Critical Questions, Intelligent Answers

Critical decisions in emergency medicine

Residency Education Program

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Head Games

Traumatic Brain Injury – Concussion

LESSON 9

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Reviewed by Daniel A. Handel, MD, MPH, FACEP

CRITICAL DECISIONS

On completion of this lesson, you should be able to:
1. Describe the physical examination findings that should raise concern for concussion.
2. Identify the most common complications of acute concussion and second impact syndrome.
3. Explain the options for treating concussion in the emergency department.
4. Explain the underlying pathophysiology of concussion.
5. Detail when and how patients can be cleared to resume physical activities following head injury.

FROM THE EM MODEL

18.0 Traumatic Disorders
18.3.6 Head Trauma

Defined by a complex constellation of physical, cognitive, and emotional symptoms, concussion is among the most common injuries seen in the emergency department. Although it falls on the mild end of the traumatic brain injury (TBI) continuum, this seemingly benign diagnosis can have life-altering — even deadly — consequences if not properly identified and managed.1

OBJECTIVES

What is a concussion, and what presentations should raise suspicion for this diagnosis?
What role does the pathophysiology of concussion play in patient management?
What diagnostic tools are most valuable for the evaluation of concussion?
What are the best options for treating acute concussion in the emergency department?
How should prolonged symptoms be managed?
What critical information should be included in a concussive patient’s discharge instructions, and how should return to play be approached?

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POSTERIOR TIBIAL NERVE BLOCK

The Critical Procedure

A posterior tibial nerve block can make an otherwise difficult and uncomfortable procedure on the sole of a patient’s foot relatively quick and painless. By providing anesthesia to the plantar surface, this approach obviates the need for local infiltration or a large volume of anesthetic.

CONTRAINDICATIONS
- Allergy to anesthetic medications
- Overlying infection/inflammation
- Relative – uncooperative patient
- Relative – severe coagulopathy

Benefits and Risks

- Nerve blocks provide almost complete sensory anesthesia to the plantar surface of the foot, often much faster than local infiltration. The posterior tibial nerve is superficial to the skin and can be approached in a variety of ways.

TECHNIQUE

1. Clean the area. Use aseptic technique to clean the skin on the posterior aspect of the ankle, including the posterior tibial artery. This can aid in the identification of the nerve. The nerve will sit approximately 0.5 to 1 cm super-/proximal to the posterior tibial artery.
2. Obtain the area. Insert the needle just outside of the nerve on ultrasound, and inject approximately 5 ml of anesthetic. Consider injecting half of the anesthetic while slowly withdrawing, and then inject the remaining anesthetic.
3. If using ultrasound:
   - Perform a thorough neurovascular examination of the ankle and foot.
   - Consider the ankle block using cross-sectional sonography and duplex sonography.
   - Pinpoint the nerve on ultrasound, and inject approximately 0.5 to 1 cm super-/proximal to the posterior tibial artery. Withdraw slightly, and inject approximately 5 ml of anesthetic. If no paresthesias are felt, consider injecting half of the anesthetic, while slowly withdrawing, and then inject the remaining anesthetic.
4. If not using ultrasound:
   - Perform a thorough neurovascular examination of the ankle and foot.
   - While the patient is sitting, apply a topical anesthetic to the skin above and medial to the posterior tibial nerve. This will help decrease the likelihood of injury to the posterior tibial nerve.
   - Clean the area, insert the needle approximately 0.5 to 1 cm super-/proximal to the posterior tibial artery. Withdraw slightly, and inject approximately 0.5 to 1 cm super-/proximal to the posterior tibial artery. Inject up to 5 ml of anesthetic. Consider injecting half of the anesthetic, while slowly withdrawing, and then inject the remaining anesthetic.
5. Perform the procedure while maintaining sterility and asepsis. The posterior tibial nerve is a small, superficial structure, so it is easily missed during needle insertion. The risk of injury to the posterior tibial nerve is lessened by palpating the posterior tibial artery, which lies just posterior to the nerve. The nerve will sit approximately 0.5 to 1 cm super-/proximal to the posterior tibial artery. Injection of the posterior tibial artery will result in injection of the posterior tibial nerve. This can be avoided by injecting the skin distal to the posterior tibial artery. Other risks include injection of veins or injury to the posterior tibial nerve.

CRITICAL PROCEDURES

Step-by-step techniques and instructional images help students master the most essential bedside procedures.
CRITICAL ECG

Dr. Amal Mattu’s popular feature makes sense of even the most challenging ECGs.

An 82-year-old man with severe weakness and diaphoresis.

CME QUESTIONS

Challenge your students with relevant questions and insightful answer descriptions that test their mettle.

CME test results will be reported directly back to program administrators via ACEP’s My Residency Learning Portal — a customized, single entry point for on-demand emergency medicine education.

ILLEGAL OPIOD USE

By Bryan Corbett, MD, University of California Health Sciences, San Diego

Despite their value as an analgesic, opioid (particularly heroin [Di) are abused medicinally with increasing frequency. Unincorporated use of these medications can be dangerously unpredictable. The increasing number of overdose deaths in recent years is partially attributable to the substitution of heroin with fentanyl and its analogues, which can be far more potent.

Complications

- Parenteral administration: Local cellulitis, abscesses (WNSA), bloodstream infections (VVG), endocarditis, sepsis, and meningitis (selected for heroin)
- Opioid tablets (crushed and diluted in water to be injected intravenously)
- Binding and filter ingredients (foam, latex, and microparticles)
- Heroin can cause a pulmonary gengiinae reaction, progressing to pulmonary fibrosis and hypertension, extra-pulmonary deposition in the heart, liver, and spleen (undetermined clinical significance)
- “Free-basing” involving heroin off of aluminum foil: Associated with acute and chronic toxicity.

Toxicology

Blood level threshold unspecified. Although the toxic symptom with higher doses, outcome depends on individual factors (age, genetics and tolerance).

Clinical Evaluation

- Seizures: Seizure is a common occurrence with codeine and other opioids (alcohol, benzodiazepines, etc). may cause respiratory depression and hypoventilation (alcohol, benzodiazepines, etc) may cause respiratory depression and hypoventilation.
- Respiratory depression: Associated with alcohols, benzodiazepines, and other opioids (alcohol, benzodiazepines, etc).
- Hypertension: Associated with the alpha-2 antagonist Naloxone.

 indications, precautions, and dosing are made simple in our monthly EM-focused Drug and Tox Box features.

DRUG and TOX BOX

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LLSA REVIEW

We distill emergency medicine literature to deliver only the most essential information. Each monthly issue of CDEM provides a summary of one of the articles from ABEM’s current reading list, with bullets highlighting the elements relevant to resident education.