CEN: Musculoskeletal and Wound Emergencies

Compartment syndrome, fractures and dislocations, crush and fat embolism, amputation, tetanus, bites, wound closure, soft-tissue infection and hot joints for the CEN

ICU Basics
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LIMB COMPARTMENT SYNDROME

Compartment pressure above capillary pressure starves muscle and nerve while the pulse persists. Causes: fractures (tibia, both-bone forearm), crush, reperfusion after vascular repair or embolectomy, tight casts and dressings, long immobility on a hard floor.

STAGE	FINDINGS	MEANING
Early	Pain out of proportion, pain on passive stretch, tense compartment	Act now
Next	Paresthesia (anterior leg: numb first web space)	Nerve ischemia
Late	Pallor, paralysis, pulselessness	Necrosis under way
Sedated or intubated	Firm limb, cannot report pain	Measure pressure

- Release every cast, splint and dressing down to skin; keep the limb at heart level, not raised
- Correct hypotension; call the surgeon at once; do not wait for the pulse to fade
- Fasciotomy threshold: compartment pressure above about 30 mm Hg, or within about 30 of the diastolic BP (diastolic minus compartment pressure, the delta, 30 or less)
- Watch potassium, CK and urine color afterward

SAFETY A palpable pulse and brisk capillary refill do not rule it out. Use diastolic BP, not MAP, for the delta.

DISLOCATIONS AND HIGH-RISK FRACTURES

INJURY	CLUE	AT RISK	PRIORITY
Anterior shoulder (95%+)	Squared-off, arm held slightly out	Axillary nerve: deltoid sensation	Document before and after reduction; sling
Posterior shoulder	After seizure or shock; arm adducted, internally rotated, cannot turn out	Easily missed on one view	Axillary or Y view
Posterior hip	Dashboard knee; leg short, adducted, internally rotated	Femoral head blood supply, sciatic nerve	Closed reduction, preferably within 6 h
Knee dislocation	Grossly unstable knee, may have reduced itself	Popliteal artery, peroneal nerve	ABI 0.9 or less: vascular surgeon, CT angiography; repair within 8 h
Supracondylar humerus (child)	Fall on outstretched hand, swollen elbow	Brachial artery, median, radial and ulnar nerves	Pulse, perfusion, motor and sensation before and after splinting
Radial head subluxation	Toddler pulled by the hand, arm held still, no swelling	Nothing serious	No x-ray if history fits; hyperpronation

EXAM TIP Normal pedal pulses do not clear a knee dislocation; an intimal tear can occlude later.

OPEN FRACTURES, SPLINTS AND CASTS

- Open fracture: IV antibiotic first, ideally within 1 h of arrival (cefazolin; add gram-negative cover for Gustilo type III), tetanus per the table, sterile moist dressing, splint; formal irrigation and debridement in the OR
- Splint deformed or unstable fractures early, joint above and below; check pulse, color, motor and sensation before and after
- Sprain or simple fracture: protect, rest, wrapped ice 15-20 min at a time for 24-48 h, compression, elevation
- Cast teaching: keep it dry, nothing inside it, keep it raised; return for worsening pain, a cast that feels too tight, new numbness or weakness, odor or fever

SAFETY Pain under a cast that analgesia does not touch is compartment syndrome until proven otherwise: release the cast and call.

FAT EMBOLISM, CRUSH AND RHABDOMYOLYSIS

PROBLEM	RECOGNIZE	DO
Fat embolism syndrome	Usually 24-72 h after long-bone or pelvic fracture: hypoxemia, confusion, petechiae on neck, chest, axillae	Oxygen, prepare to ventilate; early splinting and fixation; heparin and steroids have no proven role
Crush syndrome	Limb trapped for hours; shock, high potassium and acidosis when released	Isotonic saline before or during extrication; cardiac monitor; avoid potassium-containing fluid
Rhabdomyolysis	CK above 5 times normal; dipstick blood with no RBCs; dark urine	IV fluid to a high urine output; check potassium, calcium, creatinine

AMPUTATION AND DEGLOVING

- Stump: direct pressure, then a tourniquet if pressure fails
- Part: moist gauze, sealed bag, bag on ice or in ice water; never direct ice or freezing; label the time
- Degloving or avulsion flap still attached: pressure, lay the flap back, moist sterile dressing

TETANUS PROPHYLAXIS BY WOUND

PRIOR DOSES	CLEAN, MINOR WOUND	DIRTY OR MAJOR WOUND
Unknown or fewer than 3	Vaccine	Vaccine plus TIG
3 or more	Vaccine if last dose 10+ years ago	Vaccine if last dose 5+ years ago
HIV or severe immunodeficiency	As above	TIG whatever the history, plus vaccine if due

- Dirty or major: punctures, soil, feces, saliva (bites), burns, open fractures, crush, frostbite
- DTaP under age 7; Tdap or Td from 7
- TIG 250 IU IM for prophylaxis; never for a clean, minor wound
- Surviving tetanus gives no immunity: start the series

BITES AND RABIES

BITE	KEY POINT	PLAN
Cat	Deep punctures, high infection risk on the hand	Irrigate, leave open, amoxicillin-clavulanate
Dog, face	Face heals well and scars if left open	Irrigate, primary closure, short preemptive antibiotic
Clenched fist	Small wound over a knuckle; joint or tendon often hit	Treat as a human bite: examine with fist clenched, leave open, IV antibiotic, hand surgery
Bat in the bedroom	Sleeping, impaired or unattended person; bite may be invisible	Rabies PEP unless the bat tests negative
Healthy dog, cat or ferret	Animal can be watched	Confine and observe 10 days; PEP only if it shows signs

- Rabies PEP, never vaccinated: wash the wound; HRIG 20 IU/kg into and around it; vaccine in the deltoid days 0, 3, 7, 14 (plus 28 if immunocompromised). Vaccinated before: days 0 and 3, no HRIG

SKIN AND SOFT-TISSUE INFECTION

INFECTION	CLUE	TREATMENT
Abscess	Fluctuant, purulent	Incision and drainage; add anti-MRSA drug if SIRS or weak host defenses
Cellulitis, nonpurulent	Spreading redness, no pus	Antistreptococcal drug 5 days; elevate; treat cracked toe webs
Necrotizing infection	Pain out of proportion, edema beyond the redness, wooden-hard tissue, bullae, crepitus, numb skin, shock	Surgeon now for debridement; broad IV antibiotics; imaging must not delay surgery

SAFETY Group A strep necrotizing fasciitis: penicillin plus clindamycin, because clindamycin suppresses toxin production. Expect a return to the OR in 24-36 h.

HOT JOINT AND LIMPING CHILD

PROBLEM	CLUE	ACT
Septic arthritis	Hot swollen joint; synovial WBC above 50,000 with neutrophils	Aspirate before antibiotics; drain; crystals do not exclude infection
Disseminated gonococcal	Young adult, tenosynovitis, acral pustules, migratory joint pain	Swab all sites; ceftriaxone 1 g IV every 24 h
Septic hip vs transient synovitis	Kocher: no weight bearing, fever 38.5 C+, ESR 40 or more, WBC above 12,000	More predictors: urgent ortho aspiration; well child: NSAID and review

Sources (36) are listed with links at icubasics.com/sheets/cen-msk-wound.html. For education and exam preparation only. Not medical advice; follow current guidelines and your institution's protocols. ICU Basics is an independent study aid not affiliated with any certifying body.