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Equine Colic: Pathophysiology, Diagnosis, Treatment and Prevention – A Comprehensive Review

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ABSTRACT

Equine colic is a very common equine medical emergency case and, to this day, one of the principal causes of morbidity, mortality and economic loss in the equine industry globally. Colic is not a disease but pain in the abdomen, caused by a large number of gastrointestinal and sometimes non-gastrointestinal diseases. The condition is also affected by anatomical predisposition of the equine digestive tract, feeding habits, stress stations in management, parasitism, gut dysbiosis together with other environmental and physiological stimuli. It is an evidence-based review of the pathophysiology of the equine colic, particularly gastrointestinal anatomy and motility physiology, inflammation mechanisms, obstruction and strangulation, and cascaded systemic events that may result in serious colic events. Prevention methods of nutrition, access to water, dentistry, parasite containment and husbandry are critically assessed. It is hoped that this will make the veterinarians, researchers and equine management professionals have a comprehensive consolidated reference that helps to make informed decisions and further the research in the future.

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INTRODUCTION

Colic in horses is known to be one of the greatest equine health problems with a large percentage of emergency call in cases reports globally (Fereig 2023). The digestive physiology of horses enables them to effectively utilize fibrous roughage by fermenting the hindguts; it comes at the cost of making them vulnerable to gastrointestinal upsets which may develop into critical illnesses quickly. The general notion of the word colic is that of abdominal pain and may occur as a mere transient gas trap or as a severe obstruction that causes strangulation and must be removed through surgical procedures as soon as possible (Fereig 2023). Epidemiological research has shown that more than one in every ten horses will experience at least one colic episode in his lifetime with mortality of severe surgical cases reported as six to thirty percent based on the speed of intervention, underlying pathology and post operative complications (Curtis et al. 2019). Recovery horses can be returned to sport activity, though, certain ones are still susceptible to repeated attacks, which highlights the significance of elaborate preventive measures based on scientific findings (Campbell 2021).

The equine gut is elongated with a length of more than 30 meters and includes the stomach, small intestine, cecum, large colon, small colon and rectum (Mishra et al. 2021). Normal motility patterns under which feed moves are produced are very complex processes produced by the assembly of neural and hormonal systems (Kitazawa and Kaiya 2019). Unluckily, the anatomical structure makes horses prone to colic since they can neither vomit (have a tightly secular cardiac sphincter) nor they possess a long mobile large colon which can move or twist easily (Moss 2024). When the motility is not normal, there is a build-up of large volumes of feed and gas with these resulting in distention, ischemia, inflammation and pain (Bayne and

Edmondson 2020). Those horses which receive sudden diets, have limited access to water or have parasitic or stressful experiences in transportation are at a very high risk (Harvey et al. 2022). Colic thus is a convergence between host anatomy, physiology and management factors, and prevention in the event is therefore reliant on a proper management strategy of the three domains (Fereig 2023).

Timely diagnosis is crucial since the colic become more severe as time passes (Mair and Sherlock 2023). Non-acute manifestations with mild ones, i.e. pawing, observation of the flank, strain to urinate and low manure production, may be followed by severe ones, i.e. violent rolling, unbroken recumbency, tachycardia, swollen mucous membranes and uncontrolled pain (Fereig 2023).The effective clinical management is based on the early distinction between the simple cases of the medical colic and those conditions which presuppose surgical restoration (Freeman 2025). Increased diagnostic development in the last ten years has enhanced survival especially by use of ultrasonography and biochemical surveillance (Ortega-Ferrusola et al. 2022). Nevertheless, colic is one of the issues still to be thoroughly discussed on an academic scale and this review adds new knowledge to the scholarship to a slightly larger amount than standard summits.

Equine Colic Pathophysiology

The pathophysiology of colic cannot be understood without the understanding of the physiological processes that ensure that there is gastrointestinal motility, balance of microbes and passage of nutrients (O'Connell et al. 2025). In normal circumstances, feeds are received in the stomach where only a limited amount of enzyme digestion is carried out after which it is absorbed through the small intestine into which the amino acids, simple carbohydrates, lipids, vitamins and minerals are absorbed (Saha and Pathak 2021). Unfermented fiber is taken to the cecum and colon to be fermented by microbes that release volatile fatty acids as the energy source of horses (Muhonen et al. 2021). Distension, irritation and pain may occur as a result of any breakage in motility, fermentation or mucosal integrity (Pathan). Pathophysiological events vary between spasm induced, impaction induced, gas induced and strangulating colic, and each of the mechanisms will be outlined in succession below.

Spasmodic colic develops as a consequence of abnormal contraction of the intestinal smooth muscle, it is frequently caused by cold water intake, stress, change of diet or parasitism (Blikslager 2019). The pain, gases and transient obstruction are the results of increased intestinal motility and spasm (Camilleri 2021). It is mild in nature and is quite quick to respond to antispasmodic therapy, however a recurrence can be a sign of underlying parasitic larval movement of too little regulation of diet (Rendle et al. 2024). The excessive production of microbial gases leads to gas colic which is typically associated with the high-rate fermentation of high-starch feeds or lush pasture (Sandrini 2023). Due to fermentation imbalance, distension arises stimulating visceral pain receptors (Lucarini 2020). The horses are more vulnerable to those that do not get exercise or subjected to a change in weather with regards to eating habits (Ermers et al. 2023).

The colic caused by impaction is based on the presence of feed material in parts of the bowel, especially the pelvic flexure of the large colon with a sharp lumen (O'Connell et al. 2025). The major contributors are dehydration, inability to masticate as a result of dental disease, low water consumption during cold weather, high-fiber dry diets and insufficient exercise (Finno 2021). The ingesta becomes hard and dehydrated and obstructs passage and decreases motility (Raghavi and Karthik 2025). The development results in mucosal irritation, reduced perfusion and bacterial translocation under no treatment (Matara et al. 2022). The sand impaction in horses is seen on horses then grazing on sandy paddocks, and the planar particles are deposited in the ventral colon which leads to irritations, diarrhea, loss of weight and eventual blockage (Niinistö and Sykes 2022). Sand friction in the peritoneum is also a predisposing factor in inflammation of serosal lining (Loughrey 2024).

