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Intubating Laryngeal Mask—An Alternative to the Laryngeal Mask Airway?

ABSTRACT & COMMENTARY

Source: Baskett PJF, et al. The intubating laryngeal mask: Results of a multicenter trial with experience of 500 cases. *Anaesthesia* 1998;53:1174-1179.

This study investigated the use of a device, the intubating laryngeal mask (ILM), designed to assist in the management of the patient with a difficult airway. The aims of the study were to assess the ease of insertion and lung ventilation through the ILM, assess the ease of intubation using a flexible endotracheal tube passed blindly through the ILM, determine the learning curve of the acquisition of these skills, and assess the hemodynamic response both to the insertion of the ILM and to the passage of the tracheal tube through the device. The setting was the operating room and the investigators were anesthesiologists.

In 89% of cases, the insertion was described as easy. Ventilation using just the ILM was described as adequate in 95% of cases. Blind tracheal intubation through the ILM was achieved on the first attempt in 80% of the patients. Intubation in three attempts could not be accomplished in 19 of the 500 patients. Seventeen of the 19 failures occurred within the investigators' first 20 attempts during the course of the study. Hemodynamic responses to the insertion of the device, as well as blind intubation through the device, were unremarkable. Baskett and colleagues concluded that the ILM is a viable and perhaps superior alternative to the laryngeal mask airway (LMA) in patients who present with a difficult airway problem.

COMMENT BY GLENN C. FREAS, MD, JD, FACEP

Inability to perform endotracheal intubation is one of the most difficult challenges we face. When the emergency physician has difficulty with direct laryngoscopy and endotracheal intubation, there are a variety of techniques and tools that have been described to assist in securing an airway, including: digital intubation, retrograde intubation using cricothyroid puncture and a

guidewire, fiber-optically guided intubation LMA, and cricothyroidotomy.

Baskett et al compare the efficacy of the ILM with that of the LMA and none of the other techniques listed above. The technique that they describe for using the ILM is best used in combination with specially designed endotracheal tubes, which are straight, semirigid, and beveled differently than the standard tube. They assert that the LMA is too long and narrow to act as an acceptable guide for intubation in every case, and that it is not easy to remove the LMA once intubation has been accomplished. When the proper size ILM is used in combination with the specially designed endotracheal tubes, in experienced hands, the ILM may be superior to the LMA—given these data presented by Baskett et al. Caution should be used when extrapolating these data for use in our practice. The study was performed in the relatively ideal conditions of elective surgery in the OR. Patients with difficult airways were not the subject of the study. The investigators received special training in their technique and clearly demonstrated a learning curve requiring 20 or more attempts. Nonetheless, it would be foolish for emergency physicians to not consider adding this device to our repertoire for establishing an airway in difficult circumstances. Whether it favorably compares to other devices and techniques previously described will likely be a matter of personal preference. ❖

In the study by Baskett and his colleagues on the use of the intubating laryngeal mask (ILM):

a. it was demonstrated that the ILM was easy to insert in trauma patients in the ED.
b. it was shown that the ILM could replace standard direct laryngoscopy for all endotracheal intubations.
c. most of the unsuccessful attempts at intubation using the ILM occurred within the first 20 attempts by the investigators during the course of the study.
d. the use of the ILM was found to adversely affect hemodynamic parameters during insertion.
e. the use of the ILM was found to adversely affect hemodynamic parameters when inserting an endotracheal tube through the device.

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Pathogens in Dog and Cat Bites

ABSTRACT & COMMENTARY

Source: Talan DA, et al. Bacteriologic analysis for infected dog and cat bites. *N Engl J Med* 1999;340:85-92.

This prospective case series was conducted at 18 different emergency departments in the United States as part of the Emergency Medicine Animal Bite Infection Study Group. The purpose of the study was to better define the bacteria responsible for infections of dog and cat bites. Only patients who met well-defined criteria for infection were enrolled.

Results were analyzed from 50 patients with infected dog bites and 57 patients with infected cat bites. A mix of both aerobes and anaerobes were isolated from 56% of all wounds, aerobes alone from 36%, anaerobes alone from only 1%, and 7% of cultures had no growth. *Pasteurella* species were the most common pathogens in both dog bites (50%) and cat bites (75%). (*Pasteurella canis* was the most common isolate in dog bites; *Pasteurella multocida* was the most common in cat bites). Streptococci, staphylococci, moraxella, corynebacterium, and neisseria were the next most common isolates. The predominate anaerobes were fusobacterium, bacteroides, porphyromonas, and prevotella species.

