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Pulmonary Metastatectomy and Survival Rate of Patients

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ABSTRACT

Background: *Although presence of pulmonary metastasis is indicative of disease progression and its untreatable nature, in recent decades, numerous efforts have been made for treatment of these patients by surgical resection of metastatic lesions. The efficacy of this procedure has been variable in various reports and different diseases. This study aimed to evaluate the effect of metastatectomy in survival rate of patients with pulmonary metastases who underwent metastatectomy in Masih Daneshvari hospital.*

Materials and Methods: *This was a retrospective study and we evaluated medical records of 99 patients suffering pulmonary metastasis who had been referred to our center during 1995-2007; out of which 48 patients who were qualified for metastatectomy underwent this operation. The required qualifications for surgery included: feasibility of resecting all metastatic lesions, tolerance of surgery by the patient, absence of metastatic lesions in organs other than the lungs, and control of primary disease. Information regarding the site of primary lesion and its pathology, time interval between the diagnosis of primary disease and metastasis, surgical morbidity and mortality, form of surgical procedure, type of incision, number of pulmonary metastases and survival rate of patients was collected. Patients were followed up via clinical visits. In case of insufficient clinical visits, we contacted the patient or his/her family and collected the rewired data. Obtained data were analyzed using SPSS software. To assess the patients' survival rate after the operation, Kaplan-Meier test was used.*

Results: *Sixty-seven pulmonary metastatectomies were conducted on 48 patients (31 males and 17 females) in the age range of 16-86 years (mean 40 yrs). Twenty-five patients had unilateral and 23 had bilateral metastases. Among patients with bilateral metastases, 7 underwent single-phase metastatectomy while 16 underwent two or multi-phase metastatectomy. Surgical incisions were done through the following approaches: in 60 cases through postero-lateral thoracotomy, in 4 cases through mid-sternotomy and in 3 cases through bilateral anterior-transverse thoracotomy along with sternotomy (clamshell). In 61 cases pulmonary metastatic lesion was removed by wedge resection, in 14 cases by lobectomy and in one case by pneumonectomy. Mean number of resected lesions was 6.7 (range 1 to 59). Post-operative complications occurred in 10 patients (15%) including pneumothorax in 9 cases and chylothorax in one. No morbidity, mortality or life-threatening complications occurred in any of the patients. The mean survival of patients following metastatectomy was 22 months (range 1 to 128 months) and their 5-year survival was 24.5% Five patients had 5 years (60 months) or more survival.*

Conclusion: *Although the under-study population was not homogenous pathologically, it seems that metastatectomy with acceptable morbidity, increases the survival of patients and in some cases results in their complete recovery.* ***(Tanaffos 2008; 7(1): 47-51)***

Key words: *Pulmonary metastasis, Metastatectomy, Survival.*

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INTRODUCTION

During the recent decades many efforts have been made for the treatment of patients suffering pulmonary metastasis by surgical resection of these lesions (1).

Resection of pulmonary metastatic lesions was first reported by Divis in 1927 in European literature (2). In North America, this procedure was first performed by Barney and Churchill in 1939. The lesion which was a metastasis originated from a renal cell carcinoma was resected through lobectomy. The patient also underwent nephrectomy and lived more than 20 years without recurrence (3).

From 1940 to mid 1960s, resection of pulmonary metastases was performed rarely and only in some selected cases (4). Since 1970s more indications have been suggested for surgical resection of pulmonary metastasis (4,5) and during the last 25 years, pulmonary metastatectomy has been considered as an acceptable method for the treatment of pulmonary metastases (6,7,8).

The main objective of removing pulmonary metastases is definite treatment of the disease or increasing the symptom-free period. But the results have been variable in various studies and the correlation between definite treatment and increased survival as well as different tumors and various stages of disease is still unknown. This study aimed to evaluate the effect of metastatectomy on the survival rate of patients suffering pulmonary metastases with various pathologies who underwent metastatectomy in our center.

MATERIALS AND METHODS

We studied the medical records of 99 patients with pulmonary metastasis who were referred to our center during a 12-year period (1995-2007), out of which 48 (48.5%) were eligible for metastatectomy and underwent surgery. The indications for metastatectomy were as follows:

- the feasibility of resecting all metastatic lesions
- tolerance of surgery by the patient
-absence of any other metastases (in organs other than the lungs)
- primary disease to be under control

The location of primary lesion and its pathology, time interval between the diagnosis of primary disease and metastasis, morbidity, mortality and surgical complications, type of surgical procedure, form of incision, number of pulmonary metastatic lesions and patients' survival were all evaluated in this study. Patients were followed up by visiting them in the clinic or calling them and obtaining the required data. Surgical procedures were performed by one of the attending physicians under one lung ventilation (usually by inserting double-lumen tube in trachea) and through a unilateral or bilateral posterolateral thoracotomy incision simultaneously or in two stages. When the number of metastatic lesions was low and they were located in the anterior segments of the lungs and lobectomy was not necessary, median sternotomy incision was made for simultaneous resection of bilateral metastases. Most metastatic lesions were resected by wedge resection method with or without using stapler (precision excision method). During clinical visits or phone conversations, patients were informed that they were being questioned for a medical research study and their consent was obtained. SPSS software and Kaplan-Meier test were used for data analysis and evaluation of the survival rate of patients respectively.

