Anatomic basis of vascular exclusion of the liver

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Summary. Segmental occlusive phlebography of the IVC, coupled with a slit in its posterior wall, injection of corrosive substances into the portal and hepatocaval network, biometry of the retrohepatic IVC and serial sections of injected livers from 64 subjects allowed a study of the anatomical aspects of VEL: the Pringle maneuver and clamping of the IVC above and below the hepatocaval connexion. Surgery for hepatic tumors close to the connexion can benefit from VEL but the right suprarenal and inferior phrenic veins must be clamped. Clamping of the suprahepatic IVC is dependent on the site at which the clamp is applied in relation to the diaphragm; an abdominal approach is possible in 79% of cases. The principal right hepatic vein, lacking a collateral over 1 cm external to the liver in one of every 2 cases, can be controlled outside the liver after mobilization of the lobe right of the liver, but caution is needed because of the predominance of “accessory” hepatic veins in 20% of cases. Control of the hepatic veins external to the liver on the left side is dangerous since a common trunk between the middle and left veins is frequent (84%). Collateral branches are also numerous and often vulnerable. Section of the left triangular ligament must be cautious. The relations between the hepatocaval connexion, diaphragm and right atrium also define modalities in the treatment of hepatic lesions such as membranes in the terminal IVC and the Budd-Chiari syndrome.

Key words: Inferior vena cava — Hepatic veins — Vascular exclusion of the liver

Vascular exclusion of the liver (VEL) consists of interrupting the vascular connexions of the liver to the retrohepatic part of the inferior vena cava (IVC). This technique has been described by Huguet [16] for sage surgery in major hepatic resections (posterior tumors near the hepatocaval).

To interrupt any hepatic flow requires occlusion of the portal triad and the IVC above and below the liver.
Even if the Pringle maneuver is easy, control of the IVC is not always simple: the length of the subhepatic, suprarenal IVC is sometimes short, like the distance between the hepatocaval connexion and the diaphragm; the termination of the phrenic veins (especially the left one) is different and the right suprarenal vein flow, not below the liver, but behind it.

The anatomic study of 64 retrohepatic segments of the IVC helped us to clarify some surgical aspects of hepatocaval transection.

**Materials and methods**

Sixty-four fresh subjects without laparotomy scars were studied by 4 methods.

**Biometry**

After freeing the IVC at its phrenic hiatus, intrapericardial control and identification of the phrenic veins, retroduodenopancreatic detachment allowed dissection of the subhepatic, suprarenal IVC. The right side of the liver was mobilized and displaced to the left, displaying the suprarenal gland and the whole right margin of the retrohepatic IVC. Seven segments of the IVC from the right atrium to the renal intersection were measured (Fig. 1).

**Phlebographic and anatomic study (Fig. 2)**

Segmental occlusive phlebography of the IVC [7] was performed on the first fourteen subjects. But the superimposition of the hepatic vein territories between the IVC and the spine made it necessary to slit its posterior wall to study the orifices of its afferent vessels.