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The Antidote for Antifreeze, Something Old or Something New?

ABSTRACT & COMMENTARY

Source: Brent J, et al. Fomepizole for the treatment of ethylene glycol poisoning. *N Engl J Med* 1999;340:832-838.

Ethylene glycol poisoning causes metabolic acidosis and renal failure and may cause death. Traditionally, treatment has focused on inhibition of alcohol dehydrogenase with intravenous or oral ethanol and adjunctive hemodialysis. Brent and associates studied the efficacy of fomepizole, a new inhibitor of alcohol dehydrogenase, in the treatment of ethylene glycol poisoning. Over a two-year period they collected data on 19 patients who met the definition of ethylene glycol poisoning and had a plasma ethylene glycol concentration of 20 mg/dL or more. Seventeen patients who met specific criteria also underwent hemodialysis. Treatment was continued until plasma ethylene glycol concentrations were less than 20 mg/dL.

Fifteen of the patients initially had acidosis. This tended to normalize within hours after the initiation of treatment with fomepizole. Interestingly, the nine patients who developed renal impairment had high serum creatinine concentrations and markedly elevated plasma glycolate concentrations at enrollment (≥ 97.7 mg/dL). None of the 10 patients with normal serum creatinine concentrations at enrollment had renal injury during treatment; all 10 had plasma glycolate concentrations at or below 76.8 mg/dL. Few adverse effects were attributable to fomepizole.

COMMENT BY RICHARD HAMILTON, MD, FAAEM, ABMT

There are an estimated 5000 exposures to ethylene glycol per year, and each clinician who manages these cases is faced with the same old question about the same old antidote: "do I start an ethanol drip or not?" The reluctance to start this therapy is based on many difficulties. First, many hospitals are unable to determine an ethylene glycol level in a clinically useful period of time and clinicians must make this decision on an unreliable ingestion

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history and an only slightly more reliable test, the osmolal gap. Second, ethanol drips are uncommon orders for hospital pharmacies, and difficulties and uncertainty are the rule. Third, the ethanol drip is difficult to manage. Ethanol must be maintained at a serum level of about 100 mg/dL, requires frequent monitoring, and kinetics can vary widely depending on premorbid conditions. In addition, ethanol metabolism can cause hypoglycemia, respiratory depression, and hypovolemia.

Now clinicians will have to ask themselves a new question about a new antidote, fomepizole. This antidote, originally known as 4-methylpyrazole, was first touted as an antidote for toxic alcohol ingestions 10 years ago. It appears safe, has been demonstrated to be effective in bench, animal, and human studies, and is extremely simple to administer. Then why isn't the answer to this question an automatic yes? Like everything else in medicine at the end of the millennium, we are inhibited by cost. A course of fomepizole for an ethylene glycol-poisoned patient costs $4,000. To compare, oral loading and maintenance of ethanol is one-hundredth the cost and comes in a variety of bottles and flavors. Proponents of both therapies can make lucid fiscal arguments why either antidote is superior. I have this antidote available to me at many but not all of the hospitals where I function as a bedside consulting toxicologist, and have used it with great satisfaction. Each hospital must decide whether they can afford fomepizole, and, oddly enough, I would recommend this antidote to the hospitals who anticipate the greatest difficulty in obtaining toxicology consultation and emergent hemodialysis. It certainly is the least complicated therapy to initiate and carries the greatest chance of success for the patient. ❖

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

Group Publisher: Brenda Mooney.
Executive Publisher: Park Morgan.
Managing Editor: David Davenport.
Copy Editor: Suzanne Zunic.
Marketing Manager: Deborah Zelnio.

GST Registration Number: R128870672.

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

Back issues: $33. One to nine additional copies, $100 each; 10 or more additional copies, $60 each.

Subscriber Information

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Customer Service E-Mail Address: custserv@ahcpub.com
Editorial E-Mail Address: suzanne.zunic@medec.com
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Subscription Prices

United States: $199 per year (Resident rate: $100)
Canada: $229 per year plus GST (Resident rate: $115)
Elsewhere: $229 per year (Resident rate: $115)

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Antibiotic Resistance in Uncomplicated UTIs

ABSTRACT & COMMENTARY

Source: Gupta K, et al. Increasing prevalence of antimicrobial resistance among uropathogens causing acute uncomplicated cystitis in women. *JAMA* 1999;281:736-738.

