Iraqi Journal of Veterinary Sciences

www.vetmedmosul.com

Ultrasound evaluation of colic in horses: Diagnosis and severity assessment

M.K. Al-Dulaymi[1] and O.M. Al-Iraqi[2]

[1]Veterinary Hospital in Nineveh, Veterinary Directorate, [2]Department of Internal and Preventive Medicine, College of Veterinary Medicine, University of Mosul, Mosul, Iraq

Article information

Article history:
Received 09 August, 2024
Accepted 06 October, 2024
Published online 01 January, 2025

Keywords:
Horse
Colic
Ultrasound

Correspondence:
O.M. Al-Iraqi
osamamuwafag@uomosul.edu.iq

Abstract

Colic in horses is a common disease syndrome and could lead to death sometimes if not diagnosed quickly; however, the use of some diagnostic devices like ultrasound, which is considered an accurate method, was advised. The study examined 30 horses showing signs of colic and ten clinically healthy. Considered as the control group, animals in both groups are more than one year old and are of both sexes. The ultrasound examination was performed from seven locations (four on the left and three on the right) on the abdominal wall in a standing position. The results revealed that horses suffered from various causes of colic syndrome. Inflammation of the small intestine was the most frequent 35%, followed by cecal impaction, gaseous (flatulence) colic, spasmodic colic and gastric impaction 25, 20, 12.5, 7.5%, respectively. Ultrasound examination revealed that the average distance between the abdominal wall and the intestine 36.2 mm increased significantly in the affected horses compared to the healthy horses. At the same time, there was no significant difference in distance between the abdominal wall, colon, and cecum. Furthermore, there was an increase in the thickness of the intestinal wall by 7.3 mm, significantly in colic horses compared with healthy ones. At the same time, there was no significant difference in the wall thickness of the colon and the cecum. It was concluded that the use of ultrasound operation was a fit and trustable clinical method to confirm the rapid diagnosis of colicky courses.

DOI: 10.33899/ijvs.2024.152675.3825,

Introduction

Colic in horses is a serious medical condition and must be treated immediately (1), because it develops quickly and requires immediate medical intervention (2). If colic is not treated quickly, it can lead to a deterioration in the horse's health condition and even to death in some cases. Therefore, horse owners and those interested in equestrianism must be aware of proper prevention and care measures for the signs of colic, like pawing, kicking at the belly, and rolling, and to have the ability to deal with this condition effectively, whether through early detection and rapid medical (3,4). Healthy food is essential to improve and build body structure (5,6), while the low nutritional value of feeds leads to decreased immunity and emaciation and makes animals more susceptible to diseases (7,8). There are several methods to assist in the diagnosis of the colic, like auscultation, blood and serum analysis, and x-rays. These methods have many disadvantages, including the inability to explore the significant abdomen, while the use of ultrasound to diagnose colic in horses is an important tool for veterinarians to evaluate the digestive condition and determine the main cause of the problem (9,10) to examine the horse's abdominal area and verify the presence of changes in the intestines, such as enlargement, obstruction, torsion, or impaction, which may be an indication of colic. Using ultrasound to diagnose colic provides veterinarians with detailed and harmless images to verify the animal's condition, which helps make quick and accurate decisions regarding appropriate treatment. This technology also plays

an important role in improving treatment results and increasing the chances of survival for horses suffering from recurrent cases of colic (11,12). Colic syndrome in horses is important, especially because of the loss of the lives of many animals, amounting to approximately 10% (13). In the same way, the economic losses incurred by horse colic include costs such as transporting animals, veterinarian fees, hospitalization, and the cost of examinations, treatments, and supportive medications used to alleviate and remove the severity of colic (14).

In addition to achieving an accurate diagnosis within an acceptable time, this study was conducted to determine the cause of colic and the type and location of the cause based on ultrasound examination.

Materials and methods

Study animals

The study was conducted to examine 40 horses aged 1-8 years of both sexes, feed concentrated diet, mixed and Arabian breed and indoor housing system, from different areas of Nineveh governorate. They were referred to the University Veterinary Hospital. They were divided into two groups according to the Case Control Study method: the first group included 30 animals that showed signs of colic, and the second group included 10 clinically healthy animals.

Ethical approve

Clinical examinations used in the current study are done according to the Scientific Ethical Committee on Animal Experimentation guidelines at the College of Veterinary Medicine, University of Mosul, UM.VET.2023.115

Determine examination locations

Examination sites for ultrasound were determined according to the FLASH Technique in seven specific topographic locations: (1) Ventral abdomen, (2) Gastric window, (3) Splenorenal window, (4) Left middle third of the abdomen, (5) Duodenal window, (6) Right middle third of the abdomen, (7) Cranial ventral thorax. According to Busoni *et al.* (11) as in Figure (A).

Ultrasound examination

Using alcohol and without cutting their hair, the animals were examined in a standing position after controlling them. However, the animal was sometimes given a sedative, and then the examination areas were prepared on both sides of the animal without shaving the examination areas as much as possible. Alcohol was also applied to remove the natural fats on the animal's hair. After that, a portable ultrasound device (KX5100vet) with a curved type probe with a frequency of 3.5 MHz was used (15,16), and seven areas were examined: four places on the left side of the animal and three places on the right side of the animal (Figure 1), where these images saved in electronic memory on the hard disk, and then precise measurements were made using the (Screen Calipers Ver. 4.0) program. The diameter of different parts of the intestine, the thickness of the intestinal wall, and its distance from the abdominal wall on the left and right sides were measured, as well as the thickness of the intestine. The walls of the cecum and colon and the nature of the materials inside them are measured.

