



Techniques and Accuracy of Abdominal Ultrasound in Gastrointestinal Diseases of Horses and Foals

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KEYWORDS

- Equine • Gastrointestinal disease • Colic • Ultrasonography • Accuracy • Sensitivity • Specificity

KEY POINTS

- Abdominal ultrasound is a useful aid in the diagnosis of equine gastrointestinal disease.
- Sensitivity, specificity, and positive and negative predictive values of ultrasonography in the diagnosis of disease are necessary to determine the accuracy of this imaging modality.
- Techniques to identify various components of the gastrointestinal tract are well described in horses.

TECHNIQUES

Introduction

A thorough examination of the gastrointestinal (GI) tract in horses relies on clinical examination, ancillary diagnostic tests and procedures such as per rectal examination, peritoneal fluid analysis and diagnostic imaging. Since the inaugural research publication on the use of ultrasound (US) in the diagnostic evaluation of patients with colic in 1997,¹ a wealth of literature has developed describing techniques for identifying GI disease in horses and foals. Ultrasonography has become one of the most-used diagnostic imaging modalities under referral and field conditions. The design and development of light, portable machines with powerful software and high-quality images have turned this piece of equipment into an attractive and profitable investment for field service practitioners and referral centers. The techniques used to examine and assess the different intra-abdominal organs and viscera in adult horses and foals have been thoroughly described in textbooks and research articles.^{2–4} Therefore, only a

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brief description for routine scanning and anatomic landmarks is included. The main focus of this article is on the accuracy and usefulness of this imaging modality to assist with the diagnosis of GI disorders in foals and adult horses.

Patient Preparation

A thorough or partial abdominal examination of the abdomen of standing or recumbent adult horses and foals can be performed. Horses should ideally be secured in stocks where they can be safely scanned. Portable US machines have made it possible to scan horses while standing in the stall, hallway, or even while walking, which can be useful for horses displaying overt signs of colic.

A common practice is to soak the hair and skin with 70% isopropyl ethanol in order to facilitate coupling between the probe and the skin. In horses with thick and long-hair coats (ie, during winter months in the northern hemisphere), it may be difficult to obtain good-quality images. Areas of particular interest are better visualized by clipping the hair over the targeted structure. There are several factors that could affect how patients are examined, which largely depend on how cooperative the patients are, the degree of pain, and the differential diagnoses considered. A thorough examination is usually recommended to collect as much information of the entire GI tract as possible; however, in some cases only a partial examination can be performed. A protocol for fast localized abdominal sonography (FLASH system) for horses admitted with colic was developed and is considered useful in detecting major intra-abdominal abnormalities even by inexperienced operators.⁵ It is useful in some cases to perform multiple US examinations. The repeatability of identifying a particular abdominal structure on selected locations performed in multiple horses in repeated examinations has been assessed.⁶ Some segments of the GI tract, such as the caecum and sacculated large intestine (LI), can be more consistently identified during abdominal examinations than other segments. In some animals, the sacculated colon is occasionally identified in dorsal flank sites; the location of the small intestine (SI) can be both variable and require repeated examinations.⁶

Principles of Disease that can be Used for Examination of the Gastrointestinal Tract by Ultrasonography

There are several physical abnormal changes that can be used to enhance information obtained by US evaluation. These changes include displacements of the normal topographic anatomic arrangements of the GI tract and changes in motility (peristalsis), bowel wall thickness, layering, contents, shape, and diameter.

Anatomic abnormalities

The equine LI has several anatomic features that lend itself to diagnostic ultrasonography use. In brief, the large colon is composed of 4 segments, the right and left ventral colons and the right and left dorsal colons, with the only mesenteric attachment to the body wall being between the aboral portion of the right dorsal colon and the dorsal body wall. The large colon can, therefore, move into different abnormal positions throughout the abdomen causing vascular compromises, distensions, and outflow obstructions. The ventral colon is sacculated, whereas the dorsal colon is nonsacculated; this can be exploited for the identification of colon positioning.⁷ The blood supply to the large colon travels along the medial aspect of the colon in the mesocolon. Similarly, the identification of colonic vasculature in an abnormal lateral position can suggest abnormal colon positioning.⁸ Knowledge of normal positioning of the cecum and colon can also help differentiate between different types of intussusceptions affecting these parts of the LI.⁹

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