COMMENT BY STEPHANIE ABBUHL, MD

The findings from this study emphasize the importance of the pasteurella species in both dog and cat bite infections. Although more common in cat bites, pasteurella species were isolated from 50% of dog bites, contradicting the impression that this is an uncommon pathogen in

dog bites.

When empirical therapy for dog and cat bites is indicated, it should be directed against pasteurella, streptococci, staphylococci, and anaerobes. Unfortunately, many of the antibiotics typically used for routine skin and soft tissue infections, such as the anti-staphylococcal penicillins, first generation cephalosporins, clindamycin and erythromycin, are not very active against pasteurella. Pasteurella species are usually susceptible to ampicillin, penicillin, second- and third-generation cephalosporins, doxycycline, trimethoprim-sulfamethoxozole, fluoroquinolones, clarithromycin, and azithromycin. In addition, many species isolated from infected bites, including staphylococci and most anaerobes, are β-lactamase producers.

Given the constraints above, the following choices for empirical therapy are suggested: a combination of a β-lactamase antibiotic and a β-lactamase inhibitor (amoxicillin with clavulanic acid po or ampicillin with sulbactam IV), a second-generation cephalosporin with anaerobic activity (cefoxitin IM or IV), or combination therapy with either penicillin and a first-generation cephalosporin, or clindamycin and a fluoroquinolone. Azithromycin has shown some promise in vitro, with activity against common aerobic and anaerobic isolates from bite wounds. ❖

All of the following are antibiotic regimens suggested for the empirical therapy of both dog and cat bite infections except:

a. clindamycin and a fluoroquinolone.
b. amoxicillin and clavulanic acid.
c. a first-generation cephalosporin.
d. penicillin and a first-generation cephalosporin.

Chest Pain Units

ABSTRACT & COMMENTARY

Source: Farkouh ME, et al. A clinical trial of a chest-pain observation unit for patients with unstable angina. *N Engl J Med* 1998;339:1882-1888.

Farkouh and associates performed a prospective, randomized trial of a chest pain unit (CPU) compared to the traditional hospital admission (ADM) for "rule-out" myocardial infarction (R/O MI) in patients with unstable angina (USA). Over a sixteen-month period, adult chest pain patients were initially evaluated with a history, examination, and ECG. Based on the results, the eligible patients (determined to be at intermediate risk for short-term cardiac events according to the Agency for Health Care Policy and Research [AHCPR] guidelines) were then randomized to either CPU (212 patients) or ADM (212 patients) group. Exclusion criteria included anatomically-distributed ST segment abnormalities (elevation or depression), obvious noncardiac etiology, co-existing issue requiring hospitalization, and AHCPR low- or high-risk status for cardiac events. CPU patients then underwent serial serum markers and ECG determinations over a minimum of six hours; aspirin (all non-allergic patients) and heparin (selected cases) were administered. If investigations were negative and the course uncomplicated, patients then underwent further evaluation with exercise stress test, nuclear stress test, or stress echocardiography (interpreted by a cardiologist). If positive, the patient was admitted to a cardiologist; if negative, the patient was discharged, with cardiology follow-up within 72 hours. The six-month end points were cardiac event (primary) and the need for coronary revascularization, additional cardiac investigation, or admission for cardiac reasons (secondary).

An initial 2517 patients were initially evaluated for this study; 424 (17%) patients were enrolled. The rate of primary cardiac event was not significantly different between the two groups: 15 events for ADM patients (13 AMI, 2 CHF) and seven events for CPU group (5 AMI, 1 CHF, 1 death). Among CPU patients with a negative evaluation, no cardiac events occurred after emergency department (ED) discharge; these events occurred in the 114 patients admitted from the CPU due to a positive evaluation. For a six-month period after discharge, cardiac investigations and therapies were greater among patients in the ADM group. Admissions to the hospital were reduced by 45.8% during the study. Farkouh et al concluded that a CPU-based evaluation for patients with USA at intermediate risk for acute cardiac complications is safe, effective, and cost-efficient.

