

Follow-Up of Cataract Development in Marine Mammals Through Voluntary Eye Sonography by Immersion

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Abstract

A cataract is the clouding of any portion of the lens inside the eye, which can lead to decreased vision to complete blindness and is mainly a degenerative disease related to age, though a variety of other causes do exist, like genetics or UV light exposure. Anterior luxation of the lens is reported to be frequent at a mature stage and is very painful. Since animals in aquaria and zoological institutions are now living to an older age thanks to the evolution of husbandry care, the number of animals affected by cataracts is steadily growing as well.¹

Surgical removal of the lens has also become frequent in pinnipeds, but this is generally done upon full ripening of the lens and the technique then used is the complete removal of the mature cataract through an intra or extracapsular approach.^{2,3} However, the surgery is still heavy for the eye.⁴ Phacoemulsification, less invasive and the most widely used cataract surgery nowadays in other species, is still in infancy in marine mammals like pinnipeds, and would need to be performed at an early stage of the disease to be successful and to prevent corneal endothelial cell loss.⁵

When not fully mature or very visible, the confirmation of the presence of a cataract is generally done with the use of an ophthalmoscope or a slit lamp but is more difficult in cases of corneal opacities or in less trained animals, especially pinnipeds. In recent years voluntary eye sonography by immersion, both in pinnipeds and cetaceans, has become an excellent tool to obtain better visualization of the whole eye globe and especially the posterior area of the eye.⁶⁻⁸ Not only are the animals much keener to participate through this approach, water being their normal environment, but it also allows for more detailed identification of the intraocular structures and, in case of cataract, a much earlier appreciation of the changes occurring over time.

The vitreous is an anechoic structure. Under normal circumstances, the only echogenic structures visible between the iris/ciliary body and posterior wall of the eye are portions of the anterior and posterior lens capsule with the primary beam.⁹ As such, sonography of the eye by immersion has permitted the identification of early stages of cataract; inflammation development with and without adherences and uveitis in the anterior and posterior chambers; maturation of the cataract with time with thickening, indentation, tears and loss of integrity of the capsule; rupture of the ciliary bodies; and luxation. This approach has shown that posterior luxation can be present but unrecognized or hardly visible and remaining so for a long time. Subsequent consequences of inflammation in the anterior chamber can also be identified, such as thickening, opacities, or epithelial disruption of the cornea. Sonographic pictures and videos of

these pathologies will be presented using a Logiq e VET, Logiq BT12, or Logiq V2 ultrasound machine from General Electrics, with a 12L-RS probe, as this equipment can be used by general on-site veterinary practitioners.

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