Intraoperative Ultrasonography for Location of Proximal Limit of Inferior Vena Caval Thrombosis

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Appropriate surgical management of inferior vena caval thrombosis is dependent on the proximal limit of the thrombus. Cavograms, computed tomography, or magnetic resonance imaging all have their shortcomings in locating this limit. Intraoperative ultrasonography has allowed us to determine the exact proximal limit of vena caval thrombosis in two patients, one with suprarenal thrombosis, the other with infrarenal thrombosis. In the first patient, caval interruption and clearance of the inferior vena cava was greatly enhanced by the use of this method. Intraoperative sonography is useful in the surgical treatment of thrombosis of the inferior vena cava. (Ann Vasc Surg 1991;5:459-461).

KEY WORDS: Intraoperative ultrasonography; ultrasound; inferior vena cava thrombosis; thrombosis.

The upper or proximal limit of inferior vena caval thrombosis is often difficult to delineate with accuracy. This limit, however, is of the utmost value as a guide to appropriate surgical treatment. Three investigative techniques are classically used to assess the upper limit of thrombus: cavograms, computed tomography (CT), or magnetic resonance imaging (MRI). Each of these techniques, however, has its shortcomings and is difficult to obtain under emergency conditions. We have recently used intraoperative sonography of the inferior vena cava (IVC) in two patients, one with suprarenal, the other with an infrarenal thrombosis.

CASE REPORTS

Case No. 1

A 54-year-old man was referred for right lower limb vein thrombosis eight weeks after surgical intervention for cecal perforation. Phlebograms showed an iliofemoral clot and heparin was initiated. Twenty-four hours later, pulmonary thromboembolism occurred. The left inferior pulmonary field was found on pulmonary arteriograms to be amputated. Cavograms were obtained during the same session and showed that the clot extended in the IVC to a point 3 cm above the renal veins (Fig. 1).

Operation was through a right subcostal incision. Kocher’s maneuver was performed to expose the IVC. Intraoperative sonography was performed with a Scannel 300 (CGR) using a 5 mHz “T” probe. The retrohepatic vena cava was investigated transhepatically. For investigation of the infrahepatic vena cava, saline was gently poured into the abdomen to create a fluid interface. The superior limit of the thrombus was identified at the level of the inferior margin of the caudate lobe. The lobe was retracted, four caudate veins were ligated allowing clamping of the IVC above the clot. The clot was then cleared to below the ostia of the renal veins through a cavotomy.
Fig. 1. Preoperative cavogram showing partial thrombosis of the suprarenal inferior vena cava.

Lastly, an Adams-de Weese device was placed infra-renally. The patient made an uneventful recovery. Heparin was continued six weeks postoperatively. Asymptomatic thrombosis of the infrarenal vena cava occurred. Renal function has remained normal and the patient was well at one year.

Case No. 2

A 26-year-old woman, para one, gravida one, experienced thoracic pain, hyperpyrexia, and restlessness 24 hours after a normal delivery. The diagnosis of pulmonary thromboembolism was confirmed on phlebocavograms and pulmonary arteriograms. Low grade hematuria was found, suggesting thrombosis of the renal veins. Thrombosis of the infrarenal IVC was noted on cavograms. The upper limit of the thrombus, however, was not visualized with accuracy. Considering the young age of the patient and the hemorrhagic risk of anticoagulant therapy in the immediate postpartum period, interruption of the IVC with evaluation of the patency of the renal veins was decided.

The IVC was approached through a right subcostal incision and Kocher’s maneuver. Intraoperative sonography (Figs. 2,3) showed that the vena caval thrombus remained below the renal veins. An Adams-de Weese device was clipped on the infrarenal IVC. After an uneventful postoperative course, the patient is well at two years.

DISCUSSION

In most cases of thrombosis of the IVC, the proximal limit of the clot is flush with the renal veins and does not extend any higher because of the high rate of flow at their level. Nevertheless, in 5% of cases, the tip of the clot can extend beyond this limit [1]. This increases the risk of pulmonary embolism as well as the risk of thrombosis of the renal veins. Vena caval filters can be placed by the jugular route just proximal to the renal veins. Although this will certainly contribute to prevent further pulmonary embolism [2], thrombosis of the renal veins still remains possible. Intracaval devices are rarely advocated in the young subject because of lack of adequate long-term results in this setting.