Usefulness of MRI for diagnosis of a foreign body in the bronchus

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Key words: MRI, bronchus, foreign body, peanut

Introduction

Sometimes determining the presence of foreign bodies within the airways of children is very difficult, especially when detailed information is not obtained from the patient and family and the object is radiolucent, such as a peanut. A careful examination involving an interview and chest X-ray may indicate the possibility of this problem; however, abnormalities that might suggest this condition are not always found. In this current case, the foreign body (peanut) lodged in the left main bronchus was finally detected by magnetic resonance imaging (MRI).

Case Report

Patient: A 3-year-old boy.

Chief complaints: fever, stridor.

Present illness: On April 8, 1996, a boy suffering with a high fever (39°C) and cough was seen by a local doctor. He was diagnosed with a common cold, and the doctor administered antibiotics and anti-inflammatory drugs. However, the symptoms did not improve, and the boy began to complain more of stridor. The boy was brought to the emergency department of our hospital on April 10.

Progress: From the initial interview, a foreign body in the airway was not suspected. Physical examination and chest X-ray was taken (Fig. 1). The patient was diagnosed with pneumonia in the lower lobe of the left lung and treated with intravenous drip of antibiotics. Although the fever subsided, the cough persisted. On April 15, a chest X-ray was performed again. Atelectasis of the upper lobe of the left lung and a mediastinal shift toward the left side were observed (Fig. 2). Due to these findings, a foreign body in the bronchus was suspected for the first time, and therefore MRI was performed the following day.

Fig. 1 Chest radiograph shows slight infiltration.
In the horizontal plane, a high-intensity structure within the left main bronchus was observed on T1-weighted images (Fig. 3). The intensity was higher in the former than in the latter. Furthermore, a high-intensity structure was also found on a T1-weighted image in the sagittal plane (Fig. 4), but it was not detected on a T2-weighted image (Fig. 5). These findings suggested the existence of a radiolucent foreign body within the left main bronchus, and we suspected the object to be some kind of bean, like a peanut.

The patient was immediately moved to the Department of Otolaryngology, and using a ventilation bronchoscope, we removed the peanut from his left main bronchus after placing him under general anesthesia. The results were excellent, and the patient was discharged on April 19.

**Discussion**

Radiolucent foreign bodies in airways are not uncommon in children. Such objects may elicit various complications such as emphysema, atelectasis, pneumonia, or dyspnea. Therefore, prompt diagnosis and treatment are critical. Usually diagnosis is relatively easy from the results of an interview, physical examination, and chest X-ray. However, accurate diagnosis is difficult in some cases,
especially when little information is obtained from
the patient and family and when prominent symp-
toms are not observed initially and notable abnor-
malities are not found on physical examination or
chest X-ray.

Recently, CT has come into much wider use, and it
is now recognized as very useful for detecting foreign
bodies in airways [1]. In this case, we found that
MRI was critical for the detection of the foreign
body, a peanut, within the airway. MRI has an ad-
vantage in that any plane can be taken. In this case,
the foreign body was clearly detected on the horizon-
tal plane. Imaging the vertical plane to the travel-
ing axis of the trachea or bronchus may be useful in
some cases. The artifacts caused by respiration or
heart beat can interfere with MRI of the chest. How-
ever, an excellent picture can be obtained by syn-
chronization of signals with an electrocardiogram
[2].

Almost all of a radiolucent foreign body can be
clearly visualized on T1-weighted images, and the
use of T1-weighted imaging for detection of peanuts
in the bronchus has been reported previously [3, 4].
However, T2-weighted imaging was not performed in
these past studies. The relaxation time of the peanut
and other kinds of nuts with high lipid content is
probably longer on a T2-weighted than on a T1-
weighted image. Therefore, the picture of such nuts
on a T1-weighted image will show a very-high-
intensity structure and have a marked contrast with
the surrounding tissue. This same object hardly
would be detected on a T2-weighted image. This
presumption was clearly confirmed in our case.

The most common foreign objects in the airways
of children are peanuts. The comparison of T1- and
T2-weighted images can help to clarify, to some ex-
tent, whether the foreign body is a peanut. Impor-
tantly, fat tissue or flow-related enhancement of
blood vessels [5] must not be mistaken for a peanut.

MRI is very useful for detecting the position, size,
shape, number, and quality of foreign bodies in the
airway. Although MRI is rapidly becoming uni-
versally available, it has not yet become a popular di-
agnostic tool for this type of case, and it has the
disadvantage of usually requiring the sedation of
children during the examination. Most cases involv-
ing a foreign body in the airway are accurately di-
gnosed without MRI. However, MRI should be
performed when the possibility of a foreign body is
not completely excluded, even though it is not appar-
tently suggested from an interview, physical examina-
tion, and chest X-ray.

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