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ED Report Outline: Traumatic Wounds: Control of Bleeding, Tranexamic Acid (TXA), and Massive Transfusion Protocol (MTP)

Etiology/pathophysiology

- Three Types of Blood Loss
 - Capillary → most common type, blood oozes out
 - Ex. Cutting your finger
 - Venous → blood has a steady flow leaving body
 - Arterial → most serious, spurts out of body with each heartbeat
 - Arteries have the most pressure in them so bleeding can cause death quickly
- Hemorrhage
 - Damage to tissue causes the body to clot and break down clots at the same time
 - The body releases tissue plasminogen activator (tPA) which binds with plasminogen
 - Together, tPA and plasminogen bind to fibrin to break down clots which is called fibrinolysis
 - As more blood is lost, the body will progress into shock and cause tissue hypoperfusion
 - As time goes on, hyperfibrinolysis and anticoagulation being systemically
 - This is cause more excessive bleeding
 - Hyperfibrinolysis
 - Excessive and premature breakdown of blood clots
 - Occurs when there is increased plasmin being released after tissue damage
 - More plasmin is being generated because the body naturally release more tPA
 - This is why it is so important for intervention to happen to stop further bleeding before excessive blood loss
 - Factors that affect hemorrhage
 - The extend of the injury & trauma induced coagulopathy/hyperfibrinolysis
 - Amount of time that pasts prior to receiving medical attention
 - Results of untreated/addressed hemorrhage is hemorrhagic shock
 - Hemorrhagic Shock
 - Classified as a type of hypovolemic shock because of the reduction in intravascular blood volume
 - Results in tissue hypoxia and multi-system organ failure
 - Many patients die form shock due to blood loss
- Tranexamic Acid (TXA)
 - Is given to patients with bleedings disorders

- It will help control/prevent bleeding complications and decrease mortality with minimal adverse effects
 - Mechanisms of Action
 - Antifibrinolytic agent and a molecular analogue of lysine
 - Inhibits the conversion of plasminogen to plasmin and the breakdown of fibrin in blood clots by competing for the binding sites
 - TXA does **not** promote coagulation, its goal is to stop clots from breaking down (the clot is staying active because it is not being broken down)
 - Trauma/hemorrhage Use
 - Used to prevent blood loss
 - Will decrease the need for blood transfusions
 - Can be used surgically, in trauma situations, and postpartum hemorrhages
 - Administration and Monitoring
 - Can be given intravenously or orally
 - Standard dose for trauma use is 1 gram IV loading dose over 10 minutes and infusing an additional 1 gram over 8 hours for continued bleeding
 - Do not exceed a total of two grams
 - Should be administered within the first 3 hours after injury
 - Monitoring
 - Any more active bleeding, monitor hemodynamics, watch for thromboembolic events, and hypotension, the time frame from injury to administration of TXA
 - Side effects
 - Headache, fatigue
 - Seizures
 - DVT or PE
 - Abdominal pain
 - Contraindications
 - Hypersensitivity to TXA
 - Known history of DVT or PE
- Massive Transfusion Protocol (MTP)
 - Facilitates rapid restoration of circulating blood volume for anyone who has rapid/massive blood loss
 - Massive blood loss and massive transfusion will be activated by a physician and meet one of the listed requirements;
 - 8-10 units of red blood cells (RBCs) in less than 24 hours
 - 4-5 units of RBCs in 1 hour
 - A loss of more than 40% of a person's volume of blood in 3 hours

- Losing more than 150 mL of blood per minute
- Hemostatic Dressings
 - Should be used in the presence of bleeding with direct manual pressure
 - Dressings are infused with agents that will help enhance blood clotting
 - They are well tolerated with no adverse effects to be noted

On-scene Treatment

- Assessment of Scene
 - Ensure that the scene/situation is safe
 - Check patients airway for patency, assess breathing efforts, and the check their circulation (ABC's)
- External Bleeding – “Stop the Bleed”
 - “Stop the Bleed” version of ABC's
 - **A**lert 911
 - Identify the source of **B**leeding
 - Open or remove clothing over a wound so it can be clearly seen
 - Is the blood spurting out?
 - Is there blood pooling on the ground?
 - Are clothing or bandages soaked with blood?
 - **C**ompress with manual pressure, wound packing, or tourniquet application
 - They all have the common goal of compressing the blood vessel in order to stop the hemorrhage
 - Applying direct pressure
 - Use a clean cloth to cover the wound and apply pressure
 - Push directly down with 2 hands pushing as hard as you can
 - Continue to hold pressure until relieved by medical responders
 - Do not remove a dressing or cloth once it is applied, just place another one on top and hold them both in place
 - Packing the wound
 - “Stuff” or pack a wound if it is large and deep enough
 - There is no exact measurement to determine what is “large and deep” so use clinical judgement
 - Use a clean cloth like a shirt or gauze if available on scene
 - Tourniquets
 - Used for bleeding from bodily extremities and are placed on the arms or legs
 - Place tourniquet 2 to 3 inches above the bleeding site
 - Do not place on a joint, if needed apply one above the joint