Strangulation colic is the most life-threatening, which entails the hampering of blood flow to intestinal sections (Tharwat and Al-Sobayil 2025). Torsions, volvulus, pedunculated lipomas and herniations in the inguinal canal or umbilical ring have the ability to convert mesenteric vessels, resulting to ischemia and necrosis within hours (Khosa 2018). Due to the hypoxia of the tissues, inflammatory mediators, endotoxin and free radicals are discharged leading to syndrome of systemic inflammatory response and endotoxic shock (Zhao et al. 2024). The heart failure occurs fast without surgical intervention (Faxen et al. 2020). The pain is normally intense and chronic despite the use of analgesics (Treede et al. 2019). Horses are characterized with high heart rate, congested mucous membranes, long capillary refill time and poor gut sound. Emergency surgical exploration is the only method of life-saving in such cases (Brookes et al. 2020).

A necrotizing colitis and enteritis are a part of inflammatory colic which can be caused by infectious organisms: *Salmonella* spp., *Clostridium difficile*, Potomac horse fever (*Neorickettsia risticii*), coronavirus or intestinal parasitism (Uzal et al. 2022). The when intestinal mucosa is damaged it becomes more permeable and endotoxins are absorbed into systemic circulation (Hollander and Kaunitz 2020). The dehydration, the hemoconcentration and electrolyte imbalance are as a result of the loss of fluid in the intestinal lumen (Islam 2025). Systemic endotoxemia can result in laminitis, coagulopathy and metabolic acidosis (Leise and Fugler 2021). The diagnosis of the inflammatory colic depends on the effective laboratory assessment and specific medical treatment, instead of solving the physical obstructions (Maaser et al. 2019).

The other significant pathophysiological area is the hindgut microbiome (Chaucheyras-Durand et al. 2022). Horses greatly depend on symbiotic bacteria to feed on cellulose and any disruptive effects of abrupt change in feed or overabundance of grain or antibiotics lead to dysbiosis (Wunderlich et al. 2023). Lactic acid production decreases pH kills fiber-fermenting microbes and enriches the pathogenic bacteria (Moss 2024). Production of gases increases but water is pulled into the lumen aggravating distension (Reddy et al.). Unattended dysbiosis-related colic will lead to enterocolitis and endotoxemia (Fereig 2023).

Having these basic processes in place, colic may be regarded as the spectrum of short-lived intestinal pain to fatal ischemic damage (Auer and Stick 2018). Early identification, identification and timely treatment is what counts as it only influences outcomes better than any other. Pathophysiology informs treatment in clinical practice where spasmodic colic, analgesia, impaction, and hydration and lubrication are used respectively and strangulation insists on surgery (da Silva 2022). Clinicians should reason in a mechanistic manner instead of in a symptomatic manner in order to avoid time-wasting, which lowers the chances of survival.

Diagnosis of Equine Colic

A clinically based diagnosis of colic in horses should be performed with the help of a complex of clinical observation, physical examination, diagnostic imaging, and laboratory analysis (Fereig 2023). The first examination is a scrupulous attitude of the horse, the acuity of the pain, feeding, fecal productions, access to pasture, and water consumption, recent transports, feed transformations, and exposure to stress (Leith et al. 2025). Other non-specific behavioral changes in the presence of many cases of colic include inappetence, stretching posture which might resemble urination attempts or slight flank watching (Fereig 2023). Cases of pacing, pawing, rolling or frequent falling and standing are frequent symptoms reported by their owners (Beale 2020). Horses can over sweat, produce muscle tremors and attain tachypnea with worsening colic (Chiavaccini and Duffee 2024). Of particular concern are the vital signs; with a heart rate of more than 60 beats per minute, the presence of congested mucous membranes, and a delay of capillary refill, the body is already circulatory limited and of concern, aortic obstruction could be strangulating or happen as the result of endotoxemia (Dawra 2019). GIS sounds could be hypermotile at onset of spasmodic colic but later on become reduced or disappear with the onset of obstruction (Tharwat and Al-Sobayil 2025). One of the best signs of a possible surgical lesion is the presence of pain that is not affected by conventional painkillers (Javaid et al. 2019).

The basics of a diagnostic practice are rectal examination (Wong et al. 2024). During palpation, the veterinarian checks the location of the intestines, intensity, the nature of the fecal material and existence of either impaction or displacement (Wong et al. 2024). Pelvic flexure, cecum, and small colon could easily be palpated and thus the severity of impaction could be classified (Hassel 2020). In torsion or displacement the abnormal positioning of the colon or gas-filled loops could be observed (Munsterman 2025). Despite being very informative, rectal examination runs the risk of rectal tear and has to be done very carefully, particularly in fractious horses or where the limitation of safe manipulation is intimacy on the intestine (Wong et al. 2024). A xylazine or detomidine sedation enhances relaxation and, as well, safety. To reduce trauma, they need to be lubricated and well restrained (Rabbogliatti 2020).

Nasogastric intubation is both a diagnostic and treatment measure (Gavet and Junot 2024). The high amounts of reflux are a strong indication of the presence of small intestinal obstruction or ileus (Bhattacharya et al. 2020). The reflux fluid is also assessed in terms of pH and odor and foul smelling or bloody content is a sign of strangulation (Tagesu 2018). During Gastric debridement by intubation, the Gastric rupture is avoided, and there is symptomatic improvement (Table 1) (Boeykens and Duysburgh 2021). In case of a low rate of reflux, water, electrolytes or mineral oil can also be taken through the tube as a therapeutic intervention process depending on the type of the case (Crabtree and Epstein 2021). Masculine horses with reflux of the stomach should never be given high fluid volumes orally since this would increase distension (Bäuerlein et al. 2019).

Abdominal ultrasonography is now among the most useful assets in the modern equine colic diagnostics (Tharwat and Al-Sobayil 2025). Intestinal wall thickness, peritoneal fluid accumulation, distension pattern and motility can be observed on portable ultrasonographic devices (Pérez et al. 2020). The thickening of intestinal loops is associated with inflammatory/ischemic involvement, whereas numerous distended loops are associated with small intestinal obstruction (SarioĞLu). Surgical exploration might be determined by the presence of hypoechoic serosal fluid or gas shadows (Lubner et al. 2021). Specifically ultrasonography proves useful in determining the large colon displacement, intussusception, as well as nephrosplenic entrapment and distinguishing their distended cecal gas patterns (Wong et al. 2024). The sonography of non-motile loops of small intestine in stacking usually means that there is a serious obstruction that needs to be examined (Bernard and Nicholson 2021).

