



NOTE

Surgery

A clinical case of a subepiglottic cyst in a Japanese Black calf

Ryuichi YONESHIGE¹⁾, Mie WADA²⁾, Yusuke HONKAWA³⁾, Naoki MIURA^{1,3)},
Noriaki MIYOSHI^{1,3)} and Takaaki ANDO^{1,3)}*¹⁾Joint Faculty of Veterinary Medicine, Kagoshima University, Kagoshima, Japan²⁾Cubu Livestock Medical Center, Kagoshima, Japan³⁾Joint Graduate School of Veterinary Medicine, Kagoshima University, Kagoshima, Japan*J. Vet. Med. Sci.*

84(7): 978–981, 2022

doi: 10.1292/jvms.22-0183

Received: 14 April 2022

Accepted: 13 May 2022

Advanced Epub:

26 May 2022

ABSTRACT. A 36-day-old Japanese Black calf exhibited wheezing associated with dyspnea from birth. Arterial blood gas analysis revealed a low oxygen partial pressure of 51 mmHg, low oxygen saturation of 83%, and high carbon dioxide partial pressure of 58.8 mmHg. Computed tomography, endoscopy, and ultrasonography showed cyst formation under the epiglottis. When the cyst was aspirated under ultrasonic guidance to secure the airway, 30 ml of viscous white turbid content was aspirated. The cyst shrank immediately after aspiration, but the wheezing and respiratory symptoms resumed 7 days after aspiration. Therefore, the cyst was surgically removed from the ventral side of the neck. No cyst remodeling was observed 30 days after surgical removal.

KEYWORDS: diagnostic imaging, Japanese Black calf, subepiglottic cyst

A subepiglottic cyst forms under the epiglottis and obstructs the flow of air during breathing, resulting in dyspnea accompanied by wheezing. Small cysts are asymptomatic and often followed up. However, large cysts often cause symptoms of dysphagia and dyspnea [8, 11]. Among animals, the incidence of subepiglottic cysts is high in horses, and various diagnosis and treatment methods have been reported [10, 12, 15]; however, reports of subepiglottic cysts in cattle are rare. We herein report on the diagnosis and treatment of a Japanese Black calf with a subepiglottic cyst that caused wheezing during breathing.

This case involved a Japanese Black calf that had no desire to feed from birth and showed symptoms of wheezing associated with dyspnea. The calf was treated with antibiotics (kanamycin for 3 days and florfenicol for 5 days) and an anti-inflammatory agent (flunixin for 3 days). However, fever and respiratory symptoms were observed intermittently for more than 1 month; therefore, the calf was referred to the Kagoshima University Veterinary Teaching Hospital (KUVTH) for diagnosis and treatment. At the time of admission, the calf was 36 days old and weighed 50 kg. The general clinical findings were a body temperature of 39.7°C, heart rate of 114 beats per minute, and respiratory rate of 54 breaths per minute. Abnormal forced breathing, coughing, and wheezing during breathing were observed. The visible mucosa was slightly dark purple. Auscultation showed enhanced bronchial breath sounds but no abnormal heart sounds. A complete blood count (Poch-100iV Diff; Sysmex TMC, Tokyo, Japan) and blood biochemical test (DRI-CHEM 7000V; Fujifilm, Tokyo, Japan) showed no significant abnormal values. Arterial blood gas analysis (i-STAT 1; Abbott Japan LLC, Tokyo, Japan) showed a pH of 7.392, oxygen partial pressure (pO₂) of 51 mmHg, carbon dioxide partial pressure (pCO₂) of 58.8 mmHg, oxygen saturation of 83%, and alveolar–arterial oxygen gradient (A-aDO₂) of 25.5 mmHg, indicating type II respiratory failure due to hypoxia and hypercapnia.

A computed tomography (CT) scan (four-row helical CT images, 2-mm slice thickness) (Asteion TSX-021B; Toshiba, Tokyo, Japan) was performed to determine the cause of the wheezing and respiratory failure. The CT scan showed a clearly margined lesion with a low CT value (10–20 HU) and round shape (5 cm in diameter), and a cyst containing fluid around the larynx was highly suspected (Fig. 1). Endoscopy (VO-3B; Olympus, Tokyo, Japan) from the nasal cavity revealed a cystic structure protruding from the lower left aspect of the epiglottis, and the cyst was confirmed to inhibit respiration by closing the larynx (Fig. 2). Ultrasonography LOGIQ Book XP; GE Healthcare, Tokyo, Japan) (3-MHz convex probe) performed from the left neck showed a hypochoic lesion with a clear outline (inner diameter of 4.5 cm), confirming the liquid-like contents and distinct margins (Fig. 3). To secure the airway and eliminate respiratory failure, the cystic lesion was punctured from the left neck with a 16G needle under ultrasonic guidance, and 30 ml of white, slightly turbid, viscous fluid was aspirated. The biochemical properties of the aspirated fluid were a pH of 8.5 (pH Meter KS701; ShinDengen, Tokyo, Japan), density of 1.009, protein concentration of 0.0 mg/dl (Master-SUR; ATAGO, Tokyo, Japan), and cell count of 4,400/μl; most of the cells were keratinized epithelial cells. Based on

