Managing hemoptysis: What to do or what not to do?

Sir,

Hemoptysis is defined as the expectoration of blood from the lung parenchyma or airways.[1] It is one of the most common and challenging symptom encountered in routine clinical practice. Massive or recurrent hemoptysis is considered to be of major concern that troubles both patients and the treating physicians. Most physicians are facing difficulties in managing this symptom in a systematic and timely fashion because there are divergent opinions among different physicians regarding management of massive or recurrent hemoptysis.[2] This is partly contributed by different causes of hemoptysis, the common ones being active or healed pulmonary tuberculosis (TB), bronchiectasis, aspergilloma, lung abscess, and bronchogenic carcinoma. A systematic management protocol needs to be established to focus on a more definitive treatment.

A 17-year-old male, nonsmoker, resident of Delhi, with no prior comorbidities presented with cough and recurrent hemoptysis for 2 years that increased significantly in volume (often greater than half a cup) for 15 days before admission. He denied any history of fever or night sweats,

breathlessness, and loss of appetite or weight. There were no unusual food or animal exposures. He received empiric treatment for pulmonary TB (on radiological basis but bacteriologically not confirmed) 2 years back for 9 months. He did not regularly use any other significant medication such as aspirin or other nonsteroidal anti-inflammatory drugs or drug abuse. He had no history of trauma, rash, kidney disease, hematuria, or known autoimmune disease. The patient underwent workup for hemoptysis at different hospitals and underwent bronchoscopy which was unremarkable, and high-resolution computed tomography (HRCT) thorax showed thick-walled cavities in bilateral upper lobes. He was treated conservatively and was advised surgery in view of persistent hemoptysis, significantly restricting young patients' life; however, bilateral disease led to confusion among physicians and surgeons about the side to operate, and he was left on wait and watch policy. The patient had no indications of respiratory distress or stigmata of recent massive hemoptysis at the time of admission. His vital signs were stable: afebrile, blood pressure 120/80 mmHg, heart rate 92/min, respirations 20/min, and oxygen saturation 96% on room air. Head and neck examination revealed dry mucosa with no evidence of trauma and no lymphadenopathy. Oropharyngeal examination was normal. Systemic examination was normal. The patient's

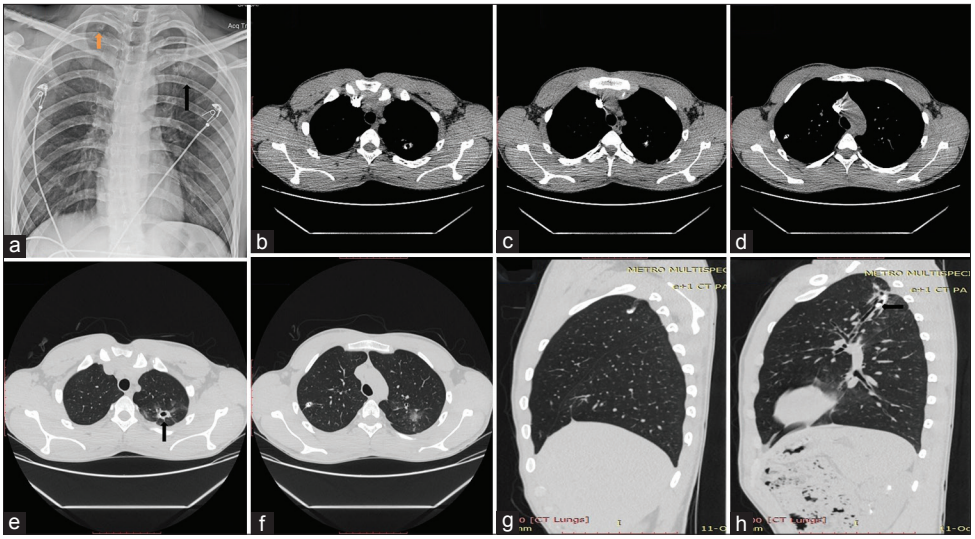

Figure 1: (a) Chest skiagram revealed haziness in right (yellow vertical arrow) and left (black vertical arrow) upper lobes. (b-f) High-resolution computed tomography thorax showed small area of cavitation with calcification in apical segment of the right upper lobe as well as apicoposterior segment of left upper lobe along with surrounding ground-glass opacity seen exclusively in the left upper lobe (black vertical arrow in e) suggestive of active source of bleeding. (g and h) The presence of calcified opacity likely broncholith (black horizontal arrow in h) in dilated bronchi communicating with cavity of left upper lobe especially observed in sagittal section

