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Surgical Treatment of Corneal Large Dermoid in a Simmental Calf

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ABSTRACT

Background: Ocular dermoid is a skin or skin-like appendage usually arising on the limbus, conjunctivae, and cornea. It can be unilateral or bilateral and may be associated with other ocular manifestation or with other malformations. Hair from the lesions is predominantly responsible for the associated irritation resulting in chronic inflammation of the conjunctivae and cornea and may cause visual impairment. Ocular dermoids are rare in cattle, with the prevalence estimated between 0.002% and 0.4%.

Case: A one-day-old Simmental calf presented for bilateral haired masses on the eyes and tumor-like growth since birth. The calf was admitted to the University of Adnan Menderes, Faculty of Veterinary Medicine 1 days after initial examination. The calf weighed 35 kg, was in good bodily condition and no further abnormalities were detected on physical examination, complete blood count and serum chemistries. General anesthesia was induced and maintained with an intravenous detomidine-ketamine-midazolam combination. The corneal dermoids extended slightly beyond the inferonasal limbus and then merged with a second mass of lightly haired tissue within the inferonasal bulbar conjunctiva of both eyes. The dermoids were excised by superficial lamellar keratectomy that was extended into the inferonasal conjunctiva. The nasal masses were excised by electrocautery. All excised tissue was submitted for histopathology. Histopathology of the excised tissue confirmed bilateral corneoconjunctival dermoids with bilateral nasal hyperplastic tissue. Topical 1% atropine sulfate ointment was applied twice daily to both eyes for 5 days and bacitracin-neomycin-polymixin ophthalmic ointment applied twice daily to both eyes for 2 weeks postoperatively. Ocular and nasal healing was uneventful, with prominent corneoconjunctival granulation tissue 6 days postoperatively, which largely resolved by the 6-week follow-up examination. Bilateral large dermoids with nasal hyperplastic tissue have not been documented previously in Simmental cattle in Turkey.

Discussion: The precise developmental mechanisms involved in the pathogenesis of ocular dermoids are not known. Metaplasia of mesenchyme (of primarily neural crest origin), resulting in abnormal differentiation of the surface ectoderm, is considered the most likely mechanism. Ocular dermoids may be associated with other congenital ocular or multiorgan abnormalities. The medial and lateral nasal processes, optic vesicle and first and second branchial arches are in close relationship on the lateral side of the embryonic head and might all be adversely influenced by the same stimulus. Ectopic lacrimal tissue may appear in combination with an ocular dermoid as in this case report and previously reported in cattle, or alone as an epibulbar choristoma. The ectopic lacrimal tissue in this calf may have represented misplacement of the nictitans gland or additional lacrimal tissue development. Superficial keratectomy is required to surgically excise a corneal dermoid although the depth of the dermoid within the cornea cannot be ascertained by ophthalmic examination until surgery is undertaken. In the case of large corneal dermoids, surgical excision should be performed early in the life of the patient to achieve optical improvement and allow functional development of the eye.

Keywords: calf, large dermoid, nasal hyperplastic tissue, surgery.
INTRODUCTION

Ocular dermoid is a skin or skin-like appendage usually arising on the limbus, conjunctivae, and cornea. It can be unilateral or bilateral and may be associated with other ocular manifestations or with other malformations. Hair from the lesions is predominantly responsible for the associated irritation resulting in chronic inflammation of the conjunctivae and cornea and may cause visual impairment [1,12,18]. Dermoids may affect the eyelids, conjunctiva, nictitans, sclera and cornea [14] and most commonly present unilaterally. Bilateral ocular dermoids have been reported in cattle [1,2,6,9,20], sheep [8], and a camel [18]. Ocular dermoids are rare in cattle, with the prevalence estimated between 0.002% and 0.4% [20]. This paper reports a case of bilateral large dermoids in a calf.

CASE REPORT

A one-day-old Simmental heifer calf was presented with an abnormal appearance of both eyes since birth. Ocular findings were similar in both eyes. A large fleshy mass was attached to the cornea and sclera with a large number of temporally and superiorly directed hairs arising from the surface of the mass (Figure 1). The calf exhibited moderate blepharospasm and watery discharge of both eyes. Superficial corneal ulceration was present in the inferotemporal cornea of both eyes as a result of trichiasis. The nictitans of each eye appeared to be displaced anteriorly by its respective corneal mass, but the inferior extent of the corneal masses could not be determined without general anesthesia. A firm nodule was present in the left and right side of the dorsomedial nasolabial planum. No other ocular abnormalities were detected in either eye (Figure 2). The clinical diagnosis was bilateral corneal dermoids and nasal hyperplastic tissue.

The calf was admitted to the University of Adnan Menderes, Faculty of Veterinary Medicine 1 days after initial examination. The calf weighed 35 kg, was in good bodily condition and no further abnormalities were detected on physical examination, complete blood count and serum chemistries. General anesthesia was induced and maintained with an intravenous detomidine-ketamine-midazolam combination [13]. The corneal dermoids extended slightly beyond the inferonasal limbus and then merged with a second mass of lightly haired tissue within the inferonasal bulbar conjunctiva of both eyes. The dermoids were excised by superficial lamellar keratectomy that was extended into the inferonasal conjunctiva (Figure 3). The nasal masses were excised by electrocautery. All excised tissue was submitted for histopathology. Topical 1% atropine sulfate ointment1 was applied

Figure 1. Initial presentation. (a) Left eye. Note the long hairs protruding from the corneal dermoid.

Figure 2: Tumor-like growth on the nasolabial planum.

