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RESPIRATORY CASE REPORTS

Carina at the Carina: Spirometry Leading to the Diagnosis of an Unusual Foreign Body within the Tracheobronchial Tree

Trakeobronşial Ağaçta Spirometre ile Tanısı Konan Alışılmadık bir Yabancı Cisim: Karinada Lades Kemiği

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Abstract

Foreign bodies in the lung can be difficult to diagnose. They may result in unusual symptoms leading to confusion about the diagnosis. Spirometry can sometimes provide a clue to a mainstem obstruction, although it may be compromised by artifacts. Herein, we present a case of an unusual foreign body within the tracheobronchial tree, for which spirometry provided the indication for bronchoscopy.

Key words: *Foreign body, spirometry, bronchoscopy.*

Özet

Akciğerdeki yabancı cisimlerin tanısı zor olabilmektedir. Bunlar tanıda karışıklığa yol açıp beklenmedik semptomlara da neden olabilirler. Solunum fonksiyon testi (SFT), bazı artefaktlardan dolayı yanıltıcı olsa da, bir ana bronştaki obstrüksiyonun ipucunu bazen bizlere verebilmektedir. SFT sonrası bronkoskopi endikasyonu koyduğumuz ve trakeobronşial ağaçta beklenmedik bir yabancı cisim saptadığımız olguyu sunuyoruz.

Anahtar Sözcükler: *Yabancı cisim, spirometre, bronkoskopi.*

Foreign bodies in the respiratory tract can be notoriously difficult to diagnose owing to the non-specificity of the symptoms that they evoke. On many occasions, the symptoms are regarded to be representative of asthma (or in case of a smoker, of COPD), or of lower respiratory tract infection. The problem may be further confounded by the fact that the foreign bodies may themselves evoke a lower respiratory tract infection, treatment of which may transiently relieve the symptoms, leading to a further delay in diagnosis. Spirometry is by no means a specific means of arriving at the diagnosis of a foreign body in the tracheobronchial tree; however, it may occasionally provide an extremely valuable clue to the diagnosis.

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CASE

A 63-year-old male smoker presented to the pulmonary outpatient clinic of our hospital with a two-month history of cough with scanty expectoration and shortness of breath with several mild wheezy episodes. There was no previous history of asthma. He had no relief despite about four courses of antibiotics. He had no fever or weight loss. There was no history of any allergies.

