

# Major Hepatic Resections for Metastatic Colorectal Cancer

MARTIN A. ADSON, M.D., JONATHAN A. VAN HEERDEN, M.D.

In 1973, our study of patients with resectable hepatic metastases from colorectal cancer compared survival of 60 patients who had metastases removed with survival of 60 patients with similar lesions that had been biopsied only. We concluded that excision of small, apparently solitary metastatic lesions could be justified on the basis of the low operative risk and prolonged survival. However, the risks and benefits of resection of larger metastatic lesions could not be determined by that earlier study, because only seven of those patients had lesions so large as to require major hepatic resection. Therefore, to evaluate size as a determinant of prognosis after resection, we added to those 7 patients 27 others who were managed since 1973 by major hepatic resection of larger metastases. There were two hospital deaths. Of the 32 surviving patients, 82% lived one year or more, 77% 18 months or more, 58% two years or more, and 41% three years or more postoperatively. Three patients are living 10–22 years after resection. We conclude from a critical analysis of the duration and quality of life of surviving patients that at least 20% and perhaps 30% of these patients were benefited by major hepatic resection of their large hepatic metastasis.

IN 1962, WAUGH<sup>5</sup> REVIEWED our institutional experience with resection of hepatic metastases from various visceral cancers. The postoperative mortality was 4%, and 20% of surviving patients lived five years or more. Since then, Foster,<sup>3</sup> in his nationwide liver tumor survey, reported similar survival rates after a somewhat higher average postoperative mortality; and recently, Fortner<sup>2</sup> reported encouraging results from resection of hepatic metastases. Nevertheless, such treatment is not yet accepted as conventional wisdom.

Even within our own institution, attitudes about surgical management of hepatic metastases have varied. This was evident in our retrospective review of 1973, for we were able to study two different groups of patients in our institutional files. One was a group of 60 patients who had had hepatic metastases from colorectal cancer removed surgically. The other group of 60 patients, matched by age and sex, had had lesions of similar size and number which had been noted and

*From the Department of Surgery,  
Mayo Clinic and Mayo Foundation,  
Rochester, Minnesota*

examined by biopsy but had not been resected. We learned from our review that these two groups were determined by differences in the philosophy and practice of the various surgeons.

That retrospective study, published in 1976,<sup>4</sup> can be summarized briefly. Forty of the resected lesions appeared to be solitary, and 20 patients had multiple lesions removed. Significantly, all but 7 of the 60 lesions were small enough to be removed by simple, safe wedge resection, a procedure associated with no postoperative hospital mortality.

Surgical results in the small group of patients who had multiple metastases were inconclusive: mean survival rates were longer after resection than after biopsy only, but no patient who had resection of multiple metastases lived for five years. However, survival rates after resection of apparently solitary lesions were unexpectedly favorable: 42% of patients lived for five years or more after removal of a metastatic lesion, and the ten-year survival following resection of apparently solitary lesions was similarly impressive (28%).

The extent to which selective bias for or against resection might have accounted for these results could not be determined retrospectively. However, comparison of the survival curve for patients having resection of solitary lesions with a curve derived from the "control" group indicates that resection most likely did enhance survival (Fig. 1).

We concluded from that earlier study that small, apparently solitary hepatic metastatic lesions should be removed, for such treatment involves little surgical risk and a surprising proportion of patients appear to be benefited.

Unfortunately, that study does not help us with decisions regarding many of the patients with hepatic metastases whom we have seen in recent years. Now, most of the patients seen for consideration for hepatic resection have been referred by physicians or surgeons who have used biologic markers (such as CEA assay) or radionuclide scans of the liver to monitor the progress

Presented at the Annual Meeting of the Southern Surgical Association, December 3–5, 1979, Hot Springs, Virginia.

Reprint requests: Martin A. Adson, M.D., Department of Surgery, Mayo Clinic and Mayo Foundation, Rochester, Minnesota 55901.

Submitted for publication: December 7, 1979.

Copyright 1979 Mayo Foundation.

of their patients after resection of colorectal cancer. These studies have identified metastases that developed some time after colonic resection, that are large, or that are symptomatic. Because our earlier study involved mostly tumors that were small and asymptomatic or had been found incidentally during colonic resection, the risks and benefits involved in major hepatic resections done for larger lesions were incompletely assessed. Therefore, our current study concerns the risks and possible benefits of major hepatic resections of large metastases from colorectal cancer.

