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SAEM 2003: Reviews of the Latest Research in Emergency Medicine

The following are brief summaries of nine abstracts presented at the Society for Academic Emergency Medicine (SAEM) 2003 Annual Meeting in Boston. Editorial board members who attended selected these topics because of their interesting content and importance to the field of emergency medicine research. Because these are abstracts and not peer-reviewed publications, results and conclusions should be considered preliminary. — The Editor

Antibiotic Use Not Supported for Dental Pain Without Infection

Source: Runyon MS, et al. The utility of anti-microbial therapy for dental pain without overt infection. *Acad Emerg Med* 2003;10:435.

In this study, the authors conducted a prospective, randomized, double-blind study on the impact of antibiotics in the treatment of dental pain in which there is no overt evidence of infection. A convenience sample of 195 patients who presented to the emergency department (ED) with dental pain were randomized to either penicillin or placebo. Both groups received standardized pain treatment with anti-inflammatory and opioid medications. Patients were excluded from the study if they had fever, oral swelling, trismus, pregnancy, immunocompromise, valvular heart disease, or trauma. There was no difference in the two groups in terms of baseline characteristics or pain scores at the time of enrollment. Of the total, 125 patients followed up at 5-7 days and underwent a structured examination for signs of infection, including fever, oral swelling, trismus, or purulent drainage. In addition, another six patients were identified by return to the ED or dental clinic for worsening pain. Overall, there was no difference between the two groups in infection rate at follow-up (9.5% in the penicillin group vs 10.3% in the placebo group). There also was no difference between the groups in terms of actual pain scores (visual analogue scale) at follow-up as well as improvement in pain scores. The authors conclude that their study does not support the routine use of antibiotics in patients presenting to the ED with dental pain without overt evidence of infection. — Reviewed by Theodore C. Chan, MD, FACEP

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TIA a High-Risk Sentinel Event for Future Morbidity and Mortality

Source: Panagos PD, et al. Short-term prognosis after emergency department diagnosis and evaluation of transient ischemic attack (TIA). *Acad Emerg Med* 2003;10:432.

In this study, the authors performed a population-based, retrospective study of patients who were diagnosed with new-onset transient ischemic attack (TIA) in the emergency department (ED). The investigators sought to determine the short-term risk of recurrent TIA, stroke, and death during the six months following the index diagnosis. The study was conducted during a one-year period in a midwestern region of approximately 1.3 million persons. Utilizing a number of methods to identify patients, including discharge codes, ED admission logs, and coroner records, investigators identified 790 patients diagnosed with TIA in

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Conflict of Interest Disclosure

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the ED. All cases underwent retrospective chart review conducted by study nurses and followed by a physician review. The investigators report the rates of stroke following the ED diagnosis of TIA was 9.2% at 30 days, 13.3% at 90 days, and 16.7% at six months. The six-month rate for recurrent TIA was 9.3%, and for death was 14.9%. The authors conclude that the initial presentation of TIA to the ED is a high-risk sentinel event, as these patients are at significantly increased risk for subsequent recurrent TIA, stroke, and death during the immediate short-term, six-month follow-up period. — *Reviewed by Theodore C. Chan, MD, FACEP*

Large Needles: More Headaches after LP?

Source: Seupaul RA, et al. Prevalence of post-dural puncture headache after ED performed lumbar puncture. *Acad Emerg Med* 2003;10:543.

In this study, the investigators conducted a multicenter, observational, prospective study of the incidence of post-dural puncture headache following lumbar puncture (LP) performed in the emergency department (ED). Patients presenting at one of two large urban EDs and requiring lumbar puncture were enrolled consecutively in the study. Follow-up was conducted by telephone interview after the ED visit to determine the incidence of complications as a result of the procedure. Post-dural puncture headache was defined as any headache that worsened with positional change and improved with supine position. All LPs were performed with either a 20- or 22-gauge needle. Overall, 72 patients were enrolled from the two ED sites, with an overall prevalence of post-dural headache of 17.9%. This rate is higher than that generally reported in the anesthesia literature. In addition, post-dural headache rates were significantly higher in patients who had LP performed with the larger gauge needle (20g) than the smaller gauge needle (22g) (37% vs 10%). Absolute risk reduction was 0.27 with use of the smaller needle. The investigators conclude that use of the larger gauge needle for LPs resulted in significantly higher rates of post-dural headache following lumbar puncture performed in the ED. — *Reviewed by Theodore C. Chan, MD, FACEP*

Which Historical Factors Predict SAH?

