

Case Report

Glued lungs: Sticky and tricky

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ABSTRACT

We report a male patient who underwent bronchoscopic instillation of glue to control moderate hemoptysis which later led to the development of postobstructive pneumonia and extensive foreign body reaction in the bronchial wall and the lung distal to the glue application. He continued to have intermittent hemoptysis and underwent bronchial artery embolization. However, recurrent moderate hemoptysis eventually led to pneumonectomy, which showed severe foreign body reaction in bronchi- and post-obstructive changes in the lung parenchyma and the draining lymph nodes. This case highlights a serious complication of intrabronchial cyanoacrylate gluing to control bleeding in hemoptysis, which might warrant its very cautious use in moderate hemoptysis although surgical modality is considered the definitive treatment in life-threatening hemoptysis.

KEY WORDS: Complication of cyanoacrylate glue, foreign body reaction to glue, intrabronchial glue, massive hemoptysis

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INTRODUCTION

Endobronchial gluing with n-butyl cyanoacrylate is a recent innovation used to control hemoptysis in a select population.^[1] The management of hemoptysis is variable, depending on preferences of treating team and availability of various treatment options. Surgical treatment is the only curative treatment but is available for only a few. Intrabronchial interventions are usually used to either control bleeding immediately or to buy time for definitive procedure later.^[2] Biological glue has been used successfully to seal pleural leaks and rarely to control hemoptysis.^[3] Cyanoacrylate glue is a biocompatible material, which has been used to embolize arterial aneurysms. Intrabronchial glue therapy has been reported in the bronchoscopic management of bronchopleural fistula and hemoptysis.^[4] Cyanoacrylate, though a volatile chemical, is reported to be safe except for allergic reactions in the occupationally exposed^[5] and has been reported to cause bronchial mucosal proliferation and obliteration of its lumen.^[6] We report here

an unreported complication of such therapy to control hemoptysis, which ultimately required pneumonectomy after prolonged suffering emphasizing the need for cautious use of such novel but unestablished procedures.

CASE REPORT

A 51-year-old male, ex-smoker, nondiabetic, and nonhypertensive, presented with complaints of hemoptysis since 3 weeks, increased for the last 4 days, multiple episodes of fresh blood daily, amounting to 200–300 ml/day. The patient gave a history of similar moderate hemoptysis 1 year back, and he had underwent intrabronchial glue therapy to control bleeding followed by anti-tubercular therapy for 9 months. However, intermittent hemoptysis continued and the patient underwent the left intercostal-bronchial trunk collaterals embolization a month back. On examination, the patient was anxious and afebrile with heart rate - 120/min, blood

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pressure - 120/60 mmHg, respiratory rate - 24/min, oxygen saturation at room air was 91%, and rest general exam being normal. Chest auscultation revealed coarse crackles on the left side. Examination of other systems was normal. Laboratory results showed Hb - 12.4 g%, TLC - 8900/mm³, poly - 77%, platelet - 233,000 L/mm³, liver function test and kidney function test were normal, and procalcitonin and brain natriuretic peptide were negative. Chest radiograph revealed nonhomogeneous opacity in the left, mid, and lower zones [Figure 1a]. Serum IgE - 340 KU/L (normal up to 120 KU/L) but IgE specific for aspergillus-negative, rheumatoid factor-34.6 (0-20), and anti - smith +++ while rest of autoimmune profile was negative. Sputum negative for acid-fast bacilli (AFB) and fungal smear as well as pyogenic culture. Contrast-enhanced computed tomography (CT) of chest [Figure 2] showed bronchiectasis of the left upper lobe with cavitory lesion and intracavitary ball but no movement demonstrated on prone positioning. The left lower lobe and right lung were normal. Small mediastinal lymph nodes were seen. Positron emission tomography-CT (PET-CT) [Figure 3] revealed fludeoxyglucose (FDG) avid (standardized uptake value [SUV] max - 3.7) thickening of the left upper lobe segmental bronchus with a distal FDG avid collapse consolidation with cavitory lesion in apicoposterior segment of the left upper lobe, measuring 3.4 cm × 2.5 cm and segmental atelectasis of the left lingular lobe with a FDG avid (SUV max - 2.3) subcentimeter-sized lymph nodes in aortopulmonary and the left paratracheal regions with non-FDG avid subcentimeter sized lymph nodes in pretracheal, prevascular, and precarinal regions.

The patient underwent fiberoptic bronchoscopy, which revealed a large soft tissue growth in the left mainstem bronchus adjacent to the secondary carina, almost completely occluding the left upper lobe bronchus and biopsy from the soft tissue, revealed submucosa foci of chronic inflammation with ill-formed granulomas and necrosis [Figure 4]. AFB stain was negative in bronchoalveolar lavage, and tissue and cultures were also negative. The patient was being managed conservatively but developed massive hemoptysis, shifted to intensive care, and taken for emergency thoracotomy with pneumonectomy as there were dense adhesions at hilum with no surgical plane to perform the left upper lobe lobectomy.

