

BRONCHOCUTANEOUS FISTULA IN A DOG

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Summary: A case of chronic bronchocutaneous fistula due to pulmonary foreign body in the French pointer breed Epagneul Breton is described. Identification of the origin of fistula with fistulography and removal of plant foreign body enabled complete remission after median sternotomy, cranial right pulmonary lobectomy. Related data from current literature are listed in the present article finally.

Key words: bronchocutaneous fistula; contrast radiography; pulmonary foreign body; lung lobectomy; dog

Introduction

Current literature does not offer many information regarding bronchocutaneous fistula (BCF) which can originate at different levels from the major airways to the peripheral lung.

Fistula is any abnormal tubelike passage or communication within body tissue, usually between two internal organs, or leading from organ to the surface of the body. Fistula may also be defined as unnatural narrow channel leading from some natural cavity, such as duct of the mammary gland, or the interior of the rectum or anal sac, to the surface. Some fistulae are created surgically, for diagnostic or therapeutic purposes; others occur as a result of injury or as congenital abnormalities (1, 2).

Some reports on fistulae related to presented case are listed below:

A gastrobronchial fistula is reported (3) in a dog with clinical signs consisted to laryngeal paralysis because of gagging and coughing of 1- month duration. The dog was pyretic and because of gagging, suspicion of aspiration, and poor response to antibiotic therapy, a swallowing disorder and esophageal dysfunction were differential diagnoses. On the survey thoracic radiographs alveolar infiltrates were evident in the ventral portions

of all right lung lobes. Bronchi in the affected lobes were dilated and irregular, and cranial displacement of the pylorus and right cardiac displacement was observed. Esophagogram (using pure barium paste per os) was normal, during evaluation of gastric contraction, contrast medium appeared in the right caudal lung lobe. On subsequent radiographs, a fistula from the cranial margin of the displaced pylorus to the right caudal lobe bronchus was seen. During surgery no evidence of foreign body was found. A complete recovery is reported.

A bronchoesophageal fistula and transient megaesophagus in a dog with chronic cough of 2 year duration is another clinical case to mention (4, 5). The dog was depressed and emaciated. A mineral-dense foreign body within the midthoracic portion of the esophagus was observed on survey thoracic radiograph. The lumen of thoracic portion of the esophagus was large and air-filled. The cranioventral aspect of the right cranial lung lobe was consolidated. A flat piece of bone at the level of the heart, adhered to the ventral mucosa was removed by esophagoscopy. Four weeks later despite the therapy with antibiotics the dog returned with clinical signs of dyspnea and coughing. Contrast radiography using liquid barium sulphate, revealed a fistula between esophagus and the bronchi of the right cranial and middle lung lobes, with secondary reflux into the right cranial lung lobe. The dog improved rapidly after the sur-

