Unilateral Phacoemulsification in a Captive Bred Greater One Horned Rhinoceros (*Rhinoceros unicornis*)

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Purpose

To describe the signalment, clinical presentation, surgical treatment, post-operative management and outcome of a captive bred greater one horned rhinoceros (*Rhinoceros unicornis*) that underwent unilateral phacoemulsification for treatment of a cataract.

Method

A 19-year-old male entire Greater One Horned Rhinoceros presented for assessment of visual deficits and bilateral cataracts.

The patient had a history of slow progressive cataract formation, reduced activity levels and collisions with enclosure furniture. Positive reinforcement behaviour training was commenced two months prior to assessment to permit a conscious full ophthalmic examination and ocular ultrasound.

Bilateral late immature cataracts were diagnosed on slit lamp examination. Ocular ultrasound revealed an axial posterior lenticonus in the left eye; therefore was not considered the preferred surgical candidate. Electroretinography (HMsERG™ Model: 1000A RetVetCorp Ltd) revealed a normal trace bilaterally.

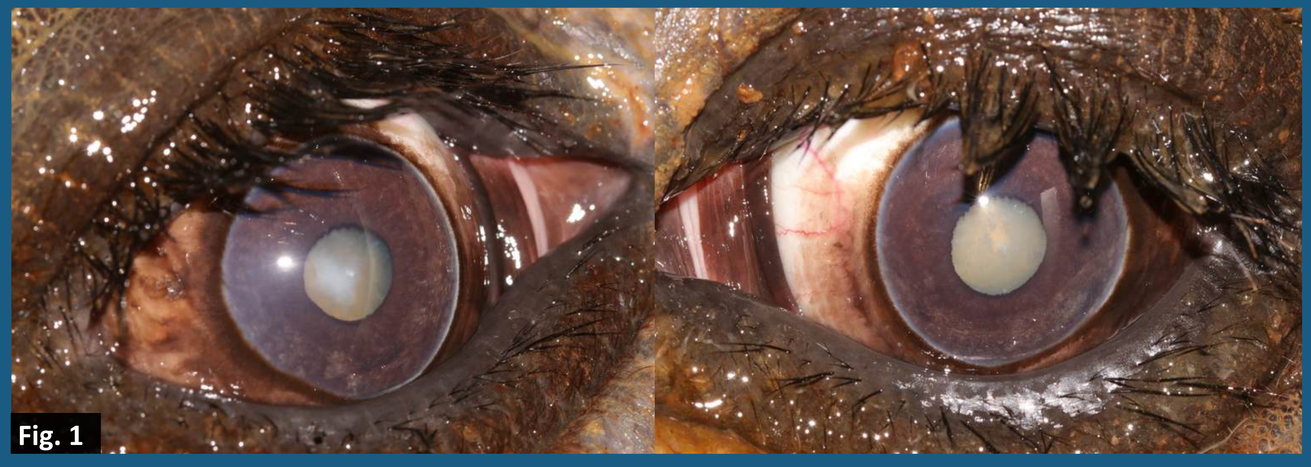
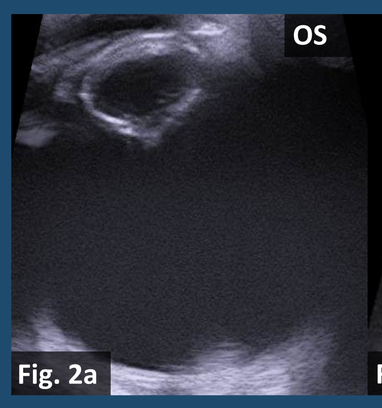
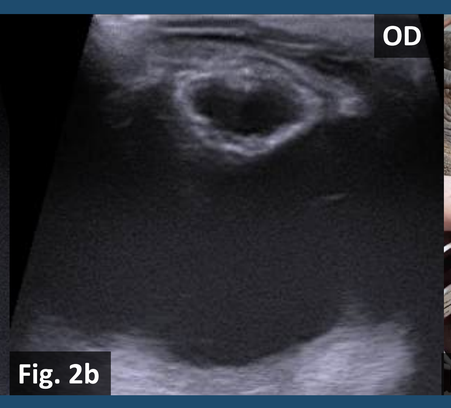


Fig. 1 Appearance of the left and right eyes at initial examination.





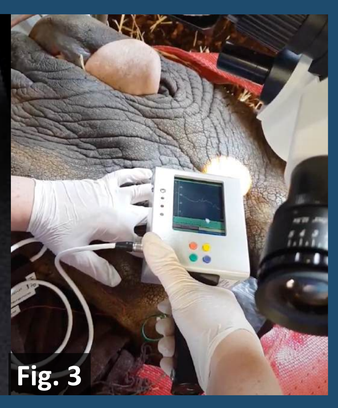


Fig 2. Transcorneal ocular ultrasound was performed under local anaesthetic while conscious. The axial lens diameter was 7.6mm in the left eye (**Fig. 2a)** and 7.0mm in the right eye (**Fig. 2b).** A posterior lenticonus was identified in the left eye.