Source: Perry JJ, et al. The value of history in the diagnosis of subarachnoid hemorrhage for emergency department patients with acute headache. *Acad Emerg Med* 2003;10:553.

The authors of this prospective study attempted to determine the value of specific historical factors in pre-

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Questions & Comments

Please call Allison Mechem, Managing Editor, at (404) 262-5589, or E-mail allison.mechem@ahcpub.com.

dicting the presence of subarachnoid hemorrhage (SAH) in emergency department (ED) patients with headache. Patients were enrolled if they complained of acute headache that peaked within one hour, had no neurologic deficit, and had no history of similar headache, trauma, prior SAH, or brain neoplasm. SAH was defined as a positive computed tomography result, cerebrospinal fluid (CSF) xanthochromia, or red cells in the last tube of CSF with positive cerebral angiography. The authors do not state the overall rate of SAH in the 589 enrolled patients, but it appears to be at least 5%. Six percent of patients who obtained complete relief from anti-migraine therapy were found to have an SAH. Significant adjusted odds ratios for the presence of SAH were associated with age older than 50 years (adjusted OR 7.8, CI not provided), neck pain (adjusted OR 5.4), and vomiting (adjusted OR 2.7). The authors conclude that these historical factors should be sought in patients complaining of acute headache, and that relief of symptoms with therapy does not exclude the presence of SAH. — Reviewed by David J. Karras, MD, FACEP, FAAEM

Adding ALS May Not Improve on Rapid Defibrillation in Out-of-Hospital Cardiac Arrest

Source: Stiell IG, et al. OPALS Study Phase III: What is the impact of advanced life support on out-of-hospital cardiac arrest? *Acad Emerg Med* 2003;10:423.

This phase of the Ontario Prehospital Advanced Life Support (OPALS) Study examined the benefit of adding an advanced life support (ALS) program to a basic life support (BLS) emergency medical system that already employs defibrillation. The trial compared outcomes of cardiac arrest victims before and after training of paramedics to meet ALS standards. The study was conducted in 17 Ontario communities and enrolled 1391 patients in the BLS phase and 4246 in the ALS phase. Patients in the two groups were well-matched in terms of initial cardiac rhythm and time to initiation of life support. While patients in the ALS phase had higher rates of hospital admission than those in the BLS phase (15% vs 11%), survival was 5% in both groups. The authors conclude that the addition of prehospital ALS does not improve survival when an effective BLS/rapid defibrillation program is already in place. This study reinforces previous findings that early defibrillation is the most effective—indeed, perhaps the only effective—therapeutic modality available for cardiac arrest victims. — Reviewed by David J. Karras, MD, FACEP, FAAEM

Antibiotic Resistance Difficult to Predict in UTI

Source: Norton R, et al. Inability to predict antimicrobial resistance of UTI pathogens in ED patients. *Acad Emerg Med* 2003;10:436.

The authors of this retrospective study attempted to develop a clinical decision rule to predict resistance to trimethoprim-sulfamethoxazole (TMP/SMX) in emergency department (ED) patients with urinary tract infections (UTI). Records of adult female patients seen in a single ED during a 26-month period were reviewed and 18 predictor variables were collected. Using classification and regression tree (CART) analysis, the authors attempted to predict TMP/SMX resistance among those patients found to have culture-confirmed UTI. Twenty percent of 512 cultures were TMP/SMX-resistant; this rate did not vary during the 26-month study period. The authors found no useful predictors of TMP-SMX resistance, and concluded that ciprofloxacin is appropriate empiric UTI therapy in settings with high rates of TMP-SMX resistance. These results are similar to those of studies performed in outpatient settings, and emphasize the need to be aware of local antibiotic resistance rates when selecting antimicrobial therapy. — Reviewed by David J. Karras, MD, FACEP, FAAEM

Reverse Trendelenburg Position May Increase Success in Femoral Vein Catheterization

Source: Stone MB, Price DD, Anderson BS. The effect of the reverse Trendelenburg position on the cross-sectional area of the femoral vein. *Acad Emerg Med* 2003;10:563.

