



## Resident Journal Review: September-October 2009

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*This is a continuing column providing journal articles pertinent to EM residents. It is not meant to be an extensive review of the articles, nor is it wholly comprehensive of all the literature published. Rather, it is a short list of potentially useful literature that the busy EM resident may have missed. Residents should read the articles themselves to draw their own conclusions. This edition will include articles published over a two month period. These selections are from papers published in May and June 2009.*

### **Bailitz J, Starr F, Beecroft M, et al. CT should replace three-view radiographs as the initial screening test in patients at high, moderate, and low risk for blunt cervical spine injury: a prospective comparison. J Trauma 2009;66:1605-1609.**

Evaluating for cervical spine injuries (CSI) in the emergency department is a common occurrence. Since the publication of the NEXUS criteria and Canadian C-spine rule, much focus has been placed on determining which patients do not need imaging. However, this paper looks to evaluate whether or not the imaging that is typically obtained – three-view radiographs – is sufficient.

This single ED prospective, observational study included 1,505 patients. These subjects (ages 16 and older) presented with blunt cervical trauma and had one or more positive NEXUS criteria. Each patient had both cervical spine radiographs (CSR) and a cervical CT scan (CCT). Readings of each were done by separate, blinded radiology attending physicians. The outcome measure was clinically significant injury (CSI), defined as those requiring operative procedure, halo application and/or rigid collar.

CSIs were present in 78 patients; all were detected by CCT, whereas CSR detected only 18 of these cases (sensitivity 36%). However, it is important to note that not all patients who had cervical radiographs had complete studies. Although not defined by the authors, “adequate studies” were done in only 16 of the 78 patients. CSR still had a false negative rate of 20.5% in these 16 patients. While this paper may suggest that CCTs be performed in all suspected blunt C-spine injury patients, there are obvious disadvantages of CCT including significant costs, radiation (particularly to the thyroid) and potential loss of time and resources in order to perform these studies. This paper does show the inadequacies of three-view CSR, and further studies such as the utility of five-view CSR may need to be done before a change in routine practice can be recommended.

### **Suzuki T, Distante A, Zizza A, et al. Diagnosis of acute aortic dissection by D-dimer: the international registry of acute aortic dissection substudy on biomarkers (IRAD-BIO) experience. Circulation 2009;119:2702-2707.**

Acute aortic dissection (AD) is associated with high morbidity and mortality. Delays in diagnosis can be catastrophic, highlighting the need for a quick, sensitive test to aid in the evaluation of this disease. D-dimer, a breakdown product of fibrin, has been used as a “rule-out” test in low-risk patients for pulmonary embolism (PE) and more recently been reported to have a similar role in acute AD as well.

In this multi-center, prospective substudy, 220 subjects from 14 centers were enrolled; each subject was suspected of having AD within the first 24 hours of symptom onset and was to undergo an imaging test for its evaluation. D-dimer levels were taken at the time of presentation.

Of the 220 patients, there were 87 cases of radiographically-proven AD. These subjects had a mean D-dimer level of 3213 ng/ml (SD +/- 1465) for Type A dissection and 3574 ng/ml (SD +/- 1430) for Type B dissection. This level was higher than those for MI, angina, PE and other diagnoses. Using a cutoff of 500ng/ml, the same as that commonly used for evaluation of PE, D-dimer had a sensitivity of 96.6% and specificity of 46.6%. The negative likelihood ratio was 0.07 and negative predictive value was 95%.

This study suggests that D-dimer is useful as a rule-out test given its high sensitivity in AD. Limitations included the small sample size and non-defined criteria for suspicion of disease. Notably, funding for this study was provided by Biosite, the maker of the D-dimer test used in these centers. It was also not specified what type of assay was used. With these items in mind, D-dimer testing in suspected aortic dissection may have a role as a rule-out test. Further studies are needed to reproduce and validate these results before routine use in the ED.

### **Lim SH, Anantharaman V, Teo WS, et al. Slow infusion of calcium channel blockers compared with intravenous adenosine in the emergency treatment of supraventricular tachycardia. Resuscitation. May 2009;80(5):523-528.**

For nearly two decades, adenosine has been considered the drug of choice for the management of supraventricular tachycardia (SVT). Prior to this time, intravenous bolus verapamil was used frequently; however, its role was diminished due to concern over significant hypotension. Few authors have examined slow infusions of calcium channel blockers for treatment of SVT. The authors of this study sought to examine the safety and efficacy of slow infusion of calcium channel blockers as compared to adenosine for SVT.

In this prospective RCT, 206 patients age 10 or older were enrolled, after excluding unstable patients, pregnant patients and those in rhythms other than SVT. Adenosine (6mg then 12mg) was compared against verapamil (1 mg/min) and diltiazem (2.5 mg/min) given as intravenous infusion. Drips were discontinued when conversion to sinus rhythm occurred. Vitals were recorded every two minutes along with total doses of medications and times to conversion.

