Spiral Suspension Technique
Under Beating Heart Through
Mini-thoracotomy for Severe Functional Tricuspid Regurgitation in Patient With Previous Open-heart Surgery

Objective: Tricuspid valve repair after previous open-heart surgery is challenging because of adhesion of dilated right atrium and ventricle to the sternum, postoperative right ventricular (RV) failure due to inadequate myocardial protection, difficulty of evaluating valve repair by water test, and residual or recurrent tricuspid regurgitation (TR) by ring annuloplasty alone. Pathophysiology of functional TR has three components: annular dilatation, RV dilatation, and leaflet tethering. Spiral suspension technique under beating heart through mini-thoracotomy has a potential to resolve these problems simultaneously. The object of this video is to evaluate our technique for severe functional TR in patient with previous open-heart surgery (OHS).

Case Video Summary: 81-year-old female who underwent AVR and mitral valve repair followed by valve-in-valve TAVR had severe TR. On transesophageal echocardiogram (TEE), severe TR with vena contracta of 2.3x0.7cm was seen. Patient was referred for catheter-based tricuspid valve repair, however, she was evaluated not to be favorable because of very large tricuspid valve coaptation gap, 14mm. Cardiopulmonary bypass was established with femoral artery perfusion and bicaval drainage. Right mini-thoracotomy through 3rd intercostal space was performed. After placing annuloplasty sutures to expose tricuspid leaflet and subvalvular apparatus, pledgeted polytetrafluoroethylene (PTFE) suture was placed at the base of anterior papillary muscle (PM), accessory inferior PM, and inferior PM continuously in a clockwise fashion. PTFE suture was tied to approximate papillary muscles to reduce RV dilatation. Suture arms were passed through the septal annulus and tricuspid band. Micro-adjustment of the suture length was performed under beating heart to obtain appropriate leaflet coaptation. Sutures were tied with automated suture fastening device. Postoperative TEE showed good coaptaion of tricuspid valve without regurgitation.

Conclusions: Spiral suspension technique provides reproducible tricuspid valve repair for severe functional TR by repairing annular dilatation, RV dilatation, and leaflet tethering simultaneously. Under beating heart, postoperative RV failure was prevented, and micro-adjustment of the suture length for appropriate leaflet coaptation was obtained. Mini-thoracotomy approach provides an excellent exposure for tricuspid valve repair and minimizes the risk of injury and bleeding for patient who had previous OHS.

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