

2016

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Published in final edited form as:

*Vet Ophthalmol.* 2016 September ; 19(5): 373–378. doi:10.1111/vop.12310.

## Retinal detachment post-phacoemulsification in Bichons Frises: A retrospective study of 54 dogs

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### Abstract

**Objective**—To compare rates of retinal detachment (RD) post phacoemulsification in American Bichons Frises with and without prophylactic retinopathy.

**Procedures**—Medical records of 54 Bichons Frises undergoing phacoemulsification with or without prophylactic retinopathy between 2003–2013 in one or both eyes were reviewed from five Midwestern university veterinary teaching hospitals. Inclusion criteria were pre-operative ERG, at least 6 months of follow up post phacoemulsification, and absence of pre-existing RD as determined by ophthalmic examination and/or ultrasound. Statistical analyses used chi-squared and Wilcoxon rank-sum tests and Wilson confidence intervals with the p value <0.05 considered significant.

**Results**—Phacoemulsification was performed without retinopathy in 79 eyes (42 dogs, non-PR group) and with prophylactic retinopathy in 23 eyes (12 dogs, PR group). Incidence of diabetes mellitus was 10/42 and 3/12 in the non-PR and the PR groups respectively (p=0.93). Intraocular lens implantation was performed in 40/42 non-PR dogs and 11/12 PR dogs, (p=0.63, 73/79 versus 21/23 eyes). At final re-examination, RD occurred in 4/79 eyes without retinopathy, compared to

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0/23 RD in the retinopexy group. There was no statistically significant difference in RD rates between the two groups ( $p=0.27$ )

**Conclusions**—These data provide no statistical evidence to support prophylactic retinopexy in Bichon Frises. Due to the low rate of retinal detachment following phacoemulsification without prophylactic retinopexy, the procedure appears to offer limited benefit to offset cost, procedural risk and risk of extended or repeated anesthesia in Bichons Frises.

### Keywords

Bichon Frise; retinal detachment; phacoemulsification; prophylactic retinopexy

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### Introduction

Retinal detachment (RD) is one of the various complications of phacoemulsification in dogs that have been reported in the veterinary literature, with reports suggesting that it occurs in 0–55% of patients. [1–5] Some reports suggest that there are breed predilections to RD, specifically in the Bichon Frise. In 2003, Gelatt et al[4], described the clinical characteristics of inherited cataracts in the Bichon Frise as well as the post-operative complications of phacoemulsification. In their retrospective review of medical records from The University of Florida Veterinary Medical Teaching Hospital (VMTH) and the Veterinary Medical Database (VMDB), they demonstrated that the rate of post-operative RD was 14% (8/57) in cases from the UF-VMTH and 13% (16/123) in cases from the VMDB.[4]

Only a few other studies have been published regarding RD in the Bichon Frise breed. In 2004, Schmidt et al performed a retrospective study evaluating Bichons Frises with cataracts presenting to a private practice in the Midwestern United States with the purpose of determining the efficacy of prophylactic random transscleral retinopexy (PR) in preventing rhegmatogenous retinal detachment following phacoemulsification in this breed. [5] In the study, records from non-diabetic dogs with cataracts typical of inherited cortical cataract and who had follow-up examination of at least 9 months were reviewed. The authors reported 10/18 (55%) eyes without PR and 5/39 (12%) of eyes with PR developed RD after phacoemulsification. The paper concluded that Bichons Frises with inherited cataract are at increased risk for developing RD following phacoemulsification and that performing PR will reduce this risk. Interestingly, the rates of RD in Bichons Frises in this study that did not undergo PR were much higher than rates of RD following phacoemulsification reported elsewhere. Furthermore, it should be noted that observed rates of RD in the eyes receiving PR (12%) in the Schmidt study are comparable to rates in Bichons Frises without prophylactic procedures reported in other studies, including the work by Gelatt et al (13–14%). [4]

Since the publication of Schmidt's work in 2004, many veterinary ophthalmologists have begun recommending prophylactic retinopexy in Bichons Frises prior to phacoemulsification on the basis of the reported 55% RD in this breed. In 2012, however, it was reported that cataracts in Bichons Frises are not associated with RD in the United Kingdom. [1] In that study of 34 eyes of Bichons Frises that had phacoemulsification performed without PR, none developed RD. The study concluded that PR or transscleral cryopexy could not be

recommended for this breed prior to phacoemulsification in the UK. The cause of the previously reported higher rates of RD in the American Bichon Frise remains unclear. One proposed potential contributing factor could be variations in the gene pools given the different geographical locations. [1]