COMMENT BY WILLIAM J. BRADY, MD

This investigation is important in that hospital admission for R/O MI is a costly, frequently used, and commonly unrewarding strategy. With the mandate for a more efficient yet safe method for evaluating such patients, the CPU may offer a reasonable alternative. It is estimated that approximately 20% of hospital EDs in the United States use this approach. Such widespread application of a strategy that lacks a solid scientific justification is alarming though common in the medical world; this report is an initial effort aimed at establishing this scientific support. EDs should not use this information as the sole support to initiate such a strategy.

Other issues to consider prior to developing such a unit include patient entry criteria; the resources, abilities, and desires of the ED; the availability of cardiac diagnostic testing; support from the local cardiology groups;

and the effect on the primary care physician. The appropriate patient—not yet conclusively identified in the literature—must be chosen for such an evaluation; this study appropriately excluded patients with ST segment change yet included the difficult-to-evaluate patient with LBBB on the ECG. The ED must have a dedicated area for aggressive cardiac monitoring with dedicated nursing staff and resources, timely return of serum markers, and knowledgeable, motivated physicians. Support from the cardiologist is vital in the form of availability of cardiac diagnostic testing seven days a week, as well as timely outpatient follow-up. Many hospitals can only provide diagnostic testing on a limited basis; without such "risk stratification" prior to discharge from the ED, the patient and physicians are placed at risk. The primary care physician must also be considered in this process, not only in terms of financial issues but also in terms of referral and resource use concerns. ❖

Issues that are considered of major importance in the daily function of an ED-based CPU include the following *except*:

a. support from the cardiologist.
b. patient entry criteria for CPU evaluation.
c. ED annual patient volume.
d. timely evaluation of cardiac testing during and after the R/O MI process.

Bundle Branch Block Revisited

ABSTRACT & COMMENTARY

Source: Eriksson P, et al. Bundle-branch block in a general male population: The study of men born in 1913. *Circulation* 1998;98:2494-2500.

Conflicting data exist concerning the etiology and significance of bundle branch block (BBB) on the electrocardiogram (ECG). Thus, Eriksson and colleagues recorded 12-lead ECGs in a random sample of 855 men who were 50 years old in 1963 when they were recruited in the city of Goteborg, Sweden, and followed them for 30 years with periodic examinations. During the 30 years, 82 subjects with BBB were found (10%). Most acquired BBB after entry; only 1% had BBB at entry. BBB became more prevalent with aging. At age 75 years, right BBB was four times more prevalent than left BBB (39 vs 9%). ECG evidence of left ventricular hypotrophy preceded left BBB in one-quarter of the subjects vs. 6% for right BBB. Risk factors for atherosclerosis, myocardial infarction (MI), and a diagnosis of ischemic heart disease were no different between those who developed BBB and those who did not. However, cardiomegaly on chest x-ray ($P < 0.05$) and congestive heart failure (36% BBB vs 14% of controls; $P < 0.01$) were more common with BBB. Also, among those who died of cardiovascular causes, more subjects had a history of chronic heart failure with BBB (61%) vs. no BBB (28%; $P < 0.01$). Eriksson et al conclude that BBB is a marker of a slowly progressive degenerative disease that affects the myocardium.

COMMENT BY MICHAEL H. CRAWFORD, MD

This study is consistent with the old adage that BBB is more commonly associated with cardiomyopathy rather than coronary artery diseases (CAD). In fact, no relation could be established between BBB and risk factors for atherosclerosis or overt CAD. This is consistent with other studies and the observation that BBB is not usually caused by acute MI. Also, the prevalence of BBB is highly correlated with advancing age, being 1% at age 50 and 17% at age 80 in men. Thus, CAD and BBB often coexist and this combination is known to increase mortality in acute MI and chronic CAD patients. Other studies suggest this may be due to a greater propensity to ventricular arrhythmias and sudden death, possibly due to prolonged repolarization. However, acute MI superimposed on a chronic progressive cardiomyopathy may result in a higher than expected mortality due to pump failure.

