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Bilateral congenital lacrimal fistula in a Brown Swiss bull

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Summary

A five-year-old Brown Swiss bull was referred to the Department of Farm Animals, University of Zurich, because of bilateral epiphora that was unresponsive to treatment. Clinical examination revealed a fistulous opening medial to the medial canthus of both eyes and mucopurulent discharge from both openings. Attempts to flush the nasolacrimal duct via the lacrimal points resulted in the fluid exiting via the fistulous opening. Retrograde flushing of the nasolacrimal duct from the nasolacrimal opening resulted in the flush fluid flowing back out the nasolacrimal opening. Bilateral lacrimal fistula medial to the medial canthus of the eye was diagnosed based on the findings. The same anomaly was diagnosed a year later in 4 related female animals referred to our Department for other reasons. Three of the cases were sired by the bull described above and one was sired by his half-brother. Therefore, an autosomal recessive mode of inheritance of this anomaly was assumed. Clinical, epidemiological and molecular studies of the offspring of both bulls are underway to further investigate this anomaly.

Keywords: cattle, bull, lacrimal fistula, anomaly

Beidseitige Tränenfisteln bei einem Brown-Swiss-Stier

In der vorliegenden Arbeit wird ein 5 Jahre alter Brown-Swiss-Stier mit beidseitigen Tränenfisteln beschrieben. Bei der klinischen Untersuchung waren medial des inneren Augenwinkels beidseits Fistelöffnungen zu sehen, aus denen mukopurulentes Sekret entwich. Bei der beidseitigen Spülung des Tränennasengangs von den Tränenpunkten aus floss die Flüssigkeit über die Fistelöffnungen wieder ab. Bei der Sondierung und Spülung des Tränenkanals vom Ostium nasolacrimale aus trat die Flüssigkeit nicht über die Tränenfisteln aus, sondern floss retrograd zurück. Aufgrund der Befunde wurde die Diagnose beidseitige Tränenfisteln medial der Augenwinkel gestellt. Ein Jahr danach wurde die beschriebene Veränderung bei insgesamt 4 Tieren, die aus anderen Gründen ans Tierspital eingeliefert wurden, festgestellt. In 3 Fällen handelte es sich um Töchter des beschriebenen Stiers und in einem Fall um die Tochter eines Halbbruders. Es wird deshalb vermutet, dass die Veränderung autosomal rezessiv vererbt wird. Zur weiteren Abklärung sollen klinische, epidemiologische und molekularbiologische Untersuchungen bei Nachkommen der beiden Stiere durchgeführt werden.

Schlüsselwörter: Rind, Stier, Tränenfistel, Missbildung

Introduction

Nasolacrimal duct anomalies are uncommon in humans and animals (Yuen et al., 2004). A sound knowledge of the anatomy and embryonic development of the lacrimal apparatus is essential to understanding related congenital defects. The anatomy of the lacrimal apparatus has been described by Simoens (2008) and a description of its embryological development has been provided by Zhuang et al. (2010). Anomalies may occur proximally and involve the lacrimal points and lacrimal canaliculi and/or distally and involve the lacrimal sac or nasolacrimal duct (Yuen et al., 2004). Congenital anomalies of the nasolacrimal duct have been reported in horses and cattle (Latimer and Wyman, 1984; Wilkie and Rings, 1990; Grahn et al., 1999), and abnormal openings in the lacrimal apparatus located medial to the medial canthus of the eye have been described in humans and cattle (Heider et al., 1975; Zhuang et al., 2010). A Brown Swiss bull with bilateral lacrimal fistula was referred to our Clinic in 2009. The

same defect was subsequently seen in several of that bull's direct offspring. The goal of this report was to describe the abnormalities in the affected bull.

History, clinical findings and diagnosis

A five-year-old Brown Swiss bull (bull A) with bilateral epiphora of several weeks duration was diagnosed with conjunctivitis by the referring veterinarian and treated with oxytetracycline ophthalmic ointment. There was an initial response to treatment followed by recurrence of epiphora. Re-examination by the referring veterinarian revealed a fistula medial to the medial canthus of both eyes. The fistulous tracts were flushed several times using an intramammary tube containing penicillin and neomycin. There was no response to treatment and the bull was referred to the Department of Farm Animals, University of Zurich. Upon admission, the general condition and demeanour of the bull were normal. The vital signs were normal with a rectal temperature of 38.9 °C, a heart rate of 60 bpm and a respiratory rate of 24 breaths per min. Auscultation of the heart and lungs and examination of the digestive tract, faeces and urine were unremarkable. An ophthalmological examination revealed that the eyeballs, conjunctivae and scleral vessels were normal; however, there was a fistulous opening medial to the medial canthus of both eyes (Fig. 1, 2) with mucopurulent discharge. Flushing of both nasolacrimal ducts with physiological saline solution through the lacrimal points resulted in the lavage fluid escaping through the fistulous openings. A probe could be passed 19.5 cm up both nasolacrimal ducts through the nasolacrimal openings. Retrograde flushing of the nasolacrimal ducts resulted in the flush fluid flowing back out the nasal openings rather than the fistulous openings. Based on these findings, a diagnosis of congenital bilateral nasolacrimal duct fistula was made. Because the defect was considered hereditary, slaughter was recommended and the bull was discharged from the Clinic.

