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JOURNAL: VETERINARY OPHTHALMOLOGY

PUBLISHER: Wiley

PUBLICATION DATE: 22 July 2019

DOI: https://doi.org/10.1111/vop.12699

OUTCOME OF PHACOEMULSIFICATION IN 71 CATS: A MULTICENTER RETROSPECTIVE STUDY (2006-2017)

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Purpose: To assess outcome of phacoemulsification in cats. **Methods:** Records of 71 cats (82 eyes) from five referral centers were reviewed. Groups were divided by cause of cataract (congenital/juvenile (n=32), traumatic (n=33) and secondary to uveitis (n=6)) and group comparisons were performed for the most common complications:

postoperative ocular hypertension (POH), uveitis, corneal ulceration, synechia/dyscoria and posterior capsular opacity (PCO) in three different time periods: immediately postoperatively, at 1-90 days and at >90 days. **Results:** Median follow-up was 198 days (interquartile-range 64-518 days). The overall visual success rate of the cats with a 12-month follow up was 92.6% (25/27 eyes). POH occurred in 35/82 (42.6%) eyes. Immediately postoperatively, uveitis was the most common complication in 28/82 eyes (34.1%) followed by corneal ulceration in 22/82 eyes (26.8%). At 1-90 days, uveitis in 41/81 eyes (50.6%) remained the most common complication, followed by synechia/dyscoria in 21/81 eyes (25.9%), corneal ulceration in 16/81 eyes (19.7%) and PCO in 15/81 eyes (18.5%). At >90 days, PCO in 17/47 eyes (36.1%), followed by synechia/dyscoria in 16/47 eyes (34%), were the most common complications. The number of eyes with synechia/dyscoria in the trauma group was higher (13/33 (39.3%)) than in the congenital/juvenile group (5/31 (16.1%)) at 1-90 days (P=0.039). No statistical difference was found for the other group comparisons. Three eyes in total were enucleated owing to endophthalmitis, post-traumatic ocular sarcoma, and secondary glaucoma. **Conclusion:** Uveitis in the short-term and PCO and synechia/dyscoria in the long-term were the most common complications following phacoemulsification in cats.

Key words: phacoemulsification, cats, cataract, carbachol, sarcoma, trauma, uveitis

Introduction

Very few reports on cataracts in cats are available in the peer-reviewed literature. The frequency of cataracts in cats has been reported to increase with age[1] and increased numbers of cataracts have been reported in cats with diabetes and previous

dehydrational episodes.[1] While primary and inherited cataracts are suspected to be rare in cats, cataracts secondary to uveitis or trauma are thought to occur more commonly.[2] Primary cataracts have been documented in various feline breeds including Persian[3], Himalayan[4], Russian blue[5], British shorthair[6] and Birman.[7] Congenital cataracts in cats have also been described as a manifestation of the Chediak-Higashi syndrome.[8] A recent publication describes cataracts suspected to have a hereditary component in a population of Bengal cats in France.[9]

The complications and visual outcome following phacoemulsification have been reported in dogs and horses. In dogs, reported success rates are from 65-90% over varying time periods: 90% and 65% at 12 and 24 months respectively,[10] and 82.7% and 79% at a median of 10 and 28 months respectively.[11,12] In horses, reported success rates vary from 35-81%: 81% at a median of 28 days,[13] 50% and 35% between one month to six months and between six to 12 months respectively[14,15] and 54% at a mean 35 months postoperatively.[14]

Braus et al evaluated the outcome of surgical treatment of lens laceration in six cats and noted that all had a favorable outcome following surgery, with all patients being visual at the last checkup and with only one patient showing a persistent posterior synechia as minor complication.[16] To the best of the authors' knowledge no other literature was available on the outcome of lens surgery in cats apart from the paper by *Braus et al*. The purpose of this study was therefore to assess the clinical findings, complications and visual outcome of a group of cats following phacoemulsification.

