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Lesions in the ocular posterior segment of raptors

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SUMMARY

Thirty-eight free-living raptors, including various hawks, owls, and an eagle, had lesions of the ocular posterior segment believed to be the result of trauma. Although lesions of the anterior ocular segment and of the rest of the body often were seen, the lesions of the posterior segment of the eye were disproportionately more severe and usually were not suspected by rehabilitation personnel. The tightly encased raptor eye, with its anteriorly placed scleral ossicles, may have rendered the eye more susceptible to contrecoup damage. In the birds that were treated, ocular lesions were resolved and some vision was restored.

IN A COMPREHENSIVE STUDY of ocular lesions in raptors,1 ocular lesions were seen in >14% of approximately 1,000 free-living raptors. The major cause of the lesions was attributed to physical injury, usually the result of interaction with people. The majority of lesions involved the anterior portion of the eye.

Purposes of the present study were to evaluate lesions associated with trauma in the ocular posterior segment of free-living raptors and to compare these lesions with other lesions of the eye and/or with lesions in nonocular tissues.

Materials and Methods

Seventy-four raptors in California, Minnesota, and Tennessee were found traumatized in the wild and were brought to rehabilitation centers. The raptors were referred to me because of known or suspected eye problems. Of the 74 birds examined, only 38 birds having lesions in the ocular posterior segment were included in the present evaluation: 1 bald eagle, 1 northern harrier, 1 kestrel, 1 Swainson's hawk, 1 pygmy owl, 2 burrowing owls, 4 red-tailed hawks, 5 barn owls, 6 great horned owls, 8 barred owls, and 8 screech owls. All but the burrowing owls were adults.

Thirty-two of the 38 birds were alive and were examined, using biomicroscopy and direct and indirect ophthalmoscopy. Vision was assessed by determining whether a bird visually followed or physically avoided moving objects, or whether a bird could navigate safely in a flight cage. The remaining 6 birds were dead, and their ocular tissues were examined grossly and microscopically.

If a lesion had fresh hemorrhage or exudate, or did not have evidence of scarring, the lesion was considered to be of recent origin. Scarring or extensive degeneration of the tissues indicated a chronic lesion. For purposes of analysis, lesions involving the ocular anterior segment were grouped separately from lesions of the posterior segment. Further distinctions were made as to whether the lesions in a particular bird were major or minor. Damage was considered major if it caused blindness or if there was destruction of a major portion of the anterior or posterior ocular tissues. When possible, major lesions in other parts of the body were compared with the amount of ocular damage. In 17 birds, however, information about nonocular tissues was not available.

Results

Six of the birds (an eagle, 1 barred owl, 2 red-tailed hawks, and 2 great horned owls) had been shot. In 3 of the 6 birds, however, shooting was not considered the cause of injury until the ocular exam revealed otherwise. Two birds (1 barn owl and 1 barred owl) had been hit by automobiles. The source of trauma in the remaining 30 birds was unknown or was conjecture. Because radiography was not performed on every bird, some lesions may have been attributable to types of trauma other than shooting.

Differences were not found between ocular disease and the state of origin or the species. Overall, neither eye was involved more frequently in birds having unilateral ocular lesions. When the birds had nonocular damage (ie, fractures of bones in the wings or legs), the damage usually was on the same side as the unilateral eye lesion. About one fourth of the birds (ie, 10 birds) had bilateral disease.
Twenty-five birds had recent, major lesions in the posterior segment, including one or more of the following: diffuse retinitis (12 birds), retinal necrosis (17), retinal edema (2), retinal separation (10), torn retina (12), torn choroid (8), hemorrhage (15), choroiditis (16), torn pecten (5), and scleral rupture (8) with
scleritis (7), and orbital cellulitis (6; Fig 1A). Vision was absent or was impaired seriously in the affected eyes. Fifteen of the 25 birds had associated major damage to the anterior segment, including one or more of the following: extensive ulcerative keratitis (3 birds), corneal perforation (3), iridocyclitis (7), lens luxation (3), lens rupture (4), hyphema (3), cataract (11), iridocyclodialysis (5), and torn iris (2; Fig 1, B and C). In the 15 birds, damage to the anterior and posterior segments had occurred at the same time. Of the 15 birds, 5 had major nonocular lesions, usually fractures of bones in the wings or legs.

Ten of the 25 birds with major lesions in the posterior segment did not have lesions in the anterior segment, or had small corneal abrasions, ulcers, and scars. Corneal lesions were minor compared with the severity of the posterior segment lesions (Fig 2 to 4). The anterior lesions seemed to be of the same duration as the posterior lesions. Four of the 10 birds did not have major nonocular lesions; the status of the remaining 6 birds was not known.

