AUTOLOGOUS BLOOD TRANSFUSION

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Types of blood transfusion

- AUTOLOGOUS BLOOD TRANSFUSION:

- Autologous Blood Transfusion (ABT) means reinfusion of blood or blood products taken from the same patient

- ALLOGENIC/HOMOLOGUS BLOOD TRANSFUSION:

- Transfusion of blood taken from a donor to a recipient is called Allogenic/Homologous blood transfusion

ABT- INTRODUCTION:

- ABT is not a new concept, fear of transfusion-transmitted diseases stimulated the growth of autologous programme
- Reinfusion of blood was employed as early as 1818 & pre-operative donation was advocated in 1930s
- Blood salvaging was reported during neuro-surgical & obstetric procedures from 1936
- During the last 20 years there is a increase in the use of ABT
- Technologic advances made possible the development of safe, easy to use devices for recovery & reinfusion of shed blood

ADVANTAGES

- Can avoid many complication associated with allogenic transfusion,
  - Acute hemolytic reactions
  - Allergic & febrile reactions
  - Transmission of diseases
    - Hepatitis – B, AIDS, Syphilis, Malaria
- Avoidance of immunosuppressive effects of allogenic transfusion
- Patient's with rare blood group are particularly benefited by these techniques
- It allows the availability of fresh whole blood for transfusion

TYPES OF ABT

- 3 different techniques available…

1. Pre-operative blood donation (POBD)

2. Acute normo-volaemic heamodilution

3. Intra & post-operative blood salvage

Donor selection for all types

- Can be considered before any elective surgical procedures where a significant blood loss is expected (esp in POBD)
- Any patient with an adequate haemoglobin level(11g)
  - A patient weighing 50 Kg, Hb >11gm & Hct> 33% can donate 450 ml of blood safely. Those with lesser body weight can donate proportionately lesser volume
- Adolescents, children below 10 years & elderly also can be a candidate and can safely donate.
- Obstretric patients – no adverse effects for mother & baby are reported
- A history of Hepatitis-B or AIDS is not a contraindication for autologous blood transfusion.

1. Pre-Operative Blood donation

- Pre donation usually begins 4-5 weeks before the proposed surgery, depending on the number of units required
- Usually one donations per week is done. In 5 weeks we can have 5 units of blood (Max 1 transfusion/3days)
- To prevent anaemia due to donations, Iron tablets are usually prescribed
- No special complications to pre-donations
  - Vasovagal reactions for which no Rx is needed(F>M)
- Time interval between the last donation and the surgery should be more than 72 hours

Pre-Operative Blood donation

- Leap-frog technique is used when 4-5 units of blood are required for POBD and to be stored in liquid state.
- The schedule starts 1 month prior to surgery and goes on for weeks

Withdrawl time	Units withdrawn	Units reinfused	Units left
Day 0	A	-	A
Day 7	B,C	A	B,C
Day 14	D,E	B	C,D,E
Day 21	F,G	C	D,E,F,G
Day 28	H,I	D	E,F,G,H,I
TOTAL	9	4	5

Pre-Op BD- Storage of blood

- Separately labeled as Autologous
- ABO & Rh typing
- Screening for Hepatitis B and AIDS are not mandatory
- No cross matching is required
- If CPDA-1 is used - the blood can be stored for 35days
- Separation into plasma and Rbc increases the shelf life to 42 days
- If more storing is required the RBC can be frozen and stored

Remember

- Mere availability of pre-donated blood is not an indication per se
- Unused blood as a policy is discarded.
- But after proper screening & cross matching can be used for other patients

Complications

- Complications include..

1. Volume overload
2. Sepsis
3. Transfusion of wrong blood (clerical error)

2. Acute normovolaemic hemodilution

- Acute normovolaemic haemodilution refers to the removal of blood from the patient immediately before or just after the induction of anaesthesia (ie at the time of surgery), and its replacement with fluid.

- No pre-donation is done in this technique, and the lost volume is replaced by crystalloids(1:3, easy excreted by diuretics) and colloids(1:1)

Acute normovolaemic hemodilution

- The amount of blood collected depends on the patients estimated blood volume, pre operative HCT and lowest HCT desired (Hct decreased by 25-30% in ANH)

- Volume (V) = EBV × Hct(i) – Hct(f)/Hct(av)

- Collected blood can be stored at room temperature for up to 4hrs or at 1-6°c for up to 24 hrs.

- The blood is re-infused in the reverse order of collection, the first unit which has the high Hct and most clotting factors is administered last.

ANH - Physiology

Withdrawal of whole blood (in std blood bag) and replacement with crystalloids and colloids result in to

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Sudden drop in Hct, arterial Oxygen content & decreased blood viscosity

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Increased cardiac out-put and & ↓ peripheral resistance

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so Oxygen delivery to tissue is not affected

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Heart rate, CVP and Blood pressure remain unchanged

ANH-Advantages

- ANH is simple and less expensive than others tecniques
- Provides fresh whole blood for transfusion.
- No biochemical alterations associated with storage.
- Removed blood is kept in room temperature, so no chance of hypothermia
- Platelet function is preserved & no reduction in oxygen carrying capacity of RBC
- RBC loss during surgery is less because it is diluted with fluid
- Haemodilution decreases blood viscosity , which improves tissue perfusion
- It is Possible for emergency surgeries.

ANH- Contraindications

- Anaemia with
  - Hb < 11gm or
  - Hct < 33% are unsuitable
- Relative contraindication
  - ↓ Renal function
  - Sever CAD
  - Carotid artery disease
  - Sever pulmonary dysfunction

ANH- Complications

- Though very rare but potential complications
  - Myocardial ischemia
  - Cerebral hypoxia

ANH- indication

- Cardiac bypass surgery

3. INTRA & POST OP BLOOD SALVAGING

- With the use of special equipments the blood is collected from the operative field and draining sites.
- Recovered blood is mixed with anticoagulant is collected in a reservoir with a filter.
- The filtered blood is then washed with saline. The RBCs suspended in the saline are then pumped into a re-infusion bag.
- Most of the WBCs, platelets, clotting factors, cell fragments and other debris are eliminated.

Characteristics of processed blood

- HCT of processed blood is 50 – 60% and can be varied by altering the processing parameters.
- Oxygen transport properties and survival of RBCs are equal or superior to stored allogenic blood.
- Processed blood has a high 2,3-DPG level.
- pH of salvaged blood is alkaline.

Applications

- The major applications are (blood loss >20% expected)
  - Rare blood group
  - Elective and Emergency surgery
    1. Cardio-vascular surgery
    2. Liver transplantation.
    3. Neurosurgery.
    4. Ortho(esp. post-op) & gynecology operations.

Complications

1. Air embolism
2. fat embolism
3. Sepsis
4. Renal dysfunction due to free Hb and Fragmented RBCs.
5. Presence of tumor cells in the operative field is considered as a relative contraindication.

Summery

- Types of Autologous blood transfusion.?
- Advantages of Autologous blood transfusion?
- What is Leap frog technique?
- Advantages of Acute normo-volaemic hemodilution
- What is intra and post-op blood salvaging?
- Application of intra and post-op blood salvaging?

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Thank you

