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An Intensive Study on Aortic Regurgitation: A Case Report of Biventricular Failure and Congestive Cardiac Failure

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ABSTRACT

A 28 years old male complained of gradual shortness of breath. An echocardiogram revealed an aortic regurgitation and moderate mitral regurgitation of rheumatic origin with biventricular failure and congestive cardiac failure in sinus rhythm. The patient warranted cardiac surgery with mitral valve repair and aortic valve replacement amidst direct drug therapy.

Keywords: Shortness of breath; Aortic regurgitation; Mitral regurgitation

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INTRODUCTION

The term "cardiovascular disease" refers to any ailment that affects the heart or blood vessels. It has also been linked to artery damage in organs like the brain, heart, kidneys, and eyes.[1] It is a common disease nowadays and most people ranging from children to adults have been seen suffering from it. Cardiovascular risk factors are classified into two categories: those that can be changed and those that cannot.[2] Smoking, high cholesterol, lack of exercise, obesity, hypertension, and diabetes are all modifiable or somewhat adjustable risk factors. A family history of cardiovascular disease, sex, and age are all non-modifiable risk factors. Aortic Regurgitation (AR) is a prominent

valvular condition caused by a variety of etiologies, which can be classified as primary valve cusp abnormalities or due to abnormalities of the aortic valve supporting structures (*i.e.* the aortic root and annulus).[3] Atherosclerotic valve degeneration is the most common cause of aortic regurgitation, particularly in the presence of a bicuspid aortic valve. Aortopathy characterized by dilatation of the aortic root or the proximal ascending aorta is also associated with a bicuspid aortic valve, which can contribute to secondary aortic regurgitation.[4] The etiology and hemodynamic/clinical presentation of patients with AR fluctuate depending on the degree of the regurgitation and whether it develops suddenly (acute AR) or gradually (chronic AR), allowing the left ventricle to adjust to the volume overload. Systolic retrograde flow from the left ventricle into the left atrium is referred to as mitral regurgitation. Even though a minor form of this valve illness is commonly encountered in healthy persons, epidemiological data reveal that moderate or severe regurgitation is the most common valve disease in the United States and the second most common kind of valvular heart disease requiring surgery in Europe Regurgitation, whether moderate or severe, is common, and its incidence rises with age.[5-7] It was anticipated to affect 20-25 million people in the United States in 2000, with that figure expected to nearly double by 2030 due to population aging and expansion.[6] Mitral regurgitation is common in young adults in regions where rheumatic fever is endemic.[8] Heart failure, also known as congestive heart failure, occurs when the heart muscle fails to pump blood as efficiently as it should. When this happens, blood and fluid can back up in the lungs, causing shortness of breath.[9]

CASE PRESENTATION

A 28 years old male, presented with complaints of shortness of breath for almost 3 years which was insidious in onset with a slow progression. For six months, the patient had symptoms like dyspnea while performing some daily activities but from last year the breathing difficulty can be felt even at rest which is worse in the supine position than in the sitting position. Further, the patient also complains of a natural attack of difficulty in breathing for the last two years which the onset is after one to two hours of sleep and awakens the patient. The patient has had a history where four years ago, he was admitted to the hospital several times due to syncope, and about one and a half years ago he had a stroke attack which weaken his body (right half) but recovered over one week. One year ago the patient also had rheumatic fever and complains about joint pain in both the knees and hip. The patient had no history of other diseases like typhoid, malaria, tuberculosis, and others. On examination, the patient was well oriented to time, place, and person, his appearance looks ill, presence of pallor and pulmonary edema, and in normosthenic condition. The patient clinical progression of aortic insufficiency was typical, with gradual distention of the left ventricle and few cardiovascular symptoms. Aortic insufficiency usually proceeds slowly, giving the left ventricle time to widen and tolerate substantial regurgitating volumes while maintaining normal filling pressure. The pulse rate was 80 beats/min having regular rhythm, high volume collapsing pulse, and normal arterial wall. His blood pressure was 170/110 mmHg. After the electrocardiogram (ECG) investigation it was found that in lead V, R wave was equivalent to S and deep wave in V_5 and V_6 along with left ventricular overload, left bundle branch block, corrected QT duration of

437 ms, QRS duration of 108 ms, and atrial fibrillation rhythm with a mean heart rate of 124 bpm. The echocardiogram report suggested that the patient is suffering from aortic regurgitation and moderate mitral regurgitation of rheumatic origin with biventricular failure and Congestive Cardiac Failure (CCF) in sinus rhythm without any evidence of infective endocarditis. Also, it was found that there was an enlargement in the left atrium with right ventricular hypertrophy. The management of the patient included benzathine penicillin (IM every three weeks), furosemide, ramipril, isosorbide dinitrate, and with restriction to physical activity, salt diet, and excess fluid intake. The patient was also suggested for mitral valve repair and aortic valve replacement.

DISCUSSION

The diastolic alteration of blood circulation from the aorta into the left ventricle is referred to as aortic regurgitation. Aortic Valve Disease (AVD) or irregularities of the perivalvular system and organs such as the ascending aorta and aortic root can potentially trigger AR.[10] In the Framingham investigation, the occurrence of AR was reported to be 4.9%, with mild and chronic AR prevailing in 0.5% of the study group. In comparison, AR was diagnosed in 8.5% of women and 13% of males. AR becomes more prevalent as people get older, rising around the age of 40-60.[11] Since there is no specific therapy for the severe form of AR, various preventative interventions such as ACE inhibitors, calcium channel blockers, and vasodilators can aid to control uncontrolled hypertension by significantly reducing systolic pressure and enhancing blood flow in the aorta.[12] The administration of beta-blocker for blood pressure management in severe AR stages B and C may be less beneficial because of the negative chronotropic response, which results in a higher stroke volume, which raises systolic pressure even more.[13,14] Aortic Valve Replacement (AVR) or Mitral Valve Replacement (MVR) should be recommended to symptomatic individuals who are suited for surgery and vasodilator therapy should be continued for a long period only if left ventricular systolic dysfunction continues after aortic valve replacement. Patients with aortic valve replacement are advised to have surgery as soon as moderate symptoms appear, rather than waiting until significant LV dysfunction develops, because of improved post-surgical recovery rate.[15] This case report showed that a 28 years old male developed a severe aortic regurgitation; even though it is mainly seen in a person 40 years and above. The patient was prescribed the following multiple medications to prevent aortic regurgitation from worsening: benzathine penicillin (IM every three weeks) which acts as prophylaxis against recurrence of acute rheumatic fever which may be the main cause of heart failure, ramipril an ACE inhibitor was also prescribed to reduce the systolic pressure in the heart along with furosemide (to reduce pulmomary edema, 20-40 mg OD or BID) and isosorbide dinitrate (20-40 mg, 6 hourly). The patient was also recommended for mitral valve repair surgery, which involves a valvuloplasty and the implantation of an annuloplasty ring to repair the heart's stiff or leaky mitral valve. Mechanical prostheses, such as the Starr Edward valve or the Porcine Bioprosthesis, can be used, and atrial valve replacement, which is performed on asymmetric patients or those with a left ventricular ejection fraction of less than 55 percent or end-systole (ventricular volume >55 percent ml/m^2 after load therapy), is another option.

CONCLUSION

We present a case of aortic regurgitation and moderate mitral regurgitation of rheumatic origin with biventricular failure and congestive cardiac failure in sinus rhythm without any evidence of infective endocarditis, the parameters influence of which could be precisely assessed by a thorough electrocardiogram and chest X-ray examination.

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