Ocular Squamous Cell Carcinoma Case in Three Cattle

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Abstract: In this article, we compared the applied treatment results with the clinical and histopathological findings for treating ocular squamous cell carcinomas in three cattle. The study materials were a five-year-old crossbred Simmental bull (First case), a four-year-old Eastern Anatolia Red cow (Second case), and a six-year-old Simmental cow (Third case). The tumoural mass observed in the first case's left eye was completely extirpated. The tumoural masses observed in the right eye of the second case and in the right eye of third case were also completely extirpated, as were the accessory organs and bulbus oculi. In the histopathological investigation, the extirpated tumour masses were determined to be ocular squamous cell carcinomas. In the first case, the mass was taken from the ventral palpebral conjunctiva, but in the second and third cases, the mass was taken from the cornea. As a result, in the cases of cattle ocular squamous cell carcinomas, after removing the mass with surgical excision, there was no recurrence in the postoperative period, and the general condition of the patients were observed to be good.

Keywords: *Ocular squamous cell carcinoma, Surgical excision, Cattle.*

Üç Sığırda Oküler Yassı Hücreli Karsinom Olgusu

Özet: Bu makalede üç sığırda görülen oküler yassı hücreli karsinom olgusunun klinik ve histopatolojik bulguları ile uygulanan sağaltım sonuçlarının değerlendirilmesi amaçlandı. Çalışma materyalini; 5 yaşlı Simental melezi boğa (I. olgu), 4 yaşlı Doğu Anadolu Kırmızısı (DAK) inek (II. olgu) ve 6 yaşlı Simental bir inek (III. olgu) oluşturdu. I. olgunun sol gözünde tespit edilen tümoral kitle total olarak ekstirpe edildi. II. olgunun sol ve III. olgunun sağ gözünde tesbit edilen tümoral kitleler ise göz küresi ve eklenti organları ile birlikte alındı. Operasyonla alınan kitlelerin histopatolojik muayenesinde I. olgunun alt göz kapağı konjuktivasından köken alan oküler yassı hücreli karsinom, II. ve III. olgunun ise korneadan köken alan oküler yassı hücreli karsinom olduğu belirlendi. Sonuç olarak, sığırların oküler yassı hücreli karsinoma olgularında cerrahi eksizyon yöntemi ile kitlenin uzaklaştırılmasından sonra, postoperatif dönemde nükslerin şekillenmediği ve olguların genel durumunun iyi olduğu gözlemlendi.

Anahtar Kelimeler: *Oküler Yassı Hücreli Karsinom, Cerrahi Eksizyon, Sığır.*

Introduction

Eye tumours in cattle may develop from the conjuctiva and accessories, the optic nerve or the bulbus oculi. Those developing from the bulbus oculi may originate from any tissue within the bulbus oculi. Squamous cell carcinoma, which is one of the most important neoplasms of the eye, is a malignant tumour that originates from stratum spinosum cells of stratified squamous epithelium (Aksoy et al., 2006; Mahjoor et al., 2003). Typically, this tumour has a ulcerative, tight, lobular structure and a cauliflower-like appearance. If it is accompanied by panophthalmia purulenta, the carcinoma may be covered with a mucopurulent layer (Taş et al., 2009). Ocular squamous cell carcinoma is reported to occur in cattle primarily in the bulbar conjunctiva and cornea but occasionally in the eyelid conjunctiva and third eyelid (Ceylan et al., 2012; Taşet al., 2009; Yavuz and Yumuşak, 2017; Yüksel et al., 2005). The root causes of ocular squamous cell carcinoma include factors such as exposure to direct ultraviolet light, a lack of pigment in the eyelids or conjunctiva, a predisposition of the hairless or sparsely hairy regions, other genetic causes or a change in certain papillomas (Aksoy et al., 2006; Anderson et al., 1991; Jubb et al., 1991; Mara et al., 2005; Mendez et al., 1997; Ramadan et al., 1976). Radiotherapy, cryosurgery, hyperthermia and surgical excision are used for treatment. Surgical excision is usually the recommended method in ocular squamous cell carcinoma cases. In this application, both the tumour and the area affected by the tumour should be excised at the border of the healthy tissue (Farris and Fraunfelder, 1976; Farris 1980; Goldschmidt and Hendrick, 2002; Kainer, 1984; Ralph and Witt, 1984; Scheck, 2005). Ocular squamous cell carcinoma in cattle is both a commonly seen and economically important neoplasm of domestic animals (Aksoy et al., 2006; Cordy, 1990; Heeney and Valli, 1985; Yavuz and Yumuşak, 2017). Although it is commonly seen in Hereford, Holstein, and Simmental cattle breeds, it is reportedly rare in

