LEVEL 400B SURGERY PRENENTATION

TOPIC: BLOOD AND BLOOD TRANSFUSION

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OUTLINE

- INTODUCTION
- INDICATIONS FOR BLOOD TRANSFUSION
- TYPES OF BLOOD TRANSFUSION
- DONATION AND COLLECTION
- ADMINISTRATION OF BLOOD

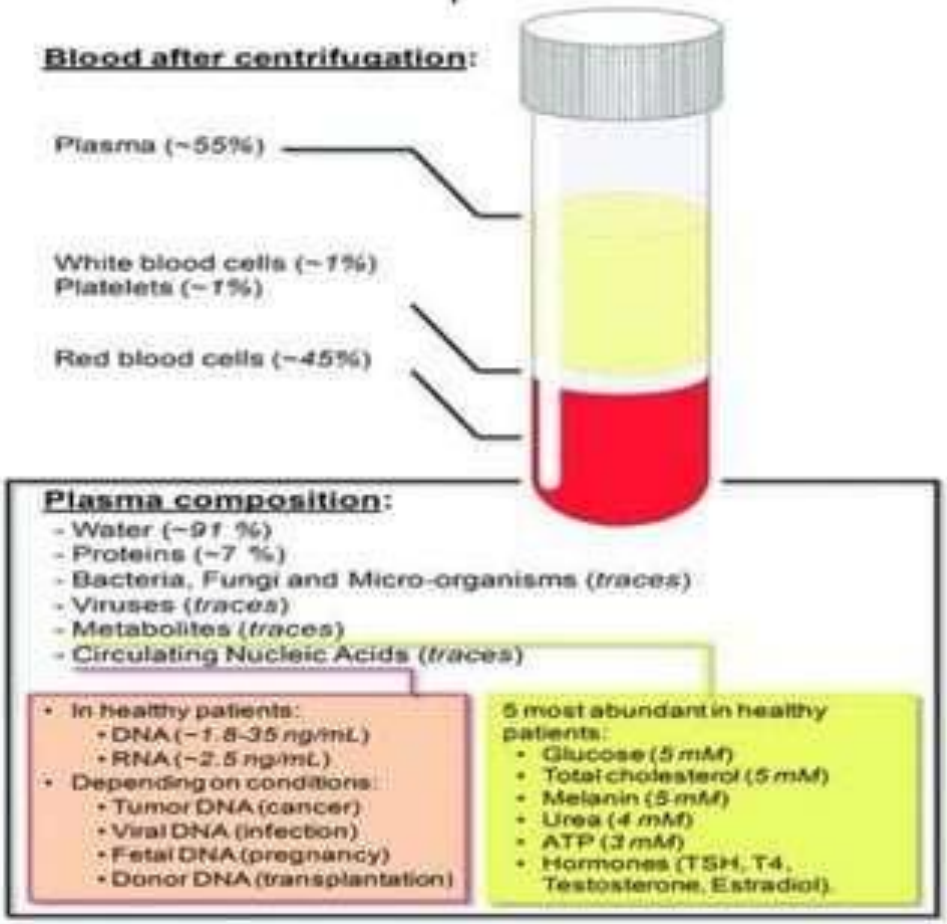
INTRODUCTION

Blood is a familiar red fluid in the body that contain white blood cells, Red blood cells, platelet, proteins, and other elements.

Each part of the blood has special function and can be separated From each other.

Blood component

1. **Whole blood**
2. **Packed cell**
3. **Platelet**
4. **Fresh frozen plasma**
5. **Cryoprecipitate**
6. **Protein solution**
7. **Factor concentrate**
8. **granulocyte concentration**



BLOOD TRANSFUSION, is the injection of a volume of blood obtained from a healthy person (the donor) into the circulation of a patient (the recipient) whose blood is deficient in quantity or quality.

Donated blood is usually subjected to processing after it is collected, and is separated into blood component by centrifugation

INDICATION FOR BLOOD TRANSFUSION

INDICATIONS FOR WHOLE BLOOD

1. **Hemorrhage** (sudden loss of 25 % or more of the blood volume).
2. **Patients undergoing exchange transfusion.**
3. **Patients who continue to bleed after receiving 4 units of packed red blood cells.**

INDICATIONS FOR PACKED CELL TRANSFUSION

The blood is centrifuged at 3000revs/min and the supernatant plasma removed. 1unite of packed cell increases the level of hemoglobin by 1g/dl and hematocrit by 3%. Packed red cells are used when whole blood may overload the circulation e.g. in,

1. **symptomatic chronic anemia without hemorrhage.**
2. **Acute sickle cell crisis.**
3. **cardiac failure.**
4. **Acute blood loss (30 % or more).**
5. **Perioperative anemia.**

INDICATIONS FOR PLATELET TRANSFUSION

It is the precipitate after platelet rich plasma is centrifuged at 3000 rev/min. Platelet-rich plasma is the supernatant plasma after whole blood is centrifuged at 1000rev/min.