The major limitation of this study was that the small number of patients with BBB reduced the power for comparing left to right BBB, which many believe are of different significance. Also, ECGs were only recorded every 5-17 years, so details about the onset and potential causes of BBB are hard to decipher. In addition, there are few objective data about other cardiac diseases in this study. Nor are there electrophysiologic data about the site of block or the need for pacing. The implications of this study are that patients who develop or present with BBB should have an echocardiogram done to assess left ventricular function. The need for stress tests or coronary angiography is less clear in the absence of other indications for these procedures. (*Dr. Crawford is Robert S. Flinn Professor, Chief of Cardiology, University of New Mexico, Albuquerque.*) ❖

In the study by Eriksson and colleagues, bundle branch block became more prevalent with age.

a. True
b. False

Route of Naloxone Administration for Out-of-Hospital

Opioid Overdose

CLINICAL BRIEF

Source: Wanger K, et al. Intravenous vs. subcutaneous naloxone for out-of-hospital management of presumed opioid overdose. *Acad Emerg Med* 1998;5:293-299.

Opioid overdose produces miosis, central nervous system depression, and respiratory depression, with hypoventilation-induced hypoxia and hypercarbia accounting for the majority of opioid-induced fatalities in the outpatient setting. With recent data to demonstrate a resurgence in heroin use, EMS and emergency department personnel are more likely to encounter significant opioid overdose cases. Naloxone, a short-acting, pure, competitive opioid antagonist, is the accepted antidote for the initial treatment of any patient with a suspected opioid overdose.

Although intravenous administration of naloxone is preferred because of its immediacy of action, its short duration of action, the ease in titrating the dose, and the need to secure intravenous access in clinically ill patients, immediate intravenous access is not always available. Many studies have been done to evaluate alternative routes of naloxone delivery. Endotracheal administration is supported by both animal studies and human case reports.[1,2] Unfortunately, although the kinetics of endotracheal naloxone administration seem favorable, the practice is totally illogical. Patients die of respiratory compromise. If tracheal access is secured, the life-threat of opioid overdose is removed, and the clinician now has all the time necessary to obtain intravenous access. Similarly, intralingual administration of naloxone makes pharmacologic sense and is also supported by animal and human data.[3,4] Once again, however, it makes no clinical sense to ask our colleagues to put their hands and sharp instruments into the mouths of minimally-responsive patients who should be on oxygen and may require respirations assisted with a bag-valve mask. The likelihood of getting bitten or stuck with a contaminated needle seems too high.

In this study, subcutaneous naloxone administration was compared to intravenous administration in the outpatient setting. Unlike the endotracheal or intralingual routes, subcutaneous administration seems fast and safe. Interestingly, in almost 200 patients, there was no clinically significant difference in the duration of respiratory depression when the two routes were compared. Wanger et al concluded that delays in the onset of action with subcutaneous naloxone were balanced by the time required to establish intravenous access. It seems reasonable to conclude that paramedics and physicians should consider subcutaneous naloxone if intravenous access cannot be easily established. It is of paramount importance to remember that all patients with significant opioid-induced respiratory depression require oxygen and/or assisted ventilation until the naloxone is effective. In addition, these patients also require intravenous access to effectively treat other life-threatening causes of altered mental status, such as hypoglycemia.**—ROBERT HOFFMAN, MD**

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Naloxone:

a. reverses benzodiazepine-induced respiratory depression.
b. is most safely administered intralingually.
c. reverses myocardial depression after opioid overdose equally quickly when given IV or SQ.
d. may be given SQ to reverse respiratory depression after opioid overdose if IV access is difficult to obtain.

Special Feature

Update: Rabies 1999

By Richard A. Harrigan, MD

The centers for disease control and prevention (CDC) has recently published an updated version of the recommendations of the Advisory Committee on Immunization Practices (ACIP) with regard to rabies.[1] Last revised in 1991, this publication is the reference standard in this country for the current status of rabies and its prevention. Key points from this document for the practicing emergency physician (EP) will be highlighted below.

What are the epidemiologic trends for animal rabies?

The likelihood that a human will be exposed to a rabid domestic animal in the United States continues to decline over this half-century. During the 1990s, the number of reported cases of cat rabies generally exceeded that of dogs, a trend attributed to differences between the two species with regard to vaccination laws, leash laws, and roaming behaviors. As with wild animals, domestic ani-

mal rabies trends vary by locale (e.g., the United States-Mexico border region features an epizootic of dog rabies).