Materials and methods

Medical records of cats that underwent phacoemulsification from 2006 to 2017 in five referral centers in the UK were reviewed. Ethical approval from the Animal Health Trust (AHT, Newmarket, UK; 25-2017E) ethical committee was obtained. Data collected included breed, sex, age, artificial intraocular lens implantation, cataract stage (incipient, immature, mature, hypermature), suspected cause of the cataract (congenital/hereditary, traumatic or secondary to uveitis), pre and postoperative treatment, postoperative complications, visual outcome, use of intracameral carbachol and postoperative mydriatics.

A successful outcome was defined as a visual and comfortable eye. Vision was based on a positive menace response and, in cases of bilateral surgery, functional vision according to the owner. For the purpose of this retrospective study, uveitis was identified when there was aqueous flare, keratic precipitates and/or iris hyperemia as these were the more common reported findings. In addition and for the purposes of this study, postoperative ocular hypertension (POH) was considered when there was a transient elevation in IOP (>25 mmHg) that resolved within 12–24 hours.[17] The cases that received intraocular pressure (IOP) regulating medication are specified.

1. – Pre-surgical assessment and treatment

All cases underwent a full ophthalmic examination including slit lamp biomicroscopy, indirect ophthalmoscopy and tonometry (Tonovet®, setting d, Icare, Finland). This was performed by an ECVO diplomate, by an ECVO resident under direct supervision of a diplomate or by an RCVS Ophthalmology Certificate holder. When available, an ocular ultrasound was performed using topical proxymethacaine hydrochloride 0.5% (Minims®, Bausch and Lomb, Surrey, UK) and a 10 to 18 mHz probe placed directly on the cornea with coupling gel (Healthlife®, Barclay-Swann Ltd, Linconshire, UK). A photopic and scotopic ERG (HMsERG 2000®, Ocuscience, Henderson, NV, USA;

Eickemeyer®, Germany and RETIcom Flash®, Roland-Consult, Brandenburg, Germany) was performed, in some cases under general anesthesia or sedation. Preoperative treatment varied among centers and included topical flurbiprofen sodium 0.03% (Ocufen®, Allergan, Bucks, UK) 1 drop every 15 minutes for four hours, phenylephrine 2.5% (Minims®, Bausch and Lomb, Surrey, UK) 1 drop/hour two doses in total, tropicamide 0.5% (Minims®, Bausch and Lomb, Surrey, UK) 1 drop/hour two doses in total, prednisolone acetate 1% (Pred Forte®, Allergan Ltd, Marlow, Bucks, UK) 1 drop/hour four doses in total and atropine (Minims®, Bausch and Lomb, Surrey, UK) to effect. Meloxicam 0.2mg/kg/subcutaneous (Metacam® 1.5 mg/ml, Boehringer Ingelheim, Germany) was given routinely peri- or intra-operatively. Intravenous cefuroxime 20 mg/kg (Zinacef®, Glaxo Operations UK Ltd, Middlesex, UK) was given intraoperatively in some cases.

2. - Surgery method and post-surgical treatment

During anesthesia a neuromuscular block was achieved with atracurium besylate (Tracrium®, Aspen Pharma Trading Limited, Ireland) (0.1-0.3 mg/kg intravenously initial dose). This was followed by another dose of 0.025-0.15 mg/kg intravenously when deemed necessary by the anesthetist. Reversal was achieved with neostigmine methylsufate (Neostigmine®, Hameln Pharmaceuticals Ltd, UK) 40-50 mcg/kg slowly intravenously when necessary. The surgical treatment included routine phacoemulsification lens extraction (Oertli Faros 3000®, Oertli instruments, Switzerland; Oertli OS3®, Oertli instruments, Switzerland; AMO Sovereign®, AMO Signature®, Abbott Medical Optics, Santa Ana, California; now Johnson & Johnson as of 2017), with or without placement of an artificial intraocular lens (IOL). The cornea was incised and a 2-step or 3-step corneal wound was constructed. Intra-cameral adrenaline (Dilute Adrenaline 1:10,000, Martindale pharmaceuticals, Essex, UK) 0.2ml

