Results of Pulmonary Resection
Other Epithelial Malignancies

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KEYWORDS

• Breast cancer • Renal cell cancer • Metastasectomy • Lymphadenectomy • Lung metastases

KEY POINTS

- Detected pulmonary nodules in patients with breast cancer represent a second cancer in up to 60% of cases (usually lung cancer).
- For selected patients, a combination of systemic therapy and surgery is reasonable.
- The role of systemic therapy after metastasectomy in patients with oligometastases and long disease-free interval must be evaluated in the future.
- Complete resection of lung metastases from renal cell cancer in selected patients is the therapy of choice.
- Systematic lymph node dissection during pulmonary metastasectomy of renal cell cancer should be considered.

THE ROLE OF METASTASECTOMY IN PATIENTS WITH BREAST CANCER

Breast cancer is the second most common cancer worldwide. It is the most common for women, with 1.67 million cases diagnosed in 2012. Compared with other tumor entities, it is fifth in cases of death.[1] The 5-year survival rate is between 22% and 100%.[2] In the first 5 years, the tumor recurs in 30% of the patients. In these cases, up to 36% are a local recurrence, up to 58% a distant recurrence, and up to 6% a local and distant recurrence.[3] The incidence of lung metastases in patients with breast cancer is between 7% and 24%, and they are most common in HER2-positive and basal-like histologies.[4] The spectrum of therapy for metastatic breast cancer may include chemotherapy, targeted anti-HER2 therapy, hormonal therapy, surgical treatment, and radiation. Adjuvant and neoadjuvant treatment is now patient customized with better survival rates, even in overall survival (OS) or in progression free survival.[5]

Regarding the resection of lung metastases from breast cancer, there is no consensus found in the literature, but therapy may include chemotherapy followed by metastasectomy.[6] In our clinic, an observation period of at least 2 months from first diagnosed lung metastases is used. During this time, we can evaluate the dynamics of the disease, including the development of new pulmonary metastases or the development of extrapulmonary metastases. In general, the indications for operation are:

- Solitary nodules after treatment
- Residual nodule after chemotherapy
- Resectable metastatic recurrences

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Furthermore, there are palliative indications for metastasectomy:

- Tumor erosion into the airways with hemorrhage or septic complications
- Infiltration of the chest wall
- Therapy-resistant pleural effusion.[7]

Generally, prerequisites for operation are:

- Local control of primary tumor
- No extrapulmonary metastases (with possible exceptions)
- No alternative treatment available
- Resectability of all metastases
- Justifiable general and functional risks[7]

The final decision for an operative treatment should be made by an interdisciplinary tumor board that includes thoracic surgeons, oncologists, gynecologists, radiotherapists, and radiologists.

DIAGNOSIS

The European Society for Medical Oncology guidelines for breast cancer do not recommend a thoracic imaging in the follow-up of initial breast cancer therapy.[8] However, Singletary and colleagues[9] recommended that a chest radiograph should be part of the follow-up to detect early lung nodules, and computed tomography (CT) is most commonly used to evaluate lung metastases.[10] In addition fluorodeoxyglucose PET (FDG-PET), alone or in combination with CT (FDG-PET/CT), improves the ability to assess for intrathoracic and extrathoracic metastases and to evaluate the response to medical treatment.[11] MRI is reserved for patients with locally invasive chest wall lesions.[12,13] Despite all radiological techniques Vogt-Moykopf and colleagues[7] showed that only 39% of the preoperatively diagnosed number of metastases corresponds to the postoperative number of metastases. They showed that palpation of the lung is the most sensitive procedure for detecting lung metastases.[7] Cerfolio and colleagues[13] confirmed this conclusion fifteen years later. They resected suspected nodules per thoracotomy, which normally could be resected by thoracoscopy. In their results they found 37% nodules, which were not seen by imaging and 48% of them were metastases.[13]

LUNG CANCER VERSUS METASTASIS BREAST CANCER

If a solitary pulmonary nodule is detected in a patient with breast cancer, in approximately 60% of cases it represents a second primary cancer (usually lung cancer), in about 30% it represents metastasis of the breast cancer, and in 10% it is benign.[14] For this reason it is essential to prove the histology before metastasectomy when possible. It can also be very difficult for the pathologist to differentiate between a breast cancer and a lung cancer in the intraoperative frozen section, especially for adenocarcinomas.

A fine-needle biopsy to get tissue can be done by bronchoscopy (central nodule) or CT (peripheral). Additionally, a video-assisted thoracoscopy can help determine if the nodule is reachable. If it is not reachable, a thoracotomy with intraoperative frozen section can be an option.[15]

In addition to the diagnosis of pulmonary nodules, lymph node involvement plays an important role. One fourth of the patients with resected lung metastases from breast cancer have lymph node metastases.[6,16] The cause might be the central location of the lung metastases and the direct pathway through lymph vessels. This differs for the primary tumor entities (**Figs. 1** and **2**).

In cases of lymph node metastases of breast cancer especially, FDG-PET and PET/CT are more sensitive than CT of the chest.[11]

SURVIVAL

The role of pulmonary metastasectomy in patients with breast cancer is patient specific, depending on the use and response to previous treatment, receptor status of the primary tumor, and other factors. This decision should be made for every patient by a multidisciplinary tumor board.

The first resection of a pulmonary metastasis from breast cancer was in 1921 by Röpke.[17] Yoshimoto and colleagues[18] reviewed the survival of their patients with breast cancer metastases after metastasectomy from 1960 to 2000. The 5-year survival rate was 54%, and the 10-year survival rate was 40%, with a median survival of 6.3 years. The 5-year survival rate in the studies before 2000 ranges from 31% to 62% with a median survival between 33 and 54 months.[7,19–22] After 2000, the

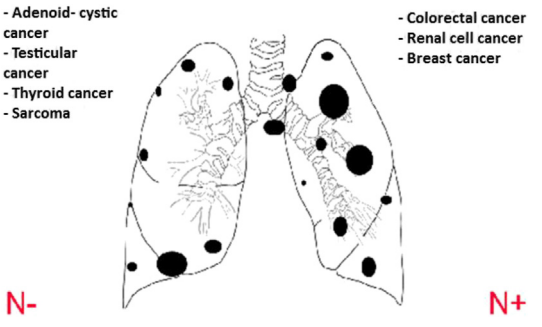

Fig. 1. Metastatic spread of different tumor entities.