Consequences of equine ocular blunt force trauma

[1]Lauren Charnock, DVM

[1,2]Richard J. McMullen Jr., Dr. med. Vet, DACVO, DECVO

[1]Department of Clinical Sciences, College of Veterinary Medicine, Auburn University, Auburn, Alabama, USA

[2]Equine Clinic Munich-Riem, Munich, Germany

Address correspondence to:

Richard J. McMullen Jr. (rjm0040@auburn.edu)

JT Vaughn Large Animal Teaching Hospital

College of Veterinary Medicine, Auburn University

1500 Wire Road

Auburn, Alabama,

36849

Phone: 334-844-4490

Abstract

Several reports have supplied an overview of signs commonly seen after a blunt ocular traumatic incident. Many of these clinical findings may be present with other ocular diseases, making the identification of blunt ocular trauma challenging, which may ultimately impact management and prognosis. The purpose of the present report was to identify specific clinical signs and patterns of ocular findings commonly associated with blunt ocular trauma to aid in its differentiation from other ocular diseases, and report on newly documented findings suspected to be associated with equine blunt ocular trauma. Medical records of horses presenting for confirmed or suspected blunt ocular trauma, pre-purchase examination and/or other ophthalmic disease from the Equine Clinic Munich-Riem and Auburn University Ophthalmology Service between March 2013 and December 2018 were reviewed. Blunt ocular trauma was confirmed in 12/44 horses and suspected in 32/44 horses. Frequent ocular findings in these horses included cataract formation (27/44), one or more components of uveitis (22/44) [including hyphema (9/22)], corneal edema (20/44), peri-papillary depigmentation (16/44), lens subluxation/luxation/loss (11/44), iridodialysis (10/44), avulsed corpora nigra (9/44) and secondary glaucoma (9/44). Equine blunt ocular trauma often presents with a distinct collection of clinical signs, allowing for differentiation from other ocular diseases. The chronic footprint of ocular signs as described herein may serve as a useful source when assessing chronic ocular lesions during pre-purchase examinations.

Key words: horse, ophthalmology, trauma, cataract, hyphema, iridodialysis

Introduction

Blunt ocular trauma refers to a closed globe injury ('contusion') or an open globe injury ('rupture') caused by contact with blunt object. Blunt ocular trauma results from significant external force being applied to the globe and orbit, with an acute rise in intraocular pressure and compression of ocular contents, followed by rapid decompression. This results in damage to many of the structures and interfaces within the globe.[1]

The human medical literature has extensive information on the findings associated with blunt ocular trauma in people.[1-4] Comparatively few publications have provided an overview of ocular blunt trauma in the equine species, and a retrospective analysis of cases to identify collections of signs highly associated with ocular trauma has not been performed.[5-8]

The prominent and lateral eye position of equids, their 'flight nature', ability to generate significant force, their specific use or work, close quarters housing, interaction with other horses and transportation are common reasons cited as contributing factors to the apparent frequency of blunt ocular trauma.[6]

Signs seen with previously reported blunt orbital and ocular trauma in equids include orbital fracture, eyelid lacerations and swelling, subconjunctival hemorrhage, chemosis, corneal abrasion, hyphema, uveitis, avulsed corpora nigra, lens subluxation or luxation, phacoceles, cataract development, vitreal hemorrhage, retinal hemorrhage, retinal tears or detachments, scleral ruptures and secondary glaucoma.[5,6,7,8]

Study Details

Ophthalmic medical records were reviewed from the Equine Clinic Munich-Riem (Munich, Germany) from March 2013 to September 2016 and the Auburn University Large Animal Teaching Hospital (Auburn, AL) between January 2017 and December 2018. Horses were presented for confirmed trauma, suspected trauma, pre-purchase examination or examination for other ocular disease. Cases were included if they had a witnessed traumatic event to the

eye, additional known traumatic injury (such as periocular abrasions, eyelid lacerations, globe rupture, or orbital fracture), specific traumatic ocular findings such as corpora nigra avulsion, lens capsule rupture, or iridodialysis, cases with a histopathology report available with diagnosis of blunt trauma, or a diagnosis in the record system of blunt ocular trauma. A total of 44 cases met the criteria for inclusion; 12 cases were confirmed incidents of blunt ocular trauma and 32 were suspected based on ophthalmic findings. The most frequent ocular findings in horses examined after known or suspected ocular blunt trauma include cataract formation (27/44), one or more components of uveitis (22/44) [including hyphema (9/22)], corneal edema (20/44), peripapillary depigmentation (16/44), lens subluxation, luxation, or lens loss (11/44), iridodialysis (10/44), avulsed corpora nigra (9/44) and secondary glaucoma (9/44). Of the known cases of blunt ocular trauma, causes included collision with a fence post, a kick from another horse, a direct blow from a polo ball or mallet, and an incident during farrier work.

Cataracts

In our observation, 61% of cases had a degree of cataract formation at the time of presentation. As cataract development can occur immediately, or weeks to months after the initial injury, 61% may yet be under-representative of the actual occurrence of cataract development in the equine species. Immature anterior and posterior cortical cataracts were reported most frequently in our study. These cataracts usually were geographic and generally occurred in one plane of the anterior and/or posterior cortex. If both anterior and posterior cortical geographic cataracts were present, it was hypothesized that the orientation of the anterior and posterior cataracts could imply a direction of compression force on the globe.

