Severe Mitral Stenosis after Duran Ring Implantation for Myxomatous Mitral Regurgitation

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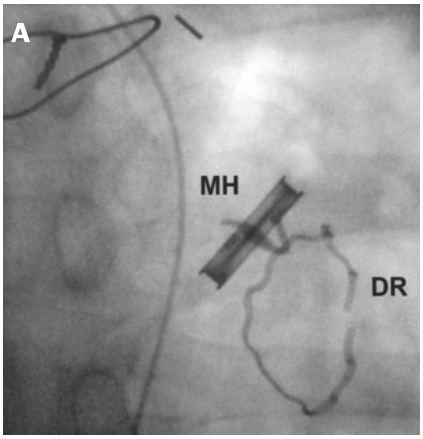
Mitral valve reconstructive (repair) surgery is commonly performed in western countries for mitral regurgitation, caused mainly by degenerative and ischemic disorders [1]. Since the first description of the surgical technique by Carpentier in 1971 [2], recurrent MR is the most common cause of mitral valve repair failure. However, the appearance of significant mitral stenosis following mitral valve repair for non-rheumatic MR is rare. We present a patient with severe symptomatic mitral stenosis 6 years after combined Bental operation and mitral valve repair with Duran ring due to myxomatous MR.

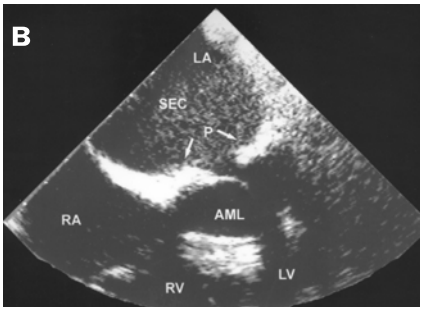
Patient Description

A 66 year old man with signs and symptoms of severe mitral stenosis after heart surgery was referred to us for clinical evaluation prior to a planned percutaneous balloon mitral commissurotomy. Six years earlier the patient underwent surgery due to severe aortic regurgitation secondary to aneurysmal dilatation of the ascending aorta with an associated severe non-rheumatic MR. He underwent replacement of the ascending aorta with a composite mechanical valve (Medtronic-Hall 25 mm), coronary re-implantation and mitral valve repair with a 31 mm Duran ring (Medtronic, Minneapolis, USA). On follow-up the patient was treated with warfarin and angiotensin-converting enzyme inhibitors.

Three years after surgery the patient developed effort-related dyspnea. Transthoracic echocardiography revealed a mitral valve area of 1.4 cm^2 with a mean transvalvular diastolic gradient of 9 mmHg. Two years later he was hospitalized due to rapid atrial fibrillation, hemoptysis and shortness of breath. On admission the patient had a body temperature of 37°C, blood pressure 130/80 mmHg, respiratory rate 20/minute and an irregular heart rate of 130 beats/min. His cervical veins were engorged, and bilateral pulmonary rales were noted on lung auscultation. Cardiac examination revealed right ventricular uplift, irregular heart sounds, accentuated first heart sound, loud opening snap followed by a 3/6 long apical diastolic murmur, increased pulmonary component of the second heart sound, and crispy closing and opening clicks of the aortic mechanical prosthesis. INR level on admission was 2.9. The patient was successfully cardioverted with intravenous verapamil and oral disopyramide. As shown in Figure A, cardiac fluoroscopy revealed normal function of the mechanical mono-leaflet aortic prosthesis, and a full circumferential 31 mm Duran ring in the mitral position. Transesophageal echocardiography [Figure B] revealed enlarged left atrium with spontaneous echo contrast and normal left ventricular diameters with preserved systolic function. Dense bright shadows surrounding the mitral annulus, caused by significant tissue overgrowth and leading to a restricted diastolic movement of the anterior mitral leaflet, were noted. Planimetric MVA was 0.8 cm^2, and Doppler flow measurements across the mitral and aortic valves revealed a mean diastolic and systolic gradient of 22 and 25 mmHg, respectively. Calculated pulmonary artery pressure was 70 mmHg. We recommended mitral valve replacement. Unfortunately, while waiting for surgery the patient died from lobar pneumonia complicated by acute respiratory and renal failure. There was no evidence of aortic valve mechanical dysfunction, and valvular vegetations were not detected by echocardiography during this last infectious episode.



[A] Cardiac fluoroscopy (right anterior oblique view) showing Medtronic-Hall (MH) monoleaflet mechanical valve in aortic position and 31 mm Duran ring (DR) in mitral position.



[B] Transesophageal echocardiography showing very large left atrium (LA) with spontaneous echo-contrast (SEC), and significant tissue overgrowth (P = pannus) surrounding the Duran ring and causing a restricted diastolic motion of the anterior mitral leaflet (AML).

Comment

Reappearance of valvular regurgitation is the most frequent cause of repair failure for non-rheumatic MR [2]. Additional compli-

MR = mitral regurgitation

MVA = mitral valve area

cations after mitral ring implantation include endocarditis, thromboembolism, postoperative appearance of intraventricular systolic gradient, as well as mechanical hemolysis [1].

Although the occurrence of mitral stenosis after mitral valve repair due to rheumatic etiology is relatively common, only two reports of late stenosis after mitral valve repair for non-rheumatic MR have been published. Ibrahim and David [3] described 9 years of experience with mitral valve repair surgery using various approaches. Only 4 of 518 patients (0.8%, 2 with myxomatous disease and 2 with ischemic etiology, with ring diameters of 25–31 mm) developed significant mitral stenosis due to tissue overgrowth. On operation the pannus could not be stripped-off without damaging the leaflets and valve replacement was necessary. On histology, the atrial aspect of the mitral leaflets was thickened, with evidence of chronic inflammation originating from the annuloplasty ring. An additional case report comes from Japan. Tanaka et al. [4] reported a case of fibrous tissue overgrowth 3 years after mitral valve repair using annuloplasty ring in a 53 year old woman. At surgery, whitish fibrous tissue had overgrown from the ring on the atrial side of the annulus and had severely reduced the valvular area, although the leaflet motion was not restricted [4]. Of interest is the fact that our patient, as well as those in the series of Ibrahim and David, all had a Duran ring implanted as an integral part of the mitral valve repair. To our knowledge, this complication has never been reported with either the Carpentier or posterior band rings. Similar to the pannus appearance after valve replacement, it seems that the mechanism in this case is a foreign body-type reaction [5].

As this unusual case report demonstrates, late mitral stenosis after mitral valve repair may occur even with large diameter Duran rings and is probably caused by tissue overgrowth. Valve replacement should be done as early as possible.

References

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