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Resolution of egg binding is possible in most client-owned parrots when multiple treatment strategies are considered

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Objective
Egg binding is a common and potentially life-threatening disorder in avian species. The aim of this study was to analyze the success rate and associated complications of different treatment approaches for egg binding in parrots.

Methods
All parrots treated in an avian-exclusive veterinary practice for egg binding during an 11-year period (2009 to 2020) were eligible for inclusion in this retrospective study. The primary outcome of the study was resolution of egg binding, defined as removal or laying of the egg and survival at 7 days from presentation.

Results
Of the 150 events that had complete follow-up, 109 (72.7%) resulted in a successful outcome. A successful outcome was observed in 44 of 133 events (33.1%) that were initially managed medically without resorting to additional treatment strategies, in 31 events (86.1%) managed with mechanical assistance, in 20 events (60.6%) managed surgically, and in 12 events (85.7%) managed with ovocentesis. Time from presentation to resolution was a median of 36 hours (range, 1 to 240 hours; n = 119). Multivariable logistic regression demonstrated associations between higher body weight, administration of medical treatment and mechanical assistance, absence of administration of sedation or anesthesia, and absence of obtundation or stupor on presentation with a positive outcome.

Conclusions
Overall, egg binding has a favorable outcome if multiple treatment strategies in addition to medical management are considered.

Clinical Relevance
We identified factors associated with resolution and outlined complications of egg binding in parrots, laying the foundation for additional prospective research on this complex condition.

Keywords: avian, psittacine, egg binding, dystocia, theriogenology

Egg binding is defined as failure of an egg to pass through the oviduct at a normal rate.[1–6] Dystocia is a subset of egg binding and implies mechanical obstruction or cloacal dysfunction.[1–5] Egg binding is a commonly diagnosed and potentially life-threatening condition and is therefore of clinical significance. Causes of egg binding are numerous and often multifactorial. Common suggested causes include hypocalcemia, vitamin E and selenium deficiencies, malformed eggs, oviductal pathology, genetic predisposition, obesity, and environmental stress.[1,2,4–7]

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Clinical signs of egg binding vary depending on the underlying etiology, as well as the duration of disease and its severity, and can include dyspnea, unilateral or bilateral leg paresis, depression, lethargy, and death.[5,6] Common sequelae of untreated egg binding include prolapse of the cloaca or the oviduct.[8] Diagnosis of egg binding can be made through a combination of history and observation of clinical signs, palpation, and diagnostic tests such as radiography, fluoroscopy, CT, and ultrasonography.[1,5,9,10]

Depending on the severity of the condition, medical management of egg binding can be successful in stable animals and typically includes fluid therapy, calcium supplementation, analgesia, and placement in an incubator until egg passage.[5,11] Some cases require more invasive treatment for egg removal, including manual egg manipulation, ovocentesis, and surgery.[6,12] A scoping literature search was conducted on November 25, 2024, with the string ("egg bind*" OR "egg bound" OR dystocia) AND (avian OR Psittaciformes OR parrots), on PubMed, Web of Science, and CAB Abstracts for original articles on egg binding in parrots. A total of 117 records were found. After removal of duplicates, articles on species other than parrots, reviews, case reports, and small (< 10 patients) case series, we found 2 articles. One was a description of epidemiology and diagnostic findings in parrots with egg binding without data on the outcome,[10] while the other was a case series on ovocentesis, a specific technique to treat egg binding.[12] On the basis of our literature search, there are no published articles that offer a comprehensive comparison of outcomes of different egg binding treatment modalities in Psittaciformes.[13]

The purpose of our study was to describe the outcomes of egg binding in parrots presented to an avian-exclusive practice and the association with treatment modalities.

