The efficacy of real-time three-dimensional transoesophageal echocardiography in detecting unicuspid aortic valve

Tomoko Nakao1, Hiroyuki Watanabe2, Norihiko Takeda1*, Shuichiro Takanashi3, and Ryozo Nagai1

1Department of Cardiovascular Medicine, Graduate School of Medicine, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8655, Japan; 2Department of Cardiovascular Medicine, Sakakibara Heart Institute, Tokyo, Japan; and 3Department of Cardiovascular Surgery, Sakakibara Heart Institute, Tokyo, Japan

* Corresponding author. Tel: +81 3 3815 5411; Fax: +81 3 3818 6673, Email: ntakeda-tky@umin.ac.jp

A 28-year-old man was admitted for heart failure secondary to severe aortic regurgitation. The initial two-dimensional transthoracic and transoesophageal echocardiography showed only two aortic valve commissures, one of which had severe calcification (Panel A). Real-time three-dimensional transoesophageal echocardiography, however, subsequently demonstrated that there was in fact only one commissure (asterisk) at the level of the sinotubular junction between the sinus of Valsalva and the ascending aorta (dotted line). The other calcified commissure, on the other hand, was located beneath the sinotubular junction, suggesting that it was actually a pseudo-commissure (arrow in Panel B; Supplementary data online, Movie S1). Aortic valve replacement was performed, at which time the diagnosis of a unicuspid valve was confirmed (Panels C and D).

Unicuspid aortic valves are rare congenital malformations that have been observed in ~0.02% of adult patients who have undergone echocardiography. There are no established diagnostic criteria for this disease, and ~25% of patients cannot be accurately diagnosed even with two-dimensional transoesophageal echocardiography. Furthermore, the accurate diagnosis of the unicuspid valve can sometimes be hampered by the presence of calcification, as shown in this case. This case also demonstrates that the number of commissures at the level of the sinotubular junction is critically important in distinguishing unicuspid and bicuspid aortic valves, and that real-time three-dimensional transoesophageal echocardiography can be a very useful diagnostic modality for detecting unicuspid aortic valves since it can define with high resolution the relationship of the commissures to the sinotubular junction. Therefore, patients with congenital aortic valve disease may benefit from investigations with real-time three-dimensional transoesophageal echocardiography.

Supplementary data are available at European Heart Journal – Cardiovascular Imaging online.