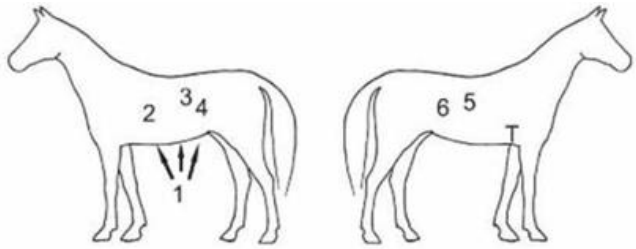

Figure 1: Shows the examination sites using the ultrasound device: (1) Ventral abdomen, (2) Gastric window, (3) Splenorenal window, (4) Left middle third of the abdomen, (5) Duodenal window, (6) Right middle third of the abdomen, (7) Cranial ventral thorax according to Busoni *et al.* (11).

Results

Type of colic

The results of the study showed that the horse colic cases in Nineveh Governorate included inflammation of the small intestine which was seen in (35% of diseased animals) followed by cecal impaction 25%, retention of gases (gas colic) 20%, spasmodic colic 12.5% and colic due to stomach impaction which was seen in 7.5% of diseased animals (Table 1).

Table 1: Percentage of colic in horses according to the cause

Diseases	Frequency (%)
Inflammation in small intestine	14 (35%)
Cecal impaction	10 (25%)
Gas colic	8 (20%)
Spasmodic colic	5 (12.5%)
Gastric impaction	3 (7.5%)

An examination was also performed using an ultrasound device for the internal organs in the abdominal cavity, which included measuring the diameter, wall thickness, and distance from the abdominal wall. It was found that there was a significant difference ($P \leq 0.01$) when measuring the distance between the abdominal wall and the intestines in millimeters for the horse suffering from colic, as it was indicated that the distance is greater than in normal healthy horses. As for measurements of the average distance between the abdomen and the colon and the abdomen and the cecum, no significant differences were recorded. There

was a significant difference in the thickness of the intestinal wall in horses suffering from colic, as it was high and reached 7.3 mm compared to normal horses 4.37 mm. In contrast, no significant differences appeared between horses that suffered from colic and normal horses when measuring the thickness of the colon wall and the thickness of the cecal wall in millimeters (Table 2).

Table 2: A comparison of measurements of internal organs in horses

Parameters	Mean±Standard error		P-value
	Colicky horses (n=40)	Control (n=10)	
Distance between the abdominal wall and intestine (mm)	4.8±36.2	2.6±22.3	0.01
Distance between the abdominal wall and colon (mm)	5.5±46.8	4.8±35.87	0.15
Distance between the abdominal wall and cecum (mm)	2.7±26.4	3.1±18.18	0.08
Intestinal wall thickness (mm)	0.5±7.3	0.2±4.37	0.01
Colon wall thickness (mm)	0.5±7.3	0.8±6.43	0.46
Cecum wall thickness (mm)	0.4±7.2	3.1±8.93	0.67

When searching for the cause of the pathological condition, it was found that various diseases, the stomach, and small intestine, represented by gastric impaction, which appeared in a form filled with echogenic food materials, with a thickening of its wall and close to the abdominal wall (Figure 2), while in another animal, it appeared in the form of an enlarged stomach and filling it with little fluid and less- echoic and its pressure on the liver (Figure 3) and congestion of blood vessels within the liver (Figure 4 and 5). In contrast, intestinal injuries were represented by inflammation, which appeared in the form of thickening and lack of echogenicity in the wall of the small intestine (Figure 6). The intestine (duodenum) was enlarged with a diameter of 5 cm, filled with echogenic substances representing food materials, and the wall thickened to 9 mm (Figure 7).

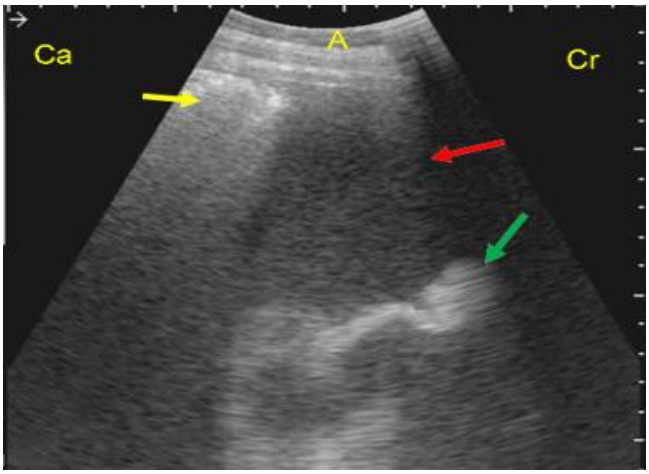

Figure 2: Ultrasound examination using a 3.5MHz probe showing A dilated gastric closed to the abdominal wall, filled with echogenic food materials, which indicates Gastric Dilation: Yellow arrow. Spleen: red arrow. A thickened, irregular colon wall contains lumpy food materials, such as green arrows. Abdominal wall: A. Caudal: Ca. Cranial: Cr.

It also appeared in other cases that the second part of the small intestine (jejunum) had enlarged to 5 cm and was filled with food materials, along with a thickening of the wall to 8 mm and an increase in echogenicity (Figure 8). Among the results in this study were several small intestine segments with a small diameter, slow physiological movement, low-echoic fluids, and high-echoic tortuous walls (Figure 9).

Figure 3: Ultrasound examination using a 3.5 MHz probe, showing Dilated gastric filled with hypoechoic fluids (yellow arrow). Abdominal wall: A. Caudal: Ca. Cranial: Cr.

The results of examining cases of the cecum using an ultrasound device also indicate enlargement of the cecum, its proximity to the abdominal wall, and its filling with nutrients (Figure 10). Furthermore, in other cases, the cecum wall appeared thickening and irregular (Figures 11 and 12). The cecum also appeared expanded, displaced towards the abdominal wall, and filled with gases (Figure 13). When examining the colon in horses that suffered from colic, the colon was enlarged and filled with highly echogenic food substances. At the same time, at other times, it showed a thickening of the colon wall, nearest to the abdominal wall, and containing low-echoic fluids (Figures 14-17).

