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Surgical treatment for metastatic malignancies. Anatomical resection of liver metastasis: indications and outcomes

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Abstract

Hepatectomy may be the only treatment modality for the cure of colorectal liver metastasis. However, whether to perform nonanatomical resection or anatomical resection remains unclear. Original articles in English on liver metastasis, including reports that dealt with case series of more than 50 curative hepatectomies, were reviewed, and the current status of surgical treatment for colorectal liver metastasis was summarized, with a special emphasis on the relevance, indications, and outcomes of anatomical hepatectomy. Anatomical hepatic resection was performed in 63% of the patients. For patients who were treated by curative hepatectomy, including both anatomical and nonanatomical resection, the morbidity rates, mortality rates, 5-year survival rates, and rates of hepatic recurrence were 23%, 3.3%, 34%, and 41.2%, respectively. In 73 articles that each analyzed more than 50 patients treated with potentially curative hepatectomy, the incidence of anatomical resection exceeded 50% in 56 series, while anatomical resection was performed in fewer than 50% of the patients in 17 series. A comparison between these two groups naturally revealed a remarkable difference in the incidence of anatomical resection (72% versus 34%), but no difference in terms of morbidity; mortality; survival rates at 3, 5, and 10 years; or rate of hepatic recurrence. The profile of liver metastasis related to prognosis was generally advantageous to patients treated with nonanatomical resection, and this may have nullified the survival advantage of anatomical hepatectomy over nonanatomical resection. Anatomical resection provides a higher probability of coresecting microscopic invasions that are predictable but undetectable, and can be recommended as a standard procedure for locally advanced metastatic liver cancer.

Key words

Colorectal liver metastases · Hepatic resection · Anatomical hepatectomy · Indication · Prognosis

Introduction

There has been remarkable progress in the treatment of metastatic liver cancer during the past four decades. Woodington and Waugh1 treated patients with colorectal liver metastasis by hepatectomy and, in 1963, reported a 5-year survival rate of 20%, although these data apparently came from a highly selected population of patients. In 1967, Flannagan and Foster2 attained a 5-year survival rate of 26% with 45 patients with colorectal liver metastasis. In 1967, Wilson and Adson,3 of the Mayo Clinic, reported that 8 of 54 patients with colorectal liver metastasis survived disease-free for 10 years after hepatectomy. In 1986, Butler et al.,4 of Memorial Sloan-Kettering, claimed 5-year and 10-year survival rates of 26% and 21%, respectively, for a series of 62 patients who underwent resection of liver metastasis from colon cancer, and demonstrated for the first time that colorectal liver metastasis was actually a curable disease. Since then, the 10-year survival rates have been reported1–11 to be in the range of 20% to 42%. D’Angelica et al.13 analyzed 96 patients who survived for more than 5 years, and concluded that disease-free survival for 5 years after liver resection most likely implies cure.

Given these encouraging data, there is little doubt that surgical resection is the only treatment modality for colorectal liver metastasis with solid evidence for a reasonable possibility of cure. However, whether to perform nonanatomical resection or anatomical resection for this disease entity remains controversial.

Methods

An electronic search of the Medline Database was undertaken, using the search terms of “hepatectomy or liver resection”, “colorectal cancer”, and “liver metastasis”. Here, original articles in English on liver metastasis that dealt with case series of more than 50 curative hepatectomies are reviewed, and the current status of surgical treatment for
colorectal liver metastasis is summarized, with a special emphasis on the relevance, and indications, and outcomes of anatomical hepatectomy.

Indications for surgical resection of colorectal liver metastasis: history and current status

The past two decades have seen remarkable progress regarding the surgical techniques and postoperative management of major hepatic surgery. Consequently, the indications for hepatectomy, now a safe and accomplished procedure, have been markedly extended. This trend was further prompted by accumulating reports in the literature claiming operative mortality of zero following hepatectomies for colorectal liver metastasis.

