

Could treatment of pregnant mares prevent abortions due to equine piroplasmosis?

B D Lewis^{a,b}, B L Penzhorn^{b*} and D H Volkmann^c

ABSTRACT

Treatment of pregnant mares to prevent abortions due to equine piroplasmosis is a novel idea practised empirically at some Thoroughbred studs in South Africa. This paper presents the results of an investigation to ascertain whether imidocarb dipropionate crosses the equine placenta. Three pregnant mares were injected intramuscularly with imidocarb and their foetuses were mechanically aborted at varying time intervals thereafter. Imidocarb was found in foetal blood at a level similar to that in the dam's blood, suggesting that imidocarb administered to the dam would be available for anti-parasitic activity in the foetal circulation. Uncertainty concerning the time of treatment to achieve the desired effect currently makes this a questionable exercise.

Key words: abortion, *Babesia equi*, equine piroplasmosis, imidocarb, prevention, *Theileria equi*.

Lewis B D, Penzhorn B L, Volkmann D H **Could treatment of pregnant mares prevent abortions due to equine piroplasmosis?** *Journal of the South African Veterinary Association* (1999) 70(2): 90–91 (En.). Department of Veterinary Tropical Diseases, Faculty of Veterinary Science, University of Pretoria, Private Bag X04, Onderstepoort, 0110 South Africa.

INTRODUCTION

Piroplasmosis is regularly diagnosed in South Africa in new-born foals and aborted foetuses^{4,7}. In a recent survey of abortions in Thoroughbred mares in South Africa, it was found that 11 % were due to *Theileria equi*^{2†}. *Babesia caballi*, the other causative organism of equine piroplasmosis, is rarely incriminated⁹. Prevention of abortion or neonatal mortality due to piroplasmosis is of significant economic importance.

Abortions, usually during the last trimester of gestation, stillbirths and peracute neonatal piroplasmosis, which is almost invariably fatal, are rarely accompanied by clinical disease in the mare^{4,7}. Some Thoroughbred stud managers administer imidocarb dipropionate

(Forray-65, Hoechst Roussel Vet) to brood mares 6–8 weeks before the expected foaling date in an attempt to prevent abortions due to piroplasmosis (personal observations).

There are no published data available on whether imidocarb crosses the equine placenta. It is therefore possible that this chemotherapy is ineffective due simply to the imidocarb not reaching the foetus. A recent study⁶ demonstrated the presence of *T. equi* in healthy equine foetuses as early as the 120th day of gestation, whereas most abortions occur much later. This implies that the most appropriate time for prevention or treatment of transplacental infection is not known.

There are also no published data available regarding the serum clearance times for imidocarb in horses. In sheep, peak plasma concentrations are reached within 4 h of administration, decreasing rapidly between 4 and 6 h post-administration and then decaying slowly by 1st-order kinetics over a 3-week period¹. It has been suggested that the peak plasma concentration in horses would also be reached between 1 and 4 h post injection (M Allen, Hoechst Roussel Vet, South Africa, pers. comm., 1998).

MATERIALS AND METHODS

Three Nooitgedacht mares were used in this trial. Mares V90 and V26 were 7 months pregnant and mare V127 was 5

months pregnant. Indirect fluorescent antibody test (IFAT) and DNA probe analysis of the blood of all 3 mares confirmed them to be *T. equi* carriers. All 3 mares were injected intramuscularly with imidocarb at a dosage of 3 mg/kg and mechanical abortion¹⁰, resulting in the delivery of a live foetus, was performed after 4 h in mare V26, 9 h in mare V90 and 48 h in mare V127.

One hour before the abortion, a 10 ml blood sample was collected from each mare into heparinised vacutainer tubes. Immediately after the foetus was delivered, at least 7 ml of blood were collected from its umbilical vein into a heparinised vacutainer tube, after which the foetus was euthanased by intra-cardiac injection of pentobarbitone sodium (Euthanaze, Centaur-Bayer Animal Health).

The heparinised blood samples were centrifuged at 3000 rpm for 15 min; the plasma was collected and stored at –15 °C. A spectrophotometric assay was conducted to compare the relative concentrations of imidocarb in the plasma of each mare and her foetus¹.

RESULTS

The plasma samples from mare V127 and her foetus became cloudy when thawed and it was impossible to get absorbency readings from either sample. The imidocarb concentrations in the plasma samples of the other 2 mares and their respective foetuses were very similar. Plasma from mare V26 contained 4.54 µg/ml imidocarb and that of her foetus 5.16 µg/ml. Plasma from mare V90 contained 2.35 µg/ml imidocarb and that of her foetus 2.75 µg/ml.

