EFFECT OF HETASTARCH COMPARED WITH PLASMA ON OUTCOME IN HORSES WITH GASTROINTESTINAL DISEASE

Jamie J Kopper DVM, PhD  
Large Animal Internal Medicine Resident  
Department of Large Animal Clinical Sciences  
College of Veterinary Medicine  
Veterinary Medical Center, D-208  
Michigan State University  
East Lansing, MI  48824-1314

Colloids are used, in both veterinary and humane medicine for volume resuscitation, particularly in the face of decreased colloid oncotic pressures. The two main types of colloids available are natural and synthetic colloids. Natural colloids include frozen plasma, whole blood and albumin, however frozen plasma remains the colloid of choice in veterinary medicine. Older versions of synthetic colloids included dextrans and gelatins however newer versions are of the Hydroxyethyl starch (HES) family which includes hetastarch, tetrastarch and pentastarch. Synthetic colloids became popular as cost effective readily available alternatives to natural colloids. However, subsequent human studies have found associations between administration of HES and adverse effects including coagulopathies, tissue storage, acute kidney injury, hepatic organ failure, pruritus and increased mortality. In equine specific studies alteration of hemostasis have been noted both in vivo and in vitro studies assessing the use of HES. Two small scale prospective studies have been performed comparing the use of HES with isotonic crystalloids in horses presenting for colitis or surgical colic, however differences in survival to discharge were not noted and larger studies including patients administered plasma are lacking. A previous study reported that 10% of horses receiving plasma from our institution experienced adverse effects including development of urticaria or tachycardia, none of which were life threatening. Our null hypothesis was that there would not be a difference in morbidity or mortality of horses presenting for gastrointestinal disease and treated with HES or Plasma.

Medical records from adult horses admitted to Michigan State University Veterinary Medical Center for gastrointestinal disease between Jan 1, 2005 and Jan 1, 2012 that received colloid therapy (6% Hetastarch 600/0.7 or MSU Frozen Plasma) were reviewed. Data retrieved from the records included signalment, presenting complaint, duration of hospitalization, volume and type of colloid administered, volume of crystalloid fluids administered, hematological evaluation and survival to discharge.

Complete medical records were obtained for 217 horses. Of those 217 horses 34 received HES, 53 received HES and plasma and 129 received plasma alone. Overall, 43% of horses that received HES and 53% of horses that received HES and plasma survived to discharge compared to 78% of horses that received plasma. Admission parameters of known prognostic value were evaluated in attempt to elucidate whether or not horses that were treated with HES were more compromised at the time of admission, which could account for their decreased rate of survival. There was no significant difference in
admission lactate or total protein between any of the three groups. From this information we can infer that horses that were treated with HES and plasma may have been more compromised at the time of admission, however there were not significant differences between the horses that received HES or plasma alone in their admission parameters.

Finally, horses that presented with gastrointestinal disease were divided into two groups: those that presented for colitis/enteritis and those that presented for an acute abdominal lesion requiring surgical intervention. Of the original 217 horses, 126 presented for enteritis or colitis and 91 had surgical lesion and received an exploratory celiotomy. Of the horses that presented for an enteritis or colitis 52% of the horses that were treated with HES and 50% of the horses that were treated with HES and plasma survived to discharge compared to 82% of the horses treated with plasma. There was not a significant difference between admission parameters in any of the three groups, however those horses that were treated with HES remained persistently azotemic. Of the 91 horses that were treated for a surgical lesion and underwent an exploratory celiotomy 27% of the horses that received HES and 57% of the horses that received HES and plasma survived to discharge compared to 76% of the horses that received plasma alone. There were not any significant differences between admission parameters in any of the three groups.

From this data we concluded that although horses that received HES and plasma may have been more compromised at the time of admission (heart rate of 70 bpm vs. 60 bpm and a packed cell volume of 56% vs. 49%), however there was not a significant difference between the admission values of horses treated with HES alone when compared to those treated with plasma alone. Persistent azotemia was observed in the horses presenting for enteritis/colitis and treated with HES compared to those horses treated with plasma and may indicate acute kidney injury in this group. Based on this data we conclude that treatment with HES was associated with increased mortality (overall survival to discharge of 43% vs. 78%). However it should be noted that the cause for increased mortality in the horses treated with HES remains unknown and further study is warranted, ideally in the form of a prospective randomized multi-center clinical trial.