

Diagnosis of Laryngeal Cyst using Respiratory Endoscopy in Hanwoo Cattle with Chronic Bronchopneumonia

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Abstract : A seven-month-old Hanwoo steer was presented immediately after transport with respiratory symptoms including a nasal discharge, depression, and anorexia. Though repeated treatments, bronchopneumonia had not been improved and had persisted for 10 months. Then, obstructive breath sound was heard. A cyst adjacent to the epiglottis could be observed with respiratory endoscopy. Consequently, chronic bronchopneumonia induced laryngeal cyst formation, resulting in obstructive dyspnea. And respiratory endoscopy may be useful for differentiating the causes of dyspnea in bovine clinical practice.

Key words : Chronic bronchopneumonia, Endoscopy, Laryngeal cyst, Transport Stress, Cattle.

Introduction

Respiratory disease in cattle is one of the most important diseases economically (1,12). Development of respiratory diseases in cattle is closely associated with the depression of immune function, which is usually caused by stresses including transportation, climate and entering a new group (1). Mainly due to the stress, the immune system is first depressed, then viruses can easily infect the respiratory tract (1). Respiratory viral infection is usually mild and subclinical in cattle, but it can lead to a secondary bacterial infection, resulting in bacterial pneumonia with severe respiratory symptoms (12). Cattle not treated appropriately at the initial stage of bacterial pneumonia can develop chronic pneumonia, which is often unresponsive to treatment and causes lower growth rate and subsequent economic loss (12).

On the other hand, respiratory endoscopy has been usually utilized in equine practice (5,10), especially racing horse, but not in bovine due to high cost. In this case, the respiratory disease unresponsive to the treatment progressed to chronic pneumonia accompanying abnormal breath sound. In order to identify the cause of abnormal breath sound, respiratory endoscopy was applied.

Case

A seven-month-old Hanwoo steer which showed mainly respiratory symptoms was referred to Farm Animal Medical Teaching Hospital in February 2016, when was the next day

to be transported to the farm. At the first physical examination, steer showed a nasal discharge and anorexia, and crackle sound was heard stethoscopically in the whole lung fields. After diagnosing as a bronchopneumonia, the steer had been treated with an antibiotic and anti-inflammatory drug. Though the illness was not fully recovered, the steer showed the partial recovery of appetite. However, respiratory symptoms were persisted for 10 months. Then, despite repeated treatments with several antibiotics, lower growth rate and rough hair coat were remarkable. Moreover, a coarse breath sound was heard even at resting, thus, respiratory endoscopy was indicated to confirm the cause of the abnormal breath sound. Endoscopy (TELE PACK VET X, 60914 NKS; KARL STORZ GmbH & Co. KG, Tuttlingen, Germany) revealed a cyst looking like expanding during expiration (Fig 1). The cyst was located adjacent to the epiglottis, a site hard to access surgically. After diagnosed as the laryngeal cyst, treatment stopped, and culling was recommended due to dyspnea by airway obstruction caused by the cyst. But it was denied with technical reasons and the patient died 7 months after treatment cessation.

The Hematological analysis was conducted on the day before death (Table 1). The CBC (HEMAVET[®] 950FS; Erba[®] Diagnostics, Dusseldorf, Germany) and serum biochemical test (BS-400; Mindray, Shenzhen, China) showed a high number of neutrophil and red blood cell, and a high concentration of total bilirubin, phosphorous, creatinine and blood urea nitrogen. These results indicated chronic inflammation and red blood cell degradation. It also showed low total cholesterol and high blood glucose levels, which seemed to be due to anorexia and stress caused by severe inflammatory conditions. The significant increases in pCO₂ and tCO₂ as indicators of respiratory function have been

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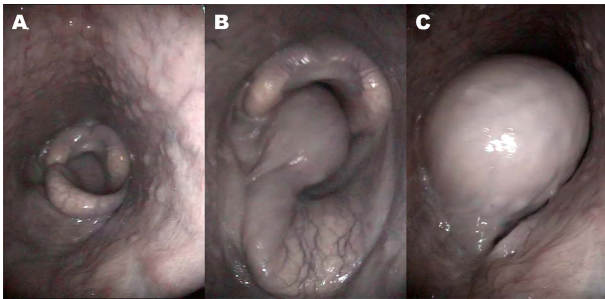


Fig 1. (A) Swollen lymph nodes on the mucosal membrane observed on the respiratory endoscopy and (B) the laryngeal cyst expanding during exhalation at the larynx which was located adjacent to epiglottis. (C) The cyst swelled up and blocked the upper airway.