Further diagnostic clarity is achieved with abdominocentesis or peritoneal tap (Boysen 2021). The sample is assessed on color, cell count, the protein level and abnormality of the material (Aliste-Fernández et al. 2020). The high level of protein or turbidity indicates inflammation or ischemia (Luo et al. 2025). A red-colored sample can result in hemoperitoneum or infected intestinal blood vessels (Gupta et al. 2024). A high level of lactate in the peritoneal fluid compared to the blood lactate is a good sign of ischemic damage (Taylor et al. 2020). The presence of bacteria or feed matter shows an intestinal rupture or dire necrosis; cases are associated with poor prognosis (Uzal et al. 2022).

Blood tests are significant in determining the status of hydration, metabolic stability and system involvement (Gomes et al. 2021). Estimate of oncotic balance in the plasma and dehydration severity is done by packed cell volume and total protein (Shah and Mandiga 2019). Systemic infection or endotoxemia may be reflected in inflammatory changes of leukogram, either neutropenia with band forms or fervent leukocytosis (Walton and Lawson 2021). Natremia, Chloromia and Potassium electrolyte imbalances are common in prolonged colic (Okafor et al. 2022). Blood gas analysis is able to identify metabolic acidosis which occurs during shock or diarrhea (Viterbo et al. 2023). Serum amyloid A and fibrinogen can be used to help track the process of inflammation (Sorić Hosman et al. 2021). Poor perfusion and endotoxin load make horses with severe cases of colic to have high heart rate, increase in the length of capillary refill time and cold extremities (Chiavaccini and Duffee 2024).

Table 1: Major risk factors and clinical manifestations of equine colic

Type of Colic	Main Cause / Risk Factor	Pathophysiology	Characteristic Clinical Signs	Diagnostic Findings	Treatment Approach	Prognosis & Notes	References
Spasmodic Colic	Sudden feed change, cold water intake, stress, parasitism	Hyper-motility and intestinal spasms causing transient obstruction and gas accumulation	Intermittent pain, pawing, rolling, gut sounds increased initially	Rectal exam normal/GI sounds hyperactive; no impaction	NSAIDs, antispasmodics, mild sedation, walking, warm water via NG tube	Excellent, usually resolves rapidly within hours	(Wong et al. 2024)
Gas Colic	High grain intake, lush pasture, sudden diet shift, dysbiosis	Rapid fermentation → gas distension → increased pressure and pain	Abdominal distension, flank watching, repeated rolling	Gas-distended colon on ultrasound/rectal palpation	Analgesics, controlled walking, NG tube decompression, fluids	Good if treated early; recurrent cases suggest diet correction	(O'Connell et al. 2025)
Impaction Colic	Poor-quality roughage, dehydration, dental issues, reduced exercise	Dry ingesta accumulates in pelvic flexure/small colon causing blockage	Reduced fecal output, mild-persistent pain, decreased gut sounds	Firm mass palpated rectally, minimal reflux	Oral fluids, mineral oil via NG tube, IV fluids, laxatives	Good in early cases; severe untreated cases may require surgery	(Leith and Englar 2025)
Sand Colic	Grazing on sandy turnout, feeding on ground	Sand accumulates in colon → irritation & obstruction	Diarrhea, weight loss, intermittent pain	Sand in feces test positive; abdominal 'sand sounds' on auscultation	Psyllium husk therapy, mineral oil, prevention via raised feeding	Good with early management; chronic cases require weekly psyllium	(Niinistö et al. 2019)
Strangulating Obstruction	Volvulus, torsion, pedunculated lipoma, herniation	Compromised blood supply → ischemia → necrosis → endotoxemia	Severe unrelenting pain, HR >60 bpm, toxic mucous membranes	High lactate, dark/red peritoneal fluid, distended loops on ultrasound	Emergency surgery mandatory	Guarded to poor, mortality high if delayed	(Fereig 2023)
Large Colon Volvulus	Broodmares post-parturition high risk	Colon twists >270° blocking blood flow	Rapid shock, severe pain, sweating, tachycardia	Markedly distended colon; ultrasonography strongly indicative	Immediate surgery essential	Survival highest with early correction (<3 hrs)	(Watrobska et al. 2024)
Enteritis/Colitis	Infections: Salmonella, Clostridium, Coronavirus; dietary insult	Inflammation → fluid loss → endotoxemia	Fever, diarrhea, depression, reduced gut motility	Increased WBC changes, thickened bowel walls on ultrasound	IV fluids, anti-endotoxin therapy, antibiotics when indicated	Variable prognosis: complications include laminitis	(Machado et al. 2025)
Intussusception	Heavy parasite load in younger horses	Intestinal segment telescopes inside another → obstruction	Moderate to severe pain, may wax and wane	'Target-like' structure on ultrasound	Surgical treatment often required	Fair if corrected early; risk of recurrence in young horses	(Barnes et al. 2024)
Nephrosplenic Entrapment	Displacement tendency in large colon	Large colon trapped over nephrosplenic ligament	Left-sided gas distension, variable pain	Rectal palpation confirms displacement	Medical rolling or surgery in refractory cases	Good if early; chronic repeaters common	(Dias 2021)
Gastric Ulcer Colic	High-grain diet, stress, NSAID overuse	Increased gastric acid → mucosal erosion	Reduced appetite, intermittent colic after meals	Gastroscopy confirms ulceration	Omeprazole, dietary modification	Excellent with treatment but recurrence possible	(Contreras-Aguilar et al. 2022)

There is clinical decision-making which is the synthesis of all findings. The mild cases usually respond to analgesia, hydration and supportive therapy, whereas severe cases with pain, abnormal peritoneal fluid, inexorable tachypnoea, the lack of gut motility or high-grade gastric reflux are leading to the demand of immediate surgical referrals (Silva 2022). The results of retrospective studies in developement of prognostic charts have indicated that a prior surgical intervention yields significant survival benefits (Jia et al. 2021). Horses being operated in less than six hours upon the onset of excessive pain record notably better results, when operated after 12 hours of experience, because the ischemic mucosa decays fast (Silva 2022). This is why the significance of the correct and timely diagnosis cannot be overestimated.

