Resection of Hepatocellular Carcinoma with Tumor Thrombus in the Major Vasculature. A European Case-Control Series

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Tumor thrombus in major vasculature is a frequent finding with a poor long-term prognosis in patients with hepatocellular carcinoma (HCC). The utility of surgical resection is still controversial. This study compared morbidity and survival after resection for HCC with and without tumor thrombus. Data of 108 patients who underwent major hepatic resection for HCC were prospectively recorded. Patients were divided into two groups. The venous thrombectomy (VT) group included 26 patients who had HCC with tumor thrombus in the portal or hepatic veins. The matched control group included 82 patients who had HCC without tumor thrombus. Surgical technique, early outcome, and late survival were analyzed in each group. Multivariate analysis was performed to assess the prognostic value of this feature. Surgical technique was comparable in the VT and control group with regard to extent of hepatectomy, procedure duration, and transfusion requirements. Early postoperative outcome was also comparable. Actuarial survival at 1, 3, and 5 years was 38%, 20%, and 13%, respectively, in the VT group (median: 9 months) versus 74%, 56%, and 33%, respectively, in the control group (median: 41 months). In the subgroup of patients with tumor thrombus limited to the portal vein, actuarial survival at 1, 3, and 5 years was 50%, 26%, and 17%, respectively, (median: 12 months) and two patients lived longer than 5 years. Multivariate analysis showed that incomplete resection, alphafetoprotein level greater than 100 N, more than two tumor nodules, and tumor thrombus in major vasculature were independent factors of poor prognosis. Survival after resection for HCC with tumor thrombus in the major vasculature is poorer than after resection for HCC without tumor thrombus. However, an aggressive surgical strategy can provide significant survival with comparable morbidity in selected cases, that is, tumor thrombus located in the portal vein only and expected complete resection of the lesions. (J GASTROINTEST SURG 2006;10:855–862)

KEY WORDS: Hepatocellular carcinoma, tumor thrombus, venous invasion, surgical resection

Venous invasion is a characteristic mode of extension for hepatocellular carcinoma (HCC). In one autopsy series, invasion of the portal vein and its main branches was noted in 65% of cases, and invasion of hepatic veins, always in association with portal vein invasion, was noted in 23% of cases.[1] In clinical practice, median survival of patients presenting macroscopic venous invasion (TNM classification, stage IVA) is less than 3 months without treatment,[2] and only slightly longer after systemic chemotherapy.[3] Because of poor survival, some practitioners consider venous invasion as a contraindication for resection,[4] whereas others consider that resection is justified as the last chance.[5] Tumor thrombus in the major portal or hepatic vein has implications for surgical strategy. However, postoperative morbidity/mortality and long-term survival after resections in such cases has not been well evaluated. This European case-control series was undertaken to assess the outcome of surgical treatment of cases involving tumor thrombus in the major vasculature.

PATIENTS AND METHODS

Patients

Between January 1988 and March 2004, we performed surgery for HCC in 370 patients. The procedure consisted of partial hepatectomy in 234 patients, including 26 patients presenting HCC with vascular invasion of a major vein, liver transplantation in 91 patients, intraoperative

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radiofrequency thermal ablation in 6 patients, and exploratory laparotomy in 39 patients. This study focuses on the 26 patients who underwent major hepatectomy, that is, resection of at least three contiguous Couinaud segments, in association with venous thrombectomy (VT). The VT group was compared with 82 control patients who underwent major hepatectomy for HCC during the same period.

Venous Invasion

Preoperative diagnosis of tumor thrombus was achieved in all cases by Doppler ultrasound, CT scan with injection, or MRI. Portography or cavography was also performed in some cases. Tumor thrombus in the portal vein was considered as resectable if residual hepatopetal flow around the thrombus could be observed contralateral to the planned resection site (Figs. 1 and 2). Tumor thrombus in the hepatic veins or inferior vena cava (IVC) was considered as resectable if the IVC was not completely obstructed, except in patients with Budd Chiari syndrome.