Previous studies have demonstrated that the Trendelenburg position increases the cross-sectional area of the internal jugular vein. In this study, the authors attempted to demonstrate the effect of the Reverse Trendelenburg (RT) position on the cross-sectional area of the femoral vein. The subjects were 52 volunteers with no history of deep venous thrombosis or vascular surgery in the lower limbs. Using a 7.5 MHz two-dimensional linear ultrasound transducer, the cross-sectional area of the left and right femoral veins of the subjects was measured in the supine and 15° RT position. The mean cross-sectional area of the femoral veins with the subjects supine was 0.85 cm², and the mean cross-sectional area of the femoral veins with the subjects in the RT position was 1.22 cm². The increase in cross-sectional area of the femoral vein was statistically significant ($p < 0.001$), with a mean increase of 55% ± 9.1%. No differences were found between right and left femoral vein dimensions ($p = 0.9$). The authors concluded that the cross-sectional area of the femoral vein is significantly increased by using the RT position. They state that this maneuver

may increase the success rate of femoral vein catheterization. — *Reviewed by Jacob W. Ufberg, MD*

Ultrasound Aids in Difficult Peripheral IV Catheter Placement

Source: Costantino TG, et al. Success rate of peripheral IV catheter insertion by emergency physicians using ultrasound. *Acad Emerg Med* 2003;10:487.

The purpose of this study was to measure the success rate of emergency physicians (EPs) using ultrasound to guide peripheral intravenous catheter (PIVC) placement among patients who could not be successfully cannulated by emergency department (ED) nurses. Subjects included a convenience sample of patients presenting to an urban ED during a six-month period who could not have a PIVC placed by any available ED nurse or paramedic. Unstable patients and patients requiring central venous access, as determined by the treating physician, were excluded. Study investigators then used ultrasound guidance with a 7.5-10 MHz linear probe to attempt PIVC placement. Fifty-one patients were enrolled in the study, with investigators able to place PIVCs in 46 of 51 patients (92%). Of the patients in whom a PIVC was placed, 43 of 46 were placed on the first attempt. The majority of PIVCs were placed in the basilic, cephalic, antecubital, or forearm veins, with four (8%) placed in the brachial vein. One case (2%) of brachial artery puncture was the only reported complication. The average time to successful PIVC placement was 2.5 minutes. The authors conclude that EPs can successfully place PIVCs using ultrasound when ED nurses are unable to do so by standard techniques. — *Reviewed by Jacob W. Ufberg, MD*

Femoral Nerve Block More Effective Analgesia for Isolated Femur Fracture

Source: Levine J, et al. A randomized, controlled trial comparing femoral nerve block to intravenous morphine in isolated femur fractures. *Acad Emerg Med* 2003;10:469.

In this study, the authors compared the analgesic efficacy of intravenous (IV) morphine and femoral nerve block (FNB) in patients with isolated femur fractures. Patients with isolated mid-shaft femur fractures who consented to inclusion were randomized to receive either 0.1 mg/kg of IV morphine sulfate or FNB with 20 mL of 0.5% bupivacaine. Subjects completed a visual analog pain scale (VAS) prior to the study intervention, and again one hour after the intervention. Adverse effects of each study intervention were recorded, along with the need for rescue analgesia. All participating physicians were trained and certified in the administration of FNB.

Sixteen patients were enrolled in the study, 10 in the FNB group, and six in the morphine sulfate group. The change in VAS at one hour was significantly greater in the FNB group (median VAS change in FNB group vs morphine group 56 mm vs 11 mm, $p = 0.004$). The need for rescue medication was significantly greater in the morphine group (RR 8.3, 95% CI 1.2-55.3). There were no adverse effects reported in either group. The authors conclude that FNB results in significantly greater analgesia than standard doses of morphine plus additional opiate analgesia for isolated femur fractures, and that patients who receive FNB require less rescue analgesics than those who receive morphine. — *Reviewed by Jacob W. Ufberg, MD*

Taking the Trauma Out of Traumatic Spinal Taps

ABSTRACT & COMMENTARY

Source: Mazor SS, et al. Interpretation of traumatic lumbar punctures: Who can go home? *Pediatrics* 2003;111:525-528.

