SAWA UNIVERSITY

اسم المادة و الكورس

Complications of blood transfusion

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Theoretical Lecture No. ……..

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Overview

-**Complications of blood transfusion**

-characteristic of transfusion

-immunological complication.

no immunological complication

.blood testing

Complications of blood transfusion

Blood transfusions are associated with several complications, many of which can be grouped as **immunological or infectious**. There is also increasing focus on complications arising **directly or indirectly** from potential quality degradation during storage. While some complication risks **depend on patient status or specific transfusion quantity involved, a major risk of complications simply increases in direct proportion to the frequency and volume of transfusion.**

“FOR RECIPIENT”

1. Immunological complications

A- Acute hemolytic reactions

- It occur with transfusion of red blood cells, and occurs in about 0.016% of transfusions, with about 0.003% being fatal.
- This is due to destruction of donor erythrocytes by preformed recipient antibodies.
- Most often this occurs due to clerical errors or improper typing and cross matching.
- Symptoms include fever, chills, chest pain, back pain, hemorrhage, increased heart rate, shortness of breath, and rapid drop in blood pressure. Kidney injury may occur due to the effects of the hemolytic reaction (pigment nephropathy).

- * When suspected, transfusion should be stopped immediately, and blood sent for tests to evaluate for presence of hemolysis.
- **B\ Delayed hemolytic reactions :**
- It occur more frequently (about 0.025% of transfusions) and are due to the same mechanism as in acute hemolytic reactions.
- The consequences are generally mild and a great proportion of patients may not have symptoms, however, evidence of hemolysis and falling hemoglobin levels may still occur.
- Treatment is generally not needed, but due to the presence of recipient antibodies, future compatibility may be affected.

C\ Febrile non-hemolytic reactions

They are due to recipient antibodies to donor white blood cells, and occurs in about 7% of transfusions.

- This may occur after 1 to 6 hours after receiving the transfusions.
- * Fever is generally short lived and is treated with antipyretics, and transfusions may be finished as long as an acute hemolytic reaction is excluded.

D\ Allergic reactions * It may occur when the recipient has performed antibodies to certain chemicals in the donor blood. * Symptoms **include urticaria, pruritus, and may proceed to anaphylactic shock**. *** Treatment is the same as for any other type I hypersensitivity reactions.**

E\ Post transfusion purpura

It is a rare complication that occurs after transfusion containing platelets that express a surface protein HPA-1a.

* Recipients who lack this protein **develop sensitization to this protein from prior transfusions, and develop thrombocytopenia about 7–10 days after subsequent transfusions.**

* Treatment is with intravenous immunoglobulin, and recipients should only receive future transfusions with HPA-1a negative cells.

F\ Transfusion-associated acute lung injury (TRALI)

TRALI is a syndrome of acute respiratory distress, often associated with fever, non cardiogenic pulmonary edema, and hypotension.

* Symptoms can range from mild to life-threatening, but most patients recover fully within 96 hours,.

Non-immunological Complications

1. **Transfusion inefficacy**, while not itself a "complication," can lead to various complications due in part to the need to repeat transfusions; **inefficacy** can be especially serious for critical-care patients **requiring rapid restoration of oxygen delivery**.
2. **Transfusion-associated volume overload** is a common complication simply due to the fact that blood products have a certain amount of volume.

3. Hypothermia: Core body temperature can go down as low as 32 °C and can produce physiologic disturbances if the transfused blood was cold. Prevention should be done with warming the blood to ambient temperature prior to transfusions.

4. Sever hemorrhage: Transfusions with large amounts of red blood cells, whether due to severe hemorrhaging and/or transfusion inefficacy, can lead to a tendency for bleeding. The mechanism is thought to be due to spread intravascular coagulation, along with dilution of recipient platelets and coagulation factors.

5. Metabolic alkalosis can occur with massive blood transfusions due to the breakdown of citrate stored in blood into bicarbonate.

6. Hypocalcemia can also occur with massive blood transfusions due to the complex of citrate with serum calcium, thus lowering the ionized plasma calcium concentration. This is usually prevented by rapid hepatic metabolism unless the patient is hypothermic. **Calcium is an important co-factor, especially in**

coagulation, and has a key role in mediating the contractility of myocardial, skeletal and smooth muscles. Hypocalcaemia results in hypotension, small pulse pressure, flat ST-segments and prolonged QT intervals on the ECG.