other breeds (Den Otter et al., 1995; Heeney and Valli, 1985; Taş et al., 2009; Woodward and Knapp, 1950). It is primarily seen in mature and older animals (Ladds and Entwistle, 1978), and it has no sex predisposition (Cordy, 1990). This article aims to assess the results of applied treatment as well as the clinical and histopathologic findings of ocular squamous cell carcinoma cases observed in three cattle.

Case Description

The study materials were composed of three cattle brought on different dates to the Surgery Polyclinic, Veterinary Faculty, Kafkas University. The first case study was a 5-year-old Simmental hybrid male animal. Its medical history and clinical findings indicated that there was a 3.5×3 cm fast-growing tumoural mass with a quite haemorrhagic surface and cauliflower-like appearance that had begun as a swelling in the left eye 1 month ago. It originated from the lower eyelid conjunctiva of the left eye and extended to the front face of the left eyelid, pressuring the bulbus oculi (Figure 1.A). After a clinical examination, the decision was made to surgically remove the tumoural mass originating from conjunctiva.

The animal was intramuscularly (IM) administered 0.1 mg/kg xylazine HCL (Rompun-Bayer) for sedation, and a 2% lidocaine 20 ml circular local infiltration anaesthesia was applied to the lesioned eye after fixing the animal in Hannover wagen. Following the anaesthesia, the tumour tissue was removed from the healthy tissues. In the postoperative period, the animal was parenterally administered benzylpenicillin+dihydrostreptomycin (Reptopen S-DIF) at a dose of 5 ml/100 kg/day IM for 7 days. The second case of the study was a 4-year-old Eastern Anatolia Red cow.

The medical history and clinical findings showed a 5.5×3 cm haemorrhagic tumoural mass with a cauliflower-like appearance that had started in the left eye as a swelling 6-7 months ago and progressed rapidly over the last 3 months, leading to a pressurized and atrophied bulbus oculi. It was also observed that all clinical signs of panophthalmia purulenta were present. The third case of the study was a 6-year-old Simmental cow.

Figure 1.A. Left bulbus oculi concerning at case I and the appearance of the mass. **B.** Postoperative appearance of the case after 6 months.

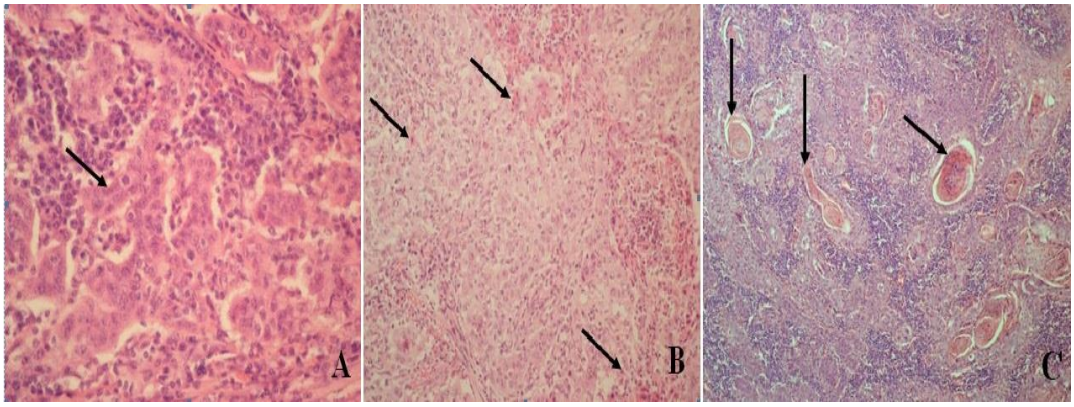

Figure 2.A. The majority of hyperchromatic nuclei, polygonal shaped and slight pleomorphic squamous cell carcinoma (black arrow), HEX20. **B.** Single cell keratinization in many tumour cells (black arrow). Slightly differentiated squamous cell carcinoma, HEX40. **C**. Parakeratoric cancer pearl (black arrow). Slightly differentiated squamous cell carcinoma, HEX10.