WHEN THE PEDIATRIC LUMBAR PUNCTURE (LP) IS traumatic, confusion arises as to whether cerebrospinal fluid (CSF) white blood cells (WBCs) are from infection or from contaminating blood. To better identify patients with and without CSF pathogens, Mazor and colleagues studied 57 children ages 1 month to 13 years who had traumatic LPs (> 500 red blood cells [RBCs]/ mm^3) during evaluation for suspected meningitis. All were seen from 1990-1999 at Children's Memorial Hospital in urban Chicago. Forty-five cases had negative CSF cultures, while 12 (21%) had bacterial pathogens: *Neisseria meningitidis* (four patients), *Haemophilus influenzae* type B (three patients), *Streptococcus pneumoniae* (two patients), Group B streptococcus (two patients), and nontypable *H. influenzae* (one patient). Children were excluded if they received antibiotics in the prior 72 hours, or had a recent neurosurgical procedure.

For each LP, the Observed:Predicted (O:P) ratio for CSF WBCs was determined by dividing observed (O) by predicted (P) WBCs in the CSF. Predicted CSF WBC was calculated by the following formula: $(P) = \text{CSF RBC} \times (\text{blood WBC}/\text{blood RBC})$. Simple ratios of CSF WBCs to RBCs also were determined for each LP.

O:P ratios in children without meningitis were quite low, with a median of 0.064 (range 0.0000054-1.09) as compared to O:P ratios in children with culture-positive CSF (median 1.26; range 0.045-4.72) ($p < 0.001$). All but

Bell's Palsy: New Trials for Better Smiles

By Michael W. Felz, MD

Introduction

Bell's palsy (BP) is the most common affliction of the facial nerve and the most frequent cause of acute facial paralysis worldwide. Since its first clinical description in 1829 by Sir Charles Bell in England, BP has been surrounded by therapeutic controversy and its etiology has been shrouded in mystery.¹ Recent literature, however, features evidence-based trials that enable emergency department (ED) clinicians to recommend more advanced treatment than ever before.

Clinical Features

BP affects all ages, attacks both genders equally, and occurs in all seasons, accounting for its frequent presentation in ED. The crooked smile, asymmetric face, and incompletely closed eye are telltale signs easily recognized by patient and physician. The motor insult to all five facial expression muscle groups is abrupt, tends to occur at night or on awakening, and attains maximal unilateral facial paralysis within 48 hours. Hyperacusis and distorted taste correlate with involvement of stapedius and chorda tympani branches of cranial nerve (CN) VII, respectively. Motor manifestations are expected to predominate, since CN VII is comprised of 70% motor axons and 30% sensory and autonomic fibers. Clinical compromise may be quantified by the House-Brackmann (HB) Facial Nerve Grading System, with stages ranging from 1 (no weakness) to 6 (total paralysis).² Determination of HB grade allows for pretreatment assessment as well as progression/improvement over time.

Pathogenesis

For 60 years, BP was regarded as idiopathic. Historical associations with pregnancy, diabetes mellitus, multiple sclerosis, temporal bone surgery or masses, middle ear disease, sarcoidosis, Ramsay-Hunt syndrome (herpes zoster of external auditory canal with BP), Melkersson-Rosenthal syndrome (BP with facial edema and fissured tongue), and viral infections such as the human immunodeficiency virus have been proposed. Yet none of these associations generated a unified hypothesis of BP pathogenesis. BP occurs in association with Lyme disease—more frequently in children than in adults—but antibiotic therapy for *Borrelia burgdorferi* has no significant impact on clinical resolution.

one of the 45 meningitis-free children had O:P less than 1.0, while 7 of 12 cases with bacterial pathogens had O:P greater than 1.0, and 5 of 12 had ratios greater than 2.0. In patients without meningitis, the CSF WBC:RBC ratio was far smaller (median 0.001, range 0-4.46) than in cases with positive CSF cultures, in whom median CSF WBC:RBC ratio was 1.98 (range 0.04-24.45) ($p < 0.001$). For the exclusion of culture-positive meningitis (i.e., proof of no meningitis), the sensitivity, specificity, and positive predictive value of an O:P ratio less than 0.01 were 91.1%, 100%, and 100%, respectively. For a CSF WBC:RBC ratio of less than 1:100, sensitivity, specificity, and positive predictive value (in excluding meningitis) were 84.4%, 100%, and 100%, respectively. The authors conclude that an O:P ratio less than 0.01 and a WBC:RBC ratio of less than 1:100 are highly specific for the absence of meningitis in ill children with a traumatic LP.

