

Oral and dental disorders in pet hedgehogs

Tzvetan CHAPRAZOV¹, Rosen DIMITROV², Kamelia STAMATOVA YOVCHEVA^{2*}, Krasimira UZUNOVA³

¹Department of Veterinary Surgery, Faculty of Veterinary Medicine, Trakia University, Stara Zagora, Bulgaria

²Department of Veterinary Anatomy, Histology, and Embryology, Faculty of Veterinary Medicine, Trakia University, Stara Zagora, Bulgaria

³Department of General Animal Breeding, Faculty of Veterinary Medicine, Trakia University, Stara Zagora, Bulgaria

Received: 20.02.2013 • Accepted: 30.07.2013 • Published Online: 18.12.2013 • Printed: 20.01.2014

Abstract: Hedgehogs are increasingly popular pets. As more people come to keep these unique creatures as pets, it is important to know how to properly take care of them, including how to provide the dental care they need. Hedgehogs are omnivorous with very well-developed jaws and short and relatively coarse teeth with a primitive structure. The skull is low with well-developed zygomatic arches. The incisors are sharp, modified forceps that are needed for elevation of small prey. The canines are small and often look like incisors or premolars. The molars and premolars are flat and wide. The teeth have closed root canals and grow for a limited time. Hedgehogs are prone to oral conditions. Captive hedgehogs are often afflicted with tooth and gum disease. Typical clinical signs and appropriate diagnostics and treatment options are discussed here where possible. The intent of this review is to provide the practitioner with a relevant and practical guide to the management of oral and dental disorders in the captive hedgehog. Proper dental care for hedgehogs will help avoid the need for treatment later.

Key words: Hedgehog, oral disorders, dental disorders, therapy

1. Introduction

The hedgehog family includes small insectivorous mammals, whose backs are covered with modified needles for hair. They fall into the order Insectivora, family Erinaceidae (1). Hedgehogs are classified according to their ear length, zygomatic morphology, and the shape and color of the needles (2). Their natural habitat includes Asia, Africa, and Europe. The most common species are the African hedgehog (*Atelerix albiventris*) and the European hedgehog (*Erinaceus europaeus*) (3). The African hedgehog is often preferred as a domesticated pet (4).

2. Historical background

2.1. Dentition and dental variations

Hedgehogs are omnivorous with very well-developed jaws and short and relatively coarse teeth (Figure 1) with primitive structure (5). The skull is low with well-developed zygomatic arches (Figure 2). The dental formula of the African hedgehog is: I 3/2, C 1/1, P 3/2, M 3/3, with a total of 36 teeth (6). There are a few other possible variations, which provide the following dental formula: I 2-3/3, C 1/1, P 3-4/2-4, M 3/3 = 36-44 teeth in total (7). In more than 2% of European hedgehogs there are 1 or a few teeth missing (8).

The incisors are sharp modified forceps (6), needed for elevating small prey (Figure 3). The canines are small and often look like incisors or premolars (9). The molars and premolars are flat and wide (Figure 3) (3). The teeth have closed root canals and grow for a limited time. The milk teeth grow between days 18 and 23. Hedgehogs develop their complete temporary dentition in the ninth week of their development. The growth of the new permanent teeth occurs between the 7th and 9th weeks. With *Erinaceus europaeus*, fully grown permanent M1, M2, P2, and I3 are found in the second month (10). The canines appear between the 2nd and the 3rd month, followed by M3, P3 and P4 come out between the 4th and the 5th month. The permanent dentition of the European hedgehog appears in the following order: M1, M2, P2, I3, C, M3, P4, P3, I2, I1 (10).

2.2. Anesthesia and sedation for oral and dental examination

Knowing the case history, including information about the diet, is as equally important for the correct diagnosis as the complete physical exam of the animal. When examining the oral cavity, it is necessary to sedate or anesthetize the animal (11).

The preferred method for sedating the animal is gas anesthesia with isoflurane or sevoflurane (12). A nose cone

* Correspondence: kameliayovcheva@abv.bg



Figure 1. Shape and structure of the incisor, canine, premolar, and molar teeth of the European hedgehog (*Erinaceus europaeus*).