Detachment rates of 55–60% are similar to the human disease called Stickler Syndrome, which is the most common cause of inherited RD in children [6,7]. Studies indicate that up to 73% of Stickler patients that do not undergo prophylactic retinopathy will have RD [7], and this is one of the few populations in which prophylactic retinopathy is performed in humans. Although there is supporting evidence for prophylactic retinopathy in the human literature, the American Academy of Ophthalmology Preferred Practice Pattern does not strongly advise prophylactic treatment of fellow eyes but rather only for cases of symptomatic flap tears. [8] It is important to note that prophylactic retinopathy carries its own risks. The physician-based literature indicates that risks of retinopathy include hemorrhage, scleral thermal effects, rupture of Bruch's membrane, transient epiphora, temporary accommodative paresis, lid swelling, and macular holes, and suggests failure of the prophylactic attachment in almost 10% of patients. [6,7,9] One study in the veterinary literature reported a 20% RD rate in a general population of dogs that had prophylactic retinopathy followed by phacoemulsification. [10] Furthermore, prophylactic retinopathy requires additional anesthetic time and increased cost to the owner in veterinary patients, particularly if it is performed as a separate procedure when recommended 2–3 weeks prior to phacoemulsification. [11]

Given the conflicting evidence, formulation of evidence-based clinical recommendations for or against the use of prophylactic retinopathy in the Bichon Frise is difficult. The purpose of the present study was to determine the rate of RD post-phacoemulsification in another population of Bichon Frise in the US to determine if the rate of RD in this breed is truly increased compared to previous reports in Bichons Frises. Records were obtained from five veterinary medical teaching universities in the Midwestern United States to examine the frequency of post-operative RDs in American Bichons Frises with no history of RD undergoing phacoemulsification and to compare the post-operative RD rate in dogs receiving PR to the rate in those not receiving PR.

## Materials and Methods

Medical records of all Bichons Frises that underwent phacoemulsification from 2003 through 2013 in one or both eyes were obtained from the University of Wisconsin Veterinary Medical Teaching Hospital, the Lloyd Veterinary Medical Center at Iowa State University, the University of Missouri Veterinary Medical Teaching Hospital, the Veterinary Health Center at Kansas State University, and the Veterinary Teaching Hospital at the University of Illinois at Urbana-Champaign. Additionally, a limited medical record review was done for all dogs (n=128 dogs, 220 eyes), excluding Bichons Frises, undergoing phacoemulsification from the University of Wisconsin Veterinary Medical Teaching Hospital in the same time period. Presence or absence of RD was noted at the last visit for this limited review.

Patients were included in the study if they had a complete ophthalmic examination, electroretinography (ERG) and/or ultrasonography prior to surgery and either confirmation of RD within six months or at least six months of follow-up time post operatively. Patients were excluded from the study if they had a pre-existing RD prior to phacoemulsification in either eye, less than 6 months follow up, lens subluxation/luxation, or phacoemulsification associated with endolaser cyclophotocoagulation.

Pre-operative data collected for each patient included breed, age, and gender; cataract stage (incipient, incomplete, complete or resorbing); documented lens intumescence; concurrent diagnosis of diabetes mellitus; clinical evidence of uveitis; pre-existing lens capsule rupture; presence of vitreous degeneration; findings on ocular ultrasonography and ERG, and ocular medications initiated prior to surgery. Surgical data collected included phacoemulsification time and power settings if recorded, whether or not an intraocular lens was placed, vitrectomy (if performed), intraoperative diagnosis of capsule rupture or any other intraoperative complications, and intraoperative use of miotics at the conclusion of the surgical procedure. Post-operative data collected included medications at the last recorded visit. Post-operative ophthalmic findings recorded included presence of RD or not, glaucoma as defined by the attending clinician, visual status, length of post operative follow-up and any other complications recorded at the final examination.

### Statistical analysis

Dogs were grouped into those receiving prophylactic retinopexy (the PR group) and not receiving prophylactic retinopexy (the non-PR group). Baseline and other pre- and intra-operative characteristics were summarized descriptively overall and by group. Tests for group differences at baseline were conducted at an  $\alpha=0.10$  level using chi-squared tests for binary variables and Wilcoxon rank-sum tests for ordered categorical variables. Per-eye characteristics were tested by dog using a derived variable of “at least one eye affected” for binary variables or “most severe eye” for ordered categorical variables.