was injected in the cases where topical mydriatics had not been given pre-operatively. The eye was inflated with a viscoelastic device (2% hydroxypropylmethylcellulose – HPMC; An-Viscose® 2%, Visionary Surgical Solutions, Chesterfield, UK- and 1.4% or 2% sodium hyaluronate –AJL Ophthalmic SA, Spain-) according to surgeon's preference. A side port was created when needed whilst using continuous irrigation. A continuous anterior curvilinear capsulorrhexis was performed whenever possible followed by phacoemulsification of the lens. Placement of an artificial intraocular lens was performed when the integrity of the lens capsule allowed it. Intracameral carbachol (Omnichol® 0.01%, Dioptrix, France) 0.2-0.4 ml was in some cases used at the end of the surgery according to surgeon's preference. Postoperative IOP monitoring was performed when patient cooperation allowed it and it varied between centers. When POH occurred, additional measurements were taken as decided by the surgeon. Postoperative treatment differed amongst centers and included topical and systemic anti-inflammatories, topical and systemic antibiotics, mydriatic/cyclopegics and IOP regulating medication.

3. - Statistical analysis

Statistical analysis was performed using SPSS software (SPSS 21). The level of significance was set at $p<0.05$ for all analyses. Gaussian distribution was assessed graphically and then with the Shapiro-Wilk test. Baseline descriptive statistics were calculated and reported as percentages for categorical data and median and interquartile range for continuous data.

Group comparisons were performed by chi-square or Fisher's exact test to compare proportions as indicated; no attempt was made to correct for multiple comparisons. Group comparison when groups were divided by cause of cataract were performed for the most common complication variables: POH, uveitis, corneal ulcer,

synechia/dyscoria, posterior capsular opacity (PCO) and glaucoma. Comparisons between the ability to implant an IOL in each group, carbachol and the presence of uveitis/fibrin in the immediately postoperatively period, and POH and the use of carbachol, breed and IOL implantation were also performed. For this purpose, breeds were grouped into pure breeds and non-pure breeds to minimize group numbers. Comparisons between the stage of cataracts and visual outcome were initially planned during the study design. However, as the number of blind eyes was so low comparisons could not be carried out. All cases lost to follow up were excluded from statistical analysis.

Results

A total of 71 cats and 82 eyes were included in the study with 11 cats undergoing bilateral surgery. Three cats with bilateral cataract had each eye operated during separate procedures. The cause of the cataract was suspected to be congenital/juvenile in 32/82 (30%), traumatic in 33/82 (40.2%), secondary to uveitis in 6/82 (7.3%), and it was not known in 11/82 (13.4%) cases. Regarding the stage of the cataract, there were 27/82 (32.9%) incipient, 28/82 (34.1%) immature, 20/82 (24.4%) mature, 2/82 (2.4%) hypermature, and in 5/82 (6%) the stage was not described on the records. Sex included 6 male entire, 34 male neutered and 31 female neutered cats. Population age was 37 months (interquartile range (IQR) 12-72 months). There were 45 Domestic short hair (DSH), 5 Domestic long hair (DLH), 6 British short hair (BSH), 3 Persian, 2 Persian crosses, 2 Savannah, 2 Birman and one each of: Siberian, Ocicat, Bengal, Abyssinian, Foreign shorthair and Maine Coon. An ocular ultrasound was performed in 56/82 (68.3%) eyes and an ERG in 9/82 (11%) eyes. The ERG was normal in all cases.

Overall results

Cases were followed for 198 days (IQR 64-518 days; range 6-1899 days). The overall success rate of the cats that remained within the study with a 12-month follow up was 92.6% (25/27). A total of 89.5% (43/48) eyes were visual at the last follow up with 34 eyes lost to follow up. Three eyes in total were enucleated: two in the trauma group owing to endophthalmitis (17 days postoperatively) and post-traumatic ocular sarcoma (640 days postoperatively) respectively and one in the uveitis group due to secondary glaucoma (1335 days postoperatively). Two of the eyes (2/27; 7.4%) that remained within the study with a 12-month follow up were blind. One of them was reported non-visual but no reason was given and the other one had retinal degeneration of unknown origin.

