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Interventional Radiology in the Treatment and Management of Liver Cancer

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Description

The management of primary and secondary malignancies of the liver constitutes one of the most difficult challenges for oncologists. First, primary hepatic malignancies frequently escape detection because most patients remain asymptomatic for long periods. Then, if clinical symptoms are present, they may be masked by the patient's underlying liver disease and may, therefore, be difficult to attribute to a malignancy. In addition, clinical outcome is typically poor, with median survival of less than 1 year for all patients and between 3 and 6 months for unresectable presentations. Hepatocellular carcinoma (hepatoma) is one of the most common fatal cancers in the world (1.2 million deaths per year) and accounts for approximately 90% of all liver cancers. It is most commonly encountered in Asia and sub-Saharan Africa, where it constitutes 20% to 40% of all malignancies.

The high incidence of hepatoma in these regions can be attributed to hepatitis B, which is endemic in these regions of the world. In Europe and North America, the incidence of hepatoma is markedly lower (10,000 to 14,000 cases per year in the United States) and largely related to alcoholic cirrhosis, but it is climbing rapidly and expected to increase further given the recent rise in hepatitis C and its association with hepatoma. Metastatic malignant tumors of the liver are by far the most common type of hepatic malignancies in the United States (at least 20 times that of hepatoma) and occur most often secondary to colorectal carcinoma (155,000 cases and 60,000 deaths per year in the United States), followed by ocular melanoma, neuroendocrine tumors of the pancreas, including carcinoid tumors, as well as both functional and nonfunctional islet cell tumors, and some sarcomas. In many of these conditions, the liver is the only site of metastatic involvement, thus justifying a role for locoregional therapy. Although rare, carcinoid tumor represents the most common of all endocrine tumors of the gastrointestinal tract, and the incidence of metastatic carcinoid tumor is 0.32 to 0.7 per 100,000 with the majority arising from the small bowel.

The tumor is usually slow growing and, therefore, associated with longer survival than hepatoma or colorectal metastatic disease, but patients can be plagued by severe symptoms due to excessive secretion of serotonin and bradykinin as part of the carcinoid syndrome (4% to 9% of cases). In cases of carcinoid syndrome, the liver is almostalways involved, and locoregional palliative therapy with chemoembolization constitutes the only therapeutic option. Ocular melanoma is a very aggressive and highly lethal disease. It usually progresses very rapidly and commonly metastasizes to the liver. Once the liver is involved, fatal hepatic disease ensues. Median survival ranges from 2 to 6 months as for the other tumors involving the liver, locoregional therapy offers the best option. For both primary and metastatic liver cancers, such surgical options as resection or transplantation offer the only hope for cure and, at the very least, have a definite impact on survival in operative candidates, with survival rates ranging from 55% to 80% at 1 year and 25% to 50% at 5 years. A minority of patients are surgical candidates (15% to 20% of all patients with either primary or secondary liver cancers). Criteria used to determine unresectability include the size, location, and volume of the lesion to be resected; multilobar involvement; as well as the presence of limited hepatic reserve due to advanced cirrhosis or chronic hepatitis and significant concurrent disease (especially cardiac or pulmonary disease). In addition, surgical resection continues to be plagued by fairly high morbidity and mortality rates, especially when surgery is performed in patients with underlying liver failure (15% to 30% perioperative mortality), as well as high recurrence rates (75% of patients).

Liver transplantation remains limited by the scarcity of liver donors (although the development of living-related liver transplantation could remedy this problem) and by a surprisingly high recurrence rate. Other therapeutic options, such as systemic chemotherapy and external-beam radiotherapy, have been disappointing. The response rate from single-agent or multidrug chemotherapy is poor, as it does not exceed 15% to 20% and a clear survival benefit has not been demonstrated. External-beam irradiation is limited by the extensive damage it causes to the radiosensitive hepatocytes. The limitations of the traditional weapons against cancer (surgery, chemotherapy, and radiotherapy), combined with the fact that the immense majority of patients afflicted by primary or metastatic liver cancer have liver-only disease, have led to the hunt for and development of various locoregional therapies. In addition, patients afflicted by hepatoma usually die of hepatic failure and cachexia as a result of local growth and resultant liver tissue destruction but not of extrahepatic metastatic disease. Thus, control of the tumor at the regional level is essential. The goal of locoregional therapy is to destroy the tumor while preserving as much of the normal liver tissue as possible. This can be accomplished either by direct percutaneous ablative methods, such as percutaneous ethanol injection and radiofrequency ablation, or by intraarterial delivery of embolic material with or without chemotherapeutic agents, such as transcatheter arterial chemoembolization, which is by far the most widely performed procedure in the treatment of unresectable liver cancers.