Prevalence, clinical features, and causes of epistaxis in dogs: 176 cases (1996–2001)

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Objective—To determine prevalence, clinical features, and causes of epistaxis in dogs.

Design—Retrospective case series.

Animals—176 dogs with epistaxis.

Procedures—Medical records were reviewed for information related to signalment, clinical features, diagnosis, and outcome.

Results—132 (75%) dogs were initially examined by the hospital’s emergency service; prevalence of epistaxis was 0.3%. Dogs with epistaxis were more likely to be old (≥ 6 years), male, and large (≥ 26 kg [58.5 lb]) than were dogs in a reference population. In 109 (62%) dogs with epistaxis, an underlying cause was identified; 115 underlying disorders were identified, with 90 classified as local and 25 classified as systemic. Local causes of epistaxis include nasal neoplasia (n = 35), trauma (33), idiopathic rhinitis (20), and periapical abscess (2). Systemic causes included thrombocytopenia (12), thrombocytopenia (7), coagulopathy (3), hypertension (2), and vasculitis (1). Dogs with local causes were more likely to have unilateral than bilateral epistaxis, but 11 of 21 (52%) dogs with systemic disorders also had unilateral epistaxis. Dogs with systemic disorders were more likely to have clinical signs of systemic disease. Duration of epistaxis (acute vs chronic), severity, and duration of hospitalization were similar for dogs with local versus systemic disorders.

Conclusions and Clinical Relevance—Results suggested that epistaxis was a common disorder in dogs and frequently regarded as an emergency. Local causes of epistaxis were predominant, and clinical features traditionally thought to be helpful in distinguishing local versus systemic causes could not be reliably used for this purpose. (J Am Vet Med Assoc 2007;231:1843–1850)

In people, epistaxis is a common ailment with potentially serious consequences. The prevalence of and risk factors for epistaxis in people are well described, with an estimated 60% of the population expected to have at least 1 episode during their lifetime and 6% expected to seek medical attention for it. In the United States, epistaxis accounts for approximately 1 in 200 human emergency department visits and is the most common emergency disorder of the ear, nose, and throat requiring hospital admission. The incidence of epistaxis is greatest in young children, the elderly, and males and during the winter months. Although most episodes of epistaxis in people are self-limiting, death as a direct consequence of epistaxis has been reported.

Causes of epistaxis in humans are also well described and are traditionally categorized into local and systemic. Local etiologies include disorders localized to the nasal cavity or paranasal sinuses, such as direct trauma; rhinitis secondary to upper respiratory tract infection, allergies, or mycotic infection; neoplasia; and irritating topical drugs and inhalants. Systemic etiologies include bleeding disorders (eg, hereditary and acquired disorders of platelets, coagulopathies, and vascular diseases), systemic inflammatory diseases (eg, Wegener granulomatosis and sarcoidosis), and hypertension. Nevertheless, although numerous etiologies have been described, a specific primary cause may not be identified in up to 80% to 90% of cases of epistaxis, with such cases referred to as spontaneous or idiopathic epistaxis.

In contrast with the situation for people, almost no epidemiologic data are available regarding epistaxis in dogs. Although numerous case reports and several reviews have described diseases associated with epistaxis in dogs, the frequency and severity of epistaxis in dogs, prevalence of various underlying causes, and outcome of dogs examined because of epistaxis have not been well described. To our knowledge, only a single case series involving dogs with epistaxis has been published. That series involved 35 dogs examined because of epistaxis or signs referable to nasal disease in combination with a history of epistaxis.

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**Abbreviations**

<table>
<thead>
<tr>
<th>OR</th>
<th>Odds ratio</th>
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<tr>
<td>CI</td>
<td>Confidence interval</td>
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<tr>
<td>IMT</td>
<td>Immune-mediated thrombocytopenia</td>
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<tr>
<td>DIC</td>
<td>Disseminated intravascular coagulation</td>
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<td>vWD</td>
<td>von Willebrand’s disease</td>
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<tr>
<td>NSAID</td>
<td>Nonsteroidal anti-inflammatory drug</td>
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Given the limited amount of published information on epistaxis in dogs, the purposes of the study reported here were to determine the prevalence, clinical features, causes, and severity of epistaxis in dogs; identify outcome of dogs examined because of epistaxis; and establish risk factors associated with the major causes of epistaxis in dogs.

Criteria for Selection of Cases

The medical records database at the University of Pennsylvania School of Veterinary Medicine was searched for records of dogs examined between January 1996 and December 2001 for which a code for epistaxis, nasal hemorrhage, or nasal bleeding had been entered in the record. Dogs were included in the study if epistaxis was documented to be a main initial complaint. For comparison purposes, a reference population was obtained by randomly selecting, for each dog with epistaxis, 2 dogs admitted to the hospital on the same day as the dog with epistaxis. Dogs in which epistaxis or nasal disease had been diagnosed were excluded from the reference population.

Procedures

Medical records review—Data retrieved from the medical records of dogs with epistaxis included the hospital service that initially examined the dog; date of admission; signalment; character, frequency, and duration of epistaxis and other signs of nasal disease; whether there was any history of trauma, drug administration, concurrent diseases, or systemic abnormalities (eg, lethargy, inappetence, weight loss, or bleeding at extranasal sites); physical examination findings; results of diagnostic testing; diagnosis; treatment; change in PCV and serum total protein concentration over time; and, when known, outcome. For consistency of interpretation, a single board-certified radiologist (AM) reviewed all available nasal radiographs and computed tomographic images. Data collected from medical records of dogs in the reference population included date of admission, age, sex, breed, and body weight.

