

Surgical management of an aspirated bone in a Shih Tzu terrier dog: a case report

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Article Info	Abstract
Article history: Received: 09 May 2023 Accepted: 17 June 2023 Available online: 15 November 2023	Foreign bodies in the respiratory tract (trachea/bronchus) are very rare conditions; therefore, it is not on top of the list of differential diagnoses in patients with chronic or severe cough, but its occurrence should not be considered unexpected. A 2-year-old male Shih Tzu terrier mix dog (9.20 kg) with a history of dyspnea for 6 days was referred to the Veterinary Teaching Hospital of Shiraz University, Shiraz, Iran. In the clinical examination, respiratory distress and pain during palpation of the neck area were observed. Radiology indicated a triangular radiopaque object (bone) in the trachea of the animal. The size of the foreign body, the weakness of the grasping forceps of the device, and the edges of the bone being stuck in the trachea caused tracheoscopy failure after 30 min of trying. Surgical procedure (tracheotomy) was effective to remove the foreign body using Noyes alligator tissue forceps. Aspirated foreign body is not a common condition. In the case of early recognition and immediate treatment of the aspirated foreign body, the prognosis is usually good.
Keywords: Dog Foreign body Tracheotomy	

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Introduction

Among previously reported foreign bodies, tracheal foreign bodies are very uncommon, but their occurrence is not impossible either. A foreign body in the airways (trachea/bronchus) causes acute symptoms, including severe cough and dyspnea.¹ Also, they are difficult to diagnose and treat.¹ Foreign bodies in the trachea and bronchi have been reported very rarely in animals, and probably most of the foreign bodies being aspirated come out with a lot of coughing, but in the patients that have been reported coughing was not effective. So far, cases have been reported in dogs, cats, horses, and chimpanzees.² There are different types of foreign objects, including bone fragments, cereal/wheat ears and plant materials, nails, pieces of rubber, teeth, stones, twigs, and bullets.² The most common clinical symptoms in cases with aspirated foreign bodies are severe cough, vomiting, and halitosis. Here, we have a very unusual case of foreign object in the trachea of a dog, being treated by tracheotomy.

Case Description

A 2-year-old male Shih Tzu terrier mix dog (9.20 kg) with a history of dyspnea for 6 days was referred to the

Veterinary Teaching Hospital of Shiraz University, Shiraz, Iran. In the history taken from the owner of the animal, severe sudden coughs occurred about 6 days ago, but after that the coughs became intermittent and were getting worse in the mornings. In the clinical examination, respiratory distress and pain during palpation of the neck area were observed, but apart from these few signs, no other abnormalities such as cyanosis were observed (temperature: 38.30 °C; heart rate: 108 beats per min; respiratory rate: 22 breaths per min). In the radiology, a triangular radiopaque object (2.67 × 1.26 cm) was observed in the cervical trachea at the level of 6th cervical vertebra (near the thoracic inlet; Fig. 1A). These conditions were informed to the animal owner and written consent was obtained to continue the process of diagnosis and treatment. After the final diagnosis, a decision was made on emergency endoscopy.

Complete blood count assessment was performed (all parameters were within the normal range) and the patient was anesthetized for the endoscopy. Initially, 22.00 mg kg⁻¹ cefazolin (Daana Pharmaceutical Co., Tabriz, Iran) was administered intramuscularly as a prophylactic antibiotic therapy. In the next step, sedation was induced using a mixture of intramuscular 0.05 mg kg⁻¹ acepromazine (Alfasan, Woerden, The Netherlands) and 0.50 mg kg⁻¹

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xylazine (Alfasan). After about 20 min when the patient calmed down, the cephalic vein was catheterized and fixed with adhesive tape. Then, anesthesia was induced with a combination of intramuscular 5.00 mg kg⁻¹ ketamine (Bremer Pharma GmbH, Warburg, Germany) and 0.25 mg kg⁻¹ midazolam (Exir Pharmaceutical Co., Borujerd, Iran). During anesthesia, the patient was receiving the Ringer solution at a rate of 10.00 mL kg⁻¹ per hr (Shahid Ghazi Pharmaceutical Co., Tehran, Iran). Heart rate, respiratory rate, and oxygen saturation were constantly checked during anesthesia. During tracheoscopy, we tried to remove the foreign body with the grasping forceps, but the size of the foreign body, the weakness of the grasping forceps of the device, and the edges of the bone being stuck in the trachea caused tracheoscopy failure after 30 min of trying. In next step, the decision of the surgical team changed to an open approach. In the radiograph, the relative position of the foreign body was determined; so that, the tracheal incision was made in the same position. At this stage, anesthesia was changed from intravenous route to inhalation using 1.50% isoflurane (Minrad International Inc., Orchard Park, USA), but care was taken to insert the tracheal tube as far as possible from the foreign body, and its cuff was also filled. The patient was positioned in the dorsal recumbency, the midline in the neck area was shaved and scrubbed for surgery, and the incision site was draped. The cervical midline was incised, extending the incision from the middle to the sternum, the subcutaneous tissues were blindly dissected, and the sternocephalicus and sternohyoidus muscles were separated. After exposing the trachea, the Metzenbaum scissors were placed under the trachea to hold the trachea in the incision site (Fig. 1B). A transverse incision was made between two of the cartilaginous rings of the trachea on the ventral side; so that, the dorsal surface of the trachea remained intact. At this moment, isoflurane was offed, but the patient was receiving pure oxygen. Ketamine/midazolam mixture was prepared for re-induction, if the patient recovered during surgery. But, we noticed that the tracheal tube had pushed the foreign body forward by a few centimeters. The tracheal tube was slightly pulled back and the foreign body was removed with Noyes alligator tissue forceps with a slight pressure (Fig. 1C). In fact, after removing the foreign