7. Hyperkalaemia: The potassium concentration of blood **increases during storage. After transfusion, the RBC membrane Na+–K+ ATPase pumping mechanism is re-established and cellular potassium reuptake occurs rapidly.**

Infectious Complications

Complications of blood transfusion are rare but can be life-threatening. Blood products **are contaminated with bacteria**. This can result in life-threatening infection, also known **as transfusion-transmitted bacterial infection.**

Sources of contaminants include the donor's blood, donor's skin, phlebotomist's skin, and from containers. **Contaminating organisms vary greatly, and include skin flora, gut flora, or environmental organisms**. **From the most important transmissible infections:**

1- HIV transmission 2- Hepatitis C virus transmission 3- Other rare transmissible infections include hepatitis B, syphilis, Chagas disease, cytomegalovirus infections,

For the donor”

The biggest risk is probably that of vasovagal syncope. The best defense, as a donor, is being well-hydrated and remaining at the donation center for 10-15 minutes after finishing the donation, to make sure he or she is feeling well. Other risks to donors included:

a) Bruise at the needle site b) Sore arm c) Hematoma at needle site d) Sensory changes in the arm used for donation (eg, burning pain, numbness, tingling) e) Fatigue f) Nausea and vomiting

A blood donation & selection of donation

A blood donation occurs when a person voluntarily has blood drawn and used for transfusions and/or made into biopharmaceutical medications by a process called **fractionation** (separation of whole-blood components). **Donation may be of whole blood (WB)**, or of specific components directly (the latter called apheresis).

Types of Donation:

Blood donations are divided into groups based on who will receive the collected blood:-

1- **An 'allogeneic' (also called 'homologous')** donation is when a donor gives blood for storage at a blood bank for transfusion to an unknown recipient.

2- A 'directed' donation is when a person, often a family member, donates blood for transfusion to a specific individual.

3- A 'replacement donor' donation is a hybrid of the two and is common in developing countries such as Ghana. In this case, a friend or family member of the recipient donates blood to replace the stored blood used in a transfusion, ensuring a consistent supply.

4- When a person has blood stored that will be transfused back to the donor at a later date, usually after surgery, that is called an 'autologous' donation.

Recipient safety : Donors are examined for signs and symptoms of diseases that can be transmitted in a blood transfusion, such as HIV, malaria, and viral hepatitis.

Donor safety The **donor is also examined and asked specific questions about their medical history to make sure that donating blood is not hazardous to their health. The donor's hematocrit or hemoglobin level is tested to make sure that the loss of blood will not make them anemic**. Pulse, blood pressure, and body temperature are also evaluated. Elderly donors are sometimes also deferred on age alone because of health concerns. The safety of donating blood during pregnancy has not been studied thoroughly, and pregnant women are usually deferred.

BLOOD TESTING

1- ABO & RH GROUP.

2-Also will screen for antibodies to less common antigens.

3-Most blood is tested for diseases, (STDs).

Site preparation and drawing blood????????

Recovery and time between donations???

Complications

1-**First-time donors, teenagers**, and women are at a higher risk of a reaction.

One study showed that 2% of donors had an adverse reaction to donation.

2-Hypovolemic reactions can occur because of a rapid change in blood pressure. Fainting is generally the worst problem encountered.

3- The process has similar risks to other forms of phlebotomy. Bruising of the arm from the needle insertion is the most common concern.

4-A number of less common complications of blood donation are known to occur. These **include arterial puncture**, **delayed bleeding, nerve irritation, nerve injury, tendon injury, thrombophlebitis,**

5-Donors sometimes have adverse reactions to the sodium citrate used in apheresis collection procedures to keep the blood from clotting. Since the anticoagulant is returned to the donor along with blood components that are not being collected, it can bind the calcium in the donor's blood and **cause hypocalcemia.**

6-The **final risk** to blood donors is from **equipment** that has not been properly sterilized.

Donor Health Benefits

1- In patients prone to iron overload, blood donation prevents the accumulation of toxic quantities.

2- Donating blood may reduce the risk of heart disease for men, but the link has not been firmly established and may be from selection bias because donors are screened for health problems.

3- Repeated blood donation is effective in reducing blood pressure, blood glucose, HbA1c, low-density lipoprotein/high-density lipoprotein ratio, and heart rate in patients with metabolic syndrome.

Any questions?