### Materials and Methods

To evaluate the role of surgery for hepatic metastases from colorectal cancer that are so large or so situated as to require major resection, we identified those seven patients in the retrospective study who had major resections of large lesions and added 27 cases of major hepatic resections done since 1973.

Twenty-two of these patients were men and 12 were women. Eleven lesions were multiple and 23 were solitary. Resected lesions varied in size from 6 to 17 cm, with an average size of 10 cm. Only four of the tumors were less than 7 cm in diameter. Generally, the size of the lesion did correlate with the scope of the resection, but not always; the location of the lesion may also determine the extent of resection required for its removal.

Resection involved 12 segmentectomies, 19 lobectomies, and 3 trisegmentectomies. We have considered segmentectomy done close to the hepatic hilus to be a major operation. Also, some segmental resections of the right lobe may involve greater problems with hemostasis than does formal lobectomy.

### Results

Two of the 34 patients died during hospital convalescence. The first death (in 1966, included from the retrospective series) involved a young man who had suffered intolerably before operation from an obstructing cecal lesion and painful expanding liver metastasis. There had been no alternative to concomitant right hemicolectomy and right hepatic lobectomy. He died on the twenty-first postoperative day, from a hemorrhagic stress ulcer—a complication more likely to be avoided by current postoperative management.

The recent postoperative death (February 1979) involved an energetic, asymptomatic 75-year-old man whose small, apparently solitary hepatic metastatic lesion had been noted and biopsied but had not been removed by his referring surgeon, who had resected the primary colonic lesion. Expecting to perform a simple,

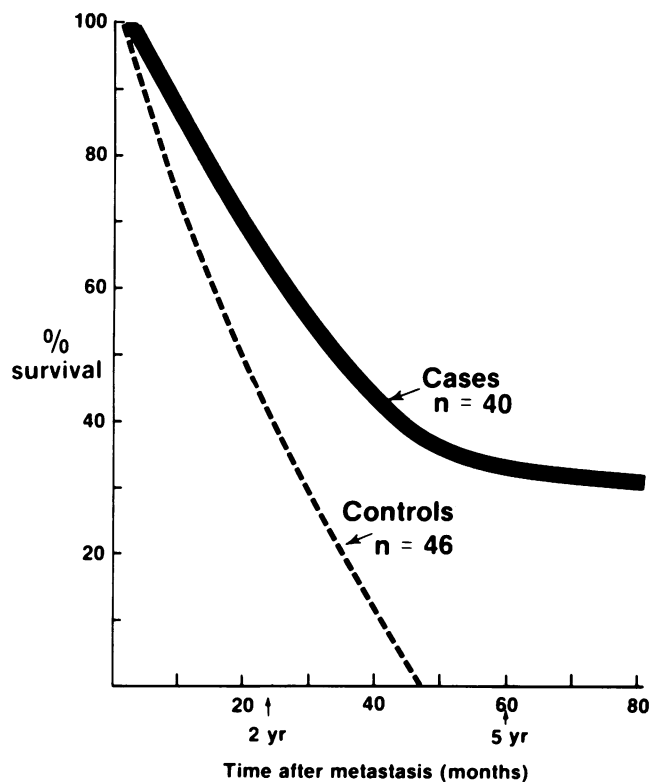


FIG. 1. Survival in 40 cases of solitary hepatic metastases from earlier retrospective study (Reprinted with permission from Wilson SM, Adson MA: Surgical treatment of hepatic metastases from colorectal cancers. *Arch Surg* 1976; 111:330-333).

safe wedge resection, we advised reoperation despite his age. A second metastatic lesion (undisclosed by preoperative computed tomography) was found in the right hepatic lobe. Right hepatic lobectomy, which then seemed justified, led to a complicated convalescence and late hospital mortality.

Postoperative morbidity in the 27 major resections done since 1973 has been minimal. Only six patients required hospital convalescence for longer than 12 days, and the longest period of postoperative hospitalization was 18 days. The average stay in hospital after operation was 11 days. Transient pleural effusion, drainage of bile from tubular drains, and indeterminate, self-limited febrile reactions were complications that required the prolonged period of postoperative observation.

