AMERICAN HEALTH CONSULTANTS®

EMERGENCY MEDICINE ALERT®

An essential monthly update of developments in emergency medicine

From the Publishers of Emergency Medicine Reports™

American Health Consultants Home Page—http://www.ahcpub.com

CME for Physicians—http://www.cmeweb.com

West Nile Virus 2002

What Insect Repellent Should Your Patients Be Using?

ABSTRACT & COMMENTARY

Source: Fradin MS, Day JF. Comparative efficacy of insect repellents against mosquito bites. *N Engl J Med* 2002;347:13-18.

THIS STUDY WAS UNDERTAKEN TO DETERMINE THE EFFICACY OF several insect repellent products available in the United States and compare their ability to provide reliable and prolonged protection from mosquito bites. A total of 16 products were chosen, including seven widely available botanical repellents, three DEET-based repellents (N,N-diethyl-3-methylbenzamide), a controlled-release 20% DEET formulation, a synthetic repellent containing IR3535, three wristbands impregnated with either DEET or citronella, and a moisturizer (Skin-So-Soft, Avon) that commonly is believed to have repellent effects.

Fifteen volunteers inserted their repellent-treated arms into a cage containing 10 laboratory-reared mosquitoes. The age and degree of hunger of the mosquitoes and the humidity, temperature, and light-dark cycle within the cage were kept constant. A total of 720 individual tests were conducted, with each repellent being randomly tested three times on each subject.

The DEET-based products provided complete protection for the longest time with a positive correlation between complete protection time and the concentration of DEET. The alcohol-based product containing 23.8% DEET protected for an average of 301.5 ± 37.6 minutes and protected significantly longer than the controlled-release formulation containing 20% DEET (234.4 ± 31.8 minutes; $p < 0.001$.) A 6.65% DEET product protected for a mean of 112.4 ± 20.3 minutes. A soybean-oil based repellent protected for an average of 94.6 ± 42.0 minutes and was not significantly different from the 4.75% DEET product with a complete protection time of 88.4 ± 21.4 minutes. The IR3535-based repellent protected for an average of 22.9 ± 11.2 minutes. All other botanical repellents provided protection for a mean of fewer than 20 minutes. The repellent-impregnated wristbands (including one with DEET) offered no protection. A eucalyptus oil repellent

VOLUME 9 • NUMBER 4 • SEPTEMBER 2002 • PAGES 25-32

INSIDE

became available after the original study was completed and was evaluated with only five subjects and had a mean of 120.1 ± 44.8 minutes of complete protection time.

COMMENTARY BY STEPHANIE B. ABBUHL, MD, FACEP

Mosquitoes are found all over the world, except in Antarctica, and the diseases these arthropods transmit include malaria, yellow fever, dengue hemorrhagic fever, epidemic polyarthritis, Bancroftian filariasis, and several forms of encephalitis.[1]

Until a few years ago, in the United States mosquito bites were considered primarily a nuisance; however, the arrival of the West Nile Virus (WNV) in North America in 1999 raised the level of concern. In 2001, the Centers for Disease Control and Prevention reported 66 human cases of WNV in the United States, including seven deaths in New York City. It is too early in the current season to know the extent of this summer's outbreak, but as of August 16, a total of 156 human cases of WNV had been reported in eight states and the District of Columbia, and WNV-positive mosquito pools had been reported in eight states and New York City.[2] In addition to WNV, the three other mosquito-borne diseases that are seen in the United States include eastern equine encephalitis, LaCrosse encephalitis, and St. Louis encephalitis.

This study confirms that DEET-based products remain the gold standard of mosquito repellent protection. A formulation of 23.8% DEET (OFF! Deep Woods, SC Johnson) provided an average of five hours of protection after a single application. While higher concentrations of DEET provided longer lasting protection, the authors mention that the duration of action tends to plateau at a concentration of about 50%, and most commercially available formulations now contain 40% DEET or less.