Methods

Study design, inclusion criteria, and primary outcome

Medical records from the Medical Center for Birds in Oakley, California, were reviewed for cases of egg binding presented between August 2009 and August 2020. Client-owned parrots with a diagnosis of egg binding and detailed records that included case outcome were eligible for inclusion. A diagnosis of egg binding was formulated on the basis of history; physical examination findings, including coelomic or digital cloacal palpation of an egg; and imaging, including radiographs, fluoroscopy, or ultrasound. The attending clinicians distinguished egg binding from a normal gravid state on the basis of the overall clinical picture, including the timing of egg retention, the presence of anorexia or other signs of systemic illness, and abnormalities such as multiple or misshapen eggs. Cases with records that were missing critical information in terms of treatment and outcome or treatment based on a presumptive diagnosis of egg binding were excluded. The primary outcome of this retrospective study was resolution of egg binding, defined as removal or laying of the egg and survival at 7 days from presentation.

Data extraction and categorization of variables

The following data were extracted from the medical records: species, intake date, weight, examination findings, hormone therapy utilization, previous laying history, treatment modalities utilized, time to egg passage following successful medical management, and case outcome, including manner of death if applicable and recurrence of egg binding. Lethargic patients demonstrated drowsiness and could be aroused by moderate stimuli but then drifted back to sleep. Obtundation referred to a state of lessened interest in the environment, slowed responses to stimulation, and increased sleep periods with drowsiness between sleep states. Stupor referred to a patient that would arouse only with vigorous and repeated stimuli and that would immediately lapse back to an unresponsive state when left undisturbed.

Treatment modalities were categorized in the following: medical management, ovocentesis, mechanical assistance, and surgical management. Medical management was defined as any clinical treatment that did not include mechanical assistance, ovocentesis, or surgery. Medical management was considered unsuccessful if the animal died or was euthanized or if medical management efforts did not result in egg passage and additional treatment modalities were necessary, such as ovocentesis, mechanical assistance, or surgery. Medical management of the cases described herein typically included multimodal analgesia, parenteral fluid administration, warmth, and serial in-patient physical assessments. Parenteral calcium was used if indicated on the basis of history (inappropriate or imbalanced diet). Specific drugs used in each patient were not extracted. Treatment strategies directed in manipulating the egg in order to assist its delivery were classified as mechanical assistance. This category included manual manipulation of the egg by palpation and gentle digital pressure, massage to promote relaxation of the vaginal sphincter, lubricants to moisten cloacal tissues, or use of a cloacal speculum to dilate the vaginal opening of the oviduct. Ovocentesis, either percutaneous or percloacal, involved aspiration of the egg content and subsequent implosion to facilitate removal. Visible fragments were manually removed, but smaller fragments were allowed to pass naturally.[12] On the basis of our primary outcome definition, ovocentesis was considered successful in the absence of a clinically significant amount of eggshell based on palpation or diagnostic imaging at 7 days from presentation. Any treatment involving the incision of the body wall with the goal of removing the egg was categorized as surgical treatment. A case was classified as receiving surgical treatment as soon as the anesthetic event for surgery was initiated, regardless of whether the surgical treatment was completed. Surgical approaches used in the practice included oviductal-sparing celiotomy caesarean section, caesarean section followed by a salpingohysterectomy, or salpingohysterectomy.

Statistical analysis

Continuous variables were summarized as medians and ranges. For categorical variables, the percentages of patients in each category were calculated. The individual egg binding event was used as the unit of analysis. Initially, we planned to perform generalized linear mixed models to be able to include patients that had multiple egg binding events and account for clusterization. Since most parrots (145 of 163 [89.0%]) had only 1 egg binding event, we opted to include in the statistical analysis only the most recent egg binding event for each parrot to simplify the model and avoid potential overfitting or instability due to sparse repeated-measures data. Univariable binary logistic regression models for each predictor variable were built to provide unadjusted ORs and 95% CIs. Predictor variables included signalment (age, body weight, species), specific physical examination findings (lethargy, cloacal prolapse, paresis, seizures, obtundation or stupor), treatment performed (medical treatment, mechanical assistance, ovocentesis, surgery), and whether the animal received any sedation or anesthesia. The dependent variable was resolution of egg binding (defined as removal or laying of the egg and survival at 7 days from presentation). Regarding the inclusion of species in the models, 2 species, budgerigar (*Melopsittacus undulatus*) and cockatiels (*Nymphicus hollandicus*), accounted for over half of the egg binding events. Each other species had relatively few events, with the third most common in the final dataset for analysis being *Psittacus erithacus* with only 10 events, limiting the opportunity to include each individual species in the models. To evaluate the association between the 2 most common species with a successful outcome, all other species were consolidated in a single category and used as a comparator in the model. A multivariable binary logistic regression model was subsequently developed to provide adjusted OR and 95% CI including all variables that had a significance level of $P < .2$ in the univariable analysis. The Hosmer-Lemeshow statistic and the Nagelkerke R^2 were used to assess goodness of fit of the model. Since the final analysis included 36 events, an alternative, more parsimonious model including only 3 predictor variables (ie, > 10 events per variable) was built to ensure that results were not the consequence of overfitting. Analysis was performed with the use of commercial software (SPSS Statistics, version 24.0; IBM Corp). A 2-sided P value of < .05 was considered to be statistically significant.

