Editorial

Significance of ^{99m}Tc-GSA liver scintigraphy in liver surgery and transplantation

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The preoperative evaluation of hepatic functional reserve is key to success in liver surgery, especially because liver cirrhosis and chronic hepatitis carry the potential risks of postoperative liver failure. Moreover, liver regeneration is requisite not only after hepatectomy, but also after liver transplantation, especially with small-for-size grafts.

As the conventional assessment of hepatic functional reserve, the indocyanine green (ICG) clearance test is a widely accepted procedure in liver surgery. However, this test has the disadvantage of being susceptible to effective hepatic blood flow, is linked to hepatocyte volume, infra- and extrahepatic shunts, and may cause severe jaundice (1).

Conversely, technetium-99m galactosyl human serum albumin (^{99m}Tc-GSA), which binds specifically to asialoglyco-protein receptors on the hepatocellular membrane, is apparently useful for assessing hepatic function in patients with liver dysfunction under various physiological and pathological conditions (2). ^{99m}Tc-GSA provides an important quantitative parameter of hepatic function that is totally independent of the ICG test. Liver allograft functional reserve in liver transplant recipients has been evaluated by ^{99m}Tc-GSA scintigraphy (3-6).

Conventionally, the receptor index (LHL15) is a simple indicator of whole hepatic functional reserve, and significant correlations between LHL15 and conventional liver function tests have been reported (7,8). A low value (LHL15 <0.9) is recognized as liver dysfunction generally (7). Many investigators have reported that comprehensive assessment using the LHL15 value can predict postoperative liver failure (9-13).

Other parameters and models based on ^{99m}Tc-GSA scintigraphy, which has been proposed for evaluation of liver function, include LHL15/HH15 (6), Rmax (14), uptake index values (15), index of convexity (16), the liver uptake ratio (LUR), the liver uptake density (LUD), and 3-, 5-, or 7-compartment models (17-19). However, none of these models have been widely accepted in clinical practice owing to their complexity.

The other advantage of ^{99m}Tc-GSA is that it can determine the functioning hepatocyte mass using SPECT/CT fusion images, and thus this procedure is acceptable for the evaluation of future remnant liver functional volume in liver surgery (20,21). Because the rate of future remnant functional hepatic volume can be calculated by ^{99m}Tc-GSA, the assessment of the shift in hepatic functional mass after percutaneous transhepatic portal vein embolization is easily determined (22-24).

Because simple measurement of the remnant liver or graft volume by CT volumetry is insufficient (1,22), the establishment of a more easily quantifiable measurement of actual functioning hepatocyte volume is desirable for postoperative liver regeneration. Although problems remain, ^{99m}Tc-GSA scintigraphy is a very sophisticated and reliable study in liver surgery.

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