One possible limitation to the study was that only Aedes aegypti mosquitoes were used in the study, and there are approximately 170 species of mosquito in North America alone. An accompanying editorial notes that other species, including certain types that transmit malaria, may be less susceptible to DEET protection.[3]

With DEET the winner of the repellents, it is reassuring to note that DEET has a remarkable safety profile after 40 years of use. Fewer than 50 cases of serious toxic effects have been documented since 1960, most resolving without sequelae and many due to long-term, frequent, or heavy use. The Travel Medicine Clinic at the University of Pennsylvania recommends the use of up to 35% DEET in adults, 10% or less in children, and no use in children younger than 1 year of age. ❖

References

1. Fradin MS. Mosquitoes and mosquito repellent: A clinician's guide. *Ann Intern Med* 1998;128:931-940.
2. Weekly Update: West Nile Virus Activity—United States, Aug. 12-16, 2002. *MMWR Morb Mortal Wkly Rep* 2002;51(32):708-709.
3. Pollack RJ, et al. Perspective: Repelling mosquitoes. *N Engl J Med* 2002;347:2-3.

Emergency Medicine Alert, ISSN 1075-6914, is published monthly by American Health Consultants, 3525 Piedmont Rd., NE, Bldg. 6, Suite 400, Atlanta, GA 30305.

Vice President and Group Publisher: Brenda Mooney.
Editorial Group Head: Valerie Loner.
Managing Editor: Allison Mechem.
Marketing Manager: Schandale Kornegay.

GST Registration Number: R128870672.

Periodicals postage paid at Atlanta GA 30304. **POSTMASTER:** Send address changes to ***Emergency Medicine Alert***, P.O. Box 740059, Atlanta, GA 30374.

Back issues: $44. One to nine additional copies, $212 each; 10 to 20 additional copies, $159 each.

Subscriber Information

Customer Service: 1-800-688-2421

Customer Service E-Mail Address: customerservice@ahcpub.com

Editorial E-Mail Address: allison.mechem@ahcpub.com

World-Wide Web: http://www.ahcpub.com

Subscription Prices

United States: $265 per year (Resident rate: $132.50)
Canada: $295 per year plus GST (Resident rate: $147.50)
Elsewhere: $295 per year (Resident rate: $147.50)

Accreditation

American Health Consultants (AHC) is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians. This CME activity was planned and produced in accordance with ACCME Essentials.

American Health Consultants designates this continuing medical education activity for up to 20 hours in category 1 credit towards the Physician's Recognition Award. Each physician should only claim those hours of credit that he/she actually spent in the educational activity.

Emergency Medicine Alert is also approved by the American College of Emergency Physicians for 20 hours of ACEP category 1 credit.

Emergency Medicine Alert has been approved by the American Academy of Family Physicians as having educational content acceptable for Prescribed credit hours. This volume has been approved for up to 20 Prescribed credit hours. Term of approval covers issues published within one year from the beginning distribution date of June 2001. Credit may be claimed for one year from the date of this issue. **For CME credit, add $50.**

THOMSON™
AMERICAN HEALTH CONSULTANTS

Questions & Comments

Please call **Allison Mechem,** Managing Editor, at (404) 262-5589, between 8:00 a.m. and 4:00 p.m. ET, Monday-Friday.

Conflict of Interest Disclosure

To reveal any potential bias in this publication, and in accordance with Accreditation Council for Continuing Medical Education guidelines, Drs. Harrigan (editor), Abbuhl, Chan, Felz, Hamilton, and Ufberg have reported no relationships with companies having ties to the field of study covered by this CME program. Dr. Grauer is sole proprietor of KG/EKG Press. Dr. Karras has reported that he is a consultant for Bayer Pharmaceuticals; consultant, speaker and researcher for Aventis Pharma; and a researcher for Bristol-Myers Squibb and Sepracor Inc. Dr. Brady is on the speaker's bureau for Genentech. Dr. Gibbs is a consultant and is involved in research for LMA North America.

Fluid Resuscitation of the Actively Bleeding Trauma Patient: What Is Our Goal?

ABSTRACT & COMMENTARY

Source: Dutton RP, et al. Hypotensive resuscitation during active hemorrhage: Impact on in-hospital mortality. *J Trauma* 2002;52:1141-1146.