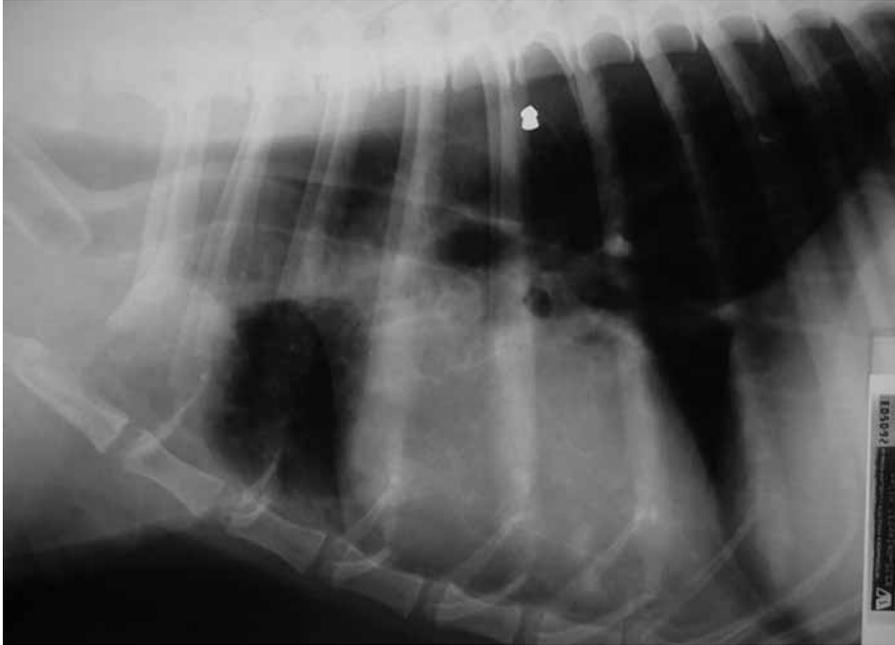


Figure 1: Survey right lateral thoracic radiograph: a marked localized interstitial infiltrate obscuring the pulmonary vessels in the right cranial lung lobe; borders are classified as alveolar in nature; radiopaque airgun projectile was found; nonradiopaque foreign body still suspected because of the infiltrate which develops around the affected bronchus

gery and no evidence of megaesophagus was found. Bronchoesophageal fistulae are rare in dogs and have not been associated with megaesophagus. In small-breed dogs with bronchoesophageal fistula, the clinical signs were pulmonary (bronchial, alveolar, interstitial changes); esophageal diverticula as a prominent feature related to foreign bodies in 9 of 10 cases (4, 5). The right caudal lung lobe was usually involved. If the localized esophagitis associated with the foreign body-fistula could cause the diffuse neuromuscular esophageal dysfunction is unknown (4, 5).

Cutaneopulmonary fistula in a dog caused by migration of a toothpick has been reported lately (6). The 6-year-old, mixed-breed dog had a chronic, nonhealing, sinus tract located over the left cranial thoracic wall and intermittent, moist cough had been noted by owner. The dog had had an abscess over that region approximately 1 year prior to presentation. The abscess was incised, explored, and drained twice with no resolution. The resultant wound from the second surgery formed a draining tract and had been treated with antibiotics. On initial physical examination, a sinus tract associated with the left thoracic wall was visualized. Moderate, generalized lymphadenopathy was also noted. The drainage from the wound was described grossly as purulent exudate. The remainder of the examination was unremarkable. Survey radiographs of the thorax revealed a mild alveolar pattern associated with

caudal aspect of the left cranial lung lobe. No evidence of pleural effusion was noted. A fistulogram was performed to determine the extent of draining tract and to visualize a suspected foreign body within the tract. Foley catheter was placed 3 cm into the fistula, and low osmolar, water-soluble, nonionic iodinated contrast medium was injected. Right lateral and ventrodorsal thoracic radiographs revealed contrast material within the bronchial tree of the left cranial and left caudal lung lobes. The contrast medium extended from the cutaneous surface through the thoracic wall, which confirmed a cutaneous-pulmonary fistula with a possible foreign body. The contrast material was disseminated within the bronchial tree. Surgical exploration of the fistula was indicated. A fibrous structure was found at the level of the costochondral junction within the thoracic cavity. This structure was excised, and a tooth-pick was found. The dog recovered without complication (6).

Clinical Report

An 11-year-old male Epagneul Breton was examined of intermittent draining tracts from the ventral neck for two years duration. The dog showed hyperthermia at exacerbations of disease and periods of remissions usually following antibiotic courses. As foreign body was suspected, tracts were unsuccessfully explored surgically twice at a private clinic. Fistulography had been



Figure 2 and 3: Right lateral and ventrodorsal thoracic radiograph (immediately after the injection of contrast material): contrast passed through the fistulous tract into the thoracic cavity and spread through bronchus in the right cranial lung lobe; bronchi in the affected lobe are dilated and irregular; no periosteal reaction of the adjacent ribs found. Bronchocutaneous fistula was diagnosed



Figure 4: Patient prepared for surgery (fistulous tracts)

performed, but no foreign body was found. Three months later the dog got all again and was presented to our institution with multiple sinus tracts, purulent discharge and severely inflamed skin of the ventral neck.

