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Inferior Myocardial Infarction, Complicated by Bilateral Papillary Muscle Rupture, Leading to Cardiogenic Shock

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ABSTRACT/BACKGROUND

Papillary muscle rupture (PMR) is a rare life-threatening complication following myocardial infarction (MI) and most commonly involves the posteromedial muscle. We present a case of a 63-year-old male with a past medical history of hypertension, who presented with chest pain of one week duration, and was found to have a bilateral papillary muscle rupture following a late presenting inferior MI. There is currently no incidence rate of bilateral papillary muscle wall rupture documented; thus, making it an extremely rare complication following a myocardial infarction. This case highlights the need for increased surveillance in patients presenting with myocardial infarctions who develop shock, and urgent cardiac and cardiothoracic surgery consults are required to reduce the risk of mortality.

Keywords: Papillary muscle rupture; Myocardial infarction; Cardiothoracic surgery

CASE PRESENTATION

We present a case of a 63-year-old male with a past medical history of hypertension, who presented with chest pain of one week duration. Upon arrival, the patient was noted to be hypotensive, and his electrocardiogram findings were significant for ST elevations in the inferior leads, with reciprocal changes in the lateral leads. The patient was emergently taken to the cardiac catheterization lab. Angiogram showed total thrombotic occlusion of the obtuse marginal (OM) branch and concurrent severe left anterior descending (LAD) and right coronary artery disease (RCA). He underwent angioplasty with stent placement to OM. Despite successful revascularization of the culprit lesion, he remained hypotensive and hypoxic with clinical findings of pulmonary edema. Left ventriculogram showed severe mitral regurgitation, raising suspicion for a mechanical complication. A bedside echocardiogram confirmed acute rupture of posteromedial papillary muscle, (Figures 1a and 1b). The patient was intubated, and an intra-aortic balloon pump was placed for hemodynamic support. He was taken emergently for

surgical repair of mitral valve, where intraoperatively he was noted to have bilateral papillary muscle rupture (Figure 1b). He underwent mitral valve replacement with double bypass to his LAD and RCA. His post-op course was remarkable for an initial good recovery, however, later in his course he developed hemorrhagic shock and expired.

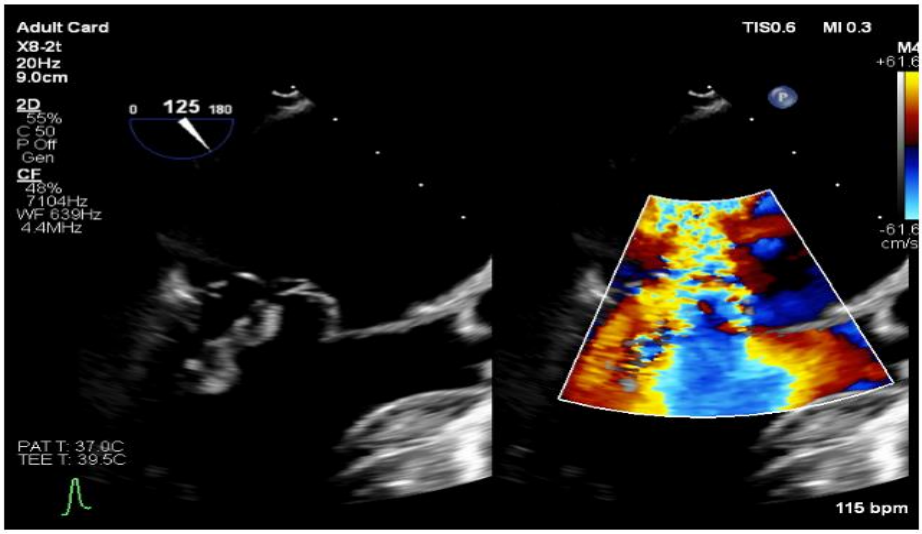

Figure 1a. Echocardiogram showing bilateral papillary muscle rupture.

