Diagnosis of Diseases of the Bileduct in Children

Katsumi ISHII
Department of Radiology, Kitasato University, Kanagawa Japan

In order to determine the most suitable treatment involved, surgical or internal, some important diseases of the bileduct in newborns and infants must be differentiated. We think that examination by nuclear medicine shoud be performed first, because it can obtain important information and has few risks. I will mention some of these in regard to our experiences.

I) Congenital Common Bileduct Atresia (CBA) and Infantile Hepatitis; In many cases it is difficult to diagnose jaundice in infants and newborns. It is especially difficult to differentiate infantile hepatitis with clinical findings of obstructive janudice, from CBA, because these two diseases sometimes have similar clinical and examinative findings. Moreover in cases of CBA, it is necessary to operate in less than 3 months of age. Therefore these two diseases must be differentiated as soon as possible. In 1965, we differentiated these diseases by means of drawing time activity curves of the heart, liver and intestine with the renogram after intravenous injection of ^{131}I-Rose Bengal. Probability of diagnosis by this method was around 80%. Since 1967, we have performed liver and bileduct scanning 30 minutes, 3 hours, 6 hours, 24 hours, 2 days and 7 days after intravenous injection of ^{131}I-Rose Bengal. We performed this method on over 100 cases of jaundice in newborns and infants. Those cases in which the images of the kidney obtained 24 hours and 48 hours afterwards, and in which there was no excretion of RI into the intestine, we diagnosed as CBA. But there were a few cases in which scan images of the kidney in clinical infantile hepatitis were obtained, and probability of diagnosis wss 95%. The infantile hepatitis in which scan images of kidney were observed were strongly obstructive, these become well by washing bileduct surgically. The findings of the examination were very useful in determining therapy. We did not observe kidney images in 100% of the cases by means of ^{121}I-BSP, and in this respect, our results were the same as Uchiyama's with CBA, so we think ^{131}I-Rose Bengal was useful. Furthermore, we want to emphasize that this method allowed us to discern the patients' condition after the operation.

2) Choledochal Cyst; Scanning of liver and bileduct should be performed first to diagnose this disease. Although the time that RI is excreted into the cyst differs according to the degree of liver disfunction ,this disease can be diagnosed if the image of the cyst is obtained by means of ^{131}I-Rose Bengal at regular intervals.

3) Other diseases; We experienced the following cases. The excretion of RI into the intestine was not observed and the image of the kidney was not obtained. Hence after operation we obtained the diagnosis as hypoplastic intra hepatic bileduct. We also used the RI examination on Siamese twins whose livers adhered to one another, and we comfirmed their bile excretion systems.

S-4 Liver Function Test with RI Labelled Compounds

Determination of LP-X and LCAT Activity with (^{3}H) Cholesterol and its Clinical Significance

Shunichi KOGA and Kyosuke YAMAMOTO
The 3rd Department of Internal Medicine, Faculty of Medicine, Kyushu University

Determination of lipoprotein X (LP-X) and lecithin: cholesterol acyltransferase (LCAT) activity were carried out in the sera of patients with liver diseases with aid of (^{3}H) cholesterol.

LP-X is known to be present in sera of cholestatic patients. We determined LP-X concentrations to

elucidate whether they were able to differentiate intrahepatic and extrahepatic cholestasis. The LP-X concentration was measured by the methods described by Ritland where (^{3}H) cholesterol was incorporated into lipoprotein of patient's serum in vitro followed by the electrophoretic separation and determination of radioactivity in LP-X. Concentration of LP-X was calculated according to the equation where free cholesterol content in LP-X was assumed 23%.

$$\text{LP-X (mg/dl)} = \text{serum free cholesterol (mg/dl)} \times \frac{^3\text{H in LP-X}}{\text{total } ^3\text{H}} \times \frac{100}{23}$$

The mean LP-X concentration in 6 patients with extrahepatic biliary obstruction was 374 ± 207 mg/dl (mean ±sd) and was significantly higher than the mean concentrations observed in the patients with intrahepatic cholestasis. The mean level of LP-X in cholestatic states observed in the patients with acute hepatitis, cirrhosis of the liver and hepatoma were 46 ± 36 mg/dl (9), 9 ± 4 mg/dl (5) and 4 ± 1mg/dl (5), respectively (mean ±sd (no. of cases)). All patients with extrahepatic biliary obstruction revealed LP-X levels exceeding 150 mg/dl, whereas the levels were velow 150 mg/dl in the cases of intrahepatic cholestasis.

The LP-X concentrations correlated significantly with free cholesterol concentration in the serum ($r=+0.881$, $n=34$). But for the purpose of differentiation of intra and extrahepatic cholestasis, the levels of LP-X were more effective than free chloesterol concentrations.

The LCAT activities in the serum were determined according to the method of Stokke and Norum where (^{3}H) cholesterol was incorporated into free cholesterol pool of the patients' serum lipoproteins followed by the determination of esterification rate after one hour incubation at 37°C. The LCAT activities were expressed as n moles of cholesterol esterified/ml of serum/hour.

The mean LCAT activity in 23 normal subjects was 59.6 ± 14.4 n moles/ml/hour (mean ± sd). The LCAT values of patients with resolving stage of acute hepatitis, inactive from of chronic hepatitis, active form of chronic hepatitis, cirrhosis of the liver, hepatoma and extrahepatic biliary obstruction were 46.8 ± 16.6 (10), 58.2 ± 15.4 (7). 41.6 ± 12.4 (14), 22.4 ± 4.7 (5), 22.4 ± 12.9 (6) and 34.6 ± 21.9 (3), respectively (mean ± sd (no. of cases)). Among those values, the mean activities in the patients with active form of chronic hepatitis, cirrhosis of the liver and hepatoma were significantly lower than the normal controls.

In comparison with the LCAT activities and other kinds of hepatic function tests, the LCAT activities correlated significantly with the serum levels of esterified cholesterol ($r=+0.819$) and albumin ($r=+0.730$). Negative correlations were observed between the LCAT activities and BSP, ICG and TTT. Correlations between the LCAT activities and GOT, GPT, serum bilirubin and alkaline phosphatase were not significant.

In summary, the determination of LP-X levels in cholestatic patients was a useful measure for the differentiation of intrahepatic and extrahepatic cholestasis. The LCAT activity indicated some aspects of hepatic function.

Measurement of Intra- and Extrahepatic Shunt Rates Using the Procedure for Percutaneous Transhepatic Portography and Macroaggregated Albumin Labelled with ^{113}I and ^{99m}Tc

Hirotaka MUSHA and Kunio OKUDA
First Department of Medicine, Chiba University School of Medicine, Chiba

It is very important to assess the degree of intra- and extrahepatic portal-caval shunting in the management of patients with cirrhosis. Various methods have in the past been proposed for the measurement of the shunt rates, but none has been adequate in its practicability and accuracy, each having its inherent demerits. Precise measurement of intra- and extrahepatic shunt rates separately in one procedure has not yet been achieved. Our technique to that end is now described.

Material and method. A total of 16 patients— —2 cases of liver steatosis, 2 of chronic hepatitis and 12 cirrhosis— —have been studies. The diagnosis was based on laparoscopy and biopsy. Under TV con-