Prevalence and trends in antimicrobial resistance among the narrow spectrum of organisms responsible for acute uncomplicated cystitis were examined in this study from Washington state. Included were those patients with a positive urine culture ($\geq 10^3$ CFUs/mL) from a population of women, ages 18-50, in a health maintenance organization, who sought treatment at an outpatient clinic or ED. The study spanned five years, controlled for seasonal variation, and included 4342 urine isolates. Selected chart review confirmed that more than 95% of the study population included visits for uncomplicated cystitis.

The distribution of causative uropathogens was not surprising: *Escherichia coli*, 86%; *Staphylococcus saprophyticus*, 4%; *Proteus* species, 3%; *Klebsiella* species, 3%; *Enterobacter* species, 1.4%; *Citrobacter* species, 0.8%; *Enterococcus*, species 0.5%; and others, 1.3%. More than 20% of *E. coli* isolates were resistant to ampicillin, cephalothin, and sulfamethoxazole. Alarmingly, resistance among *E. coli* to trimethoprim/sulfamethoxazole doubled over the course of the study, rising from 9% to 18%. A significant increasing linear trend in resistance was found for all isolates to ampicillin, cephalothin, trimethoprim, and trimethoprim/sulfamethoxazole. Ciprofloxacin, nitrofurantoin, and gentamicin faired the best with regard to limited resistance. Recognizing that in vitro resistance may not directly translate to altered patient outcome, Gupta and colleagues concluded that the days may be numbered when trimethoprim/sulfamethoxazole

should be used for empiric therapy for uncomplicated UTI.

COMMENT BY RICHARD A. HARRIGAN, MD, FAAEM, FACEP

And so, more evidence of emerging antimicrobial resistance is published; important news, but is it time to stop using trimethoprim/sulfamethoxazole as the first-line antibiotic for uncomplicated UTI? Not yet. As Gupta et al caution, this is not a clinical outcomes study, but rather a report of a microbiological trend. Moreover, trimethoprim/sulfamethoxazole is concentrated in the urine, achieving higher concentrations than in the blood;[1] thus, the pathogen might still be eradicated. Finally, a treatment failure in cases of uncomplicated UTI generally does not result in life-threatening illness, but, rather, persistence of symptoms. Thus, treatment failures should make us think not only of an alternative diagnosis, but also of the anitmicrobial resistance issue. ❖

References

1. *Physicians' Desk Reference*, 53rd ed. Montvale NJ, Medical Economics Company, 1999, p 2655.

The Use of Antiemetics in Overdose: More is Better

ABSTRACT & COMMENTARY

Source: Wright RO, et al. Effect of metoclopramide dose on preventing emesis after oral administration of N-acetylcysteine for acetaminophen overdose. *J Toxicol Clin Toxicol* 1999;37:35-42.

Wright and colleagues compared the incidence of vomiting in two groups of acetaminophen (APAP) overdose patients. Patients who received standard doses of metoclopramide (defined as < 20 mg) were not significantly different from patients who received high-dose metoclopramide (defined as > 20 mg) with regard to APAP levels, times to presentation, and the incidence of vomiting prior to antiemetic therapy. However, 63% of patients vomited after the standard dose of antiemetic therapy, which was significantly greater than the 22% of patients who vomited after high-dose antiemetic therapy. Wright et al remind us that although standard doses of metoclopramide (0.1-0.15 mg/kg IV) are sufficient to control routine cases of nausea and vomiting, oncology services frequently use doses as high as 1.0 mg/kg IV.

COMMENT BY ROBERT S. HOFFMAN, MD

APAP overdoses are among the most prevalent overdoses reported to poison centers. Both the overdose itself and the antidote, N-acetylcysteine (NAC), commonly produce vomiting. Early APAP-induced emesis may be protective in that some gastrointestinal decontamination results. Unfortunately, patients with APAP overdose frequently experience nausea and vomiting for many hours to several days after ingestion. When combined with the foul odor and taste of NAC, these gastrointestinal symptoms frequently delay administration of the antidote. Since every incremental delay in NAC administration beyond eight hours post-ingestion increases the likelihood of hepatotoxicity, it is often desirable to administer antiemetics to patients with APAP overdose to limit significant nausea or vomiting.

