

Synchronous Roentgenographically Occult Lung Carcinoma Treated with Argon Plasma Coagulation in a Patient with Resectable Primary Lung Cancer

Departments of ¹Internal Medicine, ²Chest Surgery, ³Pathology, ⁴Diagnostic Radiology, Konyang University College of Medicine, Daejeon, Korea

Mi-Hye Kwon, M.D.¹, Mi-Il Kang, M.D.¹, Ji-Hyun Jeong, M.D.¹, Hee-Kwan Won, M.D.¹, Hyun-Woong Park, M.D.¹, Jung-Ho Park, M.D.¹, Sung-Tae Kim, M.D.¹, Sun-Jung Kwon, M.D.¹, Eugene Choi, M.D.¹, Moon-Jun Na, M.D.¹, Hyun-Min Cho, M.D.², Young-Jin Kim, M.D.², Yoon-Mee Kim, M.D.³, Young-Jun Cho, M.D.⁴, Ji-Woong Son, M.D.¹

수술적 절제가 가능한 원발성 폐암 환자에서 병발된 방사선학적으로 발견되지 않은 동시성 원발성 폐암을 아르곤 플라즈마 응고소작술로 치료한 1예

권미혜¹, 강미일¹, 정지현¹, 원희관¹, 박현웅¹, 박정호¹, 김성태¹, 권선중¹, 최유진¹, 나문준¹, 조현민², 김영진², 김윤미³, 조영준⁴, 손지웅¹

건양대학교 의과대학 ¹내과학교실, ²흉부외과학교실, ³조직병리학교실, ⁴영상의학교실

1990년대 초부터 형광 기관지 내시경이 임상 진료에 사용되면서 방사선검사에서 나타나지 않는 상피내 폐암이나 미세하게 진행된 조기 폐암의 진단 빈도가 늘어났으며, 이러한 상피내 폐암의 과반수 이상에서 진행성 폐암으로 진행하므로, 근치적 목적의 치료가 더욱 조기에 도입될 수 있어 폐암 치료에서의 중요한 진단 도구가 되었다. 치료적 내시경술의 발달로 기존의 진행된 폐암에서 기도 폐쇄 감소 혹은 출혈 부위의 지혈 등의 완화적 목적뿐 아니라, 조기 폐암이지만 심폐 기능 등 전신 상태의 문제로 수술이 불가능한 환자에서 근치적 치료로도 이용되고 있으며, 특히, 수술의 절제 범위를 축소시키는 효과를 가져올 수 있다. 아르곤 플라즈마 응고소작술(argon plasma coagulation, APC)은 레이저와 광역학 치료법(photodynamic therapy, PDT) 등에 비하여 조기 폐암 병변의 치료에서 근치적 치료 및 진행성 폐암에서의 완화요법으로서 효과면에서 동등하고, 특히 침투 범위가 얇으므로 표재성의 병변에서 탁월하며, 경제적 접근성이 용이하다. 저자들은 우측 상엽의 절제 가능한 폐암에 우측 하엽에 상피내 암이 동반된 동시성 원발성 폐암 환자를 우측상엽절제와 APC로써 치료한 증례 1예를 경험하여 보고한다. (*Tuberc Respir Dis* 2008;65:137-141)

Key Words: Synchronous Roentgenographically Occult Lung Carcinoma (ROLC), Carcinoma in situ, Argon Plasma Coagulation (APC)

Introduction

The development of the autofluorescence bronchoscopy (AFB) technique in the early 1990s in addition to traditional sputum cytology methods enabled early detection of both bronchial intraepithelial neoplasia and

lung cancer in central airways. Even though this advancement allowed for earlier intervention, it unfortunately did not achieve significantly increased survival rates¹. Recently the prevalence of synchronous roentgenographically occult lung carcinoma (ROLC) in patients with resectable primary lung cancer was determined to be relatively high, 9.3%, by AFB and biopsy². Carcinoma *in situ* (CIS) diseases from the bronchus are known to progress to invasive carcinomas in more than half of the cases. Surgical resection remains the primary curative treatment of lung cancer. However, several endobronchial treatment modalities are available for curative or palliative purpose in inoperable patients

Address for correspondence: Ji-Woong Son, M.D.

