• هموویژولانس

- دکتربابک عبدالکریمی
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Complications of Transfusion

M2 Hematology/Oncology Sequence

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Transfusion Reactions

- Acute (intravascular) hemolytic reaction
- Delayed (extravascular) hemolytic reaction
- Febrile non-hemolytic reaction
- Allergic (urticarial) reaction
- Bacterial contamination
- Transfusion-related acute lung injury
- Transfusion-associated circulatory overload
- Post-transfusion purpura
- Graft-vs.-host disease

Hemolytic Transfusion Reactions

- Acute
  - Presentation within 24 hrs
  - Intravascular hemolysis
  - Prototype: ABO incompatibility
- Delayed
  - Presentation > 24 hrs
  - Typically extravascular but may be intravascular
  - Prototype: Rh

Clinical Presentation of HTR

- Intravascular
  - Fever, chills, pain, hemoglobinemia, hemoglobinuria, dyspnea, vomiting, shock
  - Complications: renal failure, DIC, ARDS, death
  - Mortality: ~10%
- Extravascular
  - Fever, chills, leukocytosis, anemia
  - Complications: renal failure, DIC, sickle cell crisis
  - Mortality: rare

Recognition of HTR

- Free serum hemoglobin, positive DAT
- New red cell antibody
- Patient or sample misidentification
- Bleeding, hemoglobinuria in an anesthetized patient

Febrile Non-Hemolytic Transfusion Reactions

- Incidence
  - 1:250 transfusions
- Presentation
  - Fever and/or chills
- Mechanisms
  - Leukocyte antibodies in recipient
  - Cytokines released in unit during storage

Allergic Reactions

- Incidence 1-3:100 transfusions
- Presentation
  - Hives, flushing, dyspnea, vomiting
- Mechanisms
  - Antibody to allergen or plasma protein
  - Passive transfer of donor antibody

Anaphylaxis

- Presentation
  - Hypotension, bronchospasm, stridor, shock
- Mechanism
  - IgA deficiency with anti-IgA
  - Haptoglobin deficiency with anti-haptoglobin
- Prevention
  - IgA deficient plasma, washed RBC & platelets

Bacterial Contamination

- Incidence in platelet concentrates
  - 1:5000 culture positive
  - 1:10,000 cause reactions
  - 1:75,000 cause mortality
- Organisms involved
  - Platelets: Gram neg. rods, Gram pos. cocci
  - RBC: Yersinia, Pseudomonas
- Sources
  - Contaminated equipment, nonsterile procedure
  - Donor skin
  - Donor blood

Bacterial Contamination

- Symptoms: fever, chills, rigors, hypo-tension, shock, DIC
- Differential: hemolytic transfusion reaction, sepsis
- Work-up: Gram stain, culture

Transfusion Related Acute Lung Injury (TRALI)

- Incidence 1:5000 transfusions
- Presentation: non-cardiogenic pulmonary edema
- Mechanisms
  - Donor antibody to recipient neutrophil-specific or HLA antigen
  - Production of platelet activating factor-like lipid during storage
  - Release of CD40L from platelets during storage
- Mortality: 10 - 20%
- Differential: Hemolytic reaction, allergic reaction, fluid overload, acute lung injury
- Reduction strategy
  - Plasma components from male donors
  - Antibody screening

Transfusion Associated Graft-vs.-Host Disease

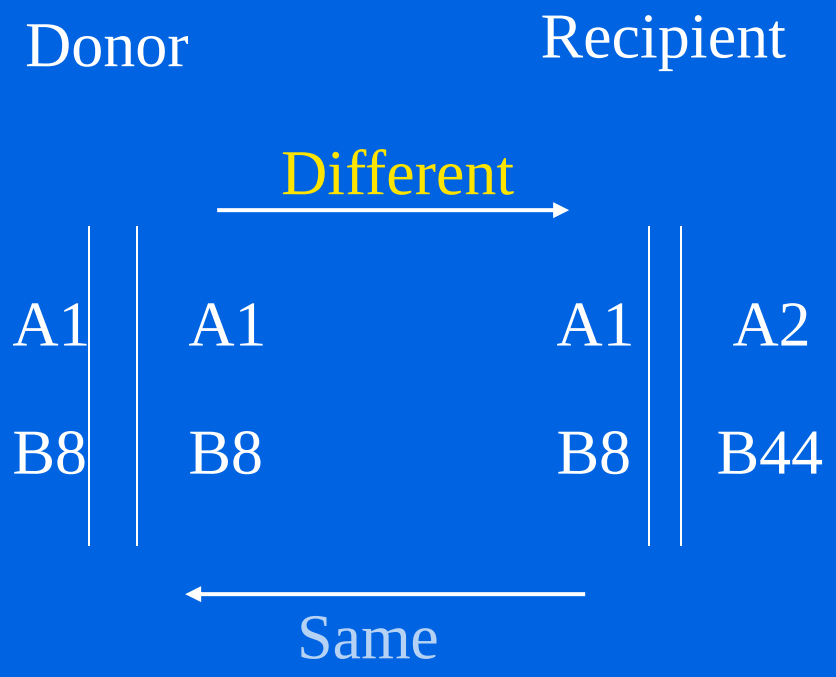
- Incidence: rare
- Presentation: rash, fever, diarrhea, liver dysfunction, cytopenia
- Mechanism: engraftment of transfused T-cells
- Mortality: very high
- Differential: viral infection, drug reactions