■ COMMENTARY BY MICHAEL FELZ, MD

How practical is this? The less cumbersome value to calculate is the CSF WBC:RBC ratio. For example, in a febrile child with 10 CSF WBCs, concomitant findings of greater than 1000 CSF RBCs would yield a WBC:RBC ratio of less than 1:100 and speak against meningitis, based on the Mazor study. The calculation of the O:P ratio is more complex but still useful in that peripheral blood WBC and RBC counts are the correction factors for the observed number of WBCs in the traumatic LP.

I found this study applicable in April 2003, when an unprecedented outbreak of enterovirus (Echovirus type 9) meningitis occurred in more than 25 pediatric patients in our urban area. Two examples are illustrative. A 10-year-old girl had two days of 102°F fever, headache, and stiff neck. CSF WBCs were 20/mm³ with RBCs 345, for a WBC:RBC ratio of 0.07. The O:P ratio was 67. Both ratios suggested the presence of meningitis based on the Mazor criteria, although this case involved a viral, not bacterial, pathogen. The second patient was a 9-year-old girl with one day of headache, vomiting, malaise, fever of 101°F, and nuchal rigidity. CSF WBCs were 570/mm³ with RBCs 8, for a ratio of 0.70. O:P ratio was quite high at 57,000. Here again, the ratios reliably predicted the presence of CSF infection, although the etiology was viral. Both children recovered rapidly with conservative management.

The greatest strength of the Mazor study is in guiding clinicians who must reconcile the appearance of a sick child with laboratory values from a traumatic LP. When the O:P and WBC:RBC ratios are less than 1:100, bacterial meningitis (and perhaps viral—although this was not addressed in this study) is highly unlikely. ❖

In the last 10 years, however, more sophisticated clinical, immunologic, pathologic, and microbiologic investigations have clarified the biologic basis for acute CN VII dysfunction with some degree of certainty. The genome of herpes simplex virus (HSV) was demonstrated by polymerase chain reaction (PCR) of the geniculate ganglion of an elderly man who died six weeks after the onset of BP.³ Furthermore, in Japanese patients with BP undergoing surgical decompression of CN VII paralysis refractory to medical management, endoneural fluid and posterior auricular muscle tissue specimens of 11 of 14 patients (79%) had HSV-1 specific DNA fragments amplified by PCR, and 12 of 13 (92%) had high HSV-1 antibody titers by complement fixation testing.⁴ These authors concluded that, given the well-recognized neuropathogenicity of HSV-1, the presence of HSV-DNA at the lesion site of CN VII paralysis directly is related to the pathogenesis of BP. In addition, HSV DNA has been detected by PCR significantly more frequently (50% vs 19%, $p < 0.05$) in saliva samples of 42 BP patients in Japan compared to 16 healthy controls.⁵ Finally, a mouse model has demonstrated that subcutaneous inoculation of the ear or anterior tongue with HSV produces transient facial paralysis and inflammatory nerve swelling with vacuolar degeneration.⁶ HSV antigens were then detected by PCR of tissue specimens from CN VII, facial nerve nucleus, and geniculate ganglion in affected mice. Taken together, these investigations provide persuasive evidence supporting an etiologic role for HSV primary infection or reactivation in the pathogenesis of acute CN VII paralysis.

Therapy

Such experimental data not only confer plausibility to biologic causation of BP, but also set the stage for targeted therapy. Acute inflammation in CN VII biopsies, segmental demyelination and axonal degeneration on electromyographic testing, nerve edema and intraforaminal compression seen on magnetic resonance scanning, and active viral replication demonstrated by PCR are factors contributing to the rationale for therapy with steroids and antiviral agents. The good news is that 70% of BP patients regain some or all CN VII function within 3-6 months. Yet 30% have unfavorable outcomes, at least historically.

What evidence directs wise therapy? Prednisone 60 mg/d for five days and tapered for five days shortened time of resolution from 69.3 to 51.4 days among 76 BP patients seen in Los Angeles, and reduced the number of patients with poor HB grades at resolution.⁷ A meta-analysis of well-designed trials of steroids in BP estimates a 17% (99% CI: 0.01-0.32) improvement in likelihood of complete facial recovery for treatment groups

over controls.⁸ In 99 BP patients randomized at the Cranial Nerve Research Center in Oakland, CA, acyclovir 2000 mg/d for 10 days plus prednisone 60 mg/d for five days and tapered for five days provided statistically better rates (92% vs 76%; $p < 0.02$) of normalized CN VII volitional motion than did placebo plus prednisone treatment.⁹ Among 56 Swedish patients with BP, treatment with valacyclovir 1000 mg t.i.d. for seven days with prednisone 50 mg/d for five days and tapered for five days was superior to non-medical therapy, with 87.5% recovery to HB grade 1 in the treatment group vs. 68% in the controls ($p < 0.05$). Ten (18%) control patients had a final HB grade of 4 or worse, compared to one patient (1.8%) in the valacyclovir-prednisone group ($p < 0.01$).¹⁰ A meta-analysis of steroids plus antiviral agents (mainly acyclovir) in BP concluded that patients treated with combination therapy showed significantly better outcomes (RR for benefit: 1.22; 95% CI: 1.02-1.45) than those treated with prednisone alone.¹¹

