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BLINDNESS IN A COYOTE, *Canis latrans*, FROM THE ROLLING PLAINS OF TEXAS

DANNY B. PENCE[1] and WYMAN P. MEINZER[2]

Abstract: Gross and histopathologic lesions in the eyes of a blind coyote, *Canis latrans*, collected in King County, Texas are discussed. The animal was in good condition and its age estimated at 7 years. The left globe presented with a superficial corneal erosion, a small punctate erosion, and an apparent lenticular opacity. Histologically, there was a mild anterior uveitis and lenticular degeneration with thickening of the anterior lens capsule, cataractous cortex with Morgagnian globules and bladder cells, and a dense nucleus. The right eye was a firm phthistic globe with thickened extraocular muscles and opaque cornea. Histologically, this presented as an adherent leucoma with partial loss of intraocular contents (retina, iris, and lens), intraocular bone undergoing haematopoiesis, a small granulomatous lesion with foreign body adjacent to the optic nerve in the dural sheath, and gliosis of the optic nerve. The loss of this eye probably resulted from a penetrating injury of the globe with partial loss of intraocular contents. Lesions noted in the eye may be interpreted as an acquired lenticular degeneration of the complicated type.

INTRODUCTION

During a study of helminth parasitism of the coyote, *Canis latrans*, from the Rolling Plains of Texas, a 7 year old male coyote was trapped February, 1976, in King County, Texas. The trapped animal was blind, but otherwise in good condition. According to several trappers, and in the experience of the junior author who has handled over 500 coyotes during the past 10 years, approximately 1 in 75 animals from this area are unilaterally or bilaterally blind. The following case report is a study of the cause of blindness in one of these animals.

MATERIALS AND METHODS

Eyes of the affected animal were photographed in the field, excised and fixed in 10% buffered formalin within 1 h. postmortem. These were later sectioned and stained with hematoxylin and eosin or the PAS reaction. A second coyote from the same area was used as a control to study normal ophthalmic histology. Its age was estimated at 5 years. Animals were aged according to the method of Gier.[1]

CASE HISTORY

An adult male coyote approximately 7 years of age, weighing 13.6 Kgm., was trapped and subsequently killed by gunshot 2 February 1976 on the Pitchfork Ranch, King Co., Texas.

Left eye:

This presented grossly with evidence of superficial corneal erosion with increased vascularization on the lower ⅓ extending to near the center of the cornea, a small punctate ulcer near the center of the cornea, and an apparent lenticular opacity (Fig. 1). The iris was more pigmented than normal. The conjunctiva and nictating membrane appeared mildly edematous. There was no evidence of excessive tearing or other discharge.

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On excision the globe measured 22.5 x 22.5 x 22.0 mm. The cornea measured 17.5 x 15.5 mm. The eye was opened in a horizontal plane. The lens was cataractous. The vitreous escaped on sectioning. The retina was separated from the pigment epithelium.

Histologically, the epithelium was absent over much of the cornea. There was increased vascularization at the base of the cornea with some cuffing of vessels with lymphocytes in the corneal limbus. The corneal endothelium was separated from Descemet's membrane in certain areas, but the remainder of the cornea appeared normal. Except for autolytic changes in the iris, no abnormalities were noted. The anterior lens capsule was markedly thickened, almost twice that observed in the control eye. Bladder cells were present in the anterior and posterior lens cortex. The anterior cuboidal epithelium was displaced and pyknotic in some areas. Subcapsular cortical degeneration presented as an intumescent cataract of the anterior and posterior cortex with numerous Morgagnian globules and liquified lens tissue (Fig. 2). The nucleus of the lens was heavily sclerotic and in certain areas with very homogenous deposits of densely staining material indicative of calcification. The vitreous body was separated posteriorly from the retina and attached to the posterior lens capsule. Small aggregates of lymphocytes were present in the vitreous at the base of the posterior lens capsule. A mild anterior uveitis with a few aggregates of lymphocytes and plasma cells were found at the base of the ciliary body. The retina was separated from the pigment epithelium and had marked autolytic changes such that it could not be interpreted. The choroid, sclera, and optic nerve appeared normal.

Right eye:

This eye was atrophied and sunken in the socket. The cornea was opaque (Fig. 3). The excised globe was firm with the extraocular muscles markedly thickened. The globe measured 20.0 x 17.5 x 16.0 mm. The cornea measured 14.0 x 16.5 mm. The sclera was thickened and the lens was not identified. On section, the globe was filled with a black material. For histological sections the globe was decalcified because of the gritty appearance of the tissue and resistance experienced on sectioning.

