A (Not So) Humerus Situation

While clearing leaves from his gutters, a 44-year-old man falls approximately 12 feet, hitting his left upper arm on the concrete curb. His neighbor sees him fall and comes quickly to his aid; after stabilizing the arm, the neighbor drives him to your facility. The patient reports feeling and hearing a snap and says he suspects he has fractured his humerus.

Medical history is remarkable for idiopathic pulmonary arterial hypertension, diagnosed at age 30. Symptoms at that time included dyspnea with exercise (and later, at rest), fatigue, palpitations, near-syncope, and lower extremity swelling. He has a pulmonologist at another facility but admits he's not compliant with medications or appointments because he doesn't like his doctor. He hasn't had an exacerbation in the past two months.

Surgical history includes a tonsillectomy as a child.

His current medications include multiple inhalers (he can't remember any names) and tadalafil, which he takes daily. He's supposed to take warfarin but says he hasn't done so for at least six months. He has no known drug allergies.

Two of his four siblings have pulmonary hypertension; the family had genetic testing performed to rule out a gene mutation. His father had cardiac sarcoidosis and died of an arrhythmia. His mother is in good health.

The patient, a welder, is on medical disability. He initially denies smoking, then admits to having two or three cigarettes a day. He drinks three beers a day and "a few more" on the weekends. He denies current illicit drug use but details heavy methamphetamine use in his early 20s.

Review of systems is noncontributory; he says he's in a lot of pain and "does not want to go into my life story." He denies shortness of breath or chest pain.

Vital signs include a blood pressure of 162/98 mm Hg; pulse, 120 beats/min; respiratory rate, 18 breaths/min^{-1}; and temperature, 96.4°F. His weight is 214 lb and his height, 74 in.

Physical exam reveals an anxious male in apparent pain, holding his left arm against his side with his right hand. A cursory HEENT exam reveals no obvious trauma. His lungs have scattered crackles in all lung fields. The cardiac exam reveals a regular rhythm at a rate of 120 beats/min. There are

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no murmurs or rubs. The abdomen is soft and nontender.

The left upper arm has multiple abrasions, and there is point tenderness and swelling in the mid-portion of the humerus. There is no visual evidence of a compound fracture, but the bone appears displaced. Aside from additional abrasions on the left hip and lower leg, the remainder of the physical exam is unremarkable.

Given the history of pulmonary hypertension and findings of tachycardia on physical exam, an ECG is obtained prior to sending the patient to radiology. The ECG reveals a ventricular rate of 122 beats/min; PR interval, 164 ms; QRS duration, 68 ms; QT/QTc interval, 310/441 ms; P axis, 15°; R axis, 119°; and T axis, 37°. What is your interpretation?

ANSWER

This ECG shows evidence of sinus tachycardia with biatrial enlargement, right-axis deviation, right ventricular hypertrophy, and poor R-wave progression consistent with a septal MI.

Sinus tachycardia is signified by an atrial rate > 100 beats/min. The markedly notched P waves in leads I and II and biphasic P waves in lead V_1 suggest biatrial enlargement. Right-axis deviation is diagnosed based on the R axis of 119°, and right ventricular hypertrophy is indicated by the right-axis deviation, a QR pattern in lead V_1, and an R wave ≥ 5 mm in lead aVR. All of the above are findings seen with a history of pulmonary hypertension.

Poor R-wave progression in leads V_1 to V_4 suggests a septal MI of indeterminate age; however, there is no history of previous infarction.

The patient was diagnosed with a complex fracture of the left humerus and referred to orthopedics for repair. At his request, a pulmonary medicine consultation was ordered so that he could establish care in this facility. **CR**