This paper has applicability to many toxicologic emergencies where nausea and vomiting interfere with orally administered therapies. Examples include patients with theophylline overdose who cannot tolerate activated charcoal, and many patients who require whole bowel irrigation for various ingestions such as iron, lithium, and sustained-release agents. While the initial dose of antiemetics administered to these patients should be the standard lower doses, higher doses should be rapidly given if symptoms persist. If vomiting continues despite high-dose metoclopramide therapy, $5HT_3$ antagonists such as ondansetron or granisetron should be given. The key element is to use these agents to their full potential in order to achieve the therapeutic objective. ❖

Relieving the Pain of Renal Colic

ABSTRACT & COMMENTARY

Source: Larkin GL, et al. Efficacy of ketorolac tromethamine versus meperidine in the ED treatment of acute renal colic. *Am J Emerg Med* 1999;17:6-10.

This study was a prospective, controlled, randomized, double-blind trial comparing the efficacy of intramuscular ketorolac and meperidine in the ED treatment of renal colic. Subjects were randomized to receive either 60 mg IM ketorolac or 100-150 mg IM

meperidine, based on weight. Patients were excluded if a stone was not confirmed either by IVP or by the passage of a visible stone in the ED. Pain was measured on a 10 cm visual analogue scale at baseline 20, 40, 60, and 90-minute intervals. The three main outcome measures were: 1) the degree of pain relief; 2) the need for rescue medication; and 3) the time to discharge from the ED.

Of the 70 patients completing the trial, 33 received ketorolac and 37 received meperidine. Baseline pain scores were similar for both groups (pain scores ~8.00), as were demographic characteristics.

There was significantly greater pain relief reported in patients treated with ketorolac compared to meperidine at 40, 60, and 90 minutes (at 20 minutes there was no difference). The use of rescue medication was similar for both groups: 33% of ketorolac patients and 43% of meperidine patients required additional medication. While the number of patients discharged was not significantly different in the two groups, the time to discharge was significantly earlier in the ketorolac group (3.46 vs 4.33 hours), even when controlling for other factors. Side effects were minor and similar in both groups.

COMMENT BY STEPHANIE B. ABBUHL, MD, FACEP

While this study had flaws in the design and data analysis, the effectiveness of ketorolac in renal colic should be the take-home message. These data favorably compare with what others have shown: that single-dose ketorolac is at least as good as, and is possibly better than, single-dose meperidine in the treatment of renal colic.[1,2] Unfortunately, I am not aware of a good study comparing IV morphine to IV ketorolac.

It may be that a combined approach using both IV opiates and IV ketorolac is a rational one. These two classes of pain medication work differently, are dosed differently (single dose vs titration), and may complement each other. Studies with ketorolac and other NSAIDs suggest an important role for prostaglandin inhibition in the treatment of renal colic. It is thought that NSAIDs work through the relaxation of ureteral spasm and in the alleviation of renal capsular distention by diminishing renal blood flow and diuresis. ❖

References

1. Oosterlinck W, et al. A double-blind, single dose comparison of intramuscular ketorolac tromethamine and pethidine in the treatment of renal colic. *J Clin Parmacol* 1990;30:336-341.
2. Cordell WH, et al. Comparison of intravenous ketorolac, meperidine, and both (balanaced analgesia) for renal colic. *Ann Emerg Med* 1996;28:151-158.

More on ECG Diagnosis of Acute MI with Concurrent LBBB

ABSTRACT & COMMENTARY

Source: Shlipak MG, et al. Should the electrocardiogram be used to guide therapy for patients with left bundle branch block and suspected acute myocardial infarction? *JAMA* 1999;281:714-719.

Shlipak and colleagues performed a retrospective, cohort study to investigate the impact of the ECG on diagnosis and treatment of patients with LBBB pattern and suspected acute myocardial infarction (AMI). The study population was composed of patients with LBBB and possible AMI on ED presentation; 30% of the study group was ultimately found to have AMI by CPK-MB elevations. In the first portion of this study, a single physician who was blinded to the clinical information interpreted the ECGs in retrospective fashion, using pre-existing criteria for AMI diagnosis developed by previous investigators. The ECGs were interpreted as either diagnostic or not diagnostic for AMI; the electrocardiographic diagnosis was then compared to the clinical diagnosis.

