

Papers

Retrospective study of 155 cases of prolapse of the nictitating membrane gland in dogs

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A retrospective study of 155 cases (114 dogs). The breed, sex and age at the time of the first and opposite onset of nictitans gland prolapse were recorded. Long-term follow-up with a minimum of one-year duration was performed by telephone conversations. One hundred and fourteen dogs representing 155 nictitans gland prolapses were included. 75.4 per cent of the first prolapse occur before one year of age. Unilateral nictitans gland prolapse was observed in 64 per cent of cases. When the condition was bilateral, it occurred simultaneously in 41.4 per cent. When it was bilateral but not simultaneous (24/41), the opposite gland prolapse occurred within three months in 70.8 per cent of the cases. Five breeds were most commonly affected by the bilateral condition: French bulldog, shar pei, great dane, English bulldog and cane corso.

PROLAPSE of the nictitating gland is a common ocular disease in the dog and the most frequent disease of the nictitating membrane (NM) (Hendrix 2007). Clinically, it appears as a reddish follicular mass protruding from the margin of the NM and is also called 'cherry eye' (Hendrix 2007, Maggs 2008, Plummer and others 2008).

The pathogenesis of the condition is still undetermined. Different hypotheses have been postulated. An abnormality or laxity in the connective tissue bands that anchor the gland to other periorbital tissues has been proposed (Morgan and others 1993, Hendrix 2007). In young animals presenting with lymphoid hyperplasia and allergic inflammation of the gland, this disease may occur in association with weakness of the connective tissues (Maggs 2008). This combination of events allows the gland to evert dorsally from behind the leading edge of the NM as a red follicular mass, while remaining anchored to the cartilage. Following chronic exposure, the nictitating gland may become inflamed, dry, enlarged and secondarily infected (Hendrix 2007, Maggs 2008).

Several canine breeds such as the American and English cocker spaniel, Boston terrier, Pekingese, beagle, basset hound, English bulldog, Lhasa apso and shih tzu are believed to be predisposed to this disorder (Dugan and others 1992, Morgan and others 1993, Hendrix 2007, Plummer and others 2008). Previous retrospective studies

reported many associated epidemiologic elements including breed, age and sex, along with surgical techniques, outcome, and incidence of keratoconjunctivitis sicca (Dugan and others 1992, Morgan and others 1993). Younger animals are over represented and the disease often occurs before two years of age (Plummer and others 2008). The disease is reported as either unilateral or bilateral; when unilateral, it may also affect the opposite eye at a later date (Maggs and others 2008, Plummer and others 2008). Reported data of bilateral occurrence of the prolapse of the NM gland present some variations and only a few studies describe the time between the first and the opposite gland prolapse (Morgan and others 1993, Maggs and others 2008, Plummer and others 2008, Premont and others 2010).

The purpose of this study is to determine the age of onset of the first prolapse, the prevalence of unilateral versus bilateral prolapse of the NM gland, and the period between the prolapse of the first and the contralateral gland when the condition occurs bilaterally.

Materials and methods

A retrospective analysis of 155 cases (114 dogs) of prolapse of the NM gland between 2001 and 2008 was performed. The sex, breed and age at the time of prolapse of the first NM gland and, when present, the opposite NM gland were recorded. The presence of other concurrent ocular diseases (assessed by a complete ophthalmic examination including Schirmer tear test I, slit lamp biomicroscopy [Kowa SL-5, Kowa], tonometry [TonoVet Hand Held Tonometer, Tiolat] and indirect ophthalmoscopy [Heine Omega 200, Heine Optotechnik]) and treatment were also recorded.

Only the cases for which there was a follow-up for a minimum of one year were included in the study. Follow-up information was obtained from medical records and subsequently by telephone conversation with the owner.

A bivariate analysis was conducted to demonstrate an over representation of certain breeds of dog in the affected group. A Pearson's chi-squared test after Monte Carlo simulation (simulated P value based on 2000 replicates of data table) was used because of expected numbers below than five in the majority of groups. The R package was used for statistical analysis (R Development Core Team 2011).

