



Review Article

Epistaxis (nasal bleeding) in cows and buffaloes (an evidence-medicine based clinical review)

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ABSTRACT

Epistaxis is the term used for bleeding from the nostrils. It is common in several animals including cattle and buffaloes. Clinically several cases of epistaxis have been reported in the female and male cattle and buffaloes. Epistaxis causes severe blood loss, bradycardia, and multiple other hematological complications. It may be caused by various infectious and noninfectious reasons. Infectious reasons include bacterial and viral diseases, while non-infectious reasons may include heat stress, parturition stress, malnutrition and several other issues. Major epistaxis is observed in the summer season, while both young and adult animals are affected by it. Various case reports have been published. Epistaxis can be prevented by managing the factors that cause epistaxis in animals.

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Introduction

Epistaxis (*Nukseer phootna* in Urdu) refers to bleeding from one or both nostrils. In cattle and buffalo, it is usually an uncommon and relatively benign condition but occasionally could be life-threatening. It is not a disease *per se* but a manifestation of the following two types of causes:

- ❖ Local (intranasal) causes, and
- ❖ Extranasal (systemic) causes.

Local causes usually lead to unilateral epistaxis whereas systemic causes (e.g. coagulopathies, conditions causing thrombocytopenia, hypertension, hyperviscosity and thrombocytopathia) are mostly responsible for bilateral epistaxis (Gieger and Northrup, 2004). Determination of the cause of epistaxis is not possible in most cases and the treatment is, therefore, usually symptomatic. The line of treatment is similar in different animal species, although the etiology of epistaxis differs from different animal species.

Causes:

- 1) **Trauma** to the nose and face is one of the common causes of epistaxis in cattle and buffaloes (Areshkumar 2019).

- 2) **Thrombocytopenia** (low blood platelet count; normal platelet count in cattle is 100,000 to 800,000/ μ l) e.g. because of acute clinical bovine viral diarrhoea (Rebhun et al. 1989) babesiosis (Joshi et al. 2020) and bovine neonatal pancytopenia (Bastian et al. 2011). Thrombocytopenia may result from:
 - a. Platelet consumption (e.g. in septicemic conditions or disseminated intravascular coagulation; DIC for short),
 - b. Decreased production of platelets noticed usually in aplastic anemia or infiltration of bone marrow with neoplastic cells, myelosuppression (bone marrow suppression) because of anti-cancerous drugs, estrogens and phenylbutazone, etc. (Gieger and Northrup 2004).
 - c. Destruction of platelets caused by immune-mediated mechanisms (Areshkumar, 2019) e.g. in aspirin and other NSAIDs, trimethoprim-sulfa, penicillin and other antibiotics toxicity (Gieger and Northrup 2004).

- 3) **Coagulation disorders** like congenital or acquired defects involving blood vessels, blood platelets or coagulation proteins (Areshkumar 2019).
- 4) **Tumors in the nasal cavity** (Maji *et al.*, 2018) are often the cause of chronic and intermittent nasal bleeding (Gieger and Northrup 2004).
- 5) **Over-exertion** by draught animals, particularly in summer.
- 6) **Anthrax:** When anthrax bacillus is transmitted through ingestion in horses, it causes fever, dyspnea, colic, dysentery and appearance of bloody discharge from the natural openings of the body (e.g. nostrils, anus). In cattle and buffaloes, peracute anthrax causes appearance of bloody discharge from the nostrils, eyes, mouth and anus usually after death (Alam *et al.*, 2022). The appearance of frothy and bloody discharge from the natural openings including nostrils in cattle or buffaloes before death is rare.
- 7) **Plant poisoning:** Poisoning because of a variety of toxic plants sometimes causes epistaxis along with other signs. *Ferula communis* (Giant fennel; *kelkh* in Arabic) and sweet clover (*Melilotus officinalis* and other *Melilotus* spp.; *Sainjee* in Urdu) are the 2 coumarin-containing plants. Coumarins are competitive antagonists of vitamin K. By this action, they block the production of prothrombin and several other factors needed for the coagulation of blood thus resulting in a hemorrhagic disorder. Clinical signs of poisoning because of toxic chemotype of Giant fennel are those of a hemorrhagic syndrome and include epistaxis, malena (black tarry feces because of the presence of blood), increase in blood clotting time, shallow breathing, bleeding in mucous membranes, the subcutaneous tissues and body cavities and death.

