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HOW USEFUL IS TETANUS ANTITOXIN IN THE TREATMENT OF EQUIDAE WITH TETANUS? A COMPARISON OF THREE TREATMENT PROTOCOLS USED IN THE MANAGEMENT OF 56 CASES OF EQUINE TETANUS PRESENTED TO THE SPANA CLINICS IN MOROCCO IN 2003/2004

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Introduction

Tetanus is a distressing and often fatal disease caused by a protein exotoxin with three components liberated by the bacteria Clostridium tetani of the family Bacillaceae. Equidae are particularly susceptible to the tetanus exotoxin (Radostits O, Blood D, Gay C 1994). It generally gains entry to the body via wounds. In Morocco, where all working equines are hobbled, pastern lesions from ill fitting or ill designed hobble s, are one of the major sites of entry.

Tetanus is considered enzootic in many countries in the developing world where vaccination programs for both man and equidae are not yet established. In Morocco tetanus is a major cause of death amongst horses, donkeys and mules. In countries where equidae play a key role in the rural economy and where the welfare of many families is intimately linked to the welfare of their draught animal, the prevention and treatment of this disease is an important issue. During an 18 month period between 2003 and 2004 SPANA (Society for the Protection of Animals Abroad) hospitalised 56 cases of equine tetanus and successfully treated 26 (approx 46%). The rest died or were euthanased on humane grounds.

The aims of treatment focus on the elimination of the source of the toxin, the neutralisation of any unbound toxin, the establishment of antitoxin immunity and the control of neuromuscular derangements. The use of tetanus antitoxin in the neutralisation of unbound exotoxin forms an important part of the treatment protocol but published dosages and routes vary widely and evidence on which to base therapy is scarce. Recommended doses range from a single administration of 5000 iu/animal to 2.5 million iu/animal followed by lower doses over five days. The economic implications of using high doses of antitoxin without evidence to indicate the increased chance of a more favourable outcome are important.

In an attempt both to establish a cost/benefit ratio to the use of high dose tetanus antitoxin, and to evaluate any prognostic indicators, SPANA conducted a clinical trial over an 18 month period in 2003 and 2004.

Equidae hospitalised for tetanus in this period were treated with one of three different dose rates of tetanus antitoxin, ranging from the first group who received none at all (14 animals), the second group who received anything from 1000IU to 39000IU IV over 1-3 days (17 animals) to the third group which each received 50,000IU IV over two consecutive days (25 animals). There was no association between treatment group and outcome (P>0.8). This suggests that tetanus antitoxin may not be beneficial or economically justifiable in the treatment of tetanus in working animals in the developing world.

Materials and methods

Most of the equidae that presented to SPANA clinics in Morocco with Tetanus during the 18 months from Jan 2003 to June 2004 were included in this case series. Only those presenting in a terminal state were excluded. The diagnosis was made on clinical signs only. Other common differential diagnosis that had to be ruled out in each case included rabies, equine exhertional rhabdomyolisis, West Nile Fever, and musculoskeletal trauma.
The clinical presentation was assessed for each case and details of age, sex, species, wound location, duration and severity of clinical signs at presentation, treatment protocol, number of hospitalised days, the outcome and any long term effects were recorded for each. Each case was allocated a 'clinical score' based on the following criteria as assessed at the time of presentation:

1. Mild clinical signs (ie.slightly stiff gait but still walking and eating without difficulty).
2. Moderate clinical signs (ie. limbs stiff and walking with difficulty, trismus and generalised muscle spasm, animal still capable of eating and drinking).
3. Severe clinical signs (ie Capable of maintaining an upright posture but incapable of walking, difficulty eating)
4. Terminal clinical signs (ie animal recumbent, incapable of eating). Animals presenting in this situation are considered candidates for immediate euthanasia and were not included in this series of cases.

Cases were assigned to one of three categories depending on the dose of tetanus antitoxin they received.

1. No dose : 14 cases
2. Low dose : 1000 -39000IU -17 cases
3. High dose : 50,000 IU - 25 cases

All animals were treated with a standard protocol consistent with those described in the literature. They all received 15000UI/kg procaine penicillin IM BID or TID (benzyl penicillin is not available for use in equidae in Morocco) for a minimum of 7 days. All cases received acepromazine 0.05mg/kg - 0.08mg/kg IV. Cases with symptoms that could not be controlled by this regime were treated with Diazepam. Wounds were systematically cleaned, meticulously debrided and subjected to copious lavage at 50psi.

None of the animals in this series had been previously vaccinated against tetanus.

**Results**

Of the 56 equidae in this series, 26 (46%) survived and 30 (54%) were euthanased or died.

A logistic regression model looked at survival as the outcome and age, wound position, clinical grade 1,2 vs 3, species, and dosage of tetanus antitoxin (TAT) by group. The results confirmed a strong association between survival and clinical grade at presentation (P=0.001) whilst the effect of species, age, wound position and dosage were not significant (P>0.4).

The survival rate by TAT dosage group is presented below.

<table>
<thead>
<tr>
<th>Number of animals</th>
<th>No TAT</th>
<th>Low dose</th>
<th>High dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival rate</td>
<td>14</td>
<td>17</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>50%</td>
<td>42%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Table 1 Survival rate associated with different doses of TAT

**Discussion.**

The mortality rate in this series was 54%. This compares favourably with rates from previous case series, (75% reported by Green et al in a series of 20 cases and 66% reported by Steinman et al in a series of 3 cases) The prognosis for survival is reported to depend on several factors; the immune and vaccination status of the host, the dose of clostridial inoculation, and the duration and availability of aggressive treatment and supportive care (Green et al). Green reported an association between survival and previous prophylactic vaccination with tetanus toxoid (P=.03) and stated that none of the nonvaccinated horses in their series of cases had survived.
We would have expected a higher mortality rate in this series given:
- the negative vaccination status of all the animals.
- the poor immune status of most of the animals, (the majority of the animals in Morocco are in poor to very poor body condition and parasite control is nonexistent)
- that most patients were admitted more than 48 hours after onset of clinical signs and 12 were admitted 4 days or more after onset of clinical signs. No previous treatment had been administered in any of these cases.

This relatively low mortality rate is puzzling given the poor vaccination and immune status of the animals in this series of all the clinical factors that were recorded for this series of cases the only one which has a clear association with prognosis is the severity of clinical signs (Grade 3) where the survival rate was 6%. (P<0.001). The apparent lack of association between dosage of tetanus antitoxin and outcome is important for clinicians in resource limited situations, and has dictated the protocol used by SPANA veterinarians in the treatment of equidae with tetanus.

References


Muylle E. Oyaert W. Ooms L. Decraemere H. (1975) Treatment of Tetanus in the horse by injections of Tetanus Antitoxin into the subarachnoid space. JAVMA Vol 167 47-48


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