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Iridociliary adenoma in a sheep (Iranian Shaal breed): A case report

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Abstract

Ocular tumors are rarely seen in farm animals. Iridociliary epithelial tumors are the second most common tumor of the eye in dogs and cats, but there is just one report of this tumor in sheep. This case report described the history, clinical signs, histopathological and immunohistochemical findings, and surgical management of an iridociliary adenoma tumor in a 3-year-old Iranian Shaal sheep with signs of anorexia, depression, loss of vision, and a mass covering the left eye. The mass had protruded from the left eye globe but had not penetrated the periocular tissues. Enucleation was performed to excise the tumor. Periodic acid–Schiff (PAS) and Alcian blue staining methods were done for the mass, but the result for both of them was negative. Slides were also immunostained for antibodies against cytokeratin AE1/AE3, vimentin, and S-100 protein. The results were positive for vimentin but negative for cytokeratin and S-100. According to the results of histopathology and immunohistochemistry, the type of tumor was diagnosed as iridociliary adenoma. To our knowledge, it was the second report of the iridociliary tumor in the sheep and the first report of this tumor in the Iranian Shaal breed.

Introduction

Iridociliary epithelial tumors are one of the primary tumors of the globe that are rarely observed in farm animals.[1] However, after melanocytoma, iridociliary epithelial tumors in dogs and cats are the second most common ocular tumors. Iridociliary tumors originate from the iris or ciliary body, pigmented or non-pigmented epithelial cells.[2] The tumor has been reported as a white to dark brown or black mass in previous studies.[2] This tumor is more common in the posterior chamber of the eye, but in some cases, it protrudes through the pupil and enters the anterior chamber.[2] Iridociliary adenocarcinomas rarely metastasize.[3] Predisposing factors that lead to the formation of this tumor in the eye include glaucoma and intraocular hemorrhage.[2] Common complications seen following the formation of this tumor include asteroid hyalosis (AH) and glaucoma.[2] Although ocular tumors are rarely detectable, they have many effects on animal function. These include vision loss, eye discoloration and eyeball deformity which cause the owner to call for a veterinarian.[4] Ocular tumors are rarely observed in sheep. However, squamous cell carcinoma, malignant melanoma, and ocular fibrosarcoma have been reported in sheep.[1,5] There is only one report of iridociliary epithelial adenoma in sheep reported by Raoofi *et al.*[1] Iridociliary epithelial adenoma has been reported in dogs, cats, rabbits, and parrots in previous studies.[2,6,7] This case report describes the history, clinical signs, histo-pathological findings, and surgical management of iridociliary adenoma in a Iranian Shaal breed sheep.

Case Description

A three-year-old Iranian Shaal ewe, weighing approximately 65.00 kg, was clinically examined at Research Institute of Agricultural Engineering, Karaj, Iran with signs of anorexia, depression, loss of vision, and a mass covering the left eye. The mass had been present for about a month and had gradually grown in size. The mass had filled the entire space of the left globe so that the vision of the left eye was completely impaired. The color of the mass was dark brown to black. Clinical examination of the sheep revealed a body temperature of 40.20 ˚C, a heart

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rate of 64 beat per min, and respiratory rate of 24 breaths per min. No abnormality in the regional lymph nodes was found.

The surgical procedure was conducted in sterile conditions. At first, retrobulbar analgesia at two points of dorsal and ventral, using 3.00 mL lidocaine 2.00% (Pasteur Institute of Iran, Tehran, Iran) at each point was performed to block the ocular nerves. Then, the enucleation transpalpebral approach was used. An incision was made 1.50 cm from the eyelids. Next, eye ligaments were transected, optic nerve was severed, and the eye globe was removed. Finally, eyelids were sutured using a 2-0 polyamide suture material (Supa, Karaj, Iran). Case follow up did not show any postoperative complication after two weeks,and the patient was completely recovered.

