Endoscopic Removal of a Nasal *Cuterebra* Larva From a Puppy

Jill L. Yates, DVM  
Shannon T. Stroup, DVM, MS, DACVIM  
Louisiana Veterinary Referral Center  
Mandeville, Louisiana

**Abstract:** Cuterebriasis in small animals is caused by infestation by, and internal migration of, a larva of the *Cuterebra* fly. This article presents a case of nasal cuterebriasis in a puppy seen at the Louisiana Veterinary Referral Center and reviews the clinical signs and diagnosis of, and treatment options for, *Cuterebra* infestations. It also describes an unusual treatment plan to successfully remove the larva.

**Case Presentation**

**History**

A 13-week-old, 10.5-kg, male intact Siberian husky presented for evaluation of right-sided epistaxis of 2 days’ duration. There was no known history of trauma. The nasal discharge began as a blood-tinged mucoid secretion but rapidly progressed to profuse bleeding and sneezing of blood clots. The referring veterinarian had begun treatment with amoxicillin–clavulanic acid (24 mg/kg PO bid) and diphenhydramine (2 mg/kg PO bid). No response to this treatment was seen; therefore, the patient was referred to the Louisiana Veterinary Referral Center.

**Diagnosis**

On presentation to the Louisiana Veterinary Referral Center, the patient was bright, alert, and very responsive, with normal vital parameters. There was no evidence of petechiation on the mucous membranes or skin. The puppy’s nose did not appear painful, and no deformities or fractures of the nasal bones or skull were palpated. There was a slight bloody discharge from the right nostril. The left nostril appeared normal. The right mandibular lymph node was approximately double the size of the left mandibular lymph node. There was no evidence of a heart murmur or arrhythmia, and the lung sounds were normal. Blood work and possible rhinoscopy were recommended, and the owners agreed to a workup. **TABLE 1** presents diagnostic differentials for epistaxis in dogs.

Blood pressure measurement is an important diagnostic test for patients with epistaxis; however, it was not performed in this case because of the rarity of hypertension in puppies and the higher likelihood of coagulopathy or foreign body.

A serum biochemistry profile, complete blood count (CBC), prothrombin time (PT), activated partial thromboplastin time (APTT), and buccal mucosal bleeding time (BMBT) were obtained. The CBC revealed a mild anemia with a hematocrit of 31% (reference range [RR]: 32% to 55%), red blood cell (RBC) count of $3.90 \times 10^{6}/\mu L$ (RR: $4.70 \times 10^{6}$ to $8.50 \times 10^{6}/\mu L$), and an increased mean corpuscular volume (MCV) of 81.7 $\mu L$ (RR: 60 to 77 $\mu L$). Although puppies tend to have lower RBC counts than adults, by 13 weeks of age, most have normal hemograms, so this value was considered slightly low. A reticulocyte count was not conducted; however, the high MCV was suggestive of regeneration, which would be expected with the epistaxis noted. The clotting profile was normal, with a PT of 14 seconds (RR: 11 to 17 seconds) and an APTT of 96 seconds (RR: 72 to 102 seconds). The BMBT was normal at 1 minute 15 seconds (RR: <4 minutes). All values on the serum biochemistry profile were within acceptable limits for a puppy this age.

After a coagulopathy was ruled out, rhinoscopy was performed. An intravenous catheter was placed in the puppy’s left cephalic vein, and anesthesia was induced with propofol (5 mg/kg IV). The puppy was intubated and maintained under isoflurane. The right nasal passage was examined with a simple otoscope because many rostral nasal foreign bodies can be identified and removed this way, negating the need for more extensive procedures and expense. However, this procedure was unrewarding due to the amount of bleeding. The oropharynx was then packed with a laparotomy sponge, and warm saline was flushed through the right nostril while the left nostril was occluded, in hope of flushing a foreign body into the nasopharynx for extraction. This step was repeated on the opposite side. The laparotomy sponge was removed and examined, with only blood clots found. A new laparotomy sponge was placed in the oropharynx, and the puppy was administered buprenorphine (0.015 mg/kg IV) and diazepam (0.2 mg/kg IV) in preparation for a full rhinoscopy.

A 3.2-mm flexible bronchoscope was retroflexed into the caudal nasopharynx, which appeared normal. A 2.7-mm 30° rigid scope was then passed into the right ventral nasal meatus. After
Endoscopic Removal of a Nasal Cuterebra Larva From a Puppy