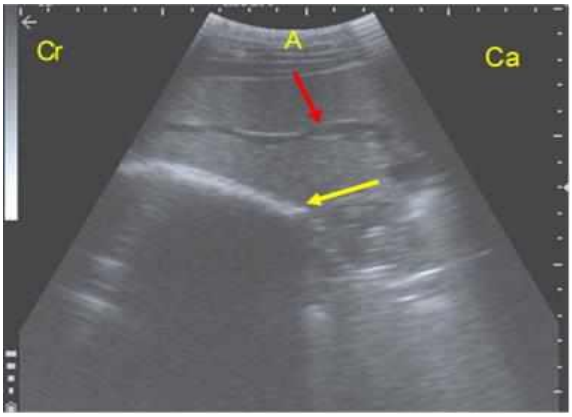

Figure 4: Ultrasound examination using a 3.5MHz probe, showing a dilated stomach with a thickened wall: yellow arrow. Blood vessels within the liver: red arrow. Abdominal wall: A. Caudal: Ca. Cranial: Cr.

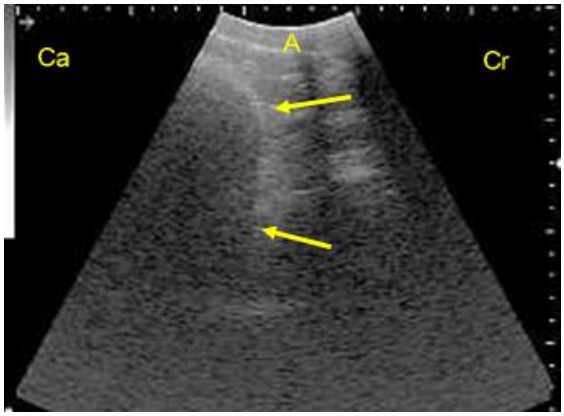

Figure 5: Ultrasound examination using a 3.5MHz probe, showing a dilated stomach and approaching the abdominal wall (Gastric Dilatation): yellow arrow. Abdominal wall: A. Caudal: Ca. Cranial: Cr.

Figure 6: Ultrasound examination using a 3.5MHz probe, showing: Thickened and low echogenic intestinal wall: yellow arrow. Abdominal wall: A. Caudal: Ca. Cranial: Cr.

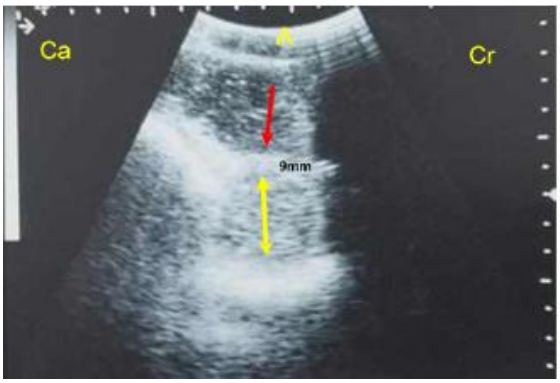

Figure 7: Ultrasound examination using a 3.5MHz probe showing that the intestinal lumen of the duodenum is enlarged (5 cm) and filled with echogenic material inside the yellow arrow. Thickening of the intestinal wall to 9 mm: red arrow. Abdominal wall: A. Caudal: Ca. Cranial: Cr.

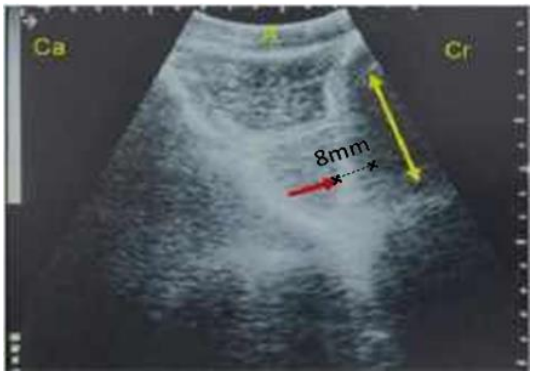

Figure 8: Ultrasound examination using a 3.5MHz probe, showing swelling of the intestinal lumen (Jejunum) to 4 cm and filling it with nutrients: yellow arrow. Thickening of the intestinal wall to 8 mm and increased echogenicity: red arrow. Abdominal wall: A. Caudal: Ca. Cranial: Cr.

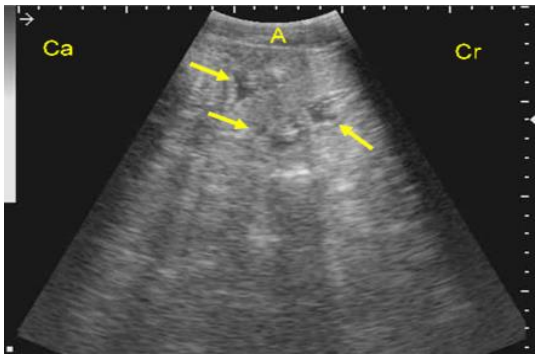

Figure 9: Ultrasound examination using a 3.5MHz probe, showing the presence of several small intestine segments appearing transversely, which show increased echogenicity in their wall while containing hypoechoic fluids: yellow arrow. Abdominal wall: A. Caudal: Ca. Cranial: Cr.

