CASE REPORT

Suspected macular degeneration in a captive western lowland gorilla (gorilla gorilla gorilla)

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Abstract

Tel.: 49 (0) 341-9738700 Fax: 49 (0) 341-9738799 e-mail: steinmetz@kleintierklinik. uni-leipzig.de The case of a 31-year-old captive female Western lowland gorilla (Gorilla gorilla gorilla) with decreased near vision but good distance vision is presented. Examination of the fundus revealed drusen-like bodies in the macula presumably because of an age-related macular degeneration (AMD).

Key Words: age-related macular degeneration (AMD), ape, decreased near vision, drusen, eye, Western lowland gorilla

INTRODUCTION

In humans, age-related macular degeneration (AMD) is known as a medical condition which usually affects older adults and results in a loss of vision in the center of the visual field because of damage to the retina. In the 'dry' (nonexudative) form of AMD so called drusen develop which are tiny yellow or white accumulations of extracellular material that build up in Bruch's membrane of the eye. This results in atrophy to the retinal pigment epithelial layer of the retina and loss of photoreceptors (rods and cones) which causes loss of acuity in the central visual field.¹ Typically, yellowwhitish spots in the area of the macula can be seen. Drusen are the hallmark of human AMD (Fig. 1).

The 'wet' form of advanced AMD causes vision loss because of abnormal blood vessel growth out of the choroid through Bruch's membrane beneath the retina, leading to blood leakage below the macula. Bleeding, leaking, and scarring from these blood vessels eventually cause irreversible damage to the photoreceptors and rapid vision loss.¹

This report describes the occurrence of drusen-like bodies in the maculas of a 31-year-old captive female Western lowland gorilla (Gorilla gorilla gorilla) with decreased near vision.

CASE REPORT

History

A 31 year-old female western lowland gorilla (90 kg body weight) (Fig. 2) of the Leipzig Zoo has shown near vision decrease in both eyes for some years. The keepers had noted a good distance vision but difficulties in finding objects at arms length. Every time when the gorilla had tried to grasp a fruit unsuccessfully in a second attempt, she leaned back tilting her head slightly obliquely and succeeded.

The gorillas were kept in a group (female of this report and her daughter, one adult male, one other adult female, two other offspring). During panic and fugitive running, the ape bumped into walls or trees and seemed to be blind.

She came from Cameroon, where she was caught and was brought to Europe in 1984 and has been living in a modern large tropical house of the Leipzig Zoo since 2001. The tropical house accommodates the five inner enclosures for the four ape species. The building is surrounded by five corresponding, spacious outdoor enclosures. There are no fences, tiles, or concrete to be seen. Instead, the animals live in indoor and outdoor enclosures designed to match their natural environments and which allow them to demonstrate their natural behavior. Visitors are separated from the apes only by wet and dry moats and, in some locations, shatterproof glass.

The gorillas have been fed with 16 kinds of vegetables and fruits, yoghurt, and leaves. They get tea for their liquid intake.

The female of this study was geriatric. Besides the ophthalmologic symptoms, she has shown signs of osteoarthrosis and tooth decay as well. For the extraction of a carious back tooth, the ape was anesthetized, and an ophthalmologic examination was performed under the same anesthesia.

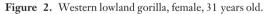
Anesthesia

The gorilla was darted. Anesthesia was introduced with 6 mg/kg xylazine (Rompun® TS; Bayer HealthCare,



Figure 1. Nonexudative age-related macula degeneration (AMD) in a woman. Typically yellow-whitish spots represent Drusen-like bodies. Photo by friendly courtesy of Christian Koch.

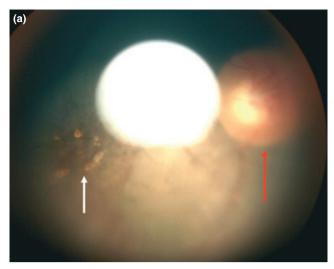




Leverkusen, Germany) and 2.5 mg/kg ketamine (Ursotamin®; Serumwerk Bernburg AG, Bernburg, Germany). Twenty-five minutes later, 1.5 mg/kg xylazine and 2.5 mg/ kg ketamine were applied intramuscular again. For abolishment of xylazine, 3.2 mg/kg yohimbine (1% solution, selfmade) was given intravenously.

Ophthalmic examination and results

The gorilla lied in dorsal recumbency; therefore, examination was performed from above. The eyelids, the cornea, and the anterior chamber were examined by biomicroscopy (SL 14; Kowa company Ltd, Tokyo, Japan) and showed no abnormalities. For measurement of the intraocular pressure (IOP) (TonoVet; Icare, Espoo, Finland), the head was tilted slightly laterally. The IOP was 16 mmHg in both eyes.