prolonged exploration of the nasal passage, a foreign object was identified just rostral to the nasopharynx, along the medial aspect of the right nasal passage, presumably near the septum. Because it had a circular array of regularly spaced black spines (FIGURE 1), it was initially thought to be plant material, but when it exhibited a periodic pulsing in and out of the nasal mucosa (VIDEO 1), it was recognized as likely to be a *Cuterebra* larva burrowed into the turbinate. Multiple attempts to extract the larva with endoscopic forceps failed, presumably for two reasons: (1) the larva was burrowed perpendicular to the rigid scope; therefore, the forceps could not be angled directly to grasp it well, and (2) as soon as the larva was touched, it retracted into its burrow. To address these issues, the rigid scope was replaced with the flexible scope, which allowed an end-on approach to the parasite, and 3 mL of lidocaine was flushed through the scope’s port to relax and paralyze the larva for easier extraction. After 5 minutes, the lidocaine had taken effect, and the larva was notably more relaxed and protruding from its burrow (FIGURE 2). This finally allowed it to be grasped and successfully removed (VIDEO 2 and FIGURE 3). Because the multiple failed attempts to retrieve the larva could have punctured its cuticle, initiating an anaphylactic reaction, the puppy was administered diphenhydramine HCL (1 mg/kg IM) and dexamethasone sodium phosphate (0.1 mg/kg IV).

The puppy recovered without any complications from the anesthetic procedure and was sent home the same night on diphenhydramine (2 mg/kg PO bid for 2 days) and amoxicillin–clavulanic acid (24 mg/kg PO bid for 1 week).

During a 5-day follow-up telephone call, the owners reported that the epistaxis had subsided but that the patient was having episodes of reverse sneezing; otherwise, the patient was a normal, active puppy. Due to the amount of inflammation that was present initially and presumably aggravated by the scope, an antiinflammatory was warranted. The puppy was prescribed carprofen (2 mg/kg PO bid for 4 days), which relieved all residual signs.

Cuterebriasis

Pathophysiology

*Cuterebra* spp are nonbiting, oviparous, bumblebee–like flies of North America. Females lay their eggs around the entrances to burrows or nests of small mammals, and when a potential host passes by, its body heat triggers the larvae to hatch instantly and attach to the host to begin migration. The natural hosts of *Cuterebra* spp include rabbits and rodents, but the larvae can also infect atypical hosts, such as dogs, cats, raccoons, ferrets, and humans, in which they undergo aberrant migration.1–14

Once a *Cuterebra* larva is on a host, it travels to a preferred site of penetration, usually the mouth, nares, or eyes, but occasionally wounds or the anal mucosa.1,4,7,15,16 In a natural host, the first instar larva penetrates the nasopharyngeal or tracheal mucosa and migrates through the pleural and peritoneal spaces until it reaches the subcutaneous tissues. Once in the dermis, the larva molts

---

**Table 1. Diagnostic Differentials for Epistaxis in Young and Older Dogs**

<table>
<thead>
<tr>
<th>Diagnostic Differentials</th>
<th>Young</th>
<th>Old</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coagulopathies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inherited (von Willebrand's disease, factor VIII deficiency)</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Acquired (Vitamin K deficiency, disseminated coagulopathy, immune-mediated coagulopathy)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Infectious Rhinitis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mycotic (aspergillosis, cryptococcosis)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Viral</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Parasitic (Capillaria, Leishmania, Linguatula, Cuterebra spp)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign body</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Acute trauma</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Thrombocytopenia (tick-borne disease)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Vasculitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polycythemia</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Paranasal or nasal tumor</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Hyperviscosity syndrome</td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

**Figure 1.** A *Cuterebra* larva in situ in the nasal mucosa of a puppy. Note the white body of the larva with a circular array of black spines. End plates are visible in the center (white arrows).
through its second and third instar stages. Local reaction to the parasite creates a “warble,” a firm swelling in the skin with an orifice at its apex through which the larva acquires oxygen. After full maturation, the third instar emerges from the skin, drops to the ground, and pupates in the soil. This process of development within the host lasts 3 to 5 weeks; infestation and development usually occur in the months of July through October.2,5,6,8–10,13,15,17,18

Clinical Signs
Clinical signs depend on the location to which the larva ultimately migrates. Typically, veterinary patients present with cutaneous infestations. However, many cases of aberrant migration have been observed, with reports of Cuterebra larvae found in the nasal passages, pharynx, trachea, thorax, eyes, and central nervous system.1–7,12,14–18 With cutaneous infestations, the larva is usually discovered in a warble in the dermis of the neck, back, or face.1,3,9,10 If the larva is in the respiratory tract, patients may present with nasal discharge, facial swelling, sneezing, stridor, stertor, dyspnea, or pawing at the face and head.2,5,6,9,11 Some animals present with neurologic signs, presumably because the larva penetrates the nasal mucosa and migrates through the cribriform plate into the brain. These cases almost always have respiratory signs that precede the neurologic signs by 1 to 2 weeks. Larvae may also enter the central nervous system hematogenously or via direct entry through the middle ear.3,5,9,11,13,18–20

There are theories that feline nonsuppurative meningoencephalitis, or feline ischemic encephalopathy (FIE), is associated with Cuterebra larval migration through the brain. FIE results in cerebral infarction and neurologic signs in cats of any breed or age and is most commonly observed in the summer months. A few cats presumed to have FIE had Cuterebra larvae identified in either the brain parenchyma, spinal cord, or skin; those that did not have obvious Cuterebra larvae did have lesions consistent with parasitic migration in central nervous tissue.1,3 FIE is generally considered an idiopathic disease, but the similarities in clinical signs, identification of Cuterebra larvae in some cats, and occurrence in the summer suggest that it may be the result of cuterebrasis.3,5,18

