Dualcontrast microangiography with iodine filter synchrotron radiation

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Introduction

Liver has a unique anatomy. It receives dual blood supply composed of hepatic artery and portal vein. These vessels and biliary tracts are contained in Glisson's capsule in the liver.

By conventional angiography or cholangiography, we can get only one vessel information at a time .It will be very useful in diagnosis if plural adjacent structures are demonstrated at a time

Umetani et al. developed dualcontrast microangiographic system with iodine filter using synchrotron radiation. This system should make it possible to demonstrate two different vessels at the same time using iodine and the other different contrast agent such as gadolinium or bismuth.

Methods

In vivo imaging of intravenous cholangiography with the single energy approach was performed on a Japanese white rabbit at the BL-14C. The rabbit ,weighing about 2.0kg,was anesthetized with Phenobarbital. The X-ray energy was adjusted to 33.3 keV, above the iodine K-edge energy, via the monochromator. Iodine contrast agent (Meglumine iotroxate) was injected intravenously at a dose of 100mg Iodine per kg of body weight over 2 minutes. The real-time contrast images were formed on a fluorescent screen, where 2 X 3 cm area was scanned by a high definition TV camera with an avalanche-type image pick-up tube and then stored as a digital image. A spatial resolution had been confirmed to be 30 μm.

Following intravenous cholangiography, the rabbit had laparotomy. A catheter was inserted into the common bile duct. After retrograde injection of Iopamidol (contrast agent) via the catheter, the upper abdomen of the rabbit was scanned again.

Results

Bile ducts were visualized the most obviously 5 minutes after administration of the contrast agent. The caliber of the visualized smallest bile duct was approximately 400 μm in diameter in the cholangiographic image. Peristalsis during excretion of the contrast medium from the common bile duct into duodenum was also recorded.

In direct retrograde cholangiography, we could verify very fine bile duct of only 100μm in diameter.

Discussion

We could obtain "microcholangiography" by application of microangiographic system to cholangiography. Pathophysiology of liver diseases will be understood more precisely by fine depiction of two adjacent structures using microangiography system with dual contrast agents.

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