

## CLINICAL CASE - TEST YOURSELF Chest Imaging

# Incidental finding in a patient presenting with acute stress syndrome

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## PART A

A 50-year old woman was admitted to our hospital with symptoms of acute stress disorder. Her past medical history was unremarkable. She was examined by the psychiatrists who evaluated that she needed to be hos-

pitalised. The anteroposterior chest radiograph at admission raised the suspicion of an abnormality which was confirmed by the following computed tomography (CT) scan (**Figs. 1-3**).



CORRESPONDING  
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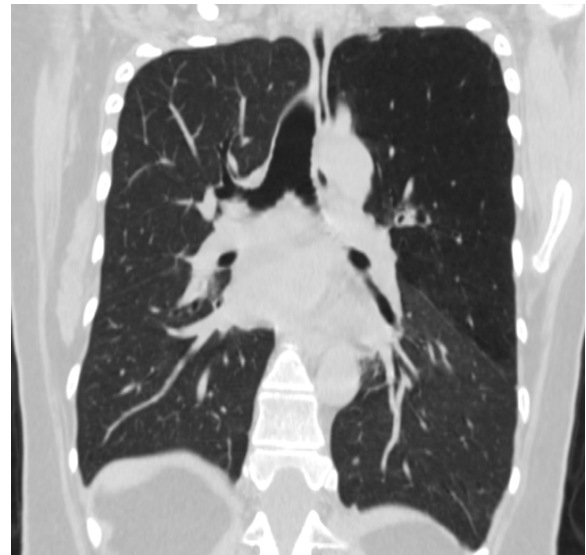
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**Fig. 1. a.** Anteroposterior and **b.** lateral chest radiograph.



**Fig. 2.** High-resolution axial CT image.



**Fig. 3.** High-resolution CT image (coronal reconstruction).

## PART B

***Diagnosis: Bronchial atresia of the apicoposterior segment of the left upper lobe associated with a pectus excavatum deformity.***

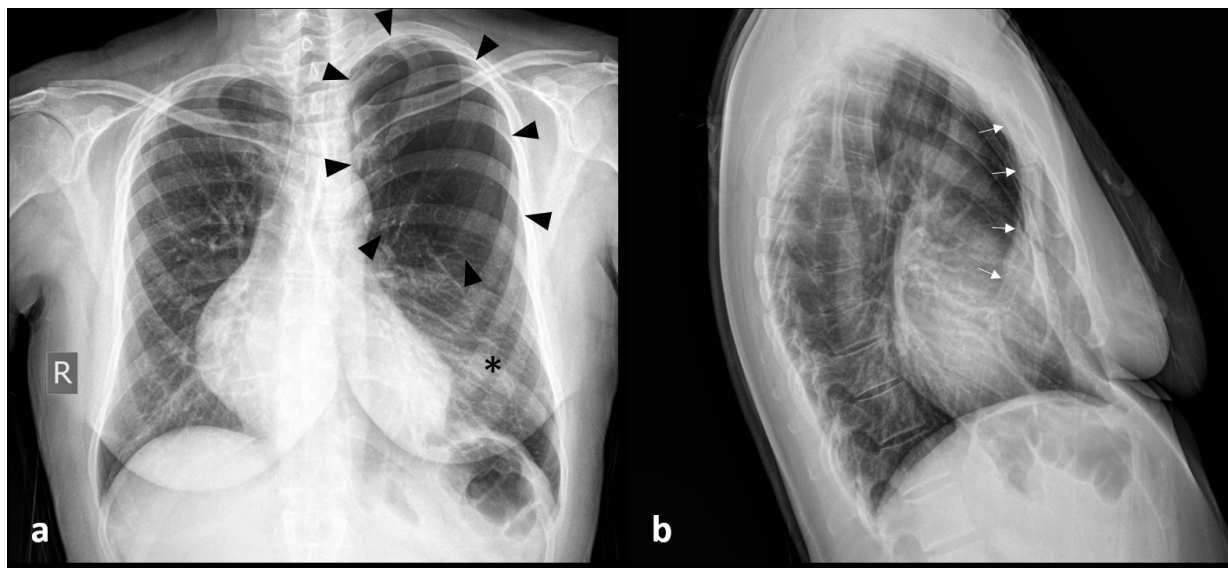
Bronchial atresia is a rare congenital malformation resulting from focal narrowing or occlusion of lobar, segmental or subsegmental bronchus [1]. The lobe or segment distal to the bronchial obstruction remains aerated through the pores of Kohn, the channels of Lambert and the interbronchiolar channels [1, 2]. This collateral ventilation functions as a one-way check valve allowing air to enter, but not to escape. As a result, the distal lung becomes hyperlucent and hyperinflated, due to air-trapping and oligoemia. The bronchus distal to the stenosis becomes filled with secretions (mucus) to form a bronchocoele [3, 4]. The remaining bronchial tree is normal. However, the adjacent healthy parenchyma may be compressed, according to the severity of emphysema [5].