Department of Internal Medicine, Konyang University Hospital, 685, Kasuwon-dong, Seo-gu, Daejeon 302-718, Korea

Phone: 82-42-600-8817, Fax: 82-42-600-9090

E-mail: sk1609@hanmail.net

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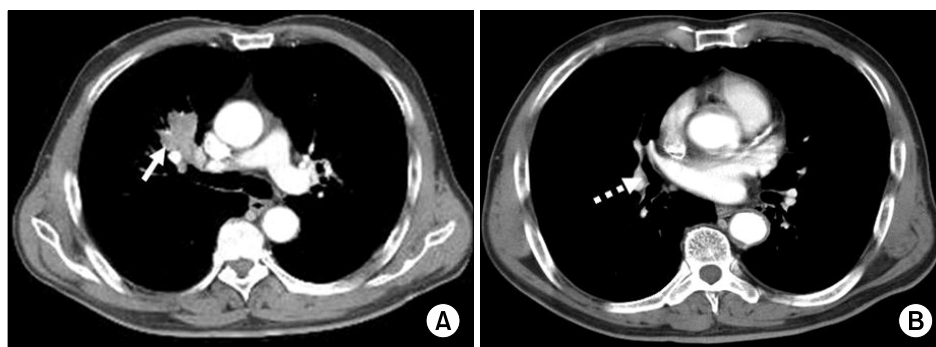


Figure 1. Preoperative images of CT showed (A) about 3.7×2.7 cm sized heterogenous enhancing low density mass with total obstruction of anterior segmental bronchus of right upper lung (solid arrow), (B) proximal portion of right middle and lower bronchus is unremarkable (dashed arrow).

with limited cardiopulmonary reserve³. Synchronous second primary lung cancer in non small cell lung cancer (NSCLC), is not a rare phenomenon and current guidelines recommend considering curative surgical resection for both of types of lesions, invasive mediastinal staging and extrathoracic imaging. We report a case of synchronous double primary lung cancers that were treated with lobectomy for lung mass and argon plasma coagulation (APC) for another lesion of CIS.

Case Report

A 68 year-old male patient visited our hospital for evaluation of an incidental right upper lung mass that was found in a chest x-ray performed at a routine check-up. The patient was a current smoker with 15 pack-years of smoking history. In addition, he had been diagnosed with hypertension and diabetes mellitus and was on regular medications. He was free from any respiratory symptoms, and had no systemic complaints such as weight loss, general weakness and decreased appetite. Furthermore, the patient's physical examination revealed no abnormal findings and his vital sign was stable upon admission. Laboratory findings revealed a white cell count of $9.21 \times 10^9/L$, 17.9 g/dL hemoglobin, 50.7% hematocrit, and platelet count $227 \times 10^9/L$. Routine chemistry and ABGA were also unremarkable. However in the chest x-ray the right hilum was prominent, and the chest dynamic CT showed 3.7×2.7 cm sized heterogeneously en-

hanced low density mass that completely obstructed the anterior segmental bronchus of the right upper lobe (Figure 1). We performed autofluorescence bronchoscopy (OncoLIFE[®], Xillix, British Columbia) and obtained a tissue sample, using forcep biopsy, from the obstructing intraluminal mass in the right upper lobe (Figure 2A) and the superior segment of the right lower lobe where a loss of autofluorescence was observed without mucosal abnormalities (Figure 2B). The pathology reports indicated that the mass in the right upper lung was squamous cell carcinoma and the lesion in the superior segment consisted of squamous cell carcinoma *in situ* (Figure 3). No distant metastasis was observed in the brain MRI, whole body bone scan, and whole body PET/CT. In the preoperative physiologic evaluation, the patient's performance was good and the postbronchodilator FEV1 and MVV were 2.39 L (92.2% of pred), and 61.8 L (60.4% of pred), respectively, therefore the right pneumonectomy was planned. During the operation, the right lobectomy and mediastinal lymph node dissection were done because he could not tolerate one-lung ventilation. After 3 weeks, the superior segment of the right lower lung lesion was treated with one session of APC (ERBE[®], Elektromedizin Tübingen, Germany) and no immediate complication was encountered (Figure 2C, D). On the 18th day post-APC, an ulcerative lesion with mild edema was observed by bronchoscopy (Figure 2E), and the biopsy report revealed acute and chronic inflammation. He was discharged uneventfully and there was no evidence



Figure 2. Initial bronchoscopy showed (A) intraluminal mass in RB3 (white dashed arrow) by conventional bronchoscopy, and (B) 'loss of autofluorescence' in superior segment of right lower bronchus (black solid arrow) by autofluorescence bronchoscopy. (C) APC was performed on the superior segment of right lower bronchus, (D) bronchoscopy immediate after APC showed debris, (E) and after two and half weeks ulcerative and mild edematous changes were shown. (F) No evidence of recurrence was shown on bronchoscopy on 3 months post-APC.

of recurrence in a follow-up bronchoscopy at 3 month post-APC (Figure 2F), and in CT at 1 year post-APC.

