Recurrent Hepatocellular Carcinoma after TACE in a Patient with Renal Function Insufficiency

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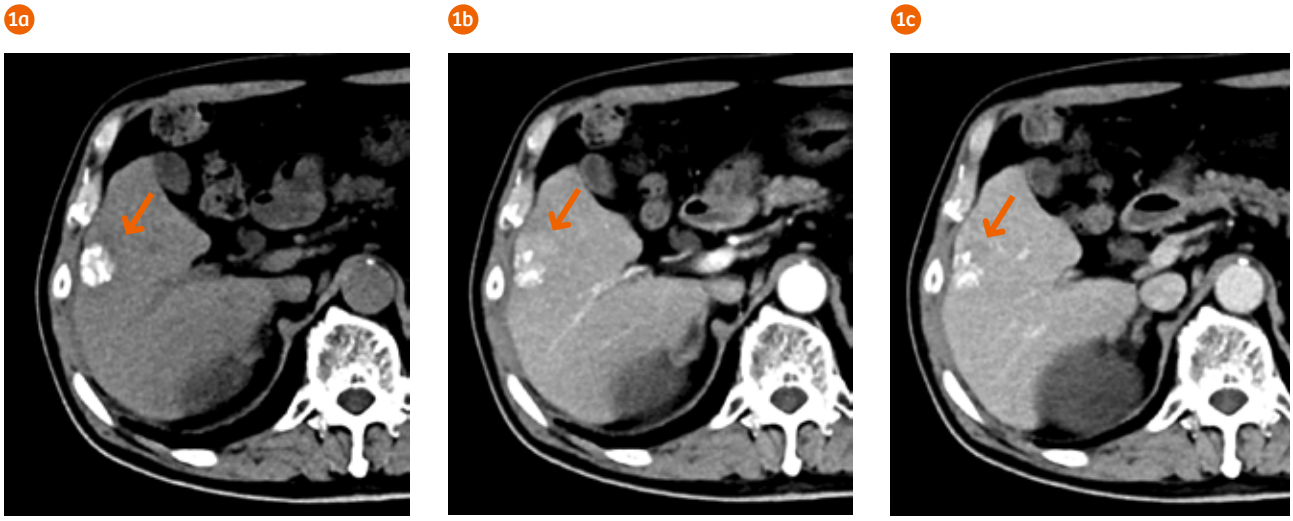

1 Axial images in noncontrast (Fig. 1a), arterial (Fig. 1b) and portal venous (Fig. 1c) phases show a low attenuation, irregular-shaped lesion (Fig. 1a, arrow) adjacent to the previous TACE site in S5 of the liver, with early enhancement (Fig. 1b, arrow) and washout (Fig. 1c, arrow). The image in the portal venous phase (Fig. 1c) shows significant contrast enhancement of the liver parenchyma and indistinct image noise.

History

An 80-year-old male patient, suffering from liver cirrhosis and chronic hepatitis B, was diagnosed with hepatocellular carcinoma (HCC) and underwent transarterial chemoembolization (TACE) in 2010. Due to his chronic renal damage (the estimated glomerular filtration rate was 28–35 mL/min/1.73 m^2), noncontrast CT or MRI had been performed for post-TACE follow-ups. In the last CT examination, a low attenuation lesion adjacent to the previous TACE site was visualized, raising the suspicion of a HCC recurrence. Considering his renal function insufficiency, a contrast-enhanced CT (CECT) scan was performed using a contrast agent with lower concentration (180 mgI/mL) and 70 kV setting. MRI was not performed due to anticipated patient's intolerability of the examination time.

Diagnosis

Noncontrast CT images showed a hypodense, irregular-shaped lesion, measuring 20 × 13 mm in size, arising from the adjacent previous TACE site in segment 5 (S5) of the liver (Fig. 1a). The lesion showed an early enhancement in the arterial phase (Fig. 1b) and washout in the venous phase (Fig. 1c), which characterized a HCC recurrence. The digital subtraction angiography (DSA) from celiac artery showed the

tumor stain (Fig. 2), which confirmed the CT findings. A TACE was performed from the artery of S5 (A5) of the liver with a suspension of epirubicin and lipiodol.

Comments

CECT is routinely performed for the visualization of liver lesions. However, in practice, it can be very challenging in patients suffering from moderate to severe chronic renal damage, as in this case, due to the concern of contrast-induced nephrotoxicity (CIN). On the one hand, reduction of concentration and volume has to be considered when applying contrast agent to these patients; on the other hand, the required lesion enhancement should be achieved for differential diagnosis. Although it is known that enhancement can be improved through lower kV settings, limitations on tube current output often prevents its application in clinical routine. In this case, a Dual Source CT dedicated scan mode called "Dual Power" was applied. This uses the power of both X-ray tubes simultaneously to provide a higher tube current needed at the 70 kV setting. Excellent lesion enhancement and image quality are achieved with an ultra-low contrast dose of 180 mgI/mL, as well as a significant radiation dose (mean $CTDI_{vol}$) reduction when compared with previous follow-up CT scans.

In our opinion, the combination of dual X-ray tube power at lower kV settings has significant potential in clinical use for patients with renal function insufficiency. It also helps the physicians to make a confident diagnosis.

Note

[1] the same scan protocol was performed for all three phases.

[2] the DSA was performed on AXIOM Artis U.

The outcomes by Siemens' customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that other customers will achieve the same results.

Examination Protocol

Scanner	SOMATOM Drive
Scan area	Abdomen
Scan mode	Dual Power spiral mode
Scan length	290 mm
Scan direction	Cranio-caudal
Scan time	12 s
Tube voltage	70/70 kV
Effective mAs	557 mAs
Dose modulation	CARE Dose4D™
$CTDI_{vol}$	6.5 mGy
DLP	188.1 mGy cm
Effective dose	2.6 mSv
Rotation time	0.5 s
Pitch	0.7
Slice collimation	32 × 0.6 mm
Slice width	1.0 mm
Reconstruction increment	0.7 mm
Reconstruction kernel	I30f ADMIRE 3
Contrast	180 mgI/mL
Volume	34 mL + 30 mL saline
Flow rate	1.1 mL/s
Start delay	Bolus triggering in the descending aorta with a threshold of 100 HU and an additional delay of 18 s

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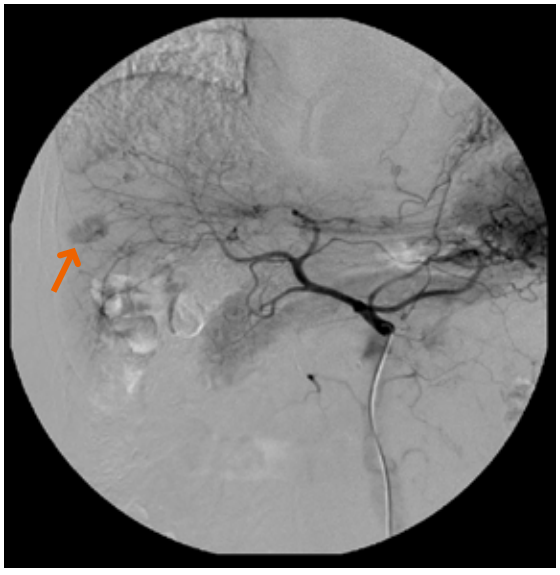

2 A DSA image from celiac artery demonstrates the tumor stain (arrow) confirming CECT findings.