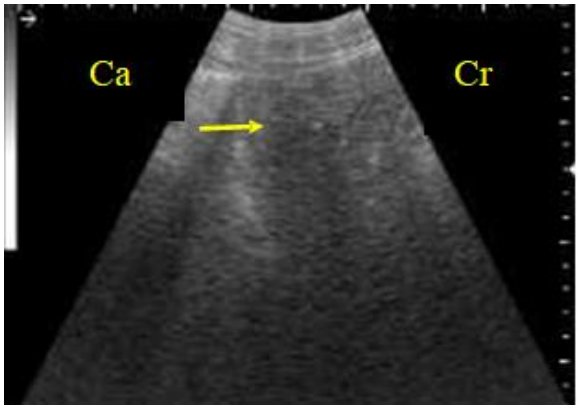

Figure 10: Ultrasound examination using a 3.5MHz probe, showing the cecum is enlarged, filled with nutrients, and close to the abdominal wall: yellow arrow. Abdominal wall: A. Caudal: Ca. Cranial: Cr.

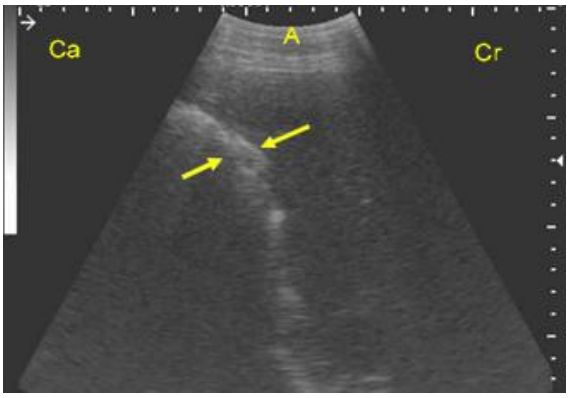

Figure 11: Ultrasound examination using a 3.5MHz probe, showing thickening and irregularity of the cecal wall (Cecal Impaction): yellow arrow. Abdominal wall: A. Caudal: Ca. Cranial: Cr.

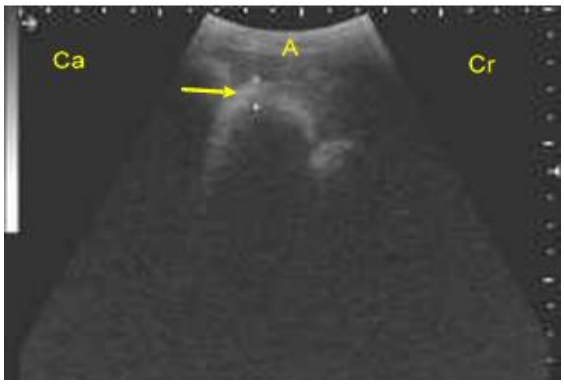

Figure 12: Ultrasound examination using a 3.5MHz probe, showing thickening of the cecal wall and its proximity to the abdominal wall (Cecal Impaction). Abdominal wall: A. Caudal: Ca. Cranial: Cr.

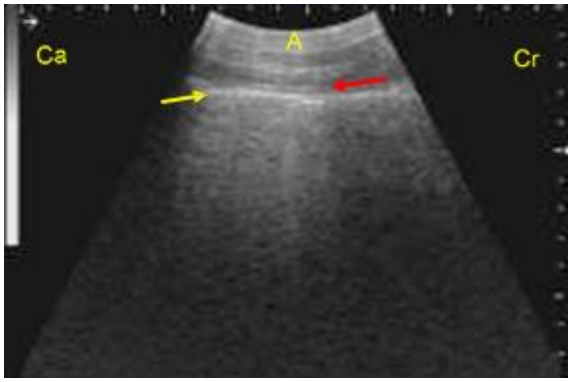

Figure 13: Ultrasound examination using a 3.5MHz probe, showing: The cecum expands and shifts toward the abdominal wall and fills with gases. Abdominal wall: A. Cecal wall: red arrow. Accumulation of gases: yellow arrows. Abdominal wall: A. caudal: Ca. Cranial: Cr.

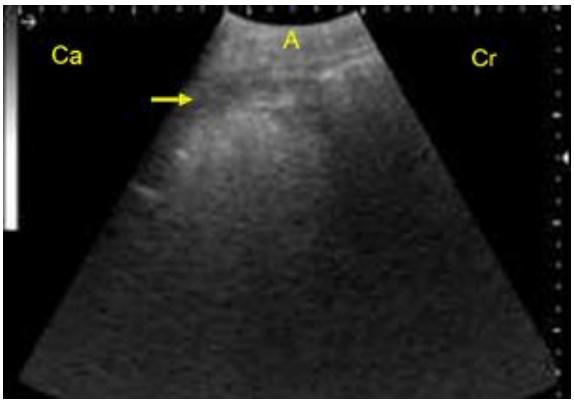

Figure 14: An ultrasound examination using a 3.5MHz probe shows that the colon is enlarged and filled with nutrients: yellow arrow. Abdominal wall: A. Caudal: Ca. Cranial: Cr.

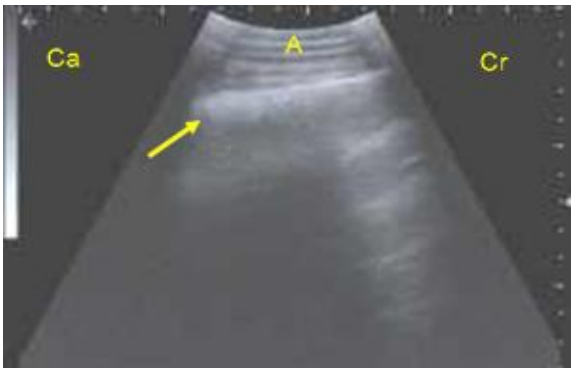

Figure 15: Ultrasound examination using a 3.5MHz probe shows that the colon wall thickened, approached the abdominal wall, and contained hypoechoic fluids with some gases. Abdominal wall: A. Caudal: Ca. Cranial: Cr.