The medical history and clinical findings showed that this animal was brought to the surgical clinic for treatment with a 7-month-old, non-healing wound. However, the animal was brought to the clinic once again, 6 months after the treatment, due to a recurrence of the disease, and a biopsy sample was taken from the animal at this time. It was observed that the biopsy sample was approximately 8 cm in diameter, had a greyish white cross-sectional surface and was haemorrhagic in some places. Since the ocular squamous cell carcinomas in both cases II and III demonstrated a pressurized and atrophied bulbus oculi and because there was inflammation in the region caused by infection, treating the extirpation of bulbus oculi by using the surgical excision method was determined for the left eye of case II and for the right eye of case III after clinical evaluation. The animals were administered 0.1 mg/kg xylazine HCL (Rompun-Bayer) for sedation IM and of the eye lateral, medial, dorsal and ventral points, each point with 2% lidocaine 10 ml retrobulbar nerve block anaesthesia was applied after fixing the animals in a Hannover wagen. Following the anaesthesia, the atrophied bulbus oculi were extirpated, together with conjunctival tissues, all accessory glands of the eye and the retrobulbar muscles. Then, the mass was completely extirpated, and the surface of the orbital bone from which the mass originated was scraped (curettage). After stopping the bleeding, a crystalline penicillin-soaked tampon was placed into the orbital space. The tip of the tampon gauze was released from the side of medial eye angle. The operation was completed by applying simple interrupted suture to the edges of the incision on the eyelid with USP 1 silk suture. In the postoperative period, the animal was parenterally administered benzylpenicillin+dihydrostreptomycin (Reptopen S-DIF) at a dose of 5 ml/100 kg/day IM for 7 days. On the 2nd postoperative day, the tampon in the space was replaced with a gauze as a drain and cut 1 cm from the tip of each day and 10ththe day was completely removed. On the 15th day postoperative, the sutures that had been applied to the eyelid were removed. In the postoperative period, the animals were observed to be in good condition, and it was reported that there was no weight loss or decrease in milk yield. No complications or recurrence were occurred in the animals that were observed up to the 6th month post-operation.

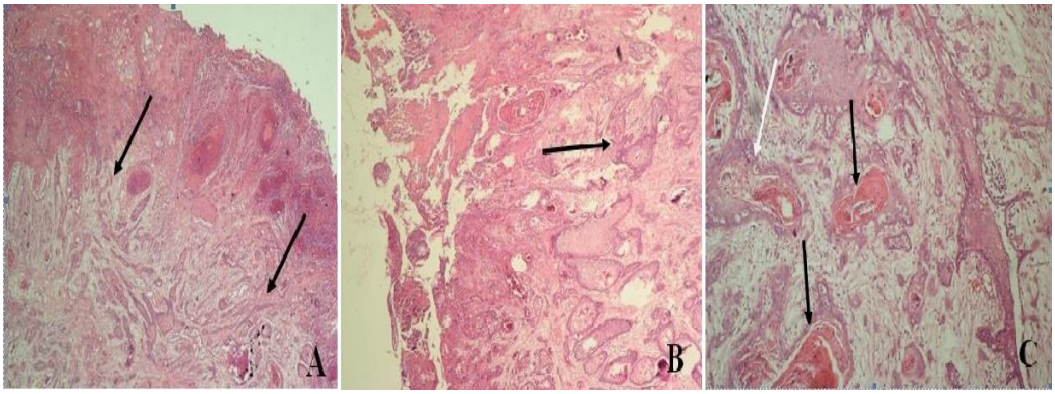

Figure 3.A. General view of well-differentiated squamous cell carcinoma (black arrow), HEX5. **B**. Cord connection with squamous epithelium or islet-shaped tumour masses (black arrow), HEX10. **C.** Concentric cell reproduction (write arrow) and well-differentiated squamous cell carcinoma characterized by keratin pearl formation in the centre (black arrow), HEX10.