While there can be no doubt that hemorrhage is the leading mechanism of post-traumatic death, the approach to combating this problem is marked with dogma and controversy. Aggressive fluid administration in animal models leads to increased bleeding because of increased arterial and venous pressure, dilution of clotting factors, and decrease in blood viscosity. This is especially true when a normal systolic blood pressure (SBP) is used as the target for fluid resuscitation with a marked decrease in survival. The clinical study of controlled hypotension in the resuscitation of trauma patients has been confined to one prospective trial completed in Houston, TX, in the 1990s. In this study, hypotensive victims of penetrating torso trauma were randomized in the field either to receive intravenous fluids or not, and this therapy was continued until the end of the patient's stay in the emergency department. This study showed a survival advantage in the no-fluid group, although the results were limited to penetrating trauma (a condition most similar to the animal models). In addition, aggressive resuscitation in the operating room followed the hypotensive phase of management. Last, the authors resuscitated patients with no fluid or aggressive fluid use, and did not limit administration when perfusion appeared to be restored. The resultant controversy called into question the value of the "stay and play" style of emergency medical service (EMS) resuscitation, and suggested that the "scoop and run" method was advantageous.[1]

In this study, patients presenting in hemorrhagic shock were randomized to one of two fluid resuscitation protocols: target SBP > 100 mmHg (conventional) or target SBP of 70 mmHg (low). Fluid therapy was titrated to this endpoint until definitive hemostasis was achieved. In-hospital mortality, injury severity, and probability of survival were determined for each patient. One hundred and ten patients were enrolled during 20 months, 55 in each group. The study cohort had a mean age of 31 years, and consisted of 79% male patients and 51% penetrating trauma victims. There was a significant difference in SBP observed during the study period (114 mmHg for the conventional group vs 100 mmHg for the low SBP group, $p < 0.001$). Injury Severity Score (19.65 ± 11.8 vs 23.64 ± 13.8, $p = 0.11$) and the duration of active hemorrhage (2.97 ± 1.75 hours vs 2.57 ± 1.46 hours, $p = 0.20$) were not different between groups. Overall survival was 92.7%, with four deaths in each group; power calculations were not reported.

The authors conclude that the titration of initial fluid therapy to a lower-than-normal SBP during active hemorrhage did not affect mortality in this study. They state that the reasons for the decreased overall mortality and the lack of differentiation between groups likely include improvements in diagnostic and therapeutic technology since prior studies, the truly heterogeneous nature of human traumatic injuries, and the imprecision of SBP as a marker for tissue oxygen delivery.

COMMENTARY BY RICHARD J. HAMILTON, MD, FAAEM, ABMT

I think this study helps put an end to this controversy. There can be no doubt that the notion that traditional aggressive fluid resuscitation might be somehow harming patients troubled many emergency medicine physicians and trauma surgeons. This study looks at this problem but uses a more realistic population and provides a much more lucid approach to resuscitation than the study that questioned this practice in the 1990s. In fact, this current study more closely reflects the actual practice of resuscitating hypovolemic shock to a perfusing blood pressure rather than a "normal" blood pressure. For now, the "stay and play" proponents and the "scoop and run" proponents will have to "run and play" over another controversy. ❖

References

1. Bickell WH, et al. Immediate versus delayed resuscitation for hypotensive patients with penetrating torso injuries. *N Engl J Med* 1994;331:1105-1109.

Rehydrating the Dehydrated Pediatric Patient: Intravenous vs. Nasogastric Fluids

ABSTRACT & COMMENTARY

Source: Nager AL, Wang VJ. Comparison of nasogastric and intravenous methods of rehydration in pediatric patients with acute dehydration. *Pediatrics* 2002;109:566-572.

Traditional therapy for dehydration in developed countries centers around hospitalization and intravenous fluid (IVF) therapy. Oral replacement therapy (ORT) solutions containing glucose and electrolytes are used widely in developing countries, but often are regarded as substandard or less preferable by clinicians in the United States. In an effort to evaluate alternatives to IVF, Nager and Wang studied rapid nasogastric (RNG) volume resuscitation, comparing this approach to rapid intravenous (RIV) hydration.