Sweet clover poisoning is sometimes associated with epistaxis in cattle. Sweet clovers are species of the genus *Melilotus* known as *Sainjee* in the local Pakistani language. Three species of the genus *Melilotus* viz. *M. albus* (white flowers spp.), *M. officinalis*, and *M. indicus* (both species have yellow flowers) are grown as fodder crops. Sweet clover plant contains several chemical compounds, of which **coumarins** are the most important from the standpoint of cattle feeding. When the sweet clover forage is poorly conserved, the growth of molds (such as *Apergillus* and *Penicillium*) occurs in the forage and this moldy growth causes the formation of dimers of coumarin resulting in the production of dicoumarol which is a potent anticoagulant because it acts as a competitive antagonist of vitamin K. The antagonism of vitamin K by

dicoumarol prevents the production of prothrombin and some other coagulation factors ultimately leading to a bleeding disorder on consumption of moldy sweet clover silage over a period of several weeks. The clinical signs of sweet clover poisoning in cattle include lameness because of bleeding in muscles, epistaxis, reddish urine (because of hematuria), and formation of hematomas. Sudden death may occur because of massive internal bleeding. Diagnosis is based on the clinical manifestation of a bleeding disorder, history of sweet clover silage feeding, and increased clotting and prothrombin times (Ruiz *et al.* 2022).

Bracken fern (*Pteridium aquilinum*) is a common invasive plant species in the mountainous areas of Pakistan and many other countries. All parts of bracken fern are toxic owing to the presence of 3 toxic compounds viz. pruinose (a cyanogenic glucoside), ptachiloside (a carcinogen), and thiaminases. Clinical signs of acute and chronic bracken fern poisoning in ruminants are caused mainly by ptachiloside. This compound exerts a biological action on bone marrow that is like that of ionizing radiation (radiomimetic action) leading to a reduction in the production of platelets and neutrophils resulting in the appearance of 3 different clinical disorders viz. acute hemorrhagic syndrome, bovine enzootic hematuria and upper alimentary tract carcinomas. The acute hemorrhagic syndrome is characterized by hyperthermia, thrombocytopenia, severe weakness, anemia, epistaxis, hemorrhagic enteritis, hemoglobinuria, brisket edema, uncontrollable bleeding from skin punctures and death in 1-7 days. Animals exposed to low doses of bracken fern over a long period develop papillomatotic tumors in the urinary bladder, which causes chronic intermittent hematuria often with the passage of fluid blood or blood clots (bovine enzootic hematuria; Ruiz *et al.* 2022).

8) **Acute allergic reactions** are a rare cause of epistaxis in cattle and buffaloes.

9) **Nasal granuloma** caused by a blood fluke (*Schistosoma nasalis*) is a common disease of cattle aged 6 months to 4 years in the Indian subcontinent. Sometimes, it also occurs in sheep, goats, and dairy buffaloes. The fluke is found in the blood vessels of the nasal cavity where it produces nasal granuloma because of chronic inflammation. Fresh-water snails act as intermediate hosts. The important clinical signs include chronic mucopurulent nasal discharge, obstruction of nasal passage with the growth of the parasite, difficult respiration, bilateral epistaxis, snoring respiratory sounds, anemia, and the presence of nodules on the lateral wall of the nasal cavity. To diagnose *S. nasalis* infection, nasal washings are collected in a test tube, 10% KOH solution is added, and

the mixture is boiled for 3 minutes to dissolve the mucus. On cooling, this solution is centrifuged at 2000 RPM, the supernatant discarded and the smears prepared from the sediment examined under the low power of the microscope for characteristic boomerang (a curved stick which when thrown in a particular way, comes back to the person who threw it) shaped egg with a terminal spine and a fully developed miracidium inside the egg (Sharma et al. 2018; Satbige et al. 2018).

