

Resected Pulmonary Metastases from Colorectal Cancer*

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PULMONARY METASTASIS from carcinoma of the colon and rectum is usually regarded as a manifestation of generalized metastasis, and therefore not considered a surgical problem. This is true to an appreciable extent; however, there are a number of patients, albeit small, who develop metastases solely to the lungs, and these would conceivably benefit from surgical extirpation of the metastatic lesions. This report is a study of our experience with such cases at Memorial Hospital.

Material and Methods

Between 1960 and 1977, there were 35 patients at Memorial Hospital who underwent pulmonary resection for metastases from adenocarcinoma of the large bowel. There were 24 males and 11 females, with an age range of 45 to 78 years, and an average age of 63 years.

Almost all the primary lesions were in the left hemicolon and rectum, the majority being in the rectum and sigmoid colon (Fig. 1). Six patients had a Dukes' A lesion, 13 Dukes' B, and ten Dukes' C. The remaining six patients could not be classified because of incomplete records (Table 1).

The pulmonary metastases were solitary in 22 patients and multiple in 13. Nine of these 13 had their multiple lesions confined to one lung, and one patient had a single lesion in each lung (Table 2). The diameters of the metastatic lesions (as measured by the pathologist) ranged from 0.3 to 9 cm, with a mean of 3 cm and a median of 2.5 cm.

Treatment and Results

Table 3 shows the number of thoracotomies performed, with one patient undergoing four thoracotomies to control his disease without any

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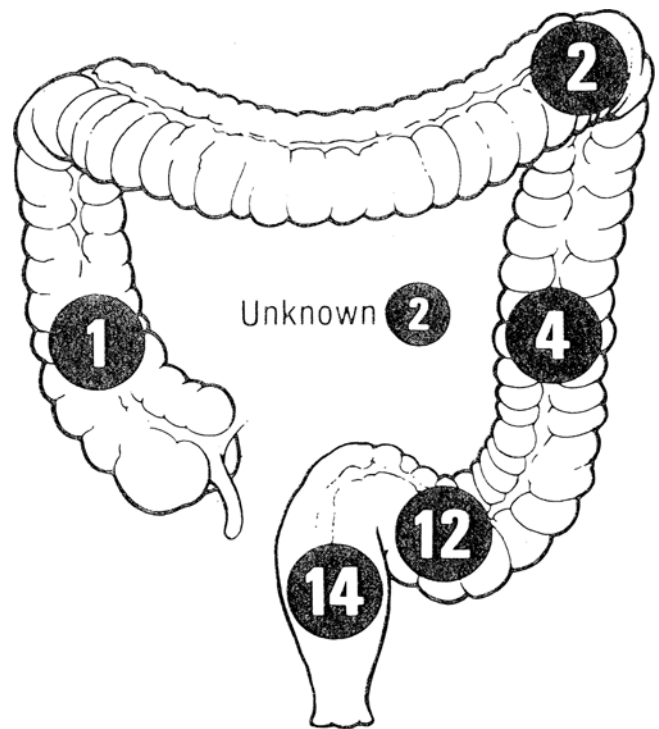


FIG. 1. Site of primary tumor.

operative mortality. The number, size, and location of the metastatic lesions dictated the type of pulmonary resection, and of the 42 thoracotomies performed on these 35 patients, 23 were wedge resections or segmentectomies, 18 were lobectomies, and one was a pneumonectomy (Table 4).

The disease-free interval between colonic resection and the detection of pulmonary metastases varied from zero to 122 months. Twelve patients had resection of the metastases within two years from the time of colonic resection, and in 23 patients, the interval was over two years. The difference in the cumulative five-year survival rate here is not statistically signifi-

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TABLE 1. *Classification of Primary Tumor*

	Number of Patients
Dukes' A	6
Dukes' B	13
Dukes' C	10
Not stated	6
TOTAL	35

TABLE 2. *Location and Size of Lung Metastases*

	Location		Size (cm)
	Unilateral	Bilateral	
Solitary	22		
Multiple	9	4	
Size			
Range			0.3-9
Mean			3
Median			2.5

cant (Fig. 2). Likewise, the difference in survival of the patients with solitary versus multiple metastases was not significant (Fig. 3). However, there was a statistically significant difference in survival rates based on Dukes' classification of the primary lesion (Fig. 4), with a 37.5 per cent five-year survival rate in patients whose large-intestinal cancer was Dukes' A