*Correspondence to: Ando, T.: ando@vet.kagoshima-u.ac.jp, Joint Faculty of Veterinary Medicine, Kagoshima University, 1-21-24 Korimoto, Kagoshima 890-0065, Japan

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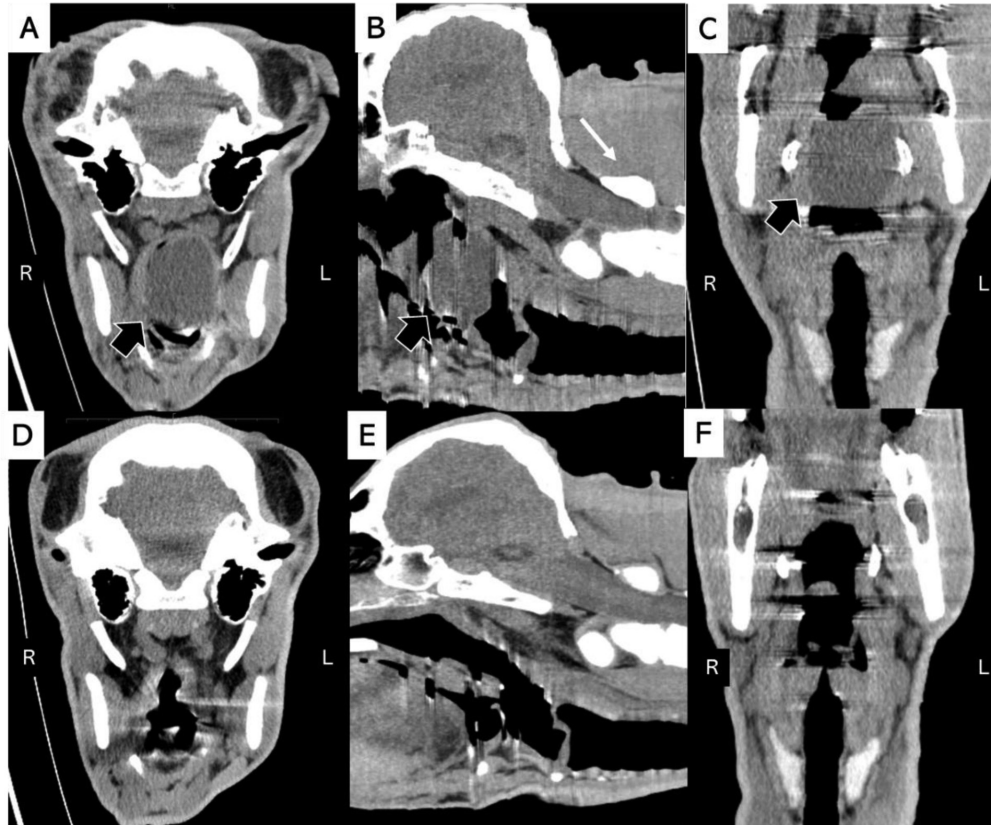


Fig. 1. Computed tomography images of the head and upper airway region. (A–C) Cystic lesion before fluid aspiration. The base of the cyst was on the left side of the larynx (black arrow) as shown in the (A) axial, (B) sagittal, and (C) coronal views. After aspiration of the fluid in the cyst, the cystic lesion became invisible by computed tomography. (D) Axial view. (E) Sagittal view. (F) Coronal view.

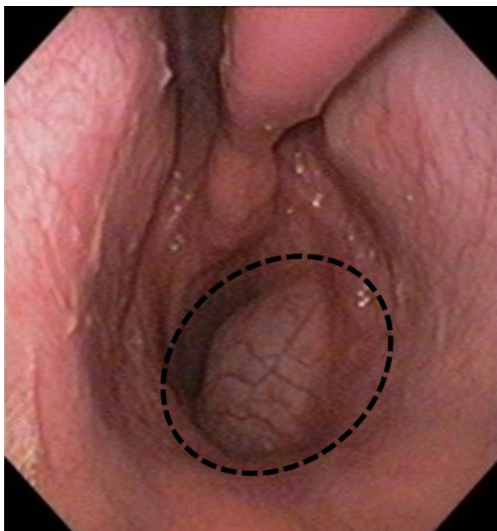


Fig. 2. Endoscopic examination findings of the larynx. The base of the cyst was on the left side of the larynx as shown in the area surrounded by the dotted line.

these properties (slightly turbid and viscous, density) of the aspirated fluid, the cyst reservoir was determined to be saliva secreted into the oral cavity. Considering the findings from all diagnostic examinations, the lesion was diagnosed as a subepiglottic cyst.

