



## Pathology Biology Section – 2011

### **G79 Metastatic Calcification of AV-Node as a Cause of Complete Heart Block and Death**

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After attending this presentation, attendees will have a better understanding of the mechanism, and the common and uncommon complications associated with dialysis-associated myocardial calcification.

This presentation will impact the forensic science community by increasing awareness of some of the possible complications of renal failure, such as myocardial calcification and conduction abnormalities, in individuals on dialysis.

Metastatic calcium deposition into soft tissue is a well documented phenomenon that occurs rarely in people treated with dialysis. The pattern of calcification and the organs involved is highly variable and thus the symptoms are myriad. A case is presented of a 37-year-old woman on nightly ambulatory peritoneal dialysis for 20 months. She had stage 4 renal failure due to uncontrolled hypertension. She presented to the hospital complaining of shortness of breath and cough of two days'

duration. She had not been feeling well enough at home to perform her dialysis for the past two days. At admission she had a GFR of 2, was hyperkalemic (6.3 mEq/L), anemic with thrombocytosis and leukocytosis (23.5 K/uL) and a left shift. She had developed a new third-degree heart block with a ventricular rate in the 30's. Her troponin-I was elevated at 1.56 ng/mL. Her total calcium was 9.4 mg/dL and her phosphorus was also elevated at 18.6 mg/dL for a calcium x phosphorus product of 174.8 mg<sup>2</sup>/dL<sup>2</sup>. She was transferred to the ICU where she became asystolic for 5-6 seconds, but had a spontaneous return of circulation. A transvenous pacemaker was placed emergently with good capture and effective right ventricular pacing. However, she quickly became hypotensive, lost consciousness, and became pulseless. After 35 minutes of unsuccessful resuscitative efforts she was pronounced dead. The case was referred to the Office of the Medical Examiner due to her sudden and somewhat unexpected clinical decline.

At autopsy, the left ventricle demonstrated a uniform mottled pail-yellow process. The coronary arteries had thin, pliable vascular walls with widely patent lumina. Microscopic exam revealed widespread calcium deposits in the myocardium including the conduction system. There was also evidence of acute myocardial ischemia. Cardiovascular complications are the leading cause of death in patients with end-stage-renal-disease (ESRD). Derangements of calcium and phosphate metabolism are known to lead to soft tissue calcification. The calcification of the coronary arteries in patients with ESRD is a common cause of morbidity and mortality. The National Kidney Foundation recommends that the calcium-phosphate product be maintained below 55 mg<sup>2</sup>/dL<sup>2</sup> to minimize the risk of metastatic calcification of soft tissue and vasculature. In patients with a severely elevated calcium-phosphate product the deposition of calcium can be rapid. If the deposition occurs in the cardiac conduction system sudden cardiac death can occur without the presence of coronary artery calcification.

Pathologists should be aware of this potential complication of ESRD in cases of sudden death in patients with elevated calcium and phosphate or in cases in which the values were not obtained near the time of death or known at the time of autopsy.

**Dialysis, Calcification, AV-Node**