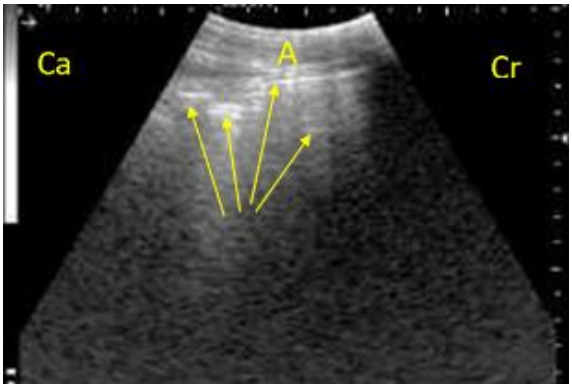

Figure 16: Ultrasound examination using a 3.5MHz probe, showing the expansion of the colon as it approaches the abdominal wall and fills with gases: yellow arrows. Abdominal wall: A. Caudal: Ca. Cranial: Cr.

Figure 17: Ultrasound examination using a 3.5MHz probe, showing the colon approaching the abdominal wall: red arrow. Thickening of the colon wall: yellow arrow. Abdominal wall: A. Caudal: Ca. Cranial: Cr.

Discussion

Thirty cases of colic were diagnosed in horses in Nineveh Governorate with different causes, starting with a high rate of inflammation of the small intestine and stomach impaction (17-20). Moreover, the cases of cecal impaction ranged at 25%, which is consistent with what was reported by Ross (21), and this result differed from Aitken *et al.* (22) and Dart *et al.* (23). The reason is that intestinal inflammation is affected by the quality of nutrition, management methods, failure to use correct preventive programs, as well as exposure to stress due to transportation or stress factors on the animal, which leads to a decrease in immunity and thus the occurrence of infections (24,25).

Cecal impaction occurs due to low fiber intake and reliance on concentrated feeds (21,26). The least common cases were stomach impaction, which occurred for many reasons, including those mentioned by Aitken *et al.* (22), including frequent ingestion of sand, especially in horses raised in stables with sandy floors or in pastures with short grass. Gaseous colic or colic due to water intake occurs frequently due to sudden changes in feed and intake of large amounts of water after exercise or stress, especially in hot weather (27,28).

The examination was conducted using an ultrasound device of the abdominal wall, which diagnosed various causes of colic, such as enlargement of the stomach, impaction of substances inside it, inflammation of the small intestine, and entrapment of food substances and gases inside the colon. Also, the entrapment of food substances and gases inside the cecum cavity was diagnosed, which showed clear changes in these organs compared to clinically healthy animals, and this result is consistent with what was reported by Kassa *et al.* (1) and Fereig (29).

Some horses suffering from colic also showed clear changes in the size of the stomach, components, and wall thickness. Cases varied from moderate stomach expansion to severe stomach expansion and closed to the abdominal wall. The stomach also contained black, hypoechoic fluids to medium or high echogenic substances, consistent with the results mentioned (30).

From the results of the ultrasound examination of the stomach, there were black, hypoechoic contents, representing the accumulation of indigestible materials or large amounts of fluid or gastric secretions, which agree with Hoffmann *et al.* (27). Accumulation of a large quantity of ingesta may be due to a lack of gastric motility due to lesions in the stomach or intestine, such as ulcers, especially in racing horses, or infestation with worms (31-33). Horses drink large amounts of water after stress or exercise, especially in the summer, which leads to their sudden expansion, causing pressure on the nerve endings in the abdominal cavity and causing colic (34). As for the echogenic fluids, they represent inflammatory exudate in the stomach wall or inside the gastric lumen, or they may be indigestible lumpy materials such as sand, as horses eat sand in some neurological cases or in some cases of anemia (Pica) (32,35).

Some of the animals in this study suffered from various lesions in the small intestine, which were diagnosed using an ultrasound device, with Doherty (36) and Magalhães *et al.* (37), which represented the primary part of the intestine and the impaction of food materials in the duodenum and jejunum. Through the use of ultrasound waves, can be determined the contents of the intestine, whether they are liquids or foodstuffs, and knowing the speed of bowel movement or its cessation, the diameter of its lumen, or the thickness of the wall of the intestine, and thus the possibility of distinguishing between different cases of small intestinal injuries (12).

Hypoechoic material inside the intestinal lumen indicates the presence of bleeding or lack of absorption of liquid substances. In contrast, the thickness of the wall and

its containment of hypoechoic areas indicates the accumulation of inflammatory fluids and an increase in blood congestion in the intestinal wall. In contrast, inactivity and stasis of intestinal peristaltic movement occur due to inflammation, which affects bowel movement (25,38). Through observations of other cases, it was found that there was an enlargement of the duodenum or jejunum, containing echogenic materials, and the occurrence of impaction of food materials in the small intestine (39).

Ultrasound examination also showed, at other times, dilatation of the cecum and filling it with hypoechoic materials, which represent fluids, as in cases of cecal impaction, or contrastingly echogenic materials, which represent food materials (not properly digested) trapped inside the cecum, or in the form of gases, which appear in the form of typical white bands parallel to each other and to the abdominal wall, these results agree with others Sherlock and Eggleston (40) and Velloso *et al.* (41).

As for colon injuries, colon injuries in its various parts were diagnosed using ultrasound technology. There were several cases in which the colon expanded and closed to the abdominal wall while containing black hypoechoic fluids or in the form of a collection of echogenic gases in the form of strips parallel to the abdominal wall, and this is consistent with Biscoe *et al.* (42) and Williams *et al.* (43), this condition may occur as a result of eating large quantities of concentrated feed or those that are indigestible.