Results

Population summary

Medical records of 170 individual events of egg binding in parrots were retrieved during the study period. After removing 7 because of incomplete records, there were 163 remaining events. The 163 events originated from 145 individual parrots. Of these 145 parrots, 14 and 2 parrots suffered 2 and 3 events of egg binding, respectively.

History and signalment

Of the 163 events included, 46 (28.2%) occurred in cockatiels; 35 (21.5%) in budgerigars; 11 (6.7%) in grey parrots (*P erithacus*); 7 (4.3%) in eclectus parrots (*Eclectus roratus*), barred parakeets (*Bolborhynchus lineola*), and sun parakeets (*Aratinga solstitialis*); 5 (3.1%) in umbrella cockatoos (*Cacatua alba*) and rosy-faced lovebirds (*Agapornis roseicollis*); and 4 (2.5%) in blue-and-yellow macaws (*Ara ararauna*). Other species in the dataset suffered ≤ 3 egg binding events per species **(Supplementary Table S1)**.

Age was recorded in 155 events. The median age was 8 years old (range, 1 to 34 years old). Body weight was recorded in 157 events. The median weight was 104 grams (range, 26 to 1,187 grams). Of the recorded events, 29 (17.8%) involved parrots experiencing their first egg deposition, while 129 (79.8%) involved subsequent depositions. In 5 events (2.4%), the medical records did not specify whether it was the first or a subsequent deposition. In terms of previous hormonal treatments, 6 (3.7%) animals had prior treatment with deslorelin acetate (n = 2) or leuprolide acetate depot (4) before the event. All the other parrots had not previously received gonadotropin-releasing hormone (GnRH) implants or injections except for 2 animals, for which it was not reported. Forty-seven birds (28.8%) presented between January and March, 51 birds (31.3%) presented between April and June, 35 birds (21.5%) presented between July and September, and 30 birds (18.4%) presented between October and December.

Treatment approach

Initially, of the 163 egg binding events, 144 were managed medically, 8 were managed surgically, 1 was managed with mechanical assistance, 5 declined any further treatment and were discharged without medical treatment, and 5 declined any further treatment and were euthanized. Of the 144 events that were initially managed medically, 10 events declined further treatments, of which 3 parrots were euthanized and 7 parrots were discharged; 63 events ended up receiving only medical management; 40 events also received mechanical assistance; 25 events also had surgery; and 16 events also had ovocentesis. Sedation or anesthesia was utilized in 53 events (32.5%). Hormonal therapies, including oxytocin or prostaglandins, were not utilized for treatment in any event.

Outcome of egg binding events

The primary outcome could not be extracted from the records of 13 events of egg binding. Of the remaining 150 events that had complete follow-up, 109 (72.7%) resulted in a successful outcome, defined as laying or removal of the egg and survival at 7 days from presentation **(Table 1)**. Of the 40 cases that had an unsuccessful outcome, 16 died spontaneously during medical treatment either in hospital or at home after discharge, 13 died in the perioperative period (7 during induction or surgery, 5 in the postoperative period during recovery, and 1 the night following the surgical procedure), 10 were euthanized due to declining conditions or failure to improve, and 1 was not specified.