Results

One hundred and fourteen dogs representing 155 prolapses of the NM gland were included in this study. Thirty-seven dogs came from

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TABLE 1: Observed (line 1) and expected (line 2) percentages of affected dogs per breeds. A significant difference (indicated by *) was confirmed between reference group and certain breed such as French bulldog, shar pei, great dane, English bulldog and cane corso, which seem to be over represented in the affected group (chi-squared test after Monte Carlo simulation, $P=0.0005$, R Development Core Team 2011)

	French bulldog	Shar pei	American cocker spaniel	Great dane	English bulldog	Boxer	Cane corso	Cavalier King Charles spaniel	Lhasa apso	Other
Observed	8.48*	9.48*	2.69	7.79*	5.82*	1.89	25*	2.5	4.4	0.4
Expected	0.99	1	0.93	0.98	0.96	0.92	1.21	0.93	0.95	0.91

the National Veterinary School of Alfort and 77 dogs from three different private practices (Belgium, Switzerland and France). These cases included 148 surgical cases and seven cases without any surgical treatment.

The sex distribution included 36 intact females (31.5 per cent), four spayed females (3.5 per cent), 67 intact males (59 per cent) and seven neutered males (6 per cent).

Thirty-four breeds were represented. Nine breeds were most commonly affected with the disorder: 14 French bulldogs, 13 shar peis, eight American cocker spaniels, six great Danes, six English bulldogs, and five boxers, cane corsos, cavalier King Charles spaniels and Lhasa apsos, respectively. For the nine most commonly affected breeds, observed numbers were markedly greater than expected ones, permitting to suspect an over representation of these breeds (Table 1). A significant difference was confirmed between reference group and certain breeds such as French bulldog, shar pei, great dane, English bulldog and cane corso which seem to be over represented in affected group (chi-squared test after Monte Carlo simulation, $P=0.0005$, R Development Core Team 2011).

The age distribution at the time of the first gland prolapse is listed in Fig 1. Eighty-six cases (75.4 per cent) occurred before one year of age. Furthermore, with respect to breed, the disorder occurred before one year of age in 100 per cent of the French bulldogs, 92.3 per cent of shar peis, 62.5 per cent of American cocker spaniels, 83.3 per cent of great Danes, 100 per cent of English bulldogs, 80 per cent of cane corsos and 60 per cent of cavalier King Charles spaniels, but only in 40 per cent of boxers and 20 per cent of Lhasa apsos. In the remaining cases, the first prolapse occurred between one and two years of age in 5.3 per cent, from two to three years of age in 7.9 per cent, from three to five years of age in 4.4 per cent, from five to 10 years of age in 5.3 per cent, and after 10 years of age in 1.7 per cent of cases.

The prevalence of unilateral and bilateral gland prolapse is summarised in Fig 2. Cases that were still unilateral after at least one-year follow-up accounted for 64 per cent of cases. Simultaneous bilateral cases accounted for 14.9 per cent of the overall affected population and 41.4 per cent of the bilateral cases. Non-simultaneous bilateral cases represented 21.1 per cent of the total affected population and 58.6 per cent of all bilateral cases. Concerning the non-simultaneous bilateral cases, the prolapse of the second NM gland was noted within three months in 70.8 per cent of cases. The side distribution in the unilateral cases included 40 right-sided cases versus 33 left-sided cases.

When the first prolapse occurred after three years of age, the condition was rarely bilateral with a one-year follow-up, representing 4.4 per cent of the overall affected population and 12.2 per cent of the bilateral cases.

Five breeds were most commonly affected by a bilateral condition with a short time interval between the two prolapses: French bulldog, shar pei, great dane, English bulldog and cane corso. Among these cases, simultaneous bilateral cases accounted for 42.8 per cent and non-simultaneous bilateral cases occurred within three months in 47.6 per cent.

Other concurrent ocular diseases encountered in the eye affected with prolapse of the NM gland, included entropion ($n=10$), eversion of the nictitating cartilage ($n=6$), ectropion ($n=3$), keratoconjunctivitis sicca ($n=2$), corneal ulceration ($n=2$), and congenital cataract ($n=2$) and one case each of idiopathic epiphora, chronic conjunctivitis and euryblepharon. The majority of entropion cases occurred in the shar pei ($n=9$) and three of the six of the cartilage eversion cases occurred in the great dane.

Treatment included either surgical repositioning of the prolapsed gland by the Morgan pocket technique in the majority of the cases (144/155), or no surgical treatment (7/155). Four glands were removed by referring veterinarians before inclusion in this study (4/155).

