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Ocular Lesions in Birds of Prey in Portugal: A Retrospective Study

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Simple Summary: Thousands of animals attend wildlife rehabilitation centers each year, including many birds of prey. Vision is essential for birds to survive. This study describes ocular injuries in wild raptors admitted to wildlife rehabilitation centers in Portugal from 2017 to 2021. Out of 2207 birds of prey, 156 (7%) had ocular lesions, with the most common being hyphema (28.2%) and corneal ulcers (20.5%). These injuries often occurred together. Ocular lesions were more common in nocturnal (76.9%) than in diurnal (23.1%) birds of prey. Despite the serious lesions, 51% of these birds were successfully released back into the wild. This shows how important eye check-ups are in rehabilitating injured birds. More research is needed to fully understand the effects of ocular lesions on their recovery and return to nature.

Abstract: In wildlife rehabilitation centers, thousands of animals are treated annually, with a substantial proportion being birds of prey. Since vision is essential for the survival of these species, this study focused on investigating the causes of ocular injuries in raptors admitted to four rehabilitation centers across mainland Portugal from 2017 to 2021. Of the 2207 birds admitted during this period, 156 (7%) presented ocular injuries. Hyphema (28.2%) and corneal ulcers (20.5%) were the most prevalent injuries, often occurring together or alongside lens luxation. Nocturnal raptors showed a higher prevalence of these injuries (76.9%) compared to diurnal raptors (23.1%). A significant association was found between ocular injuries and causes of admission, particularly with ocular hemorrhages and multiple injuries in the eye. Despite the severity of the ocular injuries, the release rate remained relatively high at 51%, underscoring the critical role of comprehensive ocular examinations and vision assessments in guiding treatment decisions and discharge decisions. This study highlights the need for further research with larger samples to better understand the impact of ocular injuries on the rehabilitation success of wild birds in Portugal.

Keywords: ophthalmology; raptors; wildlife recovery centers

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1. Introduction

The treatment of injured wild animals to return them to their natural habitat is of pivotal importance in wildlife recovery centers worldwide. Birds are usually the most affected group of autochthonous species admitted to recovery centers, followed by mammals and,

to a much lesser extent, reptiles and amphibians [1,2]. Birds are heavily reliant on their visual sense [3]. This is anatomically evidenced by the fact that the cross-sectional diameter of their optic nerves is larger than the diameter of their cervical spinal cord [4], and in most bird species, the total weight of the eyes is greater than the weight of the brain [5]. From a functional point of view, the bigger the eye, the larger the image on the retina, and the greater are the perceived details—in other words, the greater the resolving power [6]. Large diurnal raptors are the only animals with a maximum spatial resolution greater than that of humans, and they have the most acute vision of any animal studied to date [7]. Binocular vision is better developed in nocturnal raptors, whose visual field is 110 degrees, of which 70 degrees is binocular. Diurnal raptors have a visual field of about 250 degrees, 50 degrees of which is binocular [6]. All raptor species studied to date have at least one fovea, which is a more depressed specialized region of the retina where photoreceptor densities are highest [8,9]. Nocturnal raptors, which have frontally oriented eyes, have a single shallow fovea in the temporal retina, whiles diurnal raptors have two foveas, one in the central and one in the temporal retina [7]. This enhances their visual acuity, further underscoring the importance of vision in their survival and behavior. As such, for this taxonomic group in particular, the successful reintroduction into the wild is greatly dependent on the animals' visual skills, which in raptors are intricately linked to their hunting abilities. Many raptors typically search for and capture prey while airborne. Rather than remaining stationary, they hunt actively in flight, utilizing soaring, gliding, or flapping their wings to cover expansive areas. During this activity, they often bend their heads downwards, aligning the dorsal blind field with the forward direction of flight. This may contribute to their susceptibility to collisions with artificial structures, such as wind turbines and power lines, frequently resulting in various traumatic injuries [6]. A common consequence of a traumatic injury is damage to ocular function [10]. Hunting activities make raptors more prone to ocular injuries of traumatic origin that can be found from the eyelids to the more internal areas of the eye. These injuries can have mild to serious and irreversible clinical presentations and also carry the possibility of secondary bacterial infection [11]. Often the severity of the ocular disease is not evident on initial presentation after blunt force trauma. In fact, it has been shown that 30% of raptor trauma cases have suffered ocular damage, and in 50% of these, the damage only affects the posterior segment and is only visible if the eye is examined with an ophthalmoscope [12]. Thus, ocular examinations and assessments of vision performance are critical in the clinical practice of treating wild birds and are essential for making informed release decisions.