TABLE 3. *Thoracotomies Performed for Lung Metastases*

Number of Thoracotomies	Number of Patients	Total
1	30	30
2	4	8
4	1	4
	35	42

TABLE 4. *Resections for Lung Metastases*

Type	Number
Wedge/Segment	23
Lobe	18
Lung	1
	42

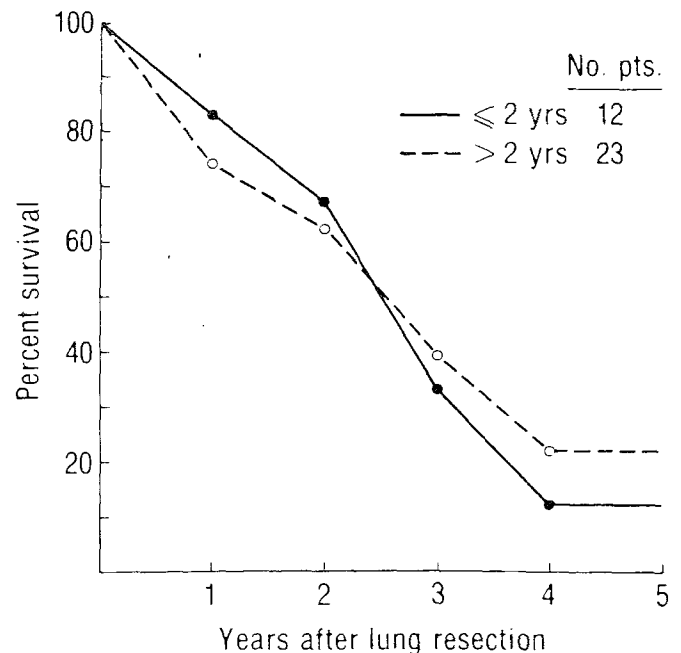


FIG. 2. Survival and disease-free interval.

compared with 15 per cent in those with a Dukes' C lesion. The cumulative five-year survival rate for the whole group was 22 per cent.

Table 5 lists the patients who survived five years or more following resection of their pulmonary metastases. Most of them had a localized lesion in the bowel, except for one who had positive nodes. The metastatic lesions were rather small and five patients out of six had prolonged disease-free intervals. As will be discussed later, solitary lesions are generally treated with a lobectomy, as was done with three out of four patients, except in patient #1 who was an increased operative risk for a lobectomy. Three patients are still alive and free of disease at 6, 6, and 11 years. The remaining three died of their disease at 5½, 7, and 7 years from the time of pulmonary resections.

Discussion

About 10 per cent of all patients with adenocarcinoma of the colon and rectum (slightly over 100,000 cases in the United States annually) will develop pulmonary metastases at some time during the course of their disease. The majority of these patients develop the lung lesions as one facet of their generalized disease; however about 10 per cent, *i.e.*, 1 per cent of the total, will develop metastases in the lungs alone. It is these approximately 1,000 patients per year who can be managed aggressively with surgery in an effort to prolong survival.

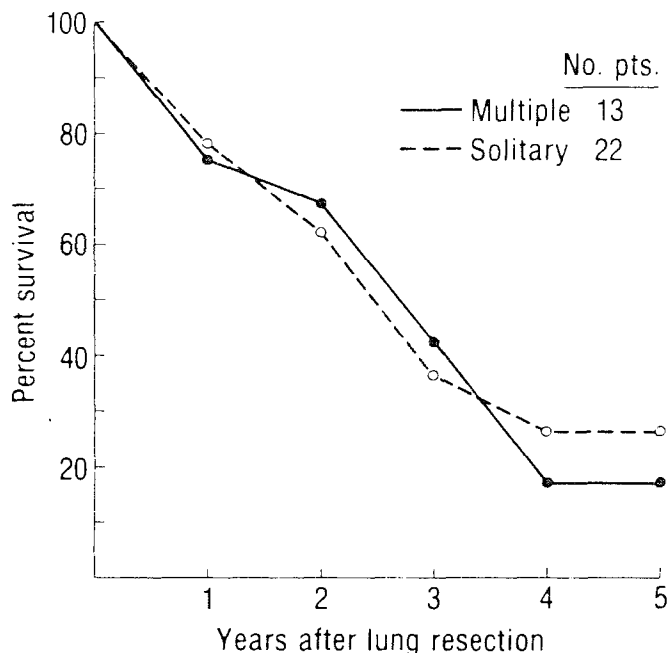


FIG. 3. Survival and number of metastases.

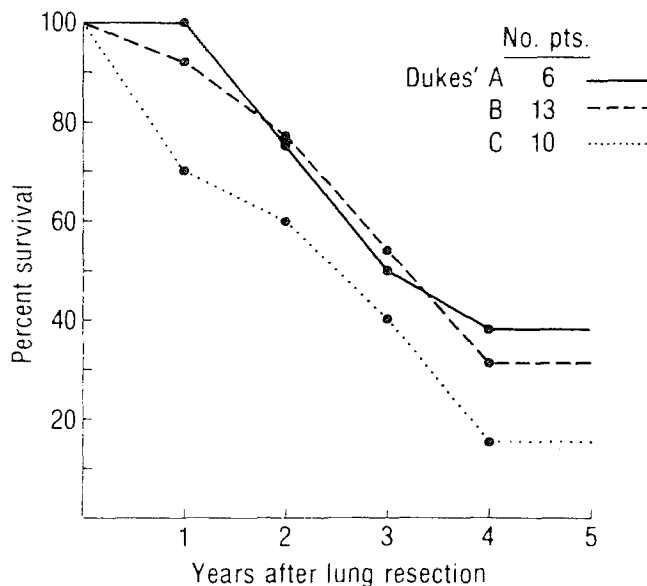


FIG. 4. Survival and Duke's classification of primary lesion.

