Case Report

Mucoid impaction of the bronchi (MIB) in a young man with no previous history of hypersensitivity

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ABSTRACT

Mucoid impaction of the bronchi (MIB) is a specific form of proximal bronchiectasis characterized by obstruction and dilation of bronchi usually presented with thick mucoid plug. MIB mostly occurs as the manifestation of a hypersensitivity state in patients with bronchial asthma or in association with allergic bronchopulmonary aspergillosis (ABPA) and clinical overlap between MIB and ABPA can occur. MIB with no history of allergic background is not common and is less reported in the literature. In the following report we discuss a 39-year-old man with no previous history of allergy and atopy who initially presented with fever and shortness of breath. Further assessments demonstrated that the patient had a chronic endobronchial lesion and consolidation of the left lower lobe of the lung. A tissue biopsy reveals no malignant cells. Despite antibiotic therapy, the patient’s symptoms persisted, and lobectomy was performed due to no clinical improvement. Even though gross pathology suggested endoluminal impaction, the patient didn’t meet the ABPA diagnostic criteria.

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Introduction

Mucoid impaction of the bronchi (MIB) is a specific form of proximal bronchiectasis characterized by obstruction and dilation of bronchi with thick mucoid plugs [1,2].

Abbreviations: MIB, Mucoid impaction of the bronchi; ABPA, Allergic bronchopulmonary aspergillosis; CT, Computed tomography; Ig, Immunoglobulin.

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senting as a chronic endobronchial lesion with left lower lobe consolidation.

In light of the limited MIB reports without an allergic background, we believe it's worth bringing this case to our attention.

**Case presentation**

A 39-year-old man, apartment building labor, was referred to Masih Daneshvari Hospital, a university-affiliated respiratory hospital in Tehran, Iran in June 2022, complaining of high-grade fever, chills and shortness of breath. Dyspnea has been a complaint of the patient for 6 months, which has intensified since last month. There has been no evidence of hemoptysis, anorexia, or significant weight loss and no relevant personal history including atopy and allergic reactions in the past or family history such as tuberculosis or asthma has been reported. Additionally, he had no known recent COVID-19 exposures or history of a recent viral illness. A 20-year history of smoking cigarettes (20 packs per year) was also reported by the patient.

A temperature of 38.5°C, heart rate of 88 bpm, blood pressure of 115/80 mm Hg, oxygen saturation of 93%, and respiratory rate of 20 breaths/min were measured and arterial blood gas revealed hypoxemia and mild respiratory alkalosis. Examination of his chest showed reduced breath sound intensity on the left side. The rest of the physical examination was unremarkable.

The laboratory data showed an elevated C-reactive protein level (48 mg/dL) and eosinophil count (450/μL, reference range: less than 400/μL). The serum immunoglobulin (Ig) E level was 480 IU/mL (reference range: less than 150 IU/mL). Specific IgE and IgG to Aspergillus and anti-neutrophil cytoplasmic antibodies were negative.

Hydatid cyst and galactomannan serology tests resulted negative. In addition, the COVID-19 PCR test was negative. Examination of a chest radiograph indicated left-sided pleural effusion (Fig. 1). Consequently, a computed tomography (CT) scan was requested, which demonstrated left-sided pleural effusion (Fig. 2).

The echocardiography confirmed proper cardiac function without any structural abnormalities. Additionally, there was no evidence of pericardial effusion. After that, a thoracentesis was performed. A cytological examination of the pleural fluid revealed neutrophilia and nuclear debris (exudative pleural effusion with $6 \times 10^3/\mu L$ leukocyte containing 80% neutrophil), but no malignant cells. Fig. 3 shows post-thoracentesis radiography.

Further evaluation of the patient included bronchoscopy, which revealed the following: there were no tumoral lesions found, the opening of the LLL was obstructed with a thick mucoid plug that did not clear with suction, and several biopsies were obtained to assess the pathology.

Despite receiving a wide range of antibiotics (ceftriaxone, clindamycin, ceftazidime, meropenem, vancomycin, and levofloxacin) and glucocorticoid therapy, symptoms of the patient persisted, and no clinical improvement was observed. Finally, the patient was referred to the surgery ward, where he underwent surgery for lobectomy of the left lower lobe.

Gross pathology (Fig. 4) of the lesion was suggestive of endoluminal impaction but patient didn’t meet the diagnostic criteria of ABPA (IgE = 480, galactomannan = negative).
Fig. 2 – Computed tomography scan of the chest showing consolidation of the left lobe together with pleural effusion.

Fig. 3 – Chest X-ray film obtained post-thoracocentesis.

Fig. 5 demonstrates the surgical pathology of specimens from left lower lobectomy of the lung, showing noticeably dilated and inflamed bronchus (A). Additionally, numerous degenerating eosinophils with relatively acellular mucin is observed (B and C). Furthermore, the gimsa staining was performed and no parasite or fungal infection have been detected.

Post-surgical follow up showed clinical improvement with no sign of previously persistent symptoms and eventually patient was discharged with good general condition.

Discussion

MIB is a clinical-radiographic syndrome that is mostly characterized by thick mucus filling of the bronchi [4]. Mucoid impaction may be present without any symptoms or may have respiratory symptoms including cough, chest pain or shortness of breath. This syndrome is mostly found in patients with allergic conditions which causes the inflammation of the airways but less commonly it can also be in association with benign or malignant processes causing airway obstruction. This condition is mostly diagnosed radiologically and have a classic “finger-in-glove” appearance but in some cases the radiological diagnosis can be challenging [4,5].