On the basis of information from the medical records and the review of diagnostic images, the underlying etiology for dogs with epistaxis was characterized as local (eg, nasal neoplasia, trauma, idiopathic rhinitis, or periapical abscess) or systemic (eg, severe thrombocytopenia, thrombocytopenia, coagulopathy, hypertension, or vasculitis). Nasal neoplasia was diagnosed if results of histologic examination of nasal biopsy specimens or computed tomography of the nasal cavity were consistent with nasal neoplasm. Trauma-related epistaxis was diagnosed if there was a history of trauma or if new lacerations, abrasions, or fractures were documented. Idiopathic rhinitis was diagnosed if histologic examination of nasal biopsy specimens revealed only nonspecific inflammatory changes (ie, lymphoplasmacytic, eosinophilic, or neutrophilic inflammation), and physical examination findings; clinicopathologic data; and results of nasal diagnostic imaging (radiography or computed tomography). Rhinoscopy, and Aspergillus serology were not suggestive of an alternative diagnosis. Periapical abscess was diagnosed on the basis of results of nasal diagnostic imaging and resolution of epistaxis following dental extraction and appropriate antimicrobial treatment.

Severe thrombocytopenia was diagnosed if the platelet count was < 30,000 platelets/μL. Thrombocytopenia was diagnosed if buccal mucosal bleeding time was > 4 minutes or if results of platelet aggregation studies were abnormal. Coagulopathy was diagnosed if prothrombin time or partial thromboplastin time was prolonged by > 50%. Hypertension was diagnosed if systolic blood pressure was > 180 mm Hg. Vasculitis was diagnosed if results of histologic examination of nasal biopsy specimens, physical examination, and clinicopathologic testing were compatible. Mycotic rhinitis was diagnosed if at least 2 of the following 3 criteria were fulfilled: fungal hyphae visible during histologic or cytologic examination of nasal specimens, characteristic radiographic or computed tomographic abnormalities, or plaques visible at rhinoscopy. The underlying cause was recorded as unknown for dogs that did not fulfill any of these diagnostic criteria.

When possible, chronicity and severity of the epistaxis were classified. Epistaxis was classified as acute if it had been present for < 30 days or if had been present for ≥ 30 days but with only 1 or 2 episodes occurring during this period. Epistaxis was classified as chronic if it had been present for ≥ 30 days with ≥ 3 episodes. Epistaxis was classified as severe if nasal bleeding was described as profuse and initial PCV was < 25%, PCV decreased by > 10% while the dog was hospitalized, or blood products were administered because of blood loss attributed to epistaxis. Epistaxis was classified as mild to moderate if the criteria for severe epistaxis were not met.

Statistical analysis—Because data for most variables were not normally distributed, the median and 5th and 95th percentiles are reported. Logistic regression was used to identify risk factors potentially associated with epistaxis; ORs and 95% CIs were calculated for factors significantly (P ≤ 0.05) associated with epistaxis. Analyses included dogs in which a definitive diagnosis of a local or systemic cause of epistaxis had been identified and specific diagnostic categories with a minimum of 5 dogs. Age was categorized as young (dogs < 6 years old) or old (dogs ≥ 6 years old). Breed was not included in the analysis because of the large number of breeds and, for most breeds, the small number of dogs of each breed. However, body size was categorized as small to medium (dogs weighing < 26 kg [58.5 lb]) or large (dogs weighing ≥ 26 kg). Time of year when the dog was examined was classified as winter (December, January, or February), spring (March, April, or May), summer (June, July, or August), or fall (September, October, or November). Results of clinicopathologic testing and physical examination findings (ie, rectal temperature, pulse rate, and respiratory rate) were classified as low, normal, or high on the basis of hospital laboratory reference ranges and published reference values, respectively. Duration of hospitalization was classified as short (< 2 days) or long (≥ 2 days). The χ² test was used to compare age, sex, and size distributions of dogs with epistaxis with distribu-
tions for the reference population. Analyses were performed with standard software. For all analyses, values of P ≤ 0.05 were considered significant.

Results

A total of 176 dogs with epistaxis met the criteria for inclusion in the study. The reference population consisted of 352 dogs examined for other reasons.