Medical Treatment of Equine Colic

The initial management of non-strangulating colic is medical and is expected to provide relief, rejuvenate motility, rehydrate ingesta and correct underlying

metabolic derangements (Tharwat and Al-Sobayil 2025). The basis of treatment is analgesia, and flunixin meglumine is employed as it possesses the strongest anti-inflammatory effect and the visceral one with a high analgesic effect (Lemonnier et al. 2022). Nevertheless, high dosages of analgesics can conceal the presence of pain in case of surgical lesions and thus give a misleading impression to the owners, which adds to delays in treatment (Kenne 2024). Xylazine and detomidine are short-term stature medications that use analgesia and allow examination and the attenuation of the stress-induced ileus (Kotwal 2022). Combination of Butorphanol with alpha-2 agonists can be used to achieve a better analgesic effect (Valverde and Skelding 2019).

The necessity of fluid therapy in the correction of dehydration and softening impacted feed is critical (Crabtree and Epstein 2021). Mild impactions can be treated with oral water and the electrolyte solution in case it is delivered through nasogastric tube (Dechant 2021). Non-planar laxatives can include mineral oil or dioctyl sodium sulfosuccinate, to lubricate ingesta and facilitate passage; mineral oil is visually traceable in manure and can be used to trace gastrointestinal passage (Niinistö). More extreme dehydration or systemic shock necessitates intravenous crystalloid solutions, e.g. isotonic saline or lactated Ringer. In critical cases, hypertonic saline can initially be used and then later the isotonic fluids can be used to maintain the plasma volume (Auckburally et al. 2019). Colloid therapy or plasma transfusion can be recommended in case of the low total protein level.

The ileus develops in some cases and therefore, motility modifiers are applied. Intestinal motility with Lidocaine infusion was demonstrated to enhance intestinal motility through the reduction of sympathetic tone, inflammation and pain signaling (Mazzotta et al. 2020). Prokinetics like proton pump inhibitors like metoclopramide could be considered but should be carefully used because it could cause excitatory side effects. Gas colic in horses is treated by controlled walking that stimulates the movement of the gut, and this promotes the expulsion of gases. The initial treatment is without feed but limited portions of forage are slowly reintroduced when motility returns and pain is alleviated (Fereig 2023).

Deworming is needed to treat parasitic colic according to the number of fecal eggs. Acute mass slaughter in strongyles can aggravate inflammations, and hence close monitoring in the veterinarian practice is imperative (Rendle et al. 2019). Inflammatory or infectious colitis in horses should be treated using aggressive fluid replacement, anti-endotoxin treatment with polymyxin B and bio-sponge or activated charcoal to sequester bacterial toxins. The spectra of antimicrobials are wide-range antimicrobials in case of a possible systemic infection. Stomach ulcers can be combined with colic and require the application of omeprazole (Kuve 2023).

Not all horses recover unaffected by surgery even with intensive medical care. Red flags in order to perform surgery are increasing pain, regardless of analgesics, tachycardia, abnormal peritoneal fluid, chronic intestinal distension on ultrasound, or rectal evacuation in favour of displacement or strangulation (Silva 2022). Veterinarians have to speak straight to owners about making decisions with time issues because, the longer the period of ischemia, the lower the chances of survival. Numerous works emphasize the significance of referral within hours and not days in surgical cases because necrosis develops very fast in case of suboptimal blood circulation (Burrell et al. 2024).

Equine colic: Surgical Management.

Strangulating obstructions, large colon volvulus, severe displacements, enterolith obstruction and cases that fail to respond to medical treatment are a definite subject of surgery Strangulating obstructions, large colon volvulus, severe displacements, enterolith obstruction and cases that fail to respond to medical treatment are a definite subject of surgery (Erwin et al. 2022).The surgeon systematically inspects the gastrointestinal system in order to find the lesion. When the colon is volvulated or displaced, it is reoriented to achieve normal geometry. In case of present ischemia, which is reversible, resection needs not be performed; but in case of necrotic portions of the case they must be reselected and anastomosed. Small intestinal surgery is more associated with more complication and adhesion-risk than large colon surgery (Yao et al. 2025).

Volvulus of large colon is a frequent surgical emergency in broodmares especially after delivery (Broyles et al. 2018). Severe abdominal pain that immediately ensues, a high rate of heart and shock are common phenomena. Early correction within the surgical room is necessary before it is too late and ischemia is irreversible. Older horses tend to have pedunculated lipomas, and these are tumors of fatty tissues that envelop mesenteric stalks that encircle intestines, choking the blood supply. Lipoma removal with intestine resection of devastated intestine is needed (de Souza et al. 2020). The colon becomes displaced by the nephrosplenic ligament in nephrosplenic entrapment, trapped by the neck, some cases can be corrected by rolling the colon under maintenance anesthesia, although recurrence can still occur (Dias 2021).

It is also very important with postoperative management. Horses need high care which would entail intravenous fluids, analgesia, anti-inflammatory treatment, antibiotics and gradual reintroduction of feed (Silva 2022). Ileus is a frequent after surgical condition, which is defined by persistent intestinal stasis and gastrointestinal reflux. Its frequency is decreased by the use of lidocaine infusion and early mobilization (Lisowski et al. 2018). The slow restoration to normal feeding starts with small regular forage meals, and surveillance of the recurrence of pain. The postoperative prognosis depends on the type of lesion, the length of strangulation and complication after surgery. Colon volvulus, which is small in size, treated early and resected is a relatively well-prognosed condition, and the strangled small intestine that has experienced extended ischemia is a poorly prognosed condition (Lisowski et al. 2018). Having gone out of athletic use, many horses regain their activity how soon as they recover, but an adhesion by which they are liable to colic periodically.

Prevention of Equine Colic

The study of the elimination of equine colic is a complex issue that must involve nutritional care, environmental permanence, regular health care and close monitoring of

specific individual risk factors (Fiedler et al. 2025). Since colic is a result of a complex of physiological processes in the gastrointestinal tract and external factors, preventive methods are aimed at reducing the negative effects on the normal functioning of the digestive system and increasing the overall wellbeing of the equines (Fereig 2023). One of the major elements of prevention is diet uniformity. Abrupt alterations in type feed, amount or time of feeding have a close relationship with colic episodes. Studies always show that horses that are used to stable diet finishaged to forage diets have lower chance of developing hindgut fermentation disturbances (Fernandes et al. 2021). Diets high in high-quality forage will encourage lifelong chewing, secretion of saliva and ideal fermentation of fiber, creating a healthier microbial environment in the cecum and the colon (Gordon and Prins 2023). Even though performance horses may need grains and concentrated feeds, this should be done over the course of days to weeks to enable adaptation of the gut microbiome and prevent the performance horses to ferment too rapidly forming excess gas and lactic acid build-up (Mishra et al. 2021).

