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Acute Onset Shortness of Breath with New Murmur: An ED Case Study

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Introduction

Shortness of breath especially acute onset, is an anxiety inducing symptom for both patients and physicians alike, and it accounts for the 6th most common reason for emergency department visits in the United States. Upon initial presentation to ED, it is the job of the ED physician to make critical decisions in the acute management of that patient, but also lay the groundwork for further treatment by consultants either medically or surgically.

In the case presented, critical decisions were made throughout initial management which ultimately led to the patient's correct diagnosis. Standard preliminary testing was done in conjunction with physical exam. However, the utilization of ultrasound was crucial to a successful outcome. Ultrasound is a tool which should be in every back pocket of the ER physician.

Clinical Presentation

A 70 year old female with PMHx of only hypertension presented to the emergency department via EMS for complaint of shortness of breath. Per patient, she was sitting at a restaurant eating lunch, when she suddenly became short of breath. Patient presented to ED with vital signs of BP 186/97, HR 120, Temp 36.9, RR 38, spO2 83% on room air.

Initial evaluation showed mild distress with increased work of breathing and conversational dyspnea was noted. Further physical exam was consistent with a new loud systolic murmur radiating to axilla as well as crackles in bilateral lung bases. No peripheral edema noted. SpO2 improved with non-rebreather, and subsequently weened to 4L NC with spO2 to mid 90s.

Preliminary workup demonstrated an EKG consistent for sinus tachycardia with no T or ST changes and a chest x-ray which showed new pulmonary edema with bilateral pleural effusions (figures 1 and 2). Do to new murmur, a bedside cardiac echocardiogram was performed by ER physician which was consistent with preserved LV function with no pericardial effusion, however a valve abnormality was appreciated.

Further workup was significant for a BNP of 200 and negative troponin. Cardiology was consulted due new murmur with acute heart failure and patient was subsequently admitted to the ICU for further evaluation and monitoring.

Testing and Imaging

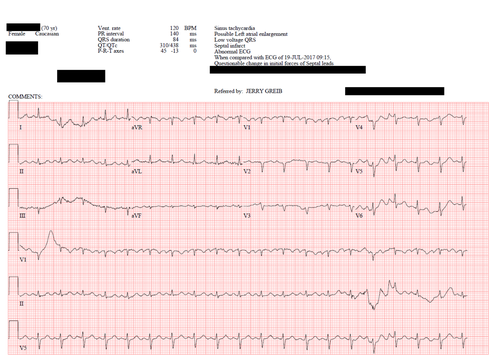

Figure 1(left): Initial EKG complete in emergency department
Figure 2 (right): Initial CXR in emergency department, showing bilateral pleural effusions

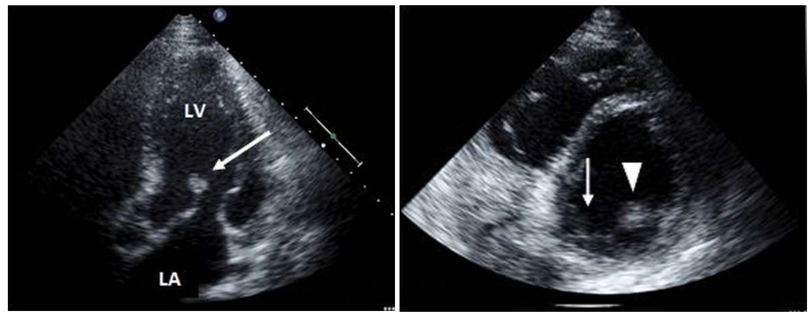

Figure 3: TTE apical-four chamber view illustrating ruptured papillary muscle attached to anterior leaflet
Figure 4: TTE mid-ventricular view illustrating a missing posteromedial papillary muscle (arrow), and (arrowhead) indicating anterolateral papillary muscle

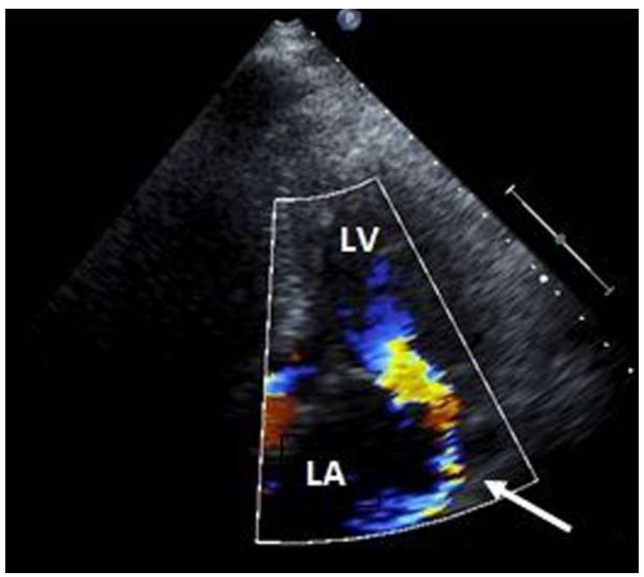

Figure 5: TTE, apical-four chamber, demonstrating posteriorly directed regurgitant jet (arrow).

Hospital Course

Admitted to ICU for monitoring and had formal imaging of a TEE which was consistent for flail leaflet of the P2 scallop of the posterior mitral leaflet with severe mitral regurgitation likely causing acute heart failure. Cardiac Catherization done, with LVEF 60% and single vessel 75% OM2 stenosis medically managed. Patient subsequently underwent cardiothoracic surgery undergoing successful Total Cardiopulmonary Bypass Mitral Valve Replacement via Median Sternotomy. Patient had expectant management and was discharge home.

Discussion

Acute flail mitral leaflet via papillary muscle rupture is a time-sensitive diagnosis and is reversible. Each of the 2 papillary muscle attach to both anterior and posterior leaflets. If ruptured, results in regurgitant blood flow. Mitral regurgitation or jets can easily be seen on bedside TTE with doppler during systolic phase in the apical four-chamber view. Papillary muscle heads in LA or a mobile echo density in LV which is out of synchrony can indicate rupture of muscles. Wall motion abnormalities may also be seen with myocardial infarction as possible etiology. LA and LV sizes will appear normal, as will LV function. Ultimately, patient will require a TEE for definitive for diagnosis, especially posterior leaflet and will need to be stabilized for surgery with vasodilator therapy.

Conclusion

Transthoracic echo is a vital tool for undifferentiated patients with dyspnea. This case exemplifies the importance of a prudent history and physical exam, however more importantly the use of adjunct studies to further strengthen a developing diagnosis while in the emergency department. Through use of bedside ultrasound to find a root cause, this patient was able to receive appropriate consultation as well as treatment by specialists after initial resuscitation leading to a successful outcome of newly diagnosed murmur to eventual replacement.

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