https://doi.org/10.47108/jidhealth.Vol9.Iss1.450
Ngalameno MK, Journal of Ideas in Health (2026); 9(1):1399-1401
Journal of Ideas in Health

Dental conditions in the silvery mole rat (heliophobius argenteocenerius emini): a case report

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Abstract

Background: As in other organisms, the normal performance of rodents depends on health status of all the body systems including the oral cavity and associated structures. Any deviation from normal function of the oral cavity or teeth results in a complex clinical sign that may be related to other systems secondarily. The current case report describes four dental conditions encountered in the Silvery mole rat (Heliophobius argenteocenerius emini) kept at Sokoine University of Agriculture, Tanzania.

Case presentation: Three out of twenty-two animals developed dental conditions associated with mandibular and maxillary incisors. Based on clinical presentations, the conditions were closely assessed under general anaesthesia using xylazine-ketamine protocol at 5 and 50 mg/kg respectively. Detailed examination revealed that all the three animals had more than one dental condition including incisor overgrowth, lateral deviation, malocclusion of different levels ranging from mild to severe and fractured incisor tooth presented as pseudo-oligodontia. Severe incisor overgrowth and malocclusion were managed by coronal reduction of the clinical crown.

Conclusion: The current report highlights few dental conditions encountered in the Silvery mole rats. Malocclusion of the incisors was common to all the three animals signifying that this probably is the most common dental condition in this species as reported in other rodents. Detailed studies are recommended to explore more on the prevalence of dental and periodontal diseases of this rodent group.

Keywords: Silvery Mole Rat, Incisor Overgrowth, Lateral Deviation, Malocclusion and Incisor Fracture, Tanzania

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How to cite: Ngalameno MK. Dental conditions in the silvery mole rat (heliophobius argenteocenerius emini): a case report. J Ideas Health. 2026 Feb. 28;9(1):1399-1401 DOI: 10.47108/jidhealth.Vol9.Iss1.450

Article Info: (**Case Report**)
Received: 06 February 2026
Revised: 22 February 2026
Accepted: 27 February 2026
Published: 28 February 2026

Journal Home page: https://www.jidhealth.com

e ISSN: 2645-9248

Background

Rodents like other mammals possess teeth with crown and root, the crown is that part projecting above the gingiva while the root is found in the alveolar bone, between the two parts is the neck [1-3]. A longitudinal section of a tooth consists of enamel, dentine, cementum and pulp. Enamel, dentine and cementum are calcified but the degree of calcification differs, enamel being the hardest followed dentine and cementum is the least of the calcified tissues [1-4]. According to the region where the teeth are anchored, they are classified into incisors, canines, premolars and molars. All rodents lack canine teeth and possess high crowned incisors that grow throughout hence classified as hypsodont as opposed to brachydont teeth of other mammals that are low crowned and complete their growth shortly after eruption [1-3]. In addition, some species of rodents lack premolars and therefore a space called diastema is found between incisors and molars [1,5]. This is not the case for the genus Heliophobius which possess two pairs of premolars and hence the diastema is between incisors and premolars [1,5,6]. Therefore, a general dental formula of Heliophobius species is 2(I1/1, C0/0, P1/1, M3/3) =20 consisting of two pairs of extrabuccal incisors, no canines, two pairs of premolars and six pairs of molar teeth [5] (Figure 1). Dental conditions of rodents are therefore peculiar due to their anatomical and physiological properties. Any deviation from normal function of the oral cavity and teeth results in a complex clinical sign that may be related to other organs or systems secondarily [1,6]. This case report covers four dental conditions encountered in three Silvery mole rat (Heliophobius argenteocenerius emini) a species endemic to the Uluguru foothills in Mvomero district- Morogoro, Tanzania [7]. These were part of twenty-two animals kept at the College of Veterinary Medicine and Biomedical Sciences, Sokoine University of Agriculture for different research objectives. The conditions developed include incisor overgrowth, lateral deviation, malocclusion and dental fracture.