Another important issue is water intake. Dehydration reduces the gastrointestinal motility and forms part of the feed dehydration in the colon predisposing horses to impactions (Velloso Alvarez et al. 2021). The equine management practices should not ignore the fact that horses need clean and fresh water at all time, particularly on hot weather, when horses are experiencing heavy workload or when they are fed on high fiber diets (Kenny et al. 2025). Managers of farms need to keep an eye on water troughs often, they should not be frozen during winter, and they must not lack capacity to serve enough troughs to avoid competition with fellow herd mates. There are those that drink less and such people can be influenced by things like providing water in several points, putting water additives that have a flavor when used with veterinary advice or given the supplements of electrolytes when the workload becomes heavier like promoting the urge to drink water.

Dental care is also vital in preventing colic when performed on a routine basis. Sharp points and skull wear which cause dental abnormality reduce the efficiency of mastication leading to the larger feed particles to get into the gastrointestinal system (Fereig 2023). Higher particle size reduces transport velocity and accelerates impaction potential especially at anatomical structures with a narrowing such as pelvic flexure. Periodic visits to an equine dental professional or a veterinarian will ensure that the teeth are evenly set so that they are capable of efficient chevage and the chances of impaction colic are minimized.

Another aspect of prevention underlying is parasite control. Routine deworming used to be a practice in the past that was not done individually. Modern results advocate fecal egg count as a guide to targeted deworming and hence lessens parasitic loads and consequently limits unproductive anthelmintic use leading to resistance. The strongyle stages of such species, in particular Strongyles vulgaris, are known to be carried by mesenteric arteries and are known to devastate viscosity and thrombosis, which cause severe colic with halted intestinal blood vessels. With effective deworming of livestock on the basis of evidence-based deworming regimes, and with pasture management aimed at maintaining abacus of parasite activity through frequent manure picking and other practices, the prevalence of parasite-related colic may be significantly decreased (Kumar).

Colic risk is also affected by exercise and stable management. Horses that are confined to more time in stables with less turnover have sluggish gastrointestinal motility than when free-grazing or excavating. Even though the amount of people who turn up is occasionally restricted due to safety and weather conditions, having horses free to enter and exit the paddocks at regular intervals stimulate movement and favorable peristalsis. The exercise programs must be arranged in such a manner that the workload is balanced by sufficient rest and feeding, vigorous exercise just after feeding could result in interruption of blood flow to the gastrointestinal tract and motility disorders. Moreover, transportation, competition travel and shift in social order in a herd may stress the catecholamine release, modify the intestinal movement and predispose to colic. These effects can be reduced by strategic planning in order to reduce stress, regularity in the course of traveling and also feed and comfort cues that are familiar (Bhatt et al. 2021).

Close observation of individual horses to observe subtle behavioral changes, changes in appetite, and fecal output and water intake will improve early awareness of precipitating factors in colic (Fereig 2023). Teaching caregivers to watch and learn to look at the first symptoms of discomposure and report the aberration of normal pattern would then lead to early measures that can be taken before the full-blown colic sets in. Furthermore, proper records of feed modifications, medical care, traveling and environmental pressures also facilitate detection of trends that may predispose particular individuals to repeat colic so that individual preventive measures may be taken.

Taken together, the combination of these actions into everyday management minimizes the occurrence and frequency of colic cases within the equine populations. The preventive strategies must be specific to a given environment, workload and individual risk profile of each of the horses, and they must consider the possibility that what prevents colic in one management system might have to be adjusted within another. The idea of management consistency and early intervention in the prevention of colic is getting more and more grounded, thus confirming that the proactive husbandry is especially vital compared to the reactive one in the case of abdominal pain (Fereig 2023).

Conclusion

Equine colic has continued to be one of the most difficult problems among horse owners, veterinarians and equine researchers. Nevertheless, in spite of the remarkable progress made in the field of diagnostic imaging, surgical procedures and evidence-based interpretation of preventive care, colic remains a significant part of emergency veterinary care and causes the morbidity and mortality of the equine population globally. Colic is a very broad term that refers not to a disease process but rather to a continuum of abdominal pain syndromes, with pathophysiological processes involving the simplest forms

of abdominal motility breakdown to an anaesthetic strangulation and ischemic injuries. The anatomical and physiological peculiarities of the equine gastrointestinal system predetermine the occurrence of colic in this animal species, which, in its turn, is enhanced by a sudden change in diet, dehydration, parasitism and stress as well as inappropriate management practices. Diagnostic patients with colic are based on close evaluation of the behavioral manifestations, vital data, the results of palpation of the rectum, ultrasonic images and laboratory results. The diagnostic tools allow the clinician to distinguish between those cases that can be treated through medical treatment and those that need surgical treatment. Medicine aims at relieving pain, intravascular volume replacement, electrolyte and dysmotility repair by fluid therapy, analgesics, motility modifier and supportive care.

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REFERENCES

Aliste-Fernández M, San-José P and Aguadero V, 2020. White blood cell count and total protein concentration to predict the absence of microcrystals in synovial fluid. Clinical Biochemistry 83: 81-85.

Auckburally A, Petruccione I and Voss S, 2019. Providing fluid therapy to equine colic patients. Part 1. In Practice 41(9): 445-454.

Auer JA and Stick JA, 2018. Equine surgery-e-book: Equine surgery-e-book. Elsevier Health Sciences.

Barnes H, Wilkinson S, Gillen A and Stack JD, 2024. Colon resection and anastomosis as treatment of an idiopathic colo-colic intussusception in an adult horse. Equine Veterinary Education 36(2): e44-e49.

Bäuerlein V, Vervuert I and Venner M, 2019. Chronic gastric dilatation in horses: Diagnosis, treatment and feeding management–a survey of 20 clinical cases. Pferdeheilkunde 35(2): 129-137.

Bayne JE and Edmondson MA, 2020. Diseases of the gastrointestinal system [image]. Sheep, goat, and cervid medicine: 63.

Beale S, 2020. Keeping horses barefoot: A shared accomplishment. The University of Liverpool (United Kingdom).

Bernard R and Nicholson M, 2021. Bacterial infections of the small and large intestine. Textbook of Pediatric Gastroenterology, Hepatology and Nutrition: A Comprehensive Guide to Practice: 203-218.