The pathogenesis of mucoid impaction is poorly understood. Presence of asthma and bronchial obstruction in the majority of patients suggests the correlation of excessive mucus secretion with impaction of mucoid plugs. The unsuccessful expectoration of these small mucoid plugs can eventually lead to the formation of bigger plugs and bronchial obstruction will follow [6].
Fig. 4 – Gross pathology of left lower lobectomy demonstrating endoluminal impaction.

Treatment is mainly focused on promoting airway clearance in order to reduce infection and inflammation of the airways therefore chest physiotherapy, positive expiratory pressure devices, mucolytics and nebulized hypertonic saline are beneficial, but the main treatment includes antibiotics and macrolides [7–9]. Due to the failure of the antibiotic treatment, our patient had no option but to undergo lobectomy (Despite the fact that surgery is not the treatment of choice in such cases).

There are several disorders associated with mucoid impaction including bronchiectasis, cystic fibrosis, primary ciliary dyskinesia, bronchial obstruction, neoplastic disorders and anatomical abnormalities [7].

One of the associated disorders leading to mucoid impaction is ABPA and it is hypersensitivity of airways induced by Aspergillus fumigatus.

The diagnostic criteria for ABPA include the presence of asthma, skin reaction to Aspergillus, serum IgE level greater than 1000 ng/mL, presence of Aspergillus IgE or IgG in plasma and central bronchiectasis [10]. In our reported case patient didn’t have any allergic background and had no previous history of asthma, IgE levels were within the normal range and specific fungal antigens were not detected therefore patient didn’t meet the diagnostic criteria and ABPA was ruled out.

Neoplastic disorders causing bronchial obstruction are another consideration in differential diagnosis of mucoid impaction. Both benign and malignant tumors can arise in airways and lead to bronchial obstruction [9], in our case persistent symptoms raised the suspicion of malignancy therefore biopsies were obtained but the results were negative, and no malignant cells were detected.

Fig. 5 – (A) Bronchiectasis, markedly dilated and inflamed bronchus at 4x. (B) Allergic mucin at low magnification, striking lamellar appearance at 4x. (C) Allergic mucin at higher magnification, numerous degenerating eosinophils alternating with relatively acellular mucin and presence of numerous charcot-leyen crystals at 10x. (D) Peripheral lung parenchyma with fibroblast plugs and organizing pneumonia pattern (nonspecific reactive change) at 4x. The specimen is stained with Haematoxylin and eosin.
In diagnostic evaluation of mucoid impaction aside from chest radiograph, the next step is to obtain a chest CT scan. Hilar adenopathy and an endobronchial mass raise the suspicion for neoplastic conditions, multifocal bronchiectasis is suggestive of immune deficiency or systemic disease like cystic fibrosis and central bronchiectasis is associated with ABPA. Although radiologic findings are helpful in the diagnosis, but further serologic and genetic testing is required to confirm the diagnosis. In some clinical settings bronchoscopy is also indicated to further evaluate the patient of endobronchial lesion or even for therapeutic purposes to remove foreign aspirated bodies [9].

In conclusion, we described a case of a patient who developed severe atelectasis by isolated MIB without having an allergic background. According to our perspective, these rare cases should be reported in order to keep the medical team updated and to consider MIB as a differential diagnosis when treating patients with the above-mentioned history.

Patient consent

Written informed consent has been obtained from the patient in Persian (the patient’s native language). Upon request, we will send it to the respected journal.

REFERENCES

[1] Ishiguro T, Takayanagi N, Tokunaga D, Kurashima k, Matsushita A, Harasawa K, et al. Pulmonary Schizophyllum commune infection developing mucoid impaction of the bronchi. Yale J Biol Med 2007;80(3):105.
[2] Kobashi Y, Mouri K, Obase Y, Kato S, Nakata M, Oka M. Mucoid impaction of the bronchi caused by Mycobacterium avium. Intern Med 2013;52(13):1537–40.
[3] Amitani R, Nishimura K, Niimi A, Kobayashi H, Nawada R, Murayama T, et al. Bronchial mucoid impaction due to the monokaryotic mycelium of Schizophyllum commune. Clin Infect Dis 1996;22(1):146–8.
[4] Urschel Jr HC, Paulson DL, Shaw RR. Mucoid impaction of the bronchi. Ann Thorac Surg 1966;2(1):1–16.
[5] Martinez S, Heyneman LE, McAdams HP, Rossi SE, Restrepo CS, Erase A. Mucoid impactions: finger-in-glove sign and other CT and radiographic features. Radiographics 2008;28(5):1369–82.
[6] Hutcheson JB, Shaw RR, Paulson DL, Kee JL. Mucoid impaction of the bronchi. Am J Clin Pathol 1960;33(5):427–32.
[7] Moulton BC, Barker AF. Pathogenesis of bronchiectasis. Clin Chest Med 2012;33(2):211–17.
[8] Fanta CH. Clinical aspects of mucus and mucus plugging in asthma. J Asthma 1985;22(6):295–301.
[9] Shah RJ, Kotloff RM. Beware of gloved fingers. Ann Am Thorac Soc 2013;10(1):56–8.
[10] Greenberger PA. Allergic bronchopulmonary aspergillosis. In: Allergy & Asthma Proceedings; 2012.