



Transfusion Reactions

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TRANSFUSION REACTIONS

- **Either acute or delayed.**
- **Common: in up to 10% of recipients therefore benefit of Tx should outweigh the risk**
- **Informed consent**

ACUTE



- **During or shortly after (within 24 hrs) of Tx**
- **The most severe occur early in Tx, so careful monitoring during Tx.**



Hemolytic Reactions

- **Immune mediated lysis of Tx rbc's: acute or delayed, intra- or extra vascular.**



AHTR

- **INCOMPATIBLE rbc's given to a pt. with clinically significant preformed ab's to an rbc Ag.**
- **Most common cause is ABO incompatibility due to clerical error.**
- **Within minutes of starting Tx**



- Usually by complement-fixing IgM or IgG: intravascular lysis.
- By anti-A or anti-B; bind mac(C5-9): intravascular lysis: Hbemia and Hburia.
- Shock, hypotension, bronchospasm: due to C3a, C5a, and other inflammatory mediators.
- Renal ischemia: ATN



- **Activation of cytokines (IL-1, IL-6, IL-8, TNF- α): FEVER, hypotension, activation of WBC's, coag. : DIC**
- **Severity is: DOSE- & RATE-RELATED**
- **MEDICAL EMERGENCY.**



MANGEMENT OF AIHTR

When suspected:

- **Stop Tx immediately**
- **maintain IV by crystalloid or colloid.**
- **maintain BP, pulse**
- **ventilation**



- **give diuretic or fluid diuresis**
- **obtain bl. and urine for Tx-reaction investigation**

Perform work-up of Tx-reaction



- paper-work: Id's, labels: right component to right pt?
- Check plasma for Hbemia, urine for Hburia
- Perform DAT.
- Repeat x-match
- Repeat typing ABO-Rh as needed.



If AIHTR is confirmed

- monitor renal status (BUN,....)
- DIC workup: PT, PTT, fibrinogen, plt.
- monitor for hemolysis (bili., LDH, hapto, Hbemia)
- If sepsis is suspected C&S and Rx....



- **most AHTR are intravasc. but if Ab doesn't fix complement or only C3: extravascular.**
- **AHTR may be caused by Ab's in ABO-incompatible plt's or IVIG which may be severe.**

NONIMMUNE HEMOLYSIS (NIH)



- If AHTR; but no ABO incompatibility: look for NIH.
- Mechanical: mech. heart valves, extracorporeal cir.
- Osmotic lysis: hypotonic saline, drugs, H₂O, infused in same line.
- Heating (bl. warmer) or freezing (refrigerator malfunction): may hemolyze rbc's prior to Tx



- **There may be Hbemia and or Hburia but no serious symptoms, however should be investigated promptly to exclude immune-mediated**



FEBRILE REACTIONS

- **FEVER:** may be due to any of: AHTR, bacterial contamination, or most commonly due to the pt's underlying dis. **OR FNHTR.**
- **FNHTR:** a rise of more than 1 C, may be with chills, not attributable to any cause, occurring during or up to 2 hrs post Tx.



- **Less than 1% of all Tx.; while a 2nd FNHTR in same pt. is 1 in 8.**
- **Up to 10% in chronically transfused pts.**
- **Cause: Ab's to transfused WBC's or plt.**
- **As a result of Ab-Ag rxn: comp. fragments and IL-1, IL-6, TNF@.**



FNHTR

- **Dx of exclusion.**
- **May be prevented by use of LR blood products, but WBC's during storage in plt. units may produce cytokines.**
- **not life-threatening but fearful and annoying and responds to antipyretics**



ALLERGIC REACTIONS

- **<1% OF Tx.**
- **caused by Ab's to donor plasma proteins.**
- **vary from mild (urticaria, itching, mild fever) to anaphylactic Rxn.**
- **if mild rxn develops: no progression to severe rxn with continuation of infusion (not dose-related)**



- most mild rxn do not recur and respond to antihistamines.
- so with mild localized rxn give antihistamines and if symptoms subside continue the Tx.
- **the risk of Tx transmitted dis. with new exposure is higher than that of restarting Tx.**
- not to be applied to rxn's with fever, chills, or vasomotor instability.
- LR will not prevent it.



IF SEVERE:

- **Stop Tx, IV access, fluids, epinephrine/steroids.**
- **for further Tx: washed rbc's.**
- **Tx of plasma containing products? difficult: risk-benefit balance, premedicate with high dose steroids, antihistamines.**



- **Make epinephrine available.**
- **Anaphylaxis may be seen in IgA-deficient pt's who were immunized previously, so use products from IgA-deficient donors (difficult).**



HYPERVOLEMIA

- IF too large a volume given too quickly.
- S & S: headache, plethora, CHF, dyspnea and systolic rise over 50 mm Hg.
- Will subside if: Tx stopped, sitting position, O₂, diuretics...