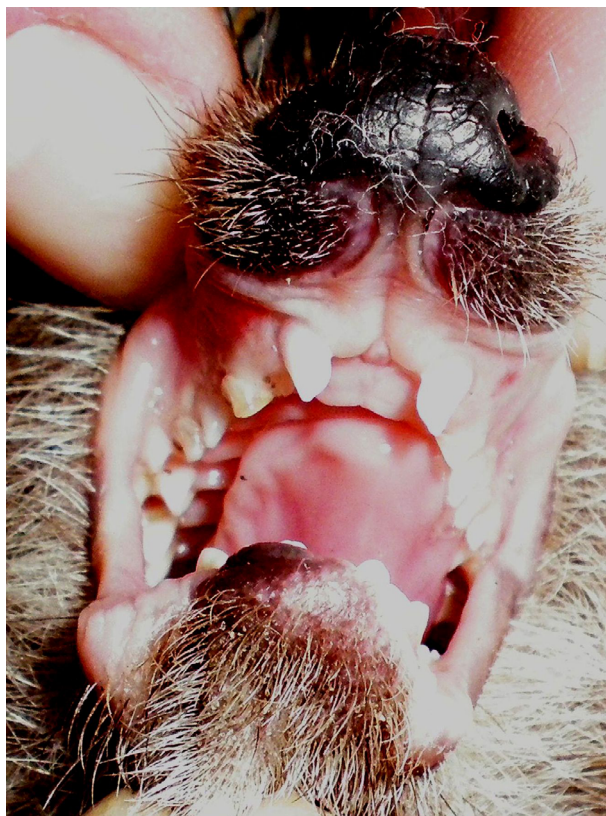


Figure 3. Shape, structure, and position of the incisors of the European hedgehog (*Erinaceus europaeus*).

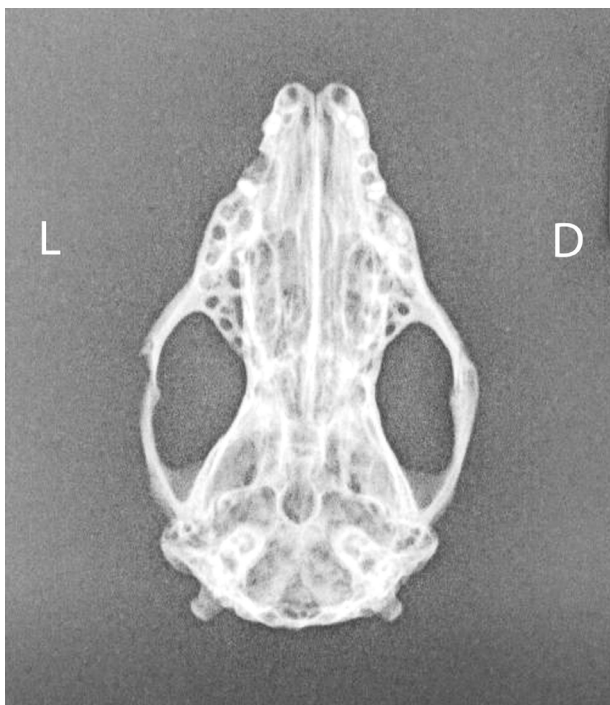


Figure 2. Shape of the zygomatic arches of the domestic African hedgehog (*Atelerix albiventris*).

for dogs (from 3% to 5% isoflurane) is used for introduction, and a facial mask (from 0.5% to 3% isoflurane) is used for maintenance (13). Initial medication with atropine lowers the risks of hypersalivation (14).

Of the specific medicaments available, ketamine hydrochloride (5–20 mg/kg, IM) is the preferred one when applied by itself or in combination with diazepam (0.5–2.0 mg/kg, IM). Another alternative is Zoletil 50 (tiletamine hydrochloride, 125 mg, and zolazepam hydrochloride, 125 mg, in 5 mL of sterile isotonic solution) from Virbac, France, applied at 1–5 mg/kg, IM (12).

2.3. Radiographic examination

Radiography in lateral projection is the preferred method because of the possibility to notably visualize the occlusion (Figure 4) and the periodontal changes in the oral inflammatory processes (15). It can also be achieved without anesthetizing the patient if the overall condition allows it.

2.4. Physical examination

During the physical examination, one should be aware of the biological and clinical parameters (Table 1) of the oral cavity, mucous membranes, eyes, nose, and ears.