In the second phase of the study, Shlipak et al investigated the impact of the ECG on specific management—the administration of a thrombolytic agent. This question was explored by means of a decision tree that compared three treatment pathways: thrombolysis for all patients, thrombolysis for only those patients with an ECG diagnostic for AMI, or no thrombolysis regardless of the ECG interpretation; the treatment algorithm was also evaluated from the perspective of stroke occurrence. Outcomes were then assessed and compared among the three management strategies.

One hundred three patient encounters made up the study population. Of the electrocardiographic features assessed, none effectively distinguished the patients who had AMI from those patients with noncoronary diagnoses. The various electrocardiographic criteria indicated AMI in only 3% of cases, with a sensitivity for the diagnosis of only 10% (95% confidence intervals, 2-26%). Using the management strategy of thrombolysis for all patients with suspected AMI and LBBB, out of 1000 patient presentations, 929 patients would survive without stroke if all patients were treated, compared to 918 patients if the electrocardiographic criteria were used as the only indication for thrombolysis.

Shlipak et al concluded that electrocardiographic criteria are poor indicators of AMI in LBBB situations; they further suggested that all patients suspected of AMI with LBBB should be considered for thrombolysis.

COMMENT BY WILLIAM J. BRADY, MD

Common medical opinion holds that the electrocardiographic diagnosis of AMI is impossible in the presence of LBBB. Such a statement, however, is too encompassing; alternatively, the electrocardiographic diagnosis of ischemic heart disease—both its acute and chronic manifestations—is made more difficult in the setting of LBBB. The authors of the current investigation provide support for this statement; further, they have begun to explore the manifestations of this thought process on management and outcome issues.

Previously, authors developed criteria that assist the physician in a very complicated scenario—the electrocardiographic diagnosis of AMI in the setting of LBBB.[1] More recent work has tested these criteria in ED patients, suggesting that the recommendations of the original investigation are much less helpful than was previously thought.[2] This study by Shlipak et al reinforces the opinion that the Sgarbossa criteria must be used with caution. AMI is still a possibility, given the appropriate clinical scenario, even if an ECG with LBBB is not diagnostic of AMI using the Sgarbossa criteria. ❖

References

1. Sgarbossa EB, et al. Electrocardiographic diagnosis of evolving acute myocardial infarction in the presence of left bundle branch block. *N Engl J Med* 1996;335: 481-487.
2. Shapiro NI, et al. Validation of electrocardiographic criteria for diagnosing acute myocardial infarction in the presence of left bundle branch block. *Acad Emerg Med* 1998;5:508.

Special Feature

New Therapy is Warranted for Bell's Palsy

By David J. Karras, MD, FACEP

The sudden appearance of facial weakness is, understandably, exceptionally disturbing to a patient. After performing a history and examination, the ED physician often makes a diagnosis of Bell's palsy without performing any tests. The physician then may try to put a favorable "spin" on the diagnosis for the distraught patient. The good news, we tell the patient, is that you're not having a stroke, and your symptoms will probably improve with time. The bad news, we go on to say, is that we don't know what caused it, we don't have an effective treatment, and it may recur.

Fortunately, the bad is news is getting better. There is now strong evidence that the etiologic agent for Bell's palsy has been identified as the herpes simplex virus. Furthermore, specific antiviral therapy appears to be of benefit. A brief review of Bell's palsy is indicated before further discussion of recent advances in its management.