Retinal detachment and glaucoma rates were computed per eye, as well as per dog with Wilson confidence intervals. A chi-squared test (by dog) was used to test for between-group differences in RD and glaucoma. A p value of  $<0.05$  was considered significant.

### Results

An initial search resulted in identification of 100 Bichons Frises; 46 were subsequently excluded for one or more of the exclusion criteria: pre-existing RD prior to phacoemulsification in either eye, less than 6 months follow up (without retinal detachment), lens subluxation/luxation, retinal abnormalities or phacoemulsification associated with endolaser cyclophotocoagulation.

A total of 54 Bichons Frises undergoing phacoemulsification surgery were included at the Wisconsin (n=12), Iowa (n=13), Missouri (n=14), Kansas (n=7), and Illinois (n=8) sites. All patients received phacoemulsification: 48 bilaterally, 6 dogs unilaterally (102 eyes). At the University of Missouri and at the University of Illinois, 6 dogs from each institution also received PR (the PR group), 11 bilaterally and 1 dog unilaterally (23 eyes total). PR was

performed 12 days prior to phacoemulsification in one dog, 75 days prior to phacoemulsification in a second dog, while the remaining 10 dogs received PR at the time of phacoemulsification. All remaining dogs at the Missouri and Illinois site and all dogs at the other 3 sites did not receive PR (the non-PR group, 42 dogs, 79 eyes total).

All patients received an electroretinogram. For three patients ocular ultrasound results were not documented; however, RD was not present immediately post-operatively in these 3 patients so they were included in the study.

The dogs' median age at the time of surgery was 7.0 years (range 1–13) with 1 intact female, 29 spayed females, and 24 neutered males. History of diabetes mellitus was identified in 13/54 (24%) dogs. Age, sex, and diabetes status were not statistically significantly different at the  $\alpha=0.10$  level between the non-PR and PR groups (Table 1) or across sites (data not shown). Median follow up time was 687 days (range 174–3240 days) with no statistically significant difference in follow up time between the PR and non-PR groups ( $p=0.14$ ).

A total of 102 eyes underwent phacoemulsification surgery. Prior to surgery, cataract stage was recorded as resorbing in 20/102 (20%) eyes, incipient (<10% of lens affected) in 1/102 eyes (1%), incomplete in 23/102 (23%) eyes, and complete in 57/102 (56%) eyes (Table 2). For one eye, the stage was not recorded. Intumescent cataract was documented in 7/102 (7%) eyes, signs of lens-induced uveitis were noted in 37/102 (36%) eyes, vitreous degeneration in 9/102 (9%) eyes, and pre-operative evidence of capsule rupture was noted at initial ophthalmic exam in 6/102 (6%) eyes. The ultrasound exam was abnormal in 12/102 (12%) eyes, with evidence of vitreous degeneration or posterior vitreous detachment. There were statistically significant differences in vitreous degeneration and posterior vitreous attachment between the PR and non-PR dogs on clinical and ultrasonographic examination (Table 3). In the PR group, vitreous degeneration on clinical exam was noted in 5/23 eyes compared to 4/79 eyes in the non- PR group ( $p=0.02$ ). Ultrasonographic vitreous abnormalities were observed in 6/23 eyes and, 6/79 eyes respectively in the PR and non-PR groups ( $p=0.01$ ). Results of electroretinography in all eyes were deemed within acceptable parameters for that institution prior to surgery. Ocular medications initiated before surgery included one or more of the following: topical antibiotic (5 dogs total), topical antibiotic plus corticosteroid (24 dogs total), topical corticosteroid (14 dogs total) only, non-steroidal anti-inflammatory (9 dog total), calcineurin immunosuppressant (1 dog total), antiglaucoma medication (14 dogs total), lubricant (2 dogs total) and mydriatic agents (2 dogs total).

During surgery, anterior vitrectomy was performed in 5/102 eyes, and an intraocular lens was placed in 94/102 eyes. Posterior lens capsule tears occurred in 13/102 eyes and anterior vitreous presentation was observed in 2/102 eyes. There were no statistically significant differences in these parameters at the  $\alpha=0.10$  level between the PR and non-PR groups (Table 4).