Histologically, all layers of the cornea were intact except the endothelium which was artifactually separated from Descemet's membrane. The central portion of the iris was adherent to the cornea near the corneal limbus. In this same area there was a small defect in Descemet's membrane. The anterior chamber was very shallow. The lens and sphincter pupillae muscles were not identified. The angles of the anterior chamber on both sides of the globe were intact but the base of the iris and the ciliary body were drawn back into the vitreous chamber where they became a continuous mass of fibrous connective tissue, new vessels, posterior choroid, and bone (Fig. 4). A chronic inflammatory response with numerous histiocytes, plasma cells, lymphocytes, and a few fibroblasts was noted adjacent to the region of calcification. Elsewhere, lymphocytes, histiocytes, and a few plasma cells were scattered throughout this area. There was vascular cuffing adjacent to the zone of ossification and in the choroid, sclera, and dural sheath of the optic nerve. The bone was undergoing active hematopoiesis with a central area of hematopoietic tissue and osteoclasts (Fig. 5). The retinal elements were not identified with certainty. The choroid consisted of pigmented and nonpigmented layers and contained numerous aggregates of plasma cells and lymphocytes. The sclera was markedly thickened and hyperplastic. Near the distal end of the optic nerve stump in the dural sheath there was a foreign body surrounded by a granulomatous response of histiocytes, lymphocytes, fibroblasts, and a few neutrophils and plasma cells (Fig. 6). The foreign body consisted of an outer opaque nonstaining amorphous coat and a central core of amorphous PAS positive material. The foreign body surrounded by aggregates of histiocytes and round cells was

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FIGURE 1. Left eye of coyote with erodent ulceration, small punctate ulcer near center of globe, and corneal opacity. Note vascularization at margin of erodent ulcer (arrow).

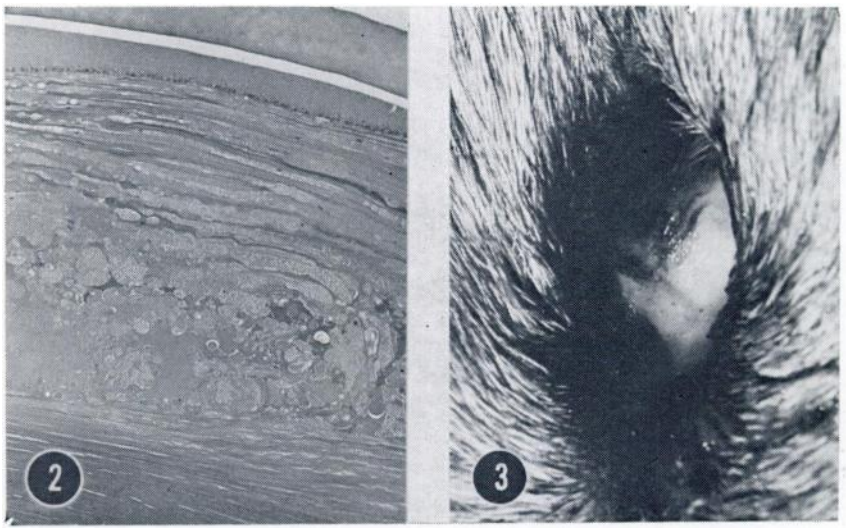


FIGURE 2. Lens of left eye illustrating thickening of anterior capsule and Morgagnian globules in cortex, PAS Reaction, X 73.

FIGURE 3. Phthistic globe of right eye of coyote. Note opaque cornea.

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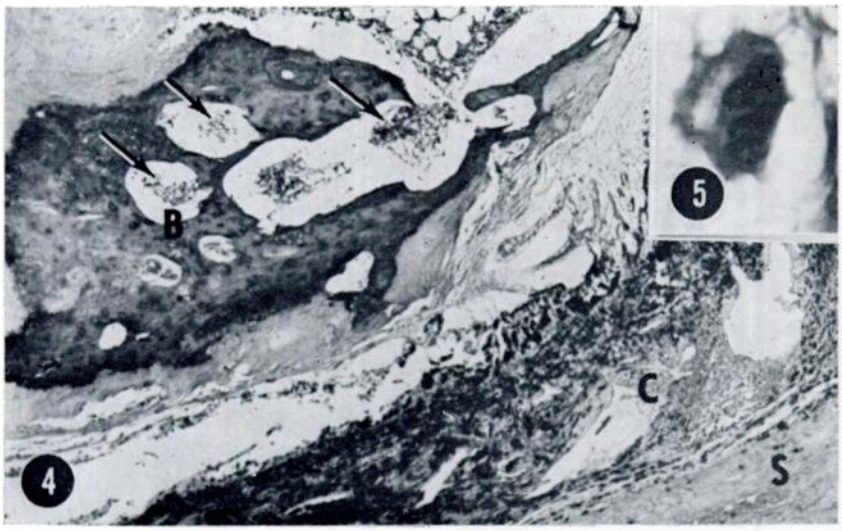


FIGURE 4. Section through vitreous chamber with intraocular bone (B) undergoing hematopoiesis (arrows), inflammatory response in the choroid (C) and thickened sclera (S), Hematoxylin and Eosin, X 63.

