NOTE *Internal Medicine*

Chronic Bronchocutaneous Fistula Caused by Toothpick Foreign Body in a Maltese Dog

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ABSTRACT. A 7-year-old, 1.76 kg Maltese dog presented with a 4-year history of a chronic pustular lesion and a wet cough. Erosive lesions were seen at the left thoracic wall. Radiology and computed tomography (CT) revealed a bronchocutaneous fistula connecting from the left cranial bronchus to the skin. On definitive surgery, a long wooden toothpick was observed within this tract, and clinical signs resolved after retrieval of the foreign body. Three-dimensional CT was useful to identify the characteristics of the bronchocutaneous fistula. However, the wooden foreign body was not apparent on CT. Here, we report the clinical, clinicopathological and diagnostic imaging findings of a chronic bronchocutaneous fistula caused by a foreign body in a dog.
KEY WORDS: bronchocutaneous fistula, canine, computed tomography, toothpick.

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A fistula is a draining tract and a pathological connection between body organs and cavities [2, 6]. Most fistulas are associated with a foreign body, most commonly a wooden object [8]. Fistulas associated with foreign bodies in dogs involve the esophagoaortic, esophagotracheal, esophagobronchial, gastrocutaneous and cutaneopulmonary tracts [2, 5, 9, 12]. Numerous cases of bronchocutaneous fistulas have been reported in humans, which develop as a complication of infection [3, 4], chest tube placement [6], lung lobectomy [7], mechanical ventilation [1], or epicardial pacing [10]. In veterinary medicine, an uncommon case of bronchocutaneous fistula with unknown etiology in a large breed of dog has been reported [11]. The clinical manifestations were very similar to those of a dog with a cutaneopulmonary fistula associated with a foreign body [5]. However, no cases of a bronchocutaneous fistula caused by a foreign body diagnosed by CT have been reported in a small breed dog.

This case report demonstrated the clinical, clinicopathological, and diagnostic imaging findings of a bronchocutaneous fistula within a long wooden toothpick in a dog.

A 7-year-old, 1.76 kg, intact female Maltese dog presented due to a chronic and recurrent pustular lesion over the left thoracic wall and a productive cough during the past 4 years. The lesion had not improved despite the use of various medications and surgical excisions. In the past, the dog was a stray and had been adopted by the present owner from an animal shelter. Upon physical examination, two erosive lesions with purulent discharge at the left thoracic wall were observed (Fig. 1A). Other vital signs including body temperature, heart rate and respiration rate were normal. A thoracic auscultation revealed normal heart sounds and pulmonary fields. A complete blood count was normal. Serum biochemical examination revealed mild hyperglobulinemia with normal albumin level (globulin 4.5 g/d*l*, reference range 2.5–4.0 g/d*l*). Routine thoracic radiographs demonstrated a soft tissue-density of tubular structure in the left lung lobe, with the caudal part consisting of the skin lesions (Fig. 2A and 2B). No evidence of pleural effusion or pneumothorax was noted. A purulent discharge from the erosive lesions was revealed as a neutrophilic inflammation caused by an infection that was isolated as methicillin resistant *Staphylococcus aureus* and *Enterococcus spp* from culture and antibiotic sensitivity examinations. A histopathologic examination of the skin lesions also revealed severe suppurative and ulcerative dermatitis. The inflammation consisted of marked infiltrates of degenerated neutrophils, lymphocytes and plasma cells within necrotic debris. The patient underwent a contrast enhanced CT examination to confirm the lesion. The examination revealed a tubular structure, the fistula, which was connected to the cranial and caudal part of the left cranial bronchus from the skin lesion (Fig. 3A-3D). The fistula was enlarged at the caudal end causing the lung defect (Fig. 4). Based on clinical, clinicopathological and diagnostic imaging findings, the patient was diagnosed with a bronchocutaneous fistula. The patient received antibiotics including cefazolin (Falexin; Dong Hwa Pharm, Seoul, South Korea) at a dose of 30 mg/kg twice daily, enrofloxacin (Baytril; Bayer, Jena, Germany) at a dose of 5 mg/kg twice daily and clindamycin (Fullgram; Sam Jin Pharm, Seoul, South Korea) at a dose of 11 mg/kg twice daily. The fistula was irrigated with 0.9% normal saline solution. Af-