The results of measuring the distance between the abdominal wall and the intestine by ultrasound revealed a significant difference as the distance between the abdominal wall and the intestine increased. At the same time, there was no significant difference in the distance between the abdominal wall and the colon and the abdominal wall and the cecum. This is attributed to the increase in bowel movement and its displacement from its location in cases of colic, which is consistent with Constable *et al.* (13) and Fikri *et al.* (44). In contrast, no evident displacement of parts of the large intestine was observed, and this result agreed with Albanese et al. (3) and Fikri *et al.* (44) and Lv *et al.* (45) and Singh *et al.* (46). It was also observed that the thickness of the intestinal wall increased significantly in horses that suffered from colic. In contrast, no significant difference was observed in the thickness of the wall of the colon and cecum because the highest percentage of cases in this study was inflammation in the wall of the small intestine, which led to a thickening of the intestinal wall as a result of the Inflammatory process, which includes congestion, edema, and inflammatory cell infiltration, as this result agreed with Banse *et al.* (24) and Rezazadeh *et al.* (38) and Freeman and Grosche (47) and Grosche *et al.* (48) and Whitfield *et al.* (49).

The results of the present study agreed with other previous studies, as the results of the average thickness measurements of the small intestine using an ultrasound device on colic horses were significantly different when compared with the control group, as mentioned by Hostetter and Uzal (25) and Smith (30) and Conwell *et al.* (50) in cases of intestinal inflammation and dorsal colitis, there is a thickening of the intestinal wall thickness, especially in cases of acute intestinal inflammation, and the reason for this is due to inflammatory reactions, edema, hyperplasia, or tumors (24).

Conclusion

It has been proved that ultrasound, as a noninvasive tool with a high level of utility, safety, and accuracy, can be used by veterinarians for the early detection of equine colic and requires little training. Therefore, ultrasonography technique is considered suitable for enhancing the clinical diagnosis of colic in horses and accelerating the choice of medical or surgical treatment.

Acknowledgment

The author is grateful to the University of Mosul /College of Veterinary Medicine for all the facilities used to conduct this study.

Conflict of interest

There is no conflict of interest.

References

1. Kassa GF, Amenu K, Ayele B. Therapeutic trial on clinical cases of impactive and spasmodic colic in donkeys in Gondar, northwest Ethiopia. Iraqi J Vet Sci. 2021;35(4):795–802. DOI: 10.33899/ijvs.2021.127394.1501
2. Benia AR, Selles SM, Benamor N. Morphometric characterization of purebred Arabian horses for galop racing (Born and raised in Algeria). Iraqi J Vet Sci. 2022;36(4):959–66. DOI: 10.33899/ijvs.2022.132670.2120
3. Albanese V, Munsterman A, Klohnen A. Prevalence of gastric ulceration in horses with enterolithiasis compared with horses with simple large intestinal obstruction. Vet Sci. 2022;9(11):587. DOI: 10.3390/vetsci9110587
4. Bowden A, Burford JH, Brennan ML, England GW, Freeman SL. Horse owners' knowledge, and opinions on recognizing colic in the horse. Equine Vet J. 2020;52(2):262–7. DOI: 10.1111/evj.13173
5. Abdullah M, Almallah O, Al-Hiyalay SS, Salih N. Effect of feeding reed with the addition mixture of enzymes and probiotic on body weight change and some blood measurements in Awassi ewes. Mesopotamia J Agric. 2022;50(1):33–40. DOI: 10.33899/magrj.2022.132692.1157
6. Sabah F, Alrawy T, Ibrahim M. Effect of different levels of soybean meal in fattening farmer diet on Awassi lambs performance and carcass characteristics. Mesopotamia J Agric. 2021;49(2):26–35. DOI: 10.33899/magrj.2021.129963.1127
7. Khayoon TH, Abbas RJ, Abdullah FA. Effects of feeding various levels of postbiotics produced by lactic acid bacteria on growth performance, gastrointestinal microbiota count, and digestibility of some nutrients in broiler chickens. Mesopotamia J Agric. 2024;52(2). DOI: 10.33899/mja.2024.145531.132019
8. Mizory F, Altaee N. Evaluation the growth performance and feed utilization of *Cyprinus carpio* fed on moringa oleifera leaves floating

