In February 2010, a 77-year-old man with a history of stroke and peripheral vascular disease presented at our emergency department in florid pulmonary edema.
He had a 6-month history of worsening dyspnea on exertion, paroxysmal nocturnal dyspnea, and leg edema.
Upon physical examination, he had diffuse rales and a murmur of aortic stenosis.
A 2-dimensional Doppler transthoracic echocardiogram revealed severe aortic valve stenosis with a peak gradient of 70 mmHg and a mean gradient of 45 mmHg, a calculated aortic valve area of 0.7 cm2, severe mitral regurgitation, and a severely dilated left ventricle (LV) with an ejection fraction of 0.20.
After the pulmonary edema had resolved, cardiac catheterization confirmed the echocardiographic findings and showed nonobstructive coronary artery disease.
Given these findings and the patient's comorbidities, we decided on a minimally invasive surgical approach.
The patient was placed in the supine position and underwent anesthetic induction and intubation with a single-lumen endotracheal tube and a bronchial blocker.
Intraoperative transesophageal echocardiography (TEE) confirmed the previous findings, also showing that the mitral valve leaflets were free of significant disease and that the mitral regurgitation originated in the A2–P2 portion of the mitral valve (Fig.1).
The mitral regurgitation was thought to be functional, caused by mitral annular dilation and tethering of the papillary muscles by the severely dilated LV.
We decided to perform edge-to-edge repair of the mitral valve from a transaortic approach.
A femoral platform was used to establish cardiopulmonary bypass.
A 2- to 3-cm incision was made in the left inguinal crease.
A 5–0 Prolene purse-string suture (Ethicon Inc., a Johnson & Johnson company; Somerville, NJ) was placed in the femoral artery and vein.
The left femoral artery was cannulated with a 16F–18F arterial cannula.
The left femoral vein was cannulated with a 25F Bio-Medicus® femoral venous cannula (Medtronic, Inc.; Minneapolis, Minn), which was placed in the superior vena cava with the aid of TEE.
We then made a 4- to 5-cm transverse parasternal incision over the 3rd intercostal space and transected the 4th costochondral cartilage to enable adequate exposure of the aorta.
This interspace was chosen in the event that the left atrium needed to be entered.
The pericardium was opened above the phrenic nerve and over the aorta to facilitate exposure.
A retrograde coronary sinus catheter was inserted directly through the incision, and a purse-string suture was placed in the right atrium.
A LV vent was inserted via a purse-string suture in the right superior pulmonary vein.
A transverse aortotomy was performed to expose the aortic valve, which was removed under direct vision.
The A2 and P2 segments of the mitral valve were identified, and an edge-to-edge repair was carried out with a 5–0 Prolene mattress suture that was reinforced with pericardial pledgets on the ventricular side of the mitral valve (Fig.2).
Next, a 27-mm Hancock® II bioprosthetic aortic valve (Medtronic) was implanted by use of standard techniques.
The aortotomy was closed in 2-layer fashion, and the patient was weaned from cardiopulmonary bypass.
The transected rib was reattached to the sternum with a 1-cm metal plate (Synthes, Inc.; West Chester, Pa), and a fiber wire was placed in figure-8 fashion.
A single chest tube was left in the pleural space.
The thoracotomy was closed in routine fashion.
Postoperative TEE showed no mitral regurgitation (Fig.3); “elbowing” of the anterior leaflet during mid-diastole due to tethering of the anterior leaflet to the posterior leaflet (Fig.4); and the double-orifice mitral valve that resulted from the edge-to-edge repair (Fig.5).
After surgery, the patient did well.
His shortness of breath resolved, and he was discharged from the hospital on postoperative day 6.
Upon follow-up evaluation in March 2011, he was asymptomatic, and echocardiography showed grade 1+ mitral regurgitation.