An IOL was implanted in 58/82 (70.7%) eyes. POH occurred in 35/82 (42.6%) eyes. Intracameral carbachol was used in 38/82 (46.3%) eyes. Immediately postoperatively, 82/82 (100%) eyes were visual. Uveitis 28/82 (34.1%) was the most common complication followed by corneal ulceration 22/82 (26.8%) immediately postoperatively. At 1-90 days postoperatively 30/31 (96.7%) eyes with congenital/juvenile, 30/33 (90.9%) traumatic and 6/6 (100%) secondary to uveitis cataracts were visual. Uveitis 41/81 (50.6%) remained the most common complication followed by synechia/dyscoria 21/81 (25.9%), corneal ulceration 16/81 (19.7%), and PCO 15/81 (18.5%). More than 90 days postoperatively, 19/19 (100%) eyes with congenital/juvenile, 15/17 (88.2%) traumatic and 3/4 (75%) secondary to uveitis were visual. PCO 17/48 (35.4%) followed by synechia/dyscoria 16/48 (33.3%) were the most common complications (Table 1).

The prevalence of POH was significantly lower in cases in which intracameral carbachol was used (P=0.026). The number of eyes with synechia/dyscoria in the

trauma group was higher (13/33 (39.3%)) than in the congenital/juvenile group (5/31 (16.1%)) at 1-90 days (P=0.039). There were no statistical differences among the groups for the rest of the group comparisons that were assessed. Mydriatics were used in 15/82 (18.3%) cases. There was no uniformity in their use; in some cases it was based solely upon the presence of synechia/dyscoria and in other cases these were used immediately after surgery. Comparisons between the use of mydriatics and the presence of synechia/dyscoria in each group could not, therefore, be carried out.

1. - Congenital/juvenile

Twenty-three cats (31 eyes) had congenital/juvenile cataracts (14 unilateral and 9 bilateral). The stage of the cataract was classified as incipient in 2/32 (6.2%) cases, immature in 20/32 (62.5%) and mature in 10/32 (31.2%). There were 17 (53.1%) male neutered, 9 (28.1%) female neutered and 6 (18.7%) male entire cats. Population age was 24 months (IQR 7-47 months). Breeds included 8 DSH, 3 BSH and one each of DLH, Foreign shorthair, Maine Coon, Birman, Bengal, Ocicat, Persian, Persian cross and Savannah. POH occurred in 14/32 eyes (43.7%) and an IOL was implanted in 29/32 eyes (90.6%). One of the cats had dendritic corneal ulceration in the immediate postoperative period and received a two-week course of ganciclovir 0.15% (Virgan®, Laboratoires Thea, France) five times daily. No testing for feline herpesvirus-1 was performed. One of the cases had pre-existing bilateral lens capsule rupture and lens material in the vitreal cavity; bilateral core vitrectomy was performed at the time of surgery.

At 1-90 days after surgery 30/31 (96.7%) eyes were visual; one was blind and one was lost to follow up. The cause of the blindness was suspected retinal degeneration following POH. Thirteen cases were lost to follow up more than 90 days

postoperatively, including the blind eye with suspected retinal degeneration following POH. The remaining 19 eyes (100%) were visual.

2. - Traumatic

Thirty-three cats (33 eyes) suffered a traumatic injury to the lens. The stage of the cataract was classified as incipient in 25/33 (75.7%) cases, immature in 2/33 (6%), mature in 2/33 (6%) and in 4/33 (12.1%) cases it was not recorded. There were 15 (45.4%) male neutered, 16 (48.4%) female neutered and 2 (6%) entire male cats. Population age was 30 months (IQR 13-70 months). Breeds included 24 DSH, 2 BSH, 2 DLH and one each of Persian, Persian cross, Savannah, Siberian and Abyssinian. POH occurred in 10/33 eyes (30.3%) and an IOL was implanted in 16/33 eyes (48.5%). Three cases in this group were hospitalized and treated medically before surgery. Following surgery, three cases received a conjunctival pedicle graft over a corneal laceration and another case underwent a corneal autograph transplant and core vitrectomy. Another case was admitted for a vitrectomy twenty days after phacoemulsification; a thorn had been removed from the eye at the time of surgery but no information was available within records as to why vitrectomy was required. A cat with a partial retinal detachment identified in the immediate postoperatively period underwent a barrier retinopexy. The detachment was no longer visualized at the next examination. At 1-90 days post surgery 30/33 (90.9%) eyes were visual and one eye was enucleated due to endophthalmitis. No information was available as to the cause of the blindness in one case. The remaining blind eye had retinal degeneration of unknown origin. In this cat, examination of the fundus immediately after surgery was normal. At the last examination 16 eyes were lost to follow up. Two eyes were blind: the one with retinal degeneration and one that was enucleated and diagnosed with post-traumatic sarcoma. The remaining eyes were visual (15/17; 88.2%).

