Virtual reality image analysis in aortic valve leaflet reconstruction

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Aortic valve reconstruction with three same-sized autologous pericardial leaflets has been performed for patients with narrow aortic roots or contraindication for valve-prostheses. Since this procedure requires precise information of the aortic root including configuration of Valsalva sinus, we assessed physiologic-anatomical condition of the aortic root by virtual reality (VR) image in order to accomplish this technique with a reproducible fashion. For VR Imaging: enrolled patients underwent enhanced ECG-triggered cardiac CT. Axial images using a 264-row CT with slice thickness of 0.625 mm were obtained during mid-to-end diastole. Subtracted volume rendering data of the aortic root were converted to stereolithography (STL) file in Visalius3D, a novel 3D workstation. Preoperatively the aortic root was assessed in order to decide neo-commissure and offsetting of deviated nadir in cases of unbalanced aortic root, like type 0 bicuspid valve. Basic surgical technique was; 1) same-sized three pieces of leaflets from autologous pericardium were tailored to original templates referred by STJ diameter, 2) the new commissures and nadirs were confirmed based on VR image (in case the non-coronary nadir deviated toward the left ventricle, a crescent form Valsalva plication were required), 3) three leaflets were sutured on the cusp-sutureline, 4) commissure coaptation stitches were placed between each leaflet to prevent from minor leakage and coronary orifices obstruction. Postoperative echocardiography revealed nicely opening of new-leaflet with no AR. VR image analysis had notably provides valuable information for understanding of precise anatomy of the aortic root.

Biography

Takeo Tedoriya has completed his PhD from Kanazawa University (Japan) and trained in cardiac surgery at German Heart Institute Berlin to get German board of cardiac surgery. He moved to St.Vincent Hospital Sydney as a temporary Consultant for heart-lung transplantation unit, after working at Kanazawa University Medical Center. He had been the Professor and Director of Showa University for 10 years; Director of Ageo Central General Hospital, Cardiovascular Center. He has published more than 45 papers in reputed journals and has been serving as a Reviewer for several journals.

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