

Vertebral Body Fragment Causing an Unusual Presentation of Rounded Atelectasis

Anas Al Khateeb and Manickam Rajapriya*

Department of Pulmonary and Critical Care Medicine, St. Joseph's University Medical Center, USA

***Corresponding Author:** Manickam Rajapriya, Department of Pulmonary and Critical Care Medicine, St. Joseph's University Medical Center, USA.

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Abstract

Atelectasis is a collapse of part or all of the lung resulting in reduced or absent gas exchange. Rounded atelectasis, also known as folded lung syndrome, Blesovsky's syndrome, shrinking pleuritis with atelectasis, atelectatic pseudotumor, and pleuroma is a form of peripheral atelectasis that develops as a result of chronic pleural disease and is characteristically associated with focal pleural thickening. Rounded atelectasis appears as a pleural-based mass-like lesion often undergo unnecessary surgical interventions and procedures to rule out malignancy.

Keywords: *Rounded Atelectasis; Pott's Disease; Pseudo Tumor; Extra-Pulmonary Tuberculosis; Hemoptysis; Cough*

Abbreviations

CT: Computed Tomography; MRI: Magnetic Resonance Imaging

Introduction

Atelectasis is a collapse of part or all of the lung resulting in reduced or absent gas exchange. Rounded atelectasis, also known as folded lung syndrome, Blesovsky's syndrome, shrinking pleuritis with atelectasis, atelectatic pseudotumor, and pleuroma is a form of peripheral atelectasis that develops as a result of chronic pleural disease and is characteristically associated with focal pleural thickening [1]. Rounded atelectasis is caused by the infolding of redundant pleura, and the nature of the collapse often gives a mass-like appearance to it. Due to its mass-like appearance, patients with rounded atelectasis often undergo unnecessary surgical interventions and procedures to rule out malignancy.

Rounded atelectasis appears as a pleural-based mass-like lesion with a rounded or oval shadow typically lying along the posterior surface of a lower lobe [2]. CT (Computed Tomography) typically shows a sharply marginated and homogeneous subpleural mass with volume loss in the affected lung, associated with adjacent pleural effusion or thickening, incurving vessels and bronchi (comet-tail sign), acute angles with pleura, and sharp lateral margins with a poorly defined central margin [3,4].

Here, we present the unique case of an elderly Haitian female with a history of treated thoracic Pott's disease, who presented with subacute productive cough and non-massive hemoptysis. Further evaluation revealed a right medial lower lobe mass containing bone fragments of her thoracic spine, that had progressed in size over the past few years. A thorough follow-up investigation revealed this to be an unusual case of rounded atelectasis.

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Case Report

An 80-year-old Haitian female, with a past medical history of extra-pulmonary tuberculosis involving her thoracic spine that was diagnosed and treated at a different institution twenty years ago, presented with a one month history of productive cough, associated with yellow mucoid sputum, and shortness of breath after severe coughing bouts. Patient was recently treated with levofloxacin without significant improvement. Patient stated that she developed hemoptysis, described as occasional blood clots, followed by blood tinged sputum few days prior to presentation. She also complained of chronic upper-mid thoracic pain, that had worsened since she developed the new-onset cough. She also reported subjective fever, sweating, but denied chills or rigors. Her appetite is normal, without significant changes in her weight. She answered all other review of system questions in negative.

On admission, her vital signs indicated temperature of 97.9 F, heart rate of 67 beats/min, blood pressure 152/65, respiratory rate 18/min, and an oxygen saturation of 99% on ambient air. Physical examination revealed an age-appropriate looking female in no distress with normal range of motion of her cervical spine. She did have decreased chest expansion on the right side with decreased breath sounds about the right lower posterior zone, and without appreciation of rales, rhonchi, or wheezing on auscultation. She had tenderness at T6-8, with radiation to the left lower extremity, associated with increased tone of her para-spinal muscles. The rest of her examination, including a complete neurological examination, was unremarkable.

Blood workup was abnormal for normocytic anemia with a hemoglobin 10.9, low albumin of 2.8, and a sedimentation rate of 47. Other blood tests including other aspects of complete blood count, complete metabolic panel, coagulation profile, procalcitonin, blood and sputum cultures were all within normal range. Her chest x ray showed decreased volume of right hemithorax relative to left (Figure 1), with lateral view significant for mid thoracic posterior opacity (Figure 2).



Figure 1: Decreased volume of Right hemithorax.

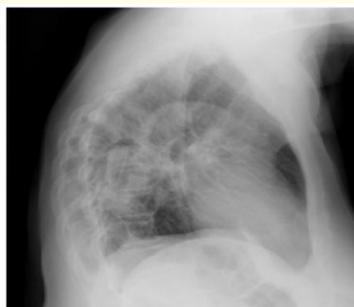


Figure 2: Mid-thoracic posterior opacity.

Subsequent Chest CT scan showed bone fragments of her thoracic spine surrounded by round pulmonary infiltrate. Bone displacement of the vertebral body was 16.8 mm as bone fragments were pulled laterally and posteriorly relative to the vertebral body with bone fragment size of 35.7 x 66.6 mm (Figure 3).