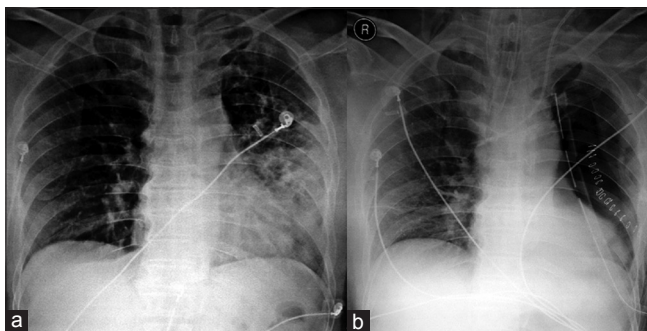


Figure 1: Chest X-ray showing (a) left, mid, and lower zone consolidation and (b) after pneumonectomy

Histopathology revealed extensive necrotizing granulomatous inflammation in the submucosa of the bronchial epithelium. The left pneumonectomy specimen revealed 3 cm × 2 cm cavity with thick wall, enlarged hilar lymph nodes, and histopathological examination showed extensive foreign body granulomatous lesions beneath hyperplastic bronchial mucosa as well as in lung parenchyma secondary to glue applied earlier. There was extensive necrotic reaction in these granulomas at places with areas of hemorrhage [Figure 5]. AFB stain was negative, no fungal elements identified, and all cultures were sterile from lung tissue as well. Postoperative period was uneventful [Figure 1b: Chest X-ray postoperative day 1] and the patient was discharged on day 7 and is presently doing well.

DISCUSSION

Moderate to massive hemoptysis is a medical emergency and requires prompt treatment. The management decisions are challenging, as they depend not only on the medical aspects of the disease, but also on the availability of expertise on various modalities to manage bleeding. Choosing a surgical alternative though carries risk of mortality and morbidity but often offers the only chance of cure in suitable cases, thus justifying such an aggressive approach whenever possible and feasible. Other alternative of transcatheter embolization of bronchial artery though has an established role in the treatment of massive hemoptysis, it is not uniformly successful. Many bronchoscopic interventions have been tried to control bleeding but are not uniformly accepted as the standard of care due to limited data and experience available.

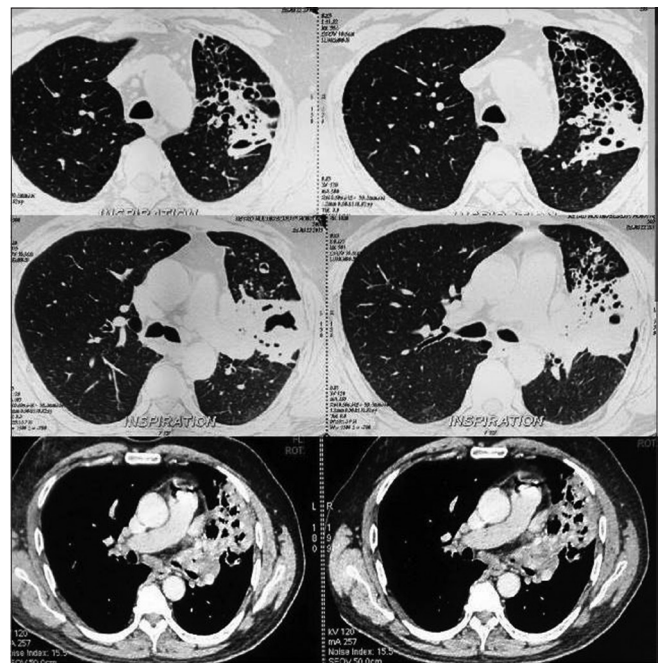


Figure 2: Bronchiectasis of the left upper lobe with cavitory lesion and intracavitary ball but no movement demonstrated on prone positioning

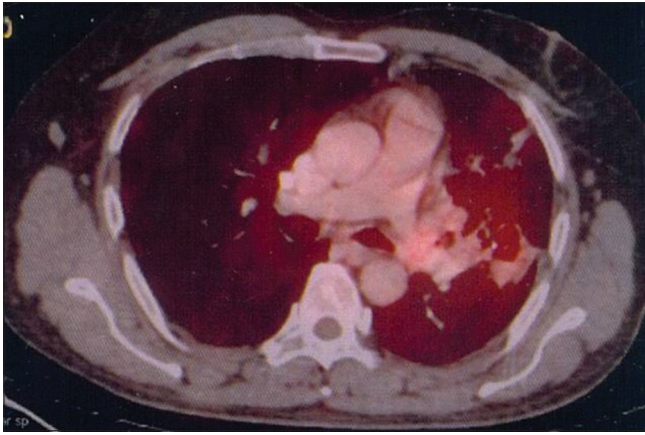


Figure 3: Fludeoxyglucose avid (standardized uptake value max – 3.7) thickening of the left upper lobe segmental bronchus with a distal fludeoxyglucose avid collapse consolidation with cavitary lesion in apicoposterior segment of the left upper lobe, measuring 3.4 cm x 2.5 cm and segmental atelectasis of the left lingular lobe with PET avid mediastinal lymph nodes

