The outcome of pars plana vitrectomy in horses with equine recurrent uveitis with regard to the presence or absence of intravitreal antibodies against various serovars of Leptospira interrogans

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Abstract

Purpose: To evaluate the outcome of pars plana vitrectomy (PPV) in eyes with clinical signs of equine recurrent uveitis (ERU) testing positive or negative for intravitreal antibodies against various serovars of Leptospira interrogans. 47 eyes of horses with ERU in which intraoperative vitreous samples were tested by microagglutination (MAT) for various serovars of Leptospira interrogans between 2001 and 2009 were included in a retrospective study. The presence or absence of postoperative ERU was evaluated by repeated ocular examinations, as well as by interrogation of referring veterinarians and owners. The absence of recurrent episodes of active uveitis was considered a success irrespective of the visual performance of the operated eyes. 85% of eyes of horses with ERU had antibodies against L. interrogans in their vitreous. The most common serovar was L. grippotyphosa. The majority of horses testing positive for antibodies against L. interrogans (40/47; 82.5%) showed no further episodes of ERU, while 6/7 (85.7%) of horses testing negative continued to experience episodes of ERU. This difference is statistically significant. It appears that PPV is an effective treatment for Leptospira-associated ERU but not for eyes testing negative for antibodies against L. interrogans. Vitreal and aqueous humor samples of horses suffering from ERU should be tested by MAT before performing a PPV. Keywords: Equine recurrent uveitis, vitrectomy, Leptospira interrogans, antibodies, ophthalmology
The outcome of pars plana vitrectomy in horses with equine recurrent uveitis with regard to the presence or absence of intravitreal antibodies against various serovars of Leptospira interrogans

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Summary

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Keywords: Equine recurrent uveitis, vitrectomy, Leptospira interrogans, antibodies, ophthalmology

Die Resultate der Pars-Plana-Vitrektomie bei Pferden mit rezidivierender Uveitis in Abhängigkeit von Antikörpern gegen verschiedene Serotypen von Leptospira interrogans im Glaskörper


Schlüsselwörter: Equine rezidivierende Uveitis, Vitrektomie, Leptospira interrogans, Antibodies, Ophthalmologie

Introduction

Equine recurrent uveitis is one of the most common causes of blindness in horses worldwide with a prevalence of 8 to 10% in horses in Western Europe [Szemes and Gerhards 2000, Deeg et al. 2002]. There is mounting evidence, that various serovars of Leptospira interrogans are at least the triggering factor for ERU [Roberts et al. 1952, Yager et al. 1952, Byans 1955, Roberts 1958, Roberts et al. 1959, Trap 1979, Hathaway et al. 1981, Davidson et al. 1987, Matthews et al. 1987, Sillerud et al. 1987, Dwyer et al. 1995, Wollanke et al. 1998, Wollanle et al. 2001, Wollanle 2002, Wollanke et al. 2004a, Niedermaier et al. 2006, Gilger Salmon et al. 2008] and it has been shown, that vaccination with a specific vaccine was successful in preventing new cases in an endemic horse population [Rohrbach et al. 2002, Wollanle et al. 2004b, Rohrbach et al. 2005]. ERU is the most common form of uveitis seen in horses. The clinical presentation is variable. The vast majority of horses are presented with clinical signs of anterior uveitis, which are easily recognizable by owners and referring veterinarians. Some of them may also have Panuveitis, although examination of the posterior segment is initially precluded by the intense miosis. A small number of patients exhibit a less obvious form of ERU, usually intermediate uveitis (pars planitis) with marked inflammatory changes of the posterior segment (vitreous). Since the clinical signs are subtle in these cases, they are usually only presented because of visual deficits at a late stage of the disease. There appears to be no correlation between the form of uveitis and the Leptospira status of an individual patient [Tömördy 2009]. The association between peripapillary choroidal degeneration (butterfly lesions) and ERU is unclear [Mat-
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Thews et al. 1990). However, in ponies experimentally infected with Leptospira spp. peripapillary chorioretinitis developed along with anterior uveitis (Williams et al. 1971). The diagnosis of ERU is based on the clinical signs of uveitis and a documented history of recurrent episodes of inflammation. In central Europe it is prudent to consider any equine uveitis to be ERU until proven otherwise. There are of course, other forms of uveitis, especially those associated with blunt or sharp trauma (Habin et al. 1994, Moore et al. 1998, Grahn and Cullen 2000). Iridocyclitis and chorioretinitis have been seen in foals with septicemia (Lottery and Wyman 1985), and we have seen bilateral anterior uveitis in a foal with an umbilical infection and bacteremia. Uveitis may also be the result of multicentric neoplasms (Germann et al. 2008). Most forms of equine ulcerative keratitis are accompanied by some degree of anterior uveitis (Nassise and Nelms 1992).