3. - Secondary to uveitis

Four cats (6 eyes; 2 unilateral and 2 bilateral) had cataracts secondary to uveitis. The stage of the cataracts was classified as immature, mature and hypermature in 2 (33.3%) cases each. There were 3 (75%) male neutered and 1 (25%) female neutered cats and population age was 91 months (IQR 62-120 months). They were all DSH. Three cats underwent further investigation: hematology (n=3) and biochemistry (n=3), feline leukemia virus (n=2), feline immunodeficiency virus (n=2), Toxoplasma IgG/IgM (n=2) and Coronavirus titers (n=1). One case showed evidence of exposure to *Toxoplasma gondii* (IgG=1:1024), lymphopenia ($0.67x10^9$/L (1.50-7)), thrombocytopenia ($112x10^9$/L (300-700)), increased amylase (1434 iU/L (400-1400)) and creatine kinase (552 iU/L (70-190)) and mild proteinemia 78g/L (55-75)). One of the cases declined further investigation and underwent phacoemulsification without a diagnostic work-up. The rest of the results were unremarkable. POH occurred in 3/6 eyes (50%) and an IOL was implanted in 5/6 eyes (83.3%).

At 1-90 days postoperatively 6/6 (100%) were visual. At more than 90 days postoperatively, one eye was lost to follow up and one was enucleated due to secondary glaucoma (no histology was performed). This cat had not been receiving glaucoma regulating medication prior to enucleation. The remaining eye of this cat appeared to have developed secondary glaucoma as per the clinical information provided by the referring veterinarian and was euthanized one year after enucleation of the first eye. No histology or necropsy examination were performed. Of the remaining eyes 3/4 (75%) eyes were still visual.

4. - Unknown cause

In eleven cases, the cause of the cataract was not reported/known; all of them had a unilateral cataract. The stage of the cataract was classified as immature in 4/11 (36.3%)

cases and mature in 6/11 (54.5%) cases; one case the stage was unknown. There were 1 (9%) male entire, 4 male neutered (36.3%) and 6 (54.4%) female neutered cats. Population age was 84 months (IQR 43-108 months). Breeds included 7 DSH, 2 DLH and one each of Persian and Birman. All cases were visual immediately after surgery. At 1-90 days postoperatively 10/11 (90.9%) were visual. The cause for the blind eye was not reported in the records. More than 90 days postoperatively, 6/7 (85.7%) eyes were visual and four eyes were lost to follow up.

Discussion

The outcome of phacoemulsification in cats is rarely reported in the literature. *Stiles (2013)* reported that the success rate for cataract surgery in cats appears better than in dogs.[2] *Braus et al (2015)* concluded that overall, cats appeared to develop less inflammation following lens trauma and lens surgery than did dogs.[16] The results of our retrospective study show an overall success rate of 92.6% for cats that remained within the study with a 12-month follow-up, and 89.5% still visual at the last follow-up (range 6-1898d). POH (42.6%) was the most common complication in the immediate postoperative period. Reports of POH in dogs vary between 37.5%–48.9% (17,18), which is comparable to our findings. Another report found that POH in dogs occurred in 22.9% of eyes.[12] The use of carbachol was suggested to be the factor contributing to a lower POH prevalence in that study.[12] Overall, the use of carbachol to reduce POH after phacoemulsification in dogs has shown conflicting results in the literature, and its effect is not clear.[19,20] The use of carbachol and its effect in diminishing the development of POH in our study was statistically significant. However, the results may have been influenced by the multi-centered nature of the study and the different surgical approaches used by individual surgeons. A prospective study with standardized

