

The difference in outcome between anemia types remained statistically significant even after correction for differences in Hb levels as a possible confounder (P=0.030).

CONCLUSION: Anemia is a frequent condition in cardiac patients and it remains an important predictor of mortality in patients undergoing PCI despite optimal medical management. To our knowledge, this is the first study to show that IDA is a strong predictor of cardiac death when compared to patients with other types of anemia or to non-anemic patients. A better understanding of the association between anemia and adverse outcomes may lead to targeted interventions in the hypothesis that identifying and correcting anemia will lead to prevention of long term morbidity and mortality in high patients undergoing PCI.

Raquel Villavicencio MD, Women's Health, 2009

PULMONARY EMBOLISM, VENTRICULAR THROMBUS, AND MYOCARDIAL INFARCTION: THE TRIPLE THREAT OF PERIPARTUM CARDIOMYOPATHY

INTRODUCTION: Peripartum cardiomyopathy (PPCM) occurs in 1:15,000 deliveries in the United States; however its complications, mainly related to persistent left ventricular (LV) dysfunction, thrombus formation, and thromboembolism, can be devastating and may create a prognostic challenge to the clinician.

CASE PRESENTATION: A 19-year-old G1P1 mixed African-American/Caucasian female, status post cesarean section at 39+6 weeks for failure to progress complicated by gestational hypertension and chorioamnionitis treated with IV antibiotics x forty-eight hours, presented to the Emergency Department nine days post-op with orthopnea, hemoptysis, fatigue, and increased lower extremity edema. She had no personal or family history of cardiac problems, pre-eclampsia, or clotting disorders. Physical exam revealed BP 150/100, HR 141, RR 24, temperature 100.9 F, room air oxygen saturation 86%, jugular venous distention to 10 cm, bilateral crackles bottom third of lung fields, abdominal incision which was clean, without erythema or exudate, and 3+ bilateral pitting edema to her knees. Initial laboratory studies were remarkable for white blood cell count of 25.7, ABG of pH 7.37, pCO2 44, pO2 44, HCO3 25.4, O2 saturation 74%, BNP of 1799, CKMB of 12.8 (which later peaked at 17.8), and troponin-I of 1.79 (peaking at 3.17). EKG showed sinus tachycardia with T-wave inversions in anterolateral leads. Chest x-ray demonstrated enlarged cardiac silhouette, interstitial edema and bilateral pleural effusions. Transthoracic echocardiogram showed an ejection fraction of 20% and a mural thrombus extending from the mid-lateral wall into the apex of the LV measuring 1.8 x 3.8 cm. Lower extremity dopplers were negative for deep vein thrombus, however CT scan revealed a pulmonary embolus in the right lower lung lobe. Despite these tragic complications, the patient did quite well and by discharge repeat echocardiography showed recovery of LV function at rest with an ejection fraction of 55-60%.

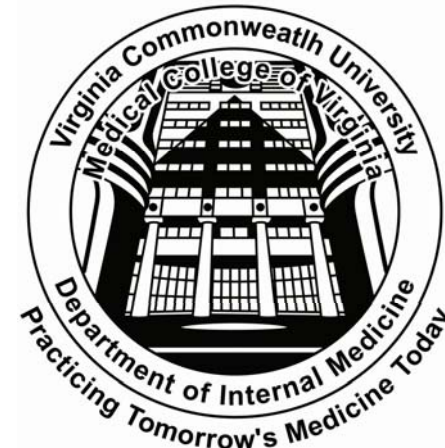
DISCUSSION: To my knowledge this is the first report of pulmonary embolus, ventricular thrombus, and myocardial infarction occurring simultaneously as a consequence of PPCM. Elevations in cardiac enzymes were thought to be secondary to microemboli from the left ventricular thrombus migrating into the coronary arteries. This case illustrates that patients with PPCM are at significant increased risk for complications of CHF and thromboembolic disease. Advising patients regarding risk of subsequent pregnancies can be a challenge to the clinician, especially in the case of recovered LV function. Despite normal resting echos, it is thought these patients may have impaired contractile reserve leading to a higher risk of maternal and fetal complications. Dobutamine stress echos may play an important role in determining prognosis, as noted by Lampert et al., and in counseling these women on risks of future pregnancies.