Etiology—In 109 of the 176 (62%) dogs with epistaxis, an underlying cause was identified; the underlying cause was not identified and was classified as unknown in the remaining 67 (38%) dogs. Six of the 109 dogs in which an underlying cause was identified were found to have 2 disorders that potentially could have caused or contributed to the epistaxis. Therefore, a total of 115 underlying disorders were identified. Of these, 90 (78%) were classified as local and 25 (22%) were classified as systemic. Local causes included nasal neoplasia (35 [30%]), trauma (33 [29%]), idiopathic rhinitis (20 [17%]), and periapical abscesses (2 [2%]). Two of the dogs with trauma and 2 of the dogs with idiopathic rhinitis also had thrombocytopathia. Systemic causes of epistaxis included severe thrombocytopenia (12 [10%]), thrombocytopathia (7 [6%]), coagulopathy (3 [3%]), hypertension (2 [2%]), and vasculitis (1 [1%]). One dog with severe thrombocytopathia and 1 dog with hypertension also had coagulopathy. For 64 of the 67 dogs in which an underlying cause was not identified, the inability to identify an underlying cause was most likely a result of incomplete diagnostic testing. However, in the remaining 3 dogs, a cause could not be identified despite extensive diagnostic testing, including hemostatic function tests, diagnostic imaging, and histologic examination of nasal biopsy specimens. The 35 dogs with nasal neoplasia included 21 with epithelial tumors (9 with carcinomas, 7 with adenocarcinomas, 4 with squamous cell carcinomas, and 1 with an adenoma), 11 with mesenchymal tumors (3 with chondrosarcomas, 2 with hemangiosarcomas, 2 with osteosarcomas, 1 with an angiosarcoma, 1 with a melanoma, 1 with an olfactory neuroblastoma, and 1 with a sarcoma), 1 with lymphosarcoma, and 2 with tumors of unknown type (results of histologic examination were not available). Types of trauma in the 33 dogs with trauma-related epistaxis included automobile trauma (n = 22), direct blows to the head (5), falls from a height (2), dog attack (1), and unknown (3). Histologic classification in the 20 dogs with idiopathic rhinitis included lymphoplasmacytic rhinitis (n = 16), predominantly eosinophilic rhinitis (2), and predominantly neutrophilic rhinitis (2). Nasal polyps were also identified in 1 dog with eosinophilic rhinitis and 1 dog with neutrophilic rhinitis. Both of the dogs with a periapical abscess were examined because of acute epistaxis without any other nasal tract signs. In one of these dogs, the epistaxis was severe enough to require a blood transfusion. Both dogs underwent extensive diagnostic testing to rule out bleeding disorders and other causes of nasal disease, and in both dogs, the epistaxis resolved following dental extraction and oronasal fistula repair without recurrence during the subsequent 5 to 9 months.

The 12 dogs with severe thrombocytopenia included 9 dogs with idiopathic IMT, 1 dog with metastatic neoplasia and DIC, and 2 dogs in which the cause of thrombocytopenia was not determined. The 7 dogs with thrombocytopathia included 3 dogs with WVD (1 of which also had suspected aspirin-induced thrombocytopathia), 2 dogs with suspected aspirin-induced thrombocytopathia, 1 dog with severe hyperglobulinemia thought to be secondary to ehrlichiosis, and 1 dog in which the cause of thrombocytopathia was not determined. The 3 dogs with coagulopathies included 1 dog with multiple myeloma, 1 dog with metastatic carcinoma, and 1 dog with metastatic neoplasia of unknown type; 2 of these dogs fulfilled the criteria for a diagnosis of DIC. The 2 dogs with systemic hypertension included 1 dog with protein-losing nephropathy (the underlying cause was not identified) and 1 dog with metastatic carcinoma. Although an infectious etiology was suspected, no underlying cause was found for the dog with systemic vasculitis despite extensive diagnostic testing, including thoracic radiography and nasal imaging; hemostatic function tests; rhinoscopy; and serologic assessment of acute and convalescent samples for evidence of infection with Rickettsia rickettsii, Ehrlichia canis, and Borrelia burgdorferi. This dog was examined because of acute severe epistaxis secondary to neutrophilic rhinitis and vasculitis, thrombocytopathia (63 × 10^9 platelets/µL), and splenomegaly that resolved following treatment with enrofloxacin and doxycycline.

The epistaxis recurred almost 2 years later, at which time chronic lymphocytic leukemia was diagnosed.

Prevalence—Overall, 132 of the 176 (75%) dogs with epistaxis were initially examined by the emergency service at the University of Pennsylvania School of Veterinary Medicine, 33 (19%) were initially examined by the internal medicine service, 3 (2%) were initially examined by the medical genetics service, 1 (1%) was initially examined by the dentistry service, and 1 (1%) was initially examined by the dermatology service. During the 6-year study period, the emergency service examined 44,409 dogs. Thus, the prevalence of epistaxis was 0.3% (132/44,409).

Forty-five (26%) dogs were examined during the winter, 40 (23%) were examined during the spring, 56 (32%) were examined during the summer, and 35 (20%) were examined during the fall. The distribution of time of year when dogs were examined did not differ significantly among dogs with local causes of epistaxis, among dogs with systemic causes of epistaxis, or among dogs with any of the specific underlying causes that were identified. Eleven of the 20 dogs with idiopathic rhinitis were examined during the summer, but they were not significantly (OR, 4.6; 95% CI, 1.0 to 22.3; P = 0.06) more likely to be examined during the summer than during other times of the year.

Signalment—Median age at the time of examination for dogs with epistaxis was 7.6 years (5th percentile, 0.5 years; 95th percentile, 14.1 years). One hundred seven (61%) dogs were male (53 castrated and 54 sexually intact), and 69 (39%) were female (54 spayed and 15 sexually intact). Forty-seven (27%) dogs were of mixed breeding. The remaining dogs represented 46
breeds, with the most common breeds being Golden Retriever (13 [7%]); German Shepherd Dog (9 [5%]); Rottweiler (8 [5%]); Cocker Spaniel (7 [4%]); Boxer, Siberian Husky, and Labrador Retriever (6 [3%] each); and Airedale Terrier, American Pit Bull Terrier, English Springer Spaniel, and Standard Poodle (5 [3%] each). Median body weight was 28 kg (5th percentile, 6.6 kg [14.5 lb]; 95th percentile, 51.7 kg [113.7 lb]).

