

Operative Treatment of Metastatic Pulmonary Cancer

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PULMONARY resection of a metastatic cancer with a 5-year survival of the patient was first reported by Barney and Churchill in 1938. The primary cancer was an adenocarcinoma of the kidney which had been treated by nephrectomy 15 months prior to pulmonary resection. The pulmonary metastasis was present at the time of primary treatment but was not resected until after an unsuccessful course of roentgen therapy. This patient was alive and without evidence of recurrence in 1944.² It is interesting that this resection for pulmonary metastasis was performed 4 months after the first successful pneumonectomy for primary carcinoma of the lung by Evarts Graham (April 1933).

The slow acceptance of pulmonary resection of metastatic cancer was evident in 1947, when Alexander and Haight¹ compiled only 24 reported cases of pulmonary resection of metastatic cancer. Since then reports have become more numerous but deal either with isolated instances of long-term survival or selected series of patients who underwent resections of metastatic disease.³⁻⁶

The purpose of this paper is to report 5-year survivals in a small group of patients selected for pulmonary resection from patients with metastatic pulmonary cancer.

Material

The records of patients with metastatic pulmonary cancer on the Thoracic Surgical Service at Barnes Hospital from January 1,

1951, to September 1, 1959 were reviewed. Complete clinical and follow-up data were available on these patients. Although resections for metastatic lesions had been performed in this institution prior to 1951, data on this earlier group were incomplete. All patients had proven extrapulmonary primary cancers with pulmonary metastasis demonstrated by x-rays.

Patients for pulmonary resection of metastatic lesions were selected according to the following criteria: 1) Complete control of the primary cancer; 2) Pulmonary metastasis was a solitary lesion by x-ray (except for 3 cases who had 2 discreet lesions); 3) No extrapulmonary metastases existed; and 4) Patient was a satisfactory operative risk.

Results

During the period of this study there were 229 patients of whom 24 (10.5%) had solitary pulmonary metastases (Table 1). The average time from diagnosis to the appearance of pulmonary metastases in 175 patients who did not have pulmonary metastases at the time of primary diagnosis is shown in Table 2.

There were 27 (11.8%) operations undertaken for cure. Four patients (15%) who had solitary lesions by x-ray were found at operation to have multiple metastases and to be non-resectable. There was one postoperative death (3.7%) due to pulmonary embolus. Of 27 patients undergoing operation there were six (22%) 5-year survivors, one with recurrent disease

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TABLE 1.

Site of Primary Carcinoma	Total Number of Patients	Number of Patients with Multiple Pulmonary Metastases	Number of Patients with Solitary Pulmonary Metastasis	Number of Patients with Pulmonary Metastases at Time of Diagnosis
Breast	49	45	4	7
Cervix	34	31	3	0
Gastrointestinal	28	24	4	9
Oropharynx	22	21	1	3
Bone and connective tissue sarcoma	18	15	3	3
Female genital (excluding cervix)	15	12	3	2
Bladder	14	13	1	5
Skin	10	10	0	3
Kidney	17	15	2	11
Prostate	9	8	1	4
Testes-penis	8	7	1	3
Adrenal and pancreas	5	4	1	4
Totals	229	205	24	54

(Table 3). These six 5-year survivors are 2.6% of the total series of 229 patients.

The average survival time of those who underwent resection but did not survive 5 years was 18 months. This included 1 patient with carcinoma of the cervix who survived 4 years after resection of the pulmonary metastasis. The average survival time of the 148 patients who were not operated upon was 6.9 months.

Among the 5-year survivors, there was one 31-year-old woman who had under-

gone a left adrenalectomy for a masculinizing adrenal carcinoma. Following adrenalectomy all masculinizing signs and symptoms disappeared. Two years later she had a recurrence of hirsutism and amenorrhea and a chest x-ray film showed a solitary pulmonary metastasis in the left lower lobe. Following pulmonary resection of the left lower lobe and the involved diaphragm symptoms again disappeared, and she remains alive and asymptomatic for 9 years. One 5-year survivor with recurrent osteo-

TABLE 2.

Site of Primary Carcinoma	Number of Patients Without Pulmonary Metastases at Time of Primary Diagnosis	Average Time (in months) from Primary Diagnosis until First Appearance of Pulmonary Metastases
Breast	42	47
Cervix	34	23
Gastrointestinal	19	20
Oropharynx	19	26
Bone and connective tissue sarcoma	15	36
Female genital (excluding cervix)	13	35
Bladder	9	23
Skin	7	24
Kidney	6	24
Prostate	5	34
Testes	5	32
Adrenal and Pancreas	1	65
Total	175	Mean 32

TABLE 3. *Five Year Survivors*

Primary Tumor	Type of Pulmonary Metastasis	Type of Pulmonary Operation
Adrenal	Single	Lobectomy
Bladder	Single	Lobectomy
Cervix	Single	Pneumectomy
Larynx	Single	Lobectomy
Fibrosarcoma of leg	Single	Lobectomy
Osteosarcoma of arm (with recurrent disease)	Multiple	Pneumectomy

genic sarcoma originally had a shoulder girdle amputation for osteosarcoma of the humerus. Thirty-eight months later metastatic lesions appeared in the right upper and right lower lobe. She underwent right upper lobectomy together with a wedge resection of the right lower lobe. Seventeen months later a metastasis became apparent in the right middle lobe, and she underwent right middle and lower lobectomy. This patient remains alive with evidence of recurrent disease in her right pleural space ten years after the last pulmonary resection.

Discussion

Since almost all pulmonary metastases arise as a result of tumor invasion of systemic veins with subsequent embolization to the pulmonary artery, there are few patients with solitary pulmonary metastasis who are suitable for pulmonary resection of metastatic cancer. Even amongst patients who appear to have solitary metas-

tases by x-ray, a significant number will be found to have multiple metastases at operation and will be non-resectable. However, on the basis of suggested criteria of operability a significant 5-year survival in these selected patients can be achieved. With a low operative mortality and an otherwise fatal disease pulmonary resection should be undertaken in this selected group. The average survival time after resection was almost three times longer in these patients than in those not operated upon.

Summary

From a series of 229 patients with pulmonary metastatic cancer 27 were selected for pulmonary resection of the metastases with six 5-year survivors.

References

- Alexander, J. and Haight, C.: Pulmonary Resection for Solitary Metastatic Sarcomas and Carcinomas. *Surg. Gynec. Obstet.*, **85**:129, 1947.
- Barney, J. J. D.: Twelve Year Cure Following Nephrectomy for Adenocarcinoma and Lobectomy for Solitary Metastasis. *J. Urol.* **52**:406, 1944.
- Gliedman, N. L., Horwitz, S. and Lewis, F. J.: Lung Resection for Metastatic Cancer. *Surgery*, **42**:521, 1957.
- Habein, H. C., Clagett, O. T. and McDonald, J. R.: Pulmonary Resection for Metastatic Tumors. *Arch. Surg.*, **78**:716, 1959.
- Hood, R. T., McBurney, R. P. and Clagett, O. T.: Metastatic Malignant Lesions of the Lungs Treated by Pulmonary Resection. *J. Thorac. Surg.*, **30**:81, 1955.
- Kelley, C. R. and Langston, H. T.: Treatment of Metastatic Pulmonary Malignancy. *J. Thorac. Surg.*, **31**:298, 1956.