2.5. Oral and periodontal disorders

Hedgehogs are prone to oral conditions (11,12).

Loss of weight, lethargy, dehydration, diarrhea, and anorexia are the most common clinical signs accompanying the main symptoms of the specific diseases of hedgehogs



Figure 4. X-ray of skull and dental formation in later-lateral recumbency of the domestic African hedgehog (*Atelerix albiventris*).

(14,16). Excessive salivation during stress is a normal reaction and should not cause any concern. Often this reaction is due to the use of isoflurane anesthesia (17).

Dental abscesses and foreign substances in the oral cavity have been found in domestic animals and wild hedgehogs (18).

Oral neoplasms, and squamous cell carcinomas in particular, which are local infiltrative tumors, occur rarely in domestic African hedgehogs. Their development is accompanied by tooth loss, gingivitis, gingivostomatitis, and deformation of the maxilla and the mandibula. They

have been found in male and female animals between 2 and 5.5 years of age (19).

Among dental disorders there are cases of dental plaque (Figure 3), tartar (20), gingivitis, and periodontitis (13,16). The physical symptoms of these conditions usually are decreased appetite, loss of weight, ptyalism, stress, and excessive rubbing of the snout with paws. Examination of the oral cavity shows signs of reddened and edematous gingiva, tartar, gingival recession of the dental surface, and loss of teeth. In some rare cases teeth fractures and dental abscesses are observed (21).

Tartar is usually diagnosed in aged hedgehogs (17). Localization is mainly around the crown of the incisive and the buccal surface of the remaining maxillae teeth (22).

Malocclusions in domestic hedgehogs have not been reported so far. The only case found of disposition of maxillar P3 and loss of maxillar P2 was in wild African hedgehogs (17).

2.6. Therapy and prophylaxes

Treatment of the oral and dental conditions includes professional tartar cleaning, antiinflammatory and analgesic treatments (Table 2), and antibiotics when necessary (20).

Stomatitis and gingivitis are more common in male hedgehogs, which bite their partners during copulation. They should be treated with a soft-food diet and a local and systemic application of antiinflammatory and antibacterial drugs (Table 3). Complicated periodontal infections, requiring total tooth extraction, impose a soft-food diet for life (23).

Tooth extraction, depuration, and antibiotic application are the same as in the rest of the small mammal species.

Table 1. Basic biological and clinical parameters of the African hedgehog (3,4,5,22).

Parameters	Reference values
Weight of male African hedgehogs	800–1200 g
Weight of female African hedgehogs	250–400 g
Internal body temperature	36.1–37.2 °C
Rectal temperature	36.0–37.4 °C
Pulse (for 1 min)	180–280
Respiratory rate (for 1 min)	25–50
Appearance of milk teeth	Starts from the 18th day and ends toward the 9th week
Appearance of permanent teeth	Starts from the 7th to 9th week
Solid food adoption	At 3 weeks of age (from 4th to 6th week)
Lifespan	Between 3 to 8 years (maximum: 10 years)

Table 2. Antiinflammatory and analgesic substances for treatment of oral and dental conditions of the domestic hedgehog (3,22).

Substance	Route of administration	Doses	Effects
Butorphanol (Torbugesic, Fort Dodge)	SC at 6–8 h	0.2–0.4 mg/kg	Analgesia
	IM at 6–8 h	0.3–0.5 mg/kg	Analgesia
Diazepam	IM	0.5–2.0 mg/kg	Sedation anticonvulsant
Flunixin meglumine (Banamine, Schering-Plough)	IM at 8 h	0.03 mg/kg	Nonsteroid antiinflammatory
	SC at 24 h	0.3 mg/kg	

Table 3. Antibacterial drugs used in oral and dental conditions of the domestic hedgehog (3,22).