Power settings and phacoemulsification times were not recorded for all eyes, but based on available data, power settings ranged from 2–80% and phacoemulsification times ranged from 0.9 to 21.3 minutes. Miotic agents were used in 54 out of 91 eyes (59%); for the

remaining eyes, it was unclear from the medical record review whether or not a miotic agent was used.

During the follow up period, RD was recorded in none of the eyes in the PR group compared to 4/79 (5%) eyes in the non-PR group (Table 5). These outcomes translate to per-dog rates of 0/12 (0%, 95% CI [0%, 24%]) in the PR group and 4/42 in the non-PR group (9.5%, 95% CI [4%, 22%]). There was no evidence of a statistically significant difference between the groups ( $p=0.27$ ). In total, 7 eyes developed glaucoma; all were in the non-PR group, but this did not represent a statistically significant difference between the groups ( $p=0.16$ ).

Overall, 98 out of 102 (96%) operated eyes remained visual at the last recheck. Of the four blind eyes, all had RD and one eye also had glaucoma. (Table 5) No other complications were observed as a result of phacoemulsification throughout the recorded time period.

Ocular medications documented at the last recorded visit included one or more of the following: an antibiotic (4 dogs total), antibiotic with a corticosteroid (11 dogs total), corticosteroid only (6 dogs total), non-steroidal anti-inflammatory (31 dogs), anti-glaucoma medication (6 dogs total), and lubricant (21 dogs total).

The limited review of all breeds (excluding Bichons Frises) from the University of Wisconsin revealed 20/220 (9%) eyes of patients had a RD following phacoemulsification. Two of these 20 patients had hypertensive retinopathy secondary to systemic hypertension.

## Discussion

Based on the observed RD rate of 4/79 (5%) of eyes in the non-PR group, this study suggests that Bichons Frises in the Midwestern United States are not at an increased risk of developing RD post phacoemulsification without prophylactic retinopexy, compared to previous reports of 0–55% [1–5] and a RD rate of 9% from other breeds in a limited review at one of the institutions in this study (UW). Although the rate of post operative RD in the present study is slightly higher than the reported 0% by Braus et al [1] in the UK Bichons, the rate of detachment (5%) in Bichons Frises in the Midwestern United States not receiving PR was significantly lower in this study than the previously reported 55% in Midwestern Bichons Frises. [5] In fact, the rate of RD in Bichons in this study is lower than the RD rate for all other breeds combined undergoing cataract surgery at UW.

Our finding of a 5% detachment rate is also in the low end of the range of 1–55% in previously published studies for all breeds undergoing phacoemulsification without PR. [3,5,10] Although we observed a 0% RD rate in PR eyes compared to 5% in non-PR eyes, the detachment rate between eyes receiving prophylactic retinopexies and those without was not statistically significantly different. It is important to note that other studies have reported 12–20% rates of RD post phacoemulsification with prophylactic retinopexy, which suggests that the potential benefit of PR does not outweigh the risks. [5,10]

The only significantly different characteristic between eyes receiving PR and eyes without PR was the increased incidence of vitreous degeneration pre-operatively in the PR eyes. Vitreous degeneration has been shown to increase with cataract stage and age, [12,13]

however, cataract stage was not different between the groups in the current study. The finding of increased vitreous degeneration may be due to case selection; clinicians who perform PR may be more likely to recommend it in cases with vitreous degeneration.

A likely explanation for the lower rate of RD in eyes without prophylactic retinopathy in this study (5%) compared to Schmidt et al's rate of 55% is the latter study's inclusion of eyes with RD at initial examination and more generally the inclusion of dogs referred for retinal reattachment surgery. [5] In our study, we excluded dogs with history of RD at baseline (prior to surgery), and the institutions in this study do not routinely have patients referred to them for retinal surgery, including prophylactic retinopathy, which may have resulted in a slightly different study population than in Schmidt et al. [5]

Braus et al [1] have suggested that the small gene pool or isolated geographical population of Bichons Frises in the United States may be an explanation for the higher rate of detachment seen when compared to rate in the UK. The Bichon Frise is a relatively new breed to the United States and the gene pool is thought to be small. The breed was first introduced in the 1960's and 1970's, and was established with nine dogs from three French Bichon Frise lines. [14] When comparing populations from this study to the previous study by Schmidt et al [5], both sets of patients were from the Midwestern United states and therefore geographical location is likely not responsible for different rates of RD. A pedigree analysis has not been performed in Bichons Frises to the authors' knowledge and further studies examining patient's pedigree and their geographical location may be warranted.