1. patients with thrombocytopenia or platelet function defect.
2. Correction of coagulopathy (if platelet count < 50×10^9 /ml
3. Prophylactic transfusion, e.g. in,
   - Major surgery or invasive procedures
   - Ocular surgery or neurosurgery
   - Surgey with active bleeding

Contraindication to platelet include;

- Thrombotic thrombocytopenic purpura
- Heparin-induced thrombocytopenia

INDICATIONS FOR FRESH FROZEN PLASMA TRANSFUSION

It is the supernatant Liquid portion when fresh blood is centrifuged at 3000 revs/min. the supernatant Liquid rapidly frozen by immersion in a mixture of carbon dioxide and ethyl alcohol within 8h of collection. Fresh frozen plasma (FFP) is indicated only when other means of correction of the deficiencies are not available. These indications are:

1. Deficiencies of coagulation factors or inhibitors of coagulation.
2. Emergency treatment of warfarin over dosage and Vitamin. K deficiency.
3. Treatment of thrombotic thrombocytopenic purpura.
4. Treatment of disseminated intravascular coagulation.

INDICATIONS FOR TRANSFUSION OF CRYOPRECIPITATE

It is the precipitate when fresh frozen plasma is allowed to thaw at 4OC and the supernatant plasma removed. It is rich in Factors VIII and XIII, fibrinogen and
Von Willebrand's factor. It is indicated in the following conditions;

1. hemophilia.
2. hypofibrinogenaemia.
3. von Willebrand's disease.
4. Disseminated intravascular coagulation
5. hepatic failure
6. surgical bleeding
7. congenital fibrinogen deficiency

INDICATIONS FOR TRANSFUSION OF PROTEIN SOLUTION

Human plasma protein fraction, e.g. albumin concentrate, immune and hyper immune globulins, anti-thrombin 3 and protein concentrate. It is indicated in the following conditions;

1. Hypoalbuminemia
2. Patient undergoing plasmapheresis
3. Patient with nephrotic syndrome
4. Liver failure

Indications for transfusion of granulocyte concentration

These are prepared as buffy coats or no blood cell separators from normal Donor or from patient with severe myeloid leukemia. They have been used In;

- patient with severe neutropenia

Indication for transfusion of Factor concentrate

e.g. Factor **VIII,** Factor **IX-prothrombin** complex, protein c, fibrinogen concentrates and Recombinant factor. Indications include;

1. hemophilia A and von willebrand disease (factor VIII concentrate)
2. Christmas disease, liver disease (Factor IX-prothrombin complex concentrate)
3. Severe sepsis with DIC (protein C concentrate)

TYPES OF BLOOD TRANSFUSION

Blood transfusion can, --allogeneic, or
--autologous

ALLOGENEIC BLOOD TRANSFUSION: IS THE TRANSFUSION OF BLOOD ORIGINATING FROM DONOR OF THE SAME SPECIEES AS THE RECIPIENT.

AUTOLOGOUS BLOOD TRANSFUSION: It is the collection and subsequent re-infusion of the patient's own blood.

TYPES OF AUTOLOGOUS BLOOD TRANSFUSION

1. **Preoperative Autologous Blood Donation (PABD)**
2. **Acute Isovolaemic Haernodilution (AIVH)**
3. **Intra-operative Blood Salvage**
4. **Postoperative Blood Salvage**

Blood donation and collection Administration of the blood

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- Donation and collection
  - Characteristics of the donor
  - Blood collection in surgery
  - Effects of storage of blood
- Administration of blood
  - Patient investigation
  - ABO and Rh grouping

Blood donation and donor selection

Blood donation

- Voluntary activity
- Whole blood
- Specific components

Donor selection

- Donors should be between 18-65 years and over 51kg in weight
- Fit
  - Hb not less than 12g/dL
  - No major operation in the last 6 months
  - No blood donation in past 6 months
  - No blood transfusion within the last 12 months
  - No pregnancy within the last 12months
  - No clinical malaria in the past 1 month
  - Free from severe hypertension, splenomegaly, hepatomegaly, bleeding disorders and allergic conditions such as asthma