- 10) **Intranasal foreign bodies** (e.g. grass awns and wood splinters) cause damage and obstruction in the nasal cavity (Gieger and Northrup, 2004). Cattle affected with allergic rhinitis (summer snuffles) vigorously rub their nostrils and foreign bodies from the environment may be trapped in the nasal cavity (Peek et al. 2018) sometimes leading to epistaxis.
- 11) **Accidental poisoning due to anticoagulant containing rodenticides** (i.e. drugs used to kill rats, mice, porcupines, squirrels etc.) e.g. bromadiolone, chlorophacinone, difethialone, brodifacoum, warfarin, diphacinone and flocoumafen which inhibit the enzyme called vitamin K (1)-2,3 epoxide reductase. This enzyme is responsible for the synthesis of vitamin K and subsequently vitally important blood clotting factors II, VII, IX and X (Areshkumar 2019).
- 12) Ethylene glycol (an anti-freezing chemical) toxicity (Areshkumar 2019) is a rare cause of epistaxis.
- 13) **Snakebite:** The bite of hemotoxic snakes e.g. Russell's viper (*Vipera russelli*; *Korian waala saunp* in Punjabi; *Kurar* in Sindhi) and saw scaled viper (*Echis carinatus*; *Jalaibi saunp* or *Karoondia* or *Phissi* in Punjabi; *Lundi* or *Khappar* in Sindhi) is characterized by bleeding from the site of the bite, thrombocytopenia, prolonged blood clotting time, bilateral epistaxis, widespread petechial or ecchymotic hemorrhages in the visceral organs, in the muscles and subcutaneous tissue around the site of bite (Bhikane et al. 2020).
- 14) **Caudal vena cava thrombosis and metastatic pneumonia** is an acute highly fatal disease that develops as a secondary complication of ruminal lactic acidosis and rumenitis in adult cattle fed on high-grain rations. High grain feeding causes ruminal lactic acidosis that leads to rumenitis which allows penetration of bacteria (e.g. *Fusobacterium necrophorum*, *Trueperella pyogenes*, *E. Coli*, *Streptococcus* spp.) into the blood. In the liver, these bacteria produce abscesses which erode into caudal vena cava leading to the formation of a septic thrombus. Emboli break away from the thrombus, travel to the lungs or heart resulting in embolic pneumonia (metastatic pneumonia) and occasionally endocarditis. In the blood vessels of lungs, emboli may cause aneurisms (i.e. an abnormal bulge or ballooning in the wall of a blood vessel) which rupture leading to hemoptysis (i.e. coughing up blood from the lungs) and epistaxis (<https://www.bovinevetonline.com/news/veterinary-education/post-mortem-caudal-vena-cava-thrombosis>). Clinical signs include dyspnea, intermittent fever, melena, increased respiration rate, cough, pale mucous membranes, tachycardia, increased lung sounds, hemoptysis, bilateral epistaxis which is usually foamy and a very high death rate. Important postmortem findings include multiple abscesses throughout the liver, septic thrombus in the hepatic part of caudal vena cava, randomly distributed multiple abscesses in lungs and blood clots in mouth, nostrils, trachea and rumen (Schild et al. 2017).
- 15) **Fungal infections** (e.g. rhinosporidiosis, cryptococcosis, penicilliosis and aspergillosis; Gieger and Northrup 2004), **nematode parasitic infections** (e.g. microfilariosis; Rani et al. 2009; lungworm infestation; Vahedi and Salehi 2019), **leech infestation** (Gemedda et al. 2022), **bacterial & viral infections** (e.g. bovine viral diarrhea; Rebhun et al. 1989) and babesiosis (Joshi et al. 2020) are the uncommon causes of epistaxis in cattle and buffaloes. Rhinosporidiosis is an important fungal disease that causes granulomatous rhinitis characterized by progressively enlarging diffuse granulomas, inspiratory dyspnea, nasal pruritus, nasal discharge and epistaxis. Actinobacillosis of nasal cavity causes similar signs and is thus often confused with rhinosporidiosis and nasal tumors (Peek et al. 2018).
- 16) **Lymphosarcoma** is a bovine leukemia virus-associated firm progressively enlarging tumorous swelling that usually develops on facial, mandibular and parotid region and may be accompanied by epistaxis, hard enlargement of prescapular lymph node, lymphocytosis and an abundant number of pleomorphic lymphocytes in fine needle aspiration cytology (Jhambh et al. 2014).
- 17) **Bronchopneumonia and pulmonary abscess** may cause erosion of the pulmonary vessels leading to bilateral

epistaxis with expulsion of foamy and blood mixed nasal discharge (Udall 1954; Braun et al. 2017).

