



# ABSTRACTS IN URGENT CARE

## On Pediatric Seizures, Hot Packs vs. Cold Packs, Hair Apposition vs. Suturing Scalp Lacerations, Delayed Intracranial Hemorrhage in Children, Pertussis in California, Immobilization After Colles Fracture Reduction, Typical Angina vs. Atypical Chest Pain, and Battery Ingestion Hazards

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Each month, Dr. Nahum Kovalski reviews a handful of abstracts from, or relevant to, urgent care practices and practitioners. For the full reports, go to the source cited under each title.

### Non-intravenous Midazolam Effectively Terminates Pediatric Seizures

**Key point:** A meta-analysis reveals that non-IV midazolam is as effective as or superior to IV or rectal diazepam for stopping seizures in children and young adults.

**Citation:** McMullan J, Comilla S, Pancioli A, et al. Midazolam versus diazepam for the treatment of status epilepticus in children and young adults: A meta-analysis. *Acad Emerg Med.* 2010;17(6):575-582.

Although intravenous (IV) lorazepam is considered first-line therapy for status epilepticus, this therapy is impractical for patients who do not have IV access. Diazepam can be administered either intravenously or rectally, but is less effective and associated with a higher risk for respiratory depression. Midazolam—although not formally recommended for treatment of seizures—can be given via IV, intramuscular (IM), intranasal (IN), or buccal routes.

These authors conducted a meta-analysis of randomized, controlled trials published from 1950 to 2009 that compared non-IV midazolam to diazepam by any route for initial treatment of status epilepticus in emergency department patients. Six studies involving 774 patients (age range: newborn to 22 years) met inclusion criteria.

In pooled analysis of medications administered by any route, midazolam was superior to diazepam for terminating seizures, with a number needed to treat (NNT) of seven to demonstrate midazolam benefit.

IM or IN midazolam was as effective as IV diazepam, while buccal midazolam was superior to rectal diazepam in achieving seizure control. Time to seizure cessation was similar in the midazolam and diazepam groups in the three studies that evaluated this outcome. The analysis was not sufficiently powered to detect differences in frequency of respiratory complications. Sensitivity analysis revealed that dose of medication and duration of seizure had no effect on differences between treatment groups.

Buccal, intramuscular, or intranasal midazolam is a cheap, easily administered, and effective alternative for children with seizures who present without IV access.

[Published in *J Watch Emerg Med*, June 18, 2010—Katherine Bakes, MD.] ■

### Hot Packs and Cold Packs Are Equally Effective for Treating Neck or Back Strain

**Key point:** Whether these therapies provide any benefit over ibuprofen alone is unclear.

**Citation:** Garra G, Singer AJ, Leno R, et al. Heat or cold packs for neck and back strain: A randomized controlled trial of efficacy. *Acad Emerg Med.* 2010;17(5):484-489.

Pain management is the primary concern when treating patients with acute neck or back strain. Hot packs or cold packs are often recommended—despite little evidence that



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either is effective—particularly when used with standard therapy, such as nonsteroidal anti-inflammatory drugs.

In a prospective study, 60 adult patients who presented to an academic emergency department with acute neck or back strain received single 400 mg doses of oral ibuprofen and were then randomized to application of hot packs or cold packs to the strained area for 30 minutes.

Patients rated pain on a 100 mm visual analog scale and a verbal rating scale before receiving ibuprofen and immediately after hot pack or cold pack treatment.

The mean decrease in pain scores after treatment was statistically significant in both groups (9 mm in the hot pack group and 8 mm in the cold pack group), but did not meet the authors' predefined threshold for clinical significance (15 mm).

Pain scores did not differ significantly between the two groups before and after treatment. Use of rescue analgesia also did not differ significantly between the two groups. About 80% of patients in each group expressed a desire to use their respective packs in the future.

Let's admit it; we've all recommended hot or cold local therapy for acute neck or back strain. This small study suggests that, at least in terms of measurable short-term relief of pain, neither therapy provides clinical benefit when ibuprofen is prescribed in analgesic doses.