This study aims to describe the ocular lesions in birds of prey admitted to four wildlife rehabilitation centers in continental Portugal from 2017 to 2021. We deemed it relevant to investigate how factors such as birds' activity patterns (diurnal/nocturnal), as well as the cause and the season of admittance, can influence the type of ocular injuries. We expect nocturnal birds to be more susceptible to eye lesions due to their reliance on visual acuity in low-light conditions. Additionally, we aim to identify if these factors are related to each other or to the type of lesion, and how that can affect the rehabilitation and potential release in birds of prey.

2. Materials and Methods

2.1. Location and Operating Areas of Wildlife Recovery Centers

The birds of prey included in this study, all with ocular lesions, were admitted to four wildlife recovery centers located in different regions of continental Portugal (Figure 1). These centers include the Wildlife Rehabilitation and Research Center of Ria Formosa (RIAS) and the Wildlife Recovery Center of Santo André (CRASSA) in the south; the Center for the Study and Recovery of Wild Animals (CERAS) in the central region; and the Wildlife Rehabilitation Center of the Veterinary Hospital of UTAD (CRAS) in the north. Specifically, RIAS receives animals from the Algarve and South Alentejo regions, while CERAS covers the areas of Northeast Alentejo, Beira Baixa, and occasionally Ribatejo. CRASSA operates on the southwest coast of Portugal, receiving animals from that region and parts of Alentejo.

CRAS, the main wildlife center in Northern Portugal, serves the districts of Vila Real, Guarda, Viseu, Bragança, Braga, Porto, Viana do Castelo, and Aveiro.

Figure 1. Location and operating areas of the four recovery centers on continental Portugal that provided data for this study (CRAS-UTAD: red, CERAS: blue, CRASSA: green, and RIAS: violet).

2.2. Animals and Samples

The animals included in this study comprise a total of 156 birds of prey with ocular lesions admitted across the aforementioned centers during the period 2017–2021. All birds included in this study were examined at admittance by the veterinary department of the hospital, with a complete physical examination (including eyes) followed by diagnosis and treatment of possible patient conditions. For each specimen, data collection included the date of admittance, cause, the type of ocular lesion observed, and destination. Regarding the admittance cause, the following categories were established: trauma (animals that displayed visible wounds and hemorrhagic lesions associated or not to skeletal fractures), unknown (when the reason for admittance was not mentioned on the animals' medical record), disease (animals exhibiting poor body condition such as low weigh, loss of feathers, unable to move, etc., but without evidence of trauma or skeletal fracture), electrocution, and illegal captivity (animals seized due to illegal capture). Six of the animals included in the present study were subjected to necropsy encompassing a detailed macroscopic inspection and eye collection at RIAS. The technique used to collect the eyes was the modified transaural enucleation from [13]. The eye samples were fixed by immersion in a fixative solution (TB-Fix) for 48 h at +4 °C. The fixative solution was made in-house [14]. Routine processing for paraffin embedding was performed at the histology and anatomical pathology laboratory of University of Trás-os Montes and Alto Douro. Tissue samples were dehydrated through graded alcohols, clarified with xylene, and embedded in paraffin wax. Samples were sectioned at 3 µm and stained with hematoxylin and eosin (HE) for histopathological evaluation.

2.3. Statistical Analysis

Statistical analysis included descriptive measures such as frequencies and percentages for the variables under study. In order to verify if there was a significant association between the different ocular lesions (classified into 11 categorical variables) in birds of prey, a chi-square test of independence was applied.

