



Case report

Endobronchial removal of a metallic needle using a flexible diagnostic bronchoscope and biopsy forceps. A case report from Djibouti

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ABSTRACT

Foreign body removal is a challenging procedure. Firstly we have to identify properly the foreign body and the position of the obstruction. Secondly we have to choose the proper removal equipment and finally the appropriate method of patient ventilation during the procedure. In our case report we present a challenging procedure with the removal of a metallic needle with minimum resources and equipment in a young girl in Djibouti, Africa.

1. Background

Airway foreign body is one of the common airway emergencies in not only adults but also adolescence. Although foreign body removal by bronchoscope has become a routine minimally invasive technique in many developing countries, it is still a clinically rare but urgent technique in Djibouti, the horn of east Africa due to the shortage of endoscopic equipment and accessories, as well as training courses. We reported a successful case of endobronchial foreign body removal in Djibouti using very limited bronchoscopic equipment and shared with our experience in this case.

2. Case report

A 13-year-old African girl complaining with airway foreign body aspiration for 6 days, coughing with hemoptysis, was admitted to the emergency room (ER) of Djibouti Military Hospital. The Chest X-ray and computer tomography (CT) were shown that a needle-shaped high-density shadow approximately 4 cm in length located in the lumen of the left lower lobe (LLL) (Fig. 1a and b). The available bronchoscopic equipment in hospital were the flexible diagnostic bronchoscope (Olympus Company, BF-180) Fig. 2 and the flexible biopsy forceps (OLYMPUS Company, FB-21C) Fig. 3. The diagnostic bronchoscope is the FB with small outer diameter and working channel, the outer

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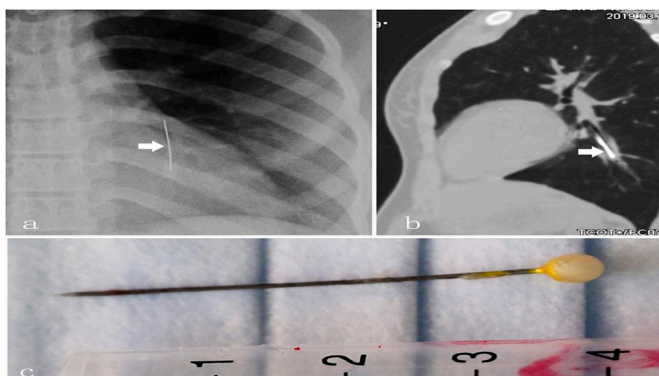


Fig. 1. a: A needle-shaped high-density shadow in the field of LLL was shown in the chest X-ray, partially overlapping with the heart shadow, as indicated by the white arrow. **Fig. 1b:** The needle-shaped foreign body was located in the distal endobronchial lumen of the LLL in the sagittal position of the chest CT, as indicated by the white arrow. **Fig. 1c:** The metallic needle approximately 4 cm in length removed from the airway.



Fig. 2. Olympus company, BF-180.



Fig. 3. Olympus company, FB-21C

diameter of scope's insertion part is less than 4.9mm, while the diameter of its working channel is less than 2.2mm, which only guarantee the access of a biopsy forceps with small diameter.

After elaborative preoperative planning. The patient was intubated by endotracheal tube (ETT) with 7.5# in size under general anesthesia, the diagnostic bronchoscope was inserted into the airway by the lumen of ETT. The metallic needle was endobronchially identified and located in the lumen of basal segment of LLL 5 minutes later. The needle was clamped and lifted up into the lumen of ETT carefully by the biopsy forceps, and eventually removed successfully out of the airway together with the ETT. No bleeding occurred during the operation, the patient wake up and breathe well without ETT intubation. The duration of the

procedure was less than 20 minutes. The patient recovered well after the procedure.