The results of treatment must be considered in light of the fact that one-third of patients had multiple lesions. Also, approximately one-fourth of the 34 patients had major hepatic resection despite the presence of extrahepatic metastases. Resection in these circumstances may be hard to justify, but it was undertaken for some symptomatic patients and in others it was considered, in concert with the views of our medical oncologists, as a debulking procedure. Also, resection

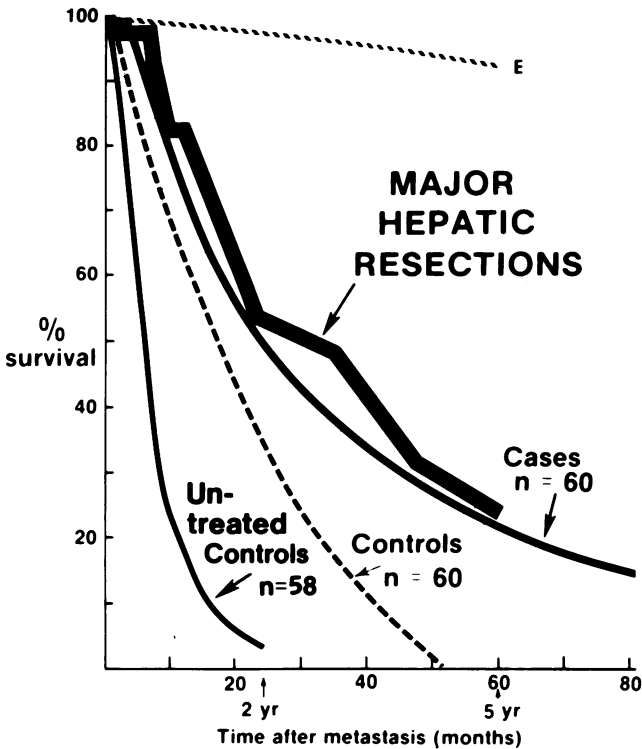


FIG. 2. Survival in new treated group ("major hepatic resections," 32 patients) and untreated controls (n = 58) compared with survival in earlier group—"cases n = 60" and "controls n = 60." E = expected survival in general population.

may at times have been done to satisfy the patient's or perhaps the surgeon's expectations—a curious, and perhaps understandable, manifestation of what might be termed "surgical momentum."

The results of treatment of surviving patients may be viewed in three different ways: (1) by the percentage of patients surviving for given periods of time, (2) by a survival curve (to be compared with historical or retrospective controls), and (3) by consideration of each individual patient's preoperative status and postoperative progress with respect to length and quality of life.

1) Of the 32 surviving patients, 82% lived for one year or more postoperatively; 77% lived for 18 months or more; 58% lived for two years or more; and 41% lived for three years or more.

2) Statistical analysis of survival has limited significance because of our small sample size, and again we were frustrated by the lack of a truly suitable group of controls. However, we can compare the survival curve of these 32 patients with the control curve for solitary and metastatic lesions derived from our retrospective study (Fig. 2). This new curve is remarkably similar to our earlier curve derived from patients 90% of whom had lesions that were less than 5 cm in diameter. This survival curve is statistically "soft" in that so few

patients are represented, but it is not really misleading, for the very long-term survival of three patients is not reflected.

The survival curve labeled "Untreated Controls" shown in Figure 2 must be explained. Having seen occasionally spontaneous regression or arrest of metastasis, and rare patients with quiescent cancer, we have been concerned about the extent to which the natural history of some metastatic cancers might account for our "surgical" results. Our colleague, Dr. Charles G. Moertel, a medical oncologist who is sympathetic with our surgical efforts and realistic about the limitations of chemotherapy for colorectal cancer, provided this group of patients, who were seen consecutively between 1955 and 1960. They are patients with biopsy-proven liver metastases who had no evidence of recurrent primary tumors or other metastatic disease. These patients are offered for comparison not as proper historical controls but rather as a sampling of patients that might be likely to contain some biologic