Diagnosis
Diagnosis of cuterebrasis can be as easy as visualizing the larva in the subcutaneous tissue. When a patient presents in respiratory distress or has clinical signs of upper airway disease, endoscopy is likely the most beneficial diagnostic tool because it may enable visualization of the warble hole and possibly the Cuterebra larva itself.2,5,7 Without rhinoscopy, the Cuterebra larva in this puppy could not have been identified and successfully removed. There is one other case report of a cat with intratracheal cuterebrasis, in which endoscopy was used to visualize and assist in surgical removal of a Cuterebra larva.2 The presence of eosinophilia on a CBC may indicate a parasitic infection and should move cuterebrasis higher up the differential diagnosis. Magnetic resonance imaging and computed tomography may be other tools to consider in the diagnosis of cuterebrasis, especially in neurologic cases and cases in which the larva is not seen during endoscopy.

Treatment
The treatment of choice is removal of the larva, taking care not to crush or puncture it. There are reports of anaphylactic reactions occurring secondary to larval tissue damage or death, presumably from an enhanced response to the release of parasitic proteases that stimulate eosinophilic and immunoglobulin E activity.1,2,5,6,9,11,13,16,18 The dog in this report was treated with diphenhydramine and dexamethasone sodium phosphate after one attempt at removal because of concern that the endoscopic forceps had torn the larval cuticle.

For cutaneous cuterebrasis, injecting the larva or the area just beneath it with lidocaine has also been recommended. This
Endoscopic Removal of a Nasal Cuterebra Larva From a Puppy

**Key Facts**

- Cuterebriasis is caused by a larva of the *Cuterebra* fly.
- Development within a typical host takes from 3 to 5 weeks and usually occurs between July and October.
- Typically, veterinary patients present with cutaneous infestations; however, many cases of aberrant migration have been observed.
- Local reaction to the parasite creates a firm swelling in the skin called a warble.
- With respiratory tract involvement, clinical signs may be related to respiratory distress or upper respiratory disease.
- Endoscopy is likely the most beneficial diagnostic tool when there is evidence of respiratory tract infestation.
- Anaphylactic reactions occur secondary to larval tissue damage or death.
- Injecting the larva with lidocaine is recommended to cause relaxation.
- Ivermectin can be administered at a dose of 0.1 to 0.3 mg/kg SC or PO to kill larvae that cannot be removed.

**Conclusion**

Intranasal cuterebriasis was diagnosed in a puppy with a 2-day history of unilateral epistaxis. With rhinoscopy, the larva was visualized and successfully retrieved. The epistaxis resolved almost immediately, and after a short course of antiinflammatory medication, reverse sneezing subsided. Cuterebriasis should be considered in cases with acute onset of unilateral epistaxis, especially those occurring in the late summer and early fall. This is the first report of a *Cuterebra* larva being successfully diagnosed and removed with endoscopy and a lidocaine bath.

**References**

Quiz

1. How long is the development of a *Cuterebra* larva within a typical host?
   a. 2 weeks
   b. 3 to 5 weeks
   c. 6 to 8 weeks
   d. 3 to 5 months

2. *Cuterebriasis* is most common during which months?
   a. January through April
   b. April through July
   c. July through October
   d. October through January

3. The natural host(s) of *Cuterebra* spp is/are
   a. rabbits and rodents.
   b. dogs and cats.
   c. deer.
   d. raccoons and opossums.

4. What stimulates a *Cuterebra* larva to hatch from its egg?
   a. heat in the environment
   b. rain
   c. heat from the body of the host
   d. ingestion by the host

5. The most common clinical presentation of cuterebriasis in veterinary patients is
   a. neurologic disease.
   b. cutaneous lesions.
   c. nasal disease.
   d. ocular disease.

6. Cuterebriasis may cause which abnormality on baseline blood work?
   a. eosinophilia
   b. monocytes
   c. neutropenia
   d. anemia

7. When cuterebriasis involves the respiratory tract, the best diagnostic tool to identify the problem is likely to be
   a. thoracic radiography.
   b. computed tomography.
   c. endoscopy.
   d. skull and neck radiography.

8. *Cuterebra* proteases can stimulate a(n) _______ anaphylactic reaction.
   a. neutrophilic and immunoglobulin E
   b. eosinophilic and immunoglobulin G
   c. eosinophilic and immunoglobulin E
   d. neutrophilic and immunoglobulin G

9. _______ almost always precede the development of neurologic signs of cuterebriasis.
   a. Respiratory signs
   b. Cutaneous lesions
   c. Ocular signs
   d. Gastrointestinal signs

10. When removal of a *Cuterebra* larva is not possible, what is the treatment of choice to kill the parasite?
    a. prednisone
    b. antibiotics
    c. fenbendazole
    d. ivermectin