

Case report

A Case study: The slippery foreign body aspiration in a dog

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Abstract A three-years-old spayed female golden retriever was presented with a history of acute cough. The lateral view of thoracic radiograph revealed an approximately 15 mm diameter of the circular foreign body that resided in the proximal cervical trachea. The dog was referred to the small animal hospital, Chiang Mai University for further management. Radiography was re-performed. While the patient was repositioned for a ventrodorsal radiograph, the circular foreign body was migrated to the thoracic trachea. An emergency generalized anesthesia was needed to perform. The surgical management was preceded. The right thoracotomy and tracheotomy was performed. The foreign body was not found inside the thoracic trachea. Due to lack of Fluoroscope in the hospital, the radiographs were repeatedly performed during surgery. The result found that the foreign body was migrated further down into the left bronchus. Bronchotomy was performed and the foreign body was removed from that site. The intrathoracic drainage tube was placed to monitor the intrathoracic effusion and air. The slippery foreign body aspiration is life-threatening due to the potential cause of acute airway obstruction, respiratory compromise and rapidly death. The carefully positioning the dog for radiograph and removal the foreign body as soon as possible should be prioritized.

Keywords: aspiration, trachea, bronchus, slippery foreign body

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รายงานสัตว์ป่วย

กรณีศึกษา: การสำลักสิ่งแปลกปลอมที่มีลักษณะลื่น เข้าสู่ทางเดินหายใจในสุนัข

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บทคัดย่อ สนับ อายุ 3 ปี เพศเมีย ทำหมันแล้ว พันธุ์กอลเด้นทรีฟเวอร์ เข้ารับการรักษาด้วยประวัติอาการไออย่างเฉียบพลัน จากภาพถ่ายทางรังสีวินิจฉัยในท่านอนตะแคงข้าง พบรสีสีเปลกปлом ลักษณะเป็นวงกลมมีเส้นผ่านศูนย์กลางประมาณ 15 มิลลิเมตรที่หลอดลมบริเวณลำคอส่วนต้น สนับถูกส่งตัวมารับการรักษาต่อที่โรงพยาบาลสตูล์ลีก มหาวิทยาลัยเชียงใหม่ สนับได้ถูกนำตัวไปถ่ายภาพรังสีเพื่อหาตำแหน่งของสิ่งเปลกปлом ในขณะที่จับสนับขันอนหายเพื่อถ่ายภาพรังสี สิ่งเปลกปломได้มีการเคลื่อนลงไปยังตำแหน่งของหลอดลมส่วนที่อยู่ภายในช่องอก สนับได้ถูกนำตัวเข้าห้องผ่าตัดและวางยาสลบทั้งตัวอย่างรวดเร็วเพื่อนำเอาสิ่งเปลกปломออกด้วยวิธีการ ผ่าตัดเปิดช่องอกและหลอดลมแต่ไม่พบสิ่งเปลกปломดังกล่าว เนื่องจากทางโรงพยาบาลไม่มีฟลูอิโรมีโคป จึงได้ทำการเอกซเรย์ในระหว่างผ่าตัด พบว่าสิ่งเปลกปломได้เคลื่อนลงสู่ชั้นปอดส่วนต้นด้านซ้าย จึงได้พิจารณาทำการเปิดชั้นปอดซ้าย และได้นำเอาสิ่งเปลกปломซึ่งมีลักษณะคล้ายถูกแก้วถูกดึงออกจากน้ำจากตำแหน่งดังกล่าว สนับได้รับการใส่ท่อระบายของเหลวช่องอก เพื่อเฝ้าระวังของเหลวและอากาศภายในช่องอก การสำลักเอาสิ่งเปลกปломที่มีลักษณะลื่นเข้าไปในทางเดินหายใจ ถือเป็นภาวะฉุกเฉิน ซึ่งเป็นเหตุทำให้สตูล์ทำให้สตูล์เสียชีวิตได้จากการขาดอากาศหายใจ การจัดทำเพื่อถ่ายภาพทางรังสีอย่างระมัดระวังและการนำเอาสิ่งเปลกปломออกจากอย่างทันท่วงทีเป็นสิ่งสำคัญ

