Vascular steal from right ventricular metastasis of renal tumor: Insight from single source dual energy cardiac CT

C. Hauville\textsuperscript{a}, B. Dubourg\textsuperscript{b,c}, J. Caudron\textsuperscript{b,c}, C. Lemarignier\textsuperscript{b,d}, F. Doguet\textsuperscript{c,e}, H. Eltchaninoff\textsuperscript{a,c}, J.-N. Dacher\textsuperscript{b,e,c}

\textsuperscript{a} Department of Cardiology, Rouen University Hospital, 1, rue de Germont, 76031 Rouen cedex, France
\textsuperscript{b} Cardiac Imaging Unit, Department of Radiology, Rouen University Hospital, 1, rue de Germont, 76031 Rouen cedex, France
\textsuperscript{c} Inserm Unit 1096, 22, boulevard Gambetta, 76183 Rouen cedex 1, France
\textsuperscript{d} Department of Nuclear Medicine, centre de recherche et de lutte contre le cancer Henri-Becquerel, rue d’Amiens, 76000 Rouen, France
\textsuperscript{e} Department of Cardiac Surgery, Rouen University Hospital, 1, rue de Germont, 76031 Rouen cedex, France

This 60-year-old female complained of chest pain in walking. Ten years before, she had had a left nephrectomy for renal clear cell carcinoma. As rest-ECG showed diffuse negative T-waves, coronary angiography was performed. It showed no coronary artery stenosis, but a rounded vascular mass arising from distal LAD (Fig. 1a, b). Prospectively, gated cardiac CT (CTDI\textsubscript{vol} 16.8 mGy; DLP 235 mGy-cm; 3.5 mSv) using a single-source (kVp-switching) dual-energy (SSDCT) technique was performed (GSI\textsuperscript{R}, General Electric, Waukesha, WI, USA). It showed a 28 $\times$ 28 mm high-attenuation mass of the right ventricular free wall (Fig. 1c). First-pass perfusion map showed decreased iodine uptake of LV apical-inferior segment (Fig. 1d). Quantification drawn from 70 keV monochromatic calculated images [1] confirmed decreased iodine content of this segment compared to septum (Fig. 1e), suggesting vascular steal from the tumor in the absence of coronary stenosis or other cause. The patient was successfully operated on under extra corporeal circulation. Histology confirmed metastasis of renal clear cell carcinoma. A 10-month follow-up was uneventful.

In this case, CT was primarily performed as a pre-operative imaging work-up. As renal cancer metastasis was probable, and enhancement is a key feature in renal tumors [2], we opted for SSDCT in order to decrease beam-hardening artifacts and approach the iodine...
content in the hypothesis of anti-angiogenic treatment. Within the tumor, the mean Hounsfield number at 70 keV was $221.5 \pm 43.4$ (Fig. 1f), corresponding to 7–8 mg/mL iodine, the threshold for enhancing tumors being set at 0.5 mg/mL [3].

Cardiac SSDECT could also unexpectedly demonstrate the inferior apical segment [4] rest ischemia, the consequence of LAD steal from the tumor.

This case illustrates the diagnostic potential of dual energy CT in cardiac tumors. The avidity of tumor for iodine could be helpful for diagnosis, as well as for treatment efficacy in medically treated patients.

Disclosure of interest

J.N. Dacher is a consultant for the General Electric Company. The authors (C. Hauville, B. Dubourg, J. Caudron, C. Lemarignier, F. Doguet, H. Eltchaninoff) declare that they have no conflicts of interest concerning this article.

References