A successful outcome was observed in 44 of 133 events (33.1%) that were initially managed medically without resorting to additional treatment strategies, with 66 events (49.6%) undergoing 1 or more additional treatment approaches. Of 36 events that were managed with mechanical assistance, 31 (86.1%) had a successful outcome. Of 33 events that were managed surgically, 20 (60.6%) had a successful outcome. Of 14 events that were managed with ovocentesis, 12 (85.7%) had a successful outcome. Time from presentation to deposition or removal of the egg was recorded in 119 cases and was a median of 36 hours (range, 1 to 240 hours).

Factors associated with a successful outcome

After exclusion of any additional egg binding event for each parrot other than the first and exclusion of events for which the primary outcome was not specified, the inferential statistical analysis included 132 individual parrots **(Table 2)**.

Table 1—Characteristics of 163 events of egg binding in client-owned parrots stratified by the primary outcome of the study. The primary outcome was a successful treatment of egg binding, defined as expulsion or removal of the egg and survival at 7 days.

		Resolution at 7 days		
		Yes	No	Unknown
Genus	*Agapornis*	5 (56%)	3 (33%)	1 (11%)
	Amazona	2 (40%)	2 (40%)	1 (20%)
	Ara	3 (75%)	1 (25%)	0 (0%)
	Aratinga	9 (82%)	0 (0%)	2 (18%)
	Bolborhynchus	4 (57%)	3 (43%)	0 (0%)
	Cacatua	11 (92%)	0 (0%)	1 (8%)
	Eclectus	6 (86%)	0 (0%)	1 (14%)
	Eupsittula	1 (100%)	0 (0%)	0 (0%)
	Forpus	1 (100%)	0 (0%)	0 (0%)
	Melopsittacus	19 (54%)	14 (40%)	2 (6%)
	Nymphicus	30 (65%)	14 (30%)	2 (4%)
	Pionites	2 (100%)	0 (0%)	0 (0%)
	Pionus	1 (100%)	0 (0%)	0 (0%)
	Poicephalus	1 (50%)	1 (50%)	0 (0%)
	Psittacara	0 (0%)	0 (0%)	1 (100%)
	Psittacula	1 (100%)	0 (0%)	0 (0%)
	Psittacus	8 (73%)	1 (9%)	2 (18%)
	Pyrrhura	2 (50%)	2 (50%)	0 (0%)
	Thectocercus	2 (100%)	0 (0%)	0 (0%)
	Trichoglossus	1 (100%)	0 (0%)	0 (0%)
Lethargy	Present	46 (69%)	17 (25%)	4 (6%)
	Absent	63 (66%)	24 (25%)	9 (9%)
Cloacal prolapse	Present	14 (58%)	8 (33%)	2 (8%)
	Absent	95 (68%)	33 (24%)	11 (8%)
Pelvic limb lameness/paresis	Present	5 (63%)	3 (38%)	0 (0%)
	Absent	104 (67%)	38 (25%)	13 (8%)
Recumbent	Present	3 (75%)	0 (0%)	1 (25%)
	Absent	106 (67%)	41 (26%)	12 (8%)
Seizures/tremors	Present	3 (75%)	1 (25%)	0 (0%)
	Absent	106 (67%)	40 (25%)	13 (8%)
Obtundation/stupor	Present	2 (33%)	3 (50%)	1 (17%)
	Absent	107 (68%)	38 (24%)	12 (8%)
Sedation/anesthesia	Administered	32 (60%)	17 (32%)	4 (8%)
	Not administered	77 (70%)	24 (22%)	9 (8%)
Medical treatment	Administered	103 (72%)	30 (21%)	11 (8%)
	Not administered	6 (32%)	11 (58%)	2 (11%)
Mechanical assistance	Administered	31 (76%)	5 (12%)	5 (12%)
	Not administered	78 (64%)	36 (30%)	8 (7%)
Ovocentesis	Administered	12 (75%)	2 (13%)	2 (13%)
	Not administered	97 (66%)	39 (27%)	11 (8%)
Surgical treatment	Administered	20 (61%)	13 (39%)	0 (0%)
	Not administered	89 (69%)	28 (22%)	13 (10%)

