

Direct Measurement of Hepatic Blood Flow in Surgical Patients: *

With Related Observations on Hepatic Flow Dynamics in Experimental Animals

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MUCH valuable information has come from indirect methods for measurement of liver blood flow such as the bromsulfalein and colloid clearance techniques.^{2,7} Shortcomings of the indirect methods are their inability to separate portal vein from hepatic artery flow, failure to indicate direction of flow, and inability to respond to rapid alteration in flow rate. Several theories have been advanced concerning the abnormalities of flow based upon pressure observations. Experimental work⁹ suggests that deductions concerning flow alterations from pressure studies are unreliable.

Development of electromagnetic technics for measurement of instantaneous flow rates through any exposed vessel has made possible this study of hepatic blood flow in 14 patients.

Methods

Hepatic artery and portal vein blood flows have been measured in nine patients during the course of biliary tract surgery for cholelithiasis and in five patients during the course of end-to-side portacaval shunts. All patients received inhalation

anesthesia and most had respiratory assistance from mechanical ventilators.

Segments of the portal vein (1.0 to 2.0 cm.) and main hepatic artery were isolated in the porta hepatis (Fig. 1). Electromagnetic flow probes^{°°°} were placed on the artery and vein in sequence (Fig. 2) and pulsatile and mean blood flow recordings made utilizing the square-wave electromagnetic flowmeter† of Denison and Spencer.⁵ In some patients certain experimental maneuvers were carried out and the studies repeated. Three patients required separate flow studies on the right and left hepatic arteries due to very proximal bifurcation of the parent trunk.

Results

The total hepatic blood flow values recorded during cholecystectomy are shown in Table 1. The mean total hepatic blood flow was about one liter per minute.

One patient in this group (E. B.) was found to have early hepatic cirrhosis grossly at operation although his liver function studies were normal and liver blood flow was in the same range as the other cases.

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