

Crush Injuries and Traumatic Amputations

Etiology & Pathophysiology

- Amputation- Tissue has been separated from the extremity & is without nutrition/oxygenation.
 - Complete- vessels are completely transected, this causes constriction & retraction.
 - Incomplete- the two ends can not retract & blood continues to flow out.
- Crush Injury/Crush syndrome-Prolonged crushing or entrapment from a traumatic mechanism.
 - Cellular hypoperfusion & hypoxia occur due to prolonged compression or torn vessels.
 - Prolonged compression-rhabdomyolysis- myoglobin & potassium are released.
 - During extrication, the limb becomes reperfused with fresh blood- the blood from the injured body part with increased levels of myoglobin & potassium are released to the rest of the body.
 - High levels of myoglobin produce tea-colored urine (can lead to renal failure) & high levels of potassium can cause cardiac dysrhythmias.
 - Before removal of the object- apply a tourniquet above the site of injury- helps to prevent the release of toxins into the circulatory system.
- Compartment syndrome- Rise in interstitial pressure within the closed fascial compartment.
 - The swelling occurs inward, leading to compression & collapse of nerves, muscle fibers, & blood vessels.
 - Pressure rises = compromised arterial flow & nerve function & cells become hypoxic (then necrotic).

On-scene Treatment

- Patients are in shock- May be unaware of the extent of injuries & this can precipitate extreme anxiety & hemodynamic instability.
- ABC's or CAB
- Hemorrhage control is essential to survival- Initially bleeding should be controlled with direct pressure & if unsuccessful = apply tourniquet.
- Management of the limbs (EMT)- 1. Clean the amputated part with LR or NS 2. Wrap in sterile gauze soaked with LR & place in a container or plastic bag 3. Label the bag & place it in a container with ice
- Stump & limb care- Do not directly place on ice or add dry ice, do not use hydrogen peroxide.
- Re-implantation may be unsuccessful due to
 - Comorbidities: diabetes mellitus, vascular disorders, HTN, & advanced age.
 - Extensive neurovascular damage, prolonged ischemia, multiple injury levels, severe contamination.

ED Treatment

- Tetanus prophylaxis & broad-spectrum antibiotic therapy.
- IV opioid therapy for pain management & obtaining labs/imaging.
- Treatment for Rhabdomyolysis- initiation of aggressive fluid resuscitation.
- Treatment for Compartment Syndrome- Emergency surgical intervention (Fasciotomy) for decompression

Role of the ED Nurse

- Surgery prep- consents signed & answer questions.
- Recognize s/sx of deterioration & report immediately.
- Administer emergency medications/fluids & any blood products prn

- Control Bleeding & prevent shock & keep vitals within normal limits ex. SpO₂ >93%.

Discharge and Prevention

- Review safety precautions~dangerous recreational activities & hazardous working conditions.
- Develop a realistic attitude about the future- monitor for PTSD.
- Teach about prevention & detection of complications after surgery.
- PT & OT will be a central part of the patient's overall plan of care.