Wild animals most often infected with rabies include raccoons, skunks, foxes, bats, and coyotes, with raccoons being the most commonly reported wild animal to have the disease.[2] It is the bat, however, that has been responsible for the most cases of human rabies since 1980; 21 (58%) of the 36 cases of human rabies diagnosed in this country during that time period have been traced to bats. Of these 21 cases, a bite was reported in only 1-2 cases; apparent contact without a detectable bite occurred in 10-12 cases; and in the remaining 7-10 cases, no exposure to a bat was reported (number of cases reported as a range due to conflicting report information). Small rodents (e.g., squirrels, chipmunks, rats, mice, and hamsters) are almost never found to be rabid, and have never been shown to transmit the virus. The same is true for lagamorphs, which include rabbits and hares. Woodchucks, although rodents, are at risk for rabies in certain areas of the country; indeed, they accounted for 93% of reported cases of rodent rabies in the first six years of this decade.

Animal rabies has been reported from all 49 continental states; only Hawaii remains free of rabies. Rabid bats have been reported from all states except Hawaii.

What constitutes a significant exposure with regard to rabies transmission?

The rabies virus is principally transmitted through contact with the saliva or neural tissue of the affected animal. Viral access to the victim is via a break in the skin or mucous membrane exposure. Thus, bites are the most common route of transmission; indeed, any break in the skin by teeth constitutes a bite. Theoretically, scratches also can lead to viral transmission. Petting a rabid animal or touching its blood, urine, or feces does not constitute an exposure. Other documented routes of transmission include exposure to large quantities of aerosolized virus, as has occurred in spelunkers (bat guano) and laboratory workers. There have been eight documented cases of human-to-human transmission via corneal transplant.

The numerous cases of human rabies contracted from bats are troubling, especially because, in the overwhelming majority of cases, no bat bite was known to have occurred. Although most of the epidemiologic data in these cases were retrospectively gathered, and, thus, a bat bite may have gone undetected, these data have led to a change in the recommendation for postexposure prophylaxis (PEP) procedures with regard to bats. Clear bat bites merit PEP, but treatment should also be instituted when direct contact or a bite cannot be ruled-out and the bat is not available for immediate sacrifice and testing. Examples of such situations include discovery of a bat in the same room with a sleeping person, a previously unattended child, a mentally disabled person, or an intoxicated person.

When should post-exposure prophylaxis be instituted, and when should it be withheld pending observation of animal behavior?

Initiation of PEP is dependent upon the source animal species and the determination of whether there was a true exposure, as outlined above. Bites or significant exposures from high-risk wild animals merit initiation of PEP pending sacrifice and testing of the animal (in coordination with local health department authorities). If the animal tests negative for rabies, PEP can be discontinued. If the animal is unavailable for testing or tests positive, PEP must be completed. All wild terrestrial carnivores are at risk for rabies, but the highest risk animals include raccoons, skunks, foxes, coyotes, and any other animal exhibiting bizarre or aggressive behavior (unprovoked attacks). That being said, signs of rabies are notoriously unreliable among wild animals; any significant exposure should lead to prompt sacrifice and testing of the source animal. For example, an overly-friendly armadillo that was adopted by a young girl was ultimately found to be rabid.[3] Once again, rodents (with the exception of woodchucks in some regions of the United States) and lagamorphs are extremely low-risk; their behavior should be reviewed on a case-by-case basis, and decisions to treat can be made in conjunction with local health authorities. Rat bites, something we see not infrequently in North Philadelphia, are an example of wild animal exposures not at risk for rabies; an analagous example would be a bite by a chipmunk being fed nuts in a park (provoked and low-risk source animal).

Among domestic animals, PEP may be withheld pending 10-day observation of the source animal—if it is a healthy dog, cat, or ferret. Previously, this was true only for dogs and cats, but now the rabies viral shedding pattern for ferrets is also well-understood. Should the animal become ill during that observation/confinement period, a veterinary evaluation should promptly ensue in conjunction with notification of the local health authorities. Euthanasia and laboratory analysis of the brain will follow should the animal show signs suggestive of rabies, and decision to treat will be based on the outcome. Stray or unwanted dogs or cats should either be observed for the 10-day period or sacrificed immediately and tested for rabies. If the source animal is unavailable for testing, then the likelihood of rabies should be weighed in light of regional trends for that species. In Philadelphia, if the source animal is a stray dog or cat unavailable for testing, the recommendation is to initiate PEP; the raccoon rabies epizootic in the Eastern United States principally is responsible for this.