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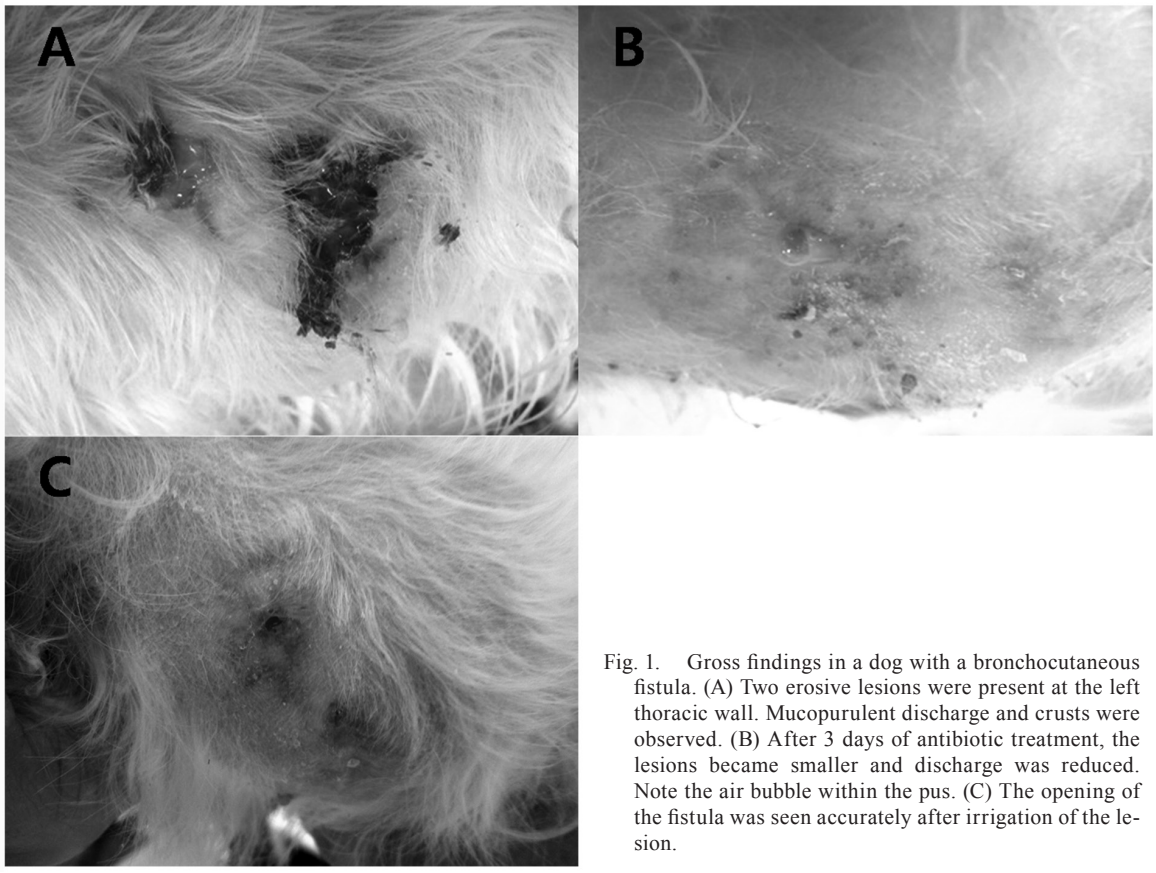

Fig. 1. Gross findings in a dog with a bronchocutaneous fistula. (A) Two erosive lesions were present at the left thoracic wall. Mucopurulent discharge and crusts were observed. (B) After 3 days of antibiotic treatment, the lesions became smaller and discharge was reduced. Note the air bubble within the pus. (C) The opening of the fistula was seen accurately after irrigation of the lesion.