The entire globe had been filled with dark fleshy solid tissue (3.00 cm × 2.30 cm), the tumor mass was extended from both the posterior aspect of the cornea toward the lens and from the posterior aspect of the lens to the caudal end of the eyeball (Fig. 1). The lens was severely atrophied, probably under pressure of tumor mass development. The sclera was becoming wrinkled, which resulted in prominent microphthalmia. The ocular mass was fixed in 10.00% neutral buffered formalin, processed routinely, sectioned at 5.00 µm, and stained with Hematoxylin and Eosin (H&E).

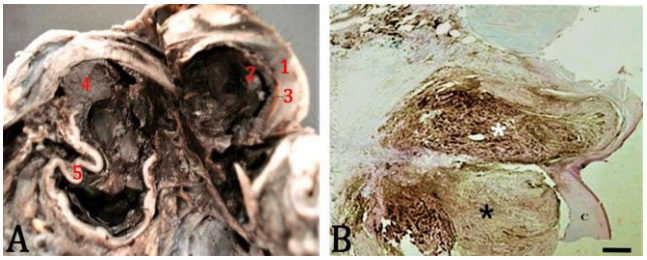

Fig. 1. A) The tumor mass filled from anterior to posterior chambers. 1: Sclera 2: Tumor mass was located at the caudal aspect of cornea 3: Interspace between sclera and tumor mass 4: Tumor mass is filling the vitreous body 5: The sclera is wrinkled at the posterior end of the globe. (Atrophied ocular lens is removed); **B)** Subgross photomicrograph of ovine globe tumor, combined of pigmented and nonpigmented parts of iridociliary adenoma (asterisks).C: Cornea (Alcian blue; Scale bar = 3.00 mm).

Microscopically, two kinds of cells were defined: The first group consisted of separated cells with spindle-shaped, round to polygonal cells with high cytoplasm volume, and the presence of black granules. The second group consisted of cells in the glandular form consisting of rows of cylindrical cells with a pigmented cytoplasm surrounded by collagen-hard connective tissue (Fig. 2A).

Periodic acid-Schiff (PAS) stain method was performed to detect the PAS-positive basement membrane reminiscent of the inner lining of the non-pigmented ciliary body epithelium, but in this case, the reaction of tumor cells to this staining was negative. Another evidence for iridociliary adenoma differentiation was the secretion of hyaluronic acid, which must be stained blue with the Alcian blue staining method. However, the result for Alcian blue staining was negative, as well (Fig. 2B). Replicated sections of tumoral tissue were also immunostained for antibodies against cytokeratin AE1/AE3 (Dako, Glostrup, Denmark), vimentin (Dako) and S-100 protein (Dako) in appropriate dilutions, using the labeled streptavidin-biotin method (LASB™; Dako). Slides were incubated with liquid diaminobenzidine tetrahydrochloride substrate and then counterstained with Mayer's Hematoxylin. The primary antibody was replaced by non-immune serum used as the negative control. The immunohistochemistry result was positive for vimentin marker (Fig. 2C), but no immunoreactivity with S-100 (Fig. 2D) and cytokeratin was appeared.

Discussion

Ocular tumors have rarely been reported in sheep. Because sheep and goats are slaughtered at an early age for meat production, tumors in these animals are less likely to grow.[8] The common age of onset of these tumors in sheep has not been determined, but their incidence is higher in older ages.[8] Previous reports have identified squamous cell carcinoma (SCC) as the most common tumor in sheep.[8] The most common breed in which ocular tumors have been reported is the Najdi breed. Factors involved in the formation of ocular tumors in small ruminants and humans include human herpesviruses and Epstein–Barr virus (EBV).[8]