- Free of history or clinical evidence and not a carrier of the ffg dxs
  - Viral hepatitis
  - HIV infection
  - Syphilis
  - Trypanosomiasis
  - Brucellosis
- Unvaccinated within the last 3 weeks
- Must not belong to any of the risk groups for HIV infection eg homosexual, IV drug abusers and prostitute or their clients

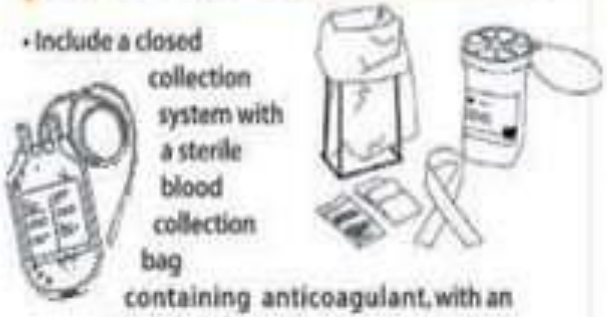
COLLECTION OF BLOOD

- Collection of blood should be done under strict asepsis into a sterile plastic bag containing 60mls of citrate-phosphate dextrose(CPD) as anticoagulant and preservative
- CPD keeps the red cell viable for 21 days in vitro
- Use of CPDA-1,adenine enriched CPD extends the shelf life to 35 days

- Glass bottle and ACD(acid citrate dextrose) are seldom used now
- The plastic bag is labelled stored as early as possible in a special bank refrigerator at 2-6°C
- Afterward the ffg tests are done on donors blood collected into separate container
  - ABO and Rh grouping
  - Serological test for syphilis, HBsAg, HTLV1 and HIV1 and HIV2,hepatitis B core antibody
  - Thick and thin film for malaria parasite

1 • Assemble equipment

• Include a closed collection system with a sterile blood collection bag containing anticoagulant, with an integrally attached tube and needle.



2 • Perform hand hygiene.

(if using soap and water, dry hands with single-use towels)

3 • Identify and prepare the donor.

Ask the donor to state his full name.

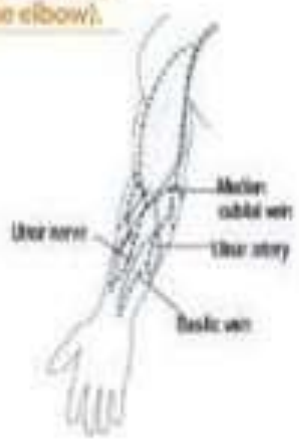
4 • Label blood collection bag and test tubes.

Ensure that:

- the blood collection bag is of the correct type;
- the labels on the blood collection bag and satellite bags, sample tubes and donor records have the correct patient name and number.

5 • Select the site (preferably at the bend of the elbow).

- Palpate the area; locate a vein of a good size that is visible, straight and clear.
- The vein should be visible without applying the tourniquet.



6 • Apply a tourniquet

or blood pressure cuff inflated to 40–60 mm Hg.

7 • Ask the donor

to form a fist so that the veins are more prominent.

8 • Put on well-fitting, non-sterile gloves.

9 • Disinfect the site.

If visibly dirty, wash with soap and water, and then wipe dry with single-use towels.

• One-step procedure (recommended – takes about one minute):

> use a product combining 2% chlorhexidine gluconate in 70% isopropyl alcohol;

> cover the area and ensure that the skin is in contact with the disinfectant for at least 30 seconds;

> allow to dry completely (30 seconds).

• Two-step procedure (if chlorhexidine gluconate in 70% isopropyl alcohol disinfectant is not available, use this procedure – takes about two minutes):

> **step 1** – use 70% isopropyl alcohol:

• cover the area and ensure that the skin is in contact with the disinfectant for at least 30 seconds;

• allow to dry completely (about 30 seconds);

> **step 2** – use tincture of iodine or chlorhexidine (2%):

• cover the area and ensure that the skin is in contact with the disinfectant for at least 30 seconds;

• allow to dry completely (30 seconds).

DO NOT touch the site after disinfection.

10 • Perform venepuncture

using a smooth, clean entry with a 16-gauge needle.