The authors analyzed 90 children, ages 3-36 months, with acute dehydration from presumed viral gastroenteritis presenting to the emergency department (ED) of

Children's Hospital of Los Angeles. All cases had acute illnesses (< 7 days) featuring vomiting, diarrhea, and insufficient oral intake. Attending physicians judged each case as mild (3-5%) or moderate (6-9%) dehydration based on 11 published clinical criteria.[1] Children with severe (> 10%) dehydration, bowel obstruction, or specific acute systemic illness were excluded.

Each patient had body weight determined before and after ED therapy; intake and output recorded; and blood, urine, and stool studies performed. In 92% of cases, final diagnosis was viral gastroenteritis. Initial serum bicarbonate was 15.2 mmol/L, with anion gap averaging 19.5. Cases were randomized to either RNG (n=46) with 50 mL/kg of Pedialyte over a three-hour period via a 5 French silastic feeding tube passed over Cetacaine nasal analgesia and into the stomach, or to RIV (n=44) with normal saline at 50 mL/kg over a three-hour period via a 22- or 24-gauge IV catheter. Children whose vital signs and clinical dehydration indicators improved, and who could tolerate ORT in improved amounts, were discharged to telephone follow-up 24 hours later.

Assessments at the conclusion of the three-hour therapy period revealed some unexpected findings. Only two (4%) RNG placements were unsuccessful (one tube pulled out; one nosebleed), whereas 27 (61%) attempts to place an IV needle required multiple procedures ($p < 0.0001$). Final heart rate was 126 beats per minute in both groups. Weight gain after treatment was greater for RIV (3.5% body weight) than for RNG (2.2% body weight; $p = 0.008$). Return rate for additional ED therapy was 18% for RNG vs. 15% for RIV ($p = 0.78$). Post-treatment determinations for urine specific gravity were 1.012 vs. 1.019 ($p < 0.001$), for serum bicarbonate were 17.0 vs. 14.7 mmol/L ($p < 0.001$), for blood urea nitrogen (BUN) were 8 vs. 9 mmol/L ($p < 0.001$), for persistent ketonuria were 43% vs. 82% ($p < 0.001$), and for urine specific gravity exceeding 1.025 were 11% vs. 32% ($p < 0.001$) for RNG vs. RIV, respectively. Cost per case was calculated at $525.90 for RNG vs. $642.64 for RIV (18% difference). The authors conclude that RNG at 50 mL/kg over a three-hour period is just as effective as RIV in volume-contracted children and improves overall ED efficiency of therapy.

COMMENTARY BY MICHAEL FELZ, MD

The "hassle" of fluid administration is reduced by NG tube placement as compared to often-difficult intravenous catheterization. In somewhat surprising fashion, several laboratory markers of volume contraction and metabolic acidosis were statistically better for RNG therapy compared to IVF infusion, which commonly is regarded as "superior." Estimated cost reductions also favored RNG statistically. Failure rates were below 20% and statistically similar for each group. RNG even worked in a small subset of patients proved to have bacterial enteritis and urinary tract infections, in addition to cases with presumed viral illness.

The authors cite prior studies comparing RNG to IVF therapy, but these all involved hospitalized children treated over a 24-hour span, or were done in developing countries such as those in Africa. What impressed me about this three-hour NG "rehydration" approach was its simplicity, success rate, and convincing superiority in laboratory markers of volume contraction. The RNG approach offers patient, parent, and ED staff acceptance, ease of administration, laboratory improvements, cost benefits, and recovery rates that equal—and for the most part surpass—the benefits of traditional IVF therapy. And it requires only three hours.

I readily admit that NG administration of fluid would be an unfamiliar mode of therapy for most parents with sick children in the ED. Yet perhaps this is directly related to lack of familiarity among the physicians caring for such children. ❖

References

1. Gorelick MH et al. Validity and reliability of clinical signs in the diagnosis of dehydration in children. *Pediatrics* 1997;99:e6.

