Case Reports

Pulmonary Amyloidosis Diagnosed by CT-guided Transbronchial Biopsy: a Case Report

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During a medical check-up, a nodular shadow was detected by chest X-ray in the right lower lung field of a 59-year-old man. On computed tomography (CT), the nodular lesion had a relatively well-defined, irregular margin. A fluoroscopy-guided bronchoscopic biopsy did not uncover any malignancy. Specimens from a subsequent CT-guided bronchoscopic biopsy revealed a pulmonary amyloid deposit. As a rule, it is difficult to exclude malignancy or confirm benign disease in cases of truly benign lesions, particularly if the lesions are difficult to biopsy. Amyloidosis is one of such conditions and requires reliable diagnostic methods to avoid unnecessary surgical resection. From our experience, we consider CT-guided bronchoscopic biopsy to be a safe and accurate procedure, even when applied to truly benign lesions.

Key words: pulmonary amyloidosis – CT-guided transbronchial biopsy – lung cancer – bronchoscopy

INTRODUCTION

Primary nodular amyloid lesions of the lung are uncommon and are not associated with primary systemic amyloidosis (1). There are no typical radiological findings to distinguish pulmonary amyloidosis from lung cancer, tuberculosis, silicosis, sarcoidosis and hamartoma (2,3). Moreover, the hard consistency of amyloid tissue makes it difficult to obtain biopsy specimens, which makes it difficult to diagnose amyloid lesions of the lung by transbronchial lung biopsy, percutaneous computed tomography (CT)-guided biopsy and thoracoscopic biopsy. As a result, the majority of the cases of pulmonary amyloidosis have been diagnosed only through thoracotomy (3). This report presents a case of pulmonary amyloidosis diagnosed by CT-guided transbronchial lung biopsy in which the necessity for surgical resection to deny malignancy was eliminated.

CASE REPORT

The chest X-ray film of a 59-year-old man revealed an abnormal shadow in his right lung. There was no evidence of any other abnormality in his right lung on the X-ray films which were taken 2 years earlier. He subsequently consulted the National Cancer Center Hospital for further evaluation. His clinical presentation was unremarkable. He did not have any pulmonary symptoms of cough, sputum production or hemoptysis, nor did he have systemic symptoms such as fever, general body malaise or weight loss. His medical history was non-contributory. He had had no exposure to chemicals or asbestos.

His chest radiograph showed a 25 × 20 mm solitary nodular shadow in the right lower lung field. CT showed a 28 × 15 mm hemispherical lesion with a relatively well-defined irregular margin in the right S₉a adjacent to the pleura (Fig. 1). He was referred to the hospital’s Endoscopy Division for fluoroscopy-guided bronchoscopic biopsy. Brushing cytology of the lesion in S₉ was performed, giving due consideration to the outpatient nature of the procedure. The specimen contained amorphous and homogeneous material that stained with light green, as well as foreign body giant cells. There was no cytological evidence of malignancy. Washing cytology was likewise negative for malignant cells. Bacterial culture and polymerase chain reaction (PCR)–DNA analysis of the washings similarly did not reveal anything abnormal.
After a period of 2 months, CT-guided bronchoscopic biopsy was performed to take advantage of its highly reliable diagnostic yield and to avoid such complications as pneumothorax. The biopsy was performed using a Pentax EB-1530T2 (Asahi Optical, Tokyo, Japan) which has a 5.3 mm distal tip diameter with a 2.0 mm working channel diameter. The interventional CT system consisted of a CT and bi-plane fluoroscopes (Xvision, Toshiba Medical, Tokyo, Japan). The specific CT used permits near real-time image visualization by reconstructing six images per second with a 0.67 s delay. The bronchoscope was inserted transorally under local anesthesia (4% lidocaine). Insertion of the biopsy forceps into the lesion was difficult because of the hardness of the lesion. However, the overall procedure was successful and the tip of the forceps was clearly visualized within the lesion by high-resolution CT. Furthermore, inadvertent biopsy of the pleura was avoided by the clarity of the visualization. Two specimens were obtained, one from the center and one from the periphery of the lesion. Both biopsies were clearly confirmed by high-resolution CT. Histologically, the specimens contained acidophilic homogeneous material with a few foreign body giant cells, histiocytes and fibroblasts (Fig. 2). On further testing, the acidophilic material exhibited an orange color on Congo Red staining, apple-green birefringence and light polarization. The patient’s course after biopsy was uneventful. Serial chest X-rays have not demonstrated any enlargement of the lesion as of 12 months after the second biopsy.