Analysis of age, sex, and body weight data indicated that males were more likely (OR, 2.8; 95% CI, 1.0 to 8.0) than females to have epistaxis with a local cause. Young dogs were more likely (OR, 14; 95% CI, 5.5 to 35.3) to have trauma-related epistaxis than were old dogs, and old dogs were more likely (OR, 4.5; 95% CI, 1.5 to 13.6) to have nasal neoplasia than young dogs. Dogs with severe thrombocytopenia were more likely (OR, 5; 95% CI, 1.4 to 20) to be female than male. Small to medium dogs were more likely (OR, 2; 95% CI, 1.0 to 4.9) to have trauma-related epistaxis than large dogs, but large dogs were more likely (OR, 4; 95% CI, 1.4 to 13.2) to have idiopathic rhinitis than small to medium dogs.

When age, sex, and body weight for dogs with epistaxis were compared with values for dogs in the reference population, dogs with epistaxis were more likely to be old (OR, 2.8; 95% CI, 1.5 to 3.3), male (OR, 1.4; 95% CI, 1.0 to 2.1), and large (OR, 1.9; 95% CI, 1.3 to 2.7) than were dogs in the reference population.

Clinical features—Information on distribution of the epistaxis (ie, unilateral or bilateral) was provided for 137 dogs, of which 117 (75%) had unilateral epistaxis (59 with left-sided and 58 with right-sided epistaxis) and 40 (25%) had bilateral epistaxis. Dogs with a local cause of epistaxis were more likely (OR, 3.2; 95% CI, 1.1 to 9.7) to have unilateral than bilateral epistaxis (Table 1). Dogs with severe thrombocytopenia were more likely (OR, 4; 95% CI, 1.1 to 13.8) to have bilateral epistaxis than were dogs with other disorders.

### Table 1—Clinical features in 109 dogs with local (n = 90) and systemic (23) causes of epistaxis.

<table>
<thead>
<tr>
<th>Clinical feature</th>
<th>Local disorder</th>
<th>Systemic disorder</th>
</tr>
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<tbody>
<tr>
<td>Distribution*</td>
<td>Unilateral†</td>
<td>Bilateral‡</td>
</tr>
<tr>
<td>63/90 (76)</td>
<td>11/21 (52)</td>
<td>20/83 (24)</td>
</tr>
<tr>
<td>Duration*</td>
<td>Acute</td>
<td>Chronic</td>
</tr>
<tr>
<td>65/90 (73)</td>
<td>22/23 (96)</td>
<td>24/89 (27)</td>
</tr>
<tr>
<td>Severity</td>
<td>Mild or moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>79/90 (88)</td>
<td>17/23 (74)</td>
<td>11/90 (12)</td>
</tr>
<tr>
<td>Other signs of nasal disease</td>
<td>6/23 (26)</td>
<td>9/90 (71)</td>
</tr>
<tr>
<td>Concurrent neurologic disease†</td>
<td>4/90 (4)</td>
<td>9/23 (39)</td>
</tr>
<tr>
<td>Lethargy†</td>
<td>10/90 (10)</td>
<td>8/23 (35)</td>
</tr>
<tr>
<td>Inappetence†</td>
<td>9/90 (10)</td>
<td>7/23 (30)</td>
</tr>
<tr>
<td>Weight loss†</td>
<td>3/90 (3)</td>
<td>4/23 (17)</td>
</tr>
<tr>
<td>Bleeding at extranasal sites†</td>
<td>3/90 (3)</td>
<td>17/23 (74)</td>
</tr>
<tr>
<td>Euthanized</td>
<td>6/90 (7)</td>
<td>4/23 (17)</td>
</tr>
<tr>
<td>Hospitalized ≥ 2 days</td>
<td>57/90 (63)</td>
<td>17/23 (74)</td>
</tr>
</tbody>
</table>

Four dogs had both a local and a systemic disorder capable of causing epistaxis. Data are given as number of dogs with clinical feature per number examined (percentage). *Information on distribution and duration was not available for all dogs. †Values were significantly \( P \leq 0.05 \) different between groups.

Median duration of epistaxis prior to examination at the veterinary teaching hospital was 4 days (5th percentile, 0.04 days; 95th percentile, 261 days). One hundred thirty-three (76%) dogs had acute epistaxis, and 41 (24%) had chronic epistaxis (in the remaining 2 dogs, duration of epistaxis was not characterized). Duration of epistaxis (acute vs chronic) was not significantly associated with underlying cause (local vs systemic; Table 1). However, dogs with trauma-related epistaxis were more likely (OR, 12; 95% CI, 1.6 to 92.1) to have acute than chronic epistaxis, and dogs with nasal neoplasia were more likely (OR, 4.5; 95% CI, 2.0 to 10.0) to have chronic than acute epistaxis.

