Quantiative 3D analysis of aortic valve apparatus for pathological classification of aortic regurgitation

Poster Contributions
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Authors: Kentaro Shibayama, Hiroyuki Watanabe, Shunsuke Sasaki, Keitaro Mahara, Minoru Tabata, Toshihiro Fukui, Jun Umemura, Shuichiro Takanashi, Tetsuya Sumiyoshi, Takahiro Shiota, Cedars-Sinai Medical Center, Los Angeles, CA, USA

Backgrounds: Three-dimensional (3D) anatomical features of the aortic valve apparatus (AVAp) in isolated AR have not been evaluated adequately. This study aimed to clarify structural features of AVAp in different AR types by quantitative analysis using 3D transesophageal echocardiography (TEE).

Methods and Results: Of 182 consecutive patients who underwent surgical correction for isolated AR, 70 patients with single mechanism of AR by surgical inspection and 15 age-, gender- and BSA- matched controls were retrospectively studied. We acquired preoperative 3D TEE datasets including the AVAp, and analyzed the data quantitatively using a novel feature-tracking program. Compared with control, coaptation height (CH) was increased in Type I (9.5±1.6 mm, P<0.001) and decreased in Type II (3.1±1.1 mm, P=0.02). In Type I, aortic root area was dilated, particularly in sinotubular junction (17.6±6.6 cm², P<0.001). In Type III, leaflet lengths were decreased (left-coronary leaflet: 9.1±1.6 mm, P=0.002; non-coronary leaflet: 10.3±1.9 mm; P = 0.01, right-coronary leaflet: 10.9±1.4 mm, P=0.006). With receiver-operating characteristic models, CH by 3D TEE was proven to be the highest discriminatory index for identification of Type I AR among various two-dimensional and 3D TEE parameters. (Figure)

Conclusions: Quantitative analysis of 3D TEE data successfully demonstrates structural features of the AVAp in various AR functional types, and may be a new objective tool for identifying AR mechanisms.