Blood and Blood Component Therapy

Obstetrical Hemorrhage

- Definition
- Blood loss associated with pregnancy or parturition that meets one or more of the following criteria
- Triggersemergency pathological response
- Decrease hct by 10 points
- Requires blood transfusion
- Causes maternal or perinatal death

Causes

- Uterine atony
- Placenta previa
- Abruptio placentae
- Placenta accreta
- Retained placenta
- Uterine rupture
- Coagulation disorder

Goal of transfusion

- To provide most appropriate blood product for the patient

- Variety of components can be obtained from one unit of blood
- Hence many patients may benefit from one unit of blood

Aim

- To restore or maintain

- Blood volume
- Q2 carrying capacity
- Hemostasis
- Leucocyte function

Remember ...

- Decision for blood transfusion
- Should always be a balance between benefit and risk

'WHAT' - for any procedure

- W - Whether required
- H - How much required
- A - Actual component required
- T - Time duration of transfusion

What are the Options ?

- Whole blood

- Blood components
- Red blood cells (pack cells)
- Fresh Frozen plasma (FFP)
- Platelets
- Cryoprecipitate

Whole blood

- **Indications**
- Acute blood loss > 25% of total blood volume
- At present there is no role of whole blood except in acute emergency and in remote area
- **Drawbacks**
- After storage for > 24 hrs platelets and WBC are non-functional
- Factor V & VIII (labile factors) decrease with storage
- Fluid overload

Whole blood

- 450 ml of blood
- 63 ml of anticoagulant solution
- Hct - 36-44 %
- No components removed
- Store at 1-6 degree C

- Infuse within 4 hrs of issue

Whole blood

- **Drawbacks**
- Massive transfusion of stored blood can aggrevate coagulopathy due to
- Dilutional thrombocytopenia
- Coagulation factor depletion
- Acidosis
- Hypothermia
- **Solving the problem**
- 1 unit fresh blood for every 5-10 units stored blood
- IV 10% calcium gluconatev 10 ml with every litrevof transfused citrated blood
- Use of microaggregate blood filters
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Blood Components

- Red blood cells (pack cells)
- Fresh Frozen Plasma (FFP)
- Platelets
- Cryoprecipitate

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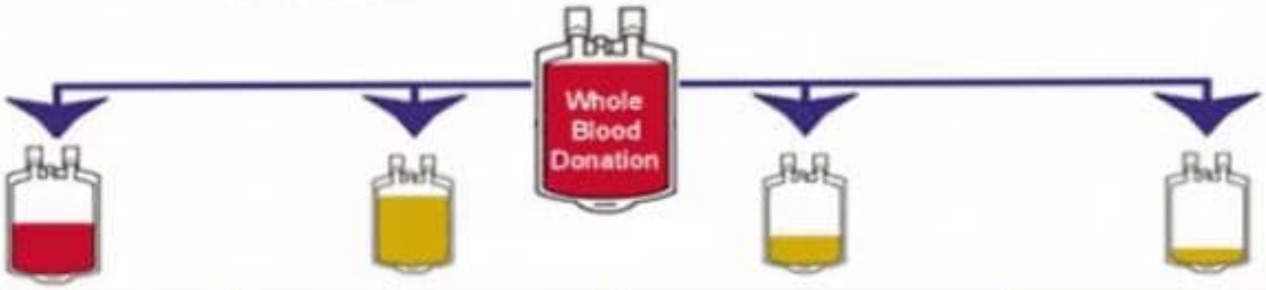
The potential of HUMAN BLOOD



Red Blood Cells	Fresh Frozen Plasma	Concentrate of Platelets	Cryoprecipitate
To increase the amount of red blood cells after trauma or surgery or to treat severe anemia.	To correct a deficiency in coagulation factors or to treat shock due to plasma loss from burns or massive bleeding.	To treat or prevent bleeding due to lowplatelet levels. To correct functional platenet problems	To treat fibrinogen deficiencies:
STORAGE PERIOD			
42 days in the refrigerator or 10 years in the freezer	1 year in the freezer	5 days at room temperature	1 year in the freezer