DISCUSSION

The results clearly show that in the 2 cases tested, imidocarb did cross the equine placenta and was detectable in the foetal circulation at a level similar to that found in the dam's blood. A sample size of 2 mares and their foetuses is very small, however, and care should be taken when extrapolating these results to an entire population.

The presence of imidocarb in foetal blood suggests that administration of the

[†]*Babesia equi* (Laveran, 1901) was redescribed as *Theileria equi* by Mehlhorn and Schein in 1998⁸. It is suggested that piroplasmosis, an older, previously well-established name is used when referring to the disease caused by this organism.

^aDepartment of Biology, Medical University of Southern Africa, Medunsa, 0204 South Africa.

^bDepartment of Veterinary Tropical Diseases, Faculty of Veterinary Science, University of Pretoria, Private Bag X04, Onderstepoort, 0110 South Africa. E-mail: bpenz@op1.up.ac.za

^cDepartment of Theriogenology, Faculty of Veterinary Science, University of Pretoria, Onderstepoort, South Africa.

*Corresponding author.

Received: December 1998. Accepted: May 1999.

compound during pregnancy could help to prevent abortions due to piroplasmosis. As imidocarb does not sterilise *T. equi* infections at the normal therapeutic dose^{3,5}, it would only be of value if administered at the time when the parasites were multiplying, and before the parasitaemia in the foetus had reached a point likely to cause abortion. As there is currently no practical way of determining the likelihood or time of an individual mare aborting, it is impossible to know when to administer imidocarb to achieve the desired effect. Therefore, although administering imidocarb during pregnancy could potentially help to reduce the incidence of abortions due to piroplasmosis, not knowing when to treat the pregnant mare significantly reduces the value of such treatments. Although abortion storms due to *T. equi* are very rare, it may be useful to apply the treatment to all late-pregnant mares in a herd where more than 1 mare has aborted owing to *T. equi* infection in a short time interval.

This report emanates from project 36.5.168, approved by the Ethics Commit-

tee of the Faculty of Veterinary Science, University of Pretoria.

ACKNOWLEDGEMENTS

We thank the Onderstepoort Teaching Animal Unit for the use of their horses and the Department of Pharmacology and Toxicology, Faculty of Veterinary Science, University of Pretoria, for performing the plasma imidocarb assays.

REFERENCES

1. Aliu Y O, Davis R H, Camp B J, Kuttler K L 1977 Absorption, distribution and excretion of imidocarb dipropionate in sheep. *American Journal of Veterinary Research* 38: 2001–2007
2. De Waal D T, Horn E, Josemans A I (in press) Epidemiology of equine piroplasmosis in South Africa: detection and duration of colostral antibodies and the incidence of new infection in foals. *Proceedings of the 8th International Conference on Equine Infectious Diseases, Dubai*, 23–26 March 1998
3. De Waal D T, Van Heerden J 1994 Equine babesiosis. In Coetzer J A W, Thomson G R, Tustin R C (eds) *Infectious diseases of livestock with special reference to southern Africa*. Oxford University Press, Cape Town: 295–304
4. Erbsloh J K E 1975 Babesiosis in the newborn foal. *Journal of Reproduction and Fertility*, Supplement 23: 725–726
5. Kuttler K L, Zaugg J L, Gipson C A 1987 Imidocarb and parvaquone in the treatment of piroplasmosis (*Babesia equi*) in equids. *American Journal of Veterinary Research* 48: 1613–1616
6. Lewis B D 1998 Transplacental transmission of *Babesia equi* in horses and chemotherapy of small *Babesia* species. PhD thesis, University of Pretoria
7. Marlow C H B, Bester R C 1994 Infectious causes of equine reproductive failure. In Coetzer J A W, Thomson G R, Tustin R C (eds) *Infectious diseases of livestock with special reference to southern Africa*. Oxford University Press, Cape Town: 1554–1563
8. Mehlhorn H, Schein E 1998 Redescription of *Babesia equi* Laveran, 1901 as *Theileria equi* Mehlhorn, Schein 1998. *Parasitology Research* 84: 467–475
9. Neitz W O 1956 Classification, transmission, and biology of piroplasms of domestic animals. *Annals of the New York Academy of Science* 64: 56–111
10. Volkmann D H, De Cramer K G M 1991 Prostaglandin E₂ as an adjunct to the induction of abortion in mares. *Journal of Reproductivity and Fertility*, Supplement 44: 722–723