on water as supplemented diet. Mesopotamia J Agric. 2023;51(1):66–78. DOI: 10.33899/magrj.2023.137303.1210
9. Ali OJ. Immunolocalization of decorin, a small leucin-rich proteoglycan, in the normal and injured horse tendon. Iraqi J Vet Sci. 2021;35(3):465–71. DOI: 10.33899/ijvs.2020.127017.1436
10. Ata EB, Shaapan RM, Nasr S, Abdel-Shafy S. Role of evolutionary epidemiology in the determination of the risk factors associated with some equine viral diseases. Iraqi J Vet Sci. 2022;37(1):143–50. DOI: 10.33899/ijvs.2022.133433.2228
11. Busoni V, Busscher VD, Lopez D, Verwilghen D, Cassart D. Evaluation of a protocol for fast localised abdominal sonography of horses (FLASH) admitted for colic. Vet J. 2011;188(1):77–82. DOI: 10.1016/j.tvjl.2010.02.017
12. Corrie S, Chapman K, Schofield I, Mair TS. Preliminary study to evaluate the use of fast abdominal ultrasonography of horses with colic in first opinion ambulatory practice. Equine Vet Edu. 2024:13940. DOI: 10.1111/eve.13940
13. Constable PD, Hinchcliff KW, Done SH, Grünberg W. Veterinary medicine: A textbook of the diseases of cattle, horses, sheep, pigs, and goats. 11th ed. USA: Elsevier; 2017. DOI: 10.1016/B978-0-7020-5246-0.00027-9
14. Burrell KL, Burford JH, England GW, Freeman SL. UK horse owners and veterinary practitioners' experiences of decision-making for critical cases of colic. Equine Vet J. 2024:14124. DOI: 10.1111/evj.14124
15. Hasan ZH, Aliraqi OM, Abdul Majjed IO. Ultrasound image analysis for detection of fatty liver and grading its severity in buffaloes at Mosul, Iraq. Iraqi J Vet Sci. 2022;36(2):507–11. DOI: 10.33899/ijvs.2021.130666.1864
16. Naoman UT, Aliraqi OM, Hayawy EL, Albaqqal SM. Clinical and ultrasonographic findings in rams with scrotal enlargement. Iraqi J Vet Sci. 2022;36(I):47–53. DOI: 10.33899/ijvs.2022.135079.2443
17. Al-Ani AN, Yousif AA. Clinical and molecular study of *Babesia caballi* in racing horses in Baghdad. Iraqi J Vet Sci. 2024;38(2):477–83. DOI: 10.33899/ijvs.2023.142808.3199
18. Bird AR, Knowles EJ, Sherlock CE, Pearson GR, Mair TS. The clinical and pathological features of gastric impaction in twelve horses. Equine Vet J. 2012;44(S43):105–10. DOI: 10.12968/bjon.2009.18.18.44555
19. McGovern KF, Suthers JM, James FM, O'Meara BJ, Parker RA, Foote AK, Bladon BM. Gastric impaction associated with displacement and volvulus of the large colon in seven mature horses. Equine Vet Edu. 2015;27(9):453-9. DOI: 10.1111/eve.12396
20. Thomas IH, Dixon JJ, Fraser B. Surgical management of a proximal duodenal hawthorn impaction in a horse. Vet Rec Case Rep. 2018;6(1):e000589. DOI: 10.1136/vetreccr-2017-000589
21. Ross MW. Surgical diseases of the equine cecum. Vet Clin N Am Equine Pract. 1989;5(2):363–75. DOI: 10.1016/S0749-0739(17)30594-1
22. Aitken MR, Southwood LL, Ross BM, Ross MW. Outcome of surgical and medical management of cecal impaction in 150 horses (1991–2011). Vet Surg. 2015;44(5):540–6. DOI: 10.1111/j.1532-950X.2014.12286.x
23. Dart A, Hodgson D, Snyder J. Caecal disease in equids. Aust Vet J. 1997;75(8):552–7. DOI: 10.1111/j.1751-0813.1997.tb14191.x
24. Banse HE, Piero FD, Andrews FM, Garcia-Abarca N, Watanabe TN. Characterization of gastrointestinal inflammatory cell type in equine glandular gastric disease. Am J Vet Res. 2023;1:1–8. DOI: 10.2460/ajvr.23.06.0129
25. Hostetter JM, Uzal FA. Gastrointestinal biopsy in the horse: Overview of collection, interpretation, and applications. J Vet Diagn Invest. 2022;34(3):376–88. DOI: 10.1177/10406387221085584
26. Ross MW, Orsini JA, Ehnen SJ. Jejunocolic anastomosis for the surgical management of recurrent cecal impaction in a horse. Vet Surg. 1987;16(4):265–8. DOI: 10.1111/j.1532-950X.1987.tb00950.x
27. Hoffmann G, Rose-Meierhöfer S, Niemann B. Water demand of horses and water consumption in horse husbandry. Tierarztliche Umschau. 2009;64:438–42. [available at]
28. Kuhnke S, Zeitler-Feicht MH, Baumgartner M. Evaluation of appropriate water and roughage supply and potential causes of injuries in horse husbandry in Germany- A field study with BestTUPferd. Tech Univ Munich. 2021. DOI: 10.13140/RG.2.2.27493.93928
29. Fereig RM. A review on equine colic: Etiology, differential diagnosis, therapy, and prevention. Ger J Vet Res. 2023;3(4):1–12. DOI: 10.51585/gjvr.2023.4.0063
30. Smith PB. Large Animal Internal Medicine. USA: Elsevier; 2015. [available at]
31. Aldelami MK, Albadrani BA. Therapeutic efficacy of a mixture of ivermectin and closantel against gastrointestinal parasites in draft horses. Iraqi J Vet Sci. 2009;23(1):37–42. DOI: 10.33899/ijvs.2009.5681
32. Ferlini Agne G, May BE, Lovett A, Simon O, Steel C, Santos L, Guedes do Carmo L, Barbosa B, Werner LC, Daros RR, Somogyi AA. Horse grimace scale does not detect pain in horses with equine gastric ulcer syndrome. Animals. 2023;13(10):1623. DOI: 10.3390/ani13101623
33. Rezazadeh F, Gharehaghajlou Y. Endoscopic Finding of Gastric Ulcer in Rural Horse and Relation with *Gasterophilus spp.* Iran J Vet Med. 2020;14(1). [available at]
34. Alhindy MK, Borovkov S, Tymoshenko O. Marker changes in the blood lipidogram in the pathogenesis of some internal diseases of horses. Ukr J Vet Sci. 2024;15(1):9–23. DOI: 10.31548/veterinary1.2024.09
35. Müller CE. Dry matter concentration, particle size distribution, and sand presence in faeces from horses with and without colic. J Equine Vet Sci. 2024;139:105126. DOI: 10.1016/j.jevs.2024.105126
36. Doherty T. Anesthesia of horses with intestinal emergencies (Colic). In: Doherty T, Valverde A, Reed RA, editors. Manual of Equine Anesthesia and Analgesia. 1st ed. USA: Wiley; 2022. 494–500 p. DOI: 10.1002/9781119631316.ch32
37. Magalhães MT, Palmers K, De Cock H, Ribonnet C. Lymphocytic myenteric ganglionitis associated with equine herpesvirus infection: A cause of chronic intestinal pseudo-obstruction and recurrent colic in an adult horse. Equine Vet Edu. 2024;36(6). DOI: 10.1111/eve.13930
38. Ludwig EK, Hobbs KJ, McKinney-Aguirre CA, Gonzalez LM. Biomarkers of Intestinal Injury in Colic. Animals. 2023;13(2):227. DOI: 10.3390/ani13020227
39. Plummer AE, Rakestraw PC, Hardy J, Lee RM. Outcome of medical and surgical treatment of cecal impaction in horses: 114 cases (1994–2004). J Am Vet Med Assoc. 2007;231(9):1378–85. DOI: 10.2460/javma.231.9.1378
40. Sherlock CE, Eggleston RB. Clinical signs, treatment, and prognosis for horses with impaction of the cranial aspect of the base of the cecum: 7 cases (2000–2010). J Am Vet Med Assoc. 2013;243(11):1596– 601. DOI: 10.2460/javma243.11.1596
41. Velloso Alvarez A, Reid Hanson R, Schumacher J. Caecal impactions: Diagnosis, management and prognosis. Equine Vet Edu. 2021;33(7):376–85. DOI: 10.1111/eve.13317
42. Biscoe EW, Whitcomb MB, Vaughan B, Dechant JE, Magdesian KG. Clinical features and outcome in horses with severe large intestinal thickening diagnosed with transabdominal ultrasonography: 25 cases (2003–2010). J Am Vet Med Assoc. 2018;253(1):108–16. DOI: 10.2460/javma.253.1.108
43. Williams S, Cooper JD, Freeman SL. Evaluation of normal findings using a detailed and focused technique for transcutaneous abdominal ultrasonography in the horse. BMC Vet Res. 2014;10(S1): S5. DOI: 10.1186/1746-6148-10-S1-S5
44. Fikri F, Hendrawan D, Wicaksono AP, Purnomo A, Khairani S, Chhetri S, Maslamama ST, Purnama MT. Incidence, risk factors, and therapeutic management of equine colic in Lamongan, Indonesia. Vet World. 2023;16(7):1408. DOI: 10.14202/vetworld.2023.1408-1414
45. Lv S, Zhang Y, Zhang Z, Meng S, Pu Y, Liu X, Liu L, Ma Y, Liu W, Jiang L. Diversity In Intestinal Microorganisms Contributes To The Bodysize Difference In Chinese Horses And Ponies. Res Sq. 2021:1-7. DOI: 10.21203/rs.3.rs-871597/v1
46. Singh G, Sangwan V, Anand A, Khosa JS, Singh SS, Mohindroo J, Gupta K, Sethi RS. Evaluation of clinical, laboratory and ultrasonography variables as prognostic indicators in equine colic surgery. Indian J Anim Res. 2023;57(1):48-57. DOI: 10.18805/ijar.b-