One hundred fifty-five (88%) dogs had mild to moderate epistaxis, and 21 (12%) had severe epistaxis. Six of the 21 dogs with severe epistaxis had an initial PCV < 25%, 10 had a > 10% decrease in PCV (range, 11% to 42% decrease), and 15 received transfusions (1 to 3 units of packed RBCs) while hospitalized. Epistaxis severity (mild to moderate vs severe) was not significantly associated with underlying cause of epistaxis (local vs systemic; Table 1). Dogs with idiopathic rhinitis were more likely (OR, 4; 95% CI, 1.3 to 12.0) to have severe epistaxis than were dogs without idiopathic rhinitis.

One hundred ten dogs had nasal tract abnormalities or a history of nasal tract abnormalities other than epistaxis, including sneezing (n = 82), nasal stertor (38), mucopurulent nasal discharge (35), gross anatomic abnormalities of the nose or frontal sinus (25), reduced nasal airflow (22), unilateral epiphora (16), signs of nasal pain (12), reduced ocular retropulsion (9), facial rubbing (6), and nasal planum depigmentation (4). Seventy-three of these dogs had an identified cause of epistaxis. Local causes of epistaxis accounted for 84% to 100% of dogs with each nasal tract abnormality, and nasal neoplasia accounted for 50% to 86% of dogs with each nasal tract abnormality. Because it was difficult to distinguish a lack of complete historical information from a true absence of these nasal tract abnormalities other than epistaxis, data for nasal tract abnormalities other than epistaxis were not analyzed.

Drug use prior to the onset of epistaxis was documented in 30 dogs. Drugs that had been administered included corticosteroids (n = 21), NSAIDs (18), antimicrobials (16), levothyroxine (8), and phenylpropanolamine (1). Drug use (yes vs no) did not differ significantly between dogs with local versus systemic causes of epistaxis. Dogs with thrombocytopenia were more likely (OR, 7.7; 95% CI, 1.6 to 37.7) to have received NSAIDs than were dogs with idiopathic rhinitis caused by other conditions.

Concurrent diseases were identified in 109 dogs. A total of 21 concurrent disorders were identified, with the most common (ie, disorders identified in ≥ 5 dogs) being dermatologic disease (n = 44), dental disease (30), musculoskeletal disease (24), neurologic disease (21), chronic gastrointestinal tract disease (7), and metastatic neoplasia (5). Proportions of dogs with these concurrent disorders did not differ significantly between dogs with local causes of epistaxis and dogs with systemic causes of epistaxis, except that neurologic disease was significantly more common in dogs with systemic causes of epistaxis than in dogs with local causes (Table 1). Dogs
with concurrent neurologic disease were more likely (OR, 2.8; 95% CI, 1.3 to 6.5) to have a systemic cause of epistaxis than were dogs without concurrent neurologic disease. All 4 dogs with a systemic cause of epistaxis and neurologic disease had severe thrombocytopenia (3 with thrombocytopenia secondary to IMT and 1 with thrombocytopenia of unknown cause). Dogs with idiopathic rhinitis were more likely (OR, 5.8; 95% CI, 2.2 to 15.4) to have dermatologic disease than were dogs without idiopathic rhinitis.

Clinical signs of systemic disease were reported in 72 dogs with epistaxis and included lethargy, (n = 38), inappetence (31), weight loss (10), and bleeding at extranasal sites unassociated with obvious trauma (37). Each of these abnormalities was more common in dogs with systemic causes of epistaxis than in dogs with local causes of epistaxis (Table 1). Dogs with lethargy were more likely (OR, 6.2; 95% CI, 2.0 to 19.3) to have a systemic cause of epistaxis than were dogs without lethargy. Dogs with inappetence were more likely (OR, 5.5; 95% CI, 1.7 to 17.8) to have a systemic cause of epistaxis than were dogs without inappetence. Dogs with a history of weight loss were more likely (OR, 8; 95% CI, 1.6 to 39.6) to have a systemic cause of epistaxis than were dogs without a history of weight loss. Dogs with bleeding at extranasal sites were more likely (OR, 22; 95% CI, 6.2 to 77.7) to have a systemic cause of epistaxis than were dogs without bleeding at extranasal sites. Dogs with severe thrombocytopenia were more likely (OR, 58; 95% CI, 7.2 to 471.8) to have bleeding at extranasal sites than were dogs without severe thrombocytopenia.

Information on rectal temperature, pulse rate, and respiratory rate at admission was available for 172 dogs. Median rectal temperature was 39°C (102.2°F; 5th percentile, 37.9°C [100.2°F]; 95th percentile, 39.9°C [104.0°F]), median pulse rate was 120 beats/min (5th percentile, 80 beats/min; 95th percentile, 180 beats/min), and median respiratory rate was 30 breaths/min (5th percentile, 16 breaths/min; 95th percentile, 64 breaths/min). There were no significant differences in rectal temperature, pulse rate, and respiratory rate at admission between dogs with local causes of epistaxis and dogs with systemic causes of epistaxis, or among dogs with any of the specific underlying causes of epistaxis that were identified.

