

## A case report of hyperdontia developmental abnormality in the lamb

Shiva Amanollahi, Ali Mirshahi, Hossein Kazemi-Mehrjerdi\*

Department of Clinical Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran.

Article Info	Abstract
<b>Article history:</b> Received: 05 December 2021 Accepted: 13 March 2022 Available online: 15 December 2022	<p>The development of tooth is a complex process wherein there is a series of interactions between the ectoderm and ectomesenchyme. Hyperdontia (also called supernumerary teeth) is a developmental abnormality being additional to the normal series of teeth with unknown etiology and is rare in ruminants. In this report, a rare case with two abnormal teeth outside the alveolar region, observed in a healthy 3-month-old female lamb was presented. The congenital defect consisted of the presence of 2 teeth positioned bilaterally in the caudal part of the mandible ramus and under the prominent pendulous skin; so, with retraction of prominent pendulous skin, these ectopic teeth were seen outside of the skin. The anomaly was found during a routine physical examination and no other congenital abnormalities were found in the lamb. The etiology of supernumerary teeth is not completely understood. This odontogenic abnormality appears to be an extraordinarily rare condition. Genetic, toxic, infectious or environmental factors related to congenital abnormalities affect the tooth growth. Depending on the supernumerary teeth position, surgery may be required.</p>
<b>Keywords:</b> Developmental abnormality Hyperdontia Ruminant Surgery	

© 2022 Urmia University. All rights reserved.

### Introduction

The development of tooth is a complex process wherein there is a series of interactions between the ectoderm and ectomesenchyme. The role of genes in determination of the shape and form of a specific tooth has already been defined.<sup>1</sup> Disturbance of the epithelium and mesenchyme interactions can markedly alter the normal odontogenesis leading to the developmental anomaly of teeth.<sup>2</sup> Developmental dental anomalies are marked deviations from the normal color, contour, structure, size, shape, number and development degree of teeth. Local as well as systemic factors may be responsible for these developmental disturbances. Such influences may begin before or after birth.<sup>3</sup> Hyperdontia (also called supernumerary teeth) is an additional number of teeth to the normal series and can be found in almost any region of the dental arch.<sup>4</sup> If hyperdontia is developed inside the alveolar regions, it is described as normotopic. Heterotopic teeth or teeth developing outside the alveolar region, are extraordinarily rare in ruminants.<sup>5</sup> The etiology of supernumerary teeth is not completely understood. Various theories exist for the different types of supernumerary teeth. One theory suggests that the supernumerary teeth

are created as a result of a dichotomy of the tooth bud. Another theory, being well supported in the literature, is the hyperactivity theory suggesting that supernumeraries are formed as a result of local, independent and conditioned hyperactivity of the dental lamina.<sup>6</sup> Heredity may also play a role in the occurrence of this anomaly.<sup>4</sup>

In this study, a case of congenital hyperdontia positioned outside of the alveolar region in the lamb was reported as the first report in Iran.

### Case Description

In a routine clinical examination of a 3-month-old female lamb (Afshari sheep breed) referred to the Veterinary Hospital of Ferdowsi University of Mashhad, Mashhad, Iran, it was found to have bilateral prominent pendulous skin positioned at the caudal part of the right and left mandibles ramus and under the ears (Fig. 1). Salivary secretions did not come out. The animal was bright, alert, responsive, and within normal body condition. For careful examination, bilateral prominent pendulous skin was retracted and presence of two ectopic and abnormal teeth was identified. They were located outside of the skin with gum, in venterolateral

#### \*Correspondence:

Hossein Kazemi-Mehrjerdi. DVM, DVSc

Department of Clinical Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran

E-mail: h-kazemi@um.ac.ir



This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) which allows users to read, copy, distribute and make derivative works for non-commercial purposes from the material, as long as the author of the original work is cited properly.

direction and had no attachment to the mandible. The teeth were abnormal in shape and reduced in size (Fig. 2). The position and number of the remaining teeth were normal. General physical examination revealed an apparently healthy animal without other detectable congenital defects.

Radiographic examination of the head revealed the presence of bilateral hyperdontia (Fig. 3). A contrast radiography was performed using oral sulfate barium solution as a contrast agent (6.00 mL kg<sup>-1</sup>; Merck, Darmstadt, Germany). Contrast study showed no sign of contrast media transit to the out of the mouth (Fig. 4).