Research has revealed the incubation period for rabies

in humans is variable and may be prolonged—the average is 30-90 days,[4] but incubation periods of greater than one year have been reported. Thus, initiation of PEP is indicated regardless of time expired since the exposure event, if the encounter meets criteria with regard to exposure type and source animal species and the patient is not already showing clinical signs of rabies.

What are the components of post-exposure rabies prophylaxis?

There are two essential components to PEP: wound care and immunization. Wound care must include immediate and meticulous cleansing of the wound with water, soap, and a virucidal agent (e.g., providone-iodine). Immunization procedures depend upon the immunization status of the patient. Most patients have not been previously immunized, so they will require both passive and active immunization. Rabies immune globulin (RIG) provides antibodies to the victim, and should be administered at the first encounter, once the decision to treat has been made. Previously, the dose (20 IU/kg) was divided (50% to the wound site[s], and 50% to the gluteal region). Current recommendations require that as much of the full dose as is anatomically possible should be infiltrated at the wound site(s), and the remainder (if any) should then be given IM at a site distal to the injection site for the vaccine. Two equally efficacious RIG preparations are available in the United States: Imogam and BayRab. The recommended dose should not be exceeded, as RIG can interfere with the active antibody response induced by the vaccine.

Vaccine is given in a five-part series on days 0 (the initial encounter, in most cases), 3, 7, 14, and 28. The recommended site is the deltoid in the adult, and the anterolateral thigh in the small child—never in the gluteus, due to reports of vaccine failure in the past. Three equivalent vaccines are now available in the United States: human diploid cell vaccine (HDCV or Imovax), rabies vaccine adsorbed (RVA), and purified chick embryo cell vaccine (PCEC or RabAvert). The dose and route (1 cc IM) are the same for all three.

Both immune globulin and vaccine are safe in pregnancy. Immunocompromised patients must have serum antibody titers checked during follow-up to ensure immunity.

How is post-exposure prophylaxis modified if the victim has been previously immunized against rabies?

If the patient has had pre-exposure prophylaxis with an appropriate cell culture vaccine (e.g., veterinarian, spelunker, animal handler), or has previously received PEP for another incident, then only wound care and vaccine are needed. RIG is contraindicated, as it may interfere with the anamnestic immune response to the vaccine. Regardless of pre-booster antibody titers, these patients only require vaccine on days 0 and 3.

Conclusions

A working knowledge of rabies evaluation and prophylactic treatment procedures is essential to the EP. Such treatment is urgent, and though not emergent, should be initiated in the ED, given that the exposure meets the treatment criteria outlined above. While wildlife exposures are the most common source in the United States, an awareness of current epidemiologic trends and regional health department recommendations is important when deciding if the source animal is at risk for harboring or transmitting the virus. Strict adherence to wound care and immunization guidelines will prevent the patient from developing rabies. The 1999 revision of the ACIP guidelines provides a thorough discussion of antirabies biologics, vaccination procedures (pre- and postexposure), adverse reactions, and follow-up considerations. The essential points for the EP have been outlined above, including a discussion of the revisions of the 1991 recommendations. These revisions include more liberal treatment of bat exposures, the change in RIG administration guidelines, availability of alternative antirabies biologics, and the extension of the 10-day observation and confinement option to healthy, domestic ferrets. ❖

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Since 1980, more than 50% of human rabies cases in the United States have been traced to:

a. bats.
b. dogs.
c. raccoons.
d. ocelots.
e. skunks.