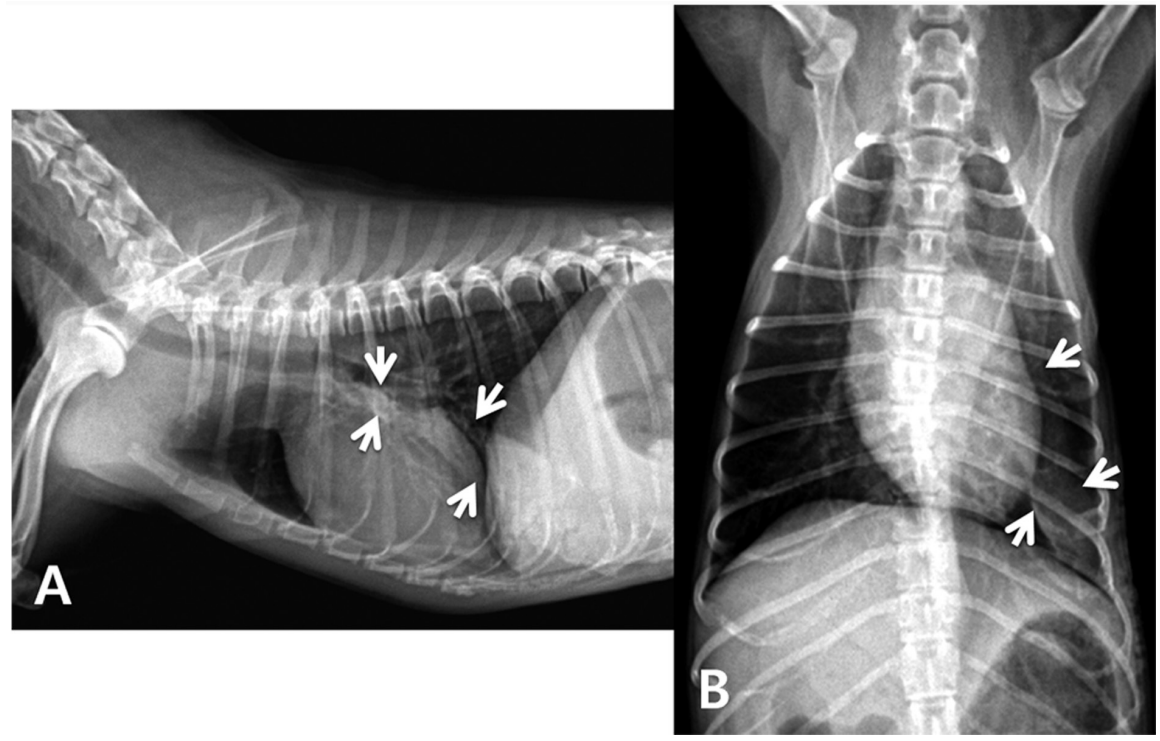

Fig. 2. Lateral (A) and ventrodorsal (B) thoracic radiographs of a dog with a bronchocutaneous fistula. Soft tissue density of a tubular structure at the left lung lobe (arrows) was observed. The tubular structure gradually enlarged and was connected to the skin lesion. Generalized bronchial patterns were mildly infiltrated at the left lung lobe including the lesion.