Symptomatic treatment of ERU (i.e., corticosteroids, mydriatics, and non-steroidal anti-inflammatory medications) aims to reduce inflammation and minimize permanent ocular damage at each episode of active uveitis, but it is not effective in preventing recurrence of disease. Corticosteroids are used topically or subconjunctivally, together with topical 1% atropine sulfate. Non-steroidal anti-inflammatory medications are usually given systemically. Intracameral injection of tissue plasminogen activator (tpa) may be used to dissolve organized fibrinous exudates in the anterior chamber (Spiess 1997). Other medications, such as aspirin, phenylbutazone, used by some clinicians to possibly prevent or decrease severity of recurrent episodes of uveitis have limited efficacy and potential detrimental side effects when used chronically in the horse.

Most veterinary ophthalmologists agree that long-term prognosis for ERU with medical therapy alone is poor. Even aggressive therapy is often insufficient to prevent recurrent painful inflammatory episodes. Cumulative intraocular damage often leads to phthisis bulbi, glaucoma, or loss of vision as a result of cataract formation or retinal detachment. Pars plana vitrectomy (PPV) has first been described in 1991 for the management of equine recurrent uveitis (Werry and Gerhards 1991). PPV has since been increasingly employed in the treatment of ERU in Europe (Werry and Gerhards 1991, Winterberg 1997, Frühauf et al. 1998, Gilger and Spiess 2006).

In a study of 43 eyes post PPV, 42 remained free of recurrent uveitis during the follow-up period of 67 months. 70% of these eyes retained some vision. The most common complication was cataract formation in 19/43 (44%) eyes, followed by phthisis bulbi in 6 eyes, and retinal detachment in 4 eyes (Winterberg 1997). In another study of 38 cases 5 eyes showed recurrence of uveitis between 10 days and 3 years post-operatively (Frühauf et al. 1998). Thirty-three eyes showed no recurrence during a follow-up period of up to 5 years. Vision remained stable in 28 eyes and improved in one eye. The remaining eyes showed marked vision loss as a result of cataracts (3), phthisis bulbi (1), or unknown cause (1). Of the 5 eyes with recurrent uveitis 2 demonstrated marked loss of vision, while 3 maintained preoperative vision.

In the present retrospective study we evaluated the outcome of PPV in relation to the Leptospira spp. status of each patient.

Animals, materials and methods

Between March 2001 and March 2009 59 eyes of 54 horses with ERU underwent a vitrectomy procedure. There were 24 mares, 28 geldings and 3 stallions representing 23 breeds. Five horses were operated bilaterally. Six unilaterally operated horses were lost to follow-up, leaving 53 eyes in the study for which follow-up information was available. The follow-up period ranged from 3 months to 7.5 years. The results of microagglutination tests (MAT) for various serovars of Leptospira interrogans were available for 47 eyes. Diluted vitreous samples were collected at the time of surgery and submitted to MAT.

The outcome of vitrectomy was evaluated with regards to the Leptospira-status of the individual patient. The presence or absence of postoperative ERU was determined by repeated ocular examinations, as well as by interrogation of referring veterinarians and owners. A vitrectomy was considered successful if no recurrent episodes of active uveitis were observed during the follow-up period. Visual performance was not assessed and patients with mature cataracts but no recurrent uveitis were listed as successful.

Data editing and all the statistical analyses were done using Stata Software. Analyses were carried out using the ciri command. A p-value of ≤ .05 was considered as significant.

Results

Forty of the 47 (85%) horses with ERU tested positive for Leptospira antibodies by MAT. Only 7 horses tested negative. For 6 horses this information was not available. The following serovars were identified in order of decreasing frequency: L. grippotyphosa, L. pomona, L. canicola, L. bratislava, L. pyrogens, L. copenhagenii, L. icterohaemorrhagiae, L. saxkoebing, L. javanica, L. tarassovi (Table 1). Most horses tested positive for more than one serovar. The overall success rate after vitrectomy (no recurrent uveitis) was 73.6%. The remaining 26.4% of patients experienced one or more episodes of active uveitis postoperatively.