The survey right lateral and ventrodorsal thoracic radiographs were taken prior to fistulography monitored under general anaesthesia. An airgun projectile as a foreign body was found. A marked localized interstitial infiltrate obscured the pulmonary vessels in the right cranial lung lobe.; borders were classified as alveolar in nature. Nonradiopaque foreign body was still suspected because of the infiltrate which develops around the affected bronchus. The larger of two fistulous tracts with diameter of about 3 mm was cannulated with Foley catheter (14 FR/CH, Kendall, Curity) and balloon was filled with sterile water which prevented catheter removal and sealed the tract. The smaller opening was closed with manual pressure. Low osmolar, water soluble, ionic iodinated contrast material (Urografin 76%, Schering) was injected under controlled pressure (8, 9, 10, 11).

Right lateral and ventrodorsal thoracic radiographs were taken immediately after the injection of the contrast material. Contrast material passed through the fistulous tracts into the thoracic cavity and spreaded through the bronchus in the right cranial lobe of the lung. Bronchi in

the affected lobe were dilated and irregular. There was no periosteal reaction of the adjacent ribs. Adverse reaction to the contrast medium was not observed. Bronchocutaneous fistula was diagnosed.

Surgical procedure

Based on the imaging findings, the diagnosis was a bronchocutaneous fistula. Surgical procedure was suggested. The patient was premedicated with midazolam (Dormicum, Roche) and metadon (Heptanon, Pliva), induced with thiopental (Nesdonal, Specia) and maintained during course of general anaesthesia with anaesthetic breathing mixture of oxygen, air and isoflurane (Forane, Abbott). Incremental doses of ketamin (Bioketan, Vetoquinol) and fentanyl (Fentanyl, Janssen) were used to improve intraoperative analgesia and to decrease vol.% of isoflurane. The patient was mechanically ventilated (IPPV), monitored with ECG, pulse oxymeter, capnometer, and blood pressure was measured directly. Median sternotomy was performed with oscilating saw, sternopericardial ligament was freed and Finochietto rib spreader used to expose both hemithoraces. The adhesion of right cranial pulmonary lobe to the craniolateral chest wall was found and the most part of the lobe was indurated. Adhesion was carefully freed with combina-



Figure 5: Resected lung lobe with foreign body (plant seed)

tion of sharp and blunt dissection and lobectomy performed with automatic stapler (Auto Suture). A canal leading from fibrotic mass to craniolateral chest wall was found. The stump was checked for air leakage, thorax copiously flushed with warm saline, chest tube was placed and sternotomy closed with stainless steel wire, lactomer and nylon. The incision site was infiltrated with bupivacain prior to skin closure.

A grass awn was found within the fibrotic mass. The dog remained at Intensive care unit for 24 hours, when chest tube was removed and remained hospitalised for another 48 hours when discharged to home care. The fistulous canal closed completely in 2 months and the dog does well at time of writing the paper as confirmed with telephone query.

Discussion

Fistulography are rather rare and sporadic diagnostic tool in small animals comparing to horses despite the fact that penetrating injuries involving foreign bodies are common problem, specially in active dogs. The presented clinical case is a good reason to stress the importance of the old fashion fistulography along with modern contrast enhanced diagnostic techniques. (7, 8, 9, 10, 12).

As it is well known that airgun projectiles, an 4, 5 mm lead bullet, are usually encapsulated and

cause no major problems and reactions, but a nonradiopaque foreign body was still a most possible reason for connection between the fistula and the affected bronchus (10).

In buffalo a traumatic reticulo-bronchial fistula has been reported. In human the leading causes of acquired gastrobronchial fistulae were gastric ulcer and subphrenic abscess (3, 8). Other reported causes related to gastrointestinal tract are congenital, previous esophageal or gastroesophageal surgery, infection caused by a foreign body or neoplasia. Regardless of etiology, occurrence of gastrobronchial fistula in humans or animals is rare. The preferred method of confirming a presumptive diagnosis of gastrobronchial fistula is upper gastrointestinal contrast study and more recently of course CT and MRI (3). Foreign body migration is not an uncommon syndrome as well as in dogs as in human. Clinical outcomes range from small, cutaneous, inflammatory reactions to severe inflammation and bacterial infection of body cavities, organs or both. Diagnosis and treatment of such conditions can be challenging. According to the literature data (7), no specific breed was overrepresented. Most of the patients had a history of soft tissue swelling, abscess, or draining tract of uncertain duration. The mean duration of the clinical signs was 9.8 months (in our case 2 years) and at least two surgical procedures had been performed before the

fistulography and further definitive diagnosis. Neck region remain the first among the others (head, paws, flank, inguinal region, gluteal region). The most common cause was the foreign body (7). Foreign body inhalation is quite common in pointer breeds, specially in Mediterranean region. Pointer dogs hunt with extended neck, highly elevated head and open mouth. Typical hunting pose and early hunting season when plants still bloom enable inhalation of grass awns (personal information, dr. Butinar). Early removal of inhaled foreign body with endoscopy after major complaint of cough, breed and history of hunting enables complete remission.