คำสำคัญ การสำลัก หลอดลม ข้อปอด สิ่งแปรกปลอมที่มีลักษณะลื่น

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Introduction

Foreign body aspiration has been reported in small animals and can cause deleterious consequences if it is not removed (Tenwolde et al., 2010, Paláez & Jolliffe, 2012). Many types of foreign bodies have been reported including plants, pin or plastic material (Peláez & Jolliffe, 2012, Tenwolde et al., 2010). The aspiration of a foreign body can cause damage to the airway and pulmonary parenchyma. The effects can be primarily due to the physical presence of the foreign body and/or secondary due to the inflammatory response. The pathological changes include bronchoconstriction, pulmonary hemorrhage, increase mucous production and pulmonary edema. These derangements can result in clinical signs such as labored breathing, cough, or respiratory distress (Schulze & Rahilly 2012, Tenwolde et al., 2010). Foreign body aspiration is life-threatening that requires immediate diagnosis and treatment to achieve a good outcome (Goodnight et al. 2010). The diagnosis confirms by using radiography, bronchoscopy, or CT scan (Tenwolde et al., 2010). Several techniques are available for removing foreign bodies that include bronchoscopy, fluoroscopy, balloon wedge pressure catheter and surgery. Surgery has become a promising technique for retrieval of foreign body aspiration. However, postoperative complications and proper management should always be considered.

The aim of this case report is to present the diagnosis and surgical removal of tracheal thoracic foreign body in a dog.

History, Clinical diagnosis and findings

A three-year old spayed female golden retriever, weighing 44 kg was presented with a history of an acute cough at the primary veterinary hospital. The lateral view thoracic radiographs were taken. An increasing radiopacity of foreign body at the cranial part of the trachea was found. Attempts to retrieve the foreign body under general anesthesia with a long forceps were unsuccessful. The patient was referred to further treatment at the small animal hospital, Chiang Mai University (CMU).

On the presentation, the dog showed clinical signs of dyspnea, shallow breathing, and tachypnea. Hydration status was normal. Mucous membrane was pink and CRT was less than 2 sec. The mental status of the dog was alert and had good response to the environment. The thoracic radiographs were re-performed to confirm the position of the foreign body. A 15.2 millimeter diameter circular foreign body in the cervical trachea was found (Figure 1). Complete blood count and basic blood chemistry profile were unremarkable. Anesthesia and surgical intervention via a cervical tracheotomy was decided.



Figure 1. A lateral view radiograph showed a 15.2 mm diameter, the radioopacity of circular foreign body in the cervical trachea.

Case management

The initial treatments for this patient were performed by oxygen therapy, the intravenous 5 ml/kg of Lactate's ringer solution. Broad spectrum antibiotic amoxicillin-clavulanic acid (Augmentin®) 15 mg/kg was given intravenously. The patient was premedicated with diazepam 0.1 mg/kg intravenously, followed by Propofol® 5 mg/kg intravenously for induction. Morphine 0.5 mg/kg and fentanyl citrate (Fentanyl®) 10 μ g/kg were intravenously administered. Anesthesia was maintained with isoflurane (Forane®) 1.5% in an O₂ flow rate 40 ml/kg/min with an average respiratory rate of 12 breaths per minute (IPPV). Mechanical ventilation was used to maintain positive pressure ventilation during the thoracotomy procedure. Additional analgesia was provided with intercostals nerve block by using lidocaine hydrochloride (1.5 mg/kg).

After generalized anesthesia was performed, the dog was placed on the operating table. The plain radiograph was taken to define

the exact location of the foreign body. The radiographs revealed that the slippery circular foreign body was migrated to the lower part of the trachea (Figure. 2), thus the surgical removal was decided. Thoracotomy and tracheotomy were performed to remove the foreign body.

