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B Unsworth, I Malik and G W Mikhail

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Recognising bicuspid aortic stenosis in patients referred for transcatheter aortic valve implantation: routine screening with three-dimensional transoesophageal echocardiography

Severe aortic valve stenosis was discovered incidentally during preoperative workup for hernia repair in a 78-year-old man. He was deemed high risk for conventional surgical aortic valve replacement because of poor lung function and was consequently assessed for transcatheter aortic valve implantation (TAVI).

An initial transthoracic echocardiogram was performed to confirm the leaflet insertion diameter. Although heavily calcified, the aortic annular region was clearly visualised and a leaflet insertion diameter of 24 mm was recorded (panel A), which is within acceptable limits for the Edwards valve. The patient also underwent routine transoesophageal echocardiography (TOE) with live three-dimensional reconstruction. TOE demonstrated significant calcification of the aortic valve, which appeared tri-leaflet although functionally bicuspid with calcific fusion between the right and non-coronary cusps. In addition, two-dimensional TOE clearly identified the location of both left main and right coronary ostia in relation to the calcium distribution (panel A). However, after live three-dimensional reconstruction, an ‘en-face’ 140° mid-oesophageal view clearly demonstrated that the valve was congenitally bicuspid (panel B). Bicuspid aortic valves are a contraindication for TAVI, and the patient was removed from the programme.

DISCUSSION
In this case, two-dimensional TOE failed to recognise the presence of a significant congenital valve pathology, which contraindicates percutaneous valve treatment. Bicuspid aortic valves are the commonest cardiac congenital abnormality occurring in approximately 0.8–2% of the population. This case highlights the benefit of routine three-dimensional TOE in the preprocedural assessment of potential recipients of TAVI.

B Unsworth, I Malik, G W Mikhail
Correspondence to Beth Unsworth; bunsworth77@hotmail.com
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Ethics approval The case discusses findings following a routine transoesophageal echocardiography performed at the echocardiography department of St Mary’s Hospital. Requested via outpatient ref system for transcatheter aortic valve implantation assessment.
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Panel A  (A) Short-axis images of a congenitally bicuspid aortic valve taken from transthoracic echocardiography (TTE) (left), (B) TOE (middle) and (C) real-time three-dimensional TOE. The two-dimensional TTE image shows a highly disorganised collection of calcium; although clearly heavily stenosed and restricted, it is impossible from this image to ascertain the valve’s true morphology. The two-dimensional TOE demonstrates that the valve appears functionally bicuspid. The three-dimensional TOE image confirms that the valve is congenitally bicuspid.

Panel B  A real-time three-dimensional TOE image clearly demonstrates a congenital raphe (arrow) revealing that the valve is bicuspid.