Clinicopathologic abnormalities—Information on PCV at admission was available for 152 dogs; PCV ranged from 15% to 64% (median, 43%; 5th percentile, 24.6%; 95th percentile, 55%). Forty-one of the 152 (27%) dogs had a PCV < 36.9%, and 8 (5%) had a PCV < 25%. Four of the 8 dogs with a PCV < 25% had a local disorder causing epistaxis (3 had idiopathic rhinitis, and 1 had nasal neoplasia), and 3 had a systemic disorder (2 had thrombocytopenia, and 1 had coagulopathy); cause of epistaxis in the remaining dog was unknown.

Information on total protein concentration at admission was available for 143 dogs; concentration ranged from 3.4 to 13.8 g/dL (median, 7.2 g/dL; 5th percentile, 5.2 g/dL; 95th percentile, 9.1 g/dL). Twenty of the 143 (14%) dogs had a total protein concentration < 6.1 g/dL.

Information on WBC count was available for 119 dogs; WBC count ranged from 4.9 to 117 X 10³ WBCs/μL (median, 14.6 X 10³ WBCs/μL; 5th percentile, 7 X 10³ WBCs/μL; 95th percentile, 31.6 X 10³ WBCs/μL).

Information on platelet count was available for 119 dogs; platelet count ranged from 0.4 to 722 X 10³ platelets/μL (median, 259 X 10³ platelets/μL; 5th percentile, 13 X 10³ platelets/μL; 95th percentile, 595 X 10³ platelets/μL). Thirty-three of the 119 (28%) dogs had a platelet count < 175 X 10³ platelets/μL. There were no significant differences in PCV, total protein concentration, WBC count, or platelet count between dogs with a local cause of epistaxis and dogs with a systemic cause of epistaxis. Dogs with trauma-related epistaxis were more likely (OR, 1.7; 95% CI, 1.1 to 2.8) to have a high WBC count than were dogs with epistaxis caused by other disorders.

Outcome—Of the 176 dogs examined because of epistaxis, 159 (90%) were discharged, 16 (9%) were euthanized, and 1 died of traumatic injuries. Dogs that were euthanized included 3 dogs with nasal neoplasia, 3 with trauma-related epistaxis, 3 with severe thrombocytopenia, 1 with neoplasia-associated coagulopathy, and 6 with unknown causes of epistaxis. Two of the dogs with severe thrombocytopenia that were euthanized also had concurrent neurologic disease. For dogs that were discharged, duration of hospitalization ranged from 1 to 14 days (median, 2 days; 5th percentile, 1 day; 95th percentile, 6 days).

The number of dogs euthanized and duration of hospitalization did not differ between dogs with a local cause of epistaxis and dogs with a systemic cause. However, dogs with nasal neoplasia (OR, 2.8; 95% CI, 1.2 to 6.2), idiopathic rhinitis (OR, 2.6; 95% CI, 2.8 to 16.4), and nontrauma-related epistaxis (OR, 2.6; 95% CI, 1.2 to 5.8) were more likely to be hospitalized for ≥ 2 days than were dogs with epistaxis caused by other disorders.

Outcome was not significantly different between dogs with mild to moderate epistaxis and dogs with severe epistaxis. However, dogs with severe epistaxis were more likely (OR, 4.5; 95% CI, 1.5 to 14.1) to be hospitalized for ≥ 2 days than were dogs with mild to moderate epistaxis.

Discussion

Many dog owners and veterinarians consider epistaxis to be an emergency, as evidenced by the fact that 73% (132/176) of the dogs in the present study were initially examined by the emergency service. In addition, epistaxis was somewhat common at the study hospital, accounting for 0.3% of canine emergency visits during the 6-year study period. Interestingly, this was similar to the 0.46% prevalence of epistaxis for emergency department visits by people, in whom epistaxis is considered extremely common.1,2 In people, epistaxis is reported to be more common among males and older individuals.2,3 Similarly, in the present study, dogs with epistaxis were more likely to be old (ie, ≥ 6 years old), male, and large (ie, weighing ≥ 26 kg), compared with a reference population of dogs examined for other reasons. Although age and body weight data for dogs in the present study were in agreement with values reported previously,9 the proportion of male dogs was...
higher. In humans, low humidity, cold temperatures, and upper respiratory tract infections lead to a greater incidence of epistaxis during winter.\(^1^,\(^2\) In contrast, we did not find any significant association with season in the present study.

Despite the paucity of published data on epistaxis in dogs, it has been commonly suggested in the veterinary literature that epistaxis is most often a result of local disorders, unilateral and chronic (with the exception of trauma-related epistaxis), and is associated with other nasal tract signs.\(^3^,\(^4\) Epistaxis that is a result of a systemic disorder is said to be bilateral, acute, and less common. These clinical impressions have often been used to prioritize lists of potential differential diagnoses for dogs with epistaxis and, because of differences in the diagnostic testing involved in identifying local versus systemic causes of epistaxis, to formulate a diagnostic plan. Results of the present study confirmed that local causes of epistaxis were predominant (83% [90/109] of dogs and 78% [90/115] of disorders) and that epistaxis was more likely to be unilateral. Importantly, however, 11 of 21 (52%) dogs with systemic disorders had unilateral epistaxis, indicating that unilateral epistaxis was not pathognomonic for a local disorder. Also, although a previous study\(^9\) found that dogs with local causes of epistaxis were more likely to have chronic epistaxis, this was not the case in the present study, in which most dogs had acute epistaxis and the proportions of dogs with acute epistaxis did not differ between dogs with local versus systemic causes. Our conclusion would have been the same even if acute epistaxis had been defined as epistaxis of \(<\)2 weeks' duration. The lower proportion of dogs with nasal neoplasia and the inclusion of dogs with trauma-related epistaxis in the present study likely accounted for the difference in epistaxis duration between the present and previous\(^9\) studies, in that dogs with nasal neoplasia were more likely to have chronic epistaxis and dogs with trauma were more likely to have acute epistaxis. Given these results, it should not be assumed that dogs with unilateral epistaxis are unlikely to have a systemic disorder or that dogs with acute epistaxis are unlikely to have intranasal disease.