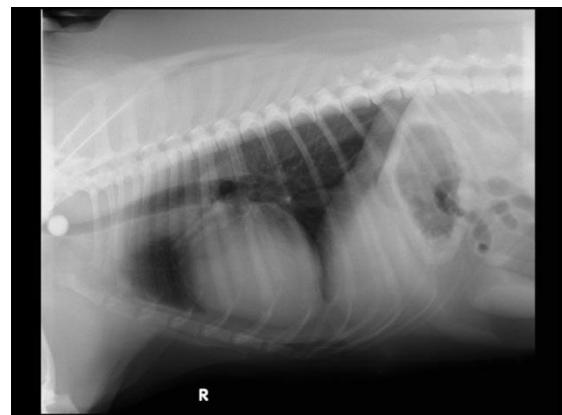


Figure 2. Lateral view thoracic radiograph was performed to define the location of foreign body prior to surgery and the radiographs showed a foreign body slipped from the proximal to the intra-thoracic part of trachea.

The patient was positioned in left lateral recumbency and prepared the surgical area. The thoracotomy was performed by located the 5th intercostal space. The incision was made through skin, subcutaneous tissues, muscle, and enter the thoracic cavity then the trachea was identified. The trachea was approached and incised 2/3 of the tracheal ring at the exact position that the foreign body resided in the lateral view of the radiograph. The foreign body was not found at the incision site; another radiograph was performed due to lack of fluoroscope in the hospital. The radiograph showed the foreign body was migrated further down into the bronchus (Figures 3A and 3B). The foreign body was identified and removed by inserting the straight artery forceps

from the first incision site into the left bronchi (Figure. 4).

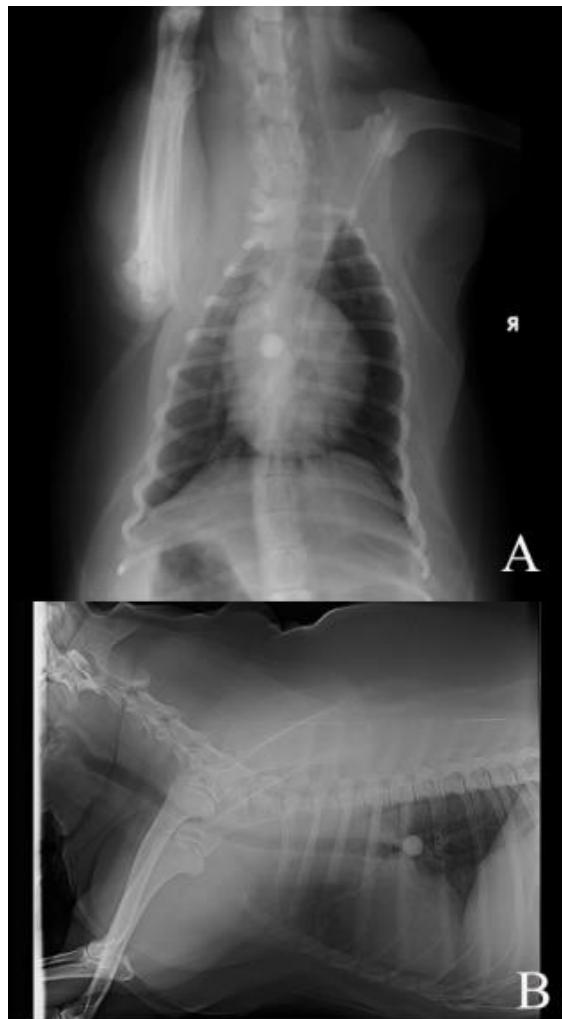


Figure 3. Dorso-ventral view thoracic radiograph (A) showed a circular radiopacity foreign body at the proximal left bronchi. Right Lateral view thoracic radiograph (B) showed a circular foreign body obstruction in the bronchus.

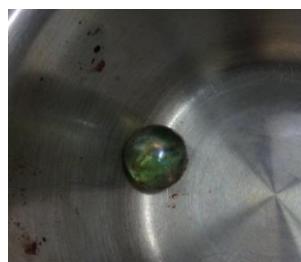


Figure 4. Showing the circular foreign body; a child's marble.

The incision was closed in a routine fashion, using simple interrupted with 3/0 polydioxanone (PDS) absorbable to suture the trachea and Kirchner-cerclage wire was used to close the intercostal ribs by circumcostal technique. The muscles were closed individually to prevent air leakage by simple interrupted suture with polyglactin 910 (vicryl® 2/0). Nylon (Ethicon®) 3/0 was used to close the skin layer by simple interrupted. The chest tube was placed to monitor the thoracic fluid or air to prevent the complication from pleural effusion or pneumothorax.