Patients at risk for TA-GVHD

- Severe cellular immuodeficiency
  - Congenital immunodeficiency
  - Intrauterine transfusion
  - Bone marrow transplantation
  - Hodgkin's disease, NHL, high dose chemotherapy
- Homogenous populations
- Recipients of donations from first degree relatives

Mechanism of Engraftment in Normal Recipients

- HLA homozygous donor
- HLA heterozygous recipient
- Shared haplotype



Transfusion-Associated Circulatory Overload (TACO)

- Incidence: Variable
- Presentation: Dyspnea, hypoxemia, pulmonary edema
- At-risk patients: heart disease, renal failure
- Mortality: ~double underlying disease
- Differential: Hemolytic reaction, allergic reaction, TRALI, cardiac or pulmonary disease

Other Adverse Effects of Transfusion

- Iron overload
- Alloimmunization
- Non-immune hemolysis
- Hypotensive reaction
- Acute pain reaction

Transfusion-Transmitted Diseases

- Hepatitis (B, C, G)
- HIV/AIDS
- Cytomegalovirus
- HTLV
- Parvovirus
- Chagas' disease
- Malaria
- Babesiosis
- Leishmania
- Variant CJD

Hepatitis B

- Jaundice 2 -3 months after transfusion
- Chronic carrier rate 5-10%
- 25% active hepatitis in carriers
- Complications
  - Cirrhosis
  - Hepatocellular carcinoma

Hepatitis C

- Acute infection usually nonicteric
- 70% develop chronic hepatitis
  - 10 - 20% progress to cirrhosis
- 0.5% of first time blood donors are HCV+

Outcome of Transfusion Transmitted HIV

- Rate of progression similar to other cohorts
- Progression rate independent of donor status
- Older recipients progress more rapidly than younger recipients

Estimated Current Risks

- Hepatitis C
  - 1:1,800,000
- HIV
  - 1:2,300,000
- Hepatitis B
  - 1:1,500,000

Cytomegalovirus

- Enveloped DNA Herpes virus
- Usually asymptomatic in immunocompetent patients
- Latent in monocytes and other cells
- High prevalence in donor populations

Patient Populations at Risk of CMV Disease

- Fetuses
- Premature infants
- Bone marrow transplantation
- HIV infection
- Congenital cellular immunodeficiency
- Solid organ transplantation

CMV and Blood Transfusion

- Transmission rate by seropositive cellular components: 0.4 - 10%
- Seronegative blood components equivalent to background rate
- Leukocyte reduced components are as effective as seronegative in prevention

Parvovirus B19

- Non-lipid enveloped DNA virus
- Clinical associations
  - Erythema infectiosum (Fifth disease)
  - Arthritis
  - Red cell aplasia
  - Non-immune hydrops

Parvovirus and Blood Transfusion

- Per unit risk 1:1,000 - 1:5,000
- Seroconversion rate: 80%
- Detected in factor concentrates, pooled plasma and donor sera by PCR
- Seroprevalence 50%

Chagas Disease

- US prevalence: ~100,000 persons
- Seroprevalence: ~1:5000 in Los Angeles
- Infectivity: 60% of seropositive bloods are PCR positive
- Transfusion transmission: 9 cases in US and Canada
- Prevention: leukocyte reduction, antibody screening

CJD

- UK vCJD experience
  - 18 donors with 66 components transfused
  - 3 recipients developed vCJD 5-10 years after transfusion
  - Background mortality: 0.24/million/year
- US sCJD and fCJD experience
  - 32 donors with 395 components transfused
  - 1663 person-years follow-up
  - No evidence of transmission to date

Other Transfusion-Transmitted Diseases

- Human T-Lymphotropic Virus
- Hepatitis G
- Epstein-Barr Virus
- Malaria
- Babesiosis
- Leishmania

Informed Consent for Transfusion

- Indications for the transfusion
- Possible risks
- Possible benefits
- Alternatives
- Possible consequences of not receiving the transfusion

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