Clinical signs

Bleeding may occur from one nostril or both nostrils. The source of bleeding may be in the nostrils, in the lungs (hemoptysis) and extremely rarely in the stomach (hematemesis). Hematemesis (vomiting blood) is an oddity in ruminants because they do not vomit. Blood may enter from the nostril into the mouth, and it may appear that it is coming from mouth. The blood is usually foamy and a mixture of blood plus secretions when it originates from the lungs. The quantity of the blood voided from the nostril may be very small or profuse. Bleeding usually lasts for a short period (usually up to 30 minutes). In rare cases, epistaxis lasts for a few hours. Some conditions (e.g. nasal tumors, nasal granulomas and thrombocytopenia) cause intermittent bleeding from the nostrils. The nature of signs accompanying epistaxis (e.g. dyspnea) depends upon the cause of epistaxis (Areshkumar, 2019).

Diagnosis and differential diagnosis

- Bleeding from the lungs (hemoptysis)
- Bleeding from the stomach (hematemesis) is an extremely rare condition in cattle and buffaloes because they do not vomit.

A thorough physical examination of the animal should be conducted, and an effort made to determine the cause(s) of the epistaxis. After proper restraint of the affected animal, remove the nasal secretions and blood from nasal cavity and then using a good light source (e.g. the mobile phone set), examine the nostril to locate the bleeding point. Petechiae, mucosal bleeding, hemorrhages in the fundus and melena usually point to the strong probability of defects of primary hemostasis (platelets defects). On the other hand, hematomas, hemarthrosis and bleeding into body cavities are usually the signs of secondary hemostasis (e.g. coagulation factors; Gieger and Northrup, 2004). Appropriate lab tests, complete blood count including platelets count and an endoscopic examination can be conducted to determine the cause and location of epistaxis.

Treatment

- a) Provide rest and keep the affected animal calm and quiet.
- b) Apply pressure to the nose and in the case of severe epistaxis, sedate the animal lightly by injecting a low dose (0.4 mg/kg b.wt.; Plumb, 2018) of diazepam (e.g. Inj. Valium® 10, Martin Dow Pharma, Pakistan; each 2 ml ampule contains 10 mg of diazepam) slow IV (Gieger and Northrup, 2004).
- c) Douse the head of the affected animal with cold water for 10-30 minutes. After this, apply ice or an icepack (e.g. Rainbow® cold compress) which is prepared for application to the bleeding nostril by placing it in deep

freezer for 1-2 hours. If this compress is too cold, wrap it in a thin cloth before application to the bleeding nostril(s) and head.

- d) Give IM or subcutaneous injection of 6 ml of adrenaline (1:1000; Omid, 2009; https://uaf.edu.pk/downloads/2nd_path/Blood_in_milk.pdf). Do not inject adrenaline if the animal is hypertensive.
OR
Give IV infusion of 300-450 ml of calcium borogluconate (e.g. Inj. Milfone® C, Star Labs., Pakistan; contains calcium borogluconate, P, Mg and dextrose) after diluting it with 1L of dextrose 10%.
- e) Give IM injection of vitamin K1 (e.g. Inj. Vitamin K®, Lawrence Pharma, Pakistan; each 1 ml ampule contains 10 mg of vitamin K) @ 1-5 mg/kg b.wt. (Ruiz et al., 2022). Repeat daily till cure.
- f) Grind 30 tablets of vitamin C (e.g. Tab. Cecon®, Abbott Pharma, Pakistan; each tablet contains 500 mg of vitamin C), dissolve in 1 liter of water and drench carefully. Repeat as per the need of the case.
- g) Inject an antibiotic (e.g. Inj. Penbionic®, Nawan Labs., Pakistan; contains penicillin and streptomycin; dose for an adult cow or buffalo is 2.5-5 grams IM) for 4-5 days to prevent secondary bacterial infections.
- h) In the case of severe bleeding from only one nostril, plug the nasal cavity at the level of bleeding point. Attach a piece of tape to a pledget of cotton wool and push it up the nasal chamber just beyond the bleeding area. After this, while holding the string with one hand, pack the cavity with more cotton wool. The idea behind attaching tape to the cotton-wool pledget is to prevent the pledget going into posterior nares or pharynx and to enable the whole of it to be removed the next day by pulling on the string. The free posterior end of the string may be tied to the nose band of the head-collar. As an alternative, take a fairly large piece of a gauze and spread it over the nostril and then push cottonwool into its center and up the nose to the required place, the edges of the gauze protruding through the nostril and being held by one hand while the other hand insert the plug. In the case of epistaxis from both the nostrils, first perform temporary tracheotomy to insert a small soft tube. Enclose the stem of this tube in a piece of gauze to prevent blood passing alongside into the lungs (Wooldridge, 1923).
- i) Inject ivermectin (e.g. Inj. Endectin®, ICI, Pakistan; each ml contains 10 mg of ivermectin; general dose rate is 1 ml/ 30 kg b.wt.) subcutaneously @ 200 µg/kg b.wt. translating to 1 ml/50 kg b.wt. if microfilariosis or lung worm infestation is the

