Abstract

A 54-year old man underwent redo mitral valve (MV) plasty because of recurrent mitral regurgitation (MR). Intraoperative transoesophageal echocardiography revealed severe MR and turbulent flow at the left ventricular (LV) outflow tract associated with systolic anterior motion of the MV. Various medical treatments, additional surgical correction, and atrial and right ventricular pacing had failed to resolve the MR associated with systolic anterior motion. LV pacing, however, markedly attenuated MR. Temporary LV pacing was discontinued on postoperative day 2, and subsequently MR associated with systolic anterior motion has not recurred. LV dyssynchrony resulting from conduction disturbances might cause systolic anterior motion immediately after MV plasty. We speculate that LV pacing eliminated LV dyssynchrony and improved the MR associated with systolic anterior motion. Temporary LV pacing can be performed easily and safely at the time of LV plasty. LV pacing can be a complementary treatment for systolic anterior motion and resultant MR.

Keywords: Systolic anterior motion • Mitral valve repair • Mitral regurgitation • Left ventricular pacing

CASE REPORT

A 54-year old man underwent an elective redo mitral valve (MV) plasty for recurrent severe mitral regurgitation (MR). The previously reconstructed chordae had ruptured, and prolapse of segment P2 of the posterior mitral leaflet was prominent. The prior 28-mm annuloplasty ring was removed, triangular resection and suturing of prolapsed segments was performed, and a 26-mm semi-rigid annuloplasty ring was applied. Water testing showed no regurgitation. After the heart resumed beating, intraoperative transoesophageal echocardiography revealed massive MR, which appeared to result from systolic anterior motion (SAM). Despite several attempts to reduce the SAM, including fluid transfusion, discontinuation of inotropic agents and ß-blocker administration, the associated MR was not controlled. Thus, we arrested the heart again and examined the MV. Water testing confirmed no regurgitation. The 26-mm annuloplasty ring was removed and an additional pair of artificial chordae was implanted in the remaining P2–P3 portion to move the coaptation point to a more posterior position. Water testing again showed no regurgitation. When the heart resumed beating, moderate MR and turbulent flow at the left ventricular (LV) outflow tract during the systolic phase persisted. The additional treatments did not achieve further attenuation of MR.

Neither atrial pacing nor right ventricular (RV) pacing helped to attenuate MR (Fig. 1A and B). LV pacing, however, just lateral to the distal portion of the left-anterior descending branch markedly decreased the degree of MR (Fig. 1C), resulting in avoidance of conversion to valve replacement. Weaning from cardiopulmonary bypass was easily achieved under LV pacing. On postoperative day 2, transthoracic echocardiography revealed only trivial MR even with sinus rhythm and temporary LV pacing could be finally discontinued. Subsequently, LV pacing has not been required, and only trivial MR was observed on transthoracic echocardiography at discharge. Approximately 7 months after the redo surgery, the patient continues to visit our hospital as an outpatient without recurrent SAM or MR.

DISCUSSION

SAM is defined as protrusion of the anterior mitral leaflet towards the LV outflow tract during the systolic phase, and is one potential complication after MV plasty, occurring in an estimated 4–10% of patients [1]. Normally, the posterior movement of the subaortic curtain during the systolic phase contributes structurally and haemodynamically to preventing SAM [2, 3]. Various medical treatments, including increasing preload, elevating mean arterial pressure by vasoconstriction, discontinuing inotropic agents and administering ß-blockers to decrease the heart rate have been used to reduce MR due to SAM, with additional surgical corrections if necessary [1, 2]. These treatments, however, do not always resolve MR associated with SAM. In the present case, several of the above-mentioned medical treatments were ineffective. However,
LV pacing (but not atrial pacing or RV pacing) succeeded in reducing SAM-associated MR. The precise mechanism by which LV pacing reduced MR associated with SAM is not clear. However, we speculate that decreased LV dyssynchrony resulted in resolution of MR associated with SAM although there was no definite evidence of LV dyssynchrony during surgery in our patient. After cardiac surgery, conduction disturbances, especially left bundle branch block, sometimes result in structural distortion of LV dimensions and inappropriate movement of the subaortic curtain and papillary muscles. These changes cause a geometric change in the left ventricle and the MV and negatively affect MV function, potentially leading to structural and/or functional SAM [4, 5]. LV pacing eliminates LV dyssynchrony resulting from conduction disturbances by restoring the geometry of the left ventricle and the MV and proper MV function and, as a result, might markedly improve the MR associated with SAM. Our speculations could explain the fact that LV pacing resolved SAM-associated MR while atrial and RV pacing were unsuccessful.

In general, SAM is a transient phenomenon and does not recur once it is controlled during the perioperative period. Indeed, in the present case, transthoracic echocardiography and electrocardiogram on postoperative day 2 revealed that LV pacing could be discontinued. MR was controlled without LV pacing and 12-lead electrocardiogram showed no left bundle branch block. The associated MR has not recurred after discontinuation of LV pacing, and subsequently additional treatments were not required. Because conduction disturbances immediately after cardiac surgery are transient in almost all cases, LV pacing is only required during the perioperative period in cases of SAM-associated MR resulting from conduction disturbances.

Temporary LV pacing is well worth trying because it can be performed easily and safely at the time of MV plasty, and could prevent conversion to valve replacement even in SAM cases that do not respond to other medical and surgical treatments. LV pacing can be a complementary treatment for SAM and resultant MR in conjunction with other medical and surgical treatments. Temporary LV pacing is the novel approach to be considered for SAM after MV plasty. Further investigations with a larger number of subjects could clarify the effects of LV pacing.

Conflict of interest: none declared.

REFERENCES