Benefits of component therapy

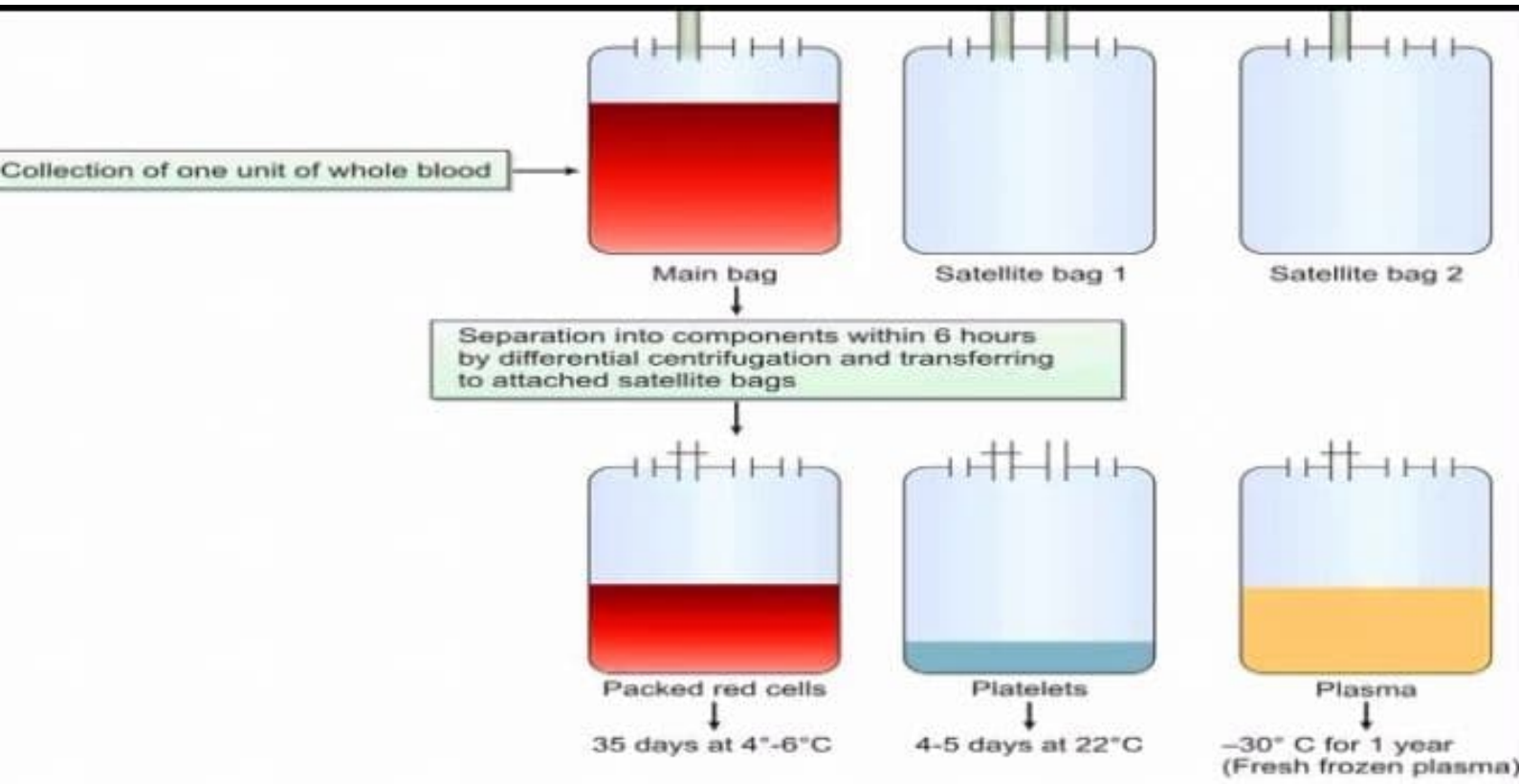
- Allows transfusion of only specific component required
- Allows optimal survival of each constituents
- Avoids use of unnecessary component which could be contraindicated in pt
- Several patients can be treatedwithblood from 1 donar

Packed Red Cells

- Made by spinning whole blood
- Supernatant is expressed off
- 200 ml red cell volume
- Hct - 70%
- 1 unit increase Hb by 2.5g/dl
- Must be ABO & Rh compatible
- Stored at 1-6 degree C
- Shelf life – 21days

