Basic Principles Of Open Fracture Management

Done by: Saleh Alkhalifa
Edited & Revised by: Adel Al Shihri
References: Department handout, Notes(by moath baeshen), 433 OSCE Team.

Introduction

Open fractures: fractures that are exposed to the external environment.
The amount of soft tissue destruction is related to the level of energy imparted to the limb during the traumatic episode.

Open fracture can be an isolated entity or part of high energy multiple trauma injuries.
Approach should be always toward saving patient's life, safe patient's limb then save limb's function.

Most likely the trauma that cause open fracture is high energy (e.g. RTA) so you need first to stabilize the patient by ATLS whenever pt stable move to the limb

<table>
<tr><th colspan="3">Classification: Open fractures are commonly described using the Gustilo grading system</th></tr>
<tr><th>Type 1</th><th>Type 2</th><th>Type 3</th></tr>
<tr><td>small (<1cm), clean wounds, minimal injury to the musculature and no significant stripping of periosteum from bone</td><td>large (> 1 cm but < 10 cm) wounds, no significant soft tissue damage</td><td>A: large wounds ,associated with extensive injury of soft tissue but adequate viable soft tissue present to cover the bone</td></tr>
<tr><td colspan="2" rowspan="2">Approach should be: always toward saving patient's life, safe patient's limb then save limb's function.

To Know whether it is 3B Or 3C Check for pulse</td><td>B: large wounds those are associated with extensive injury of soft tissue without adequate viable soft tissue present to cover the bone</td></tr>
<tr><td>C: Open fractures associated with Vascular injury</td></tr>
</table>

IN ER

- **WIPE:**
  - **Precautions guideline (gowns, shoes cover, sterile gloves, face shield mask), dressing pads, normal saline)** (Then ATLS principles, ABCs..)
  - **Consent, explain what are going to do.**
  - **Give him analgesia.**
  - **Start IV antibiotic based on open fracture initial staging and patient allergy history.**
  - **Ask the patient for tetanus vaccine status.**

- **Initial local wound care:**
    - **Expose** the wound, **look for**: Size of the wound, swelling, deformity, color of skin,
      contamination.
    - **Take picture** to avoid opening the wound again. Also, as medico legal documentation. (describe the wound; when multiple wounds, the largest is the most important)
    - **Remove any obvious foreign body from wound** (avoid digging deep into wound) (e.g. glass, clothes or dust).
    - **Irrigate** wound with Normal Saline (1-2 L).
    - **Push** any prominent fracture fragment gently.
    - **Cover** the wound with sterile saline-soaked gauzes.
    - **Wrap** the limb with sterile cotton roll.

- **Check distal neurovascular status, and check for compartment syndrome.** (wooden skin, compare to other leg, painful big toe traction)

- **Reduction:**
    - Reduce fracture by applying traction and counter-traction followed by correcting the deformity. (Maintain alignment and rotation)

- **Immobilization:**
    - Using backslab the aim is to reduce the pain, prevent further vascular damage and skin damage.

- **Re-check distal neurovascular status.**

- **Send patient for appropriate X-rays:**
    - Do X-ray 2 views and 2 joints(distal and proximal joint).

- **Antibiotics selection:**
    - According to doctor judgment (1st generation cephalosporin is used always then according to the wound he can add other antibiotics)

Grade 1	Give 1st generation cephalosporin (gram +ve) Ex: cefazolin
Grade 2	Cover both gram –ve and +ve by adding Gentamicin
Grade 3	Add penicillin to cover for anaerobes such as clostridium
Add penicillin for all farm and soaked wounds	

Tetanus prevention: **(it depends on the wound type)**

Clean wounds criteria	Other wounds
<6 hours from injury	Any wound **does not** apply to type A
Not a farm injury	
No significant devitalized tissue	
Non immersed wound	
Non contaminated wound	

Clean wounds			Other wounds		
Completed vaccination		Not Completed or Unknown	Completed vaccination		Not Completed or Unknown
Booster < 10 years	Booster > 10 years	Td 0.5 ml IM	Booster <5 years	Booster > 5 years	TIG 250U and Td 0.5ml IM
nothing	**Td 0.5ml IM**		**nothing**	**Td 0. ml IM**	

Tetanus toxoid (Td) considered as active immunity. While immunoglobulins (TIG) are passive immunity. Called in Arabic الكزاز. Ask about vaccination status. In KSA, most patients will be not completed or unknown.

When the patient is stable take him to OR

In OR

As soon as patient is stable and ready, alert the OR, and get consent from the patient for surgery.

- Plan: Irrigation (usually we use about 15 L of normal saline), debridement of necrotic tissue (because it is a source of infection) and fracture stabilization.
- The sooner the less risk of further morbidity.

In the OR: move to the OR as soon as the patient is stable enough.

- Extend wound if necessary. If it was a small wound, we need to extend until we can reach the bone.
- Thorough irrigation.
- Debride all necrotic tissue.
- Remove bone fragments without soft tissue attachment i.e. floating except articular fragments (except the part of bone that have cartilage over it).
- In OR, if there were no necrotic tissue, no contamination & the cut was simple &
- clean (make sure) →stabilize the fracture & close the wound But if you find necrotic tissue →do debridement & leave the wound open (no suture yet only gauze & bandage) →recheck again in 48-72 hour for necrotic tissue.
- Usually requires second look or more every 48-72 hours.
- Generally, do not close open wounds on first look. (Don't close it surgically, only cover it, and then put external fixation).
- whenever the wound become clean close it **the definitive Tx will be IM nail.**

(what will you tell the OR?
Diagnosis: eg Open fracture, grade 3C.
What you'll do? Debridement, irrigation and external fixation
If 3B, mention that you'll need a plastic surgeon
If 3C, mention that you'll need a vascular surgeon and a plastic surgeon)