Results of the present and previous\(^9\) studies support the assertion that dogs with local causes of epistaxis may have other signs of nasal tract disease in addition to epistaxis. However, our data should be interpreted with caution because the information was collected retrospectively. Often it was impossible to determine whether nasal abnormalities were truly lacking or simply not evaluated, and it was possible that dogs with local causes of epistaxis were more thoroughly evaluated for nasal signs. Regardless, 9 of the 23 (39%) dogs with a systemic disorder in the present study were still reported to have other signs of nasal tract disease. All of these dogs were sneezing, except for 1 dog with mucopurulent nasal discharge. Unfortunately, it could not be determined whether the sneezing was related to the underlying cause of epistaxis or was an effect of epistaxis itself.

In the present study, dogs with systemic disorders were more likely to have clinical signs of systemic disease (lethargy, inappetence, weight loss, and bleeding at extranasal sites) and concurrent neurologic disease. It may seem unusual that even a small number of dogs with local causes of epistaxis reportedly had bleeding at an extranasal site. However, 2 of these dogs had concurrent thrombocytopenia, and others had melena most likely as a result of swallowed blood. Not surprisingly, only 4 (17%) dogs with a systemic cause of epistaxis lacked clinical signs of a systemic disorder. The association with concurrent neurologic disease, however, was unexpected. The suspected cause of seizures and CNS signs in these dogs was intracranial bleeding secondary to severe thrombocytopenia. However, intracranial bleeding was not confirmed in any of the dogs. In a previous study,\(^9\) the PCV was reported to be lower in dogs with systemic versus local causes of epistaxis, but no differences in PCV or other clinicopathologic data were found between groups in the present study.

Local disease processes that have previously been reported to cause epistaxis in dogs include nasal and paranasal neoplasia,\(^9^,\(^1^,\(^3^,\(^4^,\(^5\) mycotic rhinitis,\(^9^,\(^1^,\(^3^,\(^4,\(^6^,\(^7\) idiopathic rhinitis,\(^9^,\(^1^,\(^3^,\(^1^,\(^2\) parasitic rhinitis,\(^9^,\(^1^,\(^2\) nasal foreign body,\(^2^) periapical abscesses,\(^2^) and arteriovenous malformation.\(^2^) Nasal neoplasia and mycotic rhinitis have long been regarded as common causes of epistaxis in dogs,\(^9^,\(^6^,\(^1^,\(^2\) and results of the present study support the suggestion that nasal neoplasia is a predominant cause of epistaxis in dogs. This was not unexpected, given that neoplasia is a common cause of nasal disease in dogs,\(^2^,\(^2^) with epistaxis reported in up to 77% of cases.\(^9\) The findings that older dogs and dogs with chronic epistaxis were at greater risk for nasal neoplasia were also expected. However, it was unexpected that no dogs with mycotic rhinitis were identified. Consequently, the medical records database was searched to identify dogs in which mycotic rhinitis had been diagnosed during the 6-year study period. Only 8 dogs were identified, none of which were examined because of epistaxis. Although some of the dogs in which the underlying cause of epistaxis was not determined and, possibly, some of the dogs with idiopathic rhinitis may have had mycotic rhinitis, the most likely explanation for not identifying any dogs with mycotic rhinitis in the present study is low regional prevalence. Although epistaxis is a well-reported clinical feature of mycotic rhinitis,\(^9\) recent studies support the finding that the prevalence of mycotic rhinitis is low (<8%) among dogs with chronic nasal disease\(^2^,\(^2^) and epistaxis.\(^9\)

Trauma was a common cause of epistaxis in the present study, accounting for 33 of the 109 (30%) dogs with a defined cause of epistaxis. Although trauma is a logical and widely recognized cause of epistaxis,\(^3^,\(^4^,\(^1\) the authors have been unable to find any published original studies of trauma-related epistaxis in dogs. The common occurrence of trauma-related epistaxis in the present study most likely reflected the large emergency caseload and the demographic and socioeconomic factors of the population served. Although epistaxis was a major clinical sign, most of the dogs with trauma had clear evidence of trauma, such that identifying the cause of epistaxis was not a diagnostic challenge. Young dogs (<6 years old), dogs with acute epistaxis, and small to medium dogs (<26 kg) were all at greater risk for trauma-related epistaxis than were old dogs, dogs with
chronic epistaxis, and large dogs. These dogs were also more likely to have a high WBC count, possibly because of stress or more widespread tissue trauma. Duration of hospitalization was more likely to be < 2 days for dogs with trauma, reflecting the rapid resolution of epistaxis and lack of need for extensive diagnostic testing in most dogs examined because of trauma.