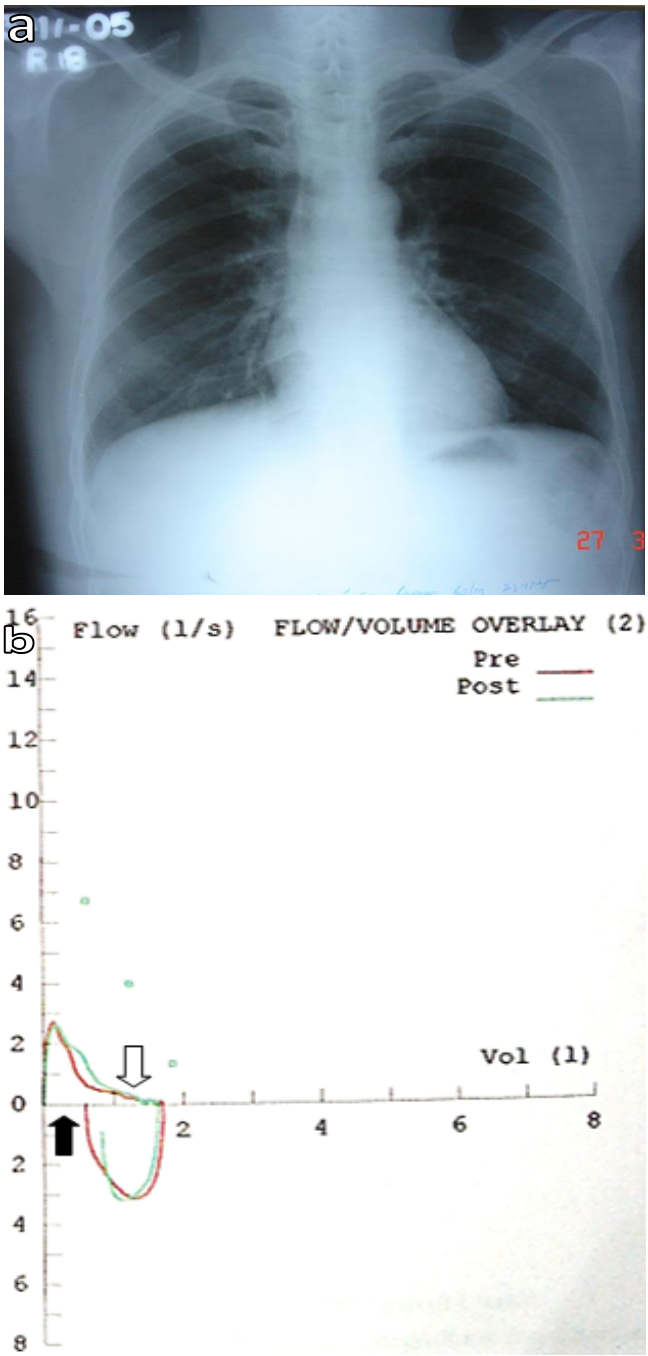

Figure 1a and b: *At presentation, the chest x-ray was essentially normal (a) while the flow volume curve showed an obstructive tracing (b)*

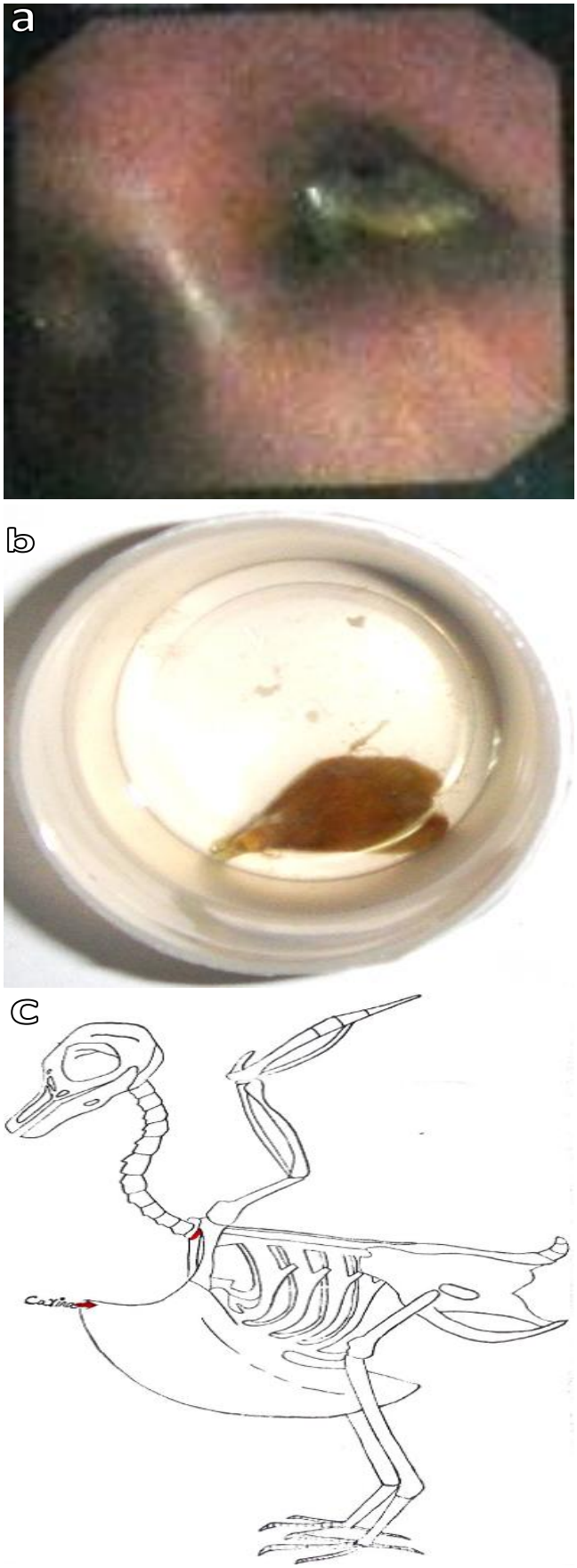

Figure 2a, b and c: *Foreign body in situ (a) and retrieved, showing a piece of the chicken's carina (b). The carina or breastbone of the chicken is shown for comparison (c)*

Physical examination revealed normal findings, except a mild postnasal drip. On auscultation, a mild wheeze was audible over both lungs, being somewhat louder over the right lung than over the left.