The first pulmonary resection for metastatic carcinoma was performed by Barney and Churchill¹ in 1938 when a lobectomy carried out for a solitary lesion proved to be metastatic renal cell carcinoma. Subsequent nephrectomy led to long-term survival. Since that time resections for solitary, and eventually multiple, metastases from sarcomas and carcinomas have been the accepted treatment when the lungs are the only site of metastases.²

Our criteria for the resection of metastatic carcinoma to the lungs are 1) the primary tumor is controlled or controllable, 2) the lungs are the only site of metastases, 3) the patient is a good operative risk, and 4) no other comparable modality of treatment is available.

The search for other metastatic sites must be thorough, and a liver scan is done routinely, but bone

and brain scans are only done if there are symptoms. The extent of surgical excision is dictated by the number and location of the lesions; and as a general rule, conservation of lung tissue, while removing all tumor is the acceptable practice in treating lung metastases (*i.e.*, wedge presections).

A solitary lesion, proved to be adenocarcinoma, in a patient with a known large-intestinal cancer, may equally be either a lung primary or a solitary metastasis,³ and this poses a dilemma to the surgeon. In such instances, lobectomy is the procedure of choice if there are no contraindications.

From this analysis we feel that surgery should be offered to all patients with pulmonary metastases from carcinoma of the large bowel if they meet the criteria mentioned earlier.⁴ Since there are no other reliable modes of therapy, and pulmonary surgery nowadays is attended by so little risk, the survival results, although low, justify an aggressive surgical ap-

TABLE 5. Patient Who Lived Five Years or More after Pulmonary Resection

Patient	Age/Sex	Primary	Solitary or Multiple	Size (cm)	Interval between Operations	Type of Resection	Status	Survival (yrs)
Patient 1	70/M	Rectum, A	S	1.5	4 yrs	Wedge	NED*	6
Patient 2	63/M	Descending colon, A	S	1.5	4 yrs	Lobe	NED	11
Patient 3	77/M	Rectum, B	S	4	4 yrs	Lobe	DOD†	7
Patient 4	51/F	Right colon, B	S	?	5 yrs	Lobe	DOD	5.5
Patient 5	54/F	Sigmoid, B	M	0.5,1.5,2.5	2 mos	Wedges	DOD	7
Patient 6	62/M	Ascending colon, C	M	2.2,3.0	8 yrs	Wedges	NED	6

* No evidence of disease.

† Died of disease.

proach.^{5,6} The follow-up of patients with resected cancer of the large bowel should always include at least a yearly chest x-ray in order to detect metastases at an early stage for surgical excision, before they, in turn, propagate the disease.

Summary

A review of 35 patients who, over an 18-year period, underwent excision of pulmonary metastases from colorectal cancer, is presented. The cumulative five-year survival rate was 22 per cent, and this was significantly increased where the primary colonic cancer was Dukes' A or B. No difference in survival was found regarding the disease-free interval and the number of metastatic lesions. The follow-up of patients with colorectal cancer should always include

yearly chest x-rays; and when metastases developed in the lungs alone, surgery for their removal is recommended.

References

1. Barney JD, Churchill EJ: Adenocarcinoma of the kidney with metastasis to the lung cured by nephrectomy and lobectomy. *J Urol* 42: 269, 1939
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Announcement

THE COLON AND ITS DISEASES; Nutritional Management in Gastrointestinal Disorders; Selected Updates in Gastroenterology and Gastrointestinal Surgery—The American Gastroenterology Association Postgraduate Course will be held on May 17th and 18th, 1980, in the Salt Palace, Salt Lake City, Utah.

The first day of the course will be devoted to the colon, its structure, physiology, pathophysiology, and disease. Current therapeutic approaches to diverticular disease, the irritable bowel syndrome, inflammatory bowel disease, and parasitic disease will be discussed. New concepts of the pathogenesis of colonic cancer and approaches to screening and early detection in high risk groups will be presented. Registrants will spend two 80-minute sessions in break-out groups; one with expert radiologists and another with pathologists, reviewing radiographic and endoscopic biopsy approaches to the diagnosis of colonic disease.

The morning of the second day will present a discussion of nutritional therapy in gastrointestinal disorders. Approaches to nutritional assessment and intervention, both enteral and parenteral, will be outlined and then discussed in break-out sessions. In the afternoon, several short presentations will provide updates on the status of viral markers and vaccines in viral hepatitis, the practical value of serum bile acid measurements, laser therapy for G.I. bleeding, and newer surgical approaches to gastroesophageal reflux, the continent ileostomy, and liver transplantation.

For registration information, contact AGA Registration Supervisor, Charles B. Slack, Inc., 6900 Grove Road, Thorofare, New Jersey 08086