Postoperative care, dexamethasone was given immediately after the endotracheal tube was removed to prevent tracheal inflammation and cause obstruction. The patient was admitted to the intensive care unit to evaluate physical condition, pain, surgical wound and respiratory function. Oxygen supplements by naso-oxygen tube.

An antibiotic were administrated; amoxicillin-clavulanic acid (Augmentin®) was given intravenously for 3 days and followed by per oral prescription for 7 days. Pain was controlled by Fentanyl® 5 µg/kg/hr; CRI for the first 24 hours postoperatively. Fentanyl patch® was placed postoperatively for 3 days and renew at the later 3 days. Morphine was given to intramuscular route every 6 hours for 5 days. At the third-day, postoperation blood work was performed, and no remarkable abnormality was found.

The thoracotomy tube was monitored every 2 hours for first 24 hours post operation, subsequently, 4 times/day until the thorax was no present of fluid and air or sign of respiratory discomfort. The thoracic radiograph was

performed to determine the lung capacity and the result was within a normal limit (Figure.5A and 5B). The chest tube was removed at 3 days post surgery.

The dog recovered to a better respiratory condition and surgical site had good wound healing, the stitches were removed at ten days after surgery. The patient went home at 10 days postoperatively and followed upon the 1st and the 2nd week twice a day after discharged; no complications were found

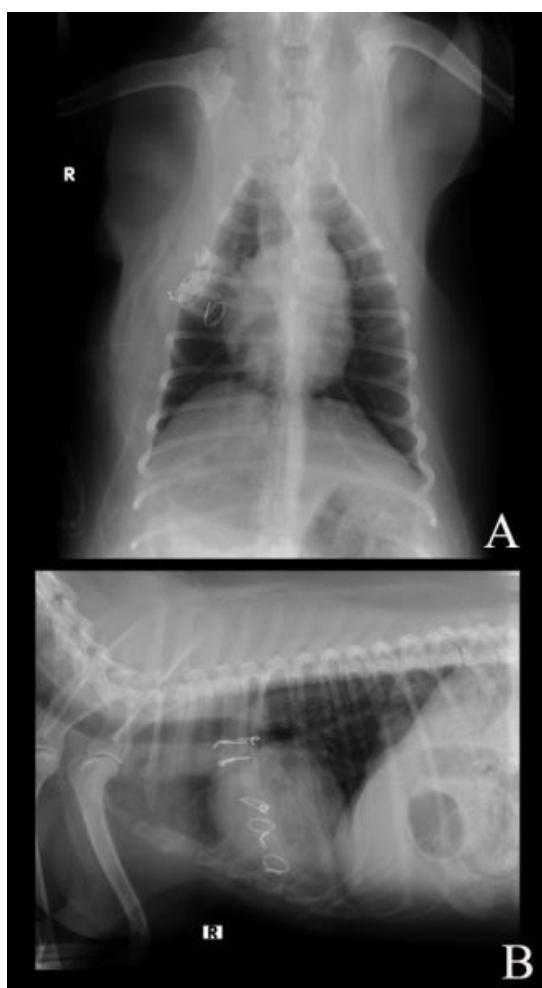


Figure 5. Ventro-dorsal (A) and lateral view (B) thoracic radiograph were performed prior to chest tube removal; there were no presenting of pneumomotorax or pleural effusion.

Discussion

The movable foreign body in the respiratory tract is an emergency situation. In this case, the foreign body was migrated from upper to lower respiratory tract; this movement was demonstrated while taking the radiograph. The emergency surgery to remove this foreign body was set up to prevent life threatening from obstruction. The alteration of the patient position was effect the location of the foreign body; the gentle manipulation was a concern not to increase the chance of obstruction. However, the determination of the location was important for surgical approach and retrieve the foreign body.

