Images in Cardiovascular CT

Tissue characterization of a papillary fibroelastoma on the aortic valve by contrast-enhanced 320-detector row computed tomography

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Abstract. A 56-year-old woman with a mass on the aortic valve as seen on echocardiogram underwent pre-operative contrast-enhanced cardiac computed tomography prior to removal. The mass was confirmed to be a papillary fibroelastoma histologically. Spatial co-registration between the contrast-enhanced CT cross-sectional images of the mass and the Movat’s pentachrome staining revealed an association of elastic fibers with higher levels of attenuation and collagen fibers with lower levels of attenuation on CT.

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A 56-year-old woman presented with palpitations, and an incidental mass was found on transthoracic echocardiogram. Transeophageal echocardiogram (Fig. 1) showed a mobile, 4 × 6-mm aortic valve mass. For preoperative planning, contrast-enhanced 320-detector row computed tomographic (CT; AquilionONE, Toshiba America Medical Systems Inc, Tustin, CA) examination with dose modulation (Fig. 2) localized the mass between the noncoronary and left coronary cusps (Fig. 3). Surgical pathology confirmed the mass as a papillary fibroelastoma, including a collagenous base with elastic fibers at the distal tip (hematoxylin & eosin stain). Movat’s pentachrome staining shows the difference between the darker staining elastin and the...

Figure 1  Transesophageal echocardiogram shows a mobile mass attached to the aortic valve in the parasternal long (A) and short-axis (B) views.

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lighter collagen (Fig. 4A). These regions correlated with CT attenuation values, including elastin-rich regions (green oval) showing higher attenuation values (338 ± 8 HU) than the collagen-rich regions (yellow oval; 199 ± 25 HU; Fig. 4C).

Primary cardiac tumors present with embolization, obstruction, arrhythmias, or incidentally.¹ Common benign tumors are myxomas, lipomas, and papillary fibroelastomas.²,³ In a review of 725 cases, cardiac papillary fibroelastomas, 2–70 mm in size, accounted for >75% of tumors.

Figure 2  Contrast-enhanced 320-multidetector computed tomography confirms the presence of a mass located between the noncoronary and left cusps as seen in the cross-section of the aortic valve (A), the left ventricular outflow tract (B), and the 3-chamber view (C).

Figure 3  Three-dimensional reconstruction of the fibroelastoma located on the noncoronary leaflet of the aortic valve (A). Magnification of the mass (B) with overlay of Hounsfield units (C) on a cross-sectional view.
Gross pathology characteristically shows a short pedicle with multiple flower-like papillary fronds. Histologically, an outer layer of endocardial cells surrounds a matrix of proteoglycans, collagen, and elastic fibers. This case highlights the potential for CT-based tissue characterization of the different tissue components within the mass.

**References**