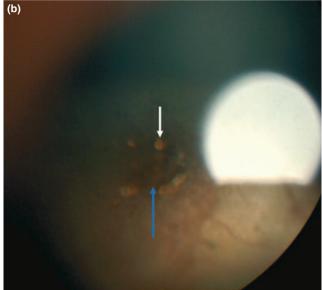


Figure 3. (a) Drusen-like bodies in the central retina area (white arrow) laterally of the optic disc (red arrow) in the right eye. (b) Drusen-like bodies (white arrow) in the otherwise more densely pigmented macula (blue arrow).

For dilation of the pupils, one drop each of tropicamide (Mydrum®; Chauvin ankerpharm, Berlin, Germany) and phenylephrine (Neosynephrin-POS 5%; Ursapharm, Saarbrücken, Germany) were placed on both eyes. After 30 min, a slit lamp examination of the lenses was performed. There were no abnormalities in the lenses.

Indirect ophthalmoscopy with 30- and 20-diopter condensing lenses (Omega 200; Heine, Herrsching, Germany) revealed in both eyes symmetrically bright spots (drusen-like bodies) in the central area of the retina (Fig. 3a). The maculas were otherwise more densely pigmented than the periphery (Fig. 3b).

For taking pictures, a digital camera (Kowa Genesis-D; Eickemeyer, Tuttlingen, Germany) was used.

The optic disc and the remaining fundus were without abnormalities.

Outcome

Because of the similarity with the signs of AMD in humans, the dry form of macular degeneration was presumed.

To reduce the progression of the AMD, the gorilla is additionally fed with 30 mg/kg omega-3 fatty acids (Omega 3-Support®; Wirtschaftsgemeinschaft deutscher Tierärzte eG, Carbsen, Germany) and 8 mg/kg vitamin E (RRR alpha-Tocopherol®; Optovit fortissimum 500®; Hermes Arzneimittel GmbH, Grosshesselohe/München, Germany) daily.

DISCUSSION

The female gorilla in this report developed a decreased near vision over recent years. She could see a piece of fruit being thrown at her but then could not find it at arms length. Humans affected by AMD see a gray shadow in the central vision field whereas peripheral vision persists.¹ This is what the ape realized when she was calm: she tilted her head slightly obliquely and could grasp the fruit. In situations of panic and escape, she failed to take this course of action and was in fact blind. Myopia, as previously described in rhesus monkeys,² and presbyopia seemed less likely because of these central scotomas from the way she acted.

In this report, ophthalmoscopically symmetrical yellowwhitish or hypopigmented spots (drusen-like bodies) could be seen in the gorilla's maculas. Such alterations of the retinal pigment epithelium were described in rhesus monkeys. The nearly identical ultrastructural features to those found in the human pigment epithelium in AMD and the influence of genetic factors made the rhesus monkey a model for agerelated maculopathy in humans.^{3–10} The degree of the drusen is correlating with the age of the animals.^{3,4,11,12} Having regard to a the life span of gorillas in the wild of up to 50 years,¹³ the female gorilla of this report was effectively geriatric.

Drusen-like bodies in geriatric western lowland gorillas have not been found so far in histological¹⁴ and clinical¹⁵ studies. In one study, a 34-year-old male gorilla showed degeneration of all cell layers, which was more prominent temporally than nasally.¹⁴

Therapy of the dry AMD in humans is, at present, dietary. A diet low in trans-unsaturated fat and rich in omega-3 fatty acids and olive oil may reduce the risk of AMD.¹⁶ The benefit of lutein and zeaxanthin supplementation or intakes of zinc and antioxidant have been controversially discussed.^{17,18} In the present case, supplementation of omega-3 fatty acids and vitamin E aim to reducing of progression. Healing is not to be expected.

The IOP of 16 mmHg in the ape's eyes, measured with TonoVet®, was higher than the mean IOP of 12 mmHg by Schiötz tonometry in five lowland gorillas. However, the range in this study was 7.0–17.0 mmHg.¹⁵ Because of the different methods of measurement, the results are not comparable. Both methods seem to be applicable in a supine anesthetized ape.

In circadian examinations with TonoVet $\$ in awake Tibetan monkeys, IOP levels up to 29 mmHg were measured.¹⁹

In conclusion of the findings above, AMD should be included in differential diagnosis of decreased vision in western lowland gorillas.

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