Presentation of Bell's palsy

Bell's palsy is acute paralysis of the peripheral portion of the seventh cranial nerve which, until recently, was considered idiopathic. Twenty people per 100,000 are affected each year, with neither gender being preferentially involved. Pregnant women have more than three times the risk of the general population, diabetics have greater than a four-fold risk, and the incidence increases steadily with age. The greatest risk factor for Bell's palsy is a history of the disease: 10% of affected patients will develop a recurrence, which occurs equally on either side.[1]

Symptoms of Bell's palsy are ipsilateral and involve structures innervated by the seventh nerve, including the muscles of facial expression, the lacrimal gland, and taste in the anterior two-thirds of the tongue. A viral syndrome precedes the illness in the majority of patients, and may be associated with transient, mild, ipsilateral facial numbness. Facial motor deficits are the hallmark of Bell's palsy and may present with anything from mild facial asymmetry to profound facial weakness with drooling and inability to fully close the eyelid. Because this is a peripheral nerve lesion, the patient loses the ability to wrinkle the forehead on the affected side. Hyperacusis results from paralysis of the stapedius muscle. The majority of patients experience dysgeusia and either hyperlacrimation or decreased tearing.

More than 90 diseases are listed in the differential diagnosis of facial paralysis.[2] The potential etiologies of acute facial paralysis are a bit more limited, and are listed in the Table. The most common causes of acute facial paralysis are Bell's palsy, trauma, and herpes zoster oticus (Ramsay-Hunt syndrome). Lyme disease also should be considered if the patient has been in an area where the disease is endemic; Lyme titers are then indicated, although empiric therapy is not. Bell's palsy can usually be diagnosed without special testing. The presence of characteristic signs and symptoms and the

absence of any other neurologic deficit or evidence of other acute illness are sufficient to make a diagnosis. Eighty-five percent of patients will have complete recovery within six months, and most of the remainder will have minor residual deficits.[3] Treatment is supportive, with artificial tears if needed. Corticosteroid therapy has been both widely advocated and widely disparaged, but is considered by some to be a standard of care.

Table

Some Causes of Acute Facial Palsy

Neurologic	**Neoplastic**
cortical CVA	cerebellopontine angle tumor
Infectious	temporal bone tumor
otitis externa and media	acoustic neuromas
mastoiditis	**Trauma**
chickenpox	skull fracture
herpes zoster	facial and middle ear injury
encephalitis	**Toxic**
meningitis	ethylene glycol
poliomyelitis	tetanus
mumps	diphtheria
mononucleosis	carbon monoxide
leprosy	**Iatrogenic**
coxsackievirus	**Idiopathic**
malaria	temporal arteritis
tuberculosis	multiple sclerosis
Lyme disease	myasthenia gravis
botulism	sarcoidosis
mucormycosis	Bell's palsy
cat scratch disease	
HIV neuropathy	

Insights into Disease Etiology and Treatment

In the 1970s, the hypothesis first appeared that Bell's palsy might be related to herpes simplex virus (HSV). Patients with Bell's palsy were found to have higher HSV titers than matched controls.[4] More weight was given to this conjecture when it was demonstrated that HSV can reside in latent form in nerve ganglia.[5] Strong, direct evidence linking HSV and Bell's palsy has been published in this decade. Facial paralysis has been induced in an animal model by inoculating HSV into mouse ears; in the same experiment, HSV was recovered from mice that developed paralysis, but not from those that did not develop paralysis.[6]

In 1996, Murakami and colleagues reported a four-year study of patients who had undergone nerve-decompression surgery for facial palsy. Fourteen patients had been diagnosed with Bell's palsy and nine with Ramsay-Hunt syndrome. Twelve controls undergoing surgery for trauma or bacterial otitis media were also included. Using polymerase chain reaction techniques, HSV was detected in the affected facial nerve of 79% of patients with Bell's palsy. Strikingly, HSV was detected in none of the patients with Ramsay-Hunt syndrome and none of the control patients.

Adding stronger evidence to the role of HSV in Bell's palsy, Adour and colleagues published a placebo-controlled, double-blind study of acyclovir for patients with Bell's palsy of less than three days' duration.[7] Ninety-nine patients were randomized to receive either acyclovir (400 mg 5 times a day) or placebo; all subjects were also treated with prednisone 1 mg/kg divided in two daily doses for five days and then in tapering doses over five more days. Patients receiving acyclovir and prednisone demonstrated better recovery in muscle function and less nerve degeneration than those receiving prednisone alone. The rate of recovery appeared better in the acyclovir-treated group, though incomplete follow-up information precluded formal testing of this difference. Adour et al conclude that HSV is the likely etiologic agent of Bell's palsy and that acyclovir is indicated in the management the disease.