On the basis of univariable models, neither age nor clinical signs observed during the physical examination (lethargy, cloacal prolapse, lameness or paresis, recumbency, seizures/tremors, obtundation or stupor) were associated with a successful outcome. Budgerigars had 0.4 times the odds of having a positive outcome (OR, 0.37; 95% CI, 0.14 to 0.99; P = .046) compared to the other species. Birds receiving medical treatment had 7 times the odds of achieving a positive outcome compared to those not receiving medical treatment (OR, 7.00; 95% CI, 2.20 to 22.30; P < .001). Parrots with higher body weights and parrots receiving mechanical assistance had small increases in odds of a successful outcome (both, P = .05). There was no association between use of sedation/anesthesia on the case or application of the other treatments with a positive outcome (Table 2).

The final multivariable model included age, body weight, species, and obtundation or stupor, in addition to medical treatment, mechanical assistance, and surgical treatment. After multivariable adjustment, the weak associations between body weight and mechanical assistance and a successful outcome were reinforced. The association between medical treatment and a successful outcome was unchanged. Finally, parrots with obtundation or stupor on presentation had 0.2 times the odds (adjusted OR, 0.02; 95% CI, 0.00 to 0.26; P = .003) of a successful outcome (Table 2).

The alternative, more parsimonious, multivariable model included obtundation or stupor, medical treatment, and mechanical assistance. All 3 variables were still significantly associated with the outcome (Table 2). Both models were well fitted (Hosmer-Lemeshow test, P = .54 and P = .93) and had a Nagelkerke R^2 of 0.38 and 0.20, respectively, indicating that approximately 38% and 20% of the variability in clinical resolution of egg binding was explained by the predictors in the models.

Table 2—Results of univariable models and 2 multivariable models built to identify factors associated with successful treatment of egg binding.

	Univariable models			Primary multivariable model			Parsimonious multivariable model		
	OR	95% CI	*P* value	aOR	95% CI	*P* value	aOR	95% CI	*P* value
Age	1.05	0.98–1.12	.15	0.96	0.86–1.06	.40			
Weight	1.00	1.00–1.01	.05	1.01	1.00–1.01	.04*			
Genus									
Melopsittacus	0.37	0.14–0.99	.046	0.34	0.08–1.46	.15			
Nymphicus	0.44	0.17–1.09	.08	1.28	0.33–4.90	.72			
Lethargy	0.82	0.38–1.78	.61						
Cloacal prolapse	0.60	0.23–1.57	.29						
Lameness or paresis	0.93	0.17–5.04	.94						
Recumbent	Insufficient events								
Seizures/tremors	1.13	0.11–11.22	.92						
Obtundation/stupor	0.23	0.04–1.46	.12	0.02	0.00–0.26	.003*	0.10	0.01–0.77	.027*
Sedation/anesthesia	0.52	0.23–1.16	.11	0.92	0.02–0.51	.006*			
Medical treatment	7.00	2.20–22.30	< .001	7.94	1.80–35.03	.006*	7.26	2.20–23.92	.001*
Mechanical assistance	2.81	1.00–7.96	.05	8.05	1.50–43.08	.02*	3.34	1.03–10.85	.045*
Ovocentesis	1.98	0.41–9.49	.40						
Surgical treatment	0.49	0.20–1.18	.11	2.49	0.38–16.30	.34			

The ORs and 95% CIs represent the strength of the association between individual factors and the outcome variable (resolution of egg binding). The adjusted ORs (aORs) represent the strength of the association between individual factors and the outcome variable after adjustment for the other factors included in the multivariable models. Every patient could receive 1 or multiple treatment strategies, as per Table 1. Details of the models are provided in the main text.

*Statistically significant association.

Follow-up

Records for 159 events notated whether GnRH agonist therapy was utilized after treatment. Deslorelin acetate implants were given to 3 animals (1.8%), while leuprolide acetate depot was given to 5 animals (3.1%). For the 161 cases with this information available in the records, 20 birds (12.4%) presented for another egg binding event at the same institution, while 141 (87.6%) did not have any reported recurrence of egg binding.

