MASSIVE TRANSFUSION

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DEPT. OF TRANSFUSION MEDICINE

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DEFINITION

Massive transfusion:

- Replacement of the patients total blood volume by stored blood in less than 24 hrs.
- Replacement of more than 50% of the patients blood volume in 3hrs.
- Replacement of blood loss more than 150 ml/min in an adult.
- In children it is defined as transfusion of more than 40ml/kg.
- Massive transfusion implies a single transfusion greater than 2500ml/ 5000ml transfused over a period of 24hrs.
- Involves selection of appropriate amounts & types of blood components to be administered.

INDICATIONS OF MASSIVE TRANSFUSION

1.Traumatic

- Haemorrhagic shock: acute blood loss of more than 20% blood volume in adults or 10-15% in children & pregnancy.
- Severe Trauma.

2. Non traumatic

- Exchange transfusion
- Cardiopulmonary bypass
- GIT bleeding
- APH – Abruptio placenta, Placenta previa
- PPH – Atonic uterus, Inversion of uterus.

EFFECTS OF MASSIVE BLEEDING

- Hypotension
- Hypo-perfusion
- Acute anemia

ISSUES OF MASSIVE BLEEDING

- VOLUME STATUS: Massive Blood Volume Loss
- Tissue Oxygenation
- Management Of Bleeding
- Coagulation Abnormalities- Dilutional coagulopathy
- Changes In Calcium , Potassium & Acid Base Balance

MASSIVE TRANSFUSION PROTOCOL

- It is the responsibility of all members of resuscitation team.
- Standardized lab monitoring for clinical crisis management.
- To provide optimal blood component therapy.
- Maintain intravascular volume.
- Infusion of RBC, Plasma & Platelets in ratio without waiting for lab results.

MASSIVE TRANSFUSION PROTOCOL

Involves

- Avoidance of hypothermia
- Normalization of acid base balance.
- Management of preexisting haematological or coagulative disorders.
- Maintain normal ionized Ca level.
- Assessment of ongoing blood loss.

TRANSFUSION TRIGGER

- When Hb level is < 7g/l , HCT 21% with acute blood loss, transfusion is indicated
- In > 80 yrs old – PCV of 30-33% is the trigger.
- The use of only Hb as a trigger for transfusion should be avoided.

- Decision for RBC transfusion should be based on individual volume status, evidence of shock, duration & extent of anemia & cardiopulmonary physiologic parameters.

LAB INVESTIGATIONS

Investigations	Normalvalues
Bleeding time	2-8 min
Prothrombin time	10-13 secs (13-20sec*)
aPTT	25-35 secs (45-65sec*)
Fibrinogen	2-4 g/l
FDP	<10 mg/dl

*at full term pregnancy

MASSIVE TRANSFUSION PROTOCOL

Routine activities of blood bank are suspended.

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O Rh negative un-crossmatched blood is issued to patients bed-side immediately

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Patients sample is obtained for type & screen before commencing transfusion

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MASSIVE TRANSFUSION PACK

[6 units packed RBC + 4 units FFP+1 SDP/ 10 Units of cryoppt.]

LOSS OF 1st HALF OF CIRCULATING BLOOD VOLUME

Circulating volume maintained by:

- Crystalloids, colloids, plasma proteins, Hydroxyethyl starch, Dextran
- Packed RBC
- Maintain CVP 5-10cm of H_20

LOSS OF SECOND HALF OF CIRCULATING BLOOD VOLUME

Dilutional coagulopathy sets in:

- Treatment with FFP
- Follow up PT, aPTT
- Packed RBC
- Maintain hematocrit at 30%

LOSS OF COMPLETE CIRCULATING BLOOD VOLUME

- Treatment with FFP & PACKED RBC
- Maintain hematocrit at 30%

- Dilutional thrombocytopenia sets in.
  Treatment with Platelets.