The tumoural masses extirpated from all three cases were sent to the pathology laboratory for histopathologic examination. The masses were fixed in a 10% buffered formalin solution and blocked in paraffin. Sections of 4 µm were taken from each block, dyed with haematoxylin-eosin (H×E) and were examined under a light microscope. Tumour cells displaying eosinophilic cytoplasm, at varying differences and with pleomorphic appearance, were observed in the microscopic examination of the section taken from case I. The nuclei of tumour cells were mostly hyperchromatic and vesicular at certain sites (Figure 2A). Single-cell keratinization was observed in some of the tumour cells throughout most areas of the biopsy sample examined. It was noteworthy that the cytoplasms of these cells were eosinophilic and had pyknotic nuclei (Figure 2B). In a part of the section, a parakeratotic cancer pearl with chromatin residues was detected where the concentric structure did not shape fully (Figure 2C).

Tumour cells, consisting of atypical keratinocytes with eosinophilic cytoplasm, vesicular nuclei and pleomorphic appearance, were observed

in the microscopic examination of the section taken from case II (Figure 3A). Bridges between the cells were evident. Similar tumour cells were seen in the dermis either as a cord bound with epidermis or as unbound islets (Figure 3B). There was keratinization in the centre of these islets, referred to as cancer or keratin pearl (Figure 3C). Keratinization mostly possessed a hyperkeratotic property, whereas it was parakeratotic in certain areas with the cancer pearl (Figure 3D). Additionally, inflammatory cell infiltration was observed and was associated with a secondary infection due to ulceration in the mass (Figure 3E).

Tumour cells displaying eosinophilic cytoplasm with polygonal shape and pleomorphic appearance were observed in the microscopic examination of the section taken from case III (Figure 4A). The nuclei of the tumour cells were mostly hyperchromatic and vesicular at certain sites. Single-cell keratinization was observed in most parts of the section, whereas a parakeratotic cancer pearl with chromatin residues was detected in some parts where concentric structure did not shape fully (Figure 4B). Additionally, inflammatory cell infiltration was observed, associated with a secondary infection due to ulceration in the mass (Figure 4C). According to the histopathologic findings, in case I, there was less differentiated squamous cell carcinoma; in case II, there was well-differentiated squamous cell carcinoma; and in case III, there was less differentiated squamous cell carcinoma.

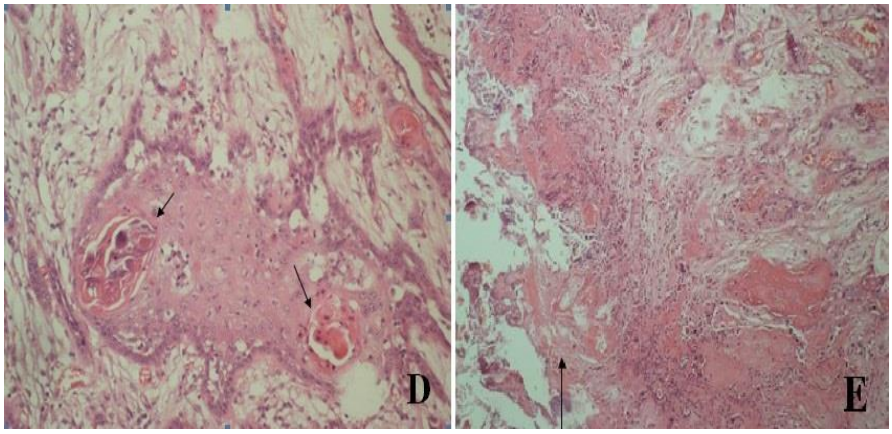

Figure 3.D. Parakeratotic cancer pearl (black arrow). Squamous cell carcinoma, HEX20. **E.** Ulcer formation on the surface and inflammatory cell infiltration (black arrow), HEX10.

