SPONTANEOUS RESTORATION OF THE SINUS RHYTHM AFTER AORTIC VALVE REPLACEMENT IN A PATIENT WITH COMPLETE ATRIOVENTRICULAR BLOCK AND AORTIC REGURGITATION

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Complete atrioventricular block may be present in 5% of patients with aortic valve disease. If established before the operation, this conduction defect usually persists after the correction of the aortic pathology and requires the implantation of a permanent pacemaker.

A 66-years-old male patient with complete atrioventricular block and aortic regurgitation underwent aortic valve replacement operation, the implantation of a permanent pacemaker was previewed after the operation. The unexpected, spontaneous restoration of the sinus rhythm occured on the fourth postoperative day. At 20th month following surgery, the patient is still in the sinus rhythm without a need for a pacemaker implantation.

This unexpected return of the sinus rhythm may be due to the resolution of the edema around the conduction tissues and to the relief of the left ventricular volume overload and strain causing stretching of the conduction bundle fibers. The present case raises the question whether new onset of conduction disturbances and complete atrioventricular block may support the indication for surgery in aortic valve patients as these disturbances may be reversible following the correction of the valvular pathology in the early stages of the disease.

Keyword: complete atrioventricular block, sinus rhythm, aortic regurgitation-aortic stenosis, pacemaker

Complete atrioventricular block (AVB) is a serious conduction disturbance requiring the implantation of a permanent pace-maker. Mostly, it may occur due to the idiopathic fibrosis of the bilateral bundle branches causing loss of conduction in the fibers in the proximal left bundle branch and in the bifurcating main bundle. Ischemic damage in patients who have survived a septal infarction, causing destruction of the bundle branches is also one of the most common causes of AVB followed by the calcific damage to the conduction tissues in mitral and/or aortic valve diseases (1). Complete AVB can also be observed during the course of cardiomyopathies, congenital heart diseases, collagen diseases and malignancies invading the interventricular septum. Congenital AVB and AVB caused by mechanical damage to the conduction tissues during cardiac surgery are also known entities. Cardiac conduction abnormalities are common in patients with aortic valve disease. Several studies have suggested that the occurence of complete AVB in these patients is related to the extent of calcium deposits in the aortic valve and adjacent structures (2). In these cases, complete AVB is usually permanent and does not resolve even after the correction of the underlying valvular disease, necessitating the implantation of a permanent pace-maker (3-5). In addition to this, complete AVB may be seen in patients who have undergone aortic valve surgery due to the damage to the conduction tissues by sutures or by efforts to remove the calcium deposits.

We report in the present paper, a case of unexpected spontaneous restoration of the sinus rhythm following aortic valve surgery in a patient with complete AVB and severe aortic regurgitation.

CASE

A 66-years-old male patient was admitted to the emergency unit with severe back pain in the interscapular region. The patient declared that he was hypertensive since 25 years and his blood pressure had been treated with nifedipine and enalapril combination. The recorded blood pressure upon admission was 220/110 mmHg and the patient was severely stressed. The physical examination revealed a high-grade diastolic murmur at the aortic area radiating to the neck and to both axillas. Pulmonary rales were present throughout both lung fields. Left ventricular (LV) hypertrophy, LV strain and complete AVB with a ventricular rate of 40/min was seen on electrocardiography (Figure 1a). The patient was unaware of his rhythm abnormality, but he described some syncopal attacks in the last months. A complete AVB with similar ventricular rate was also observed in an electrocardiagraphy recorded three months ago. Following stabilization of the blood pressure, the patient underwent transthoracic echocardiography and computed tomography of the thorax to exclude a possible aortic dissection. The tomographic examination was negative for aortic dissection. The echocardiography revealed severe aortic regurgitation with dilatation of the LV cavity (Left ventricular end-diastolic dimension: 6.3 cm, Interventricular septal thickness: 1.4 cm, posterior wall thickness: 1.4 cm, LV ejection fraction 40%). The patient was hospitalized and a transvenous transient pacemaker was implanted. The results of the blood biochemistery studies were in the normal range. The cardiac catheterization showed severe aortic regurgitation without a significant gradient between LV and aorta. The left ventriculography showed global hypokinesia of all segments.The coronary angiography showed normal coronary arteries with mild calcifications. The patient was then scheduled for aortic valve replacement and transvenous permanent pacemaker implantation following the recovery from surgery.

Five days later, the patient underwent aortic valve replacement operation. At surgery, no dissection findings were observed in the ascending aorta. The aortic annulus was largely dilated, the aortic valve was tricuspid , the leaflets were retracted and there were only mild calcifications on the right coronary cusp and these were not extending through the subannular area. There was no evidence of infective endocarditis on visual inspection. After resection of the native cusps, the aortic valve was replaced with an Omnicarbon aortic mechanical prosthesis (size : 25mm). At the end of the cardiopulmonary bypass, the heart spontaneously worked in its preoperative