VCU Health System

Virginia Commonwealth University

MCV Hospitals and Physicians

HOUSESTAFF RESEARCH PRESENTATIONS



Abstracts

Department of Internal Medicine

Grand Rounds

April 10, 2008

**Christopher Gelwix, MD, MSc, Categorical, 2010
VARIANT ANGINA REFRACTORY TO TREATMENT –
A RARE OCCURRENCE**

A 52 year-old African American male, former smoker, with controlled diabetes and hypertension presented to the emergency department complaining of sudden onset chest pain, shortness of breath and diaphoresis that woke him from sleep. He characterized his chest pain as “tightness” rated as an 8/10 in intensity and radiating into the neck. He denied any dyspnea on exertion, paroxysmal nocturnal dyspnea, lightheadedness or palpitations. His symptoms were partially relieved by sublingual nitroglycerin. ECG showed ST-segment elevations in the anterior precordial leads associated with mild isolated troponin-I elevation. He was admitted to the ICU and treated for acute coronary syndrome. Coronary angiography revealed 60% occlusion of the mid left anterior descending artery and a 90% ostial lesion of the first diagonal artery that was not amenable to intervention. Despite optimal medical management for coronary artery disease, the patient continued to have intermittent episodes of chest pain associated with transient ST segment elevation that were relieved by nitrates and morphine. Cardiac markers remained negative. Repeat catheterization on hospital day 7 showed no new disease. A nitroglycerin drip and calcium channel blockers were begun for presumed coronary artery vasospasm; aspirin and beta-blockers were discontinued. Over the next three days, the distribution of ST-segment elevation associated with chest pain progressed in a stepwise fashion to include anterior, inferior, and lateral leads. By hospital day 10, intravenous nitrates had been replaced by oral nitrates, and the patient had been pain free for over 24 hours. While awaiting transfer out of the ICU, diffuse ST elevations again appeared on telemetry, followed by pulseless electrical activity and ventricular tachycardia. The patient was resuscitated with defibrillation and amiodarone. Emergent cardiac catheterization revealed severe multi-vessel spasm that resolved with intra-coronary diliazem and nitroglycerin. In the cath lab, he again developed pulseless electrical activity. He was resuscitated but continued to have vasospasm refractory to medical therapy. Coronary artery bypass grafting was performed, but the patient expired on hospital day 15. Variant angina (VA) is characterized by angina attacks associated with transient ST segment elevation that is caused by episodic vasospasm of an epicardial coronary artery. In the era of calcium channel blockers and nitrates, VA without significant coronary obstruction has an excellent prognosis. VA that is refractory to medical therapy is rarely reported and carries a poor prognosis. The presence of multi-vessel coronary spasm is an independent predictor of adverse cardiac outcome. Recognizing the characteristics of refractory VA may be crucial to guiding early aggressive management to prevent acute myocardial infarction, life threatening arrhythmias and sudden death.

**J. Daniel Markley, DO, Categorical, 2010
IS MRSA HIDING IN THE GYM?**

BACKGROUND: The increasing incidence of community associated methicillin-resistant *Staphylococcus aureus* (MRSA) infections has fostered a great deal of concern within the public health community and the general public at large. One area of concern lies in identifying locations that may harbor high risk for acquisition of the organism. A common assumption is that exercise gyms may be sites where transmission is occurring, though no data exist to support or refute this hypothesis. Therefore, we sought to identify MRSA in a large gym.

METHODS: The study was performed at the university fitness center located on the Medical College of Virginia Campus, which is used primarily by healthcare workers and health professions students. On average, 218 members use the gym daily. Ninety-nine environmental surface cultures were obtained. These included treadmills (8), stairmasters (7), elliptical machines (9), recumbent bikes (7), upright bikes (8), locker room benches (6), other locker room surfaces (10), free weights (7), workout benches (9), weight machines (22), hand grips (1), interchangeable hand grips (1) belts (1), mats (1), medicine balls (1), and stability balls (1). The cultures were processed using standard techniques. Susceptibilities were performed using the Kirby-Bauer method. Molecular typing was performed via pulsed-field gel electrophoresis following digestion of DNA with restriction endonuclease SmaI.

RESULTS: Ten out of 99 samples yielded *Staphylococcus aureus*, all of which were methicillin-susceptible. Positive samples were collected on elliptical machines (2), recumbent bikes (2), workout benches (2), swimsuit water extractor (1), towel dispenser (1), leg press (1), and chest press (1). Molecular typing revealed that 2 strains were possibly related (4-6 bands different), however, these samples did not come from adjacent equipment. All other strains were unrelated.

CONCLUSIONS: In this point prevalence microbiologic survey of a large gym frequented by healthcare workers and health professions students, no MRSA was detected. Several strains of methicillin-susceptible *Staphylococcus aureus* were isolated, 2 of which were possibly genetically related. As the incidence of community associated MRSA continues to rise, further studies are needed to properly elucidate the epidemiology of MRSA in the gym setting.

