Subepiglottic cyst causing upper airway obstruction in a neonatal calf

John S. Mattoon, DVM; Dina Andrews, DVM; Samuel L. Jones, MS, DVM; Robert L. Linford, DVM, PhD

A 14-day-old female Brahman calf was referred to the teaching hospital for evaluation of upper airway obstruction that had existed since birth. The owners of the calf observed the birth and reported it to be normal, although respiratory difficulty was evident immediately. The original respiratory distress was apparently not serious enough to inhibit the calf from standing and suckling the cow normally; however, respiratory stridor worsened until it compromised the calf's ability to suckle. On the second day after birth, the referring veterinarian placed a tracheostomy tube, which allowed the calf to breathe with greater ease, although stridor persisted. Milk was occasionally seen at the tracheostomy site when the calf was nursing.

The calf was alert, responsive, and in good condition (70 kg). Inspiratory stridor was immediately apparent, although the tracheostomy site was allowing adequate air flow. Rectal temperature was 40.2 C, and heart (132 beats/min) and respiratory (32 breaths/min) rates were within normal limits. Mild cellulitis was evident at the tracheostomy site, and a moderate amount of mucopurulent discharge was apparent around the tube. Crackles and wheezes were auscultated bilaterally in the cranioventral lung fields. The umbilicus was dry, and slight scleral injection was observed. The calf was observed suckling the cow and did not manifest signs of dysphagia or inability to suckle. The calf maintained good suckle reflex, and cranial nerve responses were normal.

Clinicopathologic findings included normal RBC numbers (9.8×10^6 cells/μl; PCV, 37.1%) and mature neutrophilia (4,920 cells/μl) with monocytosis (2,829 cells/μl). The lymphocyte count was normal (4,551 cells/μl). Normal WBC values include 4,000 to 12,000 cells/μl; 600 to 4,000 neutrophils/μl; 0 to 120 bands/μl; 25 to 840 monocytes/μl; and 2,500 to 7,500 lymphocytes/μl. Fibrinogen concentration was slightly high (800 mg/dl). Hematologic findings were consistent with a chronic active inflammatory process. Electrolyte concentrations were within normal limits (Na, 138 mEq/L; K, 3.9 mEq/L; Cl, 95 mEq/L). Glucose concentration was normal for a suckling calf—116 mg/dl. All other serum biochemical values were within normal limits, including BUN (12 mg/dl) and creatinine (1.2 mg/dl) concentrations.

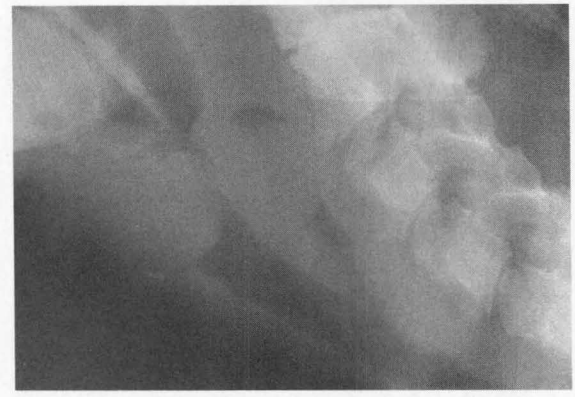

Figure 1—Lateral radiographic view of the neck of the affected calf. Notice abnormal soft tissue opacity overlying the larynx with apparent airway occlusion. Anatomic features of the larynx are obliterated. An abnormal oval mass is seen overlying the cranial portion of the esophagus, bounded cranially and caudally by crescent-shaped gas shadows. Tracheostomy tube is evident.

Survey radiography of the pharynx revealed an abnormal soft tissue opacity that obscured the normal anatomic features of the larynx and appeared to obliterate the airway. An oval soft tissue mass overlay the cranial portion of the esophagus, bordered cranially and caudally by crescent-shaped gas shadows (Fig 1). A barium swallow was performed by administration of a barium paste.[a] The barium outlined an oval mass in the cranial portion of the esophagus (Fig 2). The larynx appeared less obstructed in this study, which may be attributed to more extended head position. Radiography of

From the Departments of Radiological Sciences (Mattoon) and Surgery (Linford), and the Veterinary Teaching Hospital (Jones), School of Veterinary Medicine, University of California, Davis, CA 95616. Dr. Mattoon's present address is Veterinary Radiology Group, 1434 Irving St, San Francisco, CA 94122.