The general clinical findings the day after ultrasound-guided aspiration of the fluid were a body temperature of 39.2°C, heart rate of 96 beats per minute, respiratory rate of 36 breaths per minute, and disappearance of the coughing and wheezing during exhalation. However, wheezing was observed again 7 days after the cyst was aspirated, and ultrasonography confirmed that the cyst had recurred (inner diameter of 3.1 cm). Therefore, we decided to surgically remove the cyst.

Surgical removal of the cyst was performed by endotracheal intubation after sedation with 2% xylazine (xylazine hydrochloride, Fujita, Tokyo, Japan) at 0.01 mg/kg from jugular vein and with a ventilator using isoflurane anesthesia (Isoflurane, MSD Animal Health, Tokyo, Japan). An incision was made from the ventral side of the left neck, the subcutaneous tissue was peeled off to expose the cyst to the outside, and the cyst was resected (Fig. 4). Histopathological examination of the resected cyst revealed a salivary gland acinus around the cyst and dilation of the surrounding salivary duct (Fig. 5).

Wheezing and coughing due to swelling around the surgical wound occurred for 3 days after surgical removal but disappeared at 4 days postoperatively. Ultrasonography 10 days after excision showed no recurrence of the cyst, and arterial blood gas analysis showed a pH of

7.429, pO_2 of 78 mmHg, pCO_2 of 45.3 mmHg, oxygen saturation of 95%, and A-a DO_2 of 15.4 mmHg. The calf was discharged 30 days after surgical removal because no breathing abnormalities were observed in the subsequent follow-up.

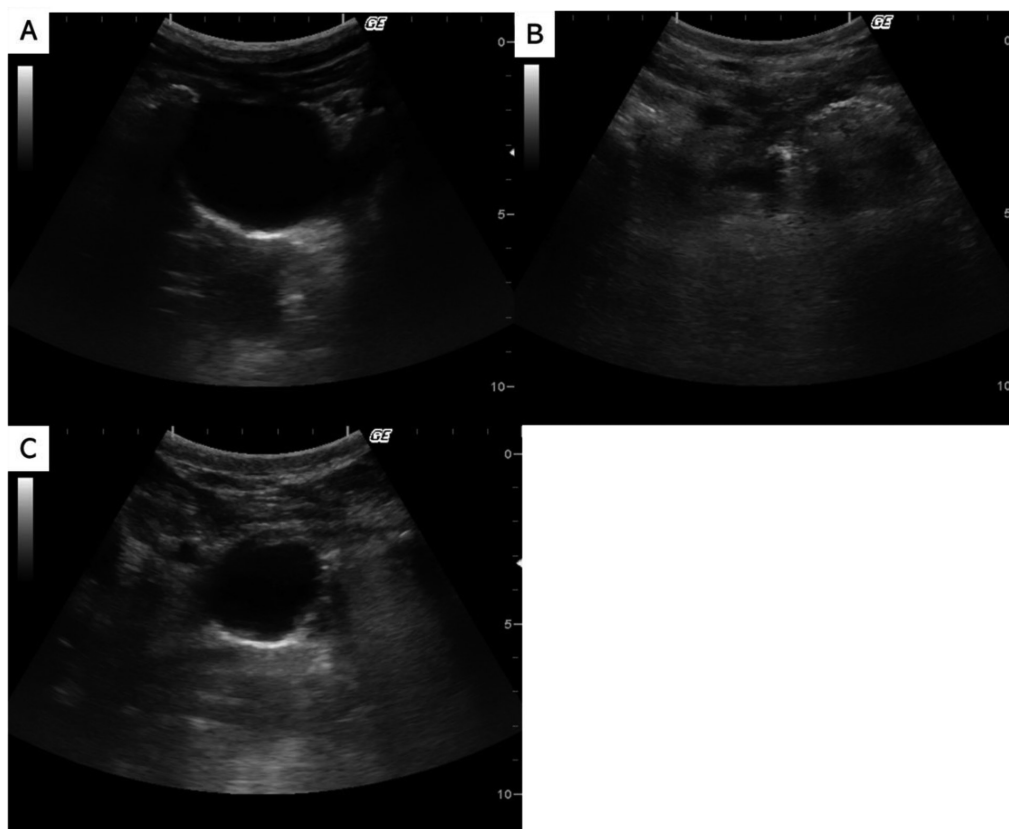


Fig. 3. Ultrasonographic image of the cyst at the larynx. (A) Cyst at the first examination (inner diameter of 4.5 cm). (B) The cyst disappeared immediately after puncture and aspiration. (C) The cyst recurred 7 days after aspiration (inner diameter of 3.1 cm).