Bhatt N, Singh NP, Mishra AK, Kandpal D and Jamwal S, 2021. A detailed review of transportation stress in livestock and its management techniques. International Journal of Livestock Research 11(1): 30-41.

Bhattacharya R, Hwang JH and Ko C, 2020. The patient with ileus or obstruction. Yamada's Handbook of Gastroenterology: 79.

Blikslager AT, 2019. Colic prevention to avoid colic surgery: A surgeon's perspective. Journal of equine veterinary science 76: 1-5.

Boeykens K and Duysburgh I, 2021. Prevention and management of major complications in percutaneous endoscopic gastrostomy. BMJ Open Gastroenterology 8(1)

Boysen SR, 2021. Pocus: Ultrasound-guided procedures–abdominocentesis, thoracocentesis, and pericardiocentesis. Point-of-Care Ultrasound Techniques for the Small Animal Practitioner: 883-905.

Brookes A, Chan Y-C, Fish R, Foo FJ, Hogan A, Konig T, Lowery A, Selvasekar CR, Seow CS and Shelat VG, 2020. Emergency surgery, Cracking the intercollegiate general surgery frcs viva 2e. CRC Press.pp: 317-414

Broyles AH, Hopper SA, Woodie JB and Ruggles AJ, 2018. Clinical outcomes after colopexy through left ventral paramedian incision in 156 thoroughbred broodmares with large colon disorders (1999-2015). Veterinary Surgery 47(4): 490-498.

Burrell KL, Burford JH, England GCW and Freeman SL, 2024. Uk horse owners and veterinary practitioners' experiences of decision-making for critical cases of colic. Equine veterinary journal 56(6): 1216-1228.

Camilleri M, 2021. Gastrointestinal motility disorders in neurologic disease. The Journal of clinical investigation 131(4)

Campbell MLH, 2021. An ethical framework for the use of horses in competitive sport: Theory and function. Animals 11(6): 1725.

Chaucheyras-Durand F, Sacy A, Karges K and Apper E, 2022. Gastro-intestinal microbiota in equines and its role in health and disease: The black box opens. Microorganisms 10(12): 2517.

Chiavaccini L and Duffee LR, 2024. Horses with colic. Veterinary Anesthesia and Analgesia: The Sixth Edition of Lumb and Jones: 1217-1234.

Contreras-Aguilar MD, Rubio CP, González-Arostegui LG, Martín-Cuervo M, Cerón JJ, Ayala I, Henriksen I-MH, Jacobsen S and Hansen S, 2022. Changes in oxidative status biomarkers in saliva and serum in the equine gastric

ulcer syndrome and colic of intestinal aetiology: A pilot study. Animals 12(5): 667.

Crabtree NE and Epstein KL, 2021. Current concepts in fluid therapy in horses. Frontiers in Veterinary Science 8: 648774.

Curtis L, Burford JH, England GCW and Freeman SL, 2019. Risk factors for acute abdominal pain (colic) in the adult horse: A scoping review of risk factors, and a systematic review of the effect of management-related changes. PLoS one 14(7): e0219307.

da Silva PVA, 2022. Equine medicine and surgery.

Dawra HK, 2019. Epidemiological studies on common equine diseases in punjab.

de Souza RP, Rafael LA, Mousquer MA, Müller V, Ávila PAO, Nogueira DM, da Rosa Curcio B and Nogueira CEW, 2020. Small intestine strangulating obstruction by mesenteric pedunculated lipoma in a criollo mare. Acta Scientiae Veterinariae 48

Dechant JE, 2021. Complications of nasogastric intubation. Complications in equine surgery: 29-35.

Dias ABM, 2021. Recurrent nephrosplenic entrapment: A review of cases, shorterm and longterm outcome after laparoscopic nephrosplenic space closure with barbed knotless suture in horses. PQDT-Global

Ermers C, McGilchrist N, Fenner K, Wilson B and McGreevy P, 2023. The fibre requirements of horses and the consequences and causes of failure to meet them. Animals 13(8): 1414.

Erwin SJ, Clark ME, Dechant JE, Aitken MR, Hassel DM, Blikslager AT and Ziegler AL, 2022. Multi-institutional retrospective case-control study evaluating clinical outcomes of foals with small intestinal strangulating obstruction: 2000–2020. Animals 12(11): 1374.

Faxen UL, Hallqvist L, Benson L, Schrage B, Lund LH and Bell M, 2020. Heart failure in patients undergoing elective and emergency noncardiac surgery: Still a poorly addressed risk factor. Journal of Cardiac Failure 26(12): 1034-1042.

Fereig RM, 2023. A review on equine colic: Etiology, differential diagnosis, therapy, and prevention. Ger J Vet Res 3(4): 1-12.

Fernandes KA, Rogers CW, Gee EK, Kittelmann S, Bolwell CF, Bermingham EN, Biggs PJ and Thomas DG, 2021. Resilience of faecal microbiota in stabled thoroughbred horses following abrupt dietary transition between freshly cut pasture and three forage-based diets. Animals 11(9): 2611.

Fiedler JM, Rosanowski S, Ayre ML and Slater JD, 2025. Horse activity participants' perceptions about practices undertaken at activity venues, and horse welfare and wellbeing. Animals 15(15): 2182.

Finno CJ, 2021. Nutritional aspects of. Equine Nutrition, An Issue of Veterinary Clinics of North America: Equine Practice 37(1): 43.

Freeman DE, 2025. Colic surgery in the horse. John Wiley & Sons.

Gavet M and Junot S, 2024. Traumatic nasogastric intubation as a suspected cause of laryngeal obstruction in a horse recovering from emergency laparotomy. Veterinary Record Case Reports 12(3): e922.

Gomes CLN, Alves AM, Ribeiro Filho JD, Moraes Júnior FJ, Barreto Júnior RA, Fucuta RS, Ribeiro BM and Miranda LM, 2021. Physiological and biochemical responses and hydration status in equines after two barrel racing courses. Pesquisa Veterinária Brasileira 40: 992-1001.

Gordon IJ and Prins HHT, 2023. Forage consumption and digestion in the modern equids, The equids: A suite of splendid species. Springer.pp: 143-170

Gupta R, Bhandari A and Navarro OM, 2024. Pediatric vascular anomalies: A clinical and radiological perspective. Indian Journal of Radiology and Imaging 34(01): 103-127.