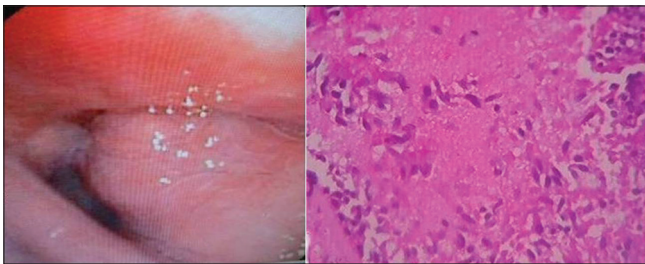


Figure 4: Bronchoscopy finding showing tumorous intrabronchial partial obliteration of the left upper lobe bronchus. Histopathological examination showing necrosis with a foreign body granuloma beneath bronchial mucosa

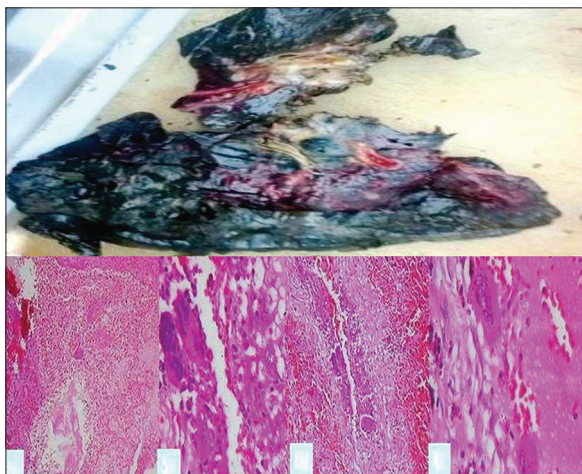


Figure 5: The left pneumonectomy specimen revealed 3 cm x 2 cm cavity with thick wall, enlarged hilar lymph nodes, and histopathological examination showed extensive foreign body granulomatous lesions beneath hyperplastic bronchial mucosa as well as in lung parenchyma

Endobronchial gluing with n-butyl cyanoacrylate is an experimental technique that has reported successful control of hemoptysis with a success rate of 79.1%. In addition, it is recommended to place sealant as distal as

possible at the bleeding site. In literature, eczema, contact dermatitis, rhinitis, and asthma have been reported on occupational exposures to cyanoacrylates.^[5,6] Percutaneous instillation of this glue into Rasmussen’s aneurysm to control bleeding has been reported without any immediate complication. Intrabronchial application has been reported to cause mucosal hypertrophy, which in our case gave pseudotumorous appearance on bronchoscopy. However, there have been no reports of any major complications by the medical use of this glue.

In our case, after intrabronchial glue therapy, the patient developed postobstructive pneumonia with persistent intermittent hemoptysis, which reoccurred despite bronchial artery embolization. PET-CT showed FDG avid segmental bronchial thickening of the left upper lobe with FDG avid collapse consolidation, thick-walled cavity and mediastinal lymphadenopathy suggestive of malignancy. Bronchial biopsy, mediastinal lymph nodes, and diseased lung obtained on pneumonectomy showed extensive necrotizing foreign body granulomas secondary to cyanoacrylate glue instilled earlier to control hemoptysis. There was no evidence of malignancy. Foreign body reactionary tissue was FDG avid indicative of ongoing active inflammation in bronchi and lung parenchyma and mediastinal lymph nodes mimicking malignant process. Unfortunately, exuberant foreign body reaction in and around the central airways, lymph nodes precluded lobectomy and required pneumonectomy. The presence of some autoimmune antibodies (RA and anti-smith) was considered nonspecific as the patient had no clinical features of any autoimmune disease.

This highlights the importance of long-term follow-up of newer innovative techniques, especially if it involves the use of foreign material, even if biocompatible.

Furthermore, our case brings into light, variable practices to manage hemoptysis in developing nations even though the patient was a suitable candidate for surgical resection. The use of cyanoacrylate glue did help the patient in the control of hemoptysis, but unfortunately he had to undergo complete pneumonectomy due to severe foreign body reaction against the glue, thus once again highlighting the very cautious use of glue in a very selected group of mild to moderate hemoptysis patients, and thereby emphasizing the need for guidelines to manage such cases.

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Conflicts of interest

There are no conflicts of interest.

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