Oblique Aortic Valve Replacement and Coronary Artery Bypass Grafting for Severely Calcified Narrow Aortic Root With Unstable Angina

We report an 84-year-old woman diagnosed with aortic stenosis and regurgitation with a severely calcified narrow aortic root and left main coronary artery trunk stenosis with triple-vessel coronary artery disease. Emergency aortic valve replacement and triple coronary artery bypass grafting were successful. The aortic annulus was small and heavily calcified, and the ascending aorta, the sinus of valsalva and the anterior leaflet of the mitral valve were severely calcified. A St. Jude Medical valve 19A (St. Jude Medical Inc., St. Paul, MN) was inserted obliquely along the noncoronary sinus. This technique is a useful alternative in cases where the patient’s life is at risk in situations involving severe extensive calcification of a narrow aortic root. (JJTCVS 2001; 49: 320–323)

Key words: aortic valve replacement, partially supraannular position, narrow aortic root, severe calcification, coronary artery bypass

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Aortic valve replacement for a severely calcificated narrow aortic root requires aortic root enlargement after decalcification or replacement with a stentless bioprosthesis. In some cases, these techniques cannot be used, however, due to severe extensive calcification of the narrow aortic root or other complications, such as advanced age or concomitant procedure. We report a case of aortic valve replacement with oblique insertion of a prosthesis valve concomitant with triple coronary artery bypass grafting for a severely calcified narrow aortic root associated with unstable angina.

Case

A small 84-year-old woman (BSA 1.43 mm²) diagnosed with unstable angina pectoris with triple-vessel disease and aortic valve stenosis and regurgitation was referred to our hospital for emergency surgery, because of uncontrollable anginal attacks at rest. Preoperative coronary angiography demonstrated 90% stenosis at the proximal lesion of the right coronary artery, 75% stenosis of the left main trunk, 75% stenosis of the left anterior descending artery, and 90% stenosis of the left circumflex artery (Fig. 1). Echocardiography revealed aortic stenosis with an estimated pressure gradient of about 100 mmHg and moderate aortic regurgitation. Chest radiography revealed a heavily calcified aorta (Fig. 2).

After median sternotomy, calcification of the ascending aorta was examined by epiaortic echocardiography. It showed a huge calcified plaque in the anterior wall and diffuse calcification in the posterior wall of the aorta. The aorta was not “porcelain”, but could be cross-clamped. Under total cardiopulmonary bypass with aortic cannulation and bivacaval drainage, the aorta was cross-clamped. Because of aortic regurgitation and left main trunk stenosis, retrograde crystalloid cardioplegia (20 ml/kg) was used for initial cardioplegia. Saphenous vein grafts (SVG) were anastomosed to the left anterior descending artery (LAD), to the mid-portion of the right coronary artery (RCA) and to the left posterolateral branch (PL). Every time
a SVG anastomosis was completed, an inflow of cardioplegic solution was added from the SVG. When all SVGs were anastomosed, cardioplegic solution was injected only through the SVGs and retrograde cardioplegia was discontinued. From the second injection of cardioplegia, we employed cold blood cardioplegia (10 ml/kg) in every 20 minutes. Aortotomy was conducted. The sinus of Valsalva, aortic annulus, anterior aortic wall, and anterior mitral valve leaflet were severely calcified. Even though there was heavy calcification of the anterior mitral leaflet, valve anatomy did not seem to be seriously damaged, so the mitral valve was left intact. Aortotomy was extended to the calcified plaque. The valve was excised, but only a 19-mm size could be tightly passed. A 19-mm SJM prosthesis (St. Jude Medical (SJM) Inc., St. Paul, MN) could not be implanted in the paraaortic annulus position, so we decided to implant a 19-mm SJM valve obliquely by suturing it to the annulus along the left and right sinus and in the supraannular position along the noncoronary sinus (Fig. 3). Four stitches of 2–0 polyester suture (Nespolene, Azwell, Osaka, Japan) with spaghetti were anchored outside the aortic wall of the noncoronary sinus. A total of 13 mattress sutures of 2–0 polyester was required. Before the aortotomy was closed, holes for the proximal anasto-