• Ask the donor to open and close the fist slowly every 10–12 seconds during collection.

• Remove the tourniquet when the blood flow is established or after 2 minutes, whichever comes first.

11 • Monitor the donor.

Look for:

• sweating, pallor or complaints of feeling faint that may precede fainting;

• development of a haematoma at the injection site;

• changes in blood flow that may indicate the needle has moved in the vein, and needs to be repositioned.

12 • Mix the collected blood gently with the anticoagulant.

either manually or by continuous mechanical mixing, about every 30 seconds during the donation.

13 • Once sufficient blood has been collected,

• Withdraw the needle gently and then give the patient a clean gauze or dry cotton-wool ball to apply to the site with gentle pressure.

• Collect samples.

• Cut off the needle using a sterile pair of scissors.

• Collect blood samples for laboratory testing.

14 • Care for the donor after the donation.

• Ask the donor to remain in the chair and relax for a few minutes.

• Inspect the site; if it is not bleeding, apply a bandage to the site; if it is bleeding, apply further pressure.

• Before the donor leaves the donation room, ensure that the person can stand up without dizziness and without a drop in blood pressure.

• Offer the donor refreshments.

15 • Ensure the blood unit and samples are stored and delivered appropriately.

Practical guidance on venepuncture for blood donation

2

World Health Organization

SIGN

WHO guidelines on drawing blood:
Best practices in phlebotomy

EFFECTS OF STORAGE OF BLOOD

- Fresh blood
  - is the blood used within 3 hours of collection,
  - has all its constituents preserved; platelets, leucocytes, factor V and VIII are all active
- However when blood is stored at 2-6°C,the ffg changes occur with time:
  - Red cells:-
    - Swell by about 20% and loss K gradually to the plasma
    - ↓ ATP and 2,3-DPG fall ⟹ diminished viability of cells
    - About 1% of cells are loss for every day of storage

- Leucocytes
  - They are not viable after 24hrs of storage
  - Even fresh leucocytes survive for only 30-90min in the recipient blood
- Platelet
  - There are no viable platelets after 24hrs of storage although non viable remains for 2weeks
- Electrolyte
  - K diffuses out of the cell and the plasma potassium rises at the rate of 1mmol\day
  - Na concentration of the plasma is increased because of the sodium citrate in the CPD anticoagulant
  - Ca - there is no ionized calcium because ionized calcium displaces sodium in disodium citrate forming unionized calcium citrate

- Clotting factors
  - Factor V and VIII declines rapidly and there is little activity after 7 days
  - Factor VII declines only after 14 days
  - Factor IX declines rapidly after 7 days and there is no activity after 14 days
  - Factor X loses its activity after 7 days
  - Fibrinogen and factor XI are stable for 21days
- pH
  - Lactic concentration rises from continuing red cell glycolysis
  - pH fall from about 7.2 at the time of collection to about 6.8 at 20days
- Plasma Hb level rises during storage due to leakage from the cell
- Ammonia concentration also rises

ADMINISTRATION AND RATE OF BT

1. Patient's investigation

- ABO grouping
- Rh grouping for the presence of D antigen, +ve in 95% Africans
- Those without the D antigen may develop antibodies to it if they are transfused with D positive blood or carry the D positive fetus

2. Cross matching

- ABO and Rh compatible blood should always be cross matched with the recipient serum before use to avoid serious adverse antigen-antibody reactions of incompatibility

Administration and rate of transfusion

- Blood to be transfused should be identified and checked against the recipient's name , group, hospital number and ward
- The drip is set up under strict asepsis using 17 gauge or large needle
- The rate should initially be 20-30 drops/min i.e.2-3ml\min.
- It is increase after half an hour to 60-80 drops /min

- If there is blood loss the rate of infusion should be rapid, squeezing the bag containing the blood if necessary
- In the elderly and very young, the rate should be slow-about 40 drops or less /min
- The patients general condition, pulse and BP should be monitored throughout

COMPLICATIONS OF BLOOD TRANSFUSION

A. IMMEDIATE REACTIONS

1. Febrile non-haemolytic reaction
2. Allergic reaction
3. Haemolytic reaction
4. Bacterial contamination
5. circulation overload
6 Cardiac arrest
7. Air embolism