Harvey AM, Ramp D and Mellor DJ, 2022. Review of the foundational knowledge required for assessing horse welfare. Animals 12(23): 3385.

Hassel DM, 2020. How to safely and effectively perform abdominal palpation per rectum.

Hollander D and Kaunitz JD, 2020. The "leaky gut": Tight junctions but loose associations? Digestive diseases and sciences 65(5): 1277-1287.

Islam S, 2025. Studies of intestinal water and electrolyte transport during dehydration, malnutrition and infection.

Javaid MK, Boyce A, Appelman-Dijkstra N, Ong J, Defabianis P, Offiah A, Arundel P, Shaw N, Pos VD and Underhil A, 2019. Best practice management guidelines for fibrous dysplasia/mccune-albright syndrome: A consensus statement from the fd/mas international consortium. Orphanet journal of rare diseases 14(1): 139.

Jia Z, Yan Y, Wang J, Yang H, Zhan H, Chen Q, He Y, Huang C and Hu Y, 2021. Development and validation of prognostic nomogram in ependymoma: A retrospective analysis of the seer database. Cancer medicine 10(17): 6140-6148.

Kenne S, 2024. Effect of pre-emptive intra-articular analgesia on recovery, postoperative pain and serum amyloid a in horses undergoing arthroscopy. SLU, Dept. of Anatomy, Physiology and Biochemistry (until 231231).

Kenny LB, Westendorf M and Williams C, 2025. Managing manure, erosion, and water quality in and around horse pastures, Horse pasture management. Elsevier.pp: 277-295

Khosa JS, 2018. Studies on surgical management of equine colic vis-à-vis oxidative stress and inflammatory mediators.

Kitazawa T and Kaiya H, 2019. Regulation of gastrointestinal motility by motilin and ghrelin in vertebrates. Frontiers in endocrinology 10: 278.

Kotwal V, 2022. Analgesic efficacy of peri-operative lignocaine in cattle undergoing intestinal surgery.

Kumar S, Prevention and control from parasitic infestation. Handbook of Common Cattle Diseases & Breeding Management: 16.

Kuve SA, 2023. Screening for carriage and antimicrobial resistance of helicobacterpylori, escherichia coli and klebsiella species among patients presenting with gastritis in kibera and dagoretti areas in nairobi, kenya.

Leise BS and Fugler LA, 2021. Laminitis updates: Sepsis/systemic inflammatory response syndrome–associated laminitis. Veterinary Clinics: Equine Practice 37(3): 639-656.

Leith G, Eaton S, Englar RE, Bentley S and Hallam L, 2025. Performing the large animal physical examination. John Wiley & Sons.

Leith G and Englar RE, 2025. Examining the alimentary tract of the equine patient. Performing the Large Animal Physical Examination: 173-202.

Lemonnier LC, Thorin C, Meurice A, Dubus A, Touzot-Jourde G, Couroucé A and Leroux AA, 2022. Comparison of flunixin meglumine, meloxicam and ketoprofen on mild visceral post-operative pain in horses. Animals 12(4): 526.

Lisowski ZM, Pirie RS, Blikslager AT, Lefebvre D, Hume DA and Hudson NPH, 2018. An update on equine post-operative ileus: Definitions, pathophysiology and management. Equine veterinary journal 50(3): 292-303.

Loughrey MB, 2024. Inflammatory disorders of the peritoneum. Morson and Dawson's Gastrointestinal Pathology: 1057-1071.

Lubner MG, Mankowski Gettle L, Kim DH, Ziemlewicz TJ, Dahiya N and Pickhardt P, 2021. Diagnostic and procedural intraoperative ultrasound: Technique, tips and tricks for optimizing results. The British journal of radiology 94(1121): 20201406.

Lucarini E, 2020. Study of post-inflammatory visceral hypersensitivity mechanisms and innovative treatments:

Evidence of adenosine a3 receptor agonists efficacy and microbiota relevance in abdominal pain persistence.

Luo Q, Li Z, Sun W, Wang G, Yao H, Wang G, Liu B and Ding J, 2025. Myocardia-injected synergistically anti-apoptotic and anti-inflammatory poly (amino acid) hydrogel relieves ischemia-reperfusion injury. Advanced Materials 37(11): 2420171.

Maaser C, Sturm A, Vavricka SR, Kucharzik T, Fiorino G, Annese V, Calabrese E, Baumgart DC, Bettenworth D and Borralho Nunes P, 2019. Ecco-esgar guideline for diagnostic assessment in ibd part 1: Initial diagnosis, monitoring of known ibd, detection of complications. Journal of Crohn's and Colitis 13(2): 144-164K.

Machado RC, Teixeira CF and Carvalho HD, 2025. Eosinophilic and lymphoplasmacytic enteritis in a horse-case report. Arquivo Brasileiro de Medicina Veterinária e Zootecnia 77(3): e13347.

Mair T and Sherlock C, 2023. Recurrent colic: Diagnosis, management, and expectations. Veterinary Clinics: Equine Practice 39(2): 399-417.

Matara D-I, Pouliakis A, Xanthos T, Sokou R, Kafalidis G, Iliodromiti Z, Boutsikou T, Iacovidou N and Salakos C, 2022. Microbial translocation and perinatal asphyxia/hypoxia: A systematic review. Diagnostics 12(1): 214.

Mazzotta E, Villalobos-Hernandez EC, Fiorda-Diaz J, Harzman A and Christofi FL, 2020. Postoperative ileus and postoperative gastrointestinal tract dysfunction: Pathogenic mechanisms and novel treatment strategies beyond colorectal enhanced recovery after surgery protocols. Frontiers in pharmacology 11: 583422.

Mishra DB, Singh P, Bhalakiya N, Kumar G and Yadav DK, 2021. Chapter-10 equine digestive system. Emerging Trends in Applied Research 45: 133.

Moss CD, 2024. Gene expression analysis before and after the pelvic flexure in the equine hindgut.

Muhonen S, Sadet-Bourgeteau S and Julliand V, 2021. Effects of differences in fibre composition and maturity of forage-based diets on the microbial ecosystem and its activity in equine caecum and colon digesta and faeces. Animals 11(8): 2337.

Munsterman A, 2025. Lefts and rights: Medical management of colonic displacements. Dvm360storage. com

Niinistö K, Naturally occurring large colon sand accumulations and their medical treatment in.

