such as this are important in the continued development of hybrid technologies for use in patients with in congenital and structural heart disease.

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Palliative role of percutaneous radiofrequency ablation for severe hemoptysis in an elderly patient with inoperable lung cancer

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Surgical resection remains the standard therapeutic treatment for patients with resectable non-small cell lung cancer and for selected patients with limited pulmonary metastases from extrathoracic tumors, even if only a small number of patients are suitable for potentially curative resection.^{1,2} Percutaneous image-guided radiofrequency ablation (RFA) is a minimally invasive therapeutic option that has been successfully applied to local control of tumors in different organs including the lung.^{3,4} This technique has recently been recognized as the primary therapy in patients who are not candidates for limited surgery or radiotherapy and can be used to treat recurrent lesions.⁴ The procedure is well tolerated and the complication rate is acceptable even when considering the treatment of large masses.^{4,5} We report a case of an elderly patient with advanced lung cancer leading to severe and recurring hemoptysis that was successfully treated with RFA.

CLINICAL SUMMARY

An 82-year-old woman was referred to our department with right lung cancer complicated by severe and recurring hemoptysis necessitating repeated blood transfusions. The tumor was 6 × 6 cm in size, located in the peripheral paren-

chyma of the lower lobe, with pathologic hilar and mediastinal lymph nodes. Three months earlier, she had been excluded from both surgery and medical treatment owing to the tumor stage (IIIB) and respiratory and cardiac comorbidities. Several bronchoscopic examinations were performed showing blood in the airways without any evident endobronchial source of the bleeding. Endobronchial cauterization was unfeasible to control the hemoptysis because there was no evident endobronchial source of the bleeding. No bronchial or pulmonary vessels supplying the mass were identified in an arteriogram, and embolization was also impossible. In the hope of controlling the bleeding by sclerosing the tumor, we attempted a percutaneous RFA, despite the size of the mass and the tumor stage. The procedure was performed under a nonenhanced computed tomographic (CT) scan by RF 3000 Radiofrequency Generator with a 16-gauge, 15-cm long, 4.0-cm array diameter LeVeen CoAssess Electrode (Radiotherapeutics, Boston Scientific Corporation, Natick, Mass), starting from 30 up to 160 watts (Figure 1) and repeated more in depth in the mass starting from 30 up to 120 watts (Figure 2). The hemoptysis was successfully controlled after the procedure. A minimal pleural effusion without pneumothorax occurred. At the 6-month follow-up, the patient was free from bleeding and the mass was reduced to 5 × 5 cm. One year after the procedure the patient died of distant metastases.

DISCUSSION

The safety and feasibility of percutaneous RFA for unresectable lung cancers have now been considered by several authors.^{1,2,5} Survival time and efficacy of the procedure are significantly longer in patients with completely ablative tumors.² Tissue ablation adequacy depends

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FIGURE 1. Nonenhanced CT scan showing a 6 × 6 cm lung cancer on the inferior right lobe. A multitined expandable array was inserted under CT guide and the procedure was performed starting from 30 up to 160 watts and repeated from 30 up to 120 watts. CT, Computed tomographic.

on the extent of necrosis that is in inverse proportion to the tumor size. Tumors of 3 cm or less guarantee complete necrosis and better survival.⁴ These findings indicate that RFA may provide a promising alternative therapy in the management of lung tumors, especially for patients not amenable to surgery.⁶ Furthermore, this technique allows ablation of the tumor tissue without damaging the surrounding normal parenchyma² so that this procedure can be performed also in patients with severe lung or cardiovascular comorbidities.⁶

Our patient had a cancerous mass, 6 cm in size, in the right lung that was complicated by a severe life-threatening hemoptysis causing anemia and repeated blood transfusions. As performing laser coagulation and arterial embolization was impossible, we decided to perform RFA despite the tumor size of 6 cm to control the bleeding. Our patient received RFA of the tumor by the standard technique and the hemoptysis was successfully controlled immediately after the procedure. Furthermore, at the 3- and 6-month follow-up examinations with CT scan, the lesion appeared stable and had reduced to 5 cm in size. It is important to underline

FIGURE 2. Nonenhanced CT scan: the array was reinserted more in depth in the mass and the procedure was repeated. CT, Computed tomographic.

that we did not observe major complications after the procedure.

Our experience shows that RFA can be helpful in the management of hemoptysis complicating lung cancer that is not suitable for other treatments such as endobronchial coagulation or embolization. We suggest a further indication of this technique in the management of complicated unresectable non-small cell lung cancer.

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