Three-dimensional visualization of severe pericardial calcification in constrictive pericarditis using multidetector-row computed tomography

Johannes von Erffa*, Werner G. Daniel, and Stephan Achenbach
Department of Internal Medicine II, University of Erlangen-Nuremberg, Ulmenweg 18, 91054 Erlangen, Germany
*Corresponding author. E-mail address: johannes.v.erffa@med2.med.uni-erlangen.de

A 73-year-old male patient was admitted due to progressive dyspnoea on exertion during the last 6 months. Chest pain or syncope was not reported.

On admission, blood pressure was 100/60 mmHg. Heart sounds were low without pericardial friction rub. Pulmonary rales were absent, but there were pronounced pre-tibial oedema. The patient had jugular venous distention. The ECG showed low voltage and atrial fibrillation with a heart rate of about 130 b.p.m. Bicycle stress ECG showed reduced exercise tolerance (terminated at the change from 50 to 75 W due to dyspnoea). Echocardiography showed preserved left ventricular function (ejection fraction 65%), both atria were dilated in the longitudinal axis and echogenic pericardial structures were seen. Transmitral flow pattern showed exaggerated respiratory variation in inflow velocities (>25%), indicating constriction (Panel A).

Chest radiograph showed no signs of pulmonary oedema but pericardial calcifications. Because of suspected constrictive pericarditis, multislice computed tomography (CT) of the heart was performed (16 × 0.75 mm collimation, 370 ms rotation, 6 mm table feed, 120 kV, 150 mA). Transaxial images as well as three-dimensional reconstructions were rendered. Extensive pericardial calcifications were documented (Panels B, C, and D; movie: see Supplementary material available at European Heart Journal online) leading to the diagnosis of calcified constrictive pericarditis.

The use of CT images for visualization of pericardial calcium in constrictive pericarditis has been previously reported. However, it had so far been limited to two-dimensional imaging.

Sixteen-slice CT permits acquisition of a cardiac high-resolution data set in ~10 s with a temporal resolution of 185 ms. It thus provides for detailed, high resolution three-dimensional visualization of pericardial calcifications that may facilitate surgical therapy.

Panel A. Echocardiographic transmitral flow pattern with exaggerated respiratory variation in inflow velocities (>25%).

Panel B. Transaxial CT image (slice thickness 3.0 mm) of the heart at mid-ventricular level, demonstrating severe calcification of the pericardium (arrows). In addition, bilateral pleural effusion is seen, AO, descending aorta; PE, pleural effusion.

Panel C. Three-dimensional volume rendering technique reconstruction of the whole chest. Nearly circumferential pericardial calcification is seen (structures of high CT density, such as bone and calcification, are rendered in white colour).

Panel D. Three-dimensional volume rendering technique reconstruction of the heart. To exclude the non-calcified part of the heart, a threshold of 130 Hounsfield units (common threshold for coronary calcification in CT imaging) was chosen.