DISCUSSION

Pulmonary amyloidosis may be localized to the respiratory tract or may be part of a widespread process involving many organs. Localized pulmonary amyloidosis is defined as amyloid deposition isolated to the respiratory tract and does not include amyloidosis associated with systemic deposition (1). There are three types of localized amyloidosis: tracheobronchial, nodular parenchymal and diffuse interstitial (4). Utz et al. reported on 55 cases of pulmonary amyloidosis seen at the Mayo Clinic from 1980 to 1993. Of the 17 localized cases, seven were nodular parenchymal amyloid lesions (1). These lesions are often incidental findings on chest radiography or at autopsy (5,6). Most nodules range in size from 0.4 to 5.0 cm with an average of 3 cm (5). The lesions are difficult to diagnose, except by surgery or autopsy, as biopsy specimens are often insufficient for diagnosis in terms of both quantity and quality (3). Open thoracotomy provides optimal access for deep parenchymal lesions and permits simultaneous biopsy of other nodules. However, the course of a solitary parenchymal amyloid lesion is generally benign (7). Therefore, it is rarely necessary to resect a nodular amyloid lesion unless it is causing respiratory symptoms. However, histological diagnosis is necessary since a chest radiograph or CT scan cannot reliably differentiate an amyloid lesion from a malignant one.

We routinely use CT-guided transbronchial biopsy for diagnosis of pulmonary lesions that are not recognizable on normal X-ray films but visible on CT (8,9). CT-guided percutaneous needle biopsy can also be used for these lesions. However, the percutaneous approach carries greater risks of pneumothorax, hemorrhage, implantation and air embolism. A surgical approach offers the best diagnostic accuracy but remains highly invasive. Considering the actual risks of minute peripheral indeterminate nodules, including lung cancer, diagnostic methods should ideally be as minimally invasive as possible.
There are two important considerations in the selection of a biopsy method for suspected amyloid lesions. First, amyloid is difficult to harvest because of its hard consistency. Second, although one malignant cell confirms malignancy, the absence of a malignant cell cannot reliably exclude malignancy in most cases. In order to diagnose reliably the benign nature of a lesion, it is important to confirm that the biopsy specimens are indeed obtained exactly from the lesion and not from tissue surrounding the lesion. It is also important that the biopsy specimens demonstrate pathological abnormalities that are compatible with the radiographic findings, particularly the findings on high-resolution CT.

CT-guided bronchoscopic biopsy, as outlined above, clearly confirms the site of the biopsies by high-resolution CT. In the case presented, high-resolution CT permitted precise definition of biopsy sites and confirmed with high reliability the origins of the two specimens obtained, i.e. one from the center and another from the periphery of the lesion.

It was not easy to insert the biopsy forceps into the lesion because of its hard consistency. However, we were able to insert the forceps aggressively into the lesion with confidence because of the advantages offered by CT-fluoroscopy guidance and the ability to confirm the precise location of the tip of the forceps by high-resolution CT during the procedure. These advantages permitted an accurate biopsy while avoiding inadvertent biopsy of such high-risk structures as the pleura and adjacent blood vessels.

Hemorrhage after the biopsy of pulmonary parenchymal lesions is an important consideration that must always be borne in mind (10). The risk is similar to that of transthoracic approaches. Re-establishment of hemostasis in such situations is difficult or nearly impossible. With bronchoscopic biopsy, good hemostasis can be established by wedging the tip of the bronchoscope into the bronchus leading to the lesion.

Given the advantages presented, we consider CT-guided bronchoscopic biopsy to be a highly effective diagnostic procedure for benign lesions, such as pulmonary amyloidosis. The procedure makes it possible to avoid highly invasive and unnecessary surgical resections.

References