**Fig. 1.** The left prominent pendulous skin at the caudal part of the left mandible ramus and under the ear.



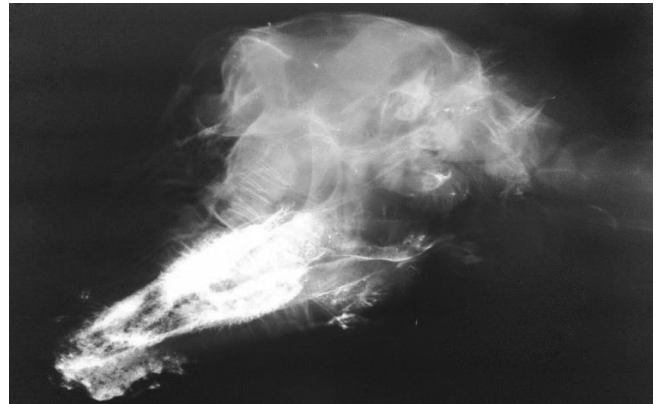
**Fig. 2.** The right abnormal tooth with gum positioned in venterolateral direction.

Because the teeth and gums were visible from the outside and there was a possibility of contamination with the environment, it was decided to remove them. The animal was positioned in lateral recumbency with the neck extended. Skins of the lateral face and ventral mandible were clipped and aseptically prepared. Sedation was performed with xylazine (1.00 mg kg<sup>-1</sup>; Alfasan, Woerden, The Netherlands), induction was executed with ketamine (5.00 mg kg<sup>-1</sup>; Bremer Pharma GmbH, Warburg, Germany) and maintenance was performed with isoflurane (Piramal Critical Care, West Drayton, UK) inhaled gas. The lamb was received prophylactic antibiotics being continued for

five days with cefazolin (10.00 mg kg<sup>-1</sup>; intravenously, q12hr; Dana Pharma Co, Tabriz, Iran). Using a No. 10 Bard – Parker blade, the teeth and gums were removed and the soft tissue was sutured with simple interrupted suture using 2/0 vicryl™ (Supa, Tehran, Iran). Finally, the subcutaneous tissue and skin were sutured using 2/0 vicryl™ (Supa) and 2/0 monofilament polyamide-6 (Supa), respectively with simple interrupted suture (Fig. 5). In post-operative follow-up, the lamb was in perfectly stable condition.



**Fig. 3.** Lateral radiograph of the skull. Presence of bilateral hyperdontia. Ectopic teeth is obvious (arrow).



**Fig. 4.** Left dorsal right ventral oblique view contrast radiograph. No sign of communication was seen between oral cavity and out of the mouth with contrast media (barium sulfate).



**Fig. 5.** Surgical excision of the extra teeth and related gum.

## Discussion

Developmental disorders can be genetically induced by abnormalities in the differentiation of the dental lamina and teeth buds. They are also induced by abnormalities in the formation of dental hard tissues or caused by traumatic, chemical and microbial irritations. They may result in anomalies in the number, size, shape or structure of the teeth.<sup>7</sup> The presence of a supernumerary teeth may cause displacement of a permanent tooth. The degree of displacement may vary from a mild rotation to complete displacement. Displacement of the crowns of incisor teeth is a common feature in the majority of cases associated with delayed eruption.<sup>8</sup> The etiology of supernumerary teeth is uncertain; but, various causes have been proposed, such as atavism (reappearance of traits being lost in prior generations), tooth germ dichotomy, excessive growth of the dental lamina, environmental, genetic and hereditary factors, and other diseases.<sup>6</sup> Differentiation of neural crest cells and interactions between epithelial and mesenchymal cells during the initiation of odontogenesis, disturbances in migration, and proliferation have been suggested to give rise to this condition. It is inconclusive whether a specific gene or an enzyme defect plays a significant role.<sup>9</sup>

Supernumerary teeth developing in addition to the normal number of deciduous and permanent dentition, have also been reported in the other species.<sup>10-12</sup> Emslie and Tutt have shown that supernumerary premolar teeth formation in Burmese cats is heritable and the involved gene or genes are autosomal.<sup>11</sup>

In ruminants, a fourth pair of mandibular molars has been described in a white-tailed deer and this condition might be hereditary. It has been considered that, since the four animals with four molars being examined were from the same locality and recovered over a short period of time, the condition might be hereditary.<sup>13</sup> Moreover, a supplemental premolar as a post-permanent fourth premolar was described in a moose bull. In this study, is a developmental abnormality being additional to the normal series of teeth with unknown etiology and is rare in ruminants. It has been concluded that, very probably development of post-permanent teeth not always can be regarded as a case of atavism, i.e., it can have a genetic origin. Activation of a latent odontogenic potential also seems possible by the action of non-genetic factors.<sup>14</sup> In sheep (*Ovis* spp.), supernumerary teeth were found among mandibular incisors, maxillary and mandibular premolars and mandibular molars.<sup>15</sup>