Uveitis

One or more components of uveitis were seen in half of the cases in this study (22/44). One or more clinical signs of uveitis were required to be present to give a diagnosis of uveitis.

Hyphema (9/22) was a finding included in the uveitis cases but was addressed separately. Uveitis may be present without hyphema, however hyphema was always associated with uveitis in the present study.

Corpora nigra avulsion

Corpora nigra avulsion has been previously described in the equine literature.[6] Infrared photography was a useful tool in evaluation of photographs for corpora nigra avulsion, especially when complete avulsion resulted in part of the corpora nigra being displaced in the ventral aspect of the anterior chamber. When hemorrhage is present, infrared photography is able to distinguish between pigmented tissue in contrast to dark areas of blood.[9]

Iridodialysis

Iridodialysis has been previously mentioned, anecdotally, in the veterinary literature.[5,10] In the present study, iridodialysis was identified in 5 cases of confirmed trauma, and in 5 cases of suspected trauma. Iridodialysis is defined as separation of the peripheral iris from its insertion at the sclera, resulting in separation from the ciliary body.[1] Cyclodialysis is an extension of this injury to include separation of the iris and pars plicata portion of the ciliary body from the sclera.[1] Visualization of a space between the peripheral iris and location of the iridocorneal angle was highlighted in cases in this report with tangential illumination as well as with infrared photography, suggesting iridodialysis versus cyclodialysis. The consequence of changes to the iridocorneal angle such as secondary glaucoma is undetermined at this time in the equine species but monitoring for signs of increases in intraocular pressure should be considered.

Retinal Detachment

Retinal detachment was infrequent in these equine cases (4/44, 9%). Due to limited follow up in some cases, it is possible that retinal detachment may have occurred later and not been documented; thus, resulting in an underestimation of this value.

Peripapillary Depigmentation

We observed a significant number of cases (16/44) with peripapillary depigmentation associated with the traumatically affected eye. Peripapillary retinal folds associated with focal retinal detachment that do not result in peripapillary depigmentation are more commonly associated with cases of ERU. Peripapillary depigmentation, on the contrary, is actually an uncommon finding in horses presenting with ERU, which makes identification of this finding potentially useful in diagnosing previous blunt ocular trauma.[11,12] A limitation of this observation is that the horses being evaluated following a suspected or observed traumatic event are undergoing an ophthalmic examination for the first time. As a result, the state or appearance of the fundus, prior to the incident, is unknown. The pathogenesis for such a lesion is not well understood.

Conclusions

In 70 months of medical records from ophthalmic referral equine patients, only 44 cases were identified as confirmed or highly suspicious of blunt ocular trauma. While the frequency of this condition is apparently low in this study from the referral population, the consequences of such a severe injury and the potential implications on treatment and prognosis emphasize the importance of accurately identifying the clinical features discussed in this manuscript. Blunt ocular trauma appears to cause significant damage to many of the structures within the eye. Although not every clinical finding described in this analysis is seen in every case, those with a combination of clinical signs or a single sign highly specific to blunt trauma should be evaluated carefully. It is important to recognize these findings to potentially differentiate these eyes from those with other types of uveitis or previous episodes of uveitis such as ERU. This distinction could significantly impact treatment and prognosis. This information may also be useful in assessing chronic ocular lesions observed during pre-purchase examinations and may aid in providing appropriate recommendations.

References

1. Yanoff M, Fine B. Ocular Pathology. 5th Editio. St. Louis: Mosby, Inc.; 2002. p.135–150.
2. Go JL, Vu VN, Lee KJ, et al. Orbital trauma. Neuroimaging Clin NA. 2002;12(2):311–24.
3. Bord SP, Linden J. Trauma to the Globe and Orbit. Emerg Med Clin North Am. 2008;26(1):97–123.
4. Kreidl KO, Kim DY, Mansour SE. Prevalence of Significant Intraocular Sequelae in Blunt Orbital Trauma. Am J Emerg Med. 2003; 21(7):525–258.
5. Habin D. Equine Traumatic Uveitis. Equine Vet Educ. 1994;6(3):122–7.
6. Brooks DE. Equine Ophthalmology. In: Gelatt KN, Lippencott, Wilkens, Williams, editors. Veterinary Ophthalmology. Philadelphia; 1999. p. 1057.
7. Millichamp N. Ocular Trauma. Vet Clin North Am - Equine Pract. 1992;8(3):521–36.
8. Gelatt K. Traumatic hyphema and iridocyclitis in the horse. Mod Vet Pract. 1975;56(7):475–9.
9. McMullen RJ, Clode AB, Gilger BC. Infrared digital imaging of the equine anterior segment. Vet Ophthalmol. 2009;12(2):125–31.
10. Colitz CMH, McMullen RJ. Diseases and Surgery of the Lens. In: B.Gilger, editor. Equine Ophthalmology. 2nd ed. Maryland Heights: Elsevier; 2011. p. 282–316.
11. McMullen RJ, Fischer BM. Medical and Surgical Management of Equine Recurrent Uveitis. Vet Clin North Am - Equine Pract. 2017;33(3):465–81.
12. Ben-Shlomo G. The Equine Fundus. Vet Clin North Am - Equine Pract. 2017;33(3):499–517.