[Published in *J Watch Emerg Med*, June 4, 2010—Diane M. Birnbaumer, MD, FACEP.] ■

### **Hair Apposition Technique is Better Than Suturing Scalp Lacerations**

*Key point: Hair apposition appears to be both practical and effective in treating minor scalp lacerations.*

Citation: Weick R, Stevermer JJ. A randomized controlled trial comparing the hair apposition technique with tissue glue to standard suturing in scalp lacerations (HAT study). *Ann Emerg Med*. 2002;40:19-26.

Suturing scalp lacerations can be a painful, time-consuming procedure. Often, it requires shaving a portion of the scalp and subsequent suture removal. The search for a less invasive means of wound closure led the authors to develop the hair apposition technique.

After cleaning the wound, and without anesthesia, four or five strands of hair from each side of the laceration are twisted together once, with a drop of tissue adhesive placed on the twist to hold it in place. A series of twists are placed over the laceration to appose the wound. Patients are instructed not to wash their hair for 2 days.

This study compared the hair apposition technique with standard suturing methods. It was performed in emergency departments at two tertiary care centers in Singapore. The authors enrolled 189 patients who had linear, non-stellate

scalp lacerations <10 cm in length. They did not include patients with severely contaminated wounds, arterial bleeding not controlled with five minutes of pressure, hair length <3 cm, and medically unstable patients.

In a concealed fashion, 93 patients were randomized to suturing and 96 patients to the hair apposition technique. Both groups had their wounds irrigated and cleansed in a similar fashion. The control group was shaved according to local practice and received an injection of local anesthetic; young children sometimes received oral sedation.

No subject in the study group received anesthesia or sedation.

A senior physician who was not involved in the initial treatment evaluated subjects after 1 week; sutures were removed at that time as well. If complications were noted, the patient was followed weekly for as long as 4 weeks.

Overall, complications were reduced by the hair apposition technique (7.4% vs. 21.5%).

Most of the difference in complication rates can be attributed to the decreased scarring (at one week) found in the hair apposition technique group. Wound breakdown, bleeding, and infection rates were similar in both groups. The hair apposition technique was quicker than suturing (median time of five vs. 15 minutes).

Less pain was reported in the hair apposition technique group (median score 2 vs. 4 [out of 10 possible]); 84% of subjects in this group claimed they would be willing to have the procedure in the future, compared with only 10% in the suture group. ■

### **Incidence of Delayed Intracranial Hemorrhage in Children After Uncomplicated Minor Head Injuries**

*Key point: The occurrence of delayed diagnosis of intracranial hemorrhage among children who present with uncomplicated minor head injuries is rare.*

Citation: Hamilton M, Mrzlik M, Johnson DW. *Pediatrics*. 2010;126(1):e33-39. Epub 2010 Jun 21.

This was an eight-year, retrospective, cohort study of children <14 years of age who presented to EDs in the Calgary Health Region between April 1992 and March 2000. Cases of uncomplicated minor head injuries and delayed diagnosis of intracranial hemorrhage (intracranial hemorrhage not apparent until ≥6 hours after injury) were identified.

An estimated 17,962 children with uncomplicated minor head injuries were evaluated at Calgary Health Region EDs. Two and eight children were identified as having delayed diagnoses of intracranial hemorrhage with and without delayed deterioration in level of consciousness (Glasgow Coma Scale scores of <15), respectively. The proportions of children

with uncomplicated minor head injuries with delayed diagnoses of intracranial hemorrhage with and without deterioration in level of consciousness were ~0.00% (0 of 17,962 children) and 0.03% (five of 17,962 children), respectively.

On the basis of population data for the Calgary Health Region, the incidences of delayed diagnosis of intracranial hemorrhage with and without deterioration in level of consciousness were 0.14 and 0.57 cases per 100,000 children per year, respectively. ■

### California Seeing Possibly Worst Pertussis Epidemic in 50 Years

*Key point: If people are visiting from California, we should be more suspect of the possibility of pertussis.*

**Citation:** California Department of Public Health. Whooping cough epidemic may be worst in 50 years. Available at: [www.cdph.ca.gov/Pages/NR10-041.aspx](http://www.cdph.ca.gov/Pages/NR10-041.aspx).

California had 910 confirmed cases of pertussis as of June 15—a fourfold increase over the same period in 2009. Health departments are looking into an additional 600 suspected cases.