The tracheal foreign bodies in dogs are rare but potentially life-threatening. The ability for rapid evaluation, diagnosis, and treating respiratory distress are crucial for a preferable outcome (Goodnight et al. 2010). In this case, the rapid set up for removing the foreign body was performed due to the potential of obstruction was observed while changing the position during the radiograph was taken. The decision of setting up the surgery as an emergency case was made base on the radiograph and the changing of clinical signs.

There are many options for removing foreign bodies a bronchoscope, fluoroscope, balloon wedge pressure catheter and surgery. The bronchoscope, fluoroscope and balloon wedge pressure catheter are less invasive approach when compared to the surgery (Tenwolde et al. 2012, Goodnight et al. 2010, Peláez & Jolliffe 2012, Nutt et al. 2014).

Bronchoscopy is suggested as the primary intervention for retrieving the foreign body (Tenwolde et al., 2010). However, surgery is the promising procedure for retrieving foreign bodies, but the consequence of the postoperative complications and managements have to be account. In this case, surgery was chosen due to the requirement of the rapid approach to remove the foreign body to decrease the period that the obstruction happen. The bronchoscopy retrieval was not chosen due to the foreign body was the movable circular object and it has a large diameter. We thought to remove the slippery object by using the basket or others bronchoscopy device has a few chance to success and it was time consuming method.

Thoracotomy approach has higher complications when compare to bronchoscopy approach (Tenwolde et al. 2012, Goodnight et al. 2010, Peláez & Jolliffe 2012, Nutt et al. 2014). Fluoroscope is one of a specific device that could help surgeon to find the location of the foreign body during the thoracotomy and it helps to decrease the duration of the operation. Fluoroscope may not available in every small animal hospital. Small animal hospital, Chiang Mai University also doesn't have it. Multiple radiographs needs to be performing during the surgery instead of using Fluoroscopy. The thoracotomy technique is time consuming surgery, and a complicated technique. These disadvantages are likely to improve with operator experience and skill (Paláez & Jolliffe, 2012). The complications due to the postoperative lateral thoracotomy were reported 47% in small animals

(Moores et al. 2007). Hemorrhage, pain, air leakage, seroma, wound infection dehiscence and ipsilateral thoracic lameness are potentiated to happen even though it is rare (Orton 1995, 2003; Bonath 1996; Tattersall & Welsh 2006; Moores et al. 2007). In this case, the patient showed the sign of respiratory distress and hyperventilation 48 h postoperatively. This complication may result from pneumothorax or pain. The pneumothorax may contribute from the leakage of the air according to the tracheal opening or the thoracic area. The air was removed every 2 h via the thoracic tube and a small amount of air was found then diminished after 24 h. The air leakage may not be the major cause of this hyperventilation. Pain is the possible cause of the hyperventilation. The circumcostal technique that used in this patient is potentiated pain due to the Kirchner-cerclage wire that use for closing thorax may entrap the intercostal nerve (Paláez & Jolliffe, 2012). This intercostal nerve entrapment was also found in small animal patient more than 70 % that received circumcostal technique (Paláez & Jolliffe, 2012). The requirement of postoperative analgesia was higher in the patient that had circumcostal technique when compare to the transcostal technique. The transcostal technique was developed to decrease the nerve entrapment; this technique may help manage the postoperative complication (Rooney et al. 2004). Postoperative analgesia management in this case, was planned by using multimodal techniques. Opioids including morphine and fentanyl were applied during preoperative and postoperative within several routes i.e. intramuscular, intravenous both

as bolus and (continuous rate infusion; CRI), and in the patch form. The intercostal block with lidocaine was performed prior the surgery. The patient was also breath with high concentration of oxygen; this may help to decrease the respiratory effort. As a result, the trauma of surgical wound while breathing and pain decreased. Even though the analgesia was applied, but the patient still response to pain by showed the signs of hyperventilation. The pain assessment and management may help to correct this complication. The others approach to manage pain are using prolong local action analgesia such as bupivacaine or ropivacaine for intercostal block prior the surgery, administration of bupivacaine and lidocaine intrapleural, or opioids administration epidurally (Berge&Orton 1986; Popilskis et al. 1991, Thompson &Johnson 1991; Conzemius et al. 1994; Stobie et al. 1995)

To the author knowledge, the circular foreign body structure is unique; it is rapidly moveable in the respiratory tract. While the dog's position is changed, the foreign body could slip from upper to lower respiratory airway and cause acute life-threatening from its obstruction. This case report reveal that the patient should be manipulated gently, decision making for remove foreign body have to be fast to prevent the airway blockage, the intervention technique has to be chosen judiciously, and prevention for postoperative complication have to be planned especially the pain management.