Then, the chi-square test of independence was applied to verify if the different lesions and the variables under study (nocturnal/diurnal birds, cause of admittance, season of admittance and destination, also classified as categorical variables) were associated. As measure of effect size for the chi-square test of independence, Cramer's V was used, according to the following rule of thumb: small effect between 0.1 and 0.29, medium between 0.3 and 0.49, and large between >0.5 [15].

In all statistical analysis a significant level of 0.05 was considered. All statistical analyses were conducted using Statistical Package for the Social Sciences (SPSS)—version 28.

3. Results

Of the 2207 birds of prey admitted to the aforementioned centers between 2017 and 2021, 156 (7%) had ocular lesions. Of these, 36 (23%) were diurnal raptors and 120 (77%) were nocturnal. Animals belong to the species Northern Goshawk (*Accipiter gentilis*) (n = 3), Eurasian Sparrowhawk (*Accipiter nisus*) (n = 6), Booted Eagle (*Aquila pennata*) (n = 3), Long-eared Owl (*Asio otus*) (n = 4), Little Owl (*Athene noctua*) (n = 37), Eurasian Eagle Owl (*Bubo bubo*) (n = 13), Eurasian Buzzard (*Buteo buteo*) (n = 12), Short-toed Snake Eagle (*Circaetus gallicus*) (n = 2), Black-winged Kite (*Elanus caeruleus*) (n = 1), Peregrine Falcon (*Falco peregrinus*) (n = 3), Common Kestrel (*Falco tinnunculus*) (n = 4), Eurasian griffon vulture (*Gyps fulvus*) (n = 1), Black Kite (*Milvus migrans*) (n = 1), Red Kite (*Milvus milvus*) (n = 1), Eurasian scops owl (*Otus scops*) (n = 1), Osprey (*Pandion haliaetus*) (n = 1), Tawny Owl (*Strix aluco*) (n = 58), and Common Barn Owl (*Tyto alba*) (n = 5). Most of them (61%) were admitted during the warm seasons (spring and summer), while only 39% entered the centers during the cold seasons (fall and winter). During the study period, the relative frequency of admitted animals varied across the centers (Table 1). RIAS admitted the highest number of birds (62 out of 156; 40%), followed by CRAS-UTAD (45 out of 156; 28%). In contrast, CRASSA admitted the fewest animals (15 out of 156; 10%). Regarding nocturnal raptors, CRAS-UTAD (30 out of 247; 12.1%) and CRASSA (12 out of 110; 10.9%) had the highest percentages of admissions. Conversely, CERAS had the lowest percentage of nocturnal raptor admissions (24 out of 311; 7.7%). Despite this, there was no significant difference (p = 0.06) between the number of diurnal and nocturnal birds admitted to the different centers.

Table 1. Birds of prey admitted to the four wildlife recovery centers between 2017 and 2021 split according to the birds' activity pattern and the presence of ocular lesions.

Center	Nocturnal	Diurnal	Total
RIAS	9.6% (52/542)	3.4% (10/295)	7.4% (62/837)
CRASSA	10.9% (12/110)	3.3% (3/90)	7.5% (15/200)
CRAS-UTAD	12.1% (30/247)	4.9% 15/302)	8.2% (45/549)
CERAS	7.7% (24/311)	3.2% (10/310)	5.5% (34/621)

As for the number of animals admitted according to years (Table 2), the number of admissions was considerably higher in 2019 for all centers except for CRASSA. The species sampled are all autochthonous; five of them are migratory, but the number of migratory animals in this study is less than 10%. Regarding the cause for admittance, the most common was trauma (109/156; 69.9%); however, in 20% of the cases (32/156), it was not possible to ascertain the specific cause, or it was missing from the records, being registered as "unknown" for the purpose of this study. Apart from these cases, disease was also frequent as an admittance cause (10/156; 6.4%), whereas electrocution was the less represented cause (2/156; 1.3%) in this study. Three animals (1.9%) were delivered to the centers by local authorities as a result of illegal captivity. Concerning the bird's destination after their staying at the center, 51% of them were released into the wild.