Five infants under age 3 months have died from pertussis this year. Infants are not fully protected against the disease until they complete the initial series of three vaccinations by age 6 months, so the California Department of Public Health is urging birthing hospitals to vaccinate new parents before sending them home with their newborns.

The CDC is not reporting any other major pertussis outbreaks around the country, according to the *New York Times*, but reporting can be delayed. ■

### Similar Results from Three Immobilization Techniques After Colles Fracture Reduction

*Key point: Outcomes were similar at 8 weeks and at 6 months with circumferential casting, volar-dorsal splinting, and modified sugar-tong splinting.*

**Citation:** Grafstein E, Stenstrom R, Christenson J, et al. A prospective randomized controlled trial comparing circumferential casting and splinting in displaced Colles fractures. *CJEM*. 2010;12(3):192-200.

Nonoperative immobilization of fractures can be accomplished by several methods, including circumferential casting, volar-dorsal splinting, and modified sugar-tong splinting. Researchers compared the efficacy of the three techniques in a prospective randomized study of 101 adult patients who presented to an ED in Vancouver, British Columbia, with closed, isolated first-time distal radius fractures and who did not have neuromuscular deficit. Patients were

randomized after successful reduction with procedural sedation in the ED.

Eighty-two percent of patients were available for follow-up assessment at eight weeks, and 61% were available at six months. At both time points, rate of loss of anatomic position; disability of the arm, shoulder, and hand (DASH) scores; and median pain scores were similar among the three groups.

A common emergency medicine admonition is, “Don’t put a circular cast on a fresh fracture” because of the risk for pressure syndromes. Yet, circular casting is still used in some cases because it is believed to provide better immobilization than other techniques. This study failed to demonstrate better outcomes with casting, and risking compartment syndrome is not advisable, even if the risk is small.

Simple volar-dorsal or modified sugar-tong techniques are both acceptable forms of immobilization after reduction; circular casting adds risk but no benefit.

[Published in *J Watch Emerg Med*, July 9, 2010—Kristi L. Koenig, MD, FACEP.] ■

### Typical Angina vs. Atypical Chest Pain

*Key point: Presence and type of symptoms did not predict inducible myocardial ischemia in patients presenting to an emergency department.*

**Citation:** Hermann LK, Weingart SD, Yoon YM, et al. Comparison of frequency of inducible myocardial ischemia in patients presenting to emergency department with typical versus atypical or non-anginal chest pain. *Am J Cardiol*. 2010;105(11):1561-1564.

Patients with acute coronary syndromes (ACS) present with a wide variety of symptoms. Investigators at a single center in New York City conducted a retrospective study involving 2,525 patients with no previous history of myocardial infarction or coronary revascularization who were evaluated for ACS in an emergency department–based chest pain unit.

Typical angina was defined as “the presence of substernal chest pain or discomfort that was provoked by exertion or emotional stress and was relieved by rest and/or nitroglycerin.” All patients underwent provocative stress testing after serial biomarkers were obtained.

Presenting symptoms did not vary significantly by sex, age, or history of diabetes. Ischemia was induced by stress testing in 14% of 231 patients with typical angina, 11% of 2,140 patients with atypical chest pain, and 16% of 153 patients with no chest pain at presentation. Thus, patients with typical angina were not significantly more likely than those with no or atypical chest pain to have inducible myocardial ischemia.

In this study, patients presenting with typical angina symptoms were no more likely than those with no or atypical

symptoms to have inducible myocardial ischemia. Although data on the presence and type of chest pain were recorded before stress testing, they were collected hours after presentation, and we cannot infer if or how they affected decisions about testing and patient disposition.

[Published in *J Watch Cardiol*, July 7, 2010—Joel M. Gore, MD.] ■

### Implications of Increasing Battery Ingestions

**Key point:** Battery ingestions are increasing in frequency and are very high-risk events.

Litovitz T, Whitaker N, Clark L, et al. Emerging battery-ingestion hazard: Clinical implications. *Pediatrics*. 2010;125(6):1168-1177.

Recent cases suggest that severe and fatal button battery ingestions are increasing and that current treatment may be inadequate. The objective of this study was to identify battery ingestion outcome predictors and trends, define the urgency of intervention, and refine treatment guidelines.