Discussion

Our study showed common clinical approaches employed to treat parrots with egg binding and their outcomes. Multivariable logistic regression demonstrated associations between higher body weight, administration of medical treatment and mechanical assistance, absence of administration of sedation or anesthesia, and absence of obtundation or stupor on presentation with a positive outcome. In this study, reasons for death included spontaneous death during medical treatment (16 of 40), perioperative death (13 of 40), and euthanasia (10 of 40).

Egg binding is considered a relatively common presenting condition in parrots. A retrospective study[10] of egg binding in parrots performed in Germany between 1993 and 1996 showed that egg binding was diagnosed in approximately 6% of the female parrots presented in that time frame. The most affected species in that study were cockatiels and budgerigars, which together accounted for over half of the egg binding events. Interestingly, we encountered a similar proportion in terms of species presented, with 28% and 22% of the events occurring in cockatiels and budgerigars, respectively. In our study, we could not prove that these 2 species are more predisposed to egg binding because of the lack of quantification of the total number of parrots of each species presented in the time frame, and their proportion could just reflect the larger number in captivity. However, in the previous study, both cockatiels and budgerigars were demonstrated to be presented with egg binding rather than other reasons more commonly than other species.[10] Considering that studies from multiple countries and from different time periods show similar results, it is possible that these species have an actual physiological predisposition to egg binding. Alternatively, the higher prevalence of egg binding observed in these species could be a consequence of confounding factors, including but not limited to their higher prevalence in the area.

In this study, medical management was the most common approach initially instituted for most of the parrots presented with egg binding. There is little information on medical management of egg binding in parrots. Historically, stabilization of the patient has been considered critical, including active reheating, fluid therapy, and oxygen if in respiratory distress.[7] Since calcium deficiency is considered a potential predisposing factor for egg binding, calcium administration is often considered in parrots with low circulating calcium values, subjective evidence of low bone density, or a history of a calcium-deficient diet. Calcium administration is also believed to assist with uterine contractility in birds.[14,15] Nevertheless, there is limited evidence on the effectiveness of this treatment for egg-bound parrots. Oxytocin does not assist with relaxation of the uterovaginal sphincter, and its use in birds is controversial because it is not an avian hormone. Arginine vasotocin, which would be the avian equivalent of oxytocin, is not commercially available. Another potential medical treatment of egg binding is prostaglandin E_2, a hormone that should help with relaxation of the uterovaginal sphincter and also stimulates oviductal contractions.[16] Currently, there are no commercially available formulations of prostaglandin E_2 in the US. In the present study, medical management was initiated in 88.7% (133 of 150) of the cases presented with complete follow-up. Of these 133 cases, 66 (49.6%) had an additional treatment approach following medical management. Overall, medical management had a success rate of 33.1% (44 of 133) in those birds that initiated medical treatment and did not receive any further treatment. While the success rate of medical management is relatively inconspicuous, the use of medical management had a statistically significant impact on the outcome. The reason for this impact likely relied on the fact that birds that did not receive medical management either (1) were very sick on presentation and deemed to require immediate surgery, mechanical assistance, or ovocentesis, all of which may be dangerous, or (2) had further treatment declined. Our retrospective study demonstrated that medical treatment is likely beneficial in birds with egg binding, but its effectiveness as a standalone treatment may be limited.

Ovocentesis involves the aspiration of egg contents to induce implosion and reduce its size, facilitating its passage or minimizing adverse effects related to its presence if the egg cannot be expelled. Ovocentesis can be conducted on eggs located in the cloaca or salpinx, with needles introduced either through the cloaca after gentle dilation or via the skin (percutaneous ovocentesis). The advantage of ovocentesis compared to surgery is that it requires a much shorter anesthetic time. In our study, ovocentesis was performed on 16 birds, proving effective in 12 cases, with 2 cases lost to follow-up (75% to 86% success rate). Only 1 study[12] to date has documented the outcomes of ovocentesis in birds. In that case series of 20 birds, 15 were parrots and the procedure was deemed successful in 10 instances, yielding a success rate of 67%. The study noted that reasons for failure included egg fragmentation during the procedure and oviductal strictures that prevented shell removal.[12] Our study confirmed that ovocentesis is a reasonable option for parrots affected by egg binding.

