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Logistic regression analysis of risk factors for prolonged pulmonary recovery in children from aspirated foreign body

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ABSTRACT

Objective: Foreign body aspiration is a life-threatening emergency for children. Fried chicken is commonly available all over the world, but no cases have previously been reported addressing this food as a tracheobronchial foreign body. We report an extremely rare case of tracheobronchial aspiration of fried chicken complicated by severe bronchitis and postoperative atelectasis. To clarify predisposing factors related to bronchopulmonary complications, we also reviewed paediatric cases of tracheobronchial foreign bodies treated in our department over the past 14 years.
Methods: We retrospectively reviewed a total of 77 cases of tracheobronchial foreign bodies from 1988 to 2011. The main outcome measure was duration of hospitalisation, reflecting postoperative therapy. Logistic regression analyses were conducted to determine risk factors for longer hospitalisation.
Results: Age, sex, and interval between the aspiration episode and bronchoscopy were not significantly associated with longer hospitalisation. Regarding kinds of foreign bodies, higher rates of longer hospitalisation were noted for patients who had aspirated peanut or animal material, as compared to patients who had aspirated non-organic material (odds ratio, 5.80; 95% confidence interval, 1.12–30.43).
Conclusions: In terms of predicting the risk of pulmonary complications, the type of foreign body aspirated offers a more meaningful factor than the interval between aspiration and operation. Specifically, peanuts or animal material containing oils appear to be associated with a more prolonged pulmonary recovery even after retrieval of the foreign body.

1. Introduction

Foreign body aspiration is a life-threatening emergency for children. The most common aspirated objects are peanuts or beans [1,2]. First, we report herein an extremely rare case of tracheobronchial foreign body aspiration involving fried chicken and complicated by severe bronchitis and postoperative atelectasis. Second, the uniqueness of this foreign body was clarified by reviewing our experience with 77 cases of foreign body aspiration in infants and children over the past 14 years. In this way, we analysed whether predisposing factors related to bronchopulmonary complications could be identified from the outcome of prolonged hospitalisation, focusing on: (1) age; (2) sex; (3) interval between inhalation and operation; and (4) type of foreign body aspirated.

2. Case report of aspirated fried chicken

A 21-month-old girl presented with a cough and choking crisis that had persisted for several hours. Onset of symptoms had occurred while she was eating fried chicken. She presented to a paediatric clinic and was initially diagnosed with bronchial asthma. After atomiser therapy failed to relieve symptoms, she was referred to our hospital. On physical examination, breath sounds on the left were slightly weak and complicated with rales. However, chest radiography failed to reveal emphysema or mediastinal deviation. Computed tomography showed a high-intensity lesion in the left main bronchus with a diameter of approximately 9 mm, implying presence of a foreign body (Fig. 1). Surgery was conducted under general anaesthesia on the same day as the aspiration episode, but the trachea and bronchus displayed oedema and accumulation of purulent secretion, presumably resulting from chemical reactions with the ingredients of the fried

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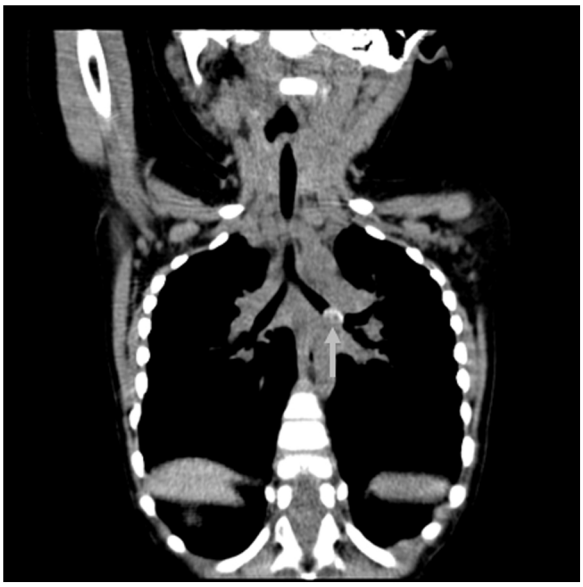

Fig. 1. Preoperative coronal CT, showing a foreign body (diameter, 9 mm) in the left main bronchus.

chicken (Fig. 2A). After revealing a foreign body in the left bronchus on flexible bronchoscopy, the first attempts using rigid ventilation bronchoscopy (FS-VB250; Machida Endoscope, Abiko, Japan) and optical forceps (peanuts forceps; Nagashima Medical Instruments, Tokyo, Japan) failed to completely remove the foreign body because of its size; only part of the aspirated material was extracted, with most remaining under the level of the vocal cords (Fig. 2B, video clip). The remaining material was removed after several more attempts by dividing the material into separate pieces (Fig. 2C). Laryngeal oedema was anticipated as a result of these processes, and the patient was thus kept on intratracheal intubation.