Table 2. Birds of prey with ocular lesions admitted by center and year.

Year	RIAS	CRASSA	CRAS UTAD	CERAS	Total (Year)
2017	9	0	9	10	28
2018	9	2	5	3	19
2019	23	4	19	14	60
2020	11	5	2	0	18
2021	10	4	10	7	31
Total (center)	62	15	45	34	156

With regard to the type of ocular lesions (Figure 2; Table 3), ophthalmic evaluation revealed that anterior chamber lesions were more prevalent, with corneal ulcers and hyphema being present in 20.5% and 28.2% of the animals, respectively. Blepharospasm and exophthalmia represent the least prevalent lesions, both standing for 1.3% each.

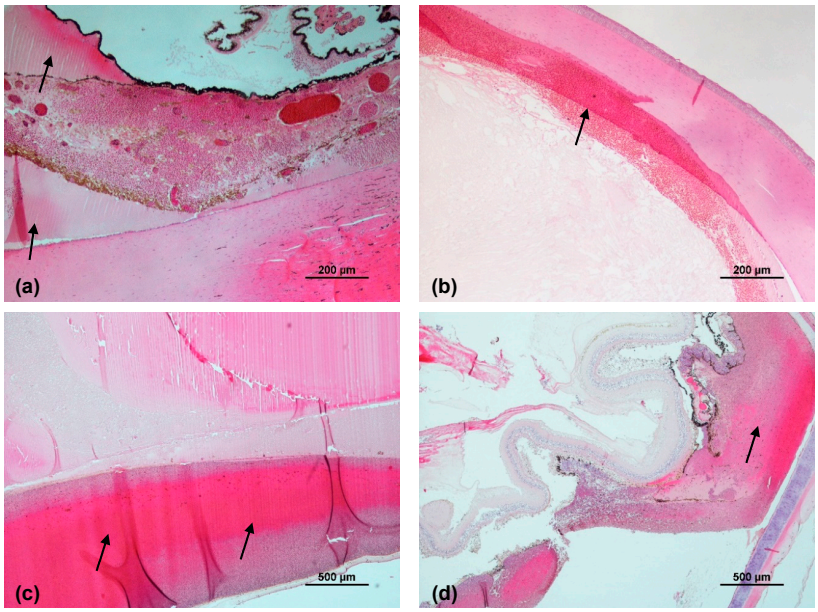

Figure 2. Microscopic images of the eye of a Eurasian Buzzard (*Buteo buteo*) stained with hematoxylin and eosin. Hemorrhage (black arrows) is present in the anterior chamber (**a**,**b**), as well as in the posterior chamber (**c**,**d**). Notice the retinal detachment (**d**) and hemorrhage also present in the subretinal and choroid space.

Table 3. Type of ocular lesions displayed by birds of prey with during the period 2017–2021.

Lesion	Nocturnal	Diurnal	Total
Corneal ulcer	19.1% (23/120)	25% (9/36)	20.5% (32/156)
Hyphema	30% (36/120)	22.2% (8/36)	28.2% (44/156)
Uveitis	7.5% (9/120)	11.1% (4/36)	8.3% (13/156)
Cataracts	2.5% (3/120)	2.8% (1/36)	2.6% (4/156)
Chorioretinitis	9.1% (11/120)	2.7% (1/36)	7.7% (12/156)
Posterior chamber hemorrhage	2.5% (3/120)	5.5% (2/36)	3.2% (5/156)
Retinal displacement	4.2% (5/120)	5.5% (2/36)	4.5% (7/156)
Lens luxation	3.3% (4/120)	16.7% (6/36)	6.4% (10/156)
Exophthalmia	1.7% (2/120)	0% (0/36)	1.3% (2/156)
Blephlarospasm	1.7% (2/120)	0% (0/36)	1.3% (2/156)
Blepharitis	4.2% (5/120)	8.3% (3/36)	5.1% (8/156)

For a detailed description of the lesions, see the glossary (Appendix A).