Conclusion

Current evidence seems cohesive that HSV and resultant inflammatory neuropathy accounts for much of the CN VII weakness evident in BP patients. Furthermore, 10 days of antiviral therapy against HSV, plus 10 days of steroids (five days at 1 mg/kg and tapered over five days) appears to confer modest benefit toward full CN VII recovery. It is prudent to follow the House-Brackmann grading score over time to document progressive improvement. Now that HSV is clearly known to be a major culprit in BP, it is time to fight back with new, proven weapons. Given these encouraging trials, perhaps BP patients can smile, and smile well, once again. ❖

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 - c. gait disturbance
 - d. all-cause mortality
16. According to the study by Perry et al, what historical features were associated with headache due to subarachnoid hemorrhage?
 - a. Age older than 50, lack of pain relief with anti-migraine therapy, and vomiting
 - b. Age older than 50, cocaine use, and lack of pain relief with anti-migraine therapy
 - c. Age older than 50, vomiting, and neck pain
 - d. Age older than 50, family history of subarachnoid hemorrhage, and vomiting
 17. The study by Levine comparing femoral nerve block to intravenous (IV) morphine among patients with isolated mid-shaft femoral fractures demonstrated that:
 - a. patients who received IV morphine obtained significantly greater analgesia.
 - b. patients who received IV morphine required less rescue analgesia.
 - c. patients who received femoral nerve block obtained significantly greater analgesia.
 - d. there was no difference between the groups in pain relief scores.
 18. Recent investigations provide persuasive evidence supporting an etiologic role for which of the following in Bell's palsy?
 - a. Multiple sclerosis
 - b. Cerebral thrombosis
 - c. Temporal bone neoplasm
 - d. Herpes simplex virus

Physician CME Questions

13. The study by Seupaul et al on the incidence of post-dural headache following LP demonstrated that:
 - a. use of an 18-gauge needle resulted in higher incidence of traumatic taps.
 - b. post-dural headache rates were lower when performed in the ED.
 - c. post-dural headache rates were higher in the elderly population.
 - d. use of a 20-gauge needle resulted in a 37% incidence of post-dural headache.
14. For exclusion of bacterial meningitis in a child with traumatic LP, a CSF WBC:RBC ratio should be:
 - a. less than 5.
 - b. greater than 1.
 - c. less than 1:100.
 - d. 100 or greater.
15. Following ED diagnosis of transient ischemic event, the study by Panagos et al found these patients to have a 9.2% incidence of _____ at 30-day follow-up.
 - a. stroke
 - b. myocardial infarction

Answer Key

- | | |
|-------|-------|
| 13. d | 16. c |
| 14. c | 17. c |
| 15. a | 18. d |

CME Instructions

Physicians participate in this continuing medical education program by reading the article, using the provided references for further research, and studying the questions at the end of the article. Participants should select what they believe to be the correct answers, then refer to the list of correct answers to test their knowledge.

To clarify confusion surrounding any questions answered incorrectly, please consult the source material. After completing this activity, you must complete the evaluation form that will be provided at the end of the semester and return it in the reply envelope provided to receive a certificate of completion. When your evaluation is received, a certificate will be mailed to you.

CME Objectives

To help physicians:

- Summarize the most recent significant emergency medicine-related studies;
- Discuss up-to-date information on all aspects of emergency medicine, including new drugs, techniques, equipment, trials, studies, books, teaching aids, and other information pertinent to emergency department care; and
- Evaluate the credibility of published data and recommendations.

