



# ***MASSIVE TRANSFUSION***

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# DEFINITION



## Massive transfusion:

- Is defined as 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 – Abruption placenta, Placenta previa
- PPH – Atonic uterus, Inversion of uterus.
- Anemia

# 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



- 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  $< 7\text{g/l}$  , 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.



# LOSS OF 1<sup>st</sup> HALF OF CBV

Circulating volume maintained by:

- Crystalloids, colloids, plasma proteins, Hydroxyethyl starch, Dextran
- Packed RBC
- Maintain CVP 5-10cm of H<sub>2</sub>O

# LOSS OF SECOND HALF OF CBV



Dilutional coagulopathy sets in:

- Treatment with FFP
- Follow up PT,APPT
- Packed RBC
- Maintain P C V at 30%



# LOSS OF COMPLETE CBV



- Treatment with FFP & PACKED RBC
- Maintain P C V 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 blood.
- 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 blood.
- Within 45 mins of receipt of sample – Type specific cross matched blood.

# ***Suggested ABO Group selection order for Transfusion of RBC'S***



<u>Recipient</u> <u>ABO Group</u>	<u>1<sup>st</sup> choice</u>	<u>2<sup>nd</sup> choice</u>	<u>3<sup>rd</sup> choice</u>	<u>4<sup>th</sup> choice</u>
AB	AB	A	B	O
A	A	O		
B	B	O		
O	O			

# STRATEGY FOR MASSIVE TRANSFUSION



## Condition

Low blood vol. \*

Low O<sub>2</sub>-Carring capacity \*

Hemorrhage owing to:

Thrombocytopenia

Coagulopathy

## Treatment

Crystallods or colloids

RBCs

Plat. Concentrates

FFP, cryoprecipitate.  
(if Fib. Is low)

\*If these occur simultaneously, whole blood may be indicated.

# ***LABORATORY INVESTIGATIONS***



## Investigations

Hb/ HCT

Platelet count

Prothrombin time

PTT

Fibrinogen

Blood gases

Thromboelastography

## Target value

10g/dl, 32%

$>50 \times 10^9/l$

$< 15$  secs

$< 1.5$  sec

$> 0.8g/l$

# COMPLICATIONS OF MASSIVE TRANSFUSION



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

# ***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.  
Iv 10% calcium gluconate 10ml with every litre of transfused blood.



- 4 . 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.

### 5. 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  $50 \times 10^9/l$



## 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)

10. GVHD ( Graft versus host disease )

11. MICRO AGGREGATES



**Save a life**  
**Give Blood**

*Thank U*