B. DELAYED REACTIONS

1. Thrombophlebitis
2. Delayed haemolytic reaction
3. post-transfusiona thrombocytopaenic purpura

4. Transmission of diseases:
    i. Viral hepatitis A, B, C, D
    ii. Malaria
    iii. Syphilis
    iv. CMV infection
    v. AIDS
    vi. Others
5. Micro-aggregates
6. Immunosupression

Febrile non-haemolytic transfusion reaction

- Definition: incompatibility between antigens on the WBCs and antibodies in the recipient's plasma.
- causes: previous transfusion or pregnancies, endotoxins or pyrogens in the transfusion set or blood.
- Features: Rigors and fever, nausea and vomitting.
- Management:
- Temporary stoppage of transfusion.
- If severe it is investigated to exclude a haemolytic reaction, septicae or malaria.
- Paracetamol
- Leucocyte-depleted blood products in future transfusion

Allergic Reaction

due to allergins, usually plasma proteins in the donor plasma.

Symptoms: urticaria, myalgia and arthalgia, bronchospasm,oedema of the face, in severe cases with anaphlaxis, chest pain, hypotension, abdominal cramps, diarrhoea and shock, pyrexia.

the reactions are mediated by histamine and leukotrienes.

Management: transfusion interrupted, antihistamine and corticosteroid given, IV adrenaline

Haemolytic reactions

- Haemolysis of donor cells if there are antibodies to them in the reccipient's plasma.

Haemolytic reactions

Clinical features:

- Sensation of heat and pain along the vein being used for transfusion.
- Headache
- Rigors and fever
- Dyspnoea
- Pain in loins
- Shock
- Haemoglobinuria
- Jaundice
- Hypotention
- Oliguria to anuria

Haemolytic reactions

management:

The blood should be stopped and the reminder and the pt's blood taken for further grouping and cross matching.

Blood culture

Laboratory confirmation:

- haemoglobinaemia
- methaelbumin
- bilirubin
- saline suspension

Diuresis

Alkaline urine

Shock correction

Reverse DIC

Bacterial contamination

- About 2% of bank blood is contaminated usually at the time of collection, and septicaemia or endotoxic shock may ensue when it is transfused.
- Contaminats include: cryophilic bacteria, pseudomonas, G-ve bacteria.

Bacterial contamination

- Clinical features: chills, high fever, dry skin, hypotension, DIC.
- Management: drip stopped, donor and recipient blood taken for culture, IV broad-spectrum antibiotics, IV fluids, steroids and vasopressors.

5. Circulatory overload

- It leads to pulmonary oedema and CCF.

- Symptoms: dyspnoea, orthopnoea, cough, cyanosis, frothy sputum, raised JVP, rales, rapid and weak pulse.
- Treatment: transfusion stopped and pt proped up, IV frusemide, phlebotomy, digitalization.

Cardiac arrest

- Its more likely to occur in massive transfusion
- Cold blood transfused rapidly may cool the heart and precipitate cardiac arrhythmias

Air embolism

- Its uncommon with collapsible plastic bags.
- Rarely,
- Aspiraion
- As littke as 10ml may prove fatal.
- Symptoms: gasping respiration, cyanosis, venous congestion, hypotension, splashing noises over the heart.
- Treatment: oxygen administration, air aspiration from heart.

B. DELAYED REACTIONS

1. Thrombophlebitis

- Its more common in lower limb veins because of immobidity of legs, it follows:

- Clinical features: pain, redness, tenderness and later thickening of the vein, pyrexia.
- Treatment: analgesics, culture and sensitivity.

2. Delayed haemolytic reaction

- Mild jaundice
- Production of antibodies
- Hemolysis of red cells

3. Post-transfusion thrombocytopaenic purpura

- Anamnestic production of production of platelet alloantibody.

- Treatment: spontaneous, prednisolone, IV immunoglobulin, plasmapheresis.

4. Transmission of disease

- Viral hepatitis
- HBsAg, anti-HBc, anti-HCV and ALT
- Hepatitis C
- Hepatitis B
- Post-transfusional hepatitis A
- Hepatitis D

- Clinical features: malaise, fever, anorexia, nausea, vomitting, jaundice, tender enlarged liver, deepening in colour of urine.
- Laboratory findings: elevated transaminases, serum bilirubin, alkaline phosphatase, hepatitis B and D surface antibody.
- Management: bed rest, alpha-interferon, glucose drinks, low fat diet, vaccines.

- Malaria
- Survives storage and readily transmitted.
- Clinical features: rigor and fever, headache, myalgia, malaise, sweating.
- teatment: chloroquine.