Fig 3. Electroretinography of the right eye was performed under general anaesthetic and revealed a normal electrical trace.

Fig 4. The patient positioned in left lateral recumbency following induction. An intravenous cannula was placed in the auricular vein in the right ear. Total intravenous anaesthesia was administered via a continuous rate infusion

Fig 5. The intraoperative set up was a challenging environment for microsurgery. Unimanual phacoemulsification surgery was performed in the right eye under general anaesthesia. A planned posterior capsulorrhexis and automated vitrectomy were performed and the eye was left aphakic.

Results

Anaesthesia Protocol

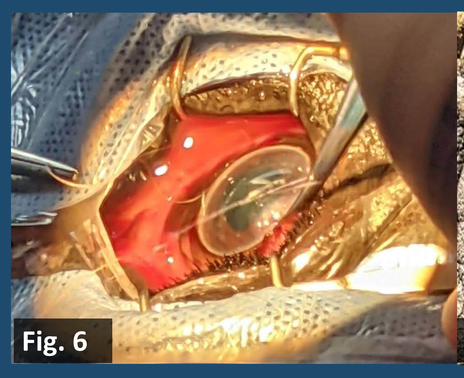
The patient was premedicated with 0.16 mg/kg acetylpromazine and 0.04 mg/kg detomidine per os. Induction was performed via an intramuscular dart 1 hour 52 minutes after oral premedication using etorphine 0.0018 mg/kg and midazolam 0.02 mg/kg. An intravenous cannula was placed in the auricular vein in the right ear. Two 250mg ketamine boluses were administered intravenously. General anaesthesia was maintained with a guaifenesin (23 mg/kg/hr), ketamine (0.23 mg/kg/hr) and detomidine (0.01 mg/kg/hr) continuous rate infusion. Reversal agents (atipamezole (0.092 mg/kg IM) and naltrexone (0.06 mg/kg IV) were administered 10 minutes after the CRI was discontinued.

Surgical Procedure

The patient was positioned in left lateral recumbency. Unimanual phacoemulsification surgery was performed in the right eye under general anaesthesia via a 3.2 mm perilimbal incision. A continuous curvilinear capsulorrhexis was performed in the anterior lens capsule. Phacoemulsification was performed using a portable phacoemulsification unit (Alexos™, Oertli Instrumente AG) with a 2.8 mm 30° flared tip needle. Residual cortical material was removed with automated coaxial irrigation/aspiration. Fibrous metaplasia of the axial posterior lens capsule was revealed and a planned posterior capsulorrhexis was performed. A limited automated vitrectomy of the anterior vitreal face was performed and the eye was left aphakic. The perilimbal incision was closed using 8-0 Polygalactin 910 in a simple interrupted pattern. Subconjunctival dexamethasone (10mg; 0.5ml) was administered at the end of surgery.

Recovery and Follow up

Recovery was uneventful; immediate examination revealed an intact menace response with mild uveitis and localised corneal oedema adjacent to the incision. The patient was confined to an indoor enclosure for 9 days and received topical bromfenac and chloramphenicol QID for 2 weeks. Follow up assessment 64 days later revealed a comfortable and visual eye. Intraocular pressure readings were 27 and 31 mmHg in the right and left eyes respectively. Animal care staff reported a significant improvement in activity levels, foraging behaviour and ability to navigate without collisions.



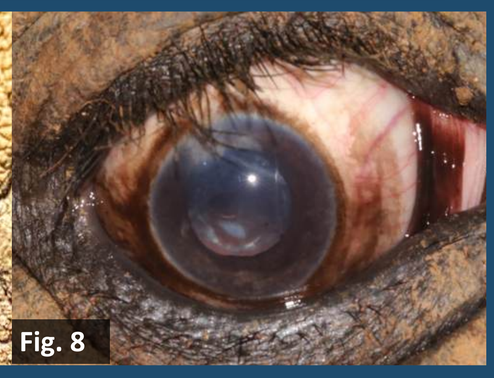


Fig 6. A large Castroviejo eyelid speculum provided good exposure of the globe during surgery. Stay sutures were placed to facilitate manipulation of the globe.
Post operative appearance of the right eye 8 days (**Fig 7.)** and 64 days (**Fig 8.)** following phacoemulsification surgery.

Conclusion

This is the first published report of unilateral phacoemulsification in a rhinoceros. A successful visual outcome was achieved with improvements in activity and expression of other normal behaviours reported by animal care staff following restoration of vision.

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