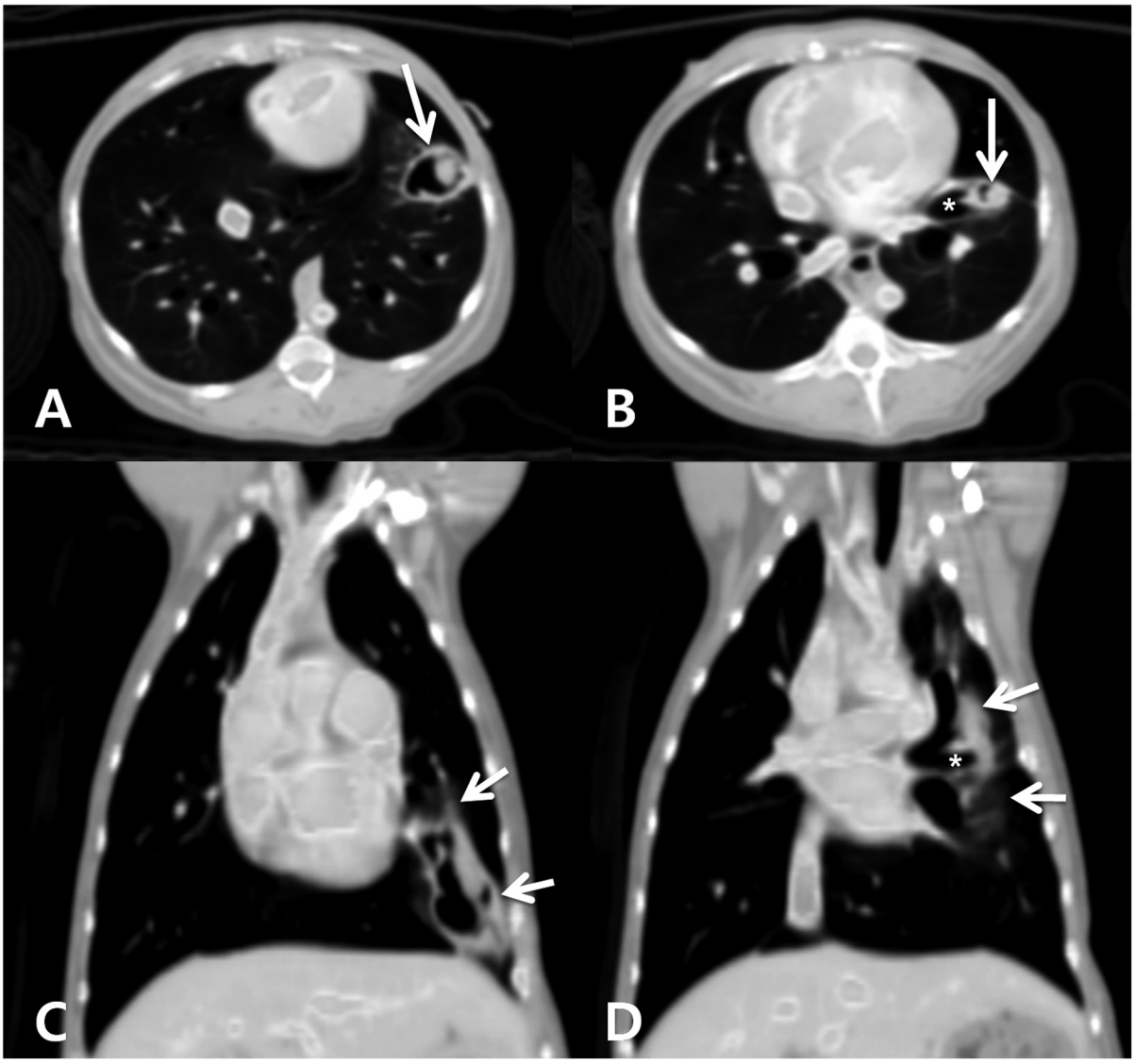

Fig. 3. Contrast enhanced computed tomography (CT) plane images of the same dog. Transverse view (A, B) and dorsal view (C, D) of the thoracic cavity. (A) A large, single tubular structure (arrows) was demonstrated at the left cranial lung lobe. (B) The fistula (arrow) was located close to the left cranial bronchus (asterisk). (C, D) Dorsal view revealed that the fistula (arrows) coursed craniomedially from the skin opening. The fistula was connected with the left cranial bronchus (asterisk).

ter 3 days of therapy, the mucopurulent discharge from the skin lesions was markedly reduced (Fig. 1B) and the cough had disappeared. However, the fistula opening remained (Fig. 1C). Despite a partial treatment response, the continuous purulent discharge and opening persisted. Therefore, a surgical exploration involving a lateral intercostal thoracotomy at the fistula opening was performed. A 6 cm-long wooden toothpick was retrieved from the excised fistula (Fig. 5A and 5B). After the foreign body was removed, partial lobectomy of the left caudal lung lobe was performed. Following surgery, the patient recovered smoothly without any complications and has remained clinically normal. Additionally, the lesion completely disappeared on thoracic radiography.

In this case, a diagnosis of bronchocutaneous fistula was made by the clinical and diagnostic imaging findings. Only one case report regarding a naturally occurring bronchocutaneous fistula in a large breed dog has been reported in the veterinary medicine [11]. In the present case, the patient showed similar characteristics to this previous case report based on clinical signs and CT findings.