Address reprint requests to Dr. Mattoon at the Department of Radiological Sciences, School of Veterinary Medicine, University of California, Davis, CA 95616.

[a]Microtrast, Picker Corp, Cleveland, Ohio.

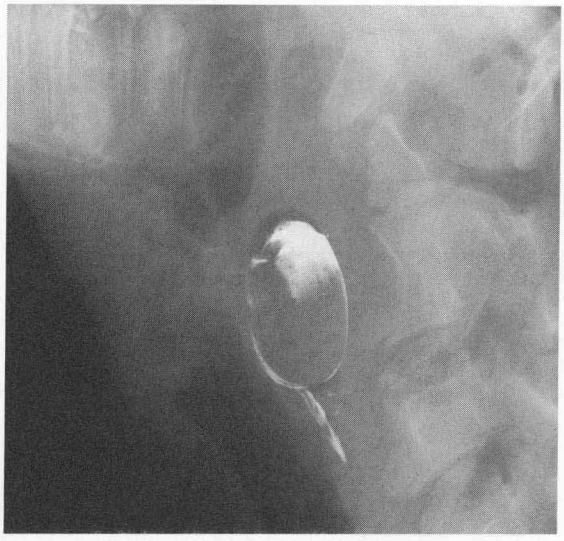

Figure 2—Lateral radiographic view after administration of barium paste. The oval mass is seen to be located in the cranial portion of the esophagus. Less soft tissue opacity overlying the larynx is evident in this radiograph, although laryngeal anatomic features remain unclear.

the thorax revealed ventrally located interstitial pulmonary infiltrates. The radiographic diagnosis was cranial esophageal mass, laryngeal edema, and aspiration bronchopneumonia. Endoscopy was recommended for further evaluation of the mass and larynx.

The calf was sedated by IV administration of 5 mg of diazepam,[b] and a Frick speculum was inserted perorally to examine the pharynx. A videoendoscope[c] was passed through the speculum, and a large pedunculated mass was seen obscuring the entire pharynx. The calf was observed to swallow the mass into the cranial portion of the esophagus. The pedicle of the mass was several centimeters long and appeared to be cystic in nature and subepiglottic in origin. It was lanced through the speculum by use of a scalpel blade attached to a uterine biopsy instrument, yielding a large amount of milky white fluid. The cyst collapsed, partially resolving the respiratory distress. Procaine penicillin G[d] (20,000 U/kg of body weight, SC, q 12 h) and gentamicin sulfate[e] (2 mg/kg, IM, q 12 h) were administered to treat aspiration pneumonia. Penicillin administration was continued until the 16th day of hospitalization, and gentamicin was continued until day 7. The BUN and creatinine concentrations remained within normal limits.

The cyst was reevaluated endoscopically 2 days later, at which time it appeared to be smaller and firmer. At that time, the calf had some residual stridor, but its breathing was greatly improved, compared with that observed immediately after lancing of the cyst. The owner was instructed to watch the calf closely until surgery could be scheduled. The tracheostomy tube was removed, and the calf did not experience any additional increase in respiratory stridor.

The calf was monitored over the next 2 weeks. Slow progression in respiratory difficulty was evident, especially when the head was elevated. The calf continued to suckle vigorously and was playful. Another tracheostomy tube was placed on day 13 of the 2-week period after appreciable respiratory distress returned. Surgery was scheduled for the next day to remove the cystic mass perorally through the endoscope or through ventral midline laryngotomy if the peroral approach was unsuccessful.

The calf was anesthetized by use of isoflurane[f] administered through the tracheostomy tube and later through a 9.5-mm endotracheal tube placed through the tracheostomy site. A snare was made using obstetric wire in a Chambers catheter, along with a sponge forceps to secure the cyst. A glass speculum was placed into the mouth, and the subepiglottal cyst was once again seen obscuring the pharynx. Continuous suction of the pharynx was necessary because of constant regurgitation of milk. The obstetric wire was placed around the pedicle as close to its subepiglottic base as possible, then cut, displacing the cyst into the oral cavity where it could be removed. The calf recovered after surgery and continued to nurse and gain weight. It was discharged on day 26 of hospitalization; respiratory stridor was not evident.