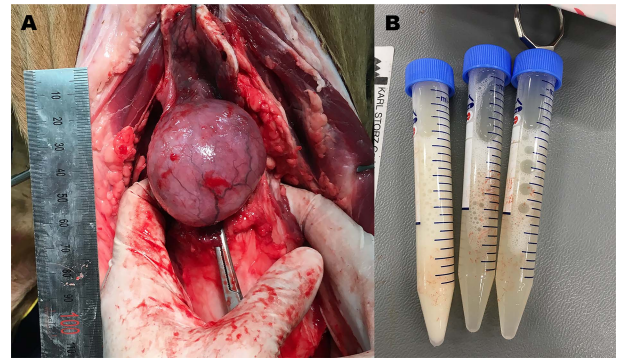


Fig 2. (A) At a necropsy, laryngeal cyst, about 5 cm in diameter, was presented, which was filled with seropurulent exudate, and (B) the amount of exudate was more than 30 mL.

Table 1. The results of blood analysis (CBC, Serum chemistry and blood gas analysis) at the day before death

Parameter (Units)	Results	Parameter (Units)	Results
White Blood Cell (K/ μ l)	22.98	Calcium (mg/dl)	8.3
Neutrophil (K/ μ l)	17.19	Phosphate (mg/dl)	10.1
Lymphocyte (K/ μ l)	2.6	Creatinine (mg/dl)	2.1
Red Blood Cell (M/ μ l)	11.98	Urea (mg/dl)	78
Hemoglobin (g/dl)	12.6	pH	7.362
Hematocrit (%)	30.7	pCO ₂ (mmHg)	67.6
Platelet (K/ μ l)	272	HCO ₃ ⁻ (mmol/L)	30.3
Total Protein (g/dl)	12.4	Base Excess (mmol/L)	13
Albumin (g/dl)	3.0	Anion Gap (mmol/L)	21
Globulin (g/dl)	9.4	K ⁺ (mmol/L)	3.9
Total Cholesterol (mg/dl)	46	Na ⁺ (mmol/L)	139
Total bilirubin (mg/dl)	0.89	Cl ⁻ (mmol/L)	84
Glucose (mg/dl)	84	tCO ₂ (mmol/L)	48
Aspartate Aminotransferase (U/L)	90		

observed in blood gas analysis (VetScan i-STAT[®] 1 Analyzer, i-STAT[®] EC8+; Abaxis, Union City, USA), which means that the ventilation in the alveoli is poor. At the necropsy, the cyst, 5 cm in diameter, was located on the larynx, behind of epiglottis (Fig 2A), and filled with seropurulent exudate (Fig 2B). As a prevalent bacterium, *Trueperella pyogenes* and *Pasteurella multocida* was identified in the cyst and in the trachea as well as alveoli, respectively (VITEK 2 Compact; bioMérieux, Marcy l'Etoile, France).

Discussion

The respiratory diseases occur mostly after transportation. In this case, the steer also was transported one day before presentation, and the main symptoms were nasal discharge, anorexia and stethoscopical crackle sound in the lung. Even

though repeated treatments with antibiotics and anti-inflammatory drugs, the symptoms were not improved and were persisted for more than 10 months. Compared to other individuals transported at the same time with the same age, the steer showed a significantly lower growth rate and rough hair coat. As symptoms worsened, abnormal breath sound due to upper airway obstruction was heard. To differentiate the causes, we used a respiratory endoscope and found the existence of laryngeal cyst. To our knowledge, this is the first report on the bovine laryngeal cyst in Korea.

While known to be uncommon in adult cattle (3), the laryngeal obstruction due to lymphoma was reported in an adult dairy cattle (6). Obstructive disorders of upper respiratory tract are common in racehorses, which are associated with persistent dorsal displacement of the soft palate, epiglottic entrapment, subepiglottic cyst, arytenoid chondritis and recurrent laryngeal neuropathy (11). Among, subepiglottic cyst usually develop in horses with exertional breathing caused by pneumonia (5). In this case, chronic bronchopneumonia may affect the formation of the laryngeal cyst, resulting in obstructive dyspnea. Previous studies have shown that laryngeal cyst could be removed by surgery or formalin injection in horses (2,4,7,8), but we could not select any options because of technical reasons as well as the concern of public health.

