Chapter 10

CURRENT TREATMENT AND UPDATES İN TRICUSPİD VALVE SURGERY

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Introduction

Surgical treatment of tricuspid valve diseases has been gradually described over time, as the tricuspid valve has a more complex anatomy than aortic and mitral valves and as primary diseases of the tricuspid valve are rare. Tricuspid valve diseases may occur secondary to acquired diseases or left heart pathologies. Although tricuspid regurgitation (TR) accounts for up to 80% of all cardiac valve diseases (1) with a high mortality rate (2), surgical treatment of tricuspid valve diseases has not been paid a particular attention until recent years. In parallel with the technological developments and with the introduction of suture annuloplasty, ring annuloplasty which yields more successful outcomes (3), and percutaneous techniques (4), high-risk TR patients who have a previous history of a cardiac surgery can be safely treated currently.

Anatomy

The tricuspid valve, which forms the boundary between the right ventricle and right atrium, is attached to the papillary muscles through triangular chordae. It is comprised of three valve leaflets, namely anterior, posterior, and septal leaflets. The anterior leaflet is the largest structure, while the posterior leaflet is the smallest. Anterior papillary muscle is the largest papillary muscle. The tricuspid valve is adjacent to the triangle of Koch demarcated by the tendon of Todaro, septal leaflet of the tricuspid valve, and the orifice of the coronary sinus occupied by the atrioventricular (AV) node. The normal tricuspid orifice in an adult approximates a diameter of 20 mm/m^2 and an area of 5.8 cm^2/m^2 (5).

Etiopathogenesis

Right ventricular dilatation presenting with secondary tricuspid annular dilatation is the most common reason for TR (6). According to the leaflet movements, conditions leading to annular dilatation secondary to left heart pathologies, ischemic heart diseases or pulmonary hypotension in the presence of normal leaflet movements; myxomatous degeneration in the presence of increased leaflet

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interventions can be performed without requiring an open surgery in high-risk patients with tricuspid valve disease who underwent a previous cardiac surgery and are currently ineligible for reoperation. However, these interventions are contraindicated in patients with severe pulmonary hypertension and right ventricular dysfunction (19). Percutaneous transcatheter interventions are classified into two groups as transcatheter valves and coaptation devices (20).

Transcatheter valve (valve-in-valve) implantation is applied to patients in whom reoperation is needed due to progressive degeneration, despite previous bioprosthetic valve replacement. Although this technique was originally developed for degenerative aortic and mitral bioprosthetic valves, it was also used in a limited number of tricuspid valves. The most common valves for valve-in-valve implantation include Melody valve (Medtronic, MN, USA) and Edwards Sapien (Edwards LifeSciences, Irvine, CA, USA) (4). It was first applied in 2010 (21) and is associated with low early mortality rates, high surgical success rates, and a one-year survival rate of up to 85% irrespective of the recent intervention, all which are promising for the future (22).

The main implantation systems for the correction of coaptation defects include MitraClip (Abbott Vascular, Menlo Park, CA, USA), FORMA (Edwards LifeSciences, Irvine, CA, USA), and Trincinch system (4Tech Cardio Ltd., Galway, Ireland) (20,23).

Using the FORMA system, the regurgitant orifice is attempted to be diminished through the device which is attached to the right ventricular myocardium, by forming a surface for the leaflet coaptation. This technique is available for high-risk and elderly patients, and is associated with favorable postoperative outcomes at one year (24).

Similarly, previous studies have demonstrated that Tricinch and MitraClip implantation techniques have yielded reduced clinical complaints related to right heart failure and TR symptoms, although the sample sizes of these studies are small (25,26).

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