Substance	Route of administration	Doses	Note
Amikacin	IM	2.5–5.0 mg/kg every 8–12 h	Not used for dehydrated animals or renal disorders
Amoxicillin/clavulanic acid (Clavamox, Pfizer)	PO	12.5 mg/kg every 12 h	Broad-spectrum, well received
Clindamycin (Antirobe, Pharmacia & Upjohn)	PO	5.5–10.0 mg/kg every 12 h	In dental conditions
Enrofloxacin (Baytril, Bayer)	PO, IM	2.5–5.0 mg/kg every 12 h	Broad-spectrum with systemic infections
	PO, SC, IM	5–10 mg/kg every 12 h	
Gentamicin	SC, IM	2 mg/kg every 8 h	Rare indications of administrations
Metronidazole	PO for 5 days	20 mg/kg every 12 h	With anaerobic infections
	PO	25 mg/kg every 12 h	Flagellates
Oxytetracycline	PO for 5–7 days	25–50 mg/kg every 24 h	Given with food, broad-spectrum
Spiramycin	PO for 8 days	15 mg/kg	With gingivitis
Chlorhexidine (Nolvasan, Fort Dodge)	0.1–0.05% solution		Topical wound treatment

Tartar formation could be isolated with the application of pet dental paste, as well as cat and dog hard-pressed chewable toys (16).

Most tumors of the domesticated African hedgehog are malignant, with dubious prognosis and effectiveness of the treatment applied (19). There are no data for effective therapy of squamous cell carcinoma in hedgehogs. Total surgical extirpation is perhaps the optimal solution with those particular species (24). The effect of radiotherapy

and chemotherapy has not yet been studied thoroughly.

Some dental abrasions develop with a hard food diet. In those cases, soft food is prescribed. The teeth of the hedgehog do not grow continuously throughout their life, and therefore it is not recommended to shorten or file them.

It was mentioned that hedgehogs are omnivorous with very well-developed jaws and short, relatively coarse teeth with primitive structure (5). In the wild, hedgehogs are

insectivorous and omnivorous (25) and their optimal diet includes low-fat and protein-rich food. Cat soft granules (26) are most commonly used. Food intake should be fractionated and limited; otherwise, pet hedgehogs would gain weight or even become obese (20), which would lead to serious health issues and dental disorders.

Well-developed zygomatic arches provoke a diet that must include fresh or frozen vegetables sprinkled with vitamins and minerals (27), fruit, hard-boiled eggs, small mice, baby jar food, steamed low-calorie meat such as chicken and lamb (26), and a variety of worms and insects (16). These diets could avoid disorders during developing of zygomatic bones and loss of maxillar premolars.

The weight has to be measured periodically (Table 1) and the diet adjusted accordingly (28).

For the development of skull bones and that of the structures in the oral cavity (gingiva and teeth), diets

containing wax worms and milk, which are rich in lipids, should be avoided. Hard fresh carrots and nuts could penetrate the hard palate and should not be given, either.

3. Conclusion

Hedgehogs are unique pets, whose popularity is growing rapidly. Sometimes they need much love and affection, including regular veterinary check-ups and dental examinations. Stomatitis and gingivitis, and some dental abrasions, are more common in male hedgehogs. They should be treated with a soft-food diet and a local and systemic application of antiinflammatory and antibacterial drugs. For the development of skull bones and that of the structures in the oral cavity (gingiva and teeth), hedgehogs should be given foods sprinkled with vitamins and minerals. This care will allow them to lead a healthy life without complications of the gastrointestinal tract.