Special Feature

ED Management of the Unstable Patient with Abdominal Aortic Aneurysm

By Michael A. Gibbs, MD

The emergency department diagnosis and management of the patient with a ruptured abdominal aortic aneurysm (AAA) poses several unique challenges. The clinical presentation is seldom "classic" and, as a result, the diagnosis often is delayed or may be overlooked completely. Once a ruptured AAA is suspected, important diagnostic imaging decisions must be made. The emergency physician should be familiar with the strengths and weaknesses of each of these testing modalities. Coincident urgent resuscitation needs make the situation even more demanding. Lastly, and perhaps most importantly, this is a condition for which time is

Table 1. Five-Year Risk of Rupture	
DIAMETER	RISK OF RUPTURE
< 4 cm	< 2%
4-5 cm	3-10%
> 5 cm	25-40%

clearly not on our side. Even short delays in definitive management may dramatically increase both morbidity and mortality. This special feature will review the epidemiology of AAA, and provide a logical management framework that I hope will address these issues

Epidemiology of a Potentially Lethal Disease

Ruptured AAA is the 13th most common cause of death in the United States. About 3-5% of patients older than 65 years harbor an asymptomatic AAA. The male-to-female ratio is approximately 4:1. There have been several different criteria employed to define AAA. The most widely used definition is any aortic diameter greater than 3.0 cm. AAA is the most common type of aneurysm. Ninety-five percent arise below the origin of the renal arteries. Coexistent iliac artery aneurysms are found in 50% of cases. Major risk factors are advanced age, male gender, smoking, hypertension, chronic obstructive pulmonary disease, and peripheral vascular disease. The incidence of AAA in patients with a first-degree relative with the disease is 11-28%. A family history of AAA is an important component of the history in the elderly patient with abdominal pain.[1]

Population-based studies suggest that an untreated AAA increases in diameter by about 0.2 cm annually. Larger aneurysms—those more than 5-6 cm—expand more rapidly than smaller ones. **Table 1** illustrates the relationship between aortic diameter and the risk of rupture. Because of the striking increase in rupture-risk with size, some recommend that all asymptomatic aneurysms larger than 5 cm undergo elective repair.

The prognosis of aortic rupture is dismal. Up to 60% of patients with ruptured aneurysms die before ever reaching the hospital. Of those who "arrive alive," the operative mortality is greater than 50%; i.e., the overall mortality of ruptured AAA is nearly 90%. When contrasted with a 1-5% mortality for patients undergoing elective operative repair, the priority clearly should be early detection of symptomatic AAA prior to rupture.[1,2]

A Challenging Clinical Diagnosis

Clinical diagnosis in symptomatic AAA is neither sensitive nor specific. It has been well demonstrated that unless the AAA is large, even experienced clinicians cannot rely solely on the physical examination.[2,3] In patients with a rapidly expanding or ruptured AAA, the classic triad of abdominal or flank pain, hypotension, and a pulsatile abdominal mass is only present in 30-50% of cases. In addition, since the majority of aneurysms rupture into the retroperitoneum, the expanding hematoma may be contained and patients may have "normal" vital signs on presentation.[4] Moreover, the differential diagnosis of a patient with hypotension, syncope, abdominal pain, flank pain or back pain is quite broad.[1]

It is prudent to consider the diagnosis of AAA in all patients older than age 50 with abdominal, flank, or back pain. This certainly does not mean the emergency physician should work up everyone with those complaints for the disease; but it should be given thought. If the patient is sick, AAA should move up a few notches on the differential diagnosis.

Table 2. Definitive Testing in Patients With Suspected AAA
CT SCANNING
Advantages:
• More accurate than ultrasound in detecting rupture
• Provides precise definition of anatomy
• Can identify other causes of symptoms
Disadvantages:
• Removes potentially unstable patients from the ED
• Time required may delay ultimate surgical repair
• Need for contrast dye
BEDSIDE ULTRASOUND
Advantages:
• Sensitivity approaches 100% in experienced hands
• Can be done rapidly at the bedside
• Non-invasive, repeatable, inexpensive
Disadvantages:
• Highly operator-dependent
• Does not accurately detect rupture
• Less anatomic definition
• Does not image visceral branch vessels

Making a Definitive Diagnosis

A definitive diagnosis of AAA can be made by either computed tomography (CT) scanning or ultrasound (or laparotomy, of course). Each modality has important strengths and weaknesses. *(See Table 2.)* The central question then becomes: Which test is best? There is no blanket answer, and decisions should be based primarily on the hemodynamic stability of the patient at hand. In the clinically unstable patient with a leaking or ruptured AAA, every minute saved will improve outcome. If available, immediate ED bedside ultrasound should be performed. The accuracy of ultrasound in this setting is well-established, and the technology is portable and readily available.[1,5] The ultrasonographic detection of AAA in the unstable patient is an indication for immediate surgical consultation.

