

Best Practice Guideline – Open Fracture Care

An open fracture occurs when a fractured bone is exposed to contamination from the external environment through the disruption of the skin and subcutaneous tissues (e.g. colon and vagina tears as well) and those fractures are susceptible to infection.

Gustilo Classification – Open Fractures	
Type I	Open fx with a skin wound < 1 cm in length and clean
Type II	Open fx with a skin wound > 1 cm in length without extensive soft tissue damage, flaps, or avulsions.
Type III	Open segmental fx with > 10 cm wound with extensive soft tissue injury or a traumatic amputation (e.g. GSW or farm injuries causing open fx).
III _a	Adequate soft tissue coverage
III _b	Significant soft tissue loss with exposed bone that requires soft tissue transfer to achieve coverage
III _c	Associated vascular injury that requires repair for limb preservation

I. EMS triage/care

- a. Primary and Secondary Survey per PHTLS
- b. Control any ongoing bleeding
- c. Irrigate gross contamination with saline or water
- d. Cover wound with sterile dressing
- e. Antibiotic therapy – IF AVAILABLE
 - i. IV antimicrobials should be given to patients within one hour of discovery
 - ii. Gustilo type 1 or 2 should receive a 1st generation cephalosporin
 - iii. Gustilo III fractures should consider adding gram negative coverage
 - iv. Severely contaminated open fractures should consider anaerobic coverage in the form of a high-dose penicillin (e.g. fecal or claustridial contamination, i.e. farm-related injuries).
- f. Remove constricting clothing or jewelry (e.g. watches, rings, bracelets) before splinting the fractured extremity.
- g. Pad and Splint the joint above and below the fracture and splint the extremity in its position of function if pulses are jeopardized.
- h. Reassess pulses after applying the splint
- i. Consider elevation of the splinted extremity to help reduce swelling
- j. Pain control per local medical direction
- k. Transport to the nearest, appropriate trauma center with Orthopaedic capabilities.

II. Emergency Department

- a. ATLS evaluation and resuscitation
- b. Control any ongoing bleeding
- c. Antibiotic therapy
 - i. IV antimicrobials should be given to patients within one hour of presentation if not previously administered by EMS or referring hospital
 - ii. Gustilo type 1 or 2 should receive a 1st generation cephalosporin
 - iii. Gustilo III fractures should consider adding gram negative coverage
 - iv. Severely contaminated open fractures should consider anaerobic coverage in the form of a high-dose penicillin (e.g. fecal or claustridial contamination, i.e. farm-related injuries).
- d. Irrigate gross contamination with saline or water
- e. Cover wound with sterile dressing
- f. Remove constricting clothing or jewelry (e.g. watches, rings, bracelets) before splinting the fractured extremity.
- g. Pad and Splint the joint above and below the fracture and splint the extremity in its position of function if pulses are jeopardized.
- h. Reassess pulses after applying the splint
- i. Consider elevation of the splinted extremity to help reduce swelling
- j. Pain control
- k. Urgent Orthopaedic consultation
- l. Tetanus toxoid should be given if:
 - i. The patient had an incomplete primary immunization
 - ii. It has been >10 years since their last booster dose
 - iii. The immunization history is unknown or unclear

III. Hospital Management

- a. Antibiotics should continue scheduled dosing until surgical management is performed.
- b. A minimum of 24 hours of antibiotics should be administered from the start of the surgical procedure and the duration of antibiotics is dependent upon the level of contamination.
- c. Patients with open fractures should be taken to the operating for irrigation and debridement within 24-hours of presentation and sooner if the contamination is severe.
- d. Skin defects overlying open fractures should be closed at the time of initial debridement whenever possible.
- e. Soft tissue coverage should be completed within seven days of injury when the injury is associated with wounds requiring skin grafting or soft tissue transfers.
- f. For severely contaminated wounds, consider external fixation with negative pressure wound management therapy and multiple irrigation trips to the operating room.
- g. Once the fracture is stabilized and the wound closed, consider the early evaluation of the patient by physical and occupational therapy as well as the rehabilitation team.

IV. Pediatric Considerations

- a. Antibiotic therapy
 - i. IV antimicrobials should be given to patients within one hour of presentation if not given by EMS or at the transferring hospital
 - ii. Gustilo type 1 or 2 should receive a 1st generation cephalosporin
 - iii. Gustilo III fractures should consider adding gram negative coverage
 - iv. Severely contaminated open fractures should consider anaerobic coverage in the form of a high-dose penicillin (e.g. fecal or claustridial contamination, i.e. farm-related injuries).

V. References

- a. ACS TQIP Best Practices in the Management of Orthopaedic Trauma
- b. EAST Practice Management Guidelines Work Group: Update to PMG for prophylactic antibiotic use in open fractures. JoTIIC. 70(3). March 2011.
- c. PHTLS 6th edition. 2007.

GETAC Trauma Systems Committee - Pending Approval