- **if not phlebotomy.**
- **prevention: not more than 2-4 ml/Kg/hr.**
- **pts at risk (children and the elderly):
slower or smaller aliquots.**



TRALI

- **Acute lung inj.: noncardiogenic acute pulmonary edema.**
- **due to donor high titer anti-HLA or WBC's Ab's (leukoagglutinines).**
- **accumulations of activated recipient's WBC's in pulmonary capillaries leading to microvascular occlusion and leakage.**



- **most common cause is: WBC Ab's in plasma-containing products from multiparous female donors, but may be due to recipient high titer anti-wbc reacting with donor's wbc's infused with RBC's, plt. or granulocyte components.**



- **clinically: severe resp. distress, hypoxia, hypotension, fever, pulmonary edema, occurring during or within 4 hrs of transfusion.**
- **Treatment is supportive: O2, ETT, ICU...**
- **further Tx: LR**



- **when suspected: call bl. supplier to quarantine all products derived from the same donor.**
- **Dx: test donor and recipient for anti-HLA or antileukocyte Ab's and if positive HLA typing.**

BACTERIAL CONTAMINATION



- **A rare but severe complication; can be fatal**
- **bacteria enter bl. bag at collection, during handling or from occult bacteremia in the donor.**
- **0.3% of blood units.**
- **Gm–ve and Gm+ve: in rbc's and plt. (at 4 C or at room temp.)**



- **during or several hrs after Tx: chills, rigor, severe fever, shock.**
- **usually no Hbemia or Hburia.**
- **Aggressive therapy and antibiotics.**
- **Culture the suspected unit + Gm stain**



HYPOTHERMIA

- **Rapid Tx of refrigerated blood.**
- **may induce cardiac arrest due to rapid cooling of sino-atrial node.**
- **also overwarming >42 C: shock.**
- **So bl. must be warmed by electric warmer to <42 and not by microwave or under hot water.**

METABOLIC COMPLICATIONS



- **Hypocalcemia: from citrate treated bl. infused rapidly: circumoral and finger parasthesia.**
- **slow the Tx or if large volumes as in aphaeresis: oral ca.**
- **with normal liver function: citrate to bicarb.**



- **IV Calcium: NOT recommended and adding ca to bl. bag is prohibited (it reverses the citrate effect resulting in bl. clots)**



Hyperkalemia

- rare, due to massive Tx of old bl. (in neonates)



Hypokalemia

- from alkalosis due to bicarb. resulting from metab. of citrate in massive Tx.



Delayed Transfusion Reactions

- Adverse effects of Tx can be seen from several days to yrs after Tx.
- Risk vs. benefit difficult to judge.
- Think twice before Tx.



Delayed hemolytic Tx rxn:

- transfused rbc's induce Ab response days (anamnestic) or weeks (primary response) after Tx.
- with each unit Tx an estimated risk of 1-1.6% of sensitization to Ag's other than D.
- not life-threatening: because Ab's do not fix Comp. beyond C3



- **extravascular hemolysis: mild symptoms, mild anemia despite Tx, mild hyperbili., +ve DAT, no Hbemia.**
- **If pt. shows severe symptoms: Rx as AIHTR.**
- **Ab's involved are: Rh and Kell.**

Transfusion-Associated Graft- vs-Host Disease (TA-GVHD)



- Immunocompetent donor lymphocytes to immunosupp. pt's.
- also when donors are homozygous for HLA and immunocompetent recipients are heterozygous for same HLA haplotypes. (usually in related but may be in unrelated donors).



- **10-12 days after Tx**
- **fever, skin rash, diarrhea, hepatitis and marrow aplasia.**
- **fatal in most cases.**
- **Prevention: irradiate cellular components 25 Gy for susceptible pt's and all cellular components from relatives regardless of immune status.**



HEMOSIDEROSIS

- 1 mL of rbc's: 1 mg iron; in Tx dependent pt's damage to heart and liver.
- deferoxamine.

Transfusion Transmitted Diseases



Despite testing: HIV, HBV, HCV and syphilis may occur.

- **we do minimum testing (no HBc antibody, p24, HTLV-I/II)**
 - **most common is hepatitis (window + low level Ag).**
 - **in north America: HBV 1 in 31,000 units, HIV 1 in 3 million, HCV 1 in 4 millions.**
- (Kleinman; Tran med rev; 17:2; 2003).**



Thank you