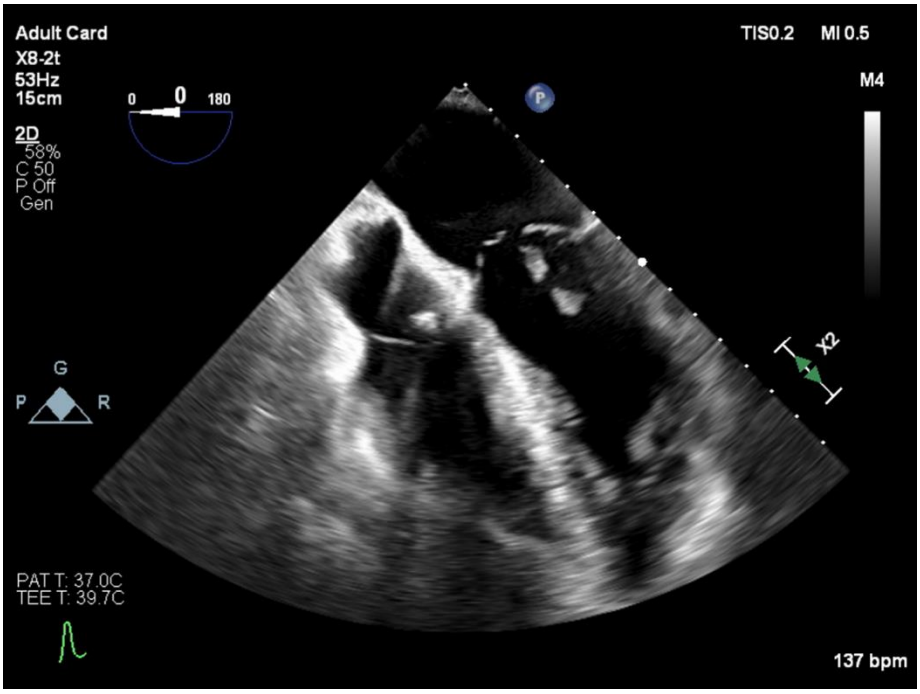

Figure 1b. Echocardiogram showing bilateral papillary muscle rupture.

DISCUSSION

The incidence of papillary muscle rupture has decreased from a rate of 1% to 5% in the pre-reperfusion era to a rate of 0.2% to 0.3% in the post-reperfusion era[1]. Following a myocardial infarction (MI), the incidence of papillary muscle rupture is higher in the older population (67 years compared to 60 years, $P < .005$), particularly

among individuals without a history of angina, without prior diabetes mellitus, and those without multivessel disease[2]. Additionally, this risk is elevated in cases of inferior MI and in individuals with a history of hypertension[3].

Papillary muscle rupture manifests clinically with a sudden drop in blood pressure and respiratory distress, attributed to pulmonary edema. This presentation typically occurs between 2 to 7 days following an inferior ST-elevation myocardial infarction (STEMI)[4]. The signs and symptoms of papillary muscle rupture exhibit considerable variability, spanning from mild dyspnea to cardiopulmonary arrest. Hemodynamic stability is contingent upon factors such as the intactness of the subvalvular apparatus, the degree of mitral regurgitation, and the extent and location of myocardial damage. Complete rupture of the papillary muscle typically leads to cardiogenic shock and fatal outcomes, whereas partial rupture often presents with pulmonary congestion without shock. Many of these ruptures, approximately 80%, occur within the first 7 days following a myocardial infarction[5]. Physical exam shows holosystolic murmur, loudest at the apex and radiating to the axilla and a transthoracic echocardiogram (TTE) usually shows the flail mitral valve with a possible freely moving damaged papillary muscle[6]. All patients should be considered for surgery while stabilizing measures like intra-aortic balloon pump, afterload reduction and inotropic support is pursued. Mortality with medical therapy is 71% compared with 40% with surgery. For partial valve rupture, repair has better short and long-term results, however, preservation of sub-valvular apparatus is a strong predictor of improved mortality outcomes[6].

CONCLUSION

PMR is a rare well-known complication following late presenting MI. Given the dual blood supply of anterolateral papillary muscle, most cases of PMR involve the posteromedial papillary muscle with an incidence of 1-5%. Bilateral PMR is extremely rare and to our knowledge this is the first reported case of bilateral PMR complicating inferior MI. Diagnosis of PMR is suspected in late-presenting patient with persistent hypotension and pulmonary edema despite revascularization. It is suggested by a ventriculogram and confirmed by echocardiogram. Once diagnosed, emergent surgical repair is indicated with a high mortality rate.

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