Spontaneous resolution of the prolapsed glands occurred in four cases that did not receive surgery, in the following breeds: French bulldog, Chihuahua, boxer and Tibetan spaniel. This occurred in a variable time after the prolapse of the NM gland diagnosis and only in the Chihuahua recurrence was observed five months after the first occurrence. No recurrence was observed in the other three cases with at least one-year follow-up.

Eighteen (18/144) glands re prolapsed after surgical repositioning in 15 animals, representing an overall success rate of the pocket technique of 87.5 per cent with a one-year follow-up. Recurrence of the prolapse was between one day and one year after surgery (median time 30 days, mean time 71 days). Recurrences occurred mostly in American cocker spaniel ($n=4$), French bulldog ($n=3$), and shar pei ($n=3$), followed by Brittany spaniel ($n=2$), Chihuahua ($n=2$), Lhasa apso ($n=1$), English bulldog ($n=1$), shih tzu ($n=1$) and a crossbred dog. The re prolapse was bilateral in the Brittany spaniel, Lhasa apso and shar pei. Twelve of the re prolapsed glands were surgically replaced and six were left untreated. A few complications occurred after the surgery: four corneal ulcerations, two nictitating cartilage eversions and one lacrimal cyst formation. Among these, only two cases of corneal ulceration were observed after surgery, which were caused by suture abrasion. Nine cases of conjunctivitis and five cases of keratoconjunctivitis sicca, including two cases observed in the preoperative period, were observed during the long-term follow-up.

Discussion

Several breeds have been reported as predisposed to prolapse of the NM gland, including the American cocker spaniel, beagle, English bulldog, pekingese, Boston terrier, basset hound, Lhasa apso and shih tzu (Dugan and others 1992, Morgan and others 1993, Hendrix 2007, Plummer and others 2008). The most commonly affected breeds in this study partially corroborated previous literature descriptions, however according to statistical analysis, French bulldog, shar pei, great dane, English bulldog and cane corso may be considered as over represented in this study. The difference between the results in this study and other studies may be due to the difference of the breed distribution in France compared with other countries.

In the literature, most cases of prolapse of the NM gland occur in young animals. Plummer and others (2008) report that the disease is observed most frequently before dogs reach two years of age. In the study by Morgan and others (1993), 61.8 per cent (55/89) of dogs were less than one year of age when the prolapse was first noted by the owner. In a study by Dugan and others (1992), the mean age at the time of prolapse was 7.8 months. In a recent report by Premont and others (2010), 91.3 per cent of the dogs were under one year of age at the time of diagnosis. The results of this study are in accordance with the previously mentioned studies as 75.4 per cent (86/114) of the overall prolapses occurred before one year of age, even if it was noted that the prevalence was higher in some breeds.

Previous studies failed to support a sex predisposition (Dugan and others 1992, Morgan and others 1993, Plummer and others 2008, Premont and others 2010), however, this study demonstrated that males (65 per cent) were over represented compared with females (35 per cent). Owing to the young age of most animals at the first onset of the condition, it was impossible to draw any conclusions regarding the influence of neutering status on the disease (either neutered versus intact males or spayed versus intact females).

It is interesting to note that among the most frequently affected breeds in this study, a majority of brachycephalic dogs are represented. Moreover, in brachycephalic dogs, a genetic predisposition has been suggested (Dugan and others 1992, Hendrix 2007, Maggs 2008).

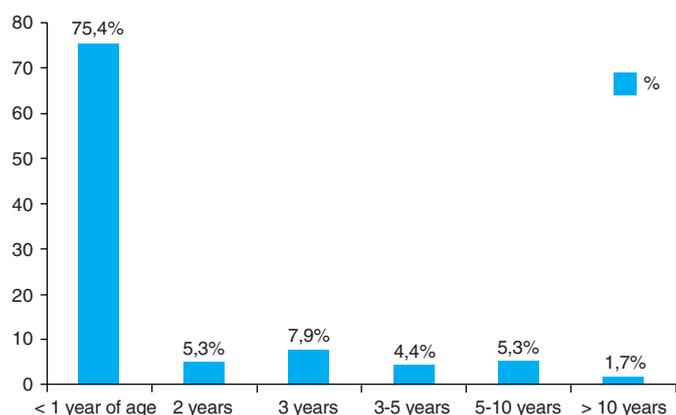


FIG 1: Age of onset of the first prolapse of the NM gland with a minimum one-year follow-up (N=114 dogs)

In older dogs, a neoplastic process might be considered as a differential diagnosis in cases of prolapse of the NM gland. Only three dogs older than 10 years were included in this study, but there was no evidence of a neoplastic aetiology based on ophthalmological examination.