RESULTS

A total of 48 patients (31 males and 17 females) with a mean age of 40 yrs (range 16-86 yrs) underwent surgical operation during 1995-2007 (a 12-year period) and 67 pulmonary metastatectomies

were performed on these patients. Metastases were unilateral in 25 patients and bilateral in 23. Among those with bilateral metastases, 7 underwent one-stage metastatectomy while 16 underwent two or multi-stage metastatectomy. Surgical incisions included 60 posterolateral thoracotomies 4 midesternotomies and 3 bilateral anterior-transverse thoracotomies along with sternotomy (clamshell). Metastases were resected by wedge resection in 61 cases, by lobectomy in 14 and by pneumonectomy in one case. Mean number of resected lesions was 6.7 (range 1 to 59). Pathology of the lesions is shown in Table 1.

Post-operative complications included pneumothorax in 9 patients and chylothorax in one (total of 10, 15%). No life-threatening complication or mortality occurred in our patients. Mean survival of patients after metastatectomy was 22 months (range 1 to 128 months) and their 5-year survival was 24.5% (Figure 1). Five patients had 5 years (60 months) or more survival including one with melanoma with 128 months survival, one with limb osteosarcoma with 84 months, one with tracheal adenocystic carcinoma with 68 months and two with breast cancer and uterine leiomyosarcoma with 6 months (Table 2).

Table 1. Histology of metastases

Hislology	Number	Percentage
Sarcoma	24	50%
Adenocarcinoma	7	14.6%
Squamous carcinoid *	3	6.25%
Melanoma	2	4.15%
Choriocarcinoma	1	2.08%
Spindle cell tumor	1	2.08%
Meningioma	1	2.08%
Thymoma	1	2.08%
Adenocystic carcinoma	1	2.08%
Testicular tumor	7	14.6%
Total	48	100%

* Squamous carcinoid had been originated from parotid, mediastinium, and larynx.

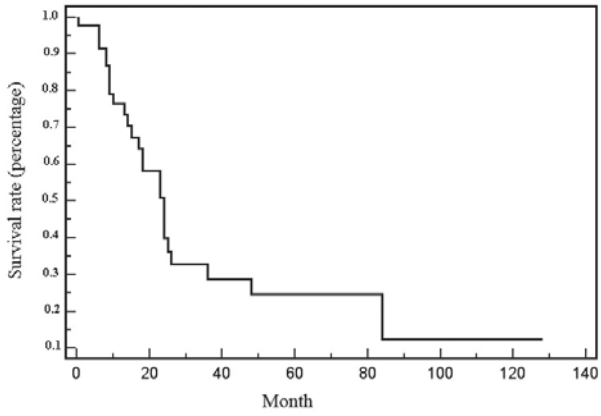

Figure 1.Survical rate of 48 patients who underwent metastatectomy

Table 2. Patients with long-term survival after metastatectomy.

Sex and age	Pathology	Site of metastasis (unilateral/bilateral)	Number of metastases	Type of surgical procedure	Survival (month)
47 year-old male	Melanoma	Bilateral	6	Right upper lobectomy, left lower lobectomy	128
26 year-old female	Metastatic osteosarcoma	Unilateral	1 (left)	Wedge resection	84
41 year-old male	Metastatic adenoid carcinoma	Bilateral	Numerous	Bilateral pulmonary wedge resection	68
50 year-old female	Metastatic breast cancer	Unilateral	1	Left Lower Lobectomy	60
45 year-old female	Leiomyosarcoma	Bilateral	2 (left), numerous right	Wedge resection of the left lower lobe Wedge resection of the right middle lobe	60

DISCUSSION

Although surgical resection of pulmonary metastases has been widely accepted by the surgeons (9,10,11) and is now used for several cancers with different histologies, there is not sufficient evidence to prove that this modality is beneficial for the patients (9).Therefore, it is necessary to share different clinical experiences in terms of patients, survival and complications of surgical procedures.

There were no morbidity, mortality or major surgical complications among our under-study patients.

Surgical procedures conducted on our patients included major surgeries such as unilateral or bilateral thoracotomies concomitant with pulmonary resections which indicate that metastatectomy is a safe procedure in eligible patients.

Five-year survival rate in our patients was 24.5% and 5 patients gained 60 to 128 months survival. There were some confounding factors affecting the survival rate of patients that we were unable to define their role in this study (including the effect of adjuvant therapies and nature of metastases with no medical intervention).However, considering the existing literature regarding the prognosis of pulmonary metastases with no surgical intervention, achieving this rate of survival is definitely due to medical interventions not the nature of these metastases (12-15). Also, long-term survival in five patients is definitely due to the positive effect of metastatectomy (Table 2). For example, one of these five patients had melanoma. He had a large tumor in the right upper lobe which was growing in spite of chemotherapy. After performing right upper lobectomy, the patient was symptom-free for 4 years but another large tumor appeared in left lower lobe. The patient underwent another lobectomy. It has been 6 years since the second operation and the patient has had no recurrences. In the remaining 4 patients , we definitely believe that metastatectomy has been responsible for their long-term survival.

Another point is that metastatectomy was only performed in half the patients referred to our center for pulmonary metastatectomy. The indications for metastatectomy have been defined in several studies and we selected our under-study patients according to these criteria (mentioned in materials and methods). Patients referred to our center for metastatectomy had been previously selected by an oncologist; never the less, almost half of them were not candidate for this procedure according to our criteria. We assume that a small percentage of all patients with pulmonary metastases are eligible for metastatectomy. This study had 2 conclusions: first, pulmonary metastatectomy is associated with almost no complication, morbidity or mortality (12) and secondly, this operation in some cases results in complete recovery or increased survival of the patient (16).

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