variables would be required to confirm this finding. Carbachol is thought to prevent or attenuate POH by opening the ciliary cleft, which has been experimentally demonstrated to be collapsed for at least 24 hours following phacoemulsification in dogs.[21] However, *Crasta et al (2010)* found that the use of carbachol did not prevent POH in dogs and concluded that this variable effect may be due to the fact that ciliary cleft collapse alone is not responsible for POH.[19] Labradors have been reported to experience a significantly increased risk of POH when compared to other breeds.[22] No breed association was evident in our study, however it may have been significant with a larger number of cases.

Uveitis (50.6%) was one of the most common complications in the 1-90 day postoperative period. Uveitis would have been expected in every case following surgery, as a breakdown of the blood aqueous barrier occurs following phacoemulsification.[23] The reduced percentage of cases experiencing uveitis is likely due to the lack of information registered in the medical records, as it is likely that only "unusual" complications were recorded. Despite this, we included uveitis as a postoperative complication as it was obvious that there is a marked reduction in its occurrence more than ninety days postoperatively. Synechia/dyscoria (25.9%) was another complication at 1-90 days postoperatively, the occurrence was statistically significant between the congenital/juvenile (16.1%) and trauma (39.3%) groups, being higher in the trauma group. This result correlates with the expected clinical findings, as a damaged iris following trauma and the resultant uveitis/iritis are a common finding in these cases. PCO (36.1%) was the most common complication in the more than 90 days postoperative period. Some studies in dogs have reported PCO as the most common complication after cataract surgery.[24,25] In our study, PCO was the most common long-term complication, affecting more than one third cases. The identification and

characterization of PCO has limitations; a grading system would have been needed to assess the degree of opacity and the apparent impact on vision.

Corneal ulcers are not a reportedly common complication following cataract surgery in dogs.[11,24] In our study, corneal ulceration was reported in 26.8% of cats in the immediate postoperative period. The prevalence of corneal ulceration decreased to 19.7% in the 1-90 days postoperatively period, and to 12.7% in the more than 90 days period. The corneal ulcers present in these cases were not sufficiently described on the clinical records to draw any conclusion about the possible cause. Exposure related ulceration during or following surgery is most likely in the immediate post-operative period but a stress induced herpetic flare up cannot be excluded. Topical prednisolone was discontinued and non-steroidal anti-inflammatories were used instead in those cases where corneal ulceration occurred.

Glaucoma has been commonly reported as a complication in dogs following cataract surgery, with a prevalence that varies from 6.7% to 28.8%.[9,24,26,27] The glaucomas are a diverse group of diseases united only by the fact that, at least initially, IOP is too high to permit the optic nerve and, in some species, the retina to function normally.[28] Characteristic changes of glaucoma include disrupted axoplasmic flow in the optic nerve head, death of retinal ganglion cells and their axons, cupping of the optic disc, and visual impairment or blindness.[28] Glaucoma was not a common complication in our study. Of the three eyes that were enucleated in the total reviewed cases only one was enucleated owing to a diagnosis of secondary glaucoma 3.6 years after surgery (but no histology was performed). The referring veterinarian euthanized this same cat one year later because of suspected secondary glaucoma in the remaining eye. Only two eyes continued to receive IOP regulating medication at their last follow-up (2/47; 4.2%) but no vision loss was documented. The eyes that received IOP regulating medication

during the 1-90 day postoperative period (47/80; 58.7%) did not continue to suffer from an elevated IOP, did not have any reported visual loss, and eventually were tapered off of the medication (apart from the two cases mentioned above). One of the other two enucleated eyes from the trauma group was histologically diagnosed with post-traumatic sarcoma at 620 days after phacoemulsification. Feline ocular sarcomas are malignant intraocular neoplasms that are often associated with a history of ocular trauma.[29,30,31] In general, they are locally invasive, potentially metastasize, and usually necessitate enucleation of the affected eye.[32] A report that looked at clinical and morphologic features of post-traumatic sarcoma in cats concluded that the most common consequence was infiltration of the optic nerve, which may extend to the optic chiasm and brain causing blindness and neurological disease.[29] In the cat reported here, the histology report concluded that it was a fairly early stage of the disease with no evidence of scleral or vascular invasion and no extension into the optic nerve. The cat was still alive 3 years after phacoemulsification and 1.3 years after enucleation.