Data were analyzed from the National Poison Data System (56,535 cases, 1985-2009); the National Battery Ingestion Hotline (8,648 cases, July 1990-September 2008); and medical literature and National Battery Ingestion Hotline cases (13 deaths and 73 major outcomes) involving esophageal or airway button battery lodgment.

All three data sets signal worsening outcomes, with a 6.7-fold increase in the percentage of button battery ingestions with major or fatal outcomes from 1985 to 2009 (National Poison Data System). Ingestions of 20- to 25 mm diameter cells increased from 1% to 18% of ingested button batteries (1990-2008), paralleling the rise in lithium-cell ingestions (1.3% to 24%).

Outcomes were significantly worse for large-diameter lithium cells ( $\geq 20$  mm) and in children  $< 4$  years.

The 20 mm lithium cell was implicated in most severe outcomes. Severe burns with sequelae occurred in just two to 2.5 hours. Most fatal (92%) or major outcome (56%) ingestions were not witnessed. At least 27% of major outcome and 54% of fatal cases were misdiagnosed, usually because of nonspecific presentations. Injuries extended after removal, with unanticipated and delayed esophageal perforations, tracheoesophageal fistulas, fistulization into major vessels, and massive hemorrhage.

Revised treatment guidelines promote expedited removal from the esophagus, increase vigilance for delayed complications, and identify patients who require urgent radiographs. ■

In this case, the patient was treated aggressively by the surgical team on board and had significant improvement. However, we believe that to date there have not been any scientific studies to summarize definitive treatment for the catastrophic consequences that may occur with promethazine and other drugs (e.g., phenytoin, thiopental, and propofol).<sup>5-7</sup>

Local anesthetic agents to promote vasodilatation, anticoagulation therapy, sympatheolytic therapy (i.e., Stellate ganglion block), and limb elevation have all been described in case studies, with varying results.<sup>8-10</sup> Nevertheless, it is important to point out that in case of inadvertent intra-arterial injection, the catheter should be left in place in order to administer emergency medications. The true extent of the problems associated with promethazine may not be known.

We, along with the manufacturer's recommendations, suggest that the following strategies be considered to prevent or minimize tissue damage:

- As 25 mg/ml is the highest strength of promethazine, try to use this concentration instead of 50 mg/ml.
- The starting dose should be between 6.26 mg/ml and 12.5 mg/ml, especially in elderly patients.
- Dilute 25 mg/ml of promethazine in 10 ml to 20 ml of normal saline (or prepare it in mini bags of normal saline).
- Promethazine should be administered only via a large-bore vein, such as the central venous catheter or deep intramuscular.
- IV promethazine should be administered over 10 to 15 minutes.
- Before administration, advise patients to let the physician know immediately whether pain or burning occur during or after injection. ■

#### References

1. Reents S, ed. *Clinical Pharmacology*. Vol. 1.16 Tampa, FL: Gold Standard Multimedia; 1998.
2. Malesker MA, Malone PM, Cingle, et al. Extravasation of i.v. promethazine. *Am J Health Syst Pharm*. 1999;56:1742-1742.
3. Marshfield PJ. Woman wins \$7.4 million jury award after she loses arm. *The Barre Montpelier Times Argus*, Barre, VT; March 19, 2004.
4. Twardowsky CA, Paola LD, Germiniani FMB, et al. Soft-tissue necrosis as a result of intravenous leakage of phenytoin. *Neurology*. 2009;73:e94-e95.
5. MacPherson RD, Rasiyah RL, McLeod LJ. Intra-arterial thiopentone is directly toxic to vascular endothelium. *Br J Anaesth*. 1991;67(5):546-552.
6. Chong M, Davis TP. Accidental intra-arterial injection of propofol. *Anesthesia*. 1987;42(7):781-782.
7. Crawford CR, Terranova WA. The role of intra-arterial vasodilators in the treatment of inadvertent intra-arterial injection injuries. *Ann Plast Surg*. 1990;25:279-281.
8. Zachary LS, Smith DJ, Hegggers JP, et al. The role of thromboxane in experimental inadvertent intra-arterial drug injections. *J Hand Surg*. 1987;12(2):240-245.
9. Keene JR, Buckley KM, Small S, et al. Accidental intra-arterial injection: A case report, new treatment modalities, and a review of the literature. *J Oral Maxillofac Surg*. 2006;64(2):965-968.