Sending these patients to the bowels of the radiology department for CT scanning can be a perilous mistake.

As ultrasound moves into emergency medicine, emergency physicians have taken the imaging of the abdominal aorta as one of its key applications.[6,7] Recent studies have shown that well-trained emergency physicians can diagnose AAA with a sensitivity that approaches 100%.[8-10] If you have ED ultrasound available, learn how to image the abdominal aorta. If you don't have ED ultrasound available, get it.

In the stable symptomatic patient, the decision to obtain a CT scan or formal ultrasound should be based on an understanding of the strengths and weaknesses of each test, their availability, and the preference of consulting surgeons. Be cautious with overreliance on plain film radiographs. These may demonstrate aortic calcification with dilatation as an indirect marker of AAA, but never should be used to exclude the diagnosis.

A special note of caution: Up to 30% of patients with symptomatic AAAs are misdiagnosed on initial presentation. In one study, common erroneous diagnoses included: renal colic (23%); gastrointestinal hemorrhage (13%); diverticulitis (12%); and back pain (9%).[11] Be especially cautious when evaluating the elderly patient with flank pain (with or without hematuria) for presumed renal colic. A helical CT scan, rather than an intravenous pyelogram, is especially useful in this setting, as both diagnostic possibilities can be explored. An alternative is sonographic evaluation of the kidneys for hydronephrosis and the aorta for AAA.

Management Essentials

The following algorithms are suggested for evaluation and treatment of the patient with suspected symptomatic AAA:

The Unstable Patient
↓
Rapid physical exam, chest x-ray, ECG
Initiate resuscitation
↓
To operating room*

*Consider bedside ultrasound if immediately available

Resuscitative efforts should focus on: 1) early, aggressive airway management, especially prior to interfacility transfers; 2) the establishment of adequate intravenous access; 3) early blood transfusion; 4) prevention of coagulopathy and hypothermia; and 5) early surgical consultation.

The Stable Symptomatic Patient
↓
Physical exam, limited studies (cross match)
Secure appropriate IV Access
↓
Bedside ultrasound vs. abdominal CT
↓
Immediate surgical consultation

Common Management Pitfalls

Immediate surgery is the only intervention that will save an unstable patient with a ruptured or leaking AAA. We resuscitate dying patients better than anyone else in the hospital, but remember, what these patients need is a surgeon and a knife.

Common ED pitfalls include:

- Failure to suspect the diagnosis on clinical grounds alone;
- Failure to obtain immediate surgical consultation and/or interfacility transfer;
- Failure to obtain the right diagnostic test for the right patient; and
- Failure to secure the airway and initiate appropriate resuscitation.

Summary

Ruptured AAAs represent one of the most lethal conditions in emergency medicine. Most of these patients, unfortunately, will not survive the experience. As emergency physicians, our prime directive should be to suspect the diagnosis in the right patient, move quickly to see if we are right, and to get the patient to the operating room. We have all the tools to do this, and to do it well. ❖

References

1. Ernst CB. Abdominal aortic aneurysm. *N Eng J Med* 1999;328:1167-1172.
2. Lederle FA, et al. Does this patient have abdominal aortic aneurysm? *JAMA* 1999;281:77-81.

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.