Niinistö K and Sykes BW, 2022. Diagnosis and management of sand enteropathy in the horse. Equine Veterinary Education 34(11): 600-606.

Niinistö KE, Määttä MA, Ruohoniemi MO, Paulaniemi M and Raekallio MR, 2019. Owner-reported clinical signs and management-related factors in horses radiographed for intestinal sand accumulation. Journal of equine veterinary science 80: 10-15.

O'Connell SM, Rodríguez MA and Karim AN, 2025. Dietary risk factors and management strategies for equine colic: A comprehensive review. Emerging Frontiers Library for The American Journal of Veterinary Sciences and Wildlife Discovery 7(8): 1-14.

Okafor HC, Ikpeama OJ, Okafor JN and Okafor RI, 2022. Paralytic ileus secondary to electrolyte imbalance: A case study in a 16 year old female. The Korean Journal of Food & Health Convergence (KJFHC) 8(1): 17-20.

Ortega-Ferrusola C, Gómez-Arrones V, Martín-Cano FE, Gil MC, Peña FJ, Gaitskell-Phillips G and Da Silva-Álvarez E, 2022. Advances in the ultrasound diagnosis in equine reproductive medicine: New approaches. Reproduction in Domestic Animals 57: 34-44.

Pathan MM, Basics of physiological disorders or dysfunctions, Fundamentals of veterinary pathophysiology. CRC Press.pp: 85-92

Pérez MJM, García EB and Bonilla JAM, 2020. Bowel ultrasound: Examination techniques and normal and pathologic patterns. Radiología (English Edition) 62(6): 517-527.

Rabbogliatti V, 2020. From recumbency to standing: Improving diagnostic imaging quality trough the evolution of equine anaesthetic protocols.

Raghavi DN and Karthik P, 2025. 11 clinical physiology of digestive. Fundamentals of Veterinary Pathophysiology: 103.

Reddy BS, Sivajothi S, Raghavi DN and Karthik P, Clinical physiology of digestive disorders in ruminants, Fundamentals of veterinary pathophysiology. CRC Press.pp: 103-118

Rendle D, Austin C, Bowen M, Cameron I, Furtado T, Hodgkinson J, McGorum B and Matthews J, 2019. Equine de-worming: A consensus on current best practice. UK-Vet Equine 3(Sup1): 1-14.

Rendle D, Hughes K, Bowen M, Bull K, Cameron I, Furtado T, Peachey L, Sharpe L and Hodgkinson J, 2024. Beva primary care clinical guidelines: Equine parasite control. Equine Veterinary Journal 56(3): 392-423.

Saha SK and Pathak NN, 2021. Digestion, absorption and metabolism of nutrients, Fundamentals of animal nutrition. Springer.pp: 219-246

Sandrini S, 2023. New perspectives in livestock nutrition to improve health and performance.

SarioĞLu O, Imaging of inflammatory abdominal pathologies. Prof. Dr. Bedriye Tunçsiper Prof. Dr. Berna Dirim Mete: 421.

Shah MM and Mandiga P, 2019. Physiology, plasma osmolality and oncotic pressure.

Silva PVAd, 2022. Equine medicine and surgery.

Sorić Hosman I, Kos I and Lamot L, 2021. Serum amyloid a in inflammatory rheumatic diseases: A compendious review of a renowned biomarker. Frontiers in Immunology 11: 631299.

Tagesu A, 2018. Regional or systematic clinical examination. Int J Vet Sci Res s1: 014-023.

Taylor J, Mandzhieva B and Shobar R, 2020. Diagnosis of acute mesenteric ischemia in a patient with end-stage renal disease with normal serum lactate. Cureus 12(1)

Tharwat M and Al-Sobayil F, 2025. Equine colic: A comprehensive overview of the sonographic evaluation, diagnostic criteria, and management of different categories. Open Veterinary Journal 15(3): 1116.

Treede R-D, Rief W, Barke A, Aziz Q, Bennett MI, Benoliel R, Cohen M, Evers S, Finnerup NB and First MB, 2019. Chronic pain as a symptom or a disease: The iasp classification of chronic pain for the international classification of diseases (icd-11). pain 160(1): 19-27.

Uzal FA, Arroyo LG, Navarro MA, Gomez DE, Asín J and Henderson E, 2022. Bacterial and viral enterocolitis in horses: A review. Journal of Veterinary Diagnostic Investigation 34(3): 354-375.

Valverde A and Skelding AM, 2019. Alternatives to opioid analgesia in small animal anesthesia: Alpha-2 agonists. Veterinary Clinics: Small Animal Practice 49(6): 1013-1027.

Velloso Alvarez A, Reid Hanson R and Schumacher J, 2021. Caecal impactions: Diagnosis, management and prognosis. Equine Veterinary Education 33(7): 376-385.

Viterbo L, Hughes J, Milner PI and Bardell D, 2023. Arterial blood gas, electrolyte and acid-base values as diagnostic and prognostic indicators in equine colic. Animals 13(20): 3241.

Walton RM and Lawson CA, 2021. Equine hematology. Equine hematology, cytology, and Clinical Chemistry: 9-26.

Watrobska N, Gough R, Hallowell G, Haugaard S and McGovern KF, 2024. Factors associated with development

of post-operative reflux in horses with large colon volvulus and association with complications and outcomes. Equine Veterinary Journal 56(6): 1155-1161.

Wong D, Sprayberry KA, Schaefer E, Colmer S, Bills KW, Dunkel B, Blikslager A, Erwin S, Ziegler A and Moore J, 2024. Examination of the digestive tract. Equine Neonatal Medicine: 351-420.

Wunderlich G, Bull M, Ross T, Rose M and Chapman B, 2023. Understanding the microbial fibre degrading communities & processes in the equine gut. Animal microbiome 5(1): 3.

Yao Z, Shang W, Yang F, Tian W, Zhao G, Xu X, Zhao R, Tian T, Li W and Huang M, 2025. Nomogram for predicting severe abdominal adhesions prior to definitive surgery in patients with anastomotic fistula post-small intestine resection: A cohort study. International Journal of Surgery 111(2): 2046-2054.

Zhao X, Wang M, Zhang Y, Zhang Y, Tang H, Yue H, Zhang L and Song D, 2024. Macrophages in the inflammatory response to endotoxic shock. Immunity, inflammation and disease 12(10): e70027.