There has been no prior case report of bronchocutaneous fistula caused by foreign body that was diagnosed by CT in a small breed dog. However, clinical manifestations similar to those presently observed were described in a case report of a cutaneopulmonary fistula associated with a foreign

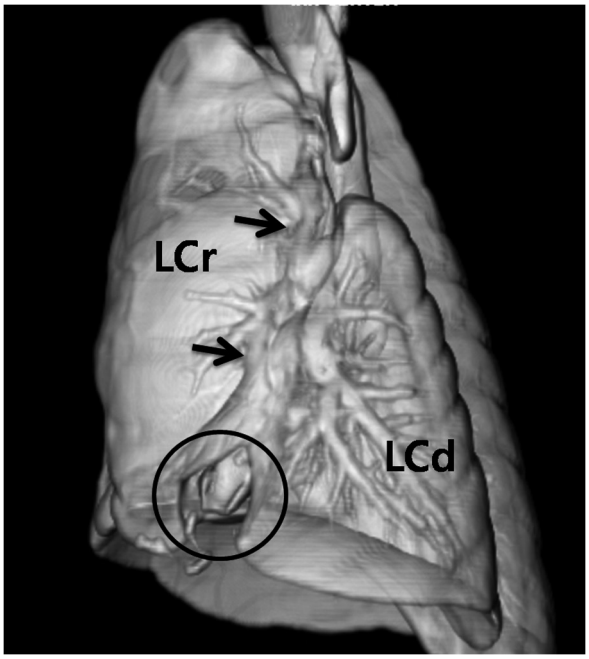

Fig. 4. Three-dimensional computed tomography (CT) image of the same dog on a left lateral view. The tubular structure was revealed at the left lung lobe. The fistula was connected to two bronchi, leading to the cranial and caudal part of left cranial lung lobe, respectively (arrows). The fistula was enlarged at the caudal end causing the lung defect (circle). LCr, left cranial lung lobe; LCd, left caudal lung lobe.

body in a dog [5]. In this latter case, the cutaneopulmonary fistula was diagnosed by sinography, and a toothpick was removed from the thoracic cavity. However, the connection between the bronchus and fistula was not confirmed, which is not consistent with a bronchocutaneous fistula. In contrast, in the present patient, three-dimensional reconstructed CT images obviously revealed the connection of the fistula with the bronchi.

Several toothpick-related injuries have been reported in small animal practices [5, 8]. The most probable route of toothpick migration for a dog is ingestion, inhalation, or a penetrating injury [8]. Because of the intact esophagus in our dog, it was believed that penetration from the thoracic wall might have been the possible injury route. As the owner denied any history of trauma, the injury might have happened before adoption from the animal shelter.

Typical characteristics including the location and fistula connection were well-identified from the CT exam. However, the foreign body itself was not detected from the scan. This was not unexpected. Variable appearances of wooden foreign bodies on CT have been reported in human cases [9, 12]. The ability to detect a wooden foreign body on CT depends on the material, type, coating and time-course of injury [12]. Additionally, the surrounding inflammatory response could mask the foreign body [9]. In our dog, although hyperdense substances in the fistula tract suspected as being discharge were observed, no foreign body was detected. In our opinion, while the CT exam was more useful for revealing the structural features of the fistula, a foreign body within the tract could better be seen from a fistulogram [5]. Presently, the foreign body was confirmed from definitive surgical excision.

In conclusion, a case of bronchocutaneous fistula was characterized based on history, clinical signs, and distinctive diagnostic images. This case report describes an uncommon clinical manifestation, namely a chronic bronchocutaneous fistula associated with an old toothpick foreign body in a dog.