Historically, idiopathic rhinitis has not been recognized as a major cause of epistaxis, but it was the third most common cause of epistaxis in the present study. This finding was in agreement with results of a recent study, in which epistaxis was found to be common in dogs with idiopathic rhinitis. In the present study, dogs with idiopathic rhinitis were also found to be more likely to have severe epistaxis, compared with dogs with other causes of epistaxis. This fact, combined with the need for extensive diagnostic testing to exclude infectious and neoplastic causes of rhinitis, likely contributed to the long duration of hospitalization for these dogs. Dogs with idiopathic rhinitis were also more likely to have concurrent dermatologic disease. This was particularly interesting, given that allergic rhinitis is a well-described risk factor for epistaxis in people. Thus, although the pathogenesis of idiopathic rhinitis is poorly understood and likely to be multifactorial and complex, there may be an allergic role. Large dogs (≥ 26 kg) had an increased risk of idiopathic rhinitis in the present study, compared with small to medium dogs, which was in agreement with findings of a previous report.

Periapical abscess was the only other local cause of epistaxis diagnosed in the present study. This disorder commonly causes mucopurulent nasal discharge when an oronasal fistula develops, but epistaxis is also occasionally described. The acute onset and severity of epistaxis due to peripapical abscess described in the present study were unique. No cases of mycotic, parasitic, or foreign body rhinitis were identified in the present study despite extensive diagnostic testing in most dogs. The absence of these diagnoses may simply reflect their overall low prevalence, but we cannot exclude the possibility that some dogs with idiopathic rhinitis had undiagnosed infections or nasal foreign bodies.

Systemic disorders previously reported to cause epistaxis in dogs include hereditary and acquired bleeding disorders and various systemic infections that usually result in acquired bleeding disorders, but may also affect the integrity of the nasal mucosa and vasculature. Although infectious disease was the most common systemic cause of epistaxis in dogs in a previous report, the most common systemic diseases identified in the present study were idiopathic IMT, vWD, aspirin-associated thrombocytopathia, and neoplasia-associated coagulopathy. Severe thrombocytopenia was the most common systemic disease category associated with epistaxis, with 9 of the 12 dogs with thrombocytopenia having idiopathic IMT. Accordingly, risk factors identified for severe thrombocytopenia (females and bleeding at extranasal sites) were in agreement with those reported for IMT. Although thrombocytopenic dogs were more likely to have bilateral epistaxis than were dogs with other disorders, the prevalence of unilateral epistaxis among dogs with thrombocytopenia was similar to the prevalence of bilateral epistaxis. We expected dogs with severe thrombocytopenia to also have lower platelet counts and be at greater risk for concurrent neurologic disease, compared with dogs with other disorders. However, the small number of dogs with severe thrombocytopenia and the large number of dogs with platelet counts less than the lower reference limit limited our ability to detect differences.

Other systemic causes of epistaxis in the present study were uncommon. Of the 7 dogs with thrombocytopathia, 3 had vWD and 2 had aspirin-associated thrombocytopathia. However, it is possible that vWD was underdiagnosed, in that the von Willebrand's factor antigen concentration was not measured in 3 dogs with thrombocytopathia. Interestingly, 4 of the 7 dogs with thrombocytopathia had 2 or more disorders capable of causing epistaxis, suggesting that some dogs with thrombocytopathia may only develop epistaxis when another risk factor is present. All 3 dogs with coagulopathy in the present study had neoplasia-associated coagulopathy. The authors have been unable to find prior reports of epistaxis in dogs with non-nasal tumors, despite evidence that neoplasia-associated coagulopathy occurs in up to 56% of dogs with malignant disease. The low prevalence of infectious disease in the present study was most likely explained by the low prevalence of diseases such as ehrlichiosis and leishmaniasis in the study hospital's geographic area. Although Bartonella spp occur nationwide and have recently been implicated as a potential cause of epistaxis in dogs, we were unable to evaluate the role of this infectious agent because testing for Bartonella infection was not performed on any of the dogs in the study. Lastly, hypertension was identified in only 2 dogs in the present study, of which also had coagulopathy, and is not well documented as a cause of epistaxis in dogs or people. Although people with epistaxis commonly have a high blood pressure while in the hospital, this is thought to be anxiety related, rather than a direct cause of the epistaxis.

Findings of the present study suggested that epistaxis is a common clinical entity, at least in the population of dogs studied, and is predominantly associated with intranasal disease. Dogs with nasal neoplasia, trauma, and idiopathic rhinitis appeared to be most commonly affected, but sometimes a cause could not be identified despite extensive diagnostic testing. Clinical features traditionally thought to be helpful in distinguishing local versus systemic causes of epistaxis, such as bilateral versus unilateral nasal bleeding and duration of epistaxis, could not be reliably used for this purpose. In addition, sneezing could not be used as evidence for intranasal disease, as it also occurred in dogs with systemic causes of epistaxis. The short-term outcome of dogs with epistaxis appeared to be good, with 90% (159/176) of dogs discharged. The severity of epistaxis did not appear to affect the short-term outcome, but may have contributed to a longer duration of hospitalization. Interestingly, dogs at greatest risk for severe epistaxis included those with idiopathic rhinitis, a previously underreported cause of epistaxis in dogs.

References