**Jared Shipley, MD, Categorical, 2008
HOSPITAL-ACQUIRED ENDOCARDITIS**

An 81-year-old Caucasian man with a history of extensive atherosclerotic disease, including mitral valve thickening with severe mitral regurgitation, presented with syncope. On admission, he had a large melanotic bowel movement as well as orthostatic hypotension. Cardiac exam revealed a II/VI systolic murmur, loudest at the apex. Labs revealed a serum hemoglobin of 7.3 g/dL (baseline 10-12 g/dL). For standard gastrointestinal bleeding treatment, two peripheral intravenous catheters were inserted, and the patient was stabilized with fluid resuscitation and blood transfusion. On hospital day 3, the patient underwent upper endoscopy without any antibiotic prophylaxis. Two days post-endoscopy, the patient developed a fever of 102 degrees Fahrenheit. Mild erythema and swelling were noted around the site of one of his peripheral intravenous catheters. He was started on vancomycin and ceftriaxone. The next day, his speech became garbled with word salad. His systolic murmur was harsher and had increased in volume. Skin exam revealed new non-blanching, nontender petechiae on three fingertips, two toes, and one heel. Two sets of blood cultures revealed methicillin-sensitive *Staphylococcus aureus* (MSSA) in both aerobic and anaerobic bottles. A transthoracic echocardiogram showed small mobile echodensities on the posterior leaflet of the mitral valve, suspicious for endocarditis. Magnetic resonance imaging scan of the brain showed acute ischemia in several noncontiguous areas, consistent with an embolic etiology. The patient was treated with four weeks of nafcillin and made a full recovery.

Onset of infective endocarditis (IE) during hospitalization is rare. In this patient, the most likely sources for IE are transient bacteremia during endoscopy or an infected intravenous catheter. The rate of bacteremia during endoscopy has been reported to be as high as 2-5%, yet the rate of associated IE is exceedingly rare. However, the morbidity and costs of IE are great, while the adverse effects of a single dose of an antibiotic are minimal. For this reason, peri-procedural ampicillin had been recommended for higher-risk patients, including those with mitral valve prolapse with regurgitation or valve thickening. In April of 2007, the American Heart Association updated its guideline for prevention of IE and retracted the original recommendation to give prophylaxis to patients undergoing gastrointestinal procedures for two reasons: 1) the rarity of IE even with documented peri-procedural bacteremia and 2) an increase in highly-resistant strains of enterococcus. In this patient's case, prophylaxis with ampicillin would not have prevented the development of MSSA IE. Although this dramatic presentation of IE was temporally related to the endoscopy, the identification of the offending organism as MSSA makes it more likely that an infected peripheral intravenous catheter was the cause. This highlights the importance of checking intravenous catheters daily for signs of infection and reducing the number of catheters to the minimum necessary.

**Amit Varma, MD, Physician-Scientist, 2013
DOES ETIOLOGY OF ANEMIA PREDICT OUTCOME IN PATIENTS
UNDERGOING CORONARY STENTING?**

INTRODUCTION: Anemia is a known unfavorable prognostic factor in patients undergoing percutaneous coronary intervention (PCI). Whether different types of anemia may be associated with differences in cardiac and non-cardiac mortality is currently unknown. The aim of this study was to assess mortality in patients receiving optimal medical management that have a reduced ejection fraction (EF < 45%) and a hemoglobin (Hb) < 12g/dL undergoing coronary stenting and whether the etiology of anemia itself was a predictor of outcome.

METHODS: One hundred twenty patients undergoing PCI between April 2003 and December 2005 were enrolled and prospective data was collected from the time of PCI for a median follow-up period of 30 months. Patients were divided into 2 groups, anemic (Hb < 12 g/dL, 29 pts, 24%) and non-anemic. Patients with anemia were then divided into 3 subgroups according to etiology of anemia: 9 patients (31%) had iron-deficiency anemia (IDA), 7 patients (24%) had a malignancy-associated anemia, and 13 patients (45%) had anemia of chronic disease (including chronic kidney disease). Mortality rates and cause of death were retrieved using both the Social Security database and hospital records. Kaplan-Meier survival curves were used to compare time-dependent variable. P values ≤ 0.05 were considered statistically significant.

RESULTS: Overall mortality was 12% with 3% cardiac, 7% cancer-related, and 2% undetermined and no deaths were directly attributable to bleeding complications. All cause and cardiac mortality were significantly higher in anemic vs. non-anemic patients, (31% vs. 6%, $P < 0.001$, and 10% vs. 1%, $P = 0.016$, respectively). There was a significant trend for higher mortality with lower hemoglobin levels as mortality was highest in anemic patients with Hb < 10 (44%) vs. anemic patients with Hb 10.1-12 (24%) or non-anemic patients (6%, P for trend < 0.001). However, different etiologies of anemia had different predictive values. IDA strongly predicted cardiac mortality (33% vs. 1% in non-anemic patients, $P < 0.001$), while malignancy-associated anemia was the strongest predictor of non-cardiac death (57% vs. 4% in non-anemic patients, $P < 0.001$) but not cardiac death. Anemia of chronic disease neither predicted cardiac nor non-cardiac death.