Successful cataract removal, and lens replacement on a rescued yellow-cheeked gibbon (Nomascus gabriellae)

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Summary

A young female yellow-cheeked gibbon (Nomascus gabriellae), rescued from the illegal pet trade as an infant, has successfully undergone cataract surgery and lens replacement by Ho Chi Minh eye surgeons in Vietnam. After checking the retina in both eyes and calculating the required power of the replacement lenses, the cataract lenses were removed using phaco-emulsification, and new monofocal lenses fitted. The young gibbon (Mika) has adapted well to sight and lives with other gibbons in the Dao Tien Endangered Primate Species Centre in Cat Tien National Park, South Vietnam.

This is an important step for improving animal welfare standards in Vietnam and throughout Southeast Asia.

Introduction

Gibbons (Hylobatidae) are distributed from north-east India and Bangladesh in the west, and Yunnan and the Hainan Island in the north, through Burma, Laos, Vietnam, Cambodia, Thailand,
and Malaysia and across Indonesia (Sumatra, Borneo and Java). With high adaptive radiation and speciation they have become the most successful ape in terms of the number of species and their distribution throughout South-east Asia.

In terms of risk of extinction, 86% of all gibbon taxa have become more endangered within the last three to six years (Geissmann, 2007). Certain gibbon species are the most endangered apes on earth (e.g. Nomascus nasutus; N. hainanus), due to loss of habitat, hunting for meat, Chinese medicine and the national and international illegal pet trade.

As a consequence, rescue centers located throughout Southeast Asia are overwhelmed with confiscated gibbons, trying to care and rehabilitate sometimes mentally and physically damaged individuals. The directors of the new Dao Tien Endangered Primate Species Centre in Cat Tien National Park, South Vietnam, have come across many gibbons with severe malnutrition and lack of social skills, but found most to possess a very strong innate ability to recover mentally and physically, if given the opportunity.

Animal welfare is becoming important in many Asian nations. The International Fund for Animal Welfare (IFAW) asked people in China, South Korea and Vietnam about their views on the treatment of animals; 90% believed “we have a moral duty to minimize suffering.” Further still, the vast majority of those questioned would like to see legislation to protect animals (BBC NEWS, 2005). There is no animal welfare legislation in Vietnam, although increased awareness and support.

Background to the young female gibbon “Mika”

Mika, a young female gibbon estimated to be born in 2003, was illegally taken from the wild as an infant and taken to market to be sold in the illegal pet trade in Ho Chi Minh City. When rescued in 2005 the cage in which she was kept was welded closed, so she had most likely not left the cage for many months, unable to move, just sit on her legs. When the young gibbon was released from the cage she appeared paralyzed, with little muscle use in her legs. The bones in Mika’s legs were seriously deformed, with 45-degree bends on the lower legs. This has probably been caused by the constricted movement in her small cage, as well as metabolic bone disease due to an unbalanced diet and lack of UVB exposure. Juvenile cataracts (clouding of the lens that gradually affects visual quality) were visible in both eyes, but she still appeared to have considerable vision. The gibbon was housed with other young gibbons for social company. Slowly she regained the use in her legs over the next 2 years.

By August 2008 when the Managers of Dao Tien first saw the gibbon, she was just reaching the age of sexual maturity and turning from black to blonde in color. The cataracts were very dense and the gibbon had no remaining sight (Fig. 1).

Background to cataract

Possible causes for cataract in early childhood are hereditary enzyme defects, severe trauma to the eye, intra-ocular inflammation, excessive ultraviolet-light exposure, poor diet, short but severe period(s) of dehydration, diabetes or the use of certain drugs. Not much is known about cataract in gibbons. Three cases of spontaneous cataracts have been investigated in a colony of vervet monkeys (Chlorocebus aethiops). Clinical chemistry gave a hint that calcium might be a key factor in the development of these cataracts; in both cases of the juvenile cataracts, the calcium content in the serum and in the aqueous humor was clearly decreased in the affected babies (Plesker et
al., 2004). While cataracts in captive-bred vervet monkeys starting at 6-8 months of age were found to have a probable genetic origin (Villiers et al., 2001).

Cataract removal in non-human primates has been successful in great apes. In 2004 a rescued chimpanzee at the Sannaga-Yong Chimpanzee Rescue Centre, Cameroon, West-central Africa was successfully operated on by an American medical ophthalmologist (Nichols, 2005). May 16th, 2007, successful cataract surgery was performed on a 20-year-old Orangutan, in Malaysia’s Matang Wildlife Centre, after cataracts formed after he bit through an electric cable (Anonym, 2008).

In this case we wanted to remove cataracts from a small ape, a gibbon and replace the lens.