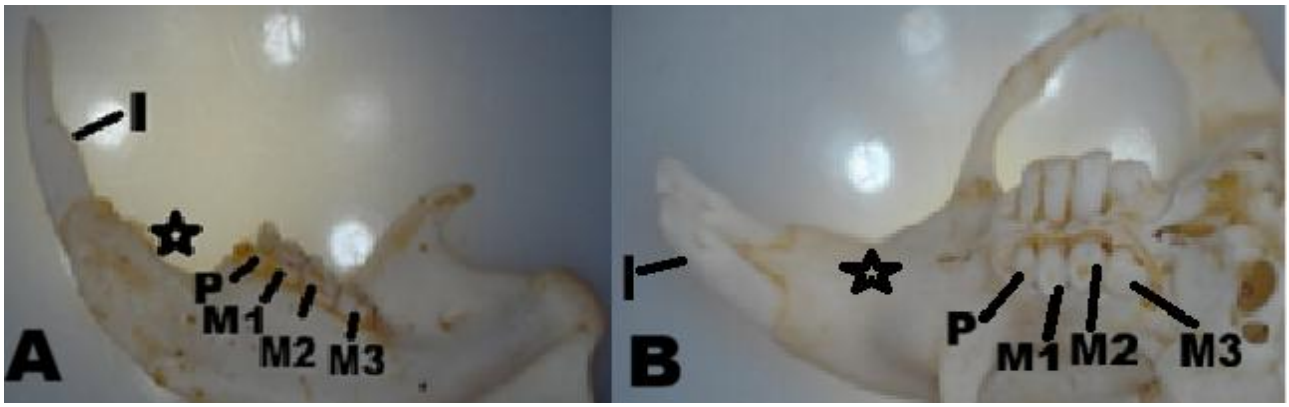

Figure 1: Dentition of the Heliophobius rodents. A: Right mandible dorsomedial view and B: Ventrolateral view of the skull I= Incisor, P and M1-M3= Mandibular and maxillary Premolars and molars respectively. In both A and B note the diastema (asterisks) and high crowned chiesal-shaped incisors. (Ngalameno, unpublished data).

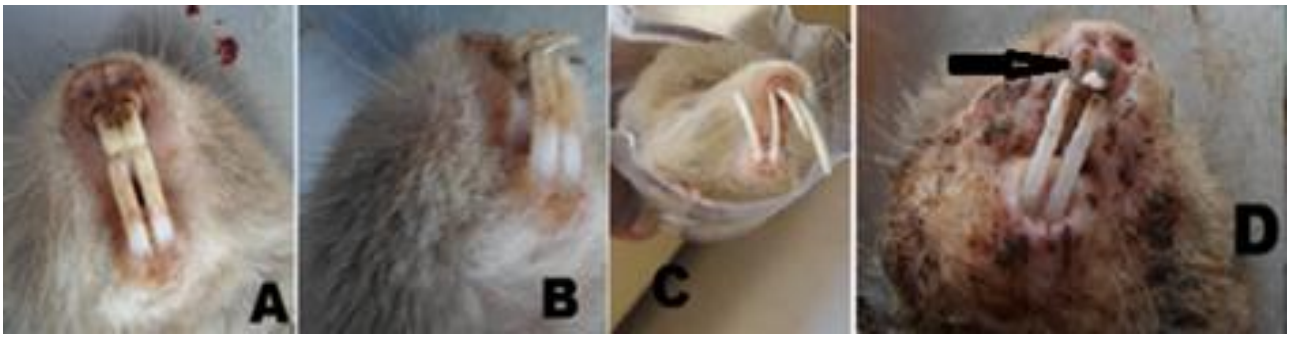

Figure 2: Dental conditions of incisor teeth in Silvery mole rat. A: Normal occlusal alignment of mandibular and maxillary incisors. B: Mild malocclusion, maxillary incisors slightly project beyond the normal occlusal plane. C: Severe malocclusion and elongation of mandibular and maxillary incisors with lateral deviation of mandibular incisors, the left one traumatized the snout. D: Fractured right maxillary incisor at the gingival level (arrow). Note also the slightly elongation and lateral deviation of the mandibular incisors.