Uveitis has been shown to be associated with an increased risk of RD with and without phacoemulsification. [3, 15, 16] Lens-induced uveitis prior to surgery is a common clinical finding in dogs and therefore these patients are likely at a higher risk of RD. There is conflicting data in regards to stage of cataract maturity and risk of RD following phacoemulsification. Davidson et al [3] noted that hypermature cataracts were more likely to be associated with an increased risk of RD following phacoemulsification, in contrast with another study that reported an apparent substantial reduction in the risk of RD with increasing cataract maturity.[10] In our study patients that did not develop RD had cataract stages that varied from incipient to resorbing, and the four patients that developed RD had complete cataracts. The small number of eyes with RD in this study makes it very difficult to evaluate any association between stage of cataract or lens-induced uveitis and RD.

When comparing rates of RD of Bichons Frises without prophylactic retinopathy in this study to general populations of dogs undergoing phacoemulsification, the rate of detachment is not significantly increased. Our data suggest that the Bichon Frise in the Midwestern of the United States should not be considered at increased risk for detachment, and the available evidence is not sufficient to recommend prophylactic retinopathy as standard of care for eyes undergoing phacoemulsification.

## Acknowledgements

Funding for statistical support was provided by: The Clinical and Translational Science Award (CTSA) program through the NIH National Center for Advancing Translational Sciences (NCATS) grant UL1TR000427

## References

1. Braus BK, Rhodes M, Featherstone HJ, et al. Cataracts are not associated with retinal detachment in the Bichon Frise in the UK--a retrospective study of preoperative findings and outcomes in 40 eyes. *Veterinary Ophthalmology*. 2012; 15:98–101. [PubMed: 22051106]
2. Sigle KJ, Nasisse MP. Long-term complications after phacoemulsification for cataract removal in dogs: 172 cases (1995–2002). *Journal of the American Veterinary Medical Association*. 2006; 228:74–79. [PubMed: 16426170]
3. Davidson MG, Nasisse MP, Jamieson VE, et al. Phacoemulsification and intraocular lens implantation: a study of surgical results in 182 dogs. *Progress in Veterinary and Comparative Ophthalmology*. 1991; 1:233–238.
4. Gelatt KN, Wallace MR, Andrew SE, et al. Cataracts in the Bichon Frise. *Veterinary Ophthalmology*. 2003; 6:3–9. [PubMed: 12641835]
5. Schmidt GM, Vainisi SJ. Retrospective study of prophylactic random transscleral retinopexy in the Bichon Frise with cataract. *Veterinary Ophthalmology*. 2004; 7:307–310. [PubMed: 15310289]
6. Carroll C, Papaioannou D, Rees A, et al. The clinical effectiveness and safety of prophylactic retinal interventions to reduce the risk of retinal detachment and subsequent vision loss in adults and children with Stickler syndrome: a systematic review. *Health Technol Assess*. 2011; 15:iii–xiv. 1–62. [PubMed: 21466760]
7. Ang A, Poulson AV, Goodburn SF, et al. Retinal detachment and prophylaxis in type 1 Stickler syndrome. *Ophthalmology*. 2008; 115:164–168. [PubMed: 17675240]
8. Wilkinson CP. Evidence-based analysis of prophylactic treatment of asymptomatic retinal breaks and lattice degeneration. *Ophthalmology*. 2000; 107:12–15. discussion 15–18. [PubMed: 10647712]
9. Avitabile T, Bartolotta G, Torrisi B, et al. A randomized prospective study of rhegmatogenous retinal detachment cases treated with cryopexy versus frequency-doubled Nd: YAG laser-retinopexy during episcleral surgery. *Retina*. 2004; 24:878–882. [PubMed: 15579984]
10. Klein HE, Krohne SG, Moore GE, et al. Postoperative complications and visual outcomes of phacoemulsification in 103 dogs (179 eyes): 2006–2008. *Veterinary Ophthalmology*. 2011; 14:114–120. [PubMed: 21366827]
11. Vainisi, Samuel J.; Wolfer, Joseph C.; Hoffman, et al. Surgery of the Canine Posterior Segment. In: Gelatt, KN., editor. *Veterinary Ophthalmology*. 5th edn. Ames, Iowa: Wiley-Blackwell Publishing; 2013. p. 1403
12. van der Woerd A, Wilkie DA, Myer CW. Ultrasonographic abnormalities in the eyes of dogs with cataracts: 147 cases (1986–1992). *Journal of the American Veterinary Medical Association*. 1993; 203:838–841. [PubMed: 8226239]
13. Park YW, Kim JY, Jeong MB, et al. A Retrospective study on the association between vitreous degeneration and cataract in dogs. *Veterinary Ophthalmology*. 2014
14. Stubbs, BB. *The Complete Bichon Frise*. New York: Home Book House; 1990. p. 1-26.
15. Hendrix DV, Nasisse MP, Cowne P, et al. Clinical signs, concurrent diseases and risk factors associated with retinal detachment in dogs. *Progress in Veterinary and Comparative Ophthalmology*. 1993; 3:87–91.
16. Vanisi, SJ. Retinal detachments. In: Riis, RC., editor. *Small Animal Ophthalmology Secrets*. Philadelphia: Hanley & Beefus; 2002. p. 268-274.