In the early era of hepatic surgery, the indication for the surgical resection of colorectal liver metastasis was defined as small solitary metastasis appearing later after resection of a colon tumor, without mesenteric lymph node involvement. Adson and Van Heerden and Adson et al., of the Mayo Clinic, later extended the indication to multiple metastatic lesions and lesions with large diameters that call for major hepatectomy. With further accumulation of data from several case series of colorectal liver metastases treated with surgery, the safety and efficacy of hepatectomy became widely accepted. More recently, hepatectomy has come to be considered and attempted even for patients with extrahepatic recurrences, or hepatic node metastases to the hepatic hilum, which, in the past, had not been indicated for surgical resection. Such an aggressive approach, however, is not currently shared by all investigators. At some institutions, metastasis to the hepatic lymph nodes, extrahepatic disease, and multiple metastases, of four or more, are considered to be contraindications to hepatic resection.

In 1996, Bismuth et al. performed hepatectomy for 53 patients with colorectal liver metastases initially considered unresectable because of mal-location, large tumor size, multiplicity, or extrahepatic disease. These lesions were downstaged by systemic chronomodulated chemotherapy with 5-fluorouracil, folinic acid, and oxaliplatin, to the point that operation could be performed, and surgery led to a remarkable 5-year survival rate of 40%, demonstrating the potential of a multimodal approach to expand the indication for hepatic resection.

Recurrence to the remnant liver following previous hepatic resection affects prognosis, but may be amenable to repeat resection. In 1994, Nordlinger et al. reported that, in a series including 116 patients, from 85 institutions treated by repeat hepatectomy, the actuarial survival rate was 33% at 3 years. In 1997, Adam et al. reported a 5-year survival rate of 41% for 64 patients treated by repeat liver resection, which is comparable to that observed following primary liver resections. Thus, patients with recurrence limited to the liver following previous hepatic resection have come to be treated by repeat surgery, as long as general indications for hepatic surgery are met, and this principle has led to the enhanced overall survival of patients with colorectal liver metastasis.

Although hepatectomy is now considered as the first choice in the treatment of colorectal liver metastasis, the aims of and eligibility for hepatic resection in modern clinical practice can be classified into the following three categories:

(i) Hepatectomy intended for cure. This applies to patients whose metastatic lesions are completely dissected along with local invasion. Patients who fall into this category should have no metastatic or recurrent disease, other than hepatic metastasis, and this must be resected completely with the associated local invasion.

(ii) Hepatectomy intended for palliation but that could result in cure. This applies to patients who have extrahepatic metastatic lesions, such as lung, locoregional, or peritoneal metastasis, that can be resected with the liver metastasis.

(iii) Hepatectomy for palliation. This applies to patients with extensive liver metastasis or extrahepatic metastasis that cannot be resected completely, including patients with systemic disease whose survival is still likely to depend on the progression of liver metastasis and those whose metastatic lesions have been downstaged and have become respectable after chemotherapy.

For each category, accurate assessment of the disease status, including the size of the metastasis, the location in relation to the main vascular pedicles, and the extent of lymph node metastasis and vascular invasion, is mandatory. In addition, surgery can only be considered as the first choice when it can be preformed adequately, with low morbidity and mortality rates, along with other components of multidisciplinary treatment.

Selection of the extent of surgical resection for hepatectomy with curative intent

According to Penna and Nodlinger, the decision of whether or not to perform surgical resection for liver metastases should be based on the patient’s condition, the extent of the metastatic disease, and the liver functional reserve. The type of liver resection depends on the size, number, and location of the metastases, their relation to the main vascular and biliary pedicles, and the volume of the liver parenchyma that can be preserved after surgery. Small metastases located near the liver capsule can be resected by nonanatomical wedge resection, while major anatomical resection is more often required for a large lesion. These comments more or less summarize the selection criteria for surgical resection and the extent of hepatectomy at most institutions.

The actual numbers of each type of surgery performed were assessed from 73 articles, each of which described the outcome of curative treatment of more than 50 patients, and presented the proportions of