Hepatocellular Carcinoma Recurrence in a Patient with Impaired Renal Function

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History

A 97-year-old male patient suffering from hepatocellular carcinoma (HCC) underwent multiple sessions of transcatheter arterial chemoembolization (TACE) within the past seven years. He was referred for an assessment of an HCC recurrence due to an elevated alphafetoprotein (AFP) serum level. Regularly, it would require 600 mgI/kg for the diagnosis of HCC in our institution. Taking into consideration his impaired kidney function (eGFR 32 mL/min/1.73 m^2), only 300 mgI/kg was administered. A TwinBeam Dual Energy (TBDE) CT was performed.

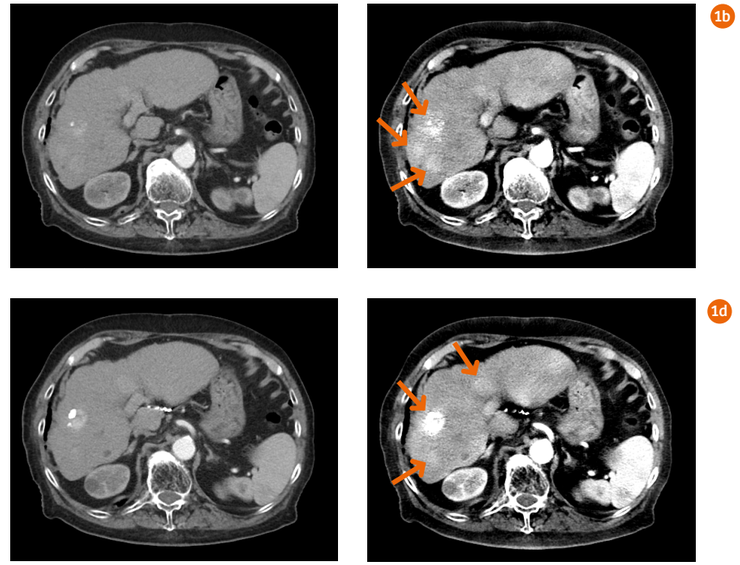
Diagnosis

TBDE CT images revealed multiple hypervascular lesions in both liver lobes. The lesions were significantly enhanced and better seen in the images displayed at 45 keV using DE Monoenergetic Plus than in the mixed images acquired at AuSn 120 kV (Fig. 1). The characteristics of the lesions suggested an HCC recurrence. In the subsequent angiography, all lesions were confirmed and another session of TACE treatment was accordingly scheduled.

Examination Protocol

Scanner	**SOMATOM Definition Edge**
Scan area	Abdomen
Scan mode	TwinBeam Dual Energy
Scan length	274 mm
Scan direction	Cranio-caudal
Scan time	7.64 s
Tube voltage	AuSn 120 kV
Effective mAs	559 mAs
Dose modulation	CARE Dose4D™
CTDI$_{vol}$	11.97 mGy
DLP	350.3 mGy cm
Rotation time	0.33 s
Pitch	0.3
Slice collimation	64 × 0.6 mm
Slice width	1.5 mm
Reconstruction increment	1.0 mm
Reconstruction kernel	Q30f (SAFIRE 2)
Contrast	300 mg/mL
Volume	50 mL
Flow rate	2 mL/s
Start delay	30 s

1 Axial images (5 mm) show multiple hypervascular lesions (arrows) in both liver lobes. The lesions are significantly enhanced and better seen in the images displayed at 45 keV (Figs. 1b and 1d) using DE Monoenergetic Plus than in the mixed images acquired at AuSn 120 kV (Figs. 1a and 1c). All images are displayed at window width of 350 and window center of 35.



Comments

HCC is one of the most common hypervascular lesions found in the liver. CT assessment of an HCC recurrence requires a higher contrast-to-noise ratio (CNR) and therefore an adequate amount of contrast medium administration to obtain the necessary tissue enhancement for differential diagnosis. However, the reduction of contrast medium, for patients with impaired renal function, must also be considered to avoid potential contrast-induced nephrotoxicity (CIN). To help manage such a conflict, advanced CT techniques have been developed, such as TBDE and *syngo*.CT DE Monoenergetic Plus. TBDE CT enables simultaneous image acquisition at two different energy levels. Images acquired can be displayed at energy levels between 40 and 190 keV using DE Monogetic Plus. Image contrast can be significantly enhanced at lower energy levels and presented graphically. In this case, although only 300 mgI/kg was administrated, the achieved lesion-to-background contrast was almost quadrupled (Fig. 2). This helps the physicians to reach a confident diagnosis and plan an adequate treatment strategy. ●

2 Graphical presentation shows CT attenuation in accordance with energy (keV) levels. Comparing 40 keV with 70 keV (equivalent to 120 kV acquisition), the CT value of the aorta has more than doubled and the lesion-to-background (normal liver tissue) contrast has almost quadrupled.