References

- Santana E, Jantz H, Best T. *Atelerix albiventris* (Erinaceomorpha: Erinaceidae). *Mammalian Species* 2010; 42: 99–110.
- Heatley J. Hedgehogs. In: Mitchell M, Tully T, editors. *Manual of Exotic Pet Practice*. St Louis, MO, USA: Saunders Elsevier, 2009. pp. 433–455.
- Jones M. Hedgehogs. In: Ballard B, Cheek R, editors. *Exotic Animal Medicine for the Veterinary Technician*. 2nd ed. Ames, IA, USA: Wiley-Blackwell, 2010. pp. 327–334.
- Ivey E, Carpenter J. African hedgehogs. In: Quesenberry K, Carpenter J, editors. *Ferrets, Rabbits and Rodents: Clinical Medicine and Surgery*. 2nd ed. St Louis, MO, USA: Elsevier Saunders, 2004. pp. 339–353.
- Markov G. *Mammals*. Sofia: Science and Art, 1988.
- Verstraete F. Advances in diagnosis and treatment of small exotic mammal dental disease. *Semin Avian Exot Pet* 2003; 12: 37–48.
- Vaughan T, Ryan J, Czaplewski N. Erinaceomorpha and Soricomorpha. In: Vaughan T, Ryan J, Czaplewski N, editors. *Mammalogy*. 5th ed. Sudbury, Canada: Jones and Bartlett Publishers LLC, 2011. pp. 242–243.
- Brockie R. Dental abnormalities in European and New Zealand hedgehogs. *Nature* 1964; 202: 1355–1356.
- Colyer J. Variations in number, size and shape. In: Miles A, Grigson C, editors. *Colyer's Variations and Diseases of the Teeth of Animals*. Revised edition. Cambridge, UK: Cambridge University Press, 1990. pp. 17–152.
- Asher R, Olbricht G. Dental ontogeny in *Macroscelides proboscideus* (Afrotheria) and *Erinaceus europaeus* (Lipotyphla). *J Mamm Evol* 2009; 16: 99–115.
- Simone-Freilicher E, Hoefler H. Hedgehog care and husbandry. *Vet Clin North Am Exot Anim Pract* 2004; 7: 257–267.
- Rosenthal K, Forbes N, Frye F, Lewbart G. *Rapid Review of Exotic Animal Medicine and Husbandry*. London, UK: Manson Publishing Ltd., 2008.
- Hoefler H. Hedgehogs. *Vet Clin North Am Small Anim Pract* 1994; 24: 113–120.
- Lightfoot T. Clinical examination of chinchillas, hedgehogs, prairie dogs, and sugar gliders. *Vet Clin North Am Exot Anim Pract* 1999; 2: 447–469.
- Crossley D. Small mammal dentistry. In: Quesenberry K, Carpenter J, editors. *Ferrets, Rabbits, and Rodents: Clinical Medicine and Surgery*. 2nd ed. St Louis, MO, USA: Elsevier Saunders, 2004. pp. 370–379.
- Johnson-Delaney C. *Exotic Companion Medicine Handbook for Veterinarians*. West Palm Beach, FL, USA: Zoological Education Network, 2008.
- Lightfoot T. Clinical techniques of selected exotic species: chinchilla, prairie dog, hedgehog, and chelonians. *Semin Avian Exot Pet* 1997; 6: 96–105.
- Isenburg E, Baumgartner R. Insectivora: Diseases of the hedgehog. In: Fowler M, editor. *Zoo and Wild Animal Medicine*. 3rd ed. Philadelphia, PA, USA: WB Saunders & Co, 1993. pp. 294–302.
- Raymond J, Garner M. Spontaneous tumors in captive African hedgehogs (*Atelerix albiventris*): a retrospective study. *J Comp Pathol* 2001; 124: 128–133.
- Sainsbury A, Cunningham A, Morris P, Kirkwood J, Macgregor S. Health and welfare of rehabilitated juvenile hedgehogs (*Erinaceus europaeus*) before and after release into the wild. *Veterinary Record* 1996; 138: 61–65.
- Johnson-Delaney C. Jaw swelling in an African pygmy hedgehog. *Exot Pet Pract* 1998; 3: 63.

22. Poduschka W, Poduschka C. Zahnstein, Zahnfleischerkrankungen and Zahnanomalien bei Erinaceinen (Mammalia: Insectivora). *Z Angew Zool* 1986; 73: 231–243 (in German).
23. Smith A. General husbandry and medical care of hedgehogs. In: Bonagura J, Kirk R, editors. *Kirk's Current Veterinary Therapy XIII: Small Animal Practice*. Philadelphia, PA, USA: WB Saunders, 2000. pp. 1128–1133.
24. Heatley J, Mauldin G, Cho D. A review of neoplasia in the captive African hedgehog (*Atelerix albiventris*). *Semin Avian Exot Pet* 2005; 14: 182–192.
25. Reeve N. *Hedgehogs*. Cambridge, UK: Cambridge University Press, 1994.
26. Allen M. The nutrition of insectivorous mammals. In: *Proceedings of the Annual Meeting of the American Association of Zoo Veterinarians*. Oakland, CA, USA, 1992. pp. 113–115.
27. Santana E, Jantz H, Best T. *Atelerix albiventris* (Erinaceomorpha: Erinaceidae). *Mammalian Species* 2010; 42: 99–110.
28. Pinney C. *Hedgehogs*. In: Pinney C, editor. *The Complete Home Veterinary Guide*. 3rd ed. New York, NY, USA: McGraw-Hill, 2003. pp. 501–508.