While a causal relationship between HSV and Bell's palsy has not been definitely established, the evidence to date is extremely compelling. Acyclovir therapy carries minimal risk. Most authorities, therefore, now recommend both prednisone and antiviral therapy for patients presenting with Bell's palsy of recent onset.[8] ❖

References

1. Jackson CG, et al. The facial curve. *Med Clin North Am* 1999;83:179-195.

2. May M, Klein S. Differential diagnosis of facial nerve palsy. *Otolaryngol Clin North Am* 1991;24:613-644.
3. Knox GW. Treatment controversies in Bell's palsy. *Arch Otolaryngol Head Neck Surg* 1998;124:821-825.
4. Adour KK, et al. Herpes simplex virus in idiopathic facial paralysis. *JAMA* 1975;233:527-530.
5. Baringer JR. Herpes simplex virus and Bell's palsy. *Ann Intern Med* 1996;124:63-65.
6. Murakami S. Role of herpes simplex virus infection in the pathogenesis of facial paralysis in mice. *Ann Otol Rhinol Laryngol* 1996;105:49-53.
7. Adour KK, et al. Bell's palsy treatment with acyclovir and prednisone compared with prednisone alone. *Ann Otol Rhinol Laryngol* 1996;105:371-378.
8. Know GW. Treatment controversies in Bell's palsy. *Arch Otolaryngol Head Neck Surg* 1998;124:821-823.

CME Questions

31. In patients with Bell's palsy, acyclovir therapy:
a. often has severe side-effects.
b. clearly speeds the rate of recovery.
c. is associated with better muscle function.
d. should replace corticosteroid therapy.

32. Features of Bell's palsy include all of the following *except*:
a. viral prodrome.
b. hyperacusis.
c. unilateral facial motor deficit.
d. sialadenitis.

33. Fomepizole:
a. inhibits 11-β hydroxylase.
b. is useful in the treatment of ethylene glycol and isopropanol toxicity.
c. tends to normalize acidosis in cases of ethylene glycol toxicity.
d. is an effective treatment of ethylene glycol toxicity yet causes many adverse effects.

34. In Larkin's study comparing 60 mg IM ketorolac with 100-150 mg IM meperidine for the treatment of renal colic, all of the following were true *except*:
a. 60 mg of IM ketorolac was well-tolerated.
b. all patients had a documented stone.
c. there was significantly greater pain relief in patients with ketorolac compared to meperidine at 40, 60, and 90 minutes.
d. this is the first study to suggest that ketorolac is at least as efficacious as single-dose meperidine in the treatment of renal colic.
e. patients given ketorolac were discharged consistently sooner than patients receiving meperidine, even when controlling for other factors.

35. Patients suspected of acute MI (AMI) who have LBBB pattern on the ECG should be considered for thrombolysis if:
a. the physical examination strongly suggests AMI.
b. the history supports AMI.
c. the ECG does not suggest AMI but a strong clinical suspicion is present for AMI.
d. the pain is similar to the patient's past angina.

36. Refractory emesis after acetaminophen overdose may best be treated by:
a. paralysis and intubation.
b. high-dose metoclopramide.
c. frequent, low-dose metaclopramide.
d. intravenous administration of activated charcoal.

37. With regard to *Escherichia coli* as a uropathogen, which of the following antibiotics has been linked to increasing resistance in uncomplicated UTI?
a. Trimethoprim/sulfamethoxazole
b. Ciprofloxacin
c. Nitrofurantoin
d. Gentamicin

38. Which of the following is *not* a common uropathogen?
a. *E. coli*
b. *Staphylococcus saprophyticus*
c. *Proteus* species
d. *Staphylococcus epidermidis*

Why Won't Heart Rate Increase?