The chest X-ray findings were normal (Figure 1a). Spirometry showed an obstructive-restrictive pattern, obstruction being the more dominant. In particular, the flow-volume loop showed a well-marked concavity typical of obstruction (Figure 1b).

In view of the fact that the patient was a current smoker, a neoplasm within one of the bronchi was considered reasonable. Bronchoscopy revealed a foreign body on either side of the main carina; i.e., a relatively large piece impacted in the right main bronchus and a smaller fragment within the left main bronchus (Figure 2a).

There was a foreign body in situ and it was retrieved, showing a piece of the chicken's carina (Figure 2b). The carina or breastbone of the chicken is shown for comparison (Figure 2c).

The entire fragment within the left main bronchus and a portion of the piece within the right main bronchus was extracted by flexible bronchoscopically at the first session. Since the remainder of the bone was tightly embedded within the inflamed mucosa of the right main bronchus, a course of broad-spectrum antibiotic, oral steroid and inhaled bronchodilator was given, following which the remnant was successfully removed. This was identified as chicken bone (Figure 2b), a part of the chicken's sternum referred to as the carina (1) (Figure 2c).

The patient, as well as his spirometric tracing, improved following the procedure (Figure 3a). However, he still smokes.

The flow volume loop is seen to have reverted to a normal configuration following removal of the foreign body (Figure 3a). A schematic representation of a classical biphasic spirogram is shown for comparison (Figure 3b).

DISCUSSION

The initial diagnosis at presentation was that of a lower respiratory tract infection. This patient was admitted to being a current smoker, and due to the concerns that there could exist a neoplasm within one of the bronchi, bronchoscopy was performed. The extraction of foreign bodies has till fairly recently been within the domain of the rigid bronchoscopy; however, the availability of a multitude of innovations such as snares and wire-loops has enabled extraction of a variety of foreign bodies by the less intrusive flexible bronchoscope. The reduction of the edema and secretions (that almost invariably surround the foreign body) by a short course of antibiotic and anti-inflammatory agents can help make the task easier.

