



# DYSPNEA IN A DEGU (*OCTODON DEGU*) ASSOCIATED WITH MAXILLARY CHEEK TEETH ELONGATION

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## Abstract

An adult, 2-year-old, 173 g, intact male degu (*Octodon degus*) was presented to the authors' clinic with a 2-week history of reduced food intake, weight loss, epiphora, and dyspnea. Physical examination revealed lethargy, cachexia, bilateral serous ocular discharge, dehydration, inspiratory dyspnea, and severe dental disease. Diagnostic investigation showed extensive apical elongation of premolars causing partial nasal cavity obstruction by masses of increased opacity, and loss of conchal detail. The animal was euthanized due to general poor condition and the severity of disease. Postmortem micro-computed tomography showed marked reserve crown elongation of all premolars and molars. All cheek teeth were abnormally curved and had widened interdental spaces. The apex of the maxillary left premolar nearly penetrated the left nasal bone. Both maxillary premolars penetrated into the nasal cavity and caused complete left and partial right nasal cavity obstruction. Apices of all premolars were dysplastic. Copyright 2016 Elsevier Inc. All rights reserved.

**Key words:** degu; computed tomography; dental disease; dyspnea; malocclusion; rodent

**A**n adult, 2-year-old, 173 g, intact male degu (*Octodon degus*) was presented with a 14-day history of reduced food intake, weight loss, mild serous bilateral epiphora, and dyspnea characterized by polypnea and intermittent open-mouth breathing. The degu was housed in a wire cage with wood shavings as a substrate. A commercial grain mixture, meadow hay, and water were provided *ad libitum*. Carrots and dried peas were offered as treats on a daily basis. The degu was maintained as a single-pet animal.

At the time of initial examination, the degu was cachectic (body condition score, 1/5). Lethargy, low skin elasticity, bilateral serous ocular discharge, distended abdomen, and dyspnea with open-mouth breathing were all observed in the patient when examined. Thoracic auscultation revealed only increased inspiratory effort without the presence of any harsh respiratory sounds. Abdominal palpation revealed distended stomach and intestines consistent with gas accumulation. Multiple hard swellings on the ventral border of

both mandibles were palpated. Mild-to-severe coronal cheek teeth elongation was seen during a brief oral cavity examination using a pediatric laryngoscope.

Following oxygen therapy and the administration of a sedative, midazolam 0.2 mg/kg intramuscular (Midazolam Torrex 1 mg/mL; Chiesi Pharma GmbH, Austria), the degu was placed under general anesthesia using isoflurane (Isoflurane; Rhodia, Torrex Pharma GmbH, Austria) mixed with oxygen. While anesthetized, a

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thorough endoscopic examination of the oral cavity was performed, blood was collected for hematology and a plasma biochemistry panel, urine collected for a urinalysis, and skull and abdominal radiographic images were obtained from the patient. Following the procedures, the degu was placed on a heating pad maintained at 102.2°F (39°C) and administered 15 mL/kg of electrolyte solution subcutaneously, ranitidine 5 mg/kg intramuscularly (Ranital; Lek Pharmaceuticals, Ljubljana, Slovenia), and butorphanol 0.3 mg/kg intramuscularly (Torbugesic; Pfizer Olot, S.L.U, Spain); after which the degu was allowed to recover in an oxygen cage.

Oral cavity endoscopy and skull radiography (dorsoventral, lateral, lateral oblique, and rostrocaudal view) revealed apical and coronal elongation of all teeth (Fig. 1). Both maxillary premolars were significantly elongated, with their apices reaching the ventral border of the frontal bone. There was widening of the interproximal coronal surfaces, coronal elongation of nearly all the cheek teeth, and abnormal occlusal surfaces of the cheek teeth. All maxillary cheek teeth formed small spurs; however, no buccal erosion was noted. The nasal cavity was partially obstructed by masses of increased opacity accompanied by loss of conchal detail. No signs of periapical infection were observed on radiographic images of the skull.

Hematology and plasma chemistry revealed mild leukopenia ( $3.3 \times 10^9$  cells; reference range  $3.5$  to  $14.6 \times 10^9$ ), lymphopenia ( $0.86 \times 10^9$  cells; reference range  $0.96$  to  $10.2 \times 10^9$ ), lower levels of total protein (39 g/L; normal range 45.8 to 77.7 g/L), hypocalcemia (1.7 mmol/L; normal range 2.01 to 2.96 mmol/L), improper Ca:P ratio (1:1.2; reference range 1:1.5 to 3), and elevated urea concentrations (16 mmol/L; reference range 6.6 to 14.9 mmol/L).<sup>1</sup> Ketonuria and aciduria (pH = 6.5) were noted in the urinalysis.

Abdominal and thoracic radiographic images revealed gaseous distention of the stomach, intestines, and cecum. The results of the physical examination, radiography, and laboratory analyses were consistent with anorexia, negative metabolic/energetic balance, advanced stage of acquired dental disease, and aerophagia because of the obstructive nasal disease. Owing to poor prognosis and health status of the animal, the owner elected euthanasia.

The skull was further evaluated using x-ray micro-computed tomography (mCT) analysis (Figs. 2-4). The degu skull was fixed in formalin, rinsed in water, and mounted in plastic tubes for micro-CT scanning in water. Specimens were



**FIGURE 1.** Lateral radiographic image of a degu skull showing a severe stage of dental disease with obvious incisor malocclusion, uneven occlusal surface, and apical and coronal elongation of all the cheek teeth. Note the extensive apical elongation of the maxillary fourth premolar with its apex reaching the nasal bone (arrow). (Used with permission from Vladimir Jekl)

scanned using a SCANCO mCT35 with 70 keV source voltage and 144  $\mu$ A intensity, and projection images were recorded with an angular increment of 0.36°. Reconstructed slices measured 1024  $\times$  1024 pixels at 30  $\mu$ m voxel size. Reconstructed image stacks were converted to .png format and visualized using the volume-rendering software Drishti.<sup>2</sup> Micro-CT examination showed marked reserve crown elongation of all premolars and molars. All cheek teeth were abnormally curved and had widened interdental spaces. The apex of the left maxillary premolar almost penetrated the left nasal bone. Both maxillary premolars penetrated into the nasal cavity and caused complete (left premolar) and partial (right premolar) nasal cavity obstruction. The apex of the left maxillary second molar compressed the bony surface of the braincase causing slight bulging of the bone into the olfactory fossa. Both maxillary last molars penetrated the cortex of the basisphenoid. The apices of maxillary and mandibular premolars had irregular surfaces and were much thicker than the reserve crown on transverse section. Histopathological examination of other thoracic and abdominal organs revealed only mild liver lipidosis and lung hyperemia.

## DISCUSSION

Dyspnea in pet hystricomorph rodents is a relatively common clinical sign of several diseases, and the clinician treating exotic pets should try to identify the primary diseases and factors that could

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