Gross examination revealed a cyst measuring 3.6 × 3 × 2.4 cm attached to a 1.6-cm stalk. The cyst was round and contained 2 lobes filled with purulent fluid. Histologic examination indicated that the cyst was lined by stratified keratinizing squamous epithelium, resembling pharyngeal tissue. Some ulceration was observed. The cyst contained a proteinaceous fluid with many keratin squamous cells and some neutrophils. A portion of the outer cystic surface was thick because of granulation tissue.

In this calf, the pharyngeal cyst was no doubt responsible for the respiratory distress owing to the occlusion of the upper airway. The stalk allowed the cyst to be swallowed, which intermittently relieved the laryngeal obstruction. It is noteworthy that the calf experienced only limited difficulties nursing. However, some aspiration of milk was presumed because of ventral pneumonia and milk at the tracheostomy site.

Lancing of the cyst was performed to provide initial, temporary relief of the upper airway obstruction. Surgical removal of the cyst was considered to be the definitive treatment; lancing alone has not been documented to be curative.

The peroral surgical approach was considered

[b]Valium, Hoffman-LaRoche Inc, Nutley, NJ.

[c]VideoEndoscope, Welch-Allyn, Skaneateles, NY.

[d]Pfi-Pen G, Pfizer, New York, NY.

[e]Tech America, Fermenta Animal Health Co, Kansas City, Mo.

[f]AErrane, Anaqueste, Madison, Wis.

the most appropriate because of the ease of the procedure and potential complications of ventral laryngotomy, including leakage of milk and possible aspiration. Ventral laryngotomy is the preferred approach in horses because of the greater surgical exposure, although peroral approach has been described and may be successful if the cyst is pedunculated.[1-3]

Application of laser surgical techniques to large animal laryngeal disorders has been recently described, including excision of subepiglottic cysts.[4-6] Laser surgery has several advantages over scalpel surgery. It is a precise, no-touch technique that reduces surgical hemorrhage and edema, in addition to decreasing postoperative pain and rehabilitation time.

Subepiglottic cysts are found in human beings, dogs, and horses.[2,3,7-12] Subepiglottic cysts do not appear to be common in cattle and specific reports are not available. One textbook describes pedunculated fibrous or mucoid pharyngeal polyps as a cause of intermittent airway obstruction in cattle, although histologic features or speculation as to the origin of these cysts is not given.[13] They may be a cause of respiratory distress at birth that is not diagnosed owing to economic considerations.

Embryologic thyroglossal duct remnants are frequently implicated in the origin of subepiglottal cysts.[2,3,8-12] Traumatically induced cysts are reported in horses.[7] The thyroglossal duct forms embryologically in the floor of the pharynx and grows ventrally along the trachea in bilobed stalks to form the primitive thyroid gland. This duct may persist, along with its secretory membrane, to form a cystic structure later in the embryo's development.[10,12] It is filled with a colloid-like material. Once removed, many of the subepiglottic cysts in human beings will recur if not properly excised by removing a portion of the hyoid bone that contains a more proximal portion of the duct (Sistrunk procedure).[10,12] Recurrence in horses and dogs has not been described.

Location of this cyst was most compatible with origin from a persistent thyroglossal duct. The histopathologic findings are also consistent with those described in human beings and horses.[2,10] The presence of neutrophils within the cyst could be considered an atypical finding, best explained by inflammation secondary to the lancing procedure. However, a few inflammatory cells are reported in these cysts in human beings.[10] Traumatically induced cyst was considered unlikely because of the stalk and the congenital nature in this calf. Dorsal pharyngeal cysts are considered to be remnants of the Rathke pouch, which grows dorsally to form the craniopharyngeal duct, which in turn develops into the pars intermedia and the pars distalis of the pituitary gland.[2] Branchial cysts are described in human medical literature, and are formed by incomplete closure of the first or second branchial clefts. These types of cysts are lateral of midline and often form an external sinus.[10,12]

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