EMERGENCY RELEASE POLICY

- The blood bank should be informed of the need for massive transfusion in a patient & the urgency of transfusion.
- Within 5 mins of receipt of sample(extreme emergency) – O Rh (D) negative packed RBC.
- Rh (D) negative women of child bearing age, Rh(D) negative blood supplied.
- Within 15 mins of receipt of sample(urgent cases) – ABO & Rh(D) Type specific cross matched packed RBC.
- Within 45 mins of receipt of sample – Type specific cross matched packed RBC.

Suggested ABO Group selection order for Transfusion of RBC'S

Recipient ABO Group	1st choice	2nd choice	3rd choice	4th choice
AB	AB	A	B	O
A	A	O		
B	B	O		
O	O			

STRATEGY FOR MASSIVE TRANSFUSION

Condition	Treatment
• Thrombocytopenia (plt.count< 50,000/cu.mm)	Platelet Concentrates
• PT, a PTT > 1.5 times & INR <1.5	FFP (15 ml/kg)
• if Fibrinogen < 100 mg/dl, and aPTT prolonged	Cryoprecipitate

TARGETS OF MASSIVE TRANSFUSION PROTOCOL

Investigations	Target value
Hb/ HCT	10g/dl,32%
Platelet count	>50 x 10^9/l
Prothrombin time	< 15 secs
aPTT	< 1.5 times normal (25-35 sec)
Fibrinogen	> 0.8g/l
Blood gases	
Thromboelastography	

BLOOD COMPONENTS DOSAGE

PACKED RBC (PRBC) 10-20 ml/kg body wt.

Each unit of PRBC has 250 ml

Dosage for 70 kg adult is 3-6units of packed RBC

FRESH FROZEN PLASMA(FFP)

12-15 ml/kg body wt. every 12 hrs

Rate of infusion- within 30 min

2-4ml/kg/hr in elderly patients & babies

SINGLE DONOR PLATELETS(SDP) 225 ml/ unit

COMPLICATIONS OF MASSIVE TRANSFUSION

1. Acidosis: result of inadequate treatment of hypovolemia than due to transfusion.

2. Hyperkalemia: stored blood results in a small increase in extracellular K+ concentration which will increase the longer it is stored.

3. Citrate toxicity & hypocalcemia: are rare, due to large volume transfusion of whole blood.

- Management Iv 10% calcium gluconate 10ml with every litre of transfused blood.

4. . Depletion of platelets:

Platelet function is lost during storage of whole blood.

Management:

Give PC only when patient shows clinical signs of micro vascular bleeding or platelet count falls below $50x10^9/l$

Contra indications of platelet transfusion:

Hemolytic uremic syndrome

Heparin induced thrombocytopenia

Thrombotic thrombocytopenic purpura

5.Depletion of fibrinogen & coagulation factors:

Plasma undergoes loss of coagulation factors during storage particularly factor v & viii unless stored at -25 deg C or colder.

Red cell concentrate lacks coagulation factors.

Dilution of coagulation factors & platelets will occur following administration of large volume of replacement fluids

Management*:*

if PT is prolonged - ABO compatible FFP

If aPTT prolonged, factor viii/ fibrinogen concentrate is recommended.

6. Hypothermia:

Rapid administration of large volumes of blood or replacement fluids directly from refrigerator can cause reduction in body temperature.

7. DIC: May develop during the course of massive blood transfusion.

It can also be due to the underlying reason for transfusion such as:

a. Hypovolemic shock
b. Trauma
c. Obstetric complications

Management- treatment of underlying cause.

8. Air embolism

9.TRALI (Transfusion induced lung injury)

Recipient's leucocytes and donor pre existing anti leucocyte antibodies cause complement activation and increased pulmonary vascular permeability.

10. GvHD (Graft versus host disease)

11.MICRO AGGREGATES

COMPLICATIONS OF MASSIVE TRANSFUSION

- ***"IT IS OFTEN THE UNDERLYING CAUSE AND CONSEQUENCES OF MAJOR HAEMORRHAGE, THAT RESULT IN COMPLICATIONS, RATHER THAN THE TRANSFUSION ITSELF"***

Thank U