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Applicability Erlanger Health -
Baroness

Long Bone Fractures in Polytrauma Patients

Guideline Statement:

To provide a systemic approach to the care of long bone fractures in the polytraumatized patient

Scope:

Emergency Department Attending, Emergency Department Resident, Trauma Residents, Trauma Attending, Orthopaedic Residents, Orthopaedic Attendings

Introduction:

- Early definitive fracture stabilization in the acidotic, incompletely resuscitated trauma patient results in an iatrogenic worsening of the inflammatory cascade, increasing morbidity and mortality for the polytrauma patient
- Within the first 8 hours, correction of lactate <4.0 mmol/L, pH >7.25 , or BE <-5.5 mmol/L is associated with a reduced risk of pulmonary complications
- In the persistently acidotic patient, damage control orthopaedics is indicated (debridement and irrigation of open fractures, external fixation of unstable pelvic ring injuries, external fixation of long bone and periarticular fracture/dislocation)

Guidelines:

- Laboratory evaluations
 - Polytraumatized intubated patients should have routine sequential ABG labs drawn until ideal resuscitation is achieved
 - Non-intubated polytrauma patients should have routine sequential serum lactate followed for 24-48 hours until ideal resuscitation is achieved

- Treatment dichotomy
 - Damage control orthopaedics (DCO)
 - Lactate >4.0 mmol/L
 - pH < 7.25
 - BE > -5.5
 - Above values plus trend towards increasing acidosis
 - Definitive fracture care (DFC)
 - Lactate <4.0 mmol/L
 - pH > 7.25
 - BE < -5.5
 - Above values plus trend towards decreasing acidosis
- Timing:
 - Femoral shaft/proximal femur fractures should be stabilized temporarily (DCO) or definitively (DFC) within 24 hours of arrival at hospital
 - Patients taken to OR in initial 24 hours for stabilization of femur should have other long bones and periarticular fracture-dislocations stabilized at that OR trip as indicated based on patient's resuscitation parameters
 - Other long bone fractures (distal femur, tibia, humerus, forearm) should receive DFC once the patient has been adequately resuscitated and medically optimized
- Sequence of fixation: femur → tibia → humerus → forearm
- DCO strategies include:
 - Debridement and irrigation of open fractures +/- antibiotic beads and wound vacuum dressings for extensively contaminated wounds
 - Temporary cannulated screw fixation of femoral neck and simple-plane peritrochanteric fractures
 - External fixation constructs for subtrochanteric/shaft/distal femur and tibial fractures and fracture/dislocations (knee/ankle)
 - Bracing or splinting of upper extremity long bone injuries unless open fractures necessitate major soft tissue or vascular repair, in which case external fixation may provide improved stability
- DFC Strategies include:
 - To prevent fat-emboli syndrome, consider distal metadiaphyseal cortical venting or use of reamer-irrigator-aspirator device when multiple long bones undergo intramedullary nailing in a single OR trip
 - To avoid cross-contamination of definitive instruments/implants with the open fracture wounds when open and closed fractures are addressed simultaneously, it may be appropriate to consider definitive internal fixation of the closed fracture before treatment of the open fracture

- When multiple long bones are stabilized in the same OR trip, communicate with anesthesia to assess patient stability before starting stabilization of secondary fracture(s)

References:

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- B. Obey, Mitchel R. MDa; Clever, David C. MD, PhDa; Bechtold, Daniel A. MDa; Stwalley, Dustin MSb; McAndrew, Christopher M. MDa; Berkes, Marschall B. MDa; Wolinsky, Philip R. MDc; Miller, Anna N. MDa. In-Hospital Morbidity and Mortality With Delays in Femoral Shaft Fracture Fixation. Journal of Orthopaedic Trauma: May 2022 - Volume 36 - Issue 5 - p 239-245 doi: 10.1097/BOT.0000000000002271

Approval Signatures

Step Description	Approver	Date
COO	John Winks: Executive Vice President-COO	01/2025
Trauma Services Committee Approval	Stephanie Spain: Trauma Prgm Mgr Adult	01/2025
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Erlanger Health - Baroness