FIGURE 5. Osteoclast from intraocular bone, Hematoxylin and Eosin, X 400.

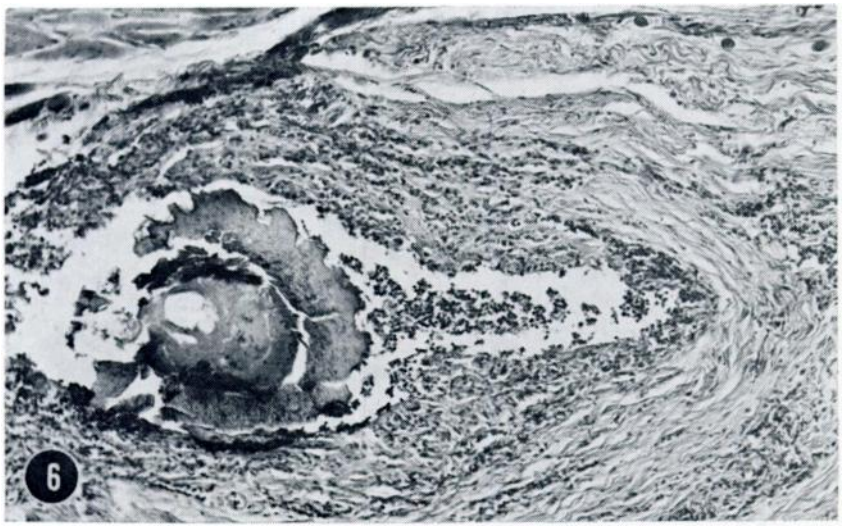


FIGURE 6. Foreign body with surrounding granuloma located adjacent to dural sheath of optic nerve, Hematoxylin and Eosin, X 160.

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encapsulated by fibrous connective tissue. There was gliosis of the optic nerve and edema of nervous tissue at the point of entry of the optic nerve into the vitreous chamber (nerve fiber layer) with the disk forming a prominent swelling towards the vitreous.

DISCUSSION

Considering the retrogressive changes, inflammatory response, bone formation, and partial loss of intraocular contents, the right eye was undoubtedly blinded as a result of a penetrating injury. Although the penetration point was not identified histologically, the small foreign body and associated granuloma in the dural sheath probably represents a residium of the penetrating object. Its structure is suggestive of the tip of a cactus spine or mesquite thorn. Reaction to vegetable matter introduced into the posterior chamber usually elicits a massive fibroplasia with encapsulation of the foreign body.[2]

The intraocular bone was felt to arise from metaplastic changes in the retinal pigment epithelium and not from the choroid. Bone appeared to be localized in the retinal pigment epithelium and metastatic processes in the choroid tend to spread first within it rather than beyond it as this tissue is limited on the inside by the resistant membrane of Bruch.[3] Intraocular osseus metaplasia of the retina pigment epithelium is not uncommon following trauma.[4] Gliosis of the optic nerve was considered to be a response to the degeneration of the globe.[3] The conclusion is that the globe was in phthisis resulting from a previously sustained penetration injury.

It was not possible to determine the specific cause of the cataract in the left eye. In the dog similar lenticular degeneration results from antecedent ocular disease such as uveitis, trauma, or progressive retinal atrophy.[5] In the coyote examined in this study there was a mild anterior nongranulomatous uveitis.

The lesions in the left eye could not be associated with a sympathetic ophthalmitis on the basis of histopathology. Although there was a mild anterior uveitis consisting of a nongranulomatous infiltration of mostly lymphocytes and a few plasma cells, the characteristic picture of a diffuse granulomatous uveal infiltration with epithelioid cells and lymphocytes, uveal pigment phagocytosis by epithelioid cells, and Dalen-Fuch's nodules were not present.[4] Likewise, a phacoanaphylactic endothalmitis was not suspected since there was no evidence histologically of neutrophils, multinucleate epitheloid giant cells, or granulation tissue.[4]

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