The authors utilized an endoscope with 2.8 mm in diameter and 1400 mm in length. Though developed for equine medicine, the endoscope can enter until the tracheal bifurcation in mildly sedated adult cattle without any special preparations. Diagnostic procedures with endoscopy are not usually used in bovine practice probably due to high cost and portability. In order to confirm the causative pathogen inducing bronchopneumonia, tracheal puncture or tracheotomy is usually performed to obtain the specimen for diagnosis. This procedure is invasive, while endoscopy is not an invasive procedure and can collect the specimen from the lower trachea. Thus, endoscopy can utilize easily in the precise diagnosis in cattle with respiratory diseases.

Pasteurella multocida and *Trueperella pyogenes* was identified in the specimen collected from alveoli and cyst, respectively. These bacteria usually do not induce any diseases in healthy cattle. But in immune-depressed cattle, they can

infect and induce pathological states (1,9). In this case, the steer was assumed to have a respiratory disease before transportation considering crackle sound at the whole lung field at the first physical examination. After transportation, the respiratory diseases worsened and did not respond to the antimicrobial treatment. Thus, before cattle are transported to other places, medication including antibiotics and anti-inflammatory drugs should be considered to prevent the development or the aggravation of the respiratory diseases.

Conclusion

Bronchopneumonia was diagnosed in the steer immediately after transport and did not respond to antibiotics and anti-inflammatory treatment, resulting in chronic bronchopneumonia. Obstructive dyspnea was caused by laryngeal cyst during exhalation which was detected with respiratory endoscopy. The laryngeal cyst may be due to persistent exertional breathing in the pneumonic steer, and respiratory endoscopy seems to be useful for differentiating the causes of dyspnea in bovine practice.

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References

1. Bojkovski J, Milanov D, Savic S, Vasic A, Zdravkovic N, Rogozarski D, Prokic N, and Korica S. Respiratory diseases of calves on dairy cow farm. *Bulletin UASVM Vet Med* 2014; 71: 313-320.
2. Dougherty SS, and Palmer JR. Use of intralesional formalin administration for treatment of a subepiglottic cyst in a horse. *J Am Vet Med Assoc* 2008; 233: 463-465.
3. Fubini SL, and Ducharme NG. Farm animal surgery. In: SAUNDERS, 2nd ed, 2017: 208.
4. Koskinen M, and Hewetson M. Equine laryngeal dysplasia as a cause of acute respiratory distress in a neonatal foal. *Equine vet Educ* 2017; 29: 87-91.
5. Kutasi O, Balogh N, Lajos Z, Nagy K, and Szenci O. Diagnostic approaches for the assessment of equine chronic pulmonary disorders. *J Equine Vet Sci* 2011; 31: 400-410.
6. Lardé H, Nichols S, Babkine M, and Chénier S. Laryngeal obstruction caused by lymphoma in an adult dairy cow. *Can Vet J* 2014; 55: 136-140.
7. Mattoon JS, Andrews D, Jones SL, and Linford RL. Subepiglottic cyst causing upper airway obstruction in a neonatal calf. *J Am Vet Med Assoc* 1991; 199: 747-749.
8. Mattos P, Ramos M, Vasconcelos G, and Barro D. Treatment of a subepiglottic cyst with formaldehyde injection in a horse. *Rev Bras Cs Vet* 2012; 19: 78-79.
9. Ribeiro MG, Riseti RM, Bolanos CAD, Caffaro KA, Morais ACB de, Lara GHB, Zamprogna TO, Paes AC, Listoni FJP, and Franco MMJ. *Trueperella pyogenes* multispecies infections in domestic animals: a retrospective study of 144 cases (2002 to 2012). *Veterinary Quarterly* 2015; 35: 82-87.
10. Saulez MN, and Gummow B. Prevalence of pharyngeal, laryngeal and tracheal disorders in thoroughbred racehorses, and effect on performance. *Vet Record* 2009; 416: 431-435.
11. Strand E, Fjordbakk CT, Sundberg K, Spangen L, Lunde H, and Hanche-olsen S. Relative prevalence of upper respiratory tract obstructive disorders in two breeds of harness racehorses (185 cases: 1998-2006). *Equine Vet J* 2012; 44: 518-523.
12. Tayler JD, Fulton RW, Lehenbauer TW, Step DL, and Confer AW. The epidemiology of bovine respiratory disease: What is the evidence for predisposing factors?. *Can Vet J* 2010; 51: 1095-1102.