

# Combined Surgical Approach for Sarcoma Lung Metastasis with Atrial Involvement

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## ABSTRACT

A 20-year-old patient, who had been treated for a femur sarcoma with pulmonary metastases 8 years before, arrived at our institution with a new metastatic hilar lung nodule. During the standard lobectomy procedure an unexpected atrial invasion by the tumor was discovered. Intraoperative transesophageal echocardiography (TEE) showed a big pediculated tumor in the atrium. Cardiopulmonary bypass (CPB) was required in order to safely resect the atrial wall with the tumor. The atrial defect was repaired with a pericardial patch. Postoperative course was uneventful. After 14 months, the patient is asymptomatic and free of disease.

## KEY WORDS

Osteosarcoma surgery - Pulmonary metastases - Bone neoplasm

## INTRODUCTION

Protocols of neoadjuvant chemotherapy have changed the prognosis of malignant bone tumors. Survival in these patients is increasing, but pulmonary metastases have begun to be a complication in the evolution of resected tumors [1]. Surgery is the treatment of choice when all tumorous tissue can be resected.

Intra-atrial extension of lung tumors is a very uncommon situation, but the associated mortality is very high. Surgery has to be safe for the patient and complete from the oncological point of view. Here we report an intra-atrial extension of a sarcoma metastasis discovered intraoperatively and the surgical approach followed is discussed.

## CASE REPORT

A 20-year-old man had been treated for a femur sarcoma with pulmonary metastases 8 years before. The treatment at that time consisted of conservative surgery of the

extremity, intensive chemotherapy [2], and wedge resection of the pulmonary metastases by right thoracotomy. He now presented for one further right-sided pulmonary nodule, measuring 6 cm, discovered after one episode of hemoptysis. A CT scan apparently showed no mediastinal extension and no adenopathies. Chemotherapeutic options were limited. A thoracotomy was proposed. The nodule was localized hilar in the right lower lobe, so a right lower lobectomy was performed. When the inferior pulmonary dissection started, a mass was palpated in the vein without infiltrating the wall. A TEE performed intraoperatively showed a big pediculated tumor in the pulmonary vein and left atrium (Fig. 1). Partial resection of the atrium with use of a clamp was rejected due to the risk of tumor embolisation. Therefore, resection of the atrium wall using CPB was decided on. Once the patient was on CPB a large incision was performed close to the interatrial groove, and the pulmonary vein including the tumor was sectioned without any problem. The small defect was covered with a pericardial patch. There were no postoperative complications, and the patient is, 14 months after surgery, alive, asymptomatic, and free of disease.

## **DISCUSSION**

Survival curves following pulmonary metastasectomy show an actuarial 5-year rate of 46% and a 10-year rate of 32% [3,4]. Complete resection of the lung metastases is the most important prognostic factor for long-term survival [5, 6]. Other parameters such as disease-free interval, tumor-doubling time, and number or size of metastatic lesions are not so important. But the pattern of relapse in sarcoma pulmonary metastasis is changing. It could be in relationship with changes in the protocols of adjuvant chemotherapy [7]. We have seen some cases where metastases tend to be isolated, more hilar and bigger when a relapse, as in this patient. This is important, because it makes it more difficult to obtain a complete resection. Extended resections can be accomplished in selected cases with acceptable results, but in this case there also was a problem of the safety of the patient: there are scattered reports in the literature about the risk of embolization of the tumor during the surgical procedure [9]. Recently, a staged surgical excision of the tumor has been proposed [10], but it is necessary to have preoperative knowledge of the extent of the tumor.

At the present, CT scanning is the most sensitive method to demonstrate pulmonary metastases, and it has become the standard tool for the follow-up of patients at risk for pulmonary metastases [11,12]. It allows a clear presentation of the areas closely adjacent to the chest wall, paravertebral region, and ventral and dorsal sinus areas, but misinterpretation of structures in the central pulmonary regions are still possible, as happened in our case: a metastatic tumor had grown into the inferior pulmonary vein and left atrium, without infiltrating the venous wall. Intraoperatively TEE proved to be a very useful tool. We were able to accurately estimate the degree of atrial invasion and the amount of tumor in the atrium so that, finally, resection of the atrium wall using CBP was decided on. The defect created in the atrium was easily covered with a pericardial patch, without any postoperative hemodynamic repercussion.

Although the use of CPB complicates the procedure, it reduces the risk of tumor embolization and makes the surgical resection more accurate. A point of major concern, however, is the increase in metastatic disease which has been linked to the

extracorporeal circulation used during open-heart surgery. Various studies have addressed this issue in patients with lung cancer and coronary disease where resection of the tumor and coronary revascularisation were done at the same time [13,14]. In our case since the tumor was in the pulmonary vein, we believed that there was not an increased risk of dissemination by using CBP.

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**Figure 1.** TEE showing a big pediculated mass growing from the inferior right pulmonary vein into the left atrium (RA = Right Atrium; RV= Right Ventricle; LV = Left Ventricle; LA = Left Atrium; T = Tumor).