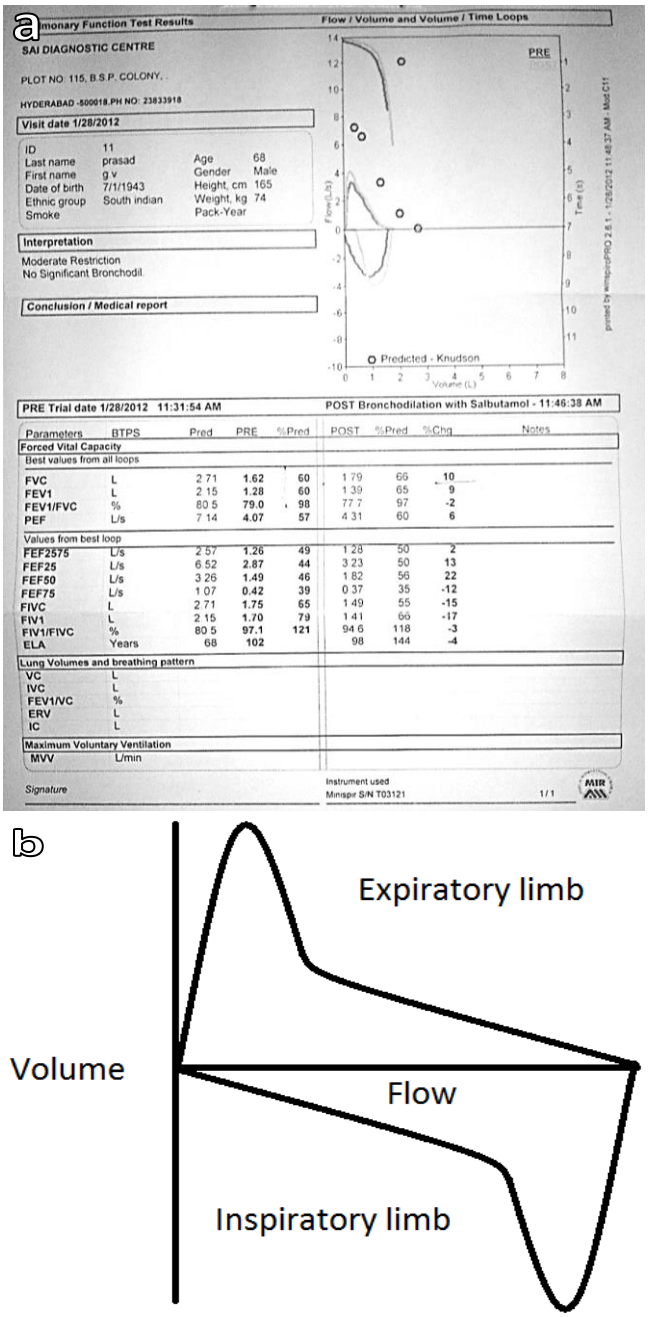

Figure 3a and b: *The flow volume loop is seen to have reverted to a normal configuration following removal of the foreign body (a). A schematic representation of a classical 'biphasic spirogram' is shown for comparison (b)*

The initial flow-volume loop showed an obstructive pattern. It is relevant to emphasize here that a biphasic pattern in the flow volume loop which is regarded to be characteristic of obstruction of a mainstem bronchus (2) (Figure 3b) was not seen in our case. An end-expiratory tailing (Figure 1b: open arrow), however, did raise the possibility of an intrabronchial obstructive lesion (3,4), particularly against the background of an absence of

asthma or chronic obstructive pulmonary disease (COPD). It is evident from the flow-volume loop that there occurred some leakage of part of the exhaled outside the mouthpiece during the performance of the forced expiratory maneuver (Figure 1b: closed arrow), leading to a premature return of the inspiratory curve to the baseline, and this very likely masked any flattening of the terminal part of the inspiratory loop—which would otherwise complete the classic biphasic flow-volume loop (2,5) (a plateauing of the expiratory loop being the first requirement). The flow-volume loop showed a marked improvement following the extraction of the foreign body (Figure 3a).

Review of the literature for spirometric abnormalities leading to the diagnosis of a bronchial pathology—either a foreign body or a bronchostenosis— revealed a limited number of cases of a similar nature to the one presented here. Of particular interest were the reports published by Uzun et al. (6) who found a metallic screw within the tracheobronchial tree of a patient with an abnormal spirometry, and of Gascoigne et al. (2) and Rhodes et al. (3) who made a difficult diagnosis of a narrowed bronchial lumen based on an abnormal spirogram. Indeed, none of the studies other than those by Uzun et al. (6) made a diagnosis of a foreign body, but rather of either a mainstem bronchial stenosis or a tumor.

In conclusion, physicians should be alert to the possibility of intrabronchial obstruction following the development of a new-onset wheeze, particularly one that is asymmetric or unresponsive to therapy. Although a biphasic flow-volume curve can be a clue to the diagnosis of an intrabronchial pathology (such as a tumor or a foreign body), it is not mandatory. An expiratory tailing of the flow-volume loop may of itself provide a due to diagnosis, particularly in the absence of associated obstructive lung disease. Spirometric artifacts generated by the leakage of air outside the system during a forced expiratory maneuver can mask the inspiratory plateauing and prevent the generation of a typical biphasic flow-volume curve.

CONFLICTS OF INTEREST

None declared.

AUTHOR CONTRIBUTIONS

Concept - F.A., G.A.K., S.S., R.H., A.H.; Planning and Design - F.A., G.A.K., S.S., R.H., A.H.; Supervision - F.A., G.A.K., S.S., R.H., A.H.; Funding -; Materials - F.A.; Data Collection and/or Processing - R.H.; Analysis and/or Interpretation - S.S.; Literature Review - G.A.K.; Writing - F.A.; Critical Review - A.H.

YAZAR KATKILARI

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