Case presentation

Case1: Mild incisor overgrowth and malocclusion

The second case presented as slightly overgrowth of maxillary incisors that project beyond the normal occlusal alignment. Both incisors were of the same size, shape and orientation. Upon close examination, the affected teeth were found firmly attached to their bony sockets and all other teeth were apparently normal (Fig2. B)

Case2: Severe incisor overgrowth, lateral deviation and malocclusion

This combination of dental conditions was observed in one animal in which all the four incisors were severely overgrown with lateral deviation of the mandibular incisors which also curved abnormally causing the left incisor to traumatized the snout. On the upper jaw, the left maxillary incisor extends about one third more than the right and both retained their orientation without lateral deviation (Fig2 C). Detailed examination was performed under general anaesthesia using xylazine and ketamine at 5 and 50mg/kg respectively as used in other rodent species [8]. All the affected incisors were intact firmly anchored in their alveolar bones. The cheek teeth were all normal. Coronal reduction of all the four incisors was performed.

Case3: Incisor fracture, slightly deviation and malocclusion

A male Silvery mole rat was directly excavated from his burrow system with a missing right maxillary incisor. Detailed examination under general anaesthesia revealed a remained portion of the clinical crown and therefore fracture of the crown at the gingival level was considered. The condition presented as pseudo-oligodontia. The animal also developed slightly overgrowth and lateral deviation of both mandibular incisors resulting into mild malocclusion to the remained maxillary incisor (Fig2 D)

Discussion

Dental diseases in rodents are peculiar because of their dental morphology and physiology [6]. A number of authors has reported dental diseases in these small mammals [6, 9,10]. Several factors have been reported to cause dental disease in rodents including repeated trauma which leads to malocclusion of the incisors, fractures and sometimes due to improper trimming of malocclucded incisor teeth [1]. Understanding dental abnormalities is important for optimal management in order to maintain masticatory function through preservation of the dentition while secondarily improvement the clinical appearance. Dental diseased rodent clinically shows dysphagia, reduced food intake and anorexia [1-3]. Malocclusion of incisors is the most common dental condition in rodents [11] and has been reported in several rodent species which presents as excessive elongated and lateral deviation of the clinical crown [1,6]. In the current case report one animal was severely affected and less developed in the other two. In the former all the four incisors were excessively elongated with lateral deviation of the mandibular incisors resulting into traumatization the snout as a secondary sequel. Similar condition was reported in golden hamster and guinea pigs. In each malocclusion was due to overgrowth of maxillary and mandibular incisors [1]. In some rodents such as

chinchilla malocclusion of the incisor teeth was reported as excessive elongation of maxillary crown that curves towards the palate resulting into ulcerations of the palate, tongue and lip, consequently interferes with mastication and to some extent causes conjunctivitis [1]. Severe malocclusion in laboratory animals is managed by coronal reduction while provision of chewing materials may reduce the less severe cases [6]. Dental fracture presented in this case report was above the clinical crown of the maxillary incisor which can be classified as traumatic type since part of the crown remained. This is one of the two types of traumatic dental fractures reported in rodents in which one is loss of the crown or part of it and the second type is loss of the entire tooth [6]. As expected in this case there was overgrowth of mandibular incisors with slightly lateral deviation due to lack of contra-abrasion and attrition [6].

Conclusion

The current report highlights few dental conditions encountered in the Silvery mole rats. Malocclusion of the incisors was common to all the three animals signifying that this probably is the most common dental condition in this species as reported in other rodents. Detailed studies are recommended to explore more on the prevalence of dental and periodontal diseases of this rodent group.

Abbreviation

Mg: Milligram; kg: Kilogram; I: Incisor; C: Canine; P: Premolar; M: Molar

Declaration

This case report is original and all the figures presented were created by the author and have not been reproduced or adapted from previous works

acknowledgment

None

Acknowledgement

None.

Funding

The author received no financial support for his research, authorship, and/or publication of this article.

Availability of data and materials

Data will be available by emailing mungokisinza@sua.ac.tz

Authors' contributions

Mungo Kisinza Ngalameno (MKN) is the lead author who reported the case, compiled the first draft and approved the final version of it. The author read and approved the final manuscript.

Ethics approval and consent to participate

We conducted the research following the declaration of Helsinki. The ethical approval was obtained from Department of Veterinary Anatomy and Pathology, Sokoine University of Agriculture, Tanzania.

Consent for publication

Not applicable

Competing interest

The authors declare that they have no competing interests.

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