PEDIATRIC
Emergency Medicine Practice
Evidence-Based Education • Practical Application

QUICK READ

Points & Pearls

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Pediatric Firearm Injuries to the Extremity: Management in the Emergency Department

Points

- Exsanguinating pediatric firearm injuries to the extremity in which bleeding is not controlled with hemostatic gauze should prompt immediate application of a tourniquet.
- If possible, the tourniquet should be removed within 120 minutes. Contraindications to removal include distal traumatic amputation, hemodynamic instability, other life-threatening injuries, and inability to monitor the wound for signs of rebleeding.[64] **(See Table 5, page 12.)**
- If the tourniquet has been in place for >120 minutes, be prepared to monitor and manage complications such as rhabdomyolysis and/or compartment syndrome.
- Hard signs of extremity injury include pulsatile external bleeding, expanding hematoma, thrill, bruit, pulselessness, pallor, and/or neurologic deficit.[45]
- If hard signs are absent, calculate an arterial pressure index (API) by comparing the systolic blood pressure obtained through Doppler evaluation of the injured extremity over the systolic blood pressure of the uninjured extremity.
- Obtain a computed tomography angiogram if the API is <0.9 or if there is any concern for a vascular injury.[47]
- Gunshot wounds that violate the joint capsule and open fractures likely benefit from early (<3 hours) antibiotic coverage. The Gustilo-Anderson classification for open fractures can help guide antimicrobial management.[66,67,69,70] **(See Table 6, page 13.)** Recently, the use of ceftriaxone alone without the use of an aminoglycoside has been advocated for type III open fractures, without an increase in soft-tissue infections.[69]
- Involve consultants early, as these injuries require a multidisciplinary approach with contributions from trauma, vascular, and/or orthopedic surgeons.
- Indications for immediate operative intervention include hard signs of vascular injury, inability to remove a tourniquet given significant bleeding, occlusive injury of a major artery causing impaired perfusion, or development of compartment syndrome.
- To decrease complications (eg, compartment syndrome, rhabdomyolysis, or limb ischemia), revascularization should be achieved as soon as possible, despite classic teaching of limb viability for up to 6 hours.
- For retained bullet fragments, discuss the potential need for serial blood lead level monitoring and possible removal if blood lead level exceeds the recommended value.[88]
- Inform parents and patients about the potential for physeal injuries leading to limb-length discrepancies that may result from the shock wave created by high-velocity projectiles.[65]
- Regardless of the intent, pediatric firearm injuries are sentinel events and provide an opportunity to discuss safe-storage practices and to screen for mental health concerns and substance abuse.[89]
- Review the state or territory laws regarding mandated firearm injury reporting to law enforcement.
- Child Protective Services should be notified separately if the child is deemed to be in danger of abuse or neglect.

Pearls

- Tachycardia and delayed capillary refill are early signs of compensated shock.
- CAT® tourniquets can be used in children as young as 2 years of age. Tourniquets should be placed proximal to the wound. Once the strap is tightened around the humerus or femur, twist the windlass until the distal pulse is no longer palpable. **(See Figure 5, page 7.)**
- Clearly document on the tourniquet and/or the chart the exact time of application.
- Beware of the "3 As" (increasing anxiety, agitation, and analgesic requirement) seen in pediatric compartment syndrome.[78]
- Safe-storage practices that should be discussed with patients and guardians are: guns should be stored unloaded and locked in a lockbox, and ammunition should be stored in a separate lockbox.