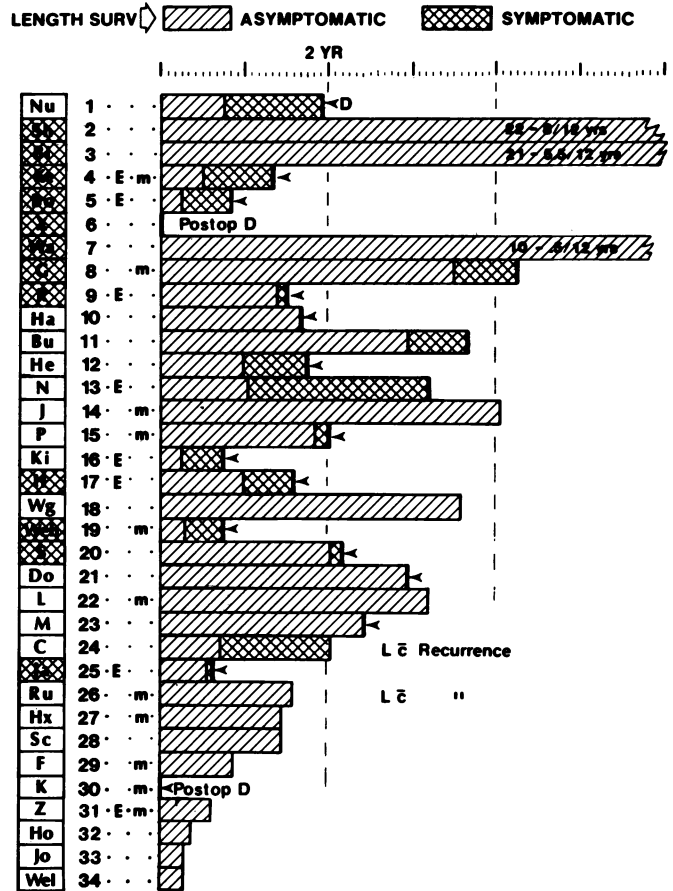


FIG. 3. Course of 34 patients who had major hepatic resection for metastatic colorectal cancer. D = death, indicated also by arrowhead; E = extrahepatic metastases; m = multiple lesions. Notations for patients 24 and 26 denote living with recurrence. Hatching in boxes preceding case numbers denotes presence of symptoms preoperatively.

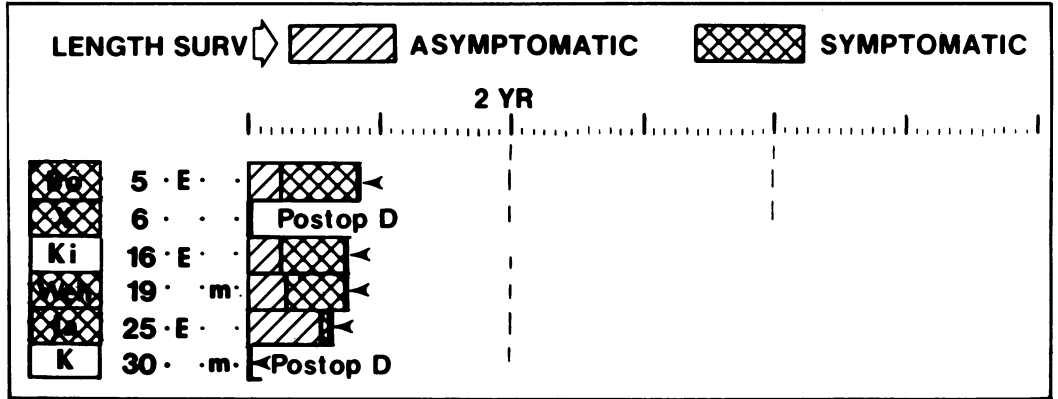


FIG. 4. Therapeutic failures (six patients).

oddities. Significant occurrence of such favorable natural history is not evident in this group of controls.