RBBB and Atypical Chest Pain in a 34-Year-Old Man

By Ken Grauer, MD

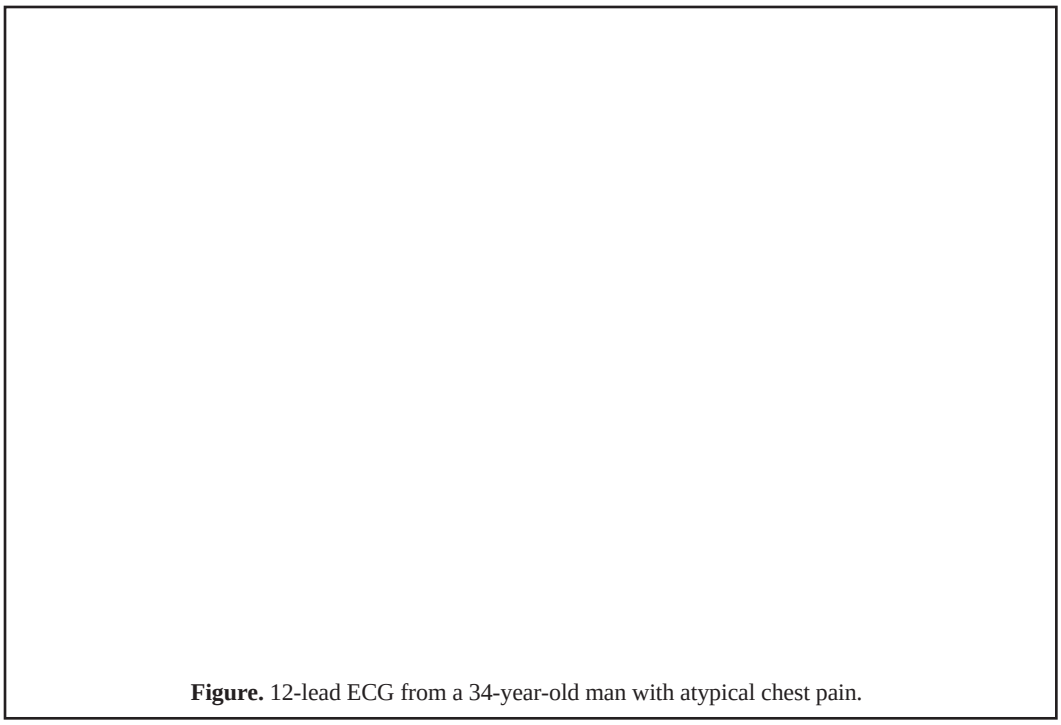

Figure. 12-lead ECG from a 34-year-old man with atypical chest pain.

Clinical Scenario: The ECG shown in the figure was obtained from a 34-year-old man who complained of atypical chest pain of recent onset. A 12-lead tracing obtained a month earlier was reported to show complete right bundle branch block (RBBB) but *no* acute changes. Based on this verbal report, do you suspect an interim change during this month? Should this patient be admitted to the hospital?

Interpretation: Several key points should be emphasized from this clinical scenario an accompanying ECG.

1. The significance of the finding of complete right or left bundle branch block depends *most* on the clinical setting in which the conduction defect occurs. Development of new complete RBBB or LBBB in association with acute infarction is likely to indicate extensive damage, a poorer prognosis, and potential need for cardiac pacing. In contrast, the occurrence of complete RBBB in an otherwise healthy young adult *without* evidence of underlying heart disease does *not* necessarily carry adverse prognostic implications.
2. Recognition of ischemia or acute infarction is clearly more difficult in the presence of a conduction defect—especially when there is complete LBBB. However, definite evidence of ischemia or infarction may sometimes be identifiable *despite* the presence of an underlying conduction defect.
3. The ECG shown in the figure illustrates how acute changes may look when they occur in a patient with an underlying conduction defect. The rhythm in this tracing is sinus arrhythmia. The QRS complex is wide and manifests the typical pattern of complete RBBB (rsR' complex in lead V_1: wide terminal S waves in leads I and V_6). However, the appearance of the ST segment and T waves is definitely *not* what one usually expects with uncomplicated RBBB.

The most remarkable abnormality on this tracing is seen in lead III, which manifests deep T wave inversion. ST segment depression is also seen in the other two inferior leads (II and aVF), as well as in leads V_5 and V_6. A subtle but real change should be noted in the high lateral leads (I and aVL). Specifically, a somewhat widened Q wave is seen in lead aVL—and the ST segment in leads I and aVL is coved, slightly elevated, and peaked. This picture is suggestive of a *hyperacute* ST-T wave change, which is often the first indicator of acute infarction. Note in particular that the appearance of the ST segment and T wave in lead aVL is the virtual "mirror image" *reciprocal* of the ST-T wave appearance in lead I. It turned out that this 34-year-old man with atypical chest pain was in the process of evolving an extensive *acute* infarction. ❖

In Future Issues:

Headache Characteristics in Subarachnoid Hemorrhage