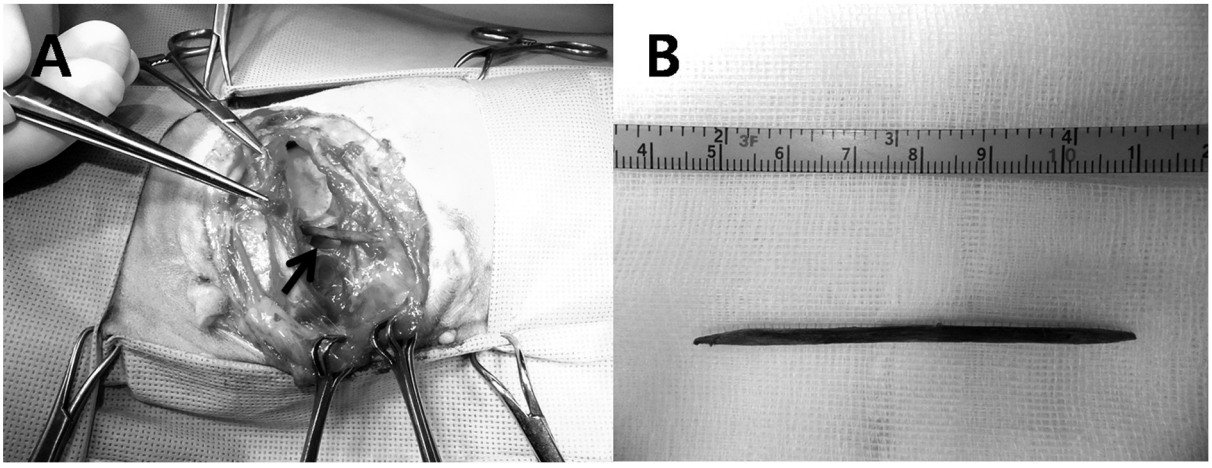

Fig. 5. Results of surgery. (A) On definitive surgical excision, a wooden foreign body within the fistula was observed craniodorsally. (B) A 6 cm-long wooden toothpick was removed during the thoracotomy.

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REFERENCES

1. Baildam, E. M., Dady, I. M. and Chiswick, M. L. 1993. Bronchocutaneous fistula associated with mechanical ventilation. *Arch. Dis. Child.* **69**: 525–526. [Medline] [CrossRef]
2. Brennan, S. F., Connery, N., Tobin, E., Mooney, C. T. and Jones, B. R. 2004. Gastrocutaneous fistula as a result of migration of a foreign body in a dog. *J. Small Anim. Pract.* **45**: 304–306. [Medline] [CrossRef]
3. Comet, R., Monteagudo, M., Herranz, S., Gallardo, X. and Font, B. 2006. Pancoast's syndrome secondary to lung infection with cutaneous fistulisation caused by *Staphylococcus aureus*. *J. Clin. Pathol.* **59**: 997–998. [Medline] [CrossRef]
4. Haubrich, R. H. and Keroack, M. A. 1992. Pneumococcal crepitant cellulitis caused by a bronchocutaneous fistula. *Chest* **101**: 566–567. [Medline] [CrossRef]
5. Jackson, A. H. and Degner, D. A. 2002. Cutaneopulmonary fistula in a dog caused by migration of a toothpick. *J. Am. Anim. Hosp. Assoc.* **38**: 545–547. [Medline]
6. John, S. K., Jacob, S. and Piskorowski, T. 2005. Bronchocutaneous fistula after chest-tube placement: A rare complication of tube thoracostomy. *Heart Lung* **34**: 279–281. [Medline] [CrossRef]
7. Koh, M. S., Ling Hsu, A. A. and Thirugnanam, A. 2005. Novel management of a large chronic bronchocutaneous fistula after lobectomy. *Interact. Cardiovasc. Thorac. Surg.* **4**: 248–249. [Medline] [CrossRef]
8. Lamb, C. R., White, R. N. and McEvoy, F. J. 1994. Sinography in the investigation of draining tracts in small animals: retrospective review of 25 cases. *Vet. Surg.* **23**: 129–134. [Medline] [CrossRef]
9. Peterson, J. J., Bancroft, L. W. and Kransdorf, M. J. 2002. Wooden foreign bodies: imaging appearance. *AJR Am. J. Roentgenol.* **178**: 557–562. [Medline]
10. Tegtmeyer, C. J., Hunter, J. G. Jr. and Keats, T. E. 1974. Bronchocutaneous fistula as a late complication of permanent epicardial pacing. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* **121**: 614–616. [Medline]
11. Yamagishi, N., Yamada, K., Ishikawa, H. and Yamada, H. 2000. Bronchocutaneous fistula in a dog. *Vet. Radiol. Ultrasound* **41**: 422–424. [Medline] [CrossRef]
12. Yamashita, K., Noguchi, T., Mihara, F., Yoshiura, T., Togao, O., Yoshikawa, H. and Honda, H. 2007. An intraorbital wooden foreign body: description of a case and a variety of CT appearances. *Emerg. Radiol.* **14**: 41–43. [Medline] [CrossRef]