Of the 40 horses testing positive for Leptospira 33 (82.5%) showed no further uveitis, while the remaining 7 (17.5%) had at least one documented relapse of uveitis.

Of the seven horses testing negative for Leptospira antibodies, only 1 (14.3%) was considered a success, while the remaining 6 (85.7%) patients continued to show recurrent episodes of uveitis (Table 2).

Discussion

The most important goal of therapy for ERU is to prevent recurrent painful episodes of active uveitis. In addition, therapy should aim at preserving, restoring or at least stabilizing vision. For the purpose of this retrospective study the absence of recurrent episodes of active uveitis was considered a success.

Medical therapy alone is usually insufficient to prevent recurrent uveitis on a long-term basis. PPV has proven to be an effective surgical therapy for ERU with a high success rate (Winterberg 1997, Frühauf et al. 1998, Gilger and Spiess 2006).

In our caseload 85% of horses with clinical signs of ERU have Leptospira antibodies in the vitreous of the affected eyes. In a study in Great Britain, only 11.1% of horses with uveitis had positive titers against L. interrogans antibodies (Matthews et al. 1987). The most common serovar was L. sejroe. In our study the most common serovar of L. interrogans was grippophyllosa followed by pomona, canicola, and bratislava. This is in accordance with another study from continental Europe (Brem et al. 1999). Similar reports from North America identified most commonly L. interrogans serovar pomona (Halliwell et al. 1985, Dwyer et al. 1995).

The most important result of the present study was the significantly different outcome of PPV of horses testing positive or negative for L. interrogans antibodies. It is interesting to note, that the vast majority of eyes testing negative experienced recurrent episodes of ERU postoperatively. In view of theses findings we now routinely submit serum, aqueous humor and vitreous samples of eyes with clinical signs of ERU for MAT for Leptospira interrogans antibodies before deciding to perform a PPV. Of 10 eyes testing positive, 9(90%) had no further recurrence of ERU (Spiess, in preparation). These numbers are significantly different outcome of PPV of horses testing positive or associated ERU is true. In a prospective study, the optimal treatment for horses with ERU not associated with Leptospira spp. should be evaluated. It is possible, that these horses benefit from the suprachoroidal implantation of a CSA-releasing device (Gilger et al. 2000a, Gilger et al. 2000b, Gilger et al. 2001, Gilger and Spiess 2006, Gilger et al. 2006).

Table 1  Antibodies against different serovars of L. interrogans identified by MAT in intraoperative vitreous samples

<table>
<thead>
<tr>
<th>Serovars of L. interrogans</th>
<th>Number of isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. grippophyllosa</td>
<td>30</td>
</tr>
<tr>
<td>L. pomona</td>
<td>15</td>
</tr>
<tr>
<td>L. canicola</td>
<td>14</td>
</tr>
<tr>
<td>L. bratislava</td>
<td>12</td>
</tr>
<tr>
<td>L. pyrogenes</td>
<td>9</td>
</tr>
<tr>
<td>L. copenhageni</td>
<td>7</td>
</tr>
<tr>
<td>L. icterohaemorragiae</td>
<td>5</td>
</tr>
<tr>
<td>L. saxkoebing</td>
<td>2</td>
</tr>
<tr>
<td>L. javanica</td>
<td>2</td>
</tr>
<tr>
<td>L. tarassovi</td>
<td>1</td>
</tr>
<tr>
<td>L. hardjo</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2  Outcome of PPV in eyes testing positive or negative for antibodies against serovars of L. interrogans

<table>
<thead>
<tr>
<th>Leptospira positive</th>
<th>Leptospira negative</th>
<th>Leptospira unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No recurrence</td>
<td>Recurrence</td>
<td></td>
</tr>
<tr>
<td>33 (82.5%)</td>
<td>7 (17.5%)</td>
<td>1 (14.3%)</td>
</tr>
<tr>
<td>N = 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No recurrence</td>
<td>Recurrence</td>
<td></td>
</tr>
<tr>
<td>6 (85.7%)</td>
<td>5 (83.3%)</td>
<td>1 (16.7%)</td>
</tr>
<tr>
<td>N = 6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Addresses

1 Bayerisches Landesamt für Gesundheit und Lebensmittelsicherheit, Veterinärstrasse 2, 85764 Oberschleissheim, Germany
2 StataCorp., 2009; Stata Statistical Software: Release 11.0; College Station, TX, USA: StataCorp LP

Literature


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