Figure 3. Corneal large dermoid of left eye just after the surgery.
twice daily to both eyes for 5 days and bacitracin-neomycin-polymixin ophthalmic ointment applied twice daily to both eyes for 2 weeks postoperatively. Ocular and nasal healing was uneventful, with prominent corneoconjunctival granulation tissue 6 days postoperatively, which largely resolved by the 6-week follow-up examination.

Histopathology was similar for the tissue excised from both eyes. The corneal lesion exhibited a moderately well delineated but nonencapsulated raised mass comprised of moderately hyperplastic, keratinizing stratified squamous epithelium overlying a thick collagenous stroma, which merged with conjunctival tissue containing submucosal glandular tissue. The corneal mass contained numerous, large, well-developed hair follicles and adnexal structures superficially. A band of abortive hair follicles and adnexa was identified as haphazardly arranged clusters of epithelium, in the absence of hair bulbs, intermingled with tortuous lumina of apocrine glands beneath the productive follicles (Figure 4).

![Figure 4. Corneo-conjunctival dermoid. Within the deeper portions of the corneal dermoid, there is a parallel arrangement of abortive hair follicular development characterized by the presence of a hair bulb (arrow) and an associated apocrine gland (arrowhead). H&E. [bar = 25 µm].](image)

**DISCUSSION**

The precise developmental mechanisms involved in the pathogenesis of ocular dermoids are not known [10,12,20]. Metaplasia of mesenchyme (of primarily neural crest origin), resulting in abnormal differentiation of the surface ectoderm, is considered the most likely mechanism [4, 5]. The resulting dermoid consists of ectodermal elements (keratinized epithelium, hairs, sebaceous and apocrine glands), and mesenchymal elements (fibrous tissue, fat and cartilage) combined in different proportions [11].

Ocular dermoids in cattle are not common, with an estimated prevalence of 0.002%–0.4% [3,7]. Ocular dermoids have been reported in cattle of many breeds worldwide, with a similar low prevalence in all breeds other than the Hereford [20]. The apparent predisposition in Herefords is largely based on a report by Barkyomb and Leipold [1] of 74 affected Hereford and Hereford-cross calves from one region of the USA, the majority of calves being bilaterally affected. The dermoid locations in that study were reported in decreasing order as limbus, third eyelid, canthus, eyelid and conjunctiva [18]. There are otherwise few reports of bilateral ocular dermoids in calves, each describing single or low numbers of animals [6,20], and only one reporting a nasal tumor-like growth [12]. Of these bilateral cases, inferonasal corneoconjunctival dermoids were most commonly reported, followed by nasal canthal dermoids [6,20].

Ocular dermoids may be associated with other congenital ocular or multiorgan abnormalities [3,4,6]. The medial and lateral nasal processes, optic vesicle and first and second branchial arches are in close relationship on the lateral side of the embryonic head and might all be adversely influenced by the same stimulus [16]. Ectopic lacrimal tissue may appear in combination with an ocular dermoid as in this case report and previously reported in cattle [9], or alone as an epibulbar choristoma [15]. The ectopic lacrimal tissue in this calf may have represented misplacement of the nictitans gland or additional lacrimal tissue development.

The primitive adnexal units situated beneath the productive hair follicles in the deeper connective tissue frequently failed to show luminal development, resulting in a band of abortive hair follicles that has not been previously described in dermoids. Also not previously reported in cattle was the prominent mitotic activity noted in the glandular tissue of the nasal choristomas, suggesting ongoing proliferative activity. Choristomas are known to grow, with the rate accelerated by trauma, irritation or puberty, in humans [6]. Malignant degeneration is rare in ocular choristomas but transformation of ectopic lacrimal tissue into adenocarcinoma and pleomorphic adenoma has been reported in humans [6].

Congenital heart disease has been reported in association with bilateral corneal and nasal canthal der-
moid in a Guernsey calf [6]. Barkyoubm and Leipold [1] described cardiac defects (Tetralogy of Fallot and patent ductus arteriosus), polycystic kidney disease and small tissue masses protruding into the external nares in some of 74 calves reported with ocular dermoids, although they did not specify the number of calves affected and whether calves showed one or a combination of the three abnormalities. Bhatt et al. reported a tumor-like growth at the entrance of the left nasal passage in association with bilateral corneal and eyelid dermoids in a Rathi calf [2]. Histopathologic examination was not performed on the nasal masses in either of these two reports.

The combination of congenital ocular and nasal abnormalities in this calf is compatible with the intimate early developmental origin of the optic and nasal regions and a common abnormality in neural crest migration [17]; whether this abnormality has a genetic basis or not is less clear. Characteristics of both autosomal recessive and polygenic inheritance were found by Barkyoubm and Leipold [1] in their analysis of Hereford cattle with ocular dermoids. Breed predispositions for ocular dermoids are reported in Birman cats, Dachshund, Dalmatian, Dobermann, Golden Retriever, German shepherd and Saint Bernard dogs, and Quarterhorses [19,20].

Superficial keratectomy is required to surgically excise a corneal dermoid [2] although the depth of the dermoid within the cornea cannot be ascertained by ophthalmic examination until surgery is undertaken [2,11]. In the case of large corneal dermoids, surgical excision should be performed early in the life of the patient to achieve optical improvement and allow functional development of the eye.

SOURCES AND MANUFACTURERS
1 Atropine sulfate ophthalmic ointment USP 1%, Abdi İbrahim, İİstanbul, Turkey.
2 Trioptic-P, Altanta Inc., Melville, NY , USA.

Declaration of interest. The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

REFERENCES