body, the reason for the failure of the tracheoscopy was found that the foreign body was large and stuck in the trachea. Indeed, the sharp edges of bone prevented its movement. A small amount of blood was also seen on the thin and sharp edges of the bone; so, the trachea was suctioned to remove any blood or pus. The incision site was sutured with a simple interrupted pattern using 2/0 Vicryl™ (Supa, Tehran, Iran). The muscles were placed together and sutured with a simple continuous pattern with the 2/0 Vicryl™ and the skin was sutured with intradermal pattern using the same material. The patient received fentanyl (5.00 µg kg⁻¹, IV; Caspian Tamin, Rasht, Iran) during surgery. For post-operative care, cephalixin syrup (20.00 mg kg⁻¹, q12hr, orally; Exir Pharmaceutical Co.) and meloxicam (0.10 mg kg⁻¹, q24hr, orally; Jalinous Pharmaceutical Co., Tehran, Iran) were administered. When the case was followed-up (two weeks after surgery), the respiratory distress was completely resolved and the suture site was healed without any complications.

Discussion

A foreign body in the trachea and bronchus, although rare, is life-threatening. The foreign body can enter the airways only when there are interferences with normal reflexes, such as taking a sudden inspiration during eating, running, or playing.³ These reflexes are not yet complete in puppies and are not effective compared to adults; therefore, the prevalence of this complication has been more reported at young ages.³ Although this disorder can occur in any breed, but it has been more reported in Labrador retriever breeds.¹ Even in some seasons of the year, the possibility of plant foreign bodies increases, because these are light and easily aspirated. In general, the ears of wheat and barley are known as foreign bodies penetrating deeply because their tentacles are one-sided and do not come out with coughing, but only move down and cause chemical and mechanical irritations.¹

The size of the foreign body determines the place where it gets stuck, and this itself determines the intensity of the cough; the deeper foreign body, the less severe cough.³ Depending on the size and type of foreign body, foreign body reaction may occur. If the edges of the foreign



Fig. 1. Tracheotomy procedure performed to remove tracheal foreign body. **A)** The presence of the foreign body in the trachea; **B)** Trachea exposure through a midline incision; **C)** The extracted foreign body (red circle).

body are sharp, it can penetrate into the surrounding tissues and become chronic. If the foreign body enters the bronchus, it mainly enters the right bronchus; the main reason for that is unknown, but probably the right bronchus has a more direct path than the left one.¹ The common term used for respiratory foreign bodies is penetration syndrome, having symptoms such as intractable cough, sudden choking, breathlessness, and wheezing;³ but the symptoms of this syndrome were not very evident in the current patient.

For a good outcome, rapid diagnosis and treatment should be done. The first step in the diagnosis and treatment of most cases is primary stabilization, including fluid therapy, oxygen therapy, sedation, and pain management. The diagnosis of this disorder is based on history, clinical symptoms and radiology. In the history, there are sudden and severe coughs occurring mainly after running in a dry and woody environment or at a park.¹ In the clinical examination, persistent or intermittent coughs being intensified after resting (also observed in current patient), hemoptysis, and halitosis are observed.⁴ In chronic cases, leukocytosis, pyrexia, and lethargy may be seen. Cough is one of the main symptoms in the patient history and clinical examination. In fact, coughing is the first symptom of a respiratory foreign body in such a way that the absence of cough strongly rejects the entry of a foreign body into the airways. Radiology is effective in diagnosing of most foreign bodies, especially if the foreign body is radiopaque. Also, radiology is useful in examining the pulmonary status and the position of the foreign body. The combination of these three techniques greatly increases the power of diagnosis.

Several treatment methods have been reported so far to remove the respiratory foreign bodies; one of the simplest ways is to suspend the patient by its hindlimbs and shake it.⁵ In these cases, two general treatment methods are defined consisting of minimally invasive techniques including tracheoscopy, bronchoscopy, and fluoroscopy and open procedure (surgery).⁴ In some cases, when the foreign body is close to the larynx, it can be removed by reaching through the oral cavity (without surgery).⁶ Depending on the location of the foreign body, surgery can be pre-sternal tracheotomy or thoracotomy. In thoracotomy, when the foreign body is palpable in the bronchus, the bronchotomy technique is used, and in cases where the foreign body has entered the lung tissue, the lung lobectomy is performed through the 4 - 6 inter-costal space. Rigid tracheoscopy/bronchoscopy is currently used as a standard technique in medical sciences, which is also considered as a standard technique in veterinary medicine. Initially, minimally invasive techniques should be chosen, because they have shorter recovery times and fewer complications. However, these techniques are not successful in all cases and the treatment should be surgery.⁴ In a similar study, tracheotomy was performed

to remove a foreign body (stone) being lodged in the cervical trachea at the level of 3rd - 4th cervical vertebrae.⁷ Surgery has more complications, including technical difficulty, potential morbidity, hemorrhage, edema, and inflammation. Even after foreign body removal, a series of complications including pneumonia, pneumothorax, and laryngeal edema have also been reported.⁴

In conclusion, bronchial foreign bodies are rare, but they should be considered in the differential diagnoses of animals with chronic coughs. Bronchoscopy is an effective and non-invasive means of foreign bodies removal in animals that do not spontaneously cough them up. If the dog is too small, the foreign body too big, or if it cannot otherwise be removed via bronchoscopy, surgical intervention is required. The prognosis for survival and long-term return to function is good if the dog survives the immediate post-operative period.

Acknowledgments

The authors would like to thank the Faculty of Veterinary Medicine, Shiraz University, Shiraz, Iran, for the financial and technical supports of this study.

Conflict of interest

The authors declare that they have no conflict of interest.

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