This case involved a Japanese Black calf with dyspnea characterized by wheezing during exhalation. A respiratory infection was suspected, and treatment was performed with antibiotics and anti-inflammatory agents by the field clinicians. However, no significant effect was observed, and the calf was therefore referred to the KUVTH for diagnosis and treatment. Diseases that cause wheezing in calves include tracheal collapse and tracheal stenosis associated with rib fractures [5], infectious pharyngitis and bronchitis [3, 16], and peri-airway tumors and abscess formation [2, 9]. In this case, arterial blood gas analysis showed type II respiratory failure due to hypoxia and hypercapnia. Because hypercapnia is a condition caused by ventilatory insufficiency [14], an underlying cause of ventilatory impairment was also strongly suspected in this case. CT and endoscopy revealed a cystic lesion around the larynx, which was diagnosed as the cause of the wheezing. Additionally, ultrasonography was effective in confirming the internal condition of the cyst and assisting in removal of the accumulated fluid by aspiration. However, it was not possible to confirm the cyst formation around the larynx based on its appearance. For diagnosis of subepiglottic cysts in calves, it is considered effective to combine multiple tests, such as identifying the site of abnormality and its interaction with neighboring organs by CT or endoscopy and then performing ultrasonography to confirm the properties of the lesion.

Biochemical examination of the fluid in the cyst collected under ultrasound guidance led to a diagnosis of digestive fluid. Diseases caused by abnormalities in the digestive glands of animals include subepiglottic cysts in horses, cows, and dogs [6, 7, 10, 15]; mucous retention cysts in dogs [1]; and salivary mucoceles in dogs and cats [13]. In this case, puncture of the cyst improved the symptoms, but the fluid retention in the cyst and the associated symptoms recurred after 7 days. This case suggests that aspiration of subepiglottic cysts is effective for temporarily relieving critical dyspnea but that it may not be a curative solution.

Surgical removal has been reported as an extraoral approach to the treatment of epiglottic cysts in horses, cows, and dogs [6, 7, 15]. Intraoral approaches include incineration by a laser or snare under an endoscope [12] and formalin injection into the cyst [4]. In the present case, the cyst was relatively deep under the mucosa based on the endoscopic and CT images, and we predicted that the extent of injury would be larger with an intraoral approach; therefore, surgical removal was performed by an extraoral approach. Swelling was observed for several days after the operation, but the symptoms were thereafter alleviated and no recurrence was observed within 30 days until discharge. However, since there are few reports of surgical removal for cases of subepiglottic cysts in calves, continuous follow-up such as the onset of respiratory symptoms after treatment is considered necessary. Based on these results, surgical removal is considered effective for radical cure of subepiglottic cysts in calves.

In conclusion, in this case, it was possible to diagnose ventilation insufficient showing hypercapnia by arterial blood gas analysis. As a result, it was possible to distinguish it from oxygenation disorder due to pneumonia. Furthermore, CT and endoscopy could confirm cystic lesions around the larynx, demonstrating that they are effective in identifying the cause and site.



Fig. 4. Surgical removal of the cyst. An incision was made from the ventral side of the left neck, and the cyst was resected.

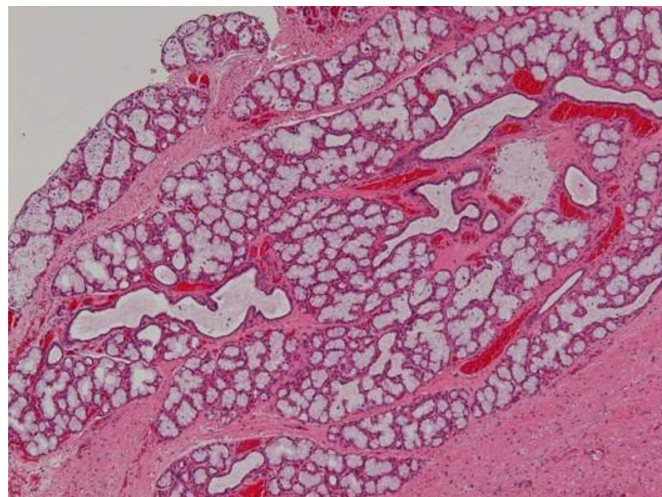


Fig. 5. Histopathological image of the removed cyst. A salivary acinus was found around the cyst, and dilation of the surrounding salivary duct was observed.

Ultrasonography can confirm the internal state of the cyst by identifying the examination site, so it was possible to confirm the properties of the cyst. Furthermore, it was a highly useful test for deciding the treatment method and observing the follow-up after the treatment. From the above results, it was considered that when dyspnea characterized by wheezing was observed in calves, it is possible to accurately confirm the treatment method and prognosis by combine with diagnostic imaging.

POTENTIAL CONFLICTS OF INTEREST. The authors declare no competing interests.

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