Lobectomy due to Pulmonary Vein Occlusion after Radiofrequency Ablation for Atrial Fibrillation

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Radiofrequency ablation is an effective treatment for atrial fibrillation. Pulmonary vein stenosis/occlusion is one of its rare complications. Herein, the case of a 50-year-old man with hemoptysis and migratory pulmonary infiltrations after transcatheter radiofrequency ablation for atrial fibrillation is presented. Initially, pneumonia, interstitial pulmonary disease, or lung cancer was suspected, but wedge resection revealed hemorrhagic infiltrations. Chest computed tomography pulmonary angiography detected no left superior pulmonary vein due to its total occlusion, and left upper lobectomy was performed. Post-ablation pulmonary vein occlusion must be strongly suspected in cases of migratory pulmonary infiltrations and/or hemoptysis.

Key words: 1. Ablation
2. Venous thrombosis
3. Stenosis, pulmonary vein

Case report

Radiofrequency catheter ablation (RFA) is a widely applied and effective means of treatment to eliminate atrial fibrillation (AF). Although high success rates have been reported, pulmonary vein stenosis (PVS) is a major, potentially lethal complication [1]. Pulmonary vein occlusion (PVO), though rare, is the most serious manifestation of PVS [2]. Major pulmonary interventions, such as lobectomy, may be necessary in such cases [3]. Herein, we present a case of such a major post-ablation complication. Written informed consent for publication was obtained from the patient.

A 50-year-old man was admitted to Evangelismos

General Hospital of Athens because of repeated hemoptysis and persistent migratory infiltrations of his left upper pulmonary lobe, first diagnosed 5 months ago. He previously suffered from AF, and had no other significant medical history. AF had been successfully converted to sinus rhythm via RFA 8 months earlier, after a strenuous second ablation session. Three months later, he was diagnosed with pneumonia due to pulmonary infiltrations of the upper lobe. Although he received antibiotics, the infiltrations persisted but migrated, although they remained in the left upper lobe (Fig. 1). His medical course was complicated, with repeated hemoptysis 2 months later. Interstitial pulmonary disease or lung cancer was suspected at the time of admission to our hospital.

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Fig. 1. Chest computed tomography images taken 3 months after the initial radiofrequency catheter ablation procedure (A) and 3 months later (B), showing left upper lobe migratory infiltrations.

Fig. 2. Left upper lobe with occluded superior pulmonary vein. (A) Patchy hemorrhagic infiltrations on the right and alveolar hemosiderin-laden macrophages on the left. (B) The yellow arrow shows the contracted left upper lobe, whereas the blue dotted line corresponds to the interlobar fissure. (C) Left upper lobe after its excision. (D) Dilatation and thickening of the superior pulmonary vein wall and thrombus development within.

Wedge resection of 3 different segments of his upper lobe was performed, but no malignancy was detected. The histologic findings revealed patchy hemorrhagic infiltrations and a marked increase in alveolar hemosiderin-laden macrophages typical of chronic pulmonary hemorrhage (Fig. 2A). Postoperative chest computed tomography (CT) pulmonary angiography did not detect the left superior pulmonary vein due to RFA-induced total occlusion. Hence, the left upper lobectomy was completed (Fig. 2B, C) and recovery was uneventful. Final histology revealed severe dilatation and thickening of the superior pulmonary vein wall, as well as thrombus development

within (Fig. 2D).

Discussion

Although effective against AF, RFA carries a risk of major complications, which have been reported to occur in 1.4%–6% of patients in previously published studies. The reported complications include transfusion, surgical intervention, or a prolonged hospital stay due to peripheral vascular complications, pericardial effusion or tamponade, thromboembolic events (transient ischemic attacks, stroke, or mesenteric embolism), deep vein thrombosis, phrenic nerve

palsy, atrioesophageal fistula, PVS, and PVO, and, extremely rarely, procedure-related mortality can occur [4-6]. Cappato et al. [7] reported a 4.5% major complication rate in their updated worldwide survey of RFA for AF that included 20,825 RFA procedures in 16,309 patients with AF between 2003 and 2006 from centers all over the world. Tamponade, the most frequent complication, was reported in 213 cases. There were 25 procedure-related deaths, 28 cases of permanent phrenic nerve palsy, 37 strokes, 115 transient ischemic attacks, 152 femoral pseudoaneurysms, and 213 episodes of tamponade. The incidence of other complications, including pneumothorax, hemothorax, sepsis, abscesses, endocarditis, total arteriovenous fistulae, valve damage requiring surgery, and atrium-esophageal fistulae, was less than 0.09%. New-onset iatrogenic atypical atrial flutter was also reported in 1,404 patients, whereas significant PVS was reported in 216 cases. Forty-eight of these cases required a corrective intervention [7].

PVO is defined as >95% stenosis or complete loss of patency of a pulmonary vein as seen on chest CT, leading to a gradual decline in arterial flow in the affected pulmonary lobe. Atelectasis, infarction, or recurrent infections are the final result of the subsequent tissue edema and ischemia [2]. Hemoptysis, exertion dyspnea, intractable cough, and recurrent pulmonary infections are the most common clinical manifestations [1], so PVO can be easily confused with pulmonary embolism, pneumonia, tuberculosis, new-onset asthma, interstitial pulmonary disease, or lung cancer [1,8]. Chest CT angiography, magnetic resonance perfusion imaging, and catheter pulmonary venography confirm the diagnosis. Pulmonary consolidation shadows and pleural effusion are typical imaging characteristics [1]. Early intervention is vital to restore venous and arterial blood flow to the affected lung [1,2]. Although balloon angioplasty and stent implantation are potential therapeutic modalities, high restenosis rates have been noted [1-3]. In restenosis cases, as well as in cases of total occlu-

sion, removal of the impaired lung is imperative to avoid lung necrosis [2,3]. In summary, PVO, though rare, must be strongly suspected in cases of migratory pulmonary infiltrations and/or hemoptysis after RFA for AF [1,2].

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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