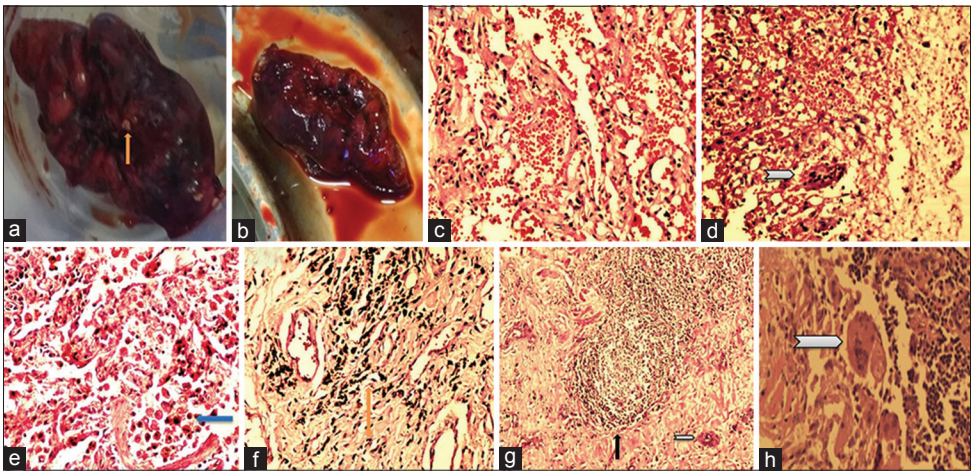

Figure 2: (a and b) Gross examination of the resected specimen of lung tissue revealed smooth-walled cavity measuring 2 cm × 2 cm × 1 cm with a small broncholith of 0.3 cm (indicated by yellow vertical arrow in a). (c-h) Microscopic histopathological examination of sections from the cavity showed granulomas (black vertical arrow in g) with giant cells (white horizontal chevron in d, g, h), foci of calcification (yellow vertical arrow in f), and mononuclear inflammation suggestive of granulomatous inflammation suggestive of tuberculosis. Lung parenchyma showed alveoli with hemorrhage and occasional hemosiderin-laden macrophages (blue horizontal arrow in e) (H and E, ×40 and × 100 respectively)

hemoglobin level was 14.9 g/dL, and the hematocrit was 41.2%. Rest laboratory parameters including platelet count, coagulation as well as vasculitis profile were within normal limits. The fecal occult blood test was negative. Two-dimensional echocardiography showed a normal ejection fraction and no valvular defect. Chest skiagram revealed nonhomogeneous opacity in the left upper lobe. HRCT thorax showed small area of cavitation with calcification in bilateral upper lobes along with surrounding ground-glass opacity seen in left upper lobe and a calcified opacity likely broncholith in dilated bronchus communicating with cavity of the left upper lobe as shown in Figure 1. Triple-phase computed tomography angiography did not reveal any abnormal vascular origin of bleeding. Repeat bronchoscopy confirmed focal source of active bleeding from apicoposterior segment of the left upper lobe. Bronchoalveolar lavage was taken from left upper lobe and was freshly hemorrhagic. The microbiological profile including GeneXpert was negative for *Mycobacterium tuberculosis* complex (MTBC). Case was reviewed with interventional cardiologist for bronchial artery embolization (BAE) together with thoracic surgical opinion for segmentectomy. Informed decision for surgical option was reached by the family and patient after risk versus benefit of both options were explained in multidisciplinary meeting among all medical and family members involved in decision-making. The patient underwent left apicoposterior segmentectomy without any complication and the specimen was sent for histopathological examination. Gross examination revealed smooth-walled cavity measuring 2 cm × 2 cm × 1 cm, with a small broncholith of 0.3 cm being the source of bleeding as shown in Figure 2. Microscopic examination showed evidence of granulomatous inflammation, but GeneXpert as well as culture was negative for MTBC. The patient was discharged after 7 days and is under regular follow-up for the last 1 year and reported no further episodes of hemoptysis.

Such situations are of common occurrence in day-to-day practice and a matter of concern is that what should have been the approach if bleeding could not have been localized to broncholith as both lungs had pathological findings in this case? Here, determining the cause and the location of bleeding becomes an important issue. Mostly patients in our country with bilateral disease are not even sent for thoracic surgical review. However, scrupulous radiologic as well as bronchoscopic examinations may provide valuable information regarding surgically correctable cause, for example, mycotic ball in a cavity or broncholiths[3] even if disease is bilateral, but definitive treatment remains surgery only. All endobronchial interventions (e.g., cold saline solution lavage, endobronchial balloon tamponade with or without endobronchial instillation of epinephrine, bronchoscopic instillation of thrombin or fibrinogen–thrombin infusion, laser photocoagulation, endobronchial blockers, and radiotherapy) or BAE are temporalizing procedures[4] with surgical therapy being only "curative." BAE could have been an alternative approach in this case, but it is not definitive as probability of recurrences are high especially with broncholith as a posttubercular sequelae.[5]

Another issue is that what will be the treatment of choice if the same patient reports again with massive or recurrent hemoptysis from lesion on opposite side, i.e., apical segment of the right upper lobe. It is a matter of open debate whether this patient should be treated with conservative strategy and observation, bronchoscopic techniques, BAE, or surgery. All these interventions have their own merits and demerits with weak evidence-based support. The choice of treatment depends on several factors such as age, comorbid illnesses, etiology, pulmonary function status, localization of bleeding, response to different methods, and availability or feasibility of technical expertise.[5] Good clinical practice guides surgical modality to be preferred in clear scenarios, for example, unilateral disease with good functional status of the patient and no significant co-morbidities tilting risk–benefit ratio in its favor. However, it is difficult to convince majority of patients for a feasible option in real life situations despite proper counselling. A very intuitive and detailed analysis of each case is required before assigning an individual option. This has to be decided by a multidisciplinary team including clinicians of different specialities. The patients along with family members should also be made part of the team. This will facilitate decision-making process easy as they will be made well aware of all available options with risk-benefit ratio. In our case, although the patient was young and needed to live life without constant fear of life-threatening hemoptysis and had broncholith beyond reach of bronchoscope, the decision to operate was still not easy. The patient had multiple hospitalizations and opinions, but clear advice could not be reached.

There are still many controversies and unresolved issues regarding the management of massive or recurrent hemoptysis from center to center as there is lack of consensus-based practical guidelines. Various treatment options are currently practiced depending on the physician's discretion, expertise, and available resources.[2] Therefore, there is a need to develop guidelines in near future for managing massive or recurrent hemoptysis systematically and also to emphasize on multidisciplinary approach. There is urgent need for research in this area, and we think multidisciplinary approach in all cases with recurrent moderate-to-severe hemoptysis can only bring best outcomes till then.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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