3) Progress of these patients may be considered in a more meaningful way: it may be viewed in terms of the individuals, taking into account not only length of life but also quality of life. In our therapeutic efforts, we cannot always distinguish between palliation as the goal and the chance for cure, but we must keep some things in mind. Significant surgical risk and discomfort can be justified when there is reasonable chance of cure, but efforts to palliate should not involve too much that is noxious. The existence that is being prolonged should be tolerable, and we must try to distinguish between that which prolongs the act of dying and that which extends the useful acceptable condition of living. We must subtract the burdens of our surgery from ultimate goals, and above all, we must "have the grace of letting the sick man die in peace."<sup>11</sup>

For a consideration of this subjective but essential aspect of surgical treatment, the progress and status of the 34 patients who had major hepatic resections are shown graphically in Figure 3. This complicated but comprehensive illustration depicts 1) length of life after resection; 2) presence or absence of symptoms related

to hepatic metastases preoperatively; 3) onset of symptoms from residual hepatic or other metastases postoperatively; 4) patients who had multiple hepatic lesions (m); and 5) patients who had extrahepatic metastases (E) found at the time of hepatic resection.

The reader may interpret the results of treatment in his own way. We have chosen to consider and classify the results of treatment somewhat empirically with the help of graphic aids, as follows.

Six operations (nearly 20% of the 34) must be considered as obvious therapeutic failures. Two patients died in early surgical convalescence, and four lived for less than one year postoperatively (Fig. 4).

Five patients (no. 29 and 31 to 34), all of whom were asymptomatic preoperatively, had hepatic resection within the past year. All are doing well without evidence of recurrence. However, this limited period of observation precludes classification of therapeutic results.

Eight patients (24% of the total but 30% of patients who were treated more than 2 years earlier) are considered to have benefited from resection of their hepatic lesions. Seven of these patients (four of whom had symptoms preoperatively) lived for 3–22 years

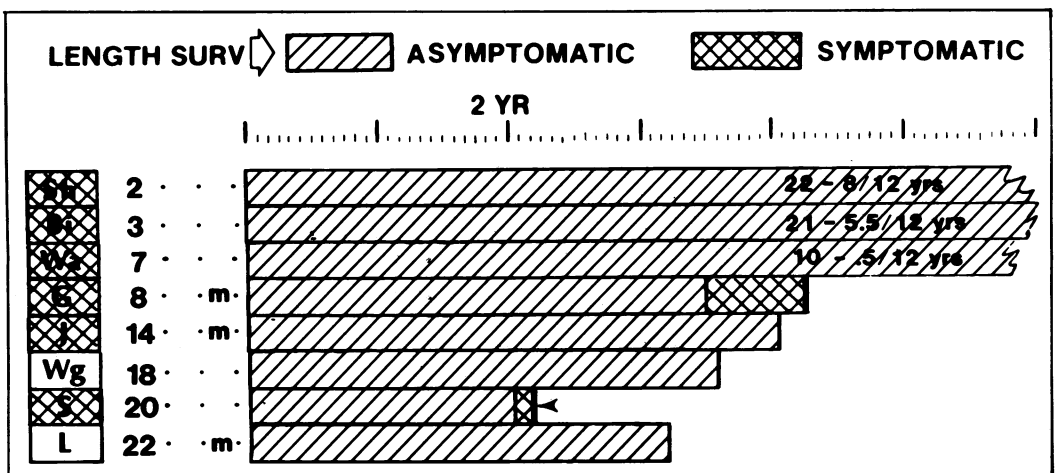


FIG. 5. Patients (eight) considered to have benefited from resection.