**Materials and Methods**

During health checks between August and November 2008, Mika was physically examined; blood and urine were tested repeatedly to rule out diabetes and other diseases. On November 29th 2008 Doctors Tien Phi Duy and Tran Huy Hoang from the Community Eye Department, Ho Chi Minh City Eye Hospital performed cataract surgery on Mika. This was the first time the doctors had performed this surgery on a non-human primate. After consultation with Dr Tran Hai Yen (Ho Chi Minh City Eye Hospital) it was agreed that the surgery could go ahead, using the training facilities in the hospital. Anaesthesia equipment was provided by the Endangered Asian Species Trust (EAST), sponsored by Robert Taylor, under veterinary supervision of Monkey World UK specialist primate veterinarian Femke van den Bos.

Before the surgery could take place, the eyes needed to be examined to check if the retina was still intact. If the retina would have been damaged, changing the lens would not have been useful.
to regain sight. The left eye appeared to have slight retinal damage, and the retina in the right eye was completely intact. This was confirmed during the surgery when the cataracts had been removed allowing the retina to be seen through the operating microscope.

The corneal curvatures (hence refractive power) were measured with a handheld keratometer. The antero-posterior length of the eyeballs were taken using an a scan sonography machine. Both machines were factory-calibrated for use on human eyes, and the lenses approved by US FDA for human use as well. The readings were then used to calculate the power of intraocular lenses to be implanted. As it turned out, Mika’s right eye needed a +27.0 diopter lens, and the left one a +29.0 diopter lens. The lens powers were calculated to return Mika's right eye to emmetropic status and render her left eye myopic. This was intended to enable her to see near objects with her left eye, and far objects with her right eye. The lenses she received were monofocal, which should enable her right eye to see well in the distance, and her left eye to see better objects nearer to her.

The surgical technique used is called phacoemulsification. This is the standard procedure for cataract removal in the US and other developed countries, which involves the use of a tiny tube inserted through a small (3 mm or less) incision into the eye to emulsify and then suck out the cataractous crystalline lens (Fig. 2). A clear, artificial intraocular lens needs to be placed in the position of the removed cataract to restore the normal refraction and therefore vision. To be implanted through such a small opening, the artificial lens must be foldable; three-piece foldable lenses (Sensar, manufactured by Allergan, USA) were used. As Mika had white cataract, trypan blue dye was used to stain the anterior lens capsule to assist with the opening of this capsule so that the lens material could be engaged with the phaco tube, leaving the capsular bag intact for lens replacement.

Fig.2. Phaco-emulsification of the eye. Photo: Marina Kenyon.
In human beings, white cataracts in a child’s eyes are almost always congenital in origin unless there are other known factors such as drug use or trauma. According to the surgeon, Mika’s cataract felt and reacted like pediatric cataract but human eyes with white congenital cataract operated as late in life as were Mika’s usually do not regain good eyesight, as did Mika. This case could have been a late onset congenital cataract, but due to her unknown history in captivity, pathological causes cannot be ruled out.

After surgery

After a great debate about how to stop Mika from rubbing her eyes after the surgery, the general consensus was that there was no realistic way to prevent her but, as the surgery should not leave the eyes uncomfortable, the frequency of eye rubbing should be at low/normal levels. As a precaution Mika was placed on pain relief, 0.1mg/kg Meloxicam once a day just to ensure she had minimal reason to touch her eye. She was also given eye drops every 2 hours in the first week, and reduced weekly, for a total of 4 weeks to help protect against infection and inflammation. As Mika was used to being handled due to her blindness, she was very compliant and when given food she would turn her face up as gibbons do, allowing eye drops to be administered. After cataract surgery the eyes might be sensitive to light so Mika was placed in a dull-light room with no direct sunlight for 3 days.

Results and Discussion

By December 20th 2008, it was very clear that Mika had gained good vision in her right eye, but limited vision in her left eye, which was expected due to retinal damage from the extended period of the cataract and the intentionally induced myopia. There is debate about the psychological affect that the sudden acquirement of vision can have on an animal. This has been used as a reason to justify not operating in similar cases. Mika appeared to take everything in her stride and seems even happier with her social group. Six months on from surgery Mika has gained condition and now behaves like a dominant adult female (Fig. 3). The next stage for Mika is to be rehabilitated into trees.

The collaboration between different organizations and fields of expertise has not only transformed Mika’s life but, demonstrated a willingness to improve animal welfare in South-east Asia, with young professionals possessing the expertise and belief to make a difference (Fig. 4). Specialist wild animal eye clinics have been suggested as a way to improve animal welfare in Vietnam, if found necessary.

Fig.3. Mika three months after surgery. Photo: Marina Kenyon.
References