cause of epistaxis. Repeat the treatment once after 10 days.

- j) Perform blood transfusion and give IV fluid therapy if epistaxis is very severe and a lot of blood has been lost and the animal is showing signs of hypovolemia (Gieger and Northrup, 2004).
- k) If the epistaxis is due to trauma, using a piece of IV set, after a few hours of bleeding, suck the blood from the nasal cavity and oropharynx to prevent it from going into the pharynx, larynx or lungs (Gieger and Northrup, 2004).
- l) If epistaxis is not very severe, using a piece of IV set or a NG tube of suitable French diameter, instill (i.e. pour in) diluted (2 ml with 18 ml of normal saline) solution of phenylephrine (a nasal decongestant) into the nasal cavity (Gieger and Northrup, 2004).
- m) In severe cases, give a light general anesthesia and then pack the nasal cavity and oropharynx with a sponge soaked in dilute (1:100,000) solution of adrenaline (Gieger and Northrup, 2004). Adrenaline is available in 1:1000 concentration.
- n) For the treatment of epistaxis due to nasal granuloma, administer *per os* praziquantel (e.g. Tab. Prazivac®, Medsuvac Pharma; each tablet contains 600 mg of praziquantel) @ 20 mg/kg b.wt. (Stabige *et al.*, 2018) thrice at an interval of 6 hours.

OR

Give IM injection of lithium antimony thiomalate (e.g. Inj. Anthiomaline®) @ 20 ml IM at weekly interval along with meloxicam (e.g. Inj. Meloxi-10®, Selmore Pharma, Pakistan; contains 10mg/ml of meloxicam) @ 0.5 mg/kg b.wt. IM for 3 days, Neurobion® 21 ml IM daily for 3 days and 25 ml of Inj. Venofer® (Oladoc Pharma, Pakistan; each 5 ml ampule contains 100 mg of iron sucrose) for 3 days IV (Sharma *et al.*, 2018).

- o) For the treatment of cutaneous lymphosarcoma-associated epistaxis, give a single injection of vincristine sulphate (e.g. Oncovin® Lilly Pharma, France) @ 0.02 mg/kg b.wt. in 2-3 liters of normal saline along with IM injection of 2.5-5 grams of streptopenicillin (e.g. Inj. Penbiotic®, Nawan Labs., Pakistan) daily for 7 days, IM injection of meloxicam @ 0.5 mg/kg b.wt. for 7 days, IM injection of a vitamin-antioxidant preparation (e.g. Inj. Selevit®, Fatro Pharma, Italy marketed in Pakistan by Prix Pharma; each ml contains Sodium selenite 0.5 mg, Vit. E 70 mg, Vit. B1 20 mg, adenosine 5 monophosphoric acid 5 mg and sorbitol 50 mg) and a liver tonic (e.g. Inj. Jetepar®, Popular Chemical Work (Pvt.) Ltd.; contains betaine glucuronate, diethanolamine, glucuronate and nicotinamide; dose for an adult cow or buffalo

is 6 ampules of 10ml each) in a drip for 7 days (Jhambh *et al.*, 2014).

