Abstract

Elective dental procedures with jewelry are common, leading to increased prevalence of foreign body aspiration. Depending on acuity and degree of airway obstruction, patients typically present with respiratory symptoms. We describe a case of a deep-seated dental device within the tracheobronchial tree. Additionally, we provide an overview of procedural methods of extraction, a comparison of flexible and rigid bronchoscopies, and a review of bronchoscopic tools available.

Case Report

This is a case report of a 22-year-old male with history of epilepsy in the context of tuberous sclerosis. Initially, he sought outpatient care from his primary care provider for new concerns of a chronic, persistent cough lasting for several months. Conservative measures were utilized, including albuterol. He had consulted his neurologist for the management of his epilepsy, which was poorly controlled, experiencing approximately one seizure a week, and his epileptic regimen was being titrated. The cough persisted, prompting radiography. A chest x-ray (figure 1) revealed a radiopaque foreign body measuring about 4.1 cm over the right main bronchus. Bronchoscopy was performed to remove the inhaled foreign body with pre-(figure 2A) and post-(figure 2B) device retrieval shown.

Procedure

The shape and the size of the dental jewelry (figure 3) made retrieval particularly challenging (horse-shoe shape, sharp/jagged edges), with concerns of vocal cord injury on retrieval.

After extreem discussion, an initial attempt with a flexible bronchoscope was agreed upon. After intubation with an 8.0 endotracheal tube, a flexible bronchoscope was introduced into the airway. Initially, under direct visualization, toothed forceps were used to dislodge the dental device from the bronchial wall. The resultant minor bleeding was controlled by instilling chilled saline.

After mobilization, the forceps were also used to "aim" the dental device so that the rounded shape would cross the vocal cords first. Unfortunately, the forceps were unable to provide enough grip to ensure safe retrieval. To ensure a tighter grip, a lasso was introduced and threaded over and around the dental device. Using the lasso, the dental device was pulled up to the bronchoscope.

Finally, simultaneously, the dental device, bronchoscope, and endotracheal tube were all removed. Initially, the patient did experience bronchospasm complicated by hypoxia requiring reintubation. Fortunately, after steroid treatment, the patient was safely extubated and able to return home.

Flexible Bronchoscopy

- Readily available
- Internal diameter smaller (5-6mm)
- Does not secure airway (single lumen)
- Conscious sedation
- Can reach distal airways
- Indicated in cervical trauma patients

Rigid Bronchoscopy

- Limited availability
- Internal diameter larger (6-8mm)
- Secures airway (double lumen)
- Full sedation
- Limited to proximal airways
- Contraindicated in cervical trauma patients

Discussion

Foreign body aspiration (FBA) is a potentially life-threatening event. In our case, an approximately 4cm dental device was found to be lodged in the right main stem bronchus with the patient becoming increasingly symptomatic:

- Extraction of these foreign bodies (FBs) can be quite challenging given the anatomical restrictions of the airway, the size and shape of the dental products (in this case), and the ability of the FB to be lodged into the tissue.

The main risk factors include:

- Trauma, alcohol, or drug use, and neurological disturbances (stroke, Parkinson’s disease, and seizure)

FBA symptoms depend on the degree of obstruction and location:

- The symptoms of incomplete obstruction are non-specific (shortness of breath, cough with or without sputum production, and signs of tachypnea, stridor, or wheeze).

An inciting event may or may not be reported:

- Often, the patient seeks medical attention when complications from the obstruction occur, such as pneumonia.

Central airway obstruction may present with respiratory distress and may even precipitate cardiac arrest. Depending on the FBA material/shape and retrieval process, scarring and granulation tissue can form.

Management is dependent on acuity. If central airway obstruction is suspected, securing the airway is of paramount importance. Endotracheal intubation is performed by an experienced operator. After securing the airway, visualization and retrieval of the FB by flexible bronchoscopy or rigid bronchoscopy is performed.

- Flexible bronchoscopy is often used for diagnosis and extraction of FBs in those with conscious sedation in non-emergent status.

- Rigid bronchoscopy is often used for patients with large FBs with asphyxiation or structurally dangerous FBs (sharp, pointed).

A comparison of the two interventions can be seen below (table 1). A pulmonologist’s toolbelt is ever-growing. A comparison of these devices is seen in (figure 4).

The goal of this case report was to present a uniquely challenging case regarding foreign body retrieval and reflect on how we can approach similar cases in the future, yielding even better results.

We hypothesize a history of epilepsy or impaired cognition as significant patient risk factors for FBA and severe obstruction with FBA may warrant utilization of rigid bronchoscopy to secure and maintain patent airway throughout prolonged retrieval process.