تقييم المغص في الخيل باستخدام الموجات فوق الصوتية: التشخيص وتحديد الشدة

محمود خيري علي[١] و أسامة موفق العراقي[٢]

[١]ممارس أقدم، المستشفى البيطري في نينوى، [٢]فرع الطب الباطني والوقائي البيطري، كلية الطب البيطري، جامعة الموصل، الموصل، العراق

الخلاصة

يعد المغص في الخيول من الحالات المرضية الشائعة والتي قد تؤدي الى الموت إذا لم تشخص بشكل سريع، وتتطلب استخدام بعض الأجهزة مثل الموجات فوق الصوتية والتي تعد من الوسائل الدقيقة المعتمدة في التشخيص. شملت الدراسة فحص ٣٠ راس من الخيل والتي أظهرت علامات المغص و١٠ خيول سليمة سريريا عدو كمجوعة سيطرة وبأعمار أكثر من سنه ومن كلى الجنسين. تم إجراء الفحص بالأمواج فوق الصوتية من سبعة مواقع (٤ من اليسار و٣ من اليمين) على جدار البطن وبوضعية الوقوف. أشارت النتاج أن الخيول عانت من أسباب مختلفة لمتلازمة المغص. وكان التهاب الأمعاء الدقيقة هو أكثر تكرارا ٣٥%، تبعها انحشار الأعور، والمغص الغازي، والمغص التشنجي، وانحشار المعدة وبنسبة ٢٥، ٢٠، ١٢,٥، ٧,٥% على التوالي. أظهر الفحص بالأمواج فوق الصوتية أن معدل المسافة بين جدار البطن والأمعاء ٣٦,٢ ملم وقد ازداد معنويا في الخيول المصابة مقارنة مع الخيول السليمة، في حين لم يلاحظ أي فرق معنوي في المسافة بين جدار البطن والقولون، والأعور. فضلا عن الازدياد المعنوي في سمك جدار الأمعاء ٧,٣ ملم في الخيول المصابة مقارنة مع السليمة، بينما لم يوجد فرق معنوي في سمك جدار القولون، والأعور. أستنتج من هذه الدراسة أن استخدام الموجات فوق الصوتية كان طريقة سريرية وتشخيصه مناسبة وموثقة لتأكيد التشخيص السريري السريع للمغص.

4264

47. Freeman DE, Grosche A. Ischemia in equine intestine – mechanisms of injury and methods of treatment: Pferdeheilkunde. 2012;28(4):366–87. DOI: 10.21836/PEM20120402
48. Grosche A, Morton AJ, Graham AS, Sanchez LC, Blikslager AT, Polyak MM, Freeman DE. Ultrastructural changes in the equine colonic mucosa after ischaemia and reperfusion. Equine Vet J. 2011;43:8-15. DOI: 10.1111/j.2042-3306.2011.00402.x
49. Whitfield-Cargile CM, Chung HC, Coleman MC, Cohen ND, Chamoun-Emanuelli AM, Ivanov I, Goldsby JS, Davidson LA, Gaynanova I, Ni Y, Chapkin RS. Integrated analysis of gut metabolome, microbiome, and exfoliome data in an equine model of intestinal injury. Microbiome. 2024;12(1):74. DOI: 10.1186/s40168-024-01785-1
50. Conwell RC, Hillyer MH, Mair TS, Pirie RS, Clegg PD. Haemoperitoneum in horses: A retrospective review of 54 cases. Vet Rec. 2010;167(14):514–8. DOI: 10.1136/vr.c4569