By Ken Grauer, MD

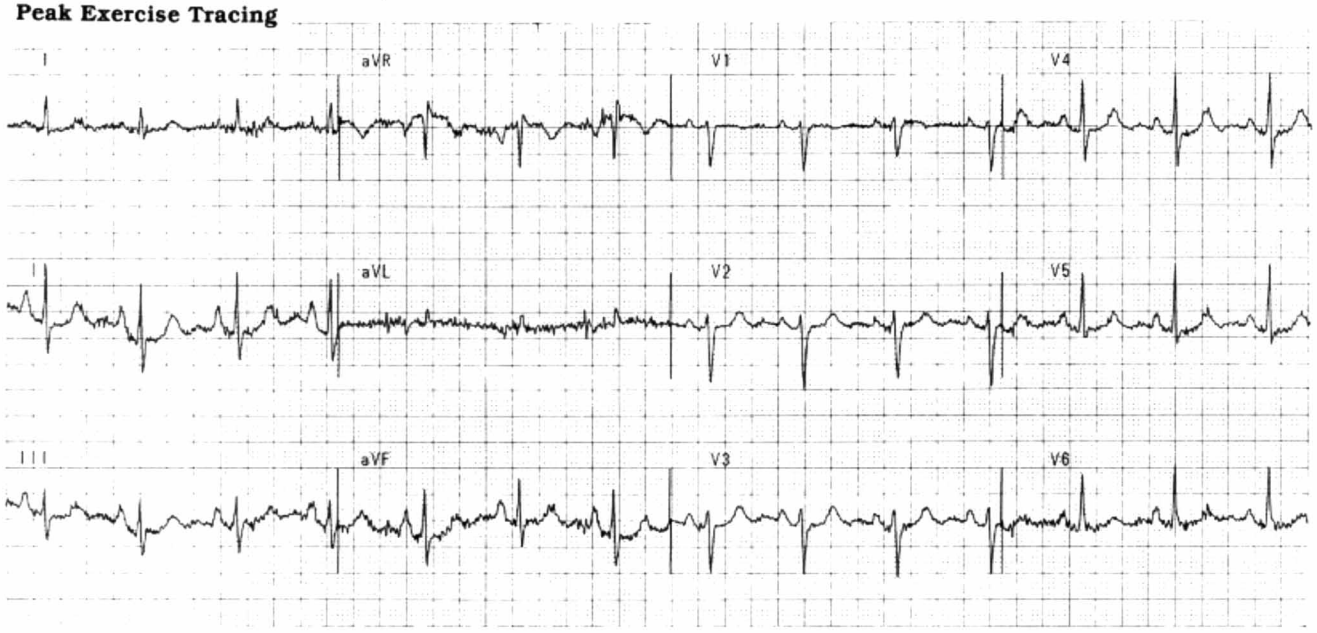

Figure. Peak exercise training from an exercise test performed on a 73-year-old woman. Her heart rate did not increase during the test.

Clinical Scenario: The 12-lead tracing shown in the figure was obtained at peak exercise during a stress test performed on a 73-year-old woman. Her chief complaint was shortness of breath during activities of daily living. The exercise test was stopped at the stage shown in the figure because of chest tightness. She had just completed nine minutes on the treadmill. Despite progressively increasing her workload during the test, her heart rate had not increased over the last three stages. The blood pressure response to exercise was normal. In view of the fact that this patient is not on any rate-slowing medications and is not known to have coronary disease, how would you interpret the results?

Interpretation: The history and peak exercise tracing shown in the figure are consistent with the diagnosis of *chronotropic* incompetence. Although baseline artifact makes interpretation of this peak exercise tracing more difficult, it is doubtful that there is anything more than slight ST segment flattening and minimal ST depression. Instead, the most remarkable finding in this patient, who is not on any rate-slowing medication, is the *inappropriate* heart rate response to exercise.

True chronotropic incompetence (in which failure to appropriately increase heart rate with progressive exercise is not the result of effort-limiting chest pain) is a relatively uncommon phenomenon. Froehlicher suggests that patients with chronotropic incompetence represent a mixed group with several explanations for their limited heart rate response.[1] These include myocardial dysfunction, coronary disease with an anginal equivalent, and a normal variant. Whether this entity reflects a manifestation of sick sinus syndrome in some individuals is uncertain. In this particular case, given the marked impairment of exercise capacity in this 73-year-old woman, cardiac catheterization should be strongly considered to define her anatomy. ❖

Reference

1. Froehlicher VF, et al. *Exercise and the Heart,* 3rd. ed. St. Louis: Mosby; 1993:90-91.

In Future Issues: ***Varicella* Infection Associated with Necrotizing Fasciitis**