Serum Alpha-Fetoprotein in Patients Following Partial Hepatectomy

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Serum alpha-fetoprotein (AFP) concentrations were estimated postoperatively at weekly intervals with the radioimmunoassay in eight adult patients. Seven patients underwent partial hepatectomies of up to 80% of the liver. Surgical drainage was carried out in one individual who had a huge pyogenic abscess in the right hepatic lobe. Despite evidence of clinical and biochemical recovery associated with normal liver regeneration, none of the sera were positive for AFP during the period 4-12 weeks after operation. This study does not support the hypothesis that the elevation of serum AFP in benign liver diseases reflects the extent of liver regeneration.

Since the discovery of alpha-fetoprotein (AFP), the detection of serum AFP level has been utilized in the diagnosis of hepatocellular carcinoma and certain other types of malignant tumors (1-3). Recently, with the aid of more sensitive methods such as immunoenzymatic assay or radioimmunoassay for AFP estimation, many workers have found that serum AFP concentrations are often elevated in patients with benign hepatic disorders, especially in viral hepatitis during the recovery phase (4-7). Although the mechanism underlying this is still under dispute, many authors have suggested that the serum AFP elevation in benign liver disease reflects liver regeneration (5, 7). For this reason, several investigators suggest that the degree of serum AFP elevation during the recovery period of fulminant hepatitis can be a good indicator for the evaluation of patients' prognosis (8, 9) although others do not necessarily agree to this (10). This speculation seems to be supported not only by clinical data but also by experimental studies of hepatotoxin-induced liver injury and partial hepatectomy.

Alpert et al (11) have shown that the elevated AFP in viral hepatitis is not a simple relationship to the degree of hepatic necrosis or regeneration. They found a high incidence of AFP positivity in patients who had fatal massive hepatic necrosis of viral origin, but no significant AFP elevations in those patients who had nonviral hepatitis. In addition, they found no significant increase in the serum AFP of patients who had undergone partial hepatectomy despite evidence of clinical and biochemical recovery which is usually found during liver regeneration (12).

In this report, we describe our experiences with eight patients whose serum AFP level did not increase during the period of normal liver regeneration in adults.

MATERIALS AND METHODS

Serum alpha-fetoprotein (AFP) concentrations were serially determined postoperatively in eight patients who had a variety of surgical diseases of the liver with a negative preoperative AFP (Table 1). Hepatitis B antigen was negative in all instances except for one (patient 6). Seven patients underwent partial hepatectomy of up to 80% of the liver. Surgical drainage was carried out in one patient...
with a huge liver abscess which had occupied almost the entire right hepatic lobe.

Liver regeneration was checked in all cases by serial determinations of conventional liver tests and liver scintigraphy with $^{99m}$Tc sulfur. In five patients, celiac arteriography was also taken at 3-6 weeks following liver resection. Excellent liver regeneration was confirmed during the observation in all patients except for one individual in whom liver fibrosis was associated with the hepatoma.

Serum AFP concentrations were estimated by the radioimmunoassay method which detects AFP greater than 5 ng/ml (13). AFP levels of less than 20 ng/ml were considered as negative. Since we consider that regeneration of human liver after partial hepatectomy occurs over a period of weeks, the AFP was measured postoperatively at weekly intervals for 4-12 weeks as shown in Table 2.

### RESULTS

Despite satisfactory regeneration of the liver during the period of serum AFP determinations, all of our postoperative serum samples were negative for AFP (Table 2).

### Case Presentation

**Patient 2.** This 68-year-old female underwent extended right lobectomy due to a huge liver cyst occupying the entire right and middle hepatic lobes (Figure 1A). Marked regeneration of the liver remnant (Figure 1B) did not induce any rise in serum AFP concentrations up to 12 weeks postoperatively.

**Patient 3.** This 58-year-old male underwent right lobectomy because of an asynchronous secondary liver cancer from the colon. Pre- and postoperative celiac arteriograms are shown in Figure 2. Marked regeneration of the liver remnant is obvious, especially in the middle hepatic lobe, with the enlarged and elongated middle hepatic artery. There was no significant increase in serum AFP during 12 weeks after operation.

**Patient 8.** This 71-year-old male had been suffering from a big pyogenic liver abscess in his right hepatic lobe. Following surgical drainage of the abscess, a defect on scintigrams was gradually replaced by