Bronchial atresia is thought to be related to an ischaemic insult during the development of the bronchial bud, leading to the formation of a blind-ending bronchus [6]. It may be associated with other congenital malformations, including pectus excavatum deformity, as in our case, cystic adenomatoid malformation, bronchopulmonary sequestration and congenital lobar emphysema [2, 6]. It is more common in the left upper lobe (especially the apicoposterior segment), which is followed by the right upper, middle and lower lobes [2, 4]. Bronchial atresia is usually asymptomatic and is incidentally found on chest radiographs (approximately two thirds of cases). These patients are diagnosed in the second or third decades of life [2, 7]. The remaining one third of patients, usually diagnosed in the neonatal period and early childhood, report symptoms which include cough, dyspnoea and recurrent infections or more rarely wheezing, haemoptysis, chest pain or spontaneous pneumothorax [2, 5-7].

Chest radiograph reveals pulmonary hyperlucency in 90% of the cases, which results from a combination of hypovascularity and hyperinflation due to air-trapping within the affected parenchyma [2-4]. An ovoid, tubular, round or branching perihilar opacity is seen in 80% of the cases, corresponding to accumulation of

secretions and mucoid impaction distal to the bronchial atresia. A combination of both findings is present in 70% of patients, as in the present patient case. Expiratory radiographs depict better the air-trapping [5]. The adjacent healthy parenchyma may collapse and appear condensed or a mediastinal shift may be noticed, due to the increased volume of the affected lung. The latter two imaging findings were also noted in our patient's radiograph (**Fig. 1a**). The lateral radiograph also revealed a marked pectus excavatum deformity which also contributed to the mediastinal herniation and the shift of the heart to the right (**Fig. 1b**). It is difficult to diagnose bronchial atresia with only chest radiograph in patients with subsegmental bronchial obstruction, because a small area of emphysematous change cannot be identified [3]. If the distal lung becomes infected, the presence of pneumonia predominates and obscures bronchial atresia [2-4]. In neonates, this will be the result of localised retention of foetal liquid by bronchial obstruction [5]. Repeated lung infections in the same territory in childhood may raise suspicion of bronchial atresia [6].