Patients receiving verapamil and diltiazem were significantly more likely to convert to sinus rhythm than patients receiving adenosine (97.9% and 98.1% vs. 86.5%, respectively). Mean post-conversion BP change for verapamil and diltiazem was -13.0/-8.0 mmHg and -7.1/-9.4 mmHg, respectively, while there was no change in blood pressure for the adenosine group. The total doses of verapamil and diltiazem needed to convert 75% of patients was 7.69 mg and 18.13 mg, respectively. In 66.3% of patients given adenosine, conversion occurred with the first 6 mg push. One patient in the verapamil group

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developed hypotension (122/81 to 74/61 after 7.5 mg infusion) requiring synchronized cardioversion; however, none of the other groups had any significant complication.

In this study, calcium channel blockers were more efficacious in converting SVT to sinus rhythm after a short intravenous infusion compared to adenosine. Blood pressure significantly decreased in these groups; however, only one patient developed significant hypotension. Slow infusion of CCB may in fact be safely used as a first line agent in the management of SVT with low risk of causing significant hypotension.

**Plint AC, Johnson DW, Patel H, et al. Epinephrine and dexamethasone in children with bronchiolitis. NEJM 2009; 360:2079-2089.**

Bronchiolitis in infancy is the most common acute infection of the lower respiratory tract. Typically caused by RSV, patients may present with rhinorrhea, cough, wheezing, respiratory distress and hypoxemia. Treatment for bronchiolitis has largely been with bronchodilators and corticosteroids, but neither has been routinely recommended. Nebulized beta-agonists have failed to show any consistent benefit whereas nebulized epinephrine has been suggested to decrease clinical symptoms.

In this double-blinded, placebo-controlled study, 800 infants (ages 6 weeks - 12 months) who presented with bronchiolitis were enrolled from eight Canadian pediatric EDs. Each was randomized to one of four groups: group one received two nebulized epinephrine treatments (3ml 1:1000 solution) in the ED and six days of oral dexamethasone (1mg/kg in the ED and then 0.6mg/kg daily for five additional days at home); group two received nebulized epinephrine and six treatments of oral placebo; group three received nebulized placebo and oral dexamethasone; group four received nebulized placebo and oral placebo. Primary outcome was hospital admission by day seven after enrollment.

Of the subjects in group one, 17.1% were admitted in the first seven days; in group two, 23.7% were admitted; group three, 25.6%; and group four, 26.4%. The relative risk of admission for group one compared to group four was 0.65 (95% CI, unadjusted 0.45-0.95, adjusted 0.41-1.03). No significant risk reduction was seen for infants in the epinephrine-alone or the dexamethasone-alone groups.

The authors suggest there is a synergistic effect between epinephrine and dexamethasone in infants with bronchiolitis. If using the unadjusted confidence interval, the NNT would be 11 to prevent one subsequent admission. However, the adjusted confidence interval just crosses 1.0, indicating a lack of statistical significance. Nonetheless, there was a trend towards benefit. Further study may show a more definitive role for epinephrine and dexamethasone in the treatment of bronchiolitis, especially considering the relative safety of the treatments and the potential benefits for the patient.

**Annane D, Bellissant E, Bollaert PE, et al. Corticosteroids in the treatment of severe sepsis and septic shock in adults: a systematic review. JAMA. Jun 10 2009;301(22):2362-2375.**

The use of corticosteroids in severe sepsis and septic shock has long been a subject of debate and uncertainty. Many authors have studied the topic with various patient populations, preparations, doses and lengths of treatment. The authors of this study performed a systematic review to attempt to find a more conclusive answer to the role of corticosteroids in sepsis.

The authors conducted a structured search of the literature, along with a hand search of reference lists and communications with authors when necessary. Only randomized or quasi-randomized trials (systematic method) were included, with or without blinding. Doses less than 300mg hydrocortisone/day (or steroid equivalent) were considered low doses. Courses of therapy lasting longer than five days were considered long courses. Control interventions included standard therapy or placebo. The primary outcome was 28 day all-cause mortality. Secondary outcomes included ICU and hospital mortality, length of stay, shock reversal and adverse events. After applying search criteria, 22 studies were included.

Analyzing data from 17 randomized trials (n=2138), 28 day all-cause mortality was not shown to be significantly different among those patients treated with corticosteroids versus control (35.3% vs. 38.5%). This finding was also true for quasi-randomized trials. Subgroup analysis of 12 randomized trials investigating prolonged low-dose corticosteroids found a significant benefit in 28 day mortality (37.5% vs. 44.1%). The prolonged low dose corticosteroid subgroup also showed decreased ICU LOS by 4.49 days and increased shock reversal by day seven. Despite higher rates of hyperglycemia and hypernatremia, the other studied adverse events, GI bleeding, superinfections, and neuromuscular weakness, were not found to be higher in the corticosteroid group.

For the studies included in this systematic review and meta-analysis, corticosteroid therapy did not show a clear mortality benefit when data from all preparations, doses, and lengths of treatment were aggregated. However, for prolonged low-dose corticosteroids (which has been the predominant treatment modality used in the past decade) corticosteroids did in fact show significant decreases in mortality and ICU LOS with an increased rate of shock reversal. Significant adverse events were not increased. This analysis provides clarity to the role of corticosteroids in severe sepsis and septic shock. Prolonged, low dose corticosteroids therapy has a more solidified role in decreasing the mortality of this morbid condition.

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