Transection of an Intravenous Catheter in Six Horses: Effects and Location of the Catheter Fragment

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An intravenous catheter was inserted into the jugular vein and transected experimentally in six horses. Thoracic radiography and cardiac ultrasonography did not reveal the location of the catheter fragment in the majority of horses. A postmortem examination revealed the catheter fragment in the pulmonary artery or cranial vena cava. Authors’ address: Virginia-Maryland Regional College of Veterinary Medicine, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061. © 1998 AAEP.

1. Introduction

Intravenous catheters are used commonly in the horse to administer fluids, injectable anesthetics, and antimicrobials. Complications associated with intravenous catheters occur infrequently in the horse and include thrombosis, thromboembolism, thrombophlebitis, and periphlebitis. Mechanical causes of failure of intravenous catheters including fragmentation and embolization have been reported recently in horses.

2. Materials and Methods

Six healthy horses (four geldings and two mares) with a mean age of 14 years and a mean weight of 440 kg were kept in individual box stalls, fed hay by free choice, and were allowed unlimited access to water for 2 days prior to euthanasia. These horses were used in another research project that required euthanasia. Physical examinations including temperature, pulse rate, respiratory rate, attitude, appetite, water consumption, and body weight were performed before and 24 h after transection of the intravenous catheter. Cardiac ultrasonography with a 2.5-MHz transducer was performed before, immediately after, and 24 h after transection of the intravenous catheter. A 14 gauge × 14 cm polytetrafluoroethylene intravenous catheter was inserted aseptically into the left jugular vein in the midcervical region. Percutaneous ultrasonography with a 7.5-MHz transducer was used to confirm the location of the catheter in the jugular vein. The catheter was transected at the junction of the catheter hub and the catheter tubing with sterile scissors. The jugular vein was massaged. Percutaneous ultrasonography was performed after transection and massage, and it confirmed that the catheter fragment was not located in the jugular vein. Thoracic radiography and a complete blood count were performed 24 h after the intravenous catheter was transected. All horses were euthanized with an overdosage of barbiturate administered in the right jugular vein 30 h after the catheter was transected.
A gross postmortem examination was performed on each horse.

3. Results
The results of the physical examination and complete blood count remained within normal limits in all horses. Cardiac ultrasonography of the right atrium, right ventricle, and pulmonary artery was performed immediately after transection of the intravenous catheter and failed to detect hyperechoic material consistent with a catheter fragment in any of the horses. Cardiac ultrasonography performed 24 h after transection identified echodense material consistent with a catheter fragment in the right atrium of one horse. Thoracic radiography performed 24 h after transection did not identify any radiodense material suggestive of a catheter fragment. A postmortem examination revealed the catheter fragment in the distal pulmonary artery (three horses), proximal pulmonary artery (two horses), and cranial vena cava (one horse). There was no inflammation of the endocardium or intimal surface of blood vessels associated with the catheter fragment.

4. Discussion
Catheter embolization has been reported frequently in human patients. A review of 202 patients with catheter emboli revealed the most frequent sites of embolization were the pulmonary arteries (34%), great veins (26%), right ventricle (19%), right atrium (16%), and lung periphery (4%). The most frequent sites of catheter embolization in the horses in this report were the pulmonary artery (5/6 horses) and cranial vena cava (1/6 horses). One report of catheter embolization in a foal revealed the catheter fragment in the right atrium and right ventricle.5

The results of a physical examination and complete blood count performed 24 h after transection of the catheter remained within normal limits in all horses in this report. We suspect the lack of alteration of the physical examination and complete blood count likely reflected the use of an aseptic technique and a relatively short duration (24 h) between the transection of the intravenous catheter and the completion of these procedures. The lack of inflammation observed on postmortem examination of the endocardium and intimal surfaces of the pulmonary artery or cranial vena cava associated with the catheter fragment also was attributed to the use of an aseptic technique and a relatively short duration (30 h) between the transection of the intravenous catheter and euthanasia.

Thoracic radiographs of a 2-day-old foal with catheter embolization revealed a 13-cm catheter fragment in the right atrium and right ventricle. Radiographs of the left and right sides of the thorax performed 24 h after transection of the intravenous catheter in the horses in this report failed to identify any radiodense material suggestive of a catheter fragment. The polytetrafluoroethylene catheter inserted in the horses in this report was radiopaque, and the length of the fragment was approximately 12 cm. We suspect that the distance between the catheter fragment in the pulmonary artery or the cranial vena cava and the radiographic cassette prevented the observation of the catheter fragment in these horses.

Cardiac ultrasonography of the right atrium, right ventricle, and pulmonary artery was performed to determine the presence of a catheter fragment in the horses in this report. Cardiac ultrasonography performed 24 h after transection of the intravenous catheter failed to detect hyperechoic material consistent with a catheter fragment. Excessive bubbles were noted in the right atrium and right ventricle in one horse, which was consistent with a fragment in the cranial vena cava. We suspect that the recently transected fragment lodged temporarily in the cranial vena cava, which prevented observation by cardiac ultrasonography. Cardiac ultrasonography performed 24 h after transection revealed echodense material consistent with a catheter fragment in the right atrium of one horse. A postmortem examination of this horse revealed the catheter fragment to be in the proximal pulmonary artery. We suspect that the catheter fragment could have embolized from the right atrium to the proximal pulmonary artery during the 6 h between the final cardiac ultrasound and the postmortem examination performed on this horse.

Although useful in a foal with catheter embolization, thoracic radiography and cardiac ultrasonography did not reveal the location of the catheter fragment in the majority of the horses in this report.

References and Footnotes

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Proceedings of the Annual Convention of the AAEP 1998