- If a tourniquet is available, pull the free end of it to make it as tight as possible
 - Twist the windlass until bleeding stops
 - If a tourniquet is not available, you can use a belt or piece of clothing to tie around body part to control bleeding
 - Document the time the tourniquet was applied
 - It can be applied and used for up to 2 hours without causing additional damage
 - Know that tourniquets will cause pain but are essential in stopping life-threatening blood loss
- Pressure Points
 - Can be used to control bleeding when a tourniquet is unavailable or cannot be used
 - Tourniquets cannot be used if an injury is too close to the trunk of the body
 - Tourniquets will always be the preferred method over using pressure points
 - Goal is to compress a major artery against the bone
 - Brachial artery pressure point
 - Position the arm in a 90° angle
 - Hold upper arm away from the patient's body
 - Use fingers to feel the inside of the patient's biceps halfway between the elbow and shoulder
 - Push the bicep muscle out of the way
 - "Squeeze or press your hand down on the patient's humerus
 - If done correctly you should be able to feel a pulse as you are pressing down
 - Femoral artery pressure point
 - Is in the groin

ED Treatment

- Initiate the Blood Transfusion
 - The amount to be transfused depends on the estimated percentage of circulatory blood volume that is lost and how the body is compensating due to that loss
- Stabilizing the Patient
 - Follow essential components of standard ABC's (airway, breathing, circulation, and disability/neurologic status)
 - Try to identify where the bleeding is coming from
 - The patient may need to go straight to the operating room to stabilize large amounts of bleeding
 - If enough blood is lost, the patient may need to be intubated to maintain oxygenation and tissue perfusion

- Follow “Stop the Bleed” steps
 - Determine if any other diagnostic procedures or scans need to be completed
 - CT
 - X-ray
- Preventing/treating Shock
 - Recognize early signs and symptoms of shock
 - Confusion
 - Rapid HR
 - Cold/clammy skin
 - Rapid breathing
 - Treat with 0.9% of Sodium Chloride or Lactated Ringers, hug warmer, stop any progressive bleeding

Role of the ED Nurse

- Establish IV Access
 - Multiple large-bore IV lines will be needed to initiate the transfusion quicker
 - Administer fluids as ordered
 - Watch for signs and symptoms of fluid overload
 - Edema, hypertension, check pain, crackles in the lungs, etc.
- Massive Transfusion Protocol (MTP)
 - Once MTP is activated, it will remain active until the attending physician discontinues the order
 - The nurse should have a dedicated person to be the liaison with the Blood Bank
 - Their job is to keep the Blood Bank informed of the status of the patient and patient location
 - Contact the Blood Bank
 - Extension 3569 in the hospital
 - Ensure that a properly labeled blood bank specimens are collected and delivered to the Blood Bank
 - Make sure there is a MTP order and other lab requests are in Cerner
- Obtain Labs
 - Check CBC, coagulation panel, fibrinogen level, lactate, and electrolyte levels
 - Monitor lab values prior to the start of, periodically throughout, and after the acute transfusion episode
 - Blood type and screen if applicable
 - Patients may receive uncrossed blood to begin the transfusion
 - Within 7 minutes of the request, uncrossed blood will be sent
 - Once the type and screen is completed than that specific blood type will be sent
 - For initial emergency release of blood
 - The nurse will receive 2 bags of red blood cells (RBC)

- After a total of 6 RBC, there will be 6 Fresh Frozen Plasma (FFP) and 1 platelet sent
 - The Blood Bank will discontinue serologic compatibility once the patient has been transfused with ten units of RBC
- Obtain Vital Signs
 - o Watch for transfusion reactions
 - Temperature, HR, BP, RR, oxygen saturation
 - MAP > 60 to ensure sufficient perfusion
- Monitor for Adverse Reactions
 - o Hemolytic reactions
 - Reaction to plasma proteins
 - May turn into anaphylaxis
 - Watch for itching and wheezing
 - o Febrile Reaction
 - Fever
 - Chills
 - o Circulatory Overload
 - The heart is not functioning properly
 - Shortness of breath, cough, back pain
 - o Air Embolism
 - Happens when blood is going in too fast
 - Air may get into the vein if not being careful
 - Shortness of breath, anxiety, chest pain
- Monitor for Complications of Massive Transfusion
 - o Rate-related complications – “washed out”
 - Hypocalcemia
 - Due to the chelation of calcium during the transfusion
 - o Calcium will need to be given after a few bags are transfused
 - Pins and needles sensation, cramping, muscle weakness
 - Hyperkalemia
 - Dysrhythmias
 - Hypomagnesemia
 - N/V, sleepiness, weakness, hyperreflexia
 - Acidosis
 - Hypothermia
 - The blood product may be cold which would cause the body to become chilled
 - Confusion, shivering, weak pulse
 - o Volume-related complications
 - Dilutional thrombocytopenia
 - Dilutional procoagulant factors

- Dilution of anticoagulant factors
- Administer TXA if ordered
 - Help control the bleeding
- Keep the patient calm
 - Determine level of consciousness
 - If the patient is alert, instruct them to report any shortness of breath, itchiness, back pain, etc.
- Emergency Consent
- Determine the Patient's Wishes
 - Religious, cultural, or spiritual beliefs conflicting with receiving a blood transfusion?
- Support the Family
 - Include the family in care
 - Explain procedures when appropriate

Discharge/prevention Instructions

- Discharge Teaching r/t "Stop the Bleed"
 - How to apply direct pressure
 - How to use a tourniquet/pressure points to control bleeding
 - What a "Stop the Bleed" kit looks like in the community
- Discharge Teaching r/t MTP
 - Watch for any new signs or worsening bleeding
 - Watch for signs of late blood transfusion reactions
 - Fever
 - Mild jaundice
 - Decrease in hemoglobin
 - Importance of follow up labs
 - CBC, coagulation panel, electrolytes
 - Follow up with doctor

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