Concerning the bilateral occurrence of the condition, some variations exist between studies. Morgan and others (1993) reported 59 per cent of cases to occur unilaterally (53/89), and Plummer and others (2008) mentioned that the condition is often bilateral. In the recent report from Premont and others (2010), 58.3 per cent of cases suffered from the unilateral condition. Prolapse of the NM gland was observed most commonly unilaterally in this study (64 per cent). Although slight variations are reported between studies, the overall tendency seems to be consistent with 60 per cent being unilateral cases.

This study suffers from some limitations of its retrospective nature pertaining to the acquisition of clinical data. The most common reason for lack of follow-up information was the failure of the owners to return for subsequent examination, or the failure of telephone contact, which caused exclusion of the animal from this study and loss of several cases from our data base. Additionally, with a relatively short follow-up period of one year, some cases of prolapse of the NM gland or recurrence could have been missed, even if it would remain a low number of these cases.

There are only few studies which report the time between the first and the opposite gland to prolapse. A study by Morgan and others 1993 presented 27.7 per cent (10/36) of cases affected with simultaneous prolapse of the NM gland. In this study, when the condition was bilateral (41/114), the second gland prolapse occurred either simultaneously in 41.1 per cent (17/41) of cases or in most cases, within a period of three months (70.8 per cent, 17/24).

This study also describes five breeds which are most commonly affected with a bilateral condition: the French bulldog, shar pei, great dane, English bulldog and cane corso (21/114). In most of these cases, the second gland prolapse was simultaneous (42.8 per cent, 9/21) or occurred within a period of three months (47.6 per cent, 10/21).

Because of its contribution to the production of the precorneal tear film, surgical removal of the prolapsed gland should be avoided and a repositioning technique is widely recommended (Dugan and others 1992). Many surgical techniques for repositioning of the gland have been reported in literature (Blogg 1980, Albert and others 1982, Gross 1983, Moore 1983, Twitchell 1984, Kaswan and Martin 1985, Moore 1990, Morgan and others 1993, Stanley and Kaswan 1994, Plummer and others 2008, Premont and others 2010). In this study, the Morgan pocket technique (Morgan and others 1993) was used with a good success rate of 87.5 per cent (126/144) for a period of at least one-year follow-up.

In conclusion, the results of this study confirm that prolapse of the NM gland is more common in young dogs. The disorder is unilateral in the majority of cases but may become bilateral most often within three months. It is also interesting to note that after the age of three years, the risk of prolapse of the contralateral gland is relatively low. Regarding the breed distribution in this study, French bulldog, shar pei, great dane, English bulldog and cane corso are most frequently

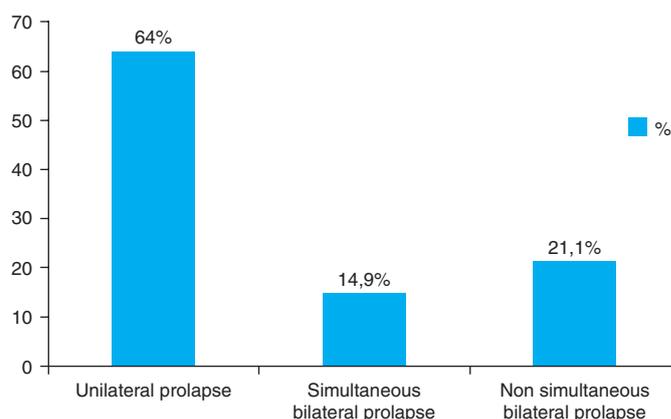


FIG 2: Prevalence of unilateral and bilateral prolapse of the NM gland with a minimum of one-year follow-up (N=114 dogs)

affected for bilateral gland prolapse. In these breeds, the glands either prolapse simultaneously or within an interval of three months between the two eyes.

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