Further cases of congenital nasolacrimal duct anomalies

One year after bull A had been examined, the same anomaly was diagnosed in 4 related female animals referred to our Clinic for other reasons. Three of these cases were daughters of bull A and one was a daughter of a half-brother (bull B). Bulls A and B had the same dam, but different sires. Bull B as well as the dam of both bulls had no signs of nasolacrimal duct anomaly.

Discussion

Congenital nasolacrimal duct anomalies are rare (Zhuang et al., 2010). They may involve the lacrimal canaliculi, lacrimal sac or nasolacrimal duct (Zhuang et al., 2010) and appear as small openings or notches below and/or medial to the medial canthus of the eye. A recent case report from the USA described a four-year-old boy with bilateral congenital nasolacrimal fistula (Zhuang et al., 2010) analogous to those described in this report. The anomaly diagnosed in bull A is very similar to that reported 35 years ago in 13 Brown Swiss calves (Heider et al., 1975). Those calves had abnormal openings in the proximal third of the nasolacrimal duct with varying distances from the medial canthus. Some of these openings were in areas of pigmented hairless skin and were clearly demarcated from the surrounding skin. Other openings were not as clearly demarcated or not visible at all in vivo. All the openings were patent and communicated with the affected nasolacrimal duct. Postmortem contrast radiography of the head of one calf revealed three accessory ducts, which communicated with the nasolac-

Figure 1: Lacrimal fistula located approximately 1.0 cm medial to the medial canthus of the right eye in a five-year-old Brown Swiss bull. The mucopurulent discharge draining from the fistula has been removed.

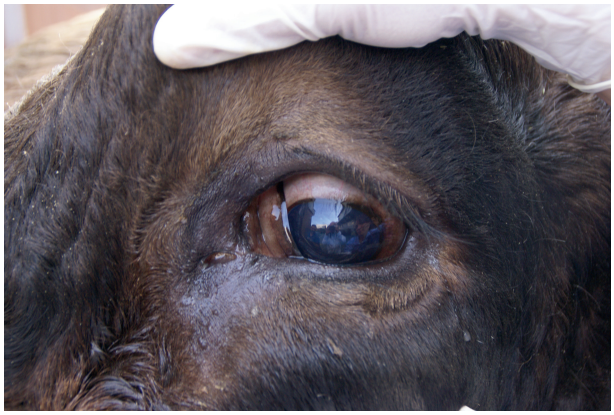

Figure 2: Lacrimal fistula located approximately 0.5 cm from the medial canthus of the left eye in the same bull as in Figure 1. The mucopurulent discharge draining from the fistula has been removed.

rimal duct and were up to 1.75 cm in length. One of these ducts was connected to an abnormal opening on the face. The anomalies were bilateral in 12 calves and unilateral in one. Unfortunately, there was no information on the lineage of any of the calves, but the anomalies of the lacrimal apparatus were suspected to be hereditary (Heider et al., 1975). Lacrimal fistulae can be autosomal dominant (Jones and Wobig, 1978) or autosomal recessive disorders (Maden et al., 2008) in humans and are often associated with other anomalies (Zhuang et al., 2010). The occurrence of lacrimal fistula in some offspring of bull A suggests a hereditary disorder. A recessive mode of inheritance is suspected because the anomaly occurred in offspring of bull B (half–brother of bull A), who was phenotypically normal. The gene or genes responsible for the anomaly must have been introduced into the population by the dam or her ancestors. Epidemiological and molecular studies are currently underway to determine the prevalence of this anomaly in the offspring of both bulls and to identify the underlying gene defect. The goal is to identify carriers of the gene responsible for the anomaly and prevent breeding of affected animals. Computed tomographic examinations may be used to assess anomalies of the lacrimal apparatus as well as endoscopy, which has been used in humans and horses (Cunningham, 2006; Wallace et al., 2006; Spadari et al., 2011).

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