Indication for Major Hepatectomy for HCC

Most patients undergoing major hepatectomy were noncirrhotic. Only cirrhotic patients classified Pugh-Child A without portal hypertension were considered as eligible for major hepatectomy. The indocyanine green (ICG) clearance test has been used to evaluate liver function in most patients since 1996. Major hepatectomy was considered feasible if ICG values were 12% or less at 15 minutes (laboratory normal value). However, higher values were not considered as an absolute contraindication, especially for patients who had tumor-related vascular obstruction that could impair ICG clearance. Embolization of the portal vein was performed before major hepatectomy in four cirrhotic patients in the control group.

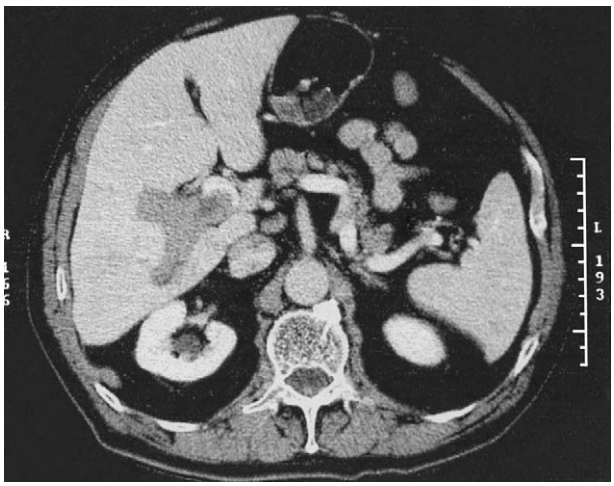

Fig. 1. CT scan showing solitary HCC located in segment VI, with tumor thrombus in the right portal vein almost completely obstructing the portal bifurcation.

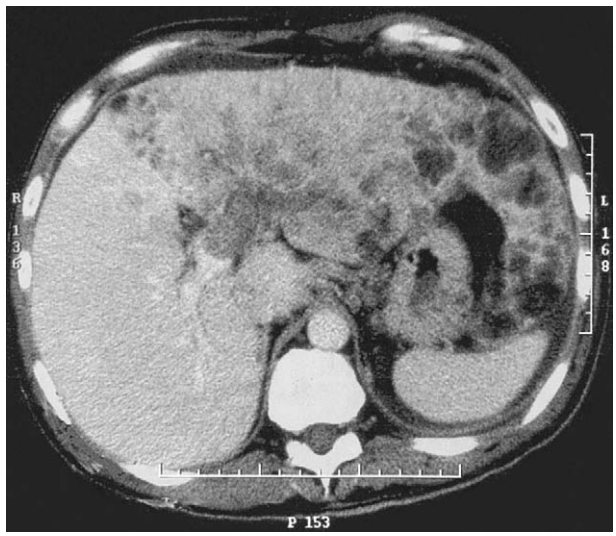

Fig. 2. CT scan showing multinodular HCC of the left liver with tumor thrombus narrowing the portal bifurcation.

Surgical Technique

The abdominal approach was used in all but four patients. Intraoperative ultrasound imaging was performed to assess the extent of thrombus (Fig. 3). Transsection of the liver was carried out using continuous or intermittent clamping of the hepatic pedicle (Pringle maneuver). Hepatic vascular exclusion (HVE) was used only if necessary and as briefly as possible. Mobilization of the liver and dissection of the IVC and hepatic veins was performed first except in cases involving large right-sided tumors treated by an anterior approach.[6] The portal pedicles were exposed by the scissural or suprahilar approach without hilar dissection. For portal vein tumor thrombus extending to the bifurcation, the sheath of the portal pedicle and then the portal vein were opened to allow extraction of the tip of the thrombus by using a forceps or Fogarty catheter. The vein was purged by portal flow before suture of the venous stump, and complete patency was checked by Doppler ultrasound. For hepatic vein tumor thrombus limited to the IVC (Fig. 4), the tip of the thrombus was extracted either by side clamping the IVC or by brief HVE. In case of atrial extension, the intracardiac tumor thrombus was removed in a first stage procedure with cardiopulmonary bypass before