Congenital supernumerary teeth in an ovine dental pad were reported in 2017. Radiographic examination of the head revealed 2 small teeth located in lateral areas of the dental pad and their positions were corresponded to fourth incisor teeth in the maxilla. The teeth were normal in shape; but, reduced in size and they were therefore

classified as focal micro-dontia. In this case, the etiology of the supernumerary teeth was uncertain.<sup>5</sup>

In our study, contrary to most reports, the extra teeth were located outside the alveolar region and oral cavity and had no effects on individual masticatory efficiency. Thus, this report can be a new type of supernumerary tooth. According to the classification of hyperdontia, both were considered as heterotopic. No previous cases of congenital abnormalities had been observed in the herd. Toxic, infectious or environmental factors related to congenital abnormalities could not be demonstrated. No changes had been introduced into the breeding stock diet and there was no history of vaccination or deworming in the weeks before and after mating. Parents were not affected. According to the most reports, genetics is one of the reasons for the extra teeth formation and may be the reason for the case being studied here. Teratoma can be considered as a differential diagnosis requiring pathological examinations.

## Acknowledgments

We thank the staff of Faculty of Veterinary Medicine Teaching Hospital of Ferdowsi University of Mashhad, Mashhad, Iran, for their cooperation.

## Conflict of interest

The authors declare that they have no conflict of interest.

## References

1. Thesleff I. Epithelial-mesenchymal signalling regulating tooth morphogenesis. *J Cell Sci* 2003; 116(Pt 9): 1647-1648.
2. Mohapatra A, Prabhakar AR, Raju OS. An unusual triplication of primary teeth-a rare case report. *Quintessence Int* 2010; 41(10): 815-820
3. Ezoddini AF, Sheikha MH, Ahmadi H. Prevalence of dental developmental anomalies: a radiographic study. *Community Dent Health* 2007; 24(3): 140-144.
4. Garvey MT, Barry HJ, Blake M. Supernumerary teeth - - an overview of classification, diagnosis and management. *J Can Dent Assoc* 1999; 65(11): 612-616.
5. Corbera JA, Morales I, Martin S, et al. A case of congenital supernumerary teeth in an ovine dental pad. *J Vet Dent* 2017; 34(4): 279-281.
6. Liu JF. Characteristics of premaxillary supernumerary teeth: a survey of 112 cases. *ASDC J Dent Child* 1995; 62(4): 262-265.
7. Schroeder HE. Development and structure of the tissues of the tooth, clinical consideration. *Oral structural biology*. 1<sup>st</sup> ed. Stuttgart, Germany: Georg Thieme Verlag 1991; 171-186.

8. Howard RD. The unerupted incisor. A study of the postoperative eruptive history of incisors delayed in their eruption by supernumerary teeth. *Dent Pract Dent Rec* 1967; 17(9): 332-341.
9. Mallineni SK, Nuvvula S, Cheung A, et al. A comprehensive review of the literature and data analysis on hypo-hyperdontia. *J Oral Sci* 2014; 56(4), 295-302.
10. Pasicka E, Onar V, Dixon PM. Supernumerary cheek tooth in a Byzantine horse from Theodosius Harbour, Istanbul, Turkey. *Equine Vet Educ* 2017; 29(5): 266-269.
11. Emslie RS, Tutt CL. Supernumerary maxillary fourth premolar teeth in five related Burmese cats. *JFMS Open Rep* 2020; 6(2): 2055116920946278. doi: 10.1177/2055116920946278.
12. Fiorenza L, Kullmer O. Occlusion in an adult male gorilla with a supernumerary maxillary premolar. *Int J Primatol* 2016; 37(6): 762-777.
13. Abler WA, Scanlon PF. A fourth pair of mandibular molars in a white-tailed deer. *J Wildl Dis* 1975; 11(1): 76-78.
14. Kierdorf H, Kierdorf U. Occurrence of a postpermanent mandibular fourth premolar in a moose bull (*Alces alces* L.). *Arch Oral Biol* 1992; 37(12): 1091-1095.
15. Miles AE, Grigson C, editors. *Colyer's Variations and diseases of the teeth of animals*. 2<sup>nd</sup> ed. Cambridge, UK: Cambridge University Press 2003; 117-124.