3. Fink HA, et al. The accuracy of physical examination to detect abdominal aortic aneurysm. *Arch Intern Med* 2000;160:833-836.
4. Zimmers T. Absence of back pain and tachycardia in the emergent presentation of abdominal aortic aneurysm. *Amer J Emerg Med* 1988:6:316.
5. Hojer J. Diagnosis of acute symptomatic aortic aneurysm—Ultrasonography is an important tool. *J Intern Med* 1992;232:427-431.
6. American College of Emergency Physicians. ACEP emergency ultrasound guidelines—2001. *Ann Emerg Med* 2001;38:470-481.
7. American College of Emergency Physicians. Use of ultrasound imaging by emergency physicians. *Ann Emerg Med* 2001;38:469-470.
8. Miller J, et al. Small ruptured abdominal aneurysm diagnosed by emergency physician ultrasound. *Amer J Emerg Med* 1999;17:174-175.
9. Kuhn M, et al. Emergency department ultrasound scanning for abdominal aortic aneurysm: Accessible, accurate, and advantageous. *Ann Emerg Med* 2000; 36:219-223.
10. Graf C, et al. Prospective study of accuracy and utility of emergency ultrasound for AAA over a two-year period. *Acad Emerg Med* 2002;9:451-452.
11. Martson WA, et al. Misdiagnosis of ruptured abdominal aortic aneurysm. *J Vasc Surg* 1992;16:17-22.

Physician CME Questions

21. All of the following statements are true about DEET-containing insect repellents *except*:
a. A 23.8% DEET product provided five hours of complete protection time.
b. A DEET-impregnated wristband provided 30 minutes of protection.
c. There is a positive correlation between complete protection time and the concentration of DEET.
d. Fewer than 50 cases of serious toxic effects due to DEET have been reported in more than 40 years of use, and most were related to frequent or heavy use.

22. Which of the following is *not* a mosquito-borne virus found in North America?
a. Coxsackie B virus
b. Eastern equine encephalitis
c. St. Louis encephalitis
d. West Nile virus

23. Fluid resuscitation of the hypotensive victim of penetrating trauma to a normal blood pressure has been clearly shown to lead to a reduction in morbidity and mortality.
a. True
b. False

24. For ill children with gastroenteritis and volume contraction, a three-hour fluid infusion of Pedialyte by nasogastric tube appears to be:
a. only possible in children older than 36 months of age.
b. inferior to rapid IV infusion.
c. superior to rapid IV infusion.
d. contraindicated.

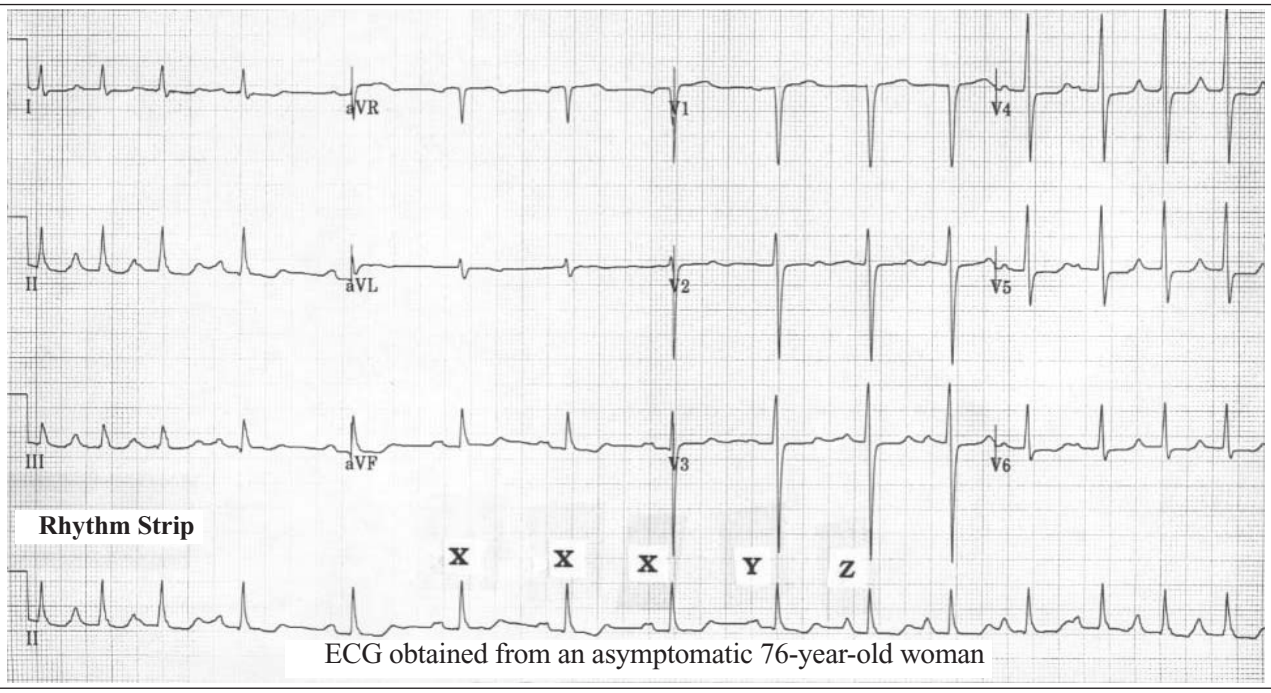
25. Risk factors for abdominal aortic aneurysm include:
a. smoking, advanced age, hypertension, COPD
b. smoking, advanced age, Buerger's disease, COPD
c. alcohol abuse, advanced age, hypertension, COPD
d. alcohol abuse, advanced age, Buerger's disease, hypertension

