



## MORNING REPORT: PART I

CHEST DISCOMFORT—  
A REAL PAIN IN THE NECK

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A 67-year-old gentleman with prior tobacco use and untreated hypertension presented to the emergency department with 5 days of left chest, shoulder, and arm pain following 2 months of exertional left arm pain.

*The differential diagnosis of chest pain in the emergency department should initially focus on life-threatening conditions including acute coronary syndrome (ACS), aortic dissection, pulmonary embolism (PE), pneumothorax, pericardial tamponade, and esophageal rupture. This patient's subacute chest pain in the setting of exertional arm pain warrants an expanded history to gauge pre-test probability of these emergency conditions.*

The chest pain was sharp, constant, radiating to the left arm and associated with exertional dyspnea relieved by rest. There was no diaphoresis, nausea, vomiting, pre-syncope, or fever. Heart rate was 87 bpm, blood pressure 173/71 mmHg, and respiratory rate and oxygenation were normal. Physical exam revealed midline trachea, regular heart rhythm, III/VI high-pitched holosystolic murmur with radiation to the axilla, normal jugular venous pressure, clear lungs, and no edema.

*An EKG and cardiac biomarkers are warranted. The patient's WELLS score of 0 makes PE unlikely, and the patient does not have exam features suggestive of tamponade or pneumothorax. The holosystolic murmur is most suggestive of previously undiagnosed mitral regurgitation (MR) and warrants transthoracic echocardiography (TTE).*

CBC and Basic Metabolic Panel were unremarkable. The patient's troponins trended from < 0.02 to 0.04 to 0.03 ng/ml (elevation is > 0.04). NT-proBNP was normal at 85 pg/ml. EKG revealed sinus rhythm without ST segment depression or T wave inversions. Chest X-Ray showed normal cardiac silhouette and no pulmonary edema, effusions, or consolidation. TTE revealed normal LV EF (55-60%) and wall motion, moderately dilated left atrium, and severe mitral regurgitation.

*The objective studies are notable for borderline troponins and severe mitral regurgitation on TTE. The*

*differential diagnosis for cardiac troponin elevation can be divided into ACS and non-ACS related causes. The lack of EKG changes and borderline troponins that peaked and fell during a prolonged episode of chest pain both point away from ACS in this patient. Non-ACS related causes are myriad and include advanced heart failure, valvular disease, acute pericarditis, cerebrovascular accidents, acute pulmonary embolism, trauma, chronic kidney disease, and sepsis. Similarly, the etiology of MR can be divided into ischemic and non-ischemic causes. Ischemic MR results from papillary muscle rupture. Non-ischemic MR results from ruptured mitral chordae tendinae (flail leaflet) due to myxomatous disease, infective endocarditis, rheumatic heart disease, or trauma. The patient's dilated left atrium and absence of wall motion abnormalities suggests the MR may be a chronic, non-ischemic process in which the left atrium has had time to accommodate and improve its compliance in the setting of increased volume. A transesophageal echocardiogram (TEE) may better characterize the mechanism and severity of MR, and coronary angiogram may be warranted to rule out significant coronary obstruction if valvular surgery is planned.*

TEE revealed a flail posterior mitral valve leaflet without vegetation and LVEF 60%. Coronary angiogram showed non-obstructive coronary artery disease. The patient did not have exam findings consistent with heart failure or hypoperfusion; therefore, he was discharged home with plans to perform mitral valve repair as an outpatient. Subsequent exams revealed reproducible upper chest wall pain that was ultimately deemed "musculoskeletal" in origin.

*The patient should be discharged on aspirin and a statin for his non-obstructive coronary artery disease and an ACE inhibitor or ARB for his hypertension. The decision to proceed with mitral valve intervention depends upon the stage of MR—characterized by the presence of symptoms, LVEF, and LV end-systolic*

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dimension. The patient's exertional dyspnea was likely a symptom of chronic MR; thus, the patient would be a candidate for corrective mitral surgery.

On his preoperative evaluation at our hospitalist led pre-op clinic, he continued to endorse left upper "chest" pain that was localized to the left deltoid region on more detailed history, associated with burning pain radiating to the left elbow and wrist. He also noticed recent loss of hand grip strength and dexterity. Surgical history identified emergent C3-6 laminectomy 7 years prior for acute central cord syndrome in the setting of underlying cervical stenosis—he recalled a fall and injury while hanging Christmas decorations. He reports no current neck pain but confirmed his arm pain was reminiscent of acute radicular symptoms at that time. Preoperative exam was notable for limited neck extension, left hand abduction weakness, and pain localized to the left C5-6 dermatomes.

The additional history reveals crucial prior medical and surgical events, significantly influencing the original differential diagnosis for his pain. The patient's current symptoms suggest that his "upper chest pain" was likely C5 radiculopathy. A complete past surgical history at the time of his index admission may have raised awareness of this sooner, shedding light on an alternative eti-

ology of his chest pain. The differential diagnosis now includes central canal stenosis, foraminal stenosis, herniated disc and thoracic outlet syndrome. Cervical spine disease is important to consider before intubation given the risk of spinal cord injury and permanent neurologic damage. Case reports document acute quadriplegia or tetraplegia after open heart surgery,<sup>1-4</sup> which often utilizes hyperextension of the neck/upper torso to facilitate sternotomy, potentially aggravating underlying spine pathology. Interestingly, one case similarly had the patient present with LUE symptoms, felt to be an angina equivalent.<sup>4</sup>

C-Spine MRI revealed several foci of myelomalacia and multilevel foraminal stenosis, worse at C4-5 and C5-6, without central canal stenosis.

The MRI findings are consistent with the patient's exam. The myelomalacia suggests the patient's symptoms are unlikely to improve. The lack of central canal stenosis is reassuring, and management can focus on the foraminal stenosis. Successful c-spine protection during cardiac surgery is reported.<sup>5</sup>

Spine precautions were utilized during intubation and surgery. The mitral valve repair was successful without neurologic injury.

Cervical spine pathology is an important consideration prior to surgery. If there is concern for pre-oper-

ative cervical spine disease, advanced imaging should be considered if it will change peri-operative care while carefully weighing the risks and benefits of potentially delaying indicated surgery to obtain cervical spine assessments.

**References**

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