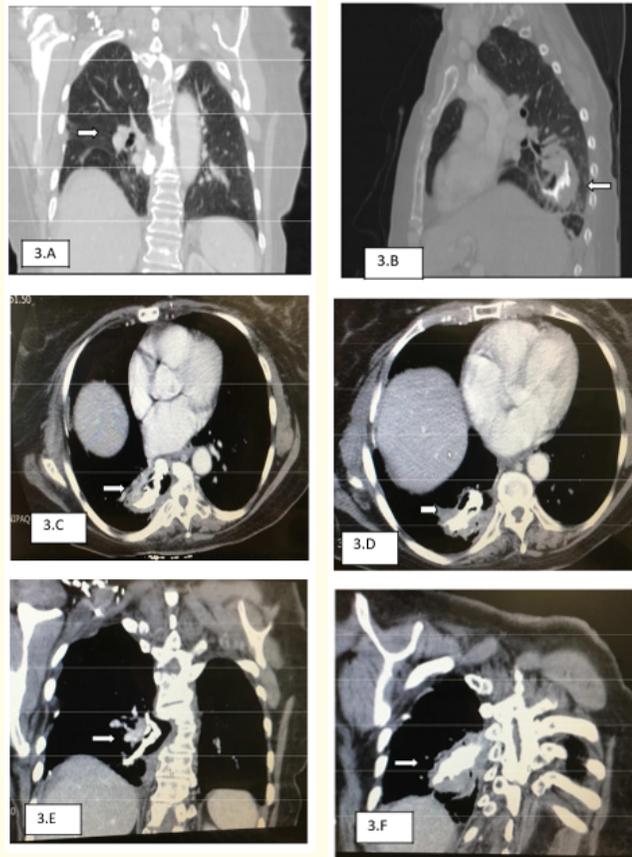


Figure 3A-3F: Chest CT showing round atelectasis (white arrow) with bone fragment inside it. Chronic-appearing scalloped absence of right half of T6-T8 vertebral bodies (Figure 3A, C and 3E).

Chest CT scan also showed chronic right fifth rib resection. Chronic-appearing scalloped absence of right half of T6-T8 vertebral bodies with chronic anterior wedging of T6 and T7 vertebral bodies with osseous fusion.

MRI (Magnetic Resonance Imaging) of the thoracic spine showed chronic deformity of the mid thoracic spine with focal kyphosis and scoliosis to the left from the T6 to the T8 levels related to prior diskitis/osteomyelitis at these levels, but did not show any evidence of active osteomyelitis, diskitis, or spinal cord compression. A subsequent bronchoscopy to assess endobronchial etiology of her hemoptysis demonstrated no evidence of ongoing bleeding, but mucosa of the posterior segment of the right lower lobe was found to be friable and bled easily on evaluation. Brushings of the superior and posterior segments of the right lower lobe were performed, but the workup was found to be negative for acid fast bacilli, fungal, gram stain and culture, as well as negative cytology for malignancy.

Once the hemoptysis had resolved and her cough improved, patient was discharged home after five days of admission. She was advised to follow up with pulmonary clinic for clinical monitoring and serial imaging of her lesion.

Discussion and Conclusion

Although the exact pathogenesis of rounded atelectasis is unknown, there have been multiple proposed theories. Menzies, et al proposed that rounded atelectasis starts with initial fibrosis of the visceral pleura that results in buckling of the pleura and collapse of underlying lung parenchyma because of pleural effusion [5]. In contrast, it has also been hypothesized that rounded atelectasis may be due to ongoing inflammation and deposition of connective tissue that shrinks and causes considerable atelectasis of the underlying pulmonary parenchyma [6]. A third proposed mechanism called microbronchial distortion theory suggests that the displacement of underlying parenchyma leads to distortion of small bronchi with subsequent gas absorption and atelectasis [7]. All of these mechanisms do however agree that part of the visceral pleura loses its normal elasticity, and the adjacent pulmonary parenchyma reacts with its continuous inflation and deflation with a localized circumferential atelectasis to that focus.

Asbestos-related pleural disease is the most identified etiology associated with the development of rounded atelectasis [8]. Other etiologies include tuberculosis, hemothorax, cardiothoracic surgeries, dialysis, and sarcoidosis [6,9,10]. Despite thorough literature search, we were unable to find any other reported cases of a bone fragment being the etiology of rounded atelectasis due to migration of the vertebral bone into the lung parenchyma over a period of years. The piece of bone that caused this likely broke off the main vertebral body and part of the adjacent rib is likely due to Pott's disease (osteomyelitis/diskitis) of the vertebra affecting that area, focal kyphosis, compression fracture of the vertebral body, and possibly previous vertebral and rib reconstruction surgery done in the 1998.

The diagnosis of rounded atelectasis requires the exclusion of other diseases, with a definitive diagnosis only achievable via a surgical biopsy. A presumptive diagnosis was established based on the CT scan findings suggesting a 3.5 - 7 cm rounded or oval mass abutting a pleural surface in the lung periphery, with vessels and bronchi curving into the mass and blurring the central margin and associated pleural thickening with or without calcification [11].

Rounded atelectasis, due to its mass-like resemblance to a neoplasm, may represent a diagnostic dilemma for clinicians, as to how confident they are of the diagnosis, and how far do they need to continue with the diagnostic momentum in ruling out other diseases. In our patient, we observed significant amount of displacement of the vertebral bone into the lung parenchyma, estimated at 10 mm ventri-dorsal diameter and 8 mm medio-lateral diameter, that suggested volume loss of the adjacent pulmonary parenchyma. Given such an atypical presentation, we opted for minimal invasive measures for evaluation of other diseases. The flexible bronchoscopy and bronchial brushings with bronchoalveolar lavage were done primarily to identify the site of hemoptysis [12].

A joint multidisciplinary team meeting consisting of specialists in infectious disease, cardiothoracic surgery, radiology, and pulmonology recognized this as an atypical case of rounded atelectasis, with plans for serial chest CT scan monitoring going forward. There is no literature to support the use of other modalities of noninvasive evaluation, such as contrast CT scan or PET scan.

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