- p) Transfuse whole blood or fresh-frozen plasma or both if coagulopathy is suspected (Gieger and Northrup, 2004).
- q) To treat epistaxis due to Giant fennel (*kelkh* in Arabic) or sweet clover (*Sainjee* in Urdu) poisoning, give IM injection of vitamin K1 (e.g. Inj. Vitamin K®, Lawrence Pharma, Pakistan; each 1 ml ampule contains 10 mg of vitamin K) @ 1-5 mg/kg b.wt. for 1-7 days, liver tonics (e.g. Inj. Hepasel®, Selmore Pharma, Pakistan; each ml contains 100 mg of Phenoxy-2 methyl-2-propionic acid; dose is 10 ml /100 kg b.wt. mixed in 1 liter of 5% dextrose IV daily for 1-7 days) and perform blood transfusion (Ruiz *et al.*, 2022).
- r) Bracken fern poisoning is highly fatal even despite treatment which involves stopping the feeding of bracken fern, administration of vitamin B1, hemopoietics like Deca-Durabolin®, and blood transfusion (Ruiz *et al.*, 2022).
- s) For the treatment of epistaxis due to nasal tumor, try an extremely slow IV injection of vincristine sulphate (e.g. Oncovin® Lilly Pharma, France) @ 0.025 mg/kg b.wt. daily for 7 days (Maji *et al.*, 2018). This treatment was, however, not found effective by these workers and surgical removal of the tumor is recommended.
- t) For the treatment of nasal granuloma due to actinobacillosis or rhinosporidiosis, administer sodium iodide IV @ 70 mg/kg b.wt. or roughly 30 grams of sodium iodide in 300 ml of distilled water for an adult cow or buffalo (Smith, 2020). Repeat this treatment at weekly intervals for 3-4 injections.
- u) To treat epistaxis due to leech infestation, slowly infuse about 60 ml of chloroform-water with the help of human orogastric tube (24 french) attached to a syringe and passed through the inferior nasal meatus of the leech infested animal. Hold the head of the animal in a horizontal position while administering chloroform-water infusion (Soulsby, 1982; Bhattacharya *et al.*, 1996).

OR

Give medicated steam inhalation from the boiling water after addition of turpentine oil or pine tar (*Deodar ka tael* in Urdu) or menthol (*Sat podina* in Urdu). This will cause the leeches to release their grip of the mucous membrane of the host (Korinek, 1917; Bhattacharya *et al.*, 1996).

OR

Apply highly concentrated salt solution, strong vinegar or alcohol to the leeches to detach them from the host skin or mucous membrane (Hendrix and Shealy, 1991; Lone *et al.*, 2011; Alshehabat, 2016). Local application of ivermectin as nasal drops often expels leeches from the nasal cavity

within 3 hours. Parenteral administration of ivermectin is not effective (Bhattacharya *et al.*, 1996). Styptics (e.g. tincture ferriperchlor, tincture benzoin co, alum) and antiseptics (Pyodine®) should be applied to the leech wounds after detachment.

Conclusive Notes:

- 1) Treatment of epistaxis and hemoptysis depends upon the cause of the condition.
- 2) Most cases of epistaxis in cattle and buffalo usually resolve spontaneously without any treatment.
- 3) Treatment of caudal vena cava thrombus and metastatic pneumonia is not generally effective (Schild *et al.*, 2017).
- 4) When all treatments have failed to control epistaxis, give a slow IV infusion of a dilute solution of formalin prepared by adding 10 ml of formalin to 500 ml of boiled cooled tap water or 500 ml of distilled water. If needed, administration of formalin can be repeated at 48 hours interval for 2-3 IV injections (Weir, 1949). Adrenaline (3-5 ml) may be injected subcut or IM if there is any reaction. Formalin helps to control bleeding by enhancing endothelial or platelet activation. Ismail (2016) recommends IV administration of 500 ml of 0.37% formalin (prepared by adding 5 ml of 37% formalin to 500 ml of normal saline) for the treatment of blood in milk in lactating dairy cows daily for 4 days. This treatment can be extrapolated for the treatment of

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epistaxis in cattle and buffalo which does not respond to other treatment measures.

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Author Contribution

GM and AA contributed equally in the manuscript.

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