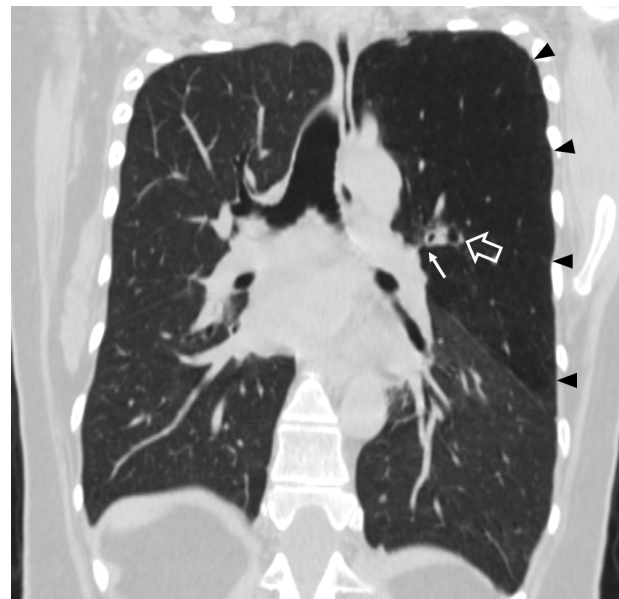
The diagnosis of bronchial atresia is confirmed by CT, by demonstrating a branching tubular or nodular opacity radiating from the hilum, usually with a "finger in glove" appearance (mucus-filled widened bronchus) surrounded by segmental hyperinflation and hypovascularity [3, 4, 6, 7]. Oligoemia occurs as a result of hypoxic vasoconstriction and intrapulmonary vascular compression [7]. These imaging characteristics were also the key criteria that brought bronchial atresia to the forefront of our differential diagnosis (**Figs. 2, 3**). Overinflation of the peripheral lung depends on the location of the obstruction and may be absent if a subsegmental bronchus is occluded [3]. In our case, the apicoposterior segment of the left upper lobe was overinflated whilst the anterior segment and the lingula were normally aerated. Therefore, we concluded that the apicoposterior segmental bronchus was atretic (**Figs. 2, 3**). The parahilar mass (bronchocoele), if present, is of low density with sharp inferior contour unlike the superior one. The superior contour can be sometimes well-defined with an air-fluid (air and mucus) level [5, 7]. Rare cases with no mucoid im-



**Fig. 1. a.** Anteroposterior chest radiograph showing hyperlucency and hypovascularity of the left upper lung field (black arrowheads). The adjacent healthy parenchyma appears to be condensed (\*). Of note is also the elevation of the left clavicle, the expansion of the superior intercostal spaces and shift of the heart to the right. **b.** Lateral projection demonstrating a marked pectus excavatum deformity (white arrows).



**Fig. 2.** High-resolution axial CT image demonstrating decrease in attenuation and vascularity of the anteroposterior segment of the left upper lobe (black arrowheads). The ectatic bronchus (white open arrow) is present distal to the bronchial atresia (white arrow) and is partially filled with mucus.



**Fig. 3.** High-resolution CT image (coronal reconstruction) demonstrating decreased attenuation and vascularity at the anteroposterior segment of the left upper lobe (black arrowheads). The ectatic bronchus (white open arrow) is present distal to the bronchial atresia (white arrow) and is partially filled with mucus.

paction and an air-filled bronchus present have also been reported [2, 7]. In our case, the ectatic bronchus was partially filled with mucus (**Figs. 2, 3**). Bronchoscopy, which reveals a blind-ending segmental or subsegmental bronchus, used to be the modality of choice before the extensive use of CT [2]. Nevertheless, it is still useful to exclude intraluminal lesions [5].

Treatment is not recommended in asymptomatic patients, like our patient [2, 4, 7]. Surgical excision is necessary if complications occur, including infection or compromise of adjacent parenchyma [2, 7]. It is also indicated if the presence of a malignant lesion cannot be ruled out [4].

Imaging findings of bronchial atresia can be similar

to congenital lobar emphysema, congenital cystic adenomatoid malformation, lung aplasia, bronchogenic cyst, anomalous pulmonary venous return, interlobar pulmonary sequestration and allergic bronchopulmonary aspergillosis. In adults, the differential diagnosis includes benign or neoplastic diseases causing acquired bronchus obstruction, such as lung cancer and bronchial adenoma [2, 4, 7].

Complications include infection, spontaneous pneumothorax and degradation of lung parenchyma in the long term [2, 6]. **R**

#### **Conflict of interest**

*The authors declared no conflicts of interest.*



#### KEY WORDS

Bronchial atresia; Bronchial anomalies; Pectus excavatum deformity; Hyperinflated lung; Emphysematous lung

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READY-MADE  
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