Reference

- Berge, R.J., Orton, E.C., 1986. Pulmonary function in dogs after intercostal thoracotomy: comparison of morphine, oxymorphone, and selective intercostal nerve block. *Am J of Vet Res.* 47, 471-474.
- Bonath, K.H., 1996. Thoracic wall closure. In: Lipowitz, A.J. (Ed.), *Complications in small animal surgery: diagnosis, management, prevention*. Williams & Wilkins, Baltimore. 229-239.
- Conzemius, M.G., Brockman, D.J., King, L.G., Perkowski, S.Z., 1994. Analgesia in dogs after intercostal thoracotomy: a clinical trial comparing intravenous buprenorphine and interpleural bupivacaine. *Vet Surg* 23, 291-298.
- Goodnight, M.E., Scansen, B.A., Kidder, A.C., Cooper, E.S., Butler, A.L., 2010. Use of a unique method for removal of a foreign body from the trachea of a cat. *J. Am. Vet. Med. Assoc.* 237, 689-694.
- Moores, A.L., Halfacree, Z.J., Baines, S.J., Lipscomb, V.J., 2007. Indications, outcomes and complications following lateral thoracotomy in dogs and cats. *J Small Anim Pract* 48, 695-698.
- Nutt, L.K., Webb, J.A., Prosser, K.J., Defarges, A., 2014. Management of dogs and cats with endotracheal tube tracheal foreign bodies. *Can. Vet. J.* 55, 565-568.
- Orton, C.E., 1995. Disorders of the thoracic wall. In: Orton, C.E., McCracken, T.O., Cann, C.C. (Eds), *Small animal thoracic surgery*. Williams & Wilkins, Malvern.
- Peláez, M.J., Jolliffe, C., 2012. Thoracoscopic foreign body removal and right middle lung lobectomy to treat pyothorax in dog. *J Small Anim Prac.* 53, 240-244.
- Popilskis, S., Kohn, D., Sanchez, J.A., Gorman, P., 1991. Epidural vs. intramuscular oxymorphone analgesia after thoracotomy in dogs. *Vet Surg* 20, 462-467.
- Rooney, M.B., Mehl, M., Monnet, E., 2004. Intercostal thoracotomy closure: transcostal sutures as a

- less painful alternative to circumcostal suture placement. *Vet Surg.* 33, 209-213.
- Schulze, H.M., Rahilly, L.J., 2012. Aspiration pneumonia in dogs: pathophysiology, prevention, and diagnosis. *Compend Contin Educ Vet.* 34(12), E5.
- Stobie, D., Caywood, D.D., Rozanski, E.A., Bing, D.R., Dhokarikar, P., Raffe, M.R., Kannan, M.S., King, V.L., Hegstad, R.L., Randall, D.A., 1995. Evaluation of pulmonary function and analgesia in dogs after intercostal thoracotomy and use of morphine administered intramuscularly or intrapleurally and bupivacaine administered intrapleurally. *Am. J. Vet. Res.* 56, 1098-1109.
- Tattersall, J.A., Welsh, E., 2006. Factors influencing the short-term outcome following thoracic surgery in 98 dogs. *J small Anim Prac.* 47, 715-720.
- Tenwolde, A.C., Johnson, L.R., Hunt, G.B., Vernau, W., Zwingenberger, A.L., 2010. The role of bronchoscopy in foreign body removal in dogs and cats: 37 cases (2000-2008). *J. Vet. Intern. Med.* 24, 1063-1068.
- Thompson, S., Johnson, J.M., 1991. Analgesia in dogs after intercostal thoracotomy: A comparison of morphine, selective intercostal nerve block, and intrapleural regional analgesia with bupivacaine. *Vet Surg.* 20, 73-77.