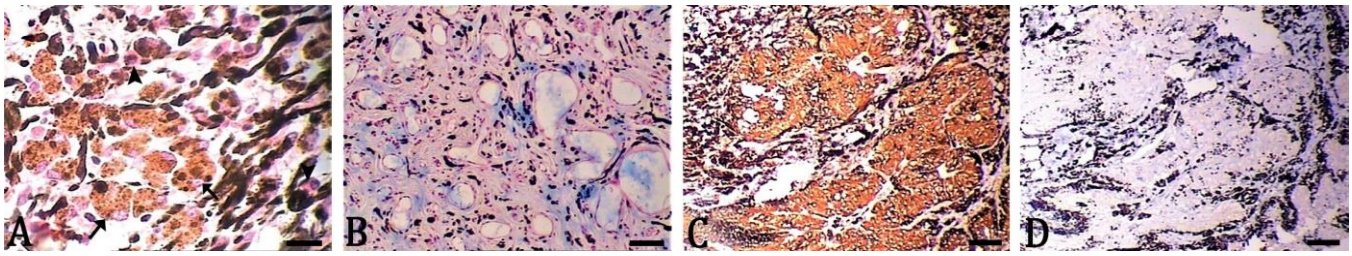

Fig. 2. A) Round to ovoid pigmented cells (arrows) in contrast to spindle-shaped cells (right). The epithelioid-like cells are present among the others (arrowheads), (H&E; Scale bar = 30.00 µm). **B)** Large numbers of neoplastic cells scattered in the relatively loose connective tissue stroma consisted of numerous closely packed thin-walled blood vessels (Alcian blue-PAS; Scale bar = 400 µm). **C)** The cytoplasms of epithelial tumor cells are immunopositive for vimentin, (SAB immunolabeling with Mayer's Hematoxylin counterstain; Scale bar = 200 µm). **D)** The solid mass of epithelial tumor cells is non-immunoreactive for S-100 protein (Scale bar = 200 µm).

There are two common methods to remove ocular tumors, which include: enucleation and exenteration.[9] Depending on the size of the tumor and penetration of the mass to the periorbital tissues, the surgical method is selected. In iridociliary epithelial tumors, the enucleation method is preferred because the tumor cells often do not spread to the periocular tissues.[9] In accordance with the Raoofi *et al.* report, enucleation was used in this case to excise the ocular tumor.[1] Depending on the tumor location, there are two new surgical techniques for iridociliary epithelial tumor excision, including anteroposterior approach and posteroanterior approach, which preserves the eyeball and removes only the tumor.[10] In a study conducted by Davis *et al.*, a posteroanterior cyclo-iridectomy and thermocautery were used to treat the iridociliary adenomas in two dogs.[10] However, preserving the eye globe in small ruminants is not very important, and using these two methods are not economical.

Unlike dogs and cats, which the result of PAS staining for the basement membrane-like structures was reported to be positive in the iridociliary tumors, but in this study, the result of PAS staining was negative. The findings of the current study were consistent with those of Raoofi *et al.*, who reported a negative result of PAS staining for the basement membrane-like structures in the sheep.[1] These structures do not appear to be present in the iridociliary epithelial tumor in sheep.

In dogs and cats, hyaluronic acid is secreted by differentiating iridociliary tumors, which stains blue with the Alcian blue staining method.[2] Alcian blue positive secretions were also found in iridociliary tumors of rabbits reported by Swisher *et al.*[6] In contrast to earlier findings, however, no evidence of Alcian blue positive secretions was detected in our study. This result might be due to lower hyaluronic acid secretions in iridociliary tumors in sheep.

According to previous reports, iridociliary epithelial tumors in dogs and cats responded positively to the vimentin and S-100 markers.[2] In the present case, the reaction for vimentin was positive, but for S-100 was negative. Also, the benign type of iridociliary tumor must probably stain negative for cytokeratin and conversely react positively in malignant forms.[2] In the present study, the immunoreaction for cytokeratin was negative, indicating the benign form of the iridociliary tumor.

Therefore, with evidence of vimentin immunolabeling in epithelial neoplastic cells, and the absence of parameters defined for malignancy, the type of the tumor was diagnosed as the iridociliary adenoma tumor. To our knowledge, it was the first report of iridociliary adenoma in the Iranian Shaal breed sheep and the second report of this tumor in the sheep.

Conflict of interest

The authors declare no conflict of interest.

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