3. Discussion

In Djibouti, there are only a few respiratory physicians and pediatricians. Currently, there are no respiratory doctors or pediatricians who are specialized in the Interventional of Pulmonology (IP), the subspecialty of Respiratory and Critical Care. In many national comprehensive hospitals in Djibouti, the equipment of bronchoscope is limited, there is usually only one diagnostic bronchoscope, and no therapeutic bronchoscope or other advanced bronchoscopic equipment at all. Most of local doctors do not have chance for specialized training in IP and do not have enough experience of clinical application in the use of bronchoscope, which restricts the clinical promotion of bronchoscopy. In Djibouti, most of patients suffering from airway diseases such as the airway foreign bodies cannot receive effective bronchoscopic treatment nation widely, and some of them have to go abroad for the treatment.

According to the literature statistics, about 79.1% of airway foreign bodies can be removed by FB, however, some of difficult airway foreign bodies need to be removed under general anesthesia with rigid bronchoscope (RB). Even so, there are still 3.76% of high-risk or difficult foreign bodies that need to be removed by thoracic surgeries [1]. The features of this cases: a typical history of inhaled needle-shaped foreign body, the time of the airway foreign body retention was not long, imaging was about 4 cm long needle-shaped metal foreign body in the lumen of the left fourth-grade airway, therefore, there was the clear indications to remove the bronchial foreign body by RB. For such a long and sharp foreign body, according to the traditional plan, firstly, we need to establish a working and ventilating channel by RB under general anesthesia, then find the foreign body in the airway, and safely remove the foreign body through the metallic channel of the RB [2]. However, most of hospitals in Djibouti do not have the RB equipment as well as the staff teams for the extraction of foreign bodies by RB. Therefore, it must be depended on the existing equipment and medical conditions in hospital, so we have to choose to remove the foreign body by FB under general anesthesia.

Since the working channel of diagnostic FB is relatively thin with 2.0mm in diameter, which can only guarantee the access of flexible biopsy forceps, while the foreign body forceps cannot pass through the lumens of diagnostic bronchoscope due to its large external diameter. Therefore, according to the existing conditions, we must firstly prove that the biopsy forceps can effectively clamp the needle, the secondly prove that the needle can be safely removed from the trachea, throat and mouth without damage to these tissues before the procedure. The vitro trial was planned and performed, since the patient was 13 years old, and ETT with No.7.5 or less is often choosed to establish an anesthetic channel for the adolescents of that age, therefore, it was necessary to confirm that our diagnostic bronchoscope can be successfully inserted into no.7.5 ETT, and the biopsy forceps can effectively clamp the needle-shaped foreign bodies and successfully remove it into ETT. After the success we got in vitro trials, we developed the treatment strategy for foreign body removal by ETT under general anesthesia according to the existing equipment. We firstly performed ETT through the mouth under anesthesia, then we put the diagnostic FB insert into the ETT, and use the flexible biopsy forceps to clamp the foreign body. After moving the foreign body into the lumen of ETT, then remove the ETT both with airway foreign body. Reintubation with a new ETT to ensure ventilation if necessary. The success of the treatment strategy depends on detailed preoperative planning and in vitro testing. This case has been proved to be the first case report in Djibouti introducing the endobronchial removal of airway foreign body using a diagnostic bronchoscope combined with a biopsy forceps by our search in Pubmed.

4. Conclusion

With the rapid development of IP, the application of FB is becoming more and more widespread [3]. Compared to RB [4], FB is relatively easy to operate. It plays an increasing important role in clinical [5–9]. Currently, The flexible bronchoscopy can basically replace many previous operations once requiring rigid bronchoscopy. So to master flexible bronchoscopy and get into the habit of preoperative assessment, which are the basic requirement for each respiratory physician. Currently, there is no relevant IP training program and training institution in Djibouti as well as east Africa. Although the local respiratory physicians and pediatricians are eager to master the technology of flexible bronchoscopy to benefit the patients, there is no opportunities to learn, which severely limited the clinical application of bronchoscopy. Therefore, in Djibouti and other developing countries in Africa, it is urgent to establish a training program based on local bronchoscopy equipment, and let more local respiratory physicians and pediatricians know how to use bronchoscope, so as to benefit more patients in Africa.

Declaration of competing interest

The authors declare no conflict of interest.

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