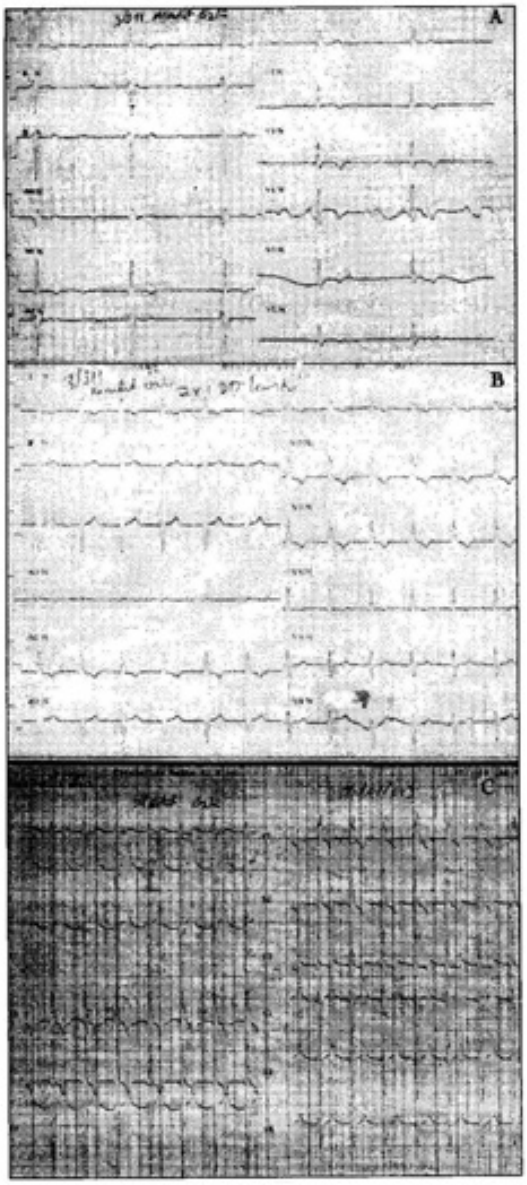

Figure –1 : The recorded electrocardiograms of the patient : upon admission at hospital (A), on the second postoperative day when the sinus rhythm returned in the patient (B) and on the 20th month following surgery (C)

rhythm and the patient was transferred to the intensive care unit with his transient pacemaker. The rhythm of the patient was always complete AVB on the coming postoperative days and the implantation of the permanent pacemaker was planned in a few days. In the fourth postoperative day, the medical staff observed spontaneous restoration of the sinus rhythm with a heart rate of 60/min (Figure 1b)and the pacemaker implantation was cancelled for further observation. The patient was monitored for ten more days in the hospital and as the sinus rhythm persisted during this period, the patient was discharged with antihypertensive and anticoagulant medications.

The 24-hours ECG Holter monitoring of the patient at the second week following discharge revealed permanent sinus rhythm with a few ectopic atrial beats. 20 months after the operation, the patient is free of symptoms with a regulated blood presure to 140/80 mmHg. The echocardiographic examination revealed a well-functionning aortic prosthesis and reduction in the size of LV cavity (left ventricular end-diastolic dimension 5.2 cm, posterior wall thickness 1.2 cm, interventricular septal thickness 1.3 cm). The electrocardiography and the 24-hours ECG Holter monitoring showed sinus rhythm with a mean heart rate of 60/mn with a first degree AVB and right bundle branch block (Figure 1c).

DISCUSSION

Aortic valve disease and especially calcific aortic stenosis may present with complete AVB in some cases. The extension of calcific infiltrates from the aortic valve into the conduction system may cause various forms and degrees of atrioventricular and intraventricular block in 5% of patients with calcific aortic stenosis (6). In these cases, the calcification presents as a cauliflower like mass within the leaflets, maximal at the sites of comissural fusion and often extending into the annulus and the adjacent aorta. Retrograde extension of the calcification into the region beneath the right coronary cusp comissure, adjacent to the membranous septum may lead to complete heart block. Although more rarely than the patients with aortic stenosis, complete AVB may also be encountered in patients with aortic regurgitation. With the continuing dilatation of the LV from untreated aortic regurgitation, fibrosis develops within the myocardium, possibly as a result of subclinical ischemia or myofibrillar degeneration. The progressive fibrosis may involve the conduction bundle producing complete AVB (7). Complete AVB is usually permanent in patients with established aortic valve disease and we have not encountered any report of spontaneous restoration of the sinus rhythm in this group of patients in the literature since

1975, even after the valve replacement procedure. Otherwise, new onset of various types of conduction defects and complete AVB are not uncommon after aortic valve surgery. In these cases, complete AVB may be sometimes transient (8) but about 3 % of patients require a permanent pacemaker following aortic valve surgery (9).

This case report presents the unexpectedly spontaneous restoration of the sinus rhythm following aortic valve replacement in a patient with established complete AVB and aortic regurgitation. This patient's valve was not severely calcific and the calcifications were not extending through the membranous septum, the possible cause of complete AVB in this patient was probably the stretching, edema and myofibrillar degeneration of the conduction tissues to a certain extent secondary to the dilatation of the LV. The spontaneous restoration of the ryhthm following the correction of the severe aortic regurgitation may be due to the relief of LV volume overload and strain causing stretching of the conduction fibers and the resolution of the edema around the conduction tissues in the acute phase. Probably, the fibrosis of the conduction tissues was not completed yet as the sinus rhythm returned in the patient. The authors think that the new onset of conduction disturbances and complete AVB may support the indication for surgery in patients with aortic valve disease, especially in those without severe calcifications and spontaneous resolution of this abnormalities may be expected after the correction of the valvular pathology. Permanent pacemaker implantation in these patients should be delayed until the correction of the valvular pathology.

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