An IOL was implanted in a total of 70.7% eyes. There was a statistically significant difference between the congenital/juvenile and the trauma group, with the former having an implanted IOL in 90.6% of the cases compared to 48.5% in the trauma group. This is not surprising as trauma of the lens may create a capsular tear that precludes IOL implantation.

The major limitations of the study are the ones related to its retrospective nature. The ocular findings considered for the diagnosis of uveitis were aqueous flare, keratic precipitates and/or iris hyperemia, as these were the more commonly reported findings in the cat's medical records. Therefore, the assessment of uveitis, both in a lower than expected number of cases as it is likely that only "unusual" complications were recorded and with only selected ocular clinical signs, is one of the limitations of this

retrospective study. Another limitation is found in the secondary to uveitis cataract group. In these cases, the cause was already established in the medical records and we cannot rule out that these cats experienced primary cataract formation and lens-induced uveitis. The study involved five different referral centers with different surgeons and no standardization of the treatment protocols. Thirty-four cases were lost to follow up. The lost to follow up cases are inherent to the nature of a retrospective study and this decreases its power; clinically significant statistical differences (type II error) may have been observed in a larger population.

In conclusion, this is the first retrospective study that has assessed the outcome of phacoemulsification in cats. The authors conclude that the prognosis for vision after surgery appears to be favorable, with serious complications such as intraocular sarcoma being rarely encountered.

Acknowledgement

The authors would like to thank Domingo Casamian-Sorrosal for his invaluable help with data analysis.

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Overall	**Immediate**	**1-90 d**	**>90 d**
Corneal ulcer	22/82 (26.8%)	16/81 (19.7%)	6/48 (12.5%)
Corneal edema	1/82 (1.2%)	2/81 (2.4%)	0/48 (0%)
Corneal lipidosis	0/82 (0%)	1/81 (1.2%)	1/48 (2%)
Suture breakdown	0/82 (0%)	1/81 (1.2%)	0/48 (0%)
Uveitis	28/82 (34.1%)	41/81 (50.6%)	10/48 (20.8%)
Hyphema	2/82 (2.4%)	0/81 (0%)	0/48 (0%)
Fibrin	8/82 (9.7%)	7/81 (8.6%)	0/48 (0%)
Synechia/Dyscoria*	3/82 (3.6%)	21/81 (25.9%)*	16/48 (33.3%)
PCO	0/82 (0%)	15/81 (18.5%)	17/48 (35.4%)
Haptic luxation	0/82 (0%)	1/81 (1.2%)	0/48 (0%)
POH	35/82 (42.6%)	0/81 (0%)	0/48 (0%)
Intraocular pressure regulating medication	0/82 (0%)	48/81 (59.2%)	2/48 (4.1%)
Vitreal opacity	0/82 (0%)	1/81 (1.2%)	0/48 (0%)
Subretinal oedema/ chorioretinitis	0/82 (0%)	0%0/81 (0%)	1/48 (2%)
Partial retinal detachment	1/82 (1.2%)	0/81 (0%)	0/48 (0%)
Retinal degeneration	0/82 (0%)	2/81 (2.4%)	1/48 (2%)
Photic retinal lesion	0/82 (0%)	1/81 (1.2%)	0/48 (0%)

Table 1. Overall complication rate in the three study time periods. * The number of eyes with synechia/dyscoria in the trauma group was higher than in the congenital/juvenile group at 1-90 days (P=0.039). There were no other statistically significant differences between any time periods for the various complications.

POH: postoperative ocular hypertension

PCO: posterior capsular opacity