- Syphilis
- Can can only be transmitted in blood which is used before 48hour as the spirochaete dies within 48hours of storage.

- Cytomegalovirus infection
- The features resemble those of viral hepatitis and it is likely that some recipients who develop jaundice after transfusion are in fact victims of this disease.

- Human immunodeficiency virus (HIV) infection
- Contaminants of blood and blood products

- Other diseases include:
- Tryponosomiasis
- Toxoplasmosis
- Infectious mononucleosis
- brucellosis

- Micro-aggregates
- Mostly occurs after massive blood transfusion.

- Immunosupression
- NKC and T-L blastogenic activities are reduced while ST-L activity is enhanced.

ALTERNATIVES TO BLOOD TRANSFUSION

- These are other options of blood transfusion. sometimes blood substitute or patient's own blood is collected & later rein fused subsequently to replace lost circulating volume.
- Reasons for an alternative blood transfusion;

1. Religion/belief-johaveh witness never accept blood and its product(packed cell,granulocyte & plasma concerntrate)
2. Availability –blood supply is limited or sometimes absent mainly because of absence of healthy volunteer donors.
3. To avert complication –transmission of diseases such as HIV & viral hepatitis,immunological complications of homologolous transfusion such as alloimmunization and transfusion reaction.

TECHNIQUES/METHODS IN ALTERNATIVES TO BLOOD TRANSFUSION

1. Autologous blood transfusion
2. Blood substitutes
   i. Plasma substitutes
   ii. RBC substitutes

1. AUTOLOGOUS BLOOD TRANSFUSION

- It is the collection and subsequent re-infusion of patient,s own blood.
- It prevent both transmission of infectious diseases as well as immunological complication of homologous transfusion.

TYPES OF AUTOLOGOUS TRANSFUSION

I. preoperative autologous blood donation(PABD)
II. Acute isovolemic hemodilution(AIVH)
III. Intraoperative blood salvage
IV. Postoperative blood salvage

TYPES OF AUTOLOGOUS TRANSFUSION(con'd)

I.PABD

- It is an effective method for patients going for ellective surgery.
- The patient donates preoperatively 1-5units of his blood which can be use to replace blood loss if necessary.

➢ Criteria for PABD

- Patient's Hb should be >10g/dl & a PCV over 30%.
- Patients with bacteraemia,serious heart disease and SCD.

➢ Precautions

- Donation should be 3-7days apart and last one should not be within 72h of surgery.
- The patient is given ferrous sulphate to elevate his Hb levels.
- Repo prevents the development of anemia.

TYPES OF AUTOLOGOUS TRANSFUSION(con'd)

II. AIVH

- Here, 1-4units of patient's own blood is removed immediately prior to commencement of of an operation, and replaced simultaneously with a crystalloid(3ml for every for every 1ml of blood collected) and/or colloid(1ml /ml of blood collected)
- Blood is subsequently re-infused during or after the operation

➢ Criteria

- Patient's initial Hb and PCV should be >12g/dl and 36% respectively and must not fall below 9g/dl and 27% respectively after the homodilution.

➢ Precaution

- Blood should be collected from one venous line while simultaneously replacement with crystalloid or colloid via a second venous line.
- Blood collected should be transferred into a standard plastic bag park containing SDA/CPDA and transfusion sets with filters are required.

TYPES OF AUTOLOGOUS TRANSFUSION(con'd)

III.Intraoperative blood salvage

- Blood that has been shed from wound/body cavity during surgery is collected and reinfused into the same patient.
- This method of autologous transfusion is important in/useful in ectopic pregnancy,hemothorax,ruptured spleen, penetrating injuries, cv surgery,orthopaedic surgery.

➢ Collection

- The shed blood in a body is collected with a ladle or galipot into a kidney dish or large large bowl containg an anticoagulant.
- Blood is filtered into a bottle through 4-6layers of sterilegauge placed in a funnel.
- Bottle is sealed and blood is reinfuse it
- Now special machine are available which aspirates the blood, adds heparin,filters and washes it and uses a roller pump to reinfused it.

- A reusable suction collection system is also available
- NOTE; shed blood undergoes various degrees of coagulation.fibrinolysis & hemolysis and infusion of unwashed blood may trigger DIC.

- Precaution
- Hemolysed blood or infected blood should not be used
- It is contraindicated in patients undergoing tumour resection because of concern of reinfusing tumour cells.

