joint after capsular closure - safe even in those contraindicated
- IV 1 gr preop and 1 gr at closure
- IV - weight based 10mg/kg

Topical Hemostatic Agents

- Collagen agents
- Fibrin sealants
- PRP
- Platelet poor plasma
- Conflicting literature
- Expensive
- Not recommended by academy
Postoperative Measures

- Reinfusion systems
- Drains increase blood loss
- No change in transfusion requirements
- Increased fibrinolysis

When to Transfuse

- No benefit to transfuse Hgb>8 even with cardiac risk
- Treat symptoms not numbers
- Definitely transfuse Hgb<6

Conclusions

- Avoid transfusions!
- Many ways from pre to post op
- Tranexamic will soon be standard of care