PRBC

- Mainly used to increase Hb & O2 carrying capacity
- When blood group is not known O Rh –ve red cells to be given
- Hb < 6 gm/dl
- Obstetric indication < 8 gm


Collection of one unit of whole blood
Main bag
Satellite bag 1
Satellite bag 2
Separation into components within 6 hours by differential centrifugation and transferring to attached satellite bags
Packed red cells
Platelets
Plasma
35 days at 4°-6°C
4-5 days at 22°C
–30° C for 1 year
(Fresh frozen plasma)

Fresh Frozen Plasma

- Separated from whole blood within 8 hrs by centrifugation
- Contains all clotting factors
- Volume 200 – 250 ml
- Keep at - 18 degree C
- Dose 15 ml/kg or 4 units in an adult
- Infusion rate – 10 mt – 1 hour
- ABO compatibility required

Indication for FFP in Obstetrics

- Abruptio placentae
- Hemolysis Elevated Liver Enzymes Low Platelet (HELLP syndrome)
- Intrauterine fetal death
- Amniotic fluid embolism
- Massive transfusion
- Severe Preeclampsia/eclampsia
- Placenta accreta
- Acute Fatty Liver of Pregnancy (AFLP)
- Septic abortion
- Puerperal sepsis

Fresh Frozen Plasma

Indications

- Single clotting factor deficiency
- Multiple clotting factors deficiencies- DIC
- Massive transfusions
- Warfarin overdose
- Haemorrhagic disease of neonates
- TTP

Guidelines for FFP use

- Usual dosing : 10 -15 ml/kg
- 1 FFP after 3 PCV
- Subsequent transfusions depending on results of clottingtests
- Aiming to maintain PT and APTT ratios at < 1.5 x normal

Platelet Concentrate (Random Donor Platelets)

- Differential centrifugation
- Volume 50 ml
- Store at 20 – 34 degree C with constant & gentle agitation
- Use within 5 days
- Bacterial contamination is a problem
- 1 unit raise the PLTcount by 5000 – 10000/ml
- ABO matched platelets preferable
- Single donar costly but more effective

Platelets : risk of spontaneous hemorrhage

Count	Site
> 40,000	Minimal
20 – 40,000	GI mucosa
5 – 20	Skin,Mucus membranes
< 5	CNS,Lung

Prophylactic Platelet

Platelet count/ul	Recommendation
0 – 5,000	Always
11 – 20,000	If febrile or minor bleeding
> 20,000	If major bleed/invasive procedure
> 50,000	May or may not give

Transfused Platelets / Survival

- 6 units = 1 single donor unit (SDP)
- Available as ¼, ½ and full SDP
- Dose : Adult 1 unit /8 – 10 kg
- Lfespan : 7 – 10 days native
- 2 – 3 days transfused
- Factors shortening lifespan
- Fever ,sepsis
- HLA,Platelet specific Abs
- DIC

PLATELETS
Response to therapy

- ABO incompatible platelets may be transfused, but shorter life span
- Rh compatibility to be considered in obstetric population
- Rh immunoglobulin to be administered if Rh + ve platelets are administered to Rh –ve individual

Cryoprecipitate

- Plasma concentrate, rich in fibrinogen, factor VIII .v WF, & fibronectin
- Volume – 15 ml/unit
- 1unit contains 100 clotting units of Factor VIII and of fibrinogen
- Stored frozen at < - 18 degree C
- Infuse within 6 hrs of thawing
- Adult dose 10 units or IU/10kg

Dose

- Standard dose two 5 unit pools to be administered early in obstetric hemorrhage
- Subsequent cryo transfusion to be guided by fibrinogen results, aim to keep levels above 1.5 g/L
- No anti-D prophylaxis required if Rh –ve woman receives RhD –positive FFP or cryoprecipitate

Indications

- Fibrinogen < 40 mg/dl
- Fibrinogen < 100 mg/dl with bleeding or surgery
- Disseminated Intravascular Complications in obstetric patient
- Abnormal Fibrinogen
- Factor X111 deficiency
- vwD with bleedingor surgery

Pre – administration procedure

- Check blood component
- Undertake baseline observations
- Undertake visual inspection
- Blood to be warmed priorto transfusion or not?
- For rapid transfusion it is required - ideal is warmer machine
- Should not be warmed in hot water
- It can cause hemolysis of red cells – may be life threatening
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