**Table 1**

Signalment, diabetic history, and follow up time of Bichons Frises undergoing phacoemulsification with (PR) and without prophylactic retinopexy (non-PR).

Group	Non-PR	PR	P-value	Overall
Number of dogs [n]	42	12		54
Age (years) Median (Range)	7.5 (1–13)	6 (2–11)	0.27	7 (1–13)
Sex n (%) Neutered male	17 (40%)	7 (58%)		24 (44%)
Female n (%)	1 (2%)	0 (0%)		1 (2%)
Spayed female n (%)	24 (57%)	5 (42%)		29 (54%)
Concurrent diabetes mellitus n (%)	10 (24%)	3 (25%)	0.93	13 (24%)
Median follow up time, (days)	720	570	0.14	687
Range of follow up time (days)	212–3240	174–1396		174–3240

**Table 2**

Total number of eyes of Bichons Frises undergoing phacoemulsification with (PR) and without prophylactic retinopexy (non-PR) and stage of cataract at the time of surgery.

Group (n=eyes)	Non-PR	PR	Overall
Phacoemulsification (n)	79	23	102
Incipient (n (%))	1 (1%)	0 (0%)	1 (1%)
Incomplete (n (%))	16 (21%)	7 (30%)	23 (23%)
Complete (n (%))	47 (60%)	10 (43%)	57 (56%)
Resorbing (n (%))	14 (18%)	6 (26%)	20 (20%)

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**Table 3**

Pre-operative clinical and ultrasound findings of eyes of Bichons Frises undergoing phacoemulsification with (PR) and without prophylactic retinopexy (non-PR).

Group (n=eyes)	Non-PR (79)	PR (23)	P-value	Overall (102)
Intumescent lens (n (%))	7 (9%)	0 (0%)	0.27	7 (7%)
Vitreous degeneration on clinical examination (n (%))	4 (5%)	5 (22%)	0.02	9 (9%)
Lens induced uveitis; n (%)	33 (42%)	4 (17%)	0.13	37 (36%)
Posterior capsule tear present (n (%))	5 (6%)	1 (4%)	0.73	6 (6%)
Vitreous degeneration or vitreous detachment present on ultrasound (n (%))	6 (8%)	6 (26%)	0.01	12 (12%)

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**Table 4**

Complications observed intra-operatively in eyes of Bichons Frises undergoing phacoemulsification with (PR) and without prophylactic retinopexy (non-PR).

Group (n=eyes)	Non-PR (79)	PR (23)	P-value	Overall (102)
Posterior capsule tear during surgery (n (%))	10 (13%)	3 (13%)	0.60	13 (13%)
Vitrectomy performed (n (%))	5 (6%)	0 (0%)	0.21	5 (5%)
Anterior vitreous presentation (n (%))	2 (3%)	0 (0%)	0.44	2 (2%)
Intraocular lens placed (n (%))	73 (92%)	21 (91%)	0.63	94 (92%)

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**Table 5**

Incidence of retinal detachment and post operative glaucoma post phacoemulsification in eyes of Bichons Frises undergoing phacoemulsification with (PR) and without prophylactic retinopexy (non-PR).

Group (n= eyes)	Non-PR (79)	PR (23)	P-value	Overall (102)
Retinal Detachment (n (%))	4 (5%)	0 (0%)	0.27	4 (4%)
Post-operative glaucoma (n (%))	7 (9%)	0 (0%)	0.16	7 (7%)

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