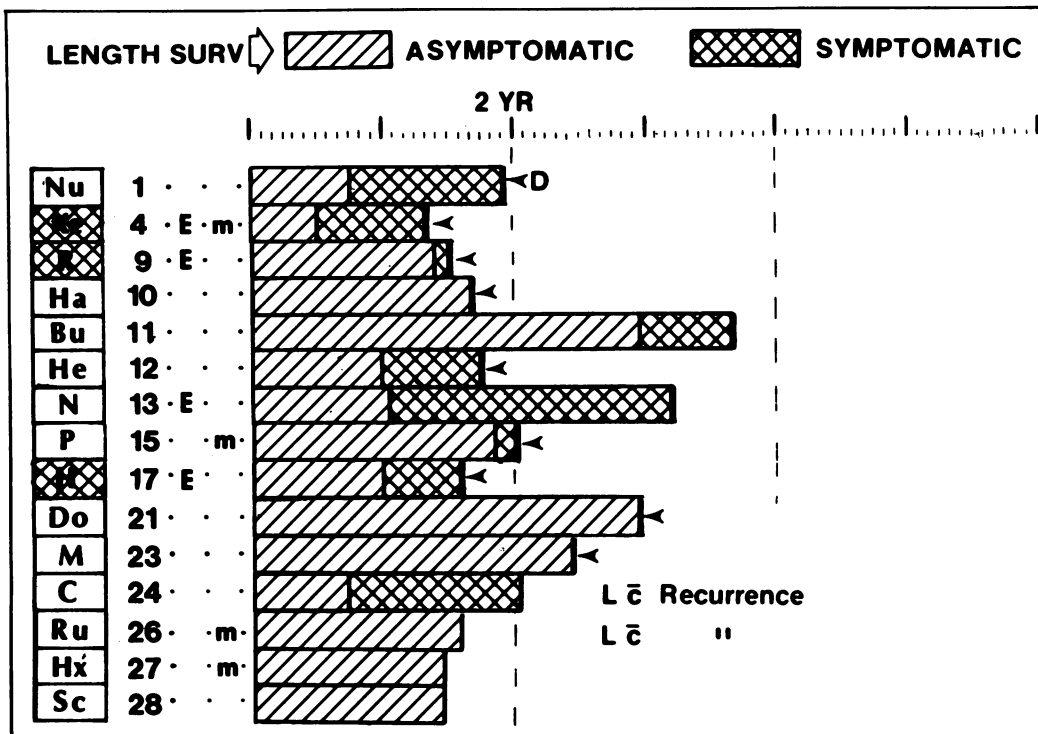


FIG. 6. Unclassified therapeutic results in 15 patients.

postoperatively. One additional patient was included. He had suffered intolerably before operation from his hepatic metastatic lesion, which was 17 cm in diameter, and he remained free of pain for two years after hepatic lobectomy (Fig. 5).

There remain 15 patients whose response to surgery has not been classified (Fig. 6). Six lived or are living for two years or more after hepatic resection and three lived for three years or more. It is tempting to include some of these patients in our group of obvious therapeutic successes. However, some of the patients who lived long also suffered long. Also, 11 of the 15 patients had no symptoms preoperatively, and thus we do not know whether their progress was determined by hepatic resection or by the natural history of their disease.

### Discussion and Conclusions

The risk of major hepatic resection of large metastases from colorectal cancer appears to be justified by lengthened survival, significant palliation of many patients, and acceptable operative risk. As shown in our previous study, which concerned chiefly simple wedge resections of small lesions, removal of the apparently solitary hepatic metastatic lesion appears to be of particular value. Whether resection of multiple hepatic metastases or removal of metastatic liver lesions associated with other extrahepatic metastases

can be justified can only be determined by further study. If multiplicity of lesions and extrahepatic spread can be shown to be an absolute contraindication to major hepatic resection, then refinement of computed tomography or other noninvasive techniques for preoperative staging may become essential for our assessment of candidates for aggressive surgical treatment.

The role of resective surgery for hepatic metastases must be placed in perspective. Although 20% of patients with colorectal cancer have hepatic metastasis, only one-fourth of these lesions are solitary or unilobar. Thus, only 5% of patients have hepatic metastases that may tempt the surgeon, and half or more of these patients have other, undetectable, metastases. This is a humbling statistic. Nevertheless, we do see individual patients with resectable lesions, and we must try to make decisions in their favor.

### References

1. Buchan J. *Witch Wood*. London, Hodder and Stoughton, 1927, p 195.
2. Fortner JG, Kim DK, MacLean BJ, et al. Major hepatic resection for neoplasia: personal experience in 108 patients. *Ann Surg* 1978; 188:363-370.
3. Foster JH, Berman MM. Solid liver tumors. *Major Probl Clin Surg* 1977; 22:1-342.
4. Wilson SM, Adson MA. Surgical treatment of hepatic metastases from colorectal cancers. *Arch Surg*, 1976; 111:330-333.
5. Woodington GF, Waugh JM. Results of resection of metastatic tumors of the liver. *Am J Surg* 1963; 105:24-29.