Radiofrequency Ablation of Lung Metastases from Adenoid Cystic Carcinoma of the Head and Neck: Retrospective Evaluation of Nine Patients

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ABSTRACT

Purpose: To retrospectively evaluate the outcomes of radiofrequency (RF) ablation of lung metastases from head and neck adenoid cystic carcinoma (ACC).

Materials and Methods: Nine patients (two men and seven women; mean age, 61.6 y) with 45 lung metastases (mean diameter, 1.1 cm; range, 0.4–2.7 cm) from head and neck ACC underwent RF ablation in 30 sessions. Primary endpoints were technical success, technique effectiveness, and procedural complications. Secondary endpoints included overall survival (OS).

Results: RF ablation was technically successful for all 45 metastases. The median tumor follow-up period was 37.1 months (range, 12.9–128.3 mo). Local progression occurred in six tumors, two of which were treated again and subsequently showed complete response. Major complications (pneumothorax requiring chest tube placement) occurred in five sessions (16.7%). The median patient follow-up period was 61.6 months (range, 20.5–134.5 mo). Two patients died of disease progression at 38.9 and 61.6 months after RF ablation, respectively, whereas the other seven remained alive at the end of the study. OS rates from the initial RF ablation were 100% at 3 years and 83.3% at 5 years (mean survival time, 106.4 mo). OS rates from the treatment of the primary site were 100% at 5 years and 62.5% at 10 years (mean survival time, 210.1 mo).

Conclusions: Radiofrequency ablation is an acceptable and effective local treatment for lung metastases from head and neck ACC. However, further study is needed to evaluate its effect on patient survival.

ABBREVIATIONS

ACC = adenoid cystic carcinoma, OS = overall survival, PET = positron emission tomography, RF = radiofrequency

Adenoid cystic carcinoma (ACC) is a rare malignancy, accounting for 1% of all head and neck cancers (1). This type of tumor exhibits unique malignant characteristics, such as slow growth and a high rate of systemic metastases. The lungs are the most frequent site of metastasis, and the median time to disease recurrence in the lungs has been reported to be between 28.7 and 45.0 months (2–4). Although results of surgical and systemic chemotherapy treatments for lung metastases from head and neck ACC have been previously reported in the literature (4–10), a standard management protocol for the disease has not been established. In the present study, we retrospectively evaluated the outcomes of radiofrequency (RF) ablation in nine patients with lung metastases from head and neck ACC.

MATERIALS AND METHODS

Informed consent was obtained from all patients before RF ablation. Our institutional review board approved this retrospective study and waived the informed consent requirement for the use of medical data from these patients.

Patients and Tumors

The characteristics of the studied patients are summarized in the **Table**. From July 2001 to March 2013, 11

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Table. Summary of Information on Patients, RF Ablation Procedures, and Follow-up Results

Pt. No./Age (y)/Sex	Primary Site	Therapy of Primary Lesion	RF Ablation Sessions/ Treated Tumors	Curative RF Ablation	Follow-up (mo)		Survival
					From Initial RF Ablation	From Therapy of Primary Site	
1/65/F	Ear canal	Surgery	1/1	Yes	86.8	176.2	Alive
2/54/F	Floor of mouth	Surgery	5*/6	Yes	134.5	280.5	Alive
3/59/F	Floor of mouth	Surgery	6/10	No	80.8	90.4	Alive
4/62/M	Oropharynx	Surgery, RT	4/10	No	38.9	73.8	Dead
5/74/F	Maxilla	Surgery, RT	3/3	No	61.6	107.8	Dead
6/54/F	Maxilla	Surgery, RT	5/8	Yes	77.6	147.0	Alive
7/60/F	Submandibular gland	Surgery	2/3	Yes	31.3	40.5	Alive
8/61/M	Floor of mouth	Surgery, RT	3/3	Yes	25.5	42.2	Alive
9/65/F	Tongue	Surgery	1/1	Yes	20.5	41.5	Alive

RF = radiofrequency, RT = radiation therapy.
*Includes two repeat sessions.

patients with 53 lung metastases from head and neck ACC received percutaneous RF ablation at our institution. Among these patients, two with eight ablated tumors were not available for follow-up visits after 3 and 9 months, respectively, and were excluded from the study. Nine patients (two men and seven women; mean age, 61.6 y ± 6.1 [standard deviation]; range, 54–74 y) with 45 lung metastases were included. For treatment of the primary site, all nine patients underwent surgical resection. In addition, four also received postoperative adjuvant radiation therapy. The mean and median intervals between the date of treatment of the primary lesion and the date of initial lung RF ablation were 49.2 and 34.9 months (range, 9.2–146.0 mo), respectively.

Three nodules in three patients were histologically confirmed to be metastases from head and neck ACC based on samples obtained from computed tomography (CT)–guided lung biopsy. Other pulmonary metastases were diagnosed based on the results of serial CT images in which newly detected and/or enlarging nodules were diagnosed as pulmonary metastases without histopathologic confirmation. One patient with a solitary lung metastasis underwent positron emission tomography (PET)/CT before RF ablation treatment. In this patient, [^{18}F] fluorodeoxyglucose accumulation was observed in the single tumor for which RF ablation was performed. The mean tumor diameter was 1.1 cm ± 0.5 (range, 0.4–2.7 cm). Thirty ablation sessions were performed to treat these tumors, including two repeat sessions conducted in cases of local tumor progression. Of these, 18 ablation sessions were conducted for the treatment of one metastasis each, eight were conducted for two each, three were conducted for three each, and one was conducted for four lesions.

Among the included patients, three had received previous treatment for lung metastases, including surgical resection and/or chemotherapy. No extrapulmonary distant metastases were detected in any patient included in the study. In six patients, all lung tumors were ablated (ie, curative therapy group), whereas RF ablation was performed to reduce lung metastatic burden in the other three patients (ie, noncurative therapy group). Four of the nine patients have previously been included in another publication (11) that reported the results of 128 patients treated between June 2001 and April 2006.

RF Ablation Technique

Detailed technical aspects of the RF ablation procedure conducted at our institution have been described previously (12). Briefly, RF ablation was performed percutaneously with the use of CT fluoroscopy (Asteion or Aquilion; Toshiba, Tokyo, Japan) in all sessions.

After local anesthesia with lidocaine and conscious sedation had been achieved, an electrode, which was connected to a generator, was introduced into the tumor, and then ablation was started. The electrodes used for the ablation included a multitined expandable electrode (LeVeen; Boston Scientific, Natick, Massachusetts) with an array diameter of 2 cm (n = 28) or 3 cm (n = 8), and a single internally cooled electrode (Cool-tip; Covidien, Mansfield, Massachusetts) with a 1-cm (n = 2), 2-cm (n = 7), or 3-cm (n = 2) noninsulated tip. Although a multitined expandable electrode was preferred, an internally cooled electrode was employed when the use of multitined expandable electrodes was deemed hazardous (eg, in cases of apical or hilar lesions). The procedure aimed at ablation of the tumor and at least a 5-mm margin.

Chest CT with 5-mm and/or thinner slice thickness was performed immediately after each RF ablation procedure to evaluate the ablation zone and procedural complications. A chest radiograph was obtained 3 hours after the completion of RF ablation and in the following morning to assess the occurrence of complications.