Regarding the type of lesions, no differences were observed between diurnal and nocturnal raptors ($p = 0.157$). As for the relationship between the different types of ocular lesion, the results showed a statistically significant association between corneal ulcer and hyphema ($X^2_{(1)} = 9.041$; $p = 0.003$; V = 0.234), and hyphema and lens luxation ($X^2_{(1)} = 5.334$; $p = 0.021$; V = 0.182). Although not statistically significant ($X^2_{(1)} = 3.681$; $p = 0.055$), the presence of ulcers tended to be associated with the cold season (autumn and winter). Overall, a statistically significant association of moderate effect was observed between ocular lesions and cause of admittance ($X^2_{(1)} = 14.361$; $p = 0.006$; V = 0.341), with hemorrhages and multiple injuries having significant different proportions (Table S1). Although not statistically significant, the presence of lesions in the adnexa appears to be related to the cause of admittance ($p = 0.08$). Conversely, the absence of these lesions tends to have a positive impact on the outcome ($p = 0.063$).

4. Discussion

The routine conditions of clinical practice in wildlife recovery centers are demanding and often pose significant challenges. In this context, ophthalmology may be easily overlooked. Additionally, in many recovery centers, resources may be rather limited, not allowing for a complete eye examination. Such limitations reflect the scarcity of studies on this subject regarding wildlife birds and, on the other hand, probably translate into a lower prevalence of the lesions addressed in this particular study, rendering them subclinical. In fact, the prevalence of eye injuries was 7%, which is lower than other studies, in which it ranged between 16% and 75% [16–21]. However, it is clearly higher than that reported in a recent study carried out in Spain [22], according to which only 3.4% of the animals admitted had ocular lesions. On the other hand, a study conducted with captive bald eagles in the United States of America [18] revealed a prevalence of 60%, with the more frequent lesion being cataracts, which is expected in captive animals that reach a higher age. The population of birds addressed in this study is made up of specimens that came from locations all around the Portuguese mainland, managing to roughly represent the national panorama. More than half (54%) of the native species of birds of prey found in Portugal are represented by it, which also exhibits a broad specific diversity. This is a significant sample that is relevant because it is composed entirely of wild birds, as opposed to other studies that involve birds kept in captivity, where specific lesions cannot be projected to free-living species.

Except for one center, the number of admissions was considerably higher in 2019 for all centers. This could be attributed to an ongoing increase in public awareness and concern for wildlife conservation. People are becoming more vigilant in reporting injured or distressed birds. On the other hand, throughout the years, recovery centers have improved their capacity for intake, data collection, and reporting, making it easier for the centers to handle more birds, resulting in sustained high admission numbers. The cumulative effects of human impact linked to continued urbanization, road construction, and other developments could have resulted in higher numbers of injuries due to collisions with vehicles, buildings, or power lines, justifying trauma as the main cause of admittance and the higher numbers seen in 2019. However, factors like the occurrence of emergent or ongoing disease outbreaks, such as avian influenza, increased breeding success or changes in food availability cannot be excluded with the present study. Conversely, and taking into account the COVID-19 pandemic context (2020–2021), during which human activities were reduced and more people spending time indoors or at home, it can be inferred that fewer people came into contact with affected animals, and that the likelihood of trauma linked to human activities decreased, thus justifying the number of admitted animals being lower during the years of 2020–2021 when compared to the year 2019.

As seen in previous studies [10,20–23], the main cause of admittance in rehabilitation centers for birds of prey presenting any type of ocular lesion is trauma, which is in accordance with the findings of this study, with 109 cases registered (69.9%). The animals in the present study are all autochthonous, but five of the species are migratory. Resident species

