

Mitral valve repair with neo-chordae

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Clinical vignette

A 56-year-old male patient presented with an isolated posterior mitral leaflet (PML) prolapse due to degenerative mitral valve (MV) disease. The preoperative transthoracic echocardiography showed severe mitral regurgitation (MR) due to a flail P2 segment. Echocardiographic examination revealed a normal left ventricular ejection fraction of 67%, the mitral annulus with a diameter of 39 mm and normal right ventricle contractility with a tricuspid annular plane systolic excursion (TAPSE) of 38 mm. The vena contracta was measured to be 0.8 cm and the effective regurgitant orifice area (EROA) was 0.7 cm². The left atrium was slightly enlarged at 23 cm². The patient was in New York Heart Association functional class II. His medical history was otherwise unremarkable.

Surgical techniques

Mitral valve repair (MVR) is the standard therapy for MV regurgitation. Neo-chordal repair with ePTFE sutures (polytetrafluoroethylene; W.L. Gore & Assoc, Inc., Flagstaff, USA) has been demonstrated to have excellent long-term outcomes (1,2). Pre-measured GORE-TEX® loops were a new modification introduced in 2000 for both minimally invasive and conventional MV surgery (3). The so-called “loop technique” enables a precise reconstruction of the MV coaptation by aligning the prolapsing leaflet at the exact height. This technique has previously been described in detail elsewhere (3). In brief, the use of the techniques makes it inevitable that the perfect length of the artificial chordae will be selected. Therefore a custom-made caliper (Geister Inc., Tuttlingen, Germany) is used to measure the exact distance between the papillary muscle and an adjacent non-prolapsing portion of the free edge of

the leaflet.

The loops are then selected as determined by the caliper. The needles of the GORE-TEX® sutures originating from the pledget are passed through the respective papillary muscle in such a way that the loops arise towards the prolapsing segment, are then passed through a second pledget and tied down. Next, the four individual ePTFE sutures are used to fix each loop to the free edge of the prolapsing segment, with the knots placed on the atrial surface of the leaflet. Depending on the area of the prolapse, the distance between each single suture may vary from 2 to 8 mm. It is however not recommended to exceed 8 mm of space. In average the length of loops for the PML are 14 mm, for the AML 22 mm in length.

When using the minimally invasive technique, cardiopulmonary bypass (CPB) is instituted via the femoral vessels. A right anterolateral mini-thoracotomy is performed approximately 5 to 7 cm in length. Additional small (5 to 10 mm) ports are used for video assistance, left atrial retractor, and the transthoracic aortic clamp.

Comments

Early assessment of the loop technique to correct MV prolapse indicates excellent short-term outcomes: in 623 patients the discharge echocardiography showed no residual MR in 75%, trace or mild MR in 21% and mild-to-moderate MR in only 4% of patients (4). Additionally we analyzed over a time period of 11 years a total of 3,438 patients who underwent minimally invasive MV surgery, of which 2,829 had MV repair. The 5- and 10-year survival of patients with a repair undergoing minimally invasive MV surgery was 85.7%±0.6% and 71.5%±1.2%, respectively. Freedom from reoperation was 96.6%±0.4%

and 92.9%±0.9% at 5 and 10 years, respectively (5).

Aside from the long-term clinical outcome, two basic principles must be allied to achieve a successful intraoperative result: (I) the assessment and selection of the optimal length; and (II) the precise fixation of neo-chordae to the papillary muscles and the free edge of the mitral leaflets.

Conclusions

The use of neo-chordae (loop technique) facilitates MVR with encouraging mid and long-term outcomes. The technique is highly standardized, easy to learn and thus easily applicable in daily practice.

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