Demonstrating the presence of a foreign body can be difficult, and successful treatment usually hinges on the complete excision of the object and the majority of diseased tissue associated with it. In the dog, many different objects have been described as migrating foreign bodies, including wood fragments, grass awns, needles, and toothpicks. In the human literature, there have been multiple reports of toothpick migration and toothpick injuries. In veterinary literature only two cases of tooth-pick-related injuries could be found (7). In dogs, the most probable route of injury would be swallowing and/or digestion of the toothpick (7) with subsequent migration. It is believed that aspiration and subsequent migration was the course of the presented case although cutaneous migration can not be ruled out. Fistulae that have been previously reported in association with a migrating foreign object include esophagoaortic, esophagotracheal, and esophagobronchial, with the latter being the most common in dogs (7). When attempting to diagnose a migrating foreign body, many modalities can be used. If peritonitis or pyothorax is present, survey radiographs, blood work, abdomino/thoracocentesis, and surgical exploration may suffice. If a draining tract is present, one additional, simple diagnostic test that can be completed is contrast radiography (8, 9, 10). Fistulography (injection of iodinated contrast into a sinus or draining tract) or fistulography (when result indicates a cutaneous-cavitary communication) is a quick, inexpensive tool to help in identifying the presence of a foreign object. Historically, these types of radiographic studies have been used frequently in equine practice, but there has been sparse reporting of their use in small animal practice. In a previous study, sensitivity for fistulo/sinography diagnosing for-

foreign bodies in small animals was reported as 87% (8). This study also reported that 44% of the animals examined, fistulography demonstrated that the extent, the position of the draining tract or both were different than expected on the basis of clinical signs and survey radiographs. This emphasizes that valuable information can be obtained by the use of contrast radiography. Other modalities which have been used to detect foreign bodies include ultrasound, magnetic resonance imaging, and computed tomography. (8, 9, 10). These modalities can be very useful, although they are not a convenient modality for initial evaluation because their requirements of anesthesia, expertise, or expensive instrumentation. Fistulography is an excellent diagnostic test available to any practitioner with radiographic capability and can provide valuable information that can help surgical planning.

A good quality survey radiograph of the tract and the surrounding tissue should be obtained before the contrast study. If no diagnosis is apparent then fistulography may be performed. The aim of the technique is to fill and distend the tract and any communicating cavity with the contrast material, injected by hand. During the injection some adjustment of the position of the catheter or tube may be necessary to obtain good filling. Initially there will be a little resistance to the flow of the contrast material but when tract is completely filled, the pressure required on the syringe plunger will increase. At this point the operator moves to a position safe from primary and scattered radiation and a radiographic exposure is made. There must not be a long delay between the filling of the sinus and the radiographic exposure because this delay may allow the sinus to begin to empty. Radiographic exposure factors for the fistulography should be greater than those used in survey radiograph (8, 9, 10).

Although fistulography is a simple technique, attention to detail is important. Contamination of the hair coat with exudate, topical applications and contrast material must be avoided. A survey radiograph must always be taken before the contrast examination because fragments of opaque foreign material may be obscured by the positive contrast. Two perpendicular projections are normally required to locate the focus accurately. When contrast material leaves the area of interest rapidly, either through the tract opening or because it is rapidly absorbed, an infusion of con-

trast may be required for additional projection. The sinus must not be over distended because the tract may rupture and contaminated contrast material may spread along otherwise normal fascial planes (8, 9, 10).