are more accustomed to their habitats compared to migratory species, which makes them less prone to injuries of traumatic origin, but the number of migratory animals sampled is less than 10%. Furthermore, most of the entries of these animals occurred during the warm seasons, a time of year when they have already been living in the territory for several months, being more familiar with the environment. The avian eye has many characteristics that make traumatic damage more likely. In contrast to other animal species, birds of prey have frontal eyes that are larger in relation to their physical size. The globe has minimal periocular cushion and nestles tightly within the orbit [24]. Given the high level of dependence that raptors have on their visual system for success in the wild, it is important first to review the process of understanding the visual potential for rehabilitating raptors as a critical step in appropriate decision making in a clinical setting [25]. Raptor patients are not considered releasable when significant vision-threatening, bilateral ocular lesions are present [10]. In general, owls are less dependent on vision for survival than diurnal raptors, as has been shown regarding the successful release in one-eyed owls, as evidenced by a study with the recapture of free-living Long-eared Owls one to three years after their recovery and release from ocular trauma [26], but diurnal falconry birds with unilateral blindness have been documented flying into branches on their blind side [27].

Since the cornea is the main ocular structure that comes into contact with the outside world, corneal ulceration is anticipated to be one of the most common injuries in a situation where traumatic alterations are prevalent, which is supported by the present results. In fact, corneal ulcers were present in 20.5% of the animals, being the second most prevalent lesion after hyphema, seen in 28.2% of the cases. Regarding ulcer prevalence, our results suggest that season of admittance has a strong tendency to be associated with these lesions. As such, it is reasonable to infer that corneal ulceration may exhibit poor prognosis if it occurs during the cold seasons (autumn and winter). This might be due to the low temperatures, which can delay the healing process of the animals [28–31].

In the present study, the percentage of admittances of unknown reason was significantly high, which points to the need to develop a national and more objective classification of admittance system in wildlife centers. Interestingly, this study revealed that the presence of ocular lesions is associated with the admittance of birds at rehabilitation centers, being more pronounced in cases with hemorrhages and multiple injuries affecting the eye. The results regarding the different types of ocular lesions found in this study are also noteworthy, revealing a statistically significant association between ulcer and hyphema, and between hyphema and lens luxation. These results reinforce the traumatic origin of these types of lesions, in line with what was already described as the main cause of admittance of birds of prey in other regions of the Iberian Peninsula [32]. In the previously mentioned study carried out in Spain [22], it was not possible to establish a statistically significant association between these lesions, despite the fact that the values were close. Taken together, these findings suggest an association of these lesions in birds of prey, at least in the ones from the Iberian Peninsula, but further studies are needed to confirm this data.

From the literature, it is expected that the prevalence of posterior segment injuries is high [33] and common in raptors due to the shape of the eyeball that is prone to damage by trauma [24]. However, in this study, most lesions (74%) affected the anterior chamber, often making it impossible to examine the fundus of the eye with the resources available in the centers. Such a reason leads us to believe that the percentage of lesions in the posterior chamber is much higher than the one verified in this study. Although there are exceptions, at some wildlife recovery centers, the equipment available for ophthalmology is limited to a direct ophthalmoscope, Schirmer test, and fluorescein. These means are scarce when compared to those described in studies carried out in other countries such as Spain [21,22,34] and the United States of America [19], where in several centers there is access to ultrasonography and electroretinography, therefore influencing the full diagnosis. A good way to reduce the cost of material for ocular examination would be to explore unorthodox cheaper methods, as suggested by some authors, with the use of a smartphone-based device to examine the *fundus* of birds [35]. According to the authors, the use of a

retinal imaging device (Peek Retina®, Berkhamsted, UK) manually aligned and attached with a universal clip to the smartphone camera allowed satisfactory *fundus* imaging in most of the birds examined, particularly in owls.

Unlike other studies, the record data available at the centers did not allow us to determine if the lesions were uni or bilateral for all the animals under study, a factor that is crucial for the possible release of a bird of prey and that has been linked to the type of bird of prey: nocturnal birds showed a higher prevalence of bilateral changes due to their close and frontally directed eyeballs and thin ocular septum that allows the transfer of the impact to the contralateral eye; on the contrary, unilateral changes stood out in diurnal birds, justified by the more lateral location of the globe [10]. Since a wild animal with visual impairment in both eyes is considered unreleasable, the options are limited to humane euthanasia or its permanent maintenance in captivity, in environmental education programs or species conservation, in the case of emblematic species [36]. The lack of information concerning the uni or bilateral aspect of the ocular lesions, the absence of a common national medical record system, namely, regarding a more objective classification of admittance cause, and the failure to fill in some fields of the record, which leads to missing data, were the main limitations of this study. Regarding the migratory animals sampling, which is low, a more comprehensive study focused on this issue would be necessary in order to infer a greater risk of eye damage in migratory species.