Tachycardia with 1° AV Block

By Ken Grauer, MD

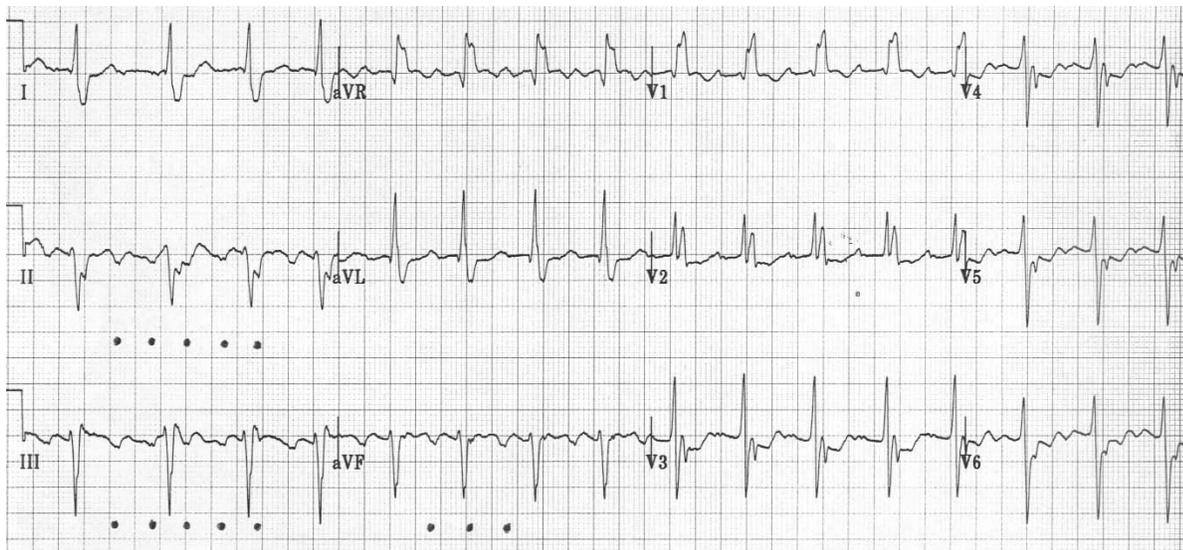


Figure. 12-lead ECG obtained from a 61-year-old woman diagnosed as having sinus tachycardia and 1° AV block.

Clinical Scenario: The ECG in the Figure was obtained from a 61-year-old woman who was being treated with flecainide for “arrhythmia.” Her tracing was interpreted as showing sinus tachycardia with 1° AV block, with the conduction disturbance being seen best in lead V₁. How would you interpret this ECG?

Interpretation: The key to interpreting the rhythm in this 12-lead ECG lies with recognizing that the very beginning of this tracing is irregular. Specifically, the first R-R interval is longer than all others on the tracing. After the first few beats, the rhythm becomes regular at a rate of about 110 beats/minute. The QRS complex is obviously widened. However, despite the seemingly upright “P” wave in lead V₁, the mechanism of this rhythm is not sinus. Sinus rhythm is defined by the presence of an *upright* P wave in lead II. A look at lead II in this tracing fails to show an upright P wave. Instead, there appear to be a number of sharp *negative* deflections in the baseline. Careful inspection of these negative deflections with calipers reveals that they are *regularly* occurring at a rate of about 220/minute (see the dots below leads II, III, and aVF in the Figure). Attention to the baseline in leads II and III shows the characteristic sawtooth pattern of atrial flutter in the longer initial R-R interval, which is not nearly as apparent

in the rest of the tracing. Thus, the rhythm is atrial flutter, initially with a variable ventricular response with 2:1 AV conduction becoming established by the third beat on the tracing. QRS widening is due to bifascicular block (right bundle branch block and left anterior hemiblock), and was not a new finding for this patient.

Several important points are highlighted by this tracing. First is the fact that 1° AV block is rarely seen with sinus tachycardia. This is because rapid heart rates usually result in *shortening* of the PR interval. Awareness of this point should be the first clue that the small upright deflection seen midway between QRS complexes in lead V₁ is unlikely to be a sinus P wave conducting with 1° AV block. The second important point about rhythm interpretation that is illustrated by this tracing is in showing how helpful it may be to always look for the pause (even if brief) in the rhythm. Except for the very first R-R interval on this tracing (which is longer than all other R-R intervals), flutter waves are nearly completely hidden by the QRS complex. Finally, note should be made that the atrial rate of flutter in this rhythm (220/minute) is slower than the usual range of 250-350/minute. This most probably is the result of antiarrhythmic treatment with flecainide. ❖