Nine birds had chronic, major lesions in the posterior segment, including one or more of the following: intraocular fibrosis (1 bird), retinal separation (5), torn retina (3), torn pecten (1), ruptured globe (1), and extensive degeneration of the retina (7), optic nerve (1), pecten (2), and choroid (3; Fig 5). Vision was impaired or absent in the affected eyes. The anterior segments were normal in 4 of the 9 birds. One bird had a small corneal ulcer and a small focal cataract. Four birds had major damage to the anterior segment similar to that described previously. In 3 of the 4 birds, the lesions were of a chronic nature. One of these 3 birds (a red-tailed hawk) had its left wing amputated at the corpus and was kept in captivity. During the ensuing year, the right eye became enlarged and the bird was referred to me. Examination revealed glaucoma and intraocular inflammation. Due to its nonrehabilitative status, the bird was killed. The right eye contained lead shot within an inflamed and fibrosed ciliary body. In the fourth bird, there was recent perforation of the left cornea, with damage to all ocular tissues. The right eye had a normal anterior segment, but had major retinal damage (Fig 6).

Four birds had chronic, minor lesions in the ocular posterior segment: focal retinal degeneration (4 birds), and clumping of the retinal epithelium (3 birds; Fig 7). In 2 of the 4 birds, major lesions were seen in the anterior segment similar to those described previously and were of recent origin, with impairment of vision in the affected eyes. The posterior lesions were not considered extensive enough to cause vision disturbance and subsequent collision with an object. In the 2 other birds, one bird did not have lesions in the anterior segment and the other had a zone of focal keratitis and a small amount of fibrin in the anterior chamber. One of these 2 birds had a major nonocular lesion (i.e., wing-bone fracture).

Three of the birds that were blind due to active inflammation of the posterior segment were treated with various doses of topical and systemic dexamethasone and with various antibiotics. In the 3 birds, therapy was associated with organization of traumatic lesions, resolution of inflammation, and return of some vision (Fig 8).

Discussion

In many birds (n = 12), ocular lesions were a direct result of trauma. Lead pellets were found within some injured eyes. The birds with recent wing, leg, or other bodily damage due to being hit by a car or to unknown trauma (n = 6) also had recent damage to the eyes; one bird had an old nonocular lesion and ocular disease of similar duration, indicating that they had occurred simultaneously. In 7 of the 12 birds, the extent of damage to the anterior and posterior segments was similar.

Generally, the amount of damage to the eyes in most of the birds did not correlate well with the amount of damage to the rest of the body, nor was
there good correlation between the severity of anterior and posterior ocular disease. Most of the birds had major lesions in the ocular posterior segment, but had little or no disturbance in the anterior segment or in the rest of the body. Ocular lesions or the bird's general body condition indicated probable trauma, although the type of trauma was not clear. Moreover, damage to the posterior segment of the eye in many of these birds was not suspected by rehabilitation personnel.

In most of the birds, determinations could not be made as to whether major retinal and other lesions of nontraumatic origin compromised the bird's vision to the point of flying into objects, or whether a collision or other trauma resulted in the ocular lesions. The tightly encased raptor eye, with its anteriorly placed scleral ossicles, may be prone to contrecoup lesions. Therefore, blunt trauma to the head may predispose the bird to the seemingly paradoxical situation of little or no damage to the ocular anterior segment or to the rest of the body, but severe damage to the ocular posterior segment.

Major unilateral damage to the ocular posterior segment, regardless of the cause, may compromise a raptor's binocular vision, particularly in the hawk or eagle, to such an extent that the raptor could not capture its prey, which, in turn, may lead to inanition and subsequent capture by people. Although this may have occurred in some of the birds of the present study, a few birds did not fit this hypothesis. These exceptions were birds that were functionally one-eyed when captured (the opposite eye was blind due to long-standing retinal and optic nerve disease), and were comprised of hawks and owls that appeared to have been obtaining adequate nourishment. Therefore, at least in these birds, stereopsis was not necessary for survival. This is an important point because some rehabilitators assume that one-eyed birds are not releasable and either kill them or keep them in captivity. As a result, these birds do not contribute to the ecosystem.

Results of the present study indicate that damage to the ocular posterior segment of raptor eyes is often inapparent and out of proportion to lesions in the rest of the eye or in other parts of the body. An examination of birds brought in for rehabilitation should always include ophthalmoscopy for critical health assessment. In addition to determining whether the lesions are treatable, data should be collected that are relevant to the effects ocular posterior segment lesions have on the ability of the birds to survive in the wild. The decision to kill a bird or to retain the bird in captivity should be based on adequate, appropriate data that indicate conclusively that the bird could not survive in the wild.

Reference