26. When evaluating the patient with hypotension, diaphoresis, pulsatile mass, and abdominal pain radiating to the back for aortic aneurysm, the best initial test in the ED is:
a. helical CT with contrast.
b. helical CT without contrast.
c. bedside ultrasound.
d. MRI with gadolinium.

27. Leading misdiagnoses in cases of missed abdominal aortic aneurysm have been shown to include all of the following *except*:
a. renal colic.
b. pneumonia.
c. diverticulitis.
d. back pain.

Shifting Sites

By Ken Grauer, MD



ECG obtained from an asymptomatic 76-year-old woman

Clinical Scenario: The ECG in the Figure was obtained from an asymptomatic 76-year-old woman. How do you interpret this tracing?

Interpretation: The most interesting part of this 12-lead ECG is the rhythm strip that appears at the bottom of the tracing. The rhythm is clearly irregular. Atrial activity is present, but it does not remain constant throughout the tracing. The obvious question is how to interpret the rhythm?

The easiest approach to arrhythmia interpretation when confronted with changing atrial activity and an irregular ventricular rhythm is to look first for the presence of an *underlying* rhythm. Recognition of the fact that the underlying rhythm in this case is sinus greatly facilitates interpretation of surrounding nonsinus activity. The complexes marked *X* (and possibly also the complex just before the first *X*-labeled beat) all occur at a regular rate (of about 75 beats/minute), and are all preceded by a similar looking upright P wave with a constant PR interval. This presumably reflects an underlying sinus rhythm. Atrial beat morphology subtly changes with the P wave marked *Y*, and beginning with the P wave marked *Z* is seen to take on a taller, more peaked shape for the remainder of the rhythm strip. The site of atrial pacemaker activity therefore has shifted from the sinus node to some other atrial site that manifests a similar P wave morphology to that seen at the very beginning of this tracing (i.e., prior to the *X*-marked sinus beats).

The rhythm strip findings we have just described suggest a *wandering* atrial pacemaker as the etiology of the rhythm, in which P wave morphology intermittently changes, reflecting rotation of the site of atrial pacemaker activity. An alternative explanation might be that the gradual acceleration of peaked P wave complexes toward the end of the rhythm strip reflects a "warm-up" phenomenon of an ectopic atrial tachycardia arising from increased automaticity of some ectopic atrial site. Additional rhythm strip monitoring is needed to clarify this possibility.

Apart from the rhythm, nonspecific ST-T wave abnormalities are present in multiple leads on this ECG, but there are no acute changes. This tracing therefore provides a nice illustration of how helpful simultaneously recorded leads may be for assisting in complex rhythm interpretation, since the etiology of this arrhythmia would not be evident from inspection of the 12-lead ECG shown here *without* the accompanying rhythm strip. ❖

In Future Issues: Portable Clinical Analyzer in the Pediatric ED