Discussion

Previously, bronchoscopic intervention was used for the removal of foreign bodies or toileting bronchial secretions, and the applications have been widened

nowadays. Tumors that are located in the central airways can be treated with several bronchoscopic techniques, such as lasers (Nd:YAG), photodynamic therapy (PDT), brachytherapy, cryotherapy and electrocautery (argon, CO₂), for palliation of airway obstruction in advanced cancers and for curative treatment of ROLCs. APC delivers a high-frequency alternating current to the tissue through an ionized argon gas in non-contact

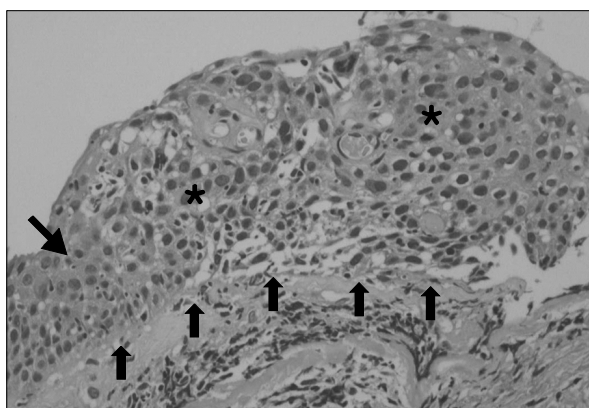


Figure 3. The report from pathologist revealed ‘carcinoma in situ’ for superior segment of right lower bronchus. The five small upward arrows shows intact basement membrane, and the region marked as ‘*’ is filled with cancer cells with mitosis, pleomorphism. The downward arrow (left middle) revealed normal stratified squamous epithelium (H&E stain, $\times 200$).

mode and has been extensively evaluated in open surgery of liver, spleen, and kidneys. From these evaluations it was shown that APC is an effective tool for superficial bleeding and controlling bleeding during gastrointestinal endoscopies⁴. In addition, it is attractive for the treatment of hemorrhagic superficial spreading tumor and also suitable for treating tumors ‘around the corner’ at a sharp angle. APC causes more acute superficial tissue destruction, thus, is more effective than any other method for the management of hemostasis⁵. However, it is less efficient for the in-depth tissue destruction of bulky tumors because it has a limited penetration depth of 2~3 mm. The cost of APC is less expensive and more readily available in many centers than lasers and photodynamic therapy (PDT). The possible complications are imminent respiratory failure, hemorrhage and life-threatening airway obstruction.

The results of previous studies showed that when electrocautery of rigid or flexible bronchoscopes for palliative treatment of lung cancer was used it was equally effective in achieving tumor coagulation and debulking compared to an Nd:YAG laser but with less excessive complication rates⁶⁻¹⁰. For microinvasive lung cancer, PDT is preferentially used because of its strength of

‘selective’ damage where only relatively minor destruction occurs in normal tissue. However, any kinds of bronchoscopic technique can be effectively used when less than 3 millimeters of invasion of the bronchial mucosa and visible distal margin is required if the patient is not a candidate for surgery because of poor cardiopulmonary function¹¹. The cases treated with electrocautery for occult cancer and typical intraluminal carcinoid were reported¹².

Schuurman et al.¹³ reported a case of microinvasive and premalignant lesion detected by AFB and treated with APC and surgery. In addition, Kato et al.¹⁴ reported several cases where early lung cancers treated with PDT resulted in a reduction in the extent of required surgery. These reports clearly demonstrate the benefits of interventional bronchoscopy in that it provided an additional option of curative treatment to patient unable to tolerate surgery. In the present report, the patient was a candidate for pneumonectomy, with good preoperative physiologic function, but when on a mechanical ventilator in the operation room the patient was not able to tolerate one-lung ventilation and oxygen saturation dropped while the right upper lobectomy was performed. The pathology report of the *in situ* lesion revealed cancer cells of 1~2 millimeters’ thickness and the basement membrane was intact. Therefore, we treated the *in situ* lesion with one session of APC, since the therapeutic depth of the diseased region was within the limits of APC. After APC treatment, the patient was free from immediate complications and from long-term sequelae, such as airway stenosis. Furthermore, there was no evidence of recurrence after 1 year. Consequently the patient was treated successfully with reduced-extent surgery by using APC as a curative treatment. We think interventional bronchoscopy, especially APC, is an effective, safe and economical tool for the curative treatment of ROLCs with superficial diseases, and it can be an alternative for patients who can’t tolerate surgery.

Summary

We treated synchronous double primary lung can-

cers, where one site resulted from CIS disease, with lobectomy and argon plasma coagulation (APC) in a patient who couldn't tolerate pneumonectomy, which resulted in a reduction of the extent of surgery. APC could be a reasonable alternative for CIS disease of lung in inoperable patients.

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