IV.Post operative blood salvage

- This method is considers in patient that have the likelyhood of postoperative blood loss likely to cause hemodynamic instability.
- Example in chest injuries,cardiac surgery,orthopeadic

Surgery etc

Blood is salvaged from joint spaces & body cavities.

- Blood substitutes
- Plasma substitute
- Colloids-they are HMW solutions that are potent plasma expanders
- Examples include stable plasma proteins,albumin dextran,synthetic gelatin colloids(heamacel gelofusin)etc
- Crystalloid/electrolyte solutions
- LMW solutions that are readily available & cheap,
- Low colloidal osmotic pressure so they rapidly diffuse into all body compartment.
- Red cell substitute-Hb based o2 carrier(HBO) & based O2 carrier

- Summary.
- Blood transfusion or its products is an invaluable therapeutic measure which should be with good reasons because of its potential hazards.
- Blood loss in during a surgical procedure should be minimized
- RBC booster should be given pre & postoperatively to patients

CONCEPT OF MASSIVE BLOOD TRANSFUSION

What is massive blood transfusion?

- Definition:

  Massive blood transfusion is defined as the replacement of one or more of the patient's blood volume within 24hrs or about 5l in an adult.

Indications for massive blood transfusion

- Patients undergoing exchange transfusions
- In order to restore blood volume in cases of sudden loss of more than 25% of the total blood volume
- Trauma
- Cardiovascular injury such as cardiac byepass and valve replacement
- Spinal surgery
- Hepatic surgery including transplants
- Obstetrics emergencies

Problems associated with MBT

- Technical and clerical errors:-These are more common when many units of blood are required urgently,thus hemolytic reactions are more common
- Ciculatory overload:-In elderly and debilitated patients,rapid and excessive blood transfusion may overload the circulation and result in pulmonary oedema and/or congestive cardiac failure

- Arrhythmias and cardiac arrest:-Many conditions acting singly or combined can cause cardiac arrest and arrhythmia,this include
- Hyperkalaemia
- Hypocalcemia
- Hypothermia
- Acidosis

- Hyperkalemia;As stored blood has a high k^+ concentration ,large quantities infused rapidly may raise the k^+ concentration of the recipients plasma precipitates cardiac arrhythmias

- Hypocalcemia:-The citrate ion in the anticoagulant of banked blood combines with ionized calcium of the recipients plasma causing hypocalcemia.This may potentiate the action of hyperlalaemia and precipitate cardiac arrest.
- Hypothermia:-if cold blood is transfused,it causes hypothermia which results in cardiac depression and arrhythmia,shivering may occur thereby increasing oxygen demand.

- Acidosis:-This results from excess citrate ions in th anticoagulant solution and production of lactic acid by the red cells.The pH of the blood falls from about 7.2 to about 6.6.it may cause myocardial relaxation,decreased contractility and predispose to ventricular fibrillation.

- Bleeding diathesis:-There maybe excessive uncontrollable bleeding during surgery due to;

- Thrombocytopenia:Banked blood contains no functioning platelets and dilutes the recipients platelet
- Deficiency of clotting factors V and VIII in banked blood

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- NOTE; shed blood undergoes various degrees of coagulation.fibrinolysis & hemolysis and infusion of unwashed blood may trigger DIC.

- Precaution
- Hemolysed blood or infected blood should not be used
- It is contraindicated in patients undergoing tumour resection because of concern of reinfusing tumour cells.

IV.Post operative blood salvage

- This method is considers in patient that have the likelyhood of postoperative blood loss likely to cause hemodynamic instability.
- Example in chest injuries,cardiac surgery,orthopeadic

Surgery etc

Blood is salvaged from joint spaces & body cavities.

- Blood substitutes
- Plasma substitute
- Colloids-they are HMW solutions that are potent plasma expanders
- Examples include stable plasma proteins,albumin dextran,synthetic gelatin colloids(heamacel gelofusin)etc
- Crystalloid/electrolyte solutions
- LMW solutions that are readily available & cheap,
- Low colloidal osmotic pressure so they rapidly diffuse into all body compartment.
- Red cell substitute-Hb based o2 carrier(HBO) & based O2 carrier

CONCLUSION

- Blood transfusion or its products is an invaluable therapeutic measure which should be with good reasons because of its potential hazards.
- Blood loss in during a surgical procedure should be minimized
- RBC booster should be given pre & postoperatively to patients