In this study, the release rate was relatively high (51%), despite the majority of lesions being of traumatic origin, which is usually an indicator of a bad prognosis [10]. However, in the present study, this was not observed, a fact that could be associated with the absence of comorbidities that would compromise the general state of the birds. Further extensive studies, ideally involving a larger sample size, are needed to fully understand the impact of ocular injuries on the rehabilitation and successful return of wild birds to their natural habitats in Portugal.

5. Conclusions

Diagnosing and understanding the causes of ocular injuries in birds of prey is vital for their successful reintroduction into the wild, given the direct impact of vision on their hunting skills. Consequently, ophthalmology is a key component of their rehabilitation. The present study provides a general panorama of ocular lesions in birds of prey in continental Portugal and may contribute to the recognition of the significance of ophthalmology in the daily clinical practices of a wildlife recovery center. The accurate and precise ophthalmic exploration and interpretation of the results, in light of the knowledge of ornithological ophthalmology, prove to be critical in establishing the prognosis and in solving these cases. Additionally, studies such as this may help to unveil emerging health issues or fluctuations in food availability within bird populations. Future research is required and advised to ascertain how these lesions impact the visual capacities of free-living birds and how specific lesions impair a given free-living species' capacity to be released.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/birds5040043/s1, Table S1: Relationship between ocular lesions and main admittance causes (trauma and unknown categories) ($X^2_{(1)}$ test). Each subscript letter denotes a subset of cause of admittance categories for which column proportions do not differ significantly from each other at a significant level of 0.05.

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Institutional Review Board Statement: All procedures complied with the Portuguese legislation for the protection of animals used for scientific purposes (i.e., Decree-Law no. 113/2013, of 7 August 2013), which transposes European legislation (i.e., Directive 2010/63/EU of the European Parliament and of the Council, of 22 September 2010). Ethical review and approval were waived for this study because it involved biological samples from wildlife animals that died during their stay at the recovery centers, rather than from experimental trials.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

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Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A. Glossary

Corneal ulcer: Wound-like open sore on the cornea, the clear, dome-shaped tissue layer at the front of the eye. It involves disruption of the epithelial layer and the corneal stroma. **Hyphema:** Hemorrhage/presence of blood in the anterior chamber of the eye, the space between the cornea and the iris. **Uveitis:** Inflammation of the uvea, the middle layer of the eye, which includes the iris, ciliary body, and choroid. **Cataracts:** Cloudy areas that form in the eye's lens, leading to a decrease in vision. They form when protein builds up in the lens and are common with age progress. **Chorioretinitis:** Inflammation of both the choroid and the retina, two layers at the back of the eye. It is a form of posterior uveitis. **Posterior chamber hemorrhage:** Hemorrhage/presence of blood in the posterior chamber of the eye, located between the iris and the lens. **Retinal displacement:** Often referred to as retinal detachment, it occurs when the retina, a thin layer of tissue at the back of the eye, is lifted or pulled away from the layer of blood vessels that provides it with oxygen and nutrients. It is an emergency situation and it that can lead to vision loss if not treated promptly. **Lens luxation:** The displacement of the lens from its normal position, which can be anterior or posterior within the eye. It occurs when the ligaments supporting the lens weaken, displacing it from its normal position. **Exophthalmia:** Also known as exophthalmos, it is the abnormal protrusion or bulging of the eyeball from the orbit. **Blephlarospasm:** Neurological disorder characterized by involuntary spasm or twitching of the eyelid muscles (orbicularis oculi muscles). **Blepharitis:** Inflammation of the eyelids, particularly at the base of the eyelashes.

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