Although intravenous antibiotic and dexamethasone were administered, chest radiography revealed atelectasis of the right upper lobe complicated by pneumonia on the following day (data not shown). Oxygen saturation was lower than 90% in room air, purulent secretion was continuously drained from the intubation tube, and atelectasis did not show radiological recovery until 8 days postoperatively. The patient was thus maintained under ventilatory support for 9 days postoperatively with the use of sedative agents including vecuronium and midazolam.

The patient resumed ingestion on postoperative day 19 after recovery of slight disturbance of consciousness, presumably due to prolonged effects of the sedative agents. She was discharged on postoperative day 30.

3. Materials and methods

3.1. Study population

Retrospective chart review was performed for all cases of foreign body aspiration treated at Tohoku University Hospital between 1988 and 2011; a total of 77 Japanese children undergoing treatment for foreign body aspiration were reviewed after excluding cases without presence of a foreign body. Our university is the only university hospital in Miyagi Prefecture. This prefecture in northern Japan has a population of 2,300,000. Almost all paediatric patients from the local districts suspected of inhaled foreign bodies are referred to our department.

Relevant clinical findings such as clinical history, symptoms, physical findings, interval from aspiration to correct diagnosis, endoscopic findings, and complications were reviewed.

3.2. Clinical evaluation

Surgical procedures and anaesthesiological management have been described in detail in previously published work from our department [1]. Briefly, all cases underwent diagnostic flexible bronchoscopy, followed by removal of the foreign body by rigid

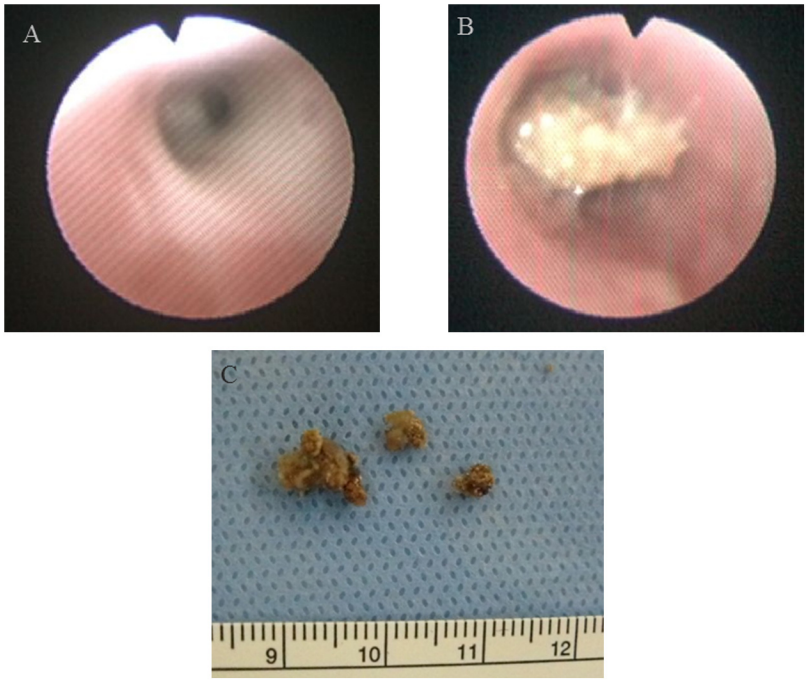

Fig. 2. (A) Bronchoscopic findings, revealing purulent secretion and oedema of the bronchus. (B) Bronchoscopic findings after aspiration of the discharge, revealing a foreign body lodged in the left main bronchus. (C) Foreign bodies (fried chicken) removed after dividing the material into separate pieces.