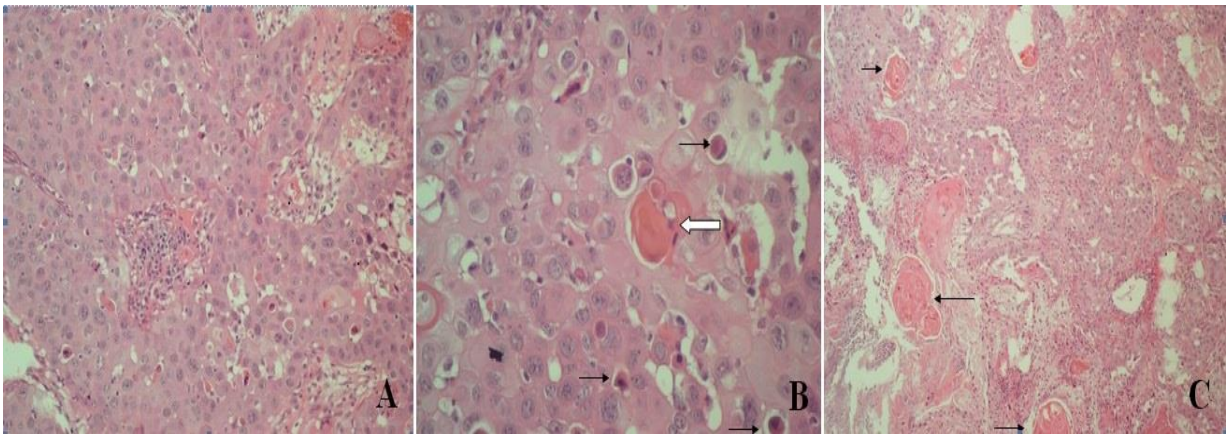

Figure 4.A. General view of less differentiated squamous cell carcinoma, HEX20. **B.** Single cell keratination in the tumour cells (black arrow) and parakeratotic cancer pearl (white arrow), slightly differentiated squamous cell carcinoma, HEX40. **C.** Inflammatory cell infiltration, cancer pearl (black arrow), slightly differentiated squamous cell carcinoma, HEX10.

Discussion and Conclusion

Ocular squamous cell carcinoma is commonly seen in Hereford, Holstein and Simmental cattle breeds, whereas it is rarely reported in other breeds (Den Other et al., 1995; Heeney and Valli, 1985; Jubb et al., 1991; Kainer et al., 1980; Taş et al., 2009; Woodward and Knapp, 1950). In our study, two cases were found in Simmental, and the other case was in an Eastern Anatolia Red, a breed in which ocular squamous cell carcinoma is rarely seen. Ocular squamous cell carcinoma is primarily

seen in mature and old animals (Ladds and Entwistle, 1978). It is reported that tumours are rarely seen under the age of 3 and are almost never seen under the age of one. It is also reported that ocular squamous cell carcinoma cases are generally seen in cattle aged 5 or more (Cordy, 1990; Hawkins et al., 1981; Taş et al., 2009). The ages of the animals in this study appear to be consistent with opinions of researchers.

Ocular squamous cell carcinoma is reported to occur in the bulbar conjunctiva and the cornea in cattle at a ratio of 75% (90% limbus, 10% cornea) and in eyelid conjunctiva and the third eyelid at a ratio of 25% (Ceylan et al., 2012; Gharagozlou et al., 2007; Taş et al., 2009; Yüksel et al., 2005). In the histopathologic examination of ocular squamous cell carcinoma detected in our cases, a less-differentiated ocular squamous cell carcinoma, originating from the eyelid conjunctiva, was found in case I, and a well-differentiated ocular squamous cell carcinoma, originating from the cornea was found in cases II and III. These data support the data from the relevant researcher. In this study, at the Surgery Clinic of Veterinary Faculty, Kafkas University, showed the clinical signs of panophthalmia prulenta in eyes of the cattle, and after further clinical evaluation, the eyeballs and accessory organs or tumoural masses were determined to be extirpated in cases, and diagnosed with ocular squamous cell carcinoma as a results of a histopathological examination the findings of three cases were reported.

As a result, ocular squamous cell carcinoma in cattle is an economically important because it causes weight loss, a decrease in yield and increases in treatment costs. According to the results of this study in three cattle, selecting surgical intervention from among the treatment options was found to be important for easy to apply, the low risk of complication, low cost. At the same time, surgical operation option is prolongation of the economic life of animals as well as to minimize economic losses.

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