Mechanical assistance in the present study had a success rate of 86.1% and was the only treatment approach in addition to medical management to be statistically associated with a successful outcome in parrots with egg binding. There is very limited published information on strategies and risks associated with mechanical assistance in parrots. Complications of mechanical assistance include egg rupture, trauma or laceration of oviductal tissues, hemorrhage, or displacement of the egg or egg fragments into an ectopic position.[4] These complications were particularly concerning in the population of parrots included in our study, considering their overall small size. Mechanical assistance in this study was performed by experienced veterinarians at an avian-only practice. The effectiveness of this treatment approach is unpredictable when performed by less experienced practitioners.

Surgical approaches in our population had a success rate of 60.6%. Because of associated risks and costs, surgery is typically not considered a first-line treatment option for parrots with egg binding. Therefore, patients undergoing surgery are typically more critical, have been sick for a longer period of time, or have an underlying disease process causing egg binding that is more complicated and difficult to treat. These factors, in addition to the inherent surgical and anesthetic risks, may contribute to surgery having the noted poorer success rate in this study. Surgery still remains the elective treatment option in cases of ectopic eggs, cloacal and/or oviductal prolapse, torsion, or necrosis, or if the egg is preventing micturition or defecation.[4]

Gonadotropin-releasing hormone agonist therapies have long been used by practitioners to suppress the reproductive cycle; however, limited prospective studies have been published regarding their efficacy. Leuprolide acetate depot and deslorelin acetate are 2 GnRH agonists that decrease plasma sex hormones and cause downregulation of GnRH receptors via negative feedback mechanisms and ultimately cause gonadotropin levels and cessation of oviposition.[13,17] In this study, only 3% of cases received deslorelin implants prior to an egg binding episode. Furthermore, only 8 cases (4.88%) suffering an egg binding episode received therapy with GnRH agonists before discharge. Of those cases, 4 (50%) experienced repeat egg binding events. This suggests that there are other physiologic or environmental factors that contribute to egg binding events that may override the effects of GnRH agonists, such as photoperiod, mate presence and social interactions, and food availability. It should be noted that, in the US, the Suprelorin F (deslorelin acetate) 4.7-mg implant is an FDA-indexed product for treating ferret adrenal disease. Extralabel use of US FDA-indexed products is prohibited for any animal species, including psittacine species.

The present study had several limitations. Egg binding is the failure of an egg to pass through the oviduct at a normal rate. Dystocia is a subset of egg binding and implies mechanical obstruction or cloacal dysfunction. Egg binding may be more responsive to medical management, while dystocia may require more intrusive interventions, such as ovocentesis or surgery, and therefore carries a more uncertain prognosis. This study did not classify case outcome on the basis of diagnosis of egg binding versus dystocia, as it can be difficult to definitively diagnose and subsequently is not often reflected in records. Case success rate may correlate with severity of disease rather than the treatment modalities utilized, but further studies are required to distinguish how diagnosis of egg binding versus dystocia affects the success rate of therapies. Another limitation was that only a limited subset of the population had circulating calcium concentrations measured at the time of egg binding. This was likely due to a combination of several factors, including the financial burden, broad time span of patient inclusion, and small size of most included patients. A further limitation was that, while we reported the number of patients that presented for subsequent episodes of egg binding at the institution where the data were collected, it is possible that some patients experienced additional episodes that were not captured by the data extraction. Consequently, the actual number of parrots with egg binding following the events described here may be higher than reported.

This study provides information regarding the success rate of commonly used treatment modalities in parrots with egg binding. Further suggested studies include assessing specific thresholds for escalation to more invasive treatments following an ineffective medical treatment, determining the success of GnRH agonist treatments in preventing future egg binding episodes in areas where use is not prohibited, and establishing success rates and complications associated with GnRH agonist administration during treatment.

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Supplementary Materials

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