It is important to note that low osmolar, water-soluble, nonionic contrast agents are the agents of choice especially in cases where the agent comes in direct contact with pulmonary tissue. Ionic agents are contraindicated in fistulograms that may enter the pulmonary parenchyma, because they can stimulate severe inflammation reaction in pulmonary tissue, which can result in fatalities (11). The biologic characteristics of the nonionic agents are similar to those of the nonionic monomers. General characteristic commonly shared are low molecular weight, low lipid solubility, inertness, and rapid glomerular filtration. Like ionic agents, extracellular space distribution occurs throughout the body, except in brain tissue. Nonionic contrast agents have a higher LD50 and a lower incidence of adverse clinical reactions than ionic compounds (11).

Filling defects are important radiographic findings. If sinus is associated with a stick the filling defect may be of similar dimensions on both views and have a regular or geometric outline. It is important to use two views to gain a three dimensional impression of the shape and location of any filling defect (8, 9, 10, 11, 12).

The majority of draining tracts due to chronic foreign body result in complete resolution of clinical signs, when the diseased tissue is fully excised (13).

Conclusions

- bronchocutaneous fistula is a rare pathologic condition in a dog
- diagnostic imaging is crucial to localize the origin of the fistula
- choice of diagnostic imaging depends on equipment availability
- correctly performed fistulo/sinography is an easily performed, and relatively accurate method

- lobectomy of the affected lung lobe results in complete remission
- grass awn or similar foreign bodies can be found in resected lobe
- foreign body inhalation is not uncommon, specially in pointer dogs

References

1. Fistula. In: Dorland's illustrated medical dictionary, 29th ed. Philadelphia: W.B. Saunders Company, 2000.
2. Blood DC, Studdert VP. Saunders comprehensive veterinary dictionary, 2nd ed. London: W.B. Saunders, 1999.
3. Silverstone AM, Adams WM. Radiographic diagnosis-gastrobronchial fistula in a dog. *Veterinary Radiology & Ultrasound* 1999; 40:477-9.
4. Van Ee RT, Dodd VM, Pope ER, et al. Bronchoesophageal fistula and transient megaesophagus in a dog. *Journal of the American Veterinary Medical Association* 1986; 188:874-6.
5. Basher AW, Hogan PM, Hanna PE, et al. Surgical treatment of a congenital bronchoesophageal fistula in a dog. *Journal of the American Veterinary Medical Association* 1991; 199:479-82.
6. Jackson AH, Degner DA. Cutaneopulmonary fistula in a dog caused by migration of a toothpick. *Journal of the American Animal Hospital Association* 2002; 38:545-7.
7. Hittmair KM, Wanivenhaus G. Ultrasonographic detection of ingested toothpick perforating the spleen in a dog. *Wien Tierarztl Monatsschr* 2001; 88:252-6.
8. Lamb CR, White RN, McEvoy FJ. Sinography in the investigation of draining tracts in small animal: retrospective review of 25 cases. *Veterinary Surgery* 1994; 23:129-34.
9. McEvoy FJ, Lamb CR, White RN. An application of sinography in small animal practice. *Veterinary Record* 1993;132:183-5.
10. Yanofsky G, Bonneau NH, Breton L. Fistulography as an aid in the diagnosis of a nonradiopaque foreign body in a dog. *Canadian Veterinary Journal* 1986; 27:291-2.
11. Holland M. Contrast agents. *Veterinary Clinics of North America: Small Animal Practice* 1993; 23:269-77.
12. Yamagishi N, Yamada K, Ishikawa H et al. Bronchocutaneous fistula in a dog. *Veterinary Radiology & Ultrasound* 2000; 5:422-4.
13. Reich T, Tait J. Chronic bronchocutaneous fistula in the dog: a method for construction. *Surgery* 1971; 69:895-8.

BRONHOKUTANA FISTULA PRI PSU

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Povzetek: Opisan je primer bronhokutane fistule pri psu, kot posledica inhaliranega tujka v pljučih. Kontrastna fistulografija je omogočila identifikacijo tujka, njegovo kasnejšo kirurško odstranitev (lobektomija dela desnega kranialnega lobusa pljuč) in uspešno ozdravitev oz. popolno sanacijo bolezenskega procesa. V članku je uporabljena sorodna novejša literatura.

Ključne besede: bronhokutana fistula, kontrastna radiografija, tujek, lobektomija, psi