Editorial

**Equine colic: putting the puzzle together**

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Equine colic remains one of the most common causes of mortality in domesticated horses and is a condition that horse owners recognise as being potentially life-threatening (Leblond and others 2000, Mellor and others 2001). Multiple epidemiological studies have demonstrated that colic has a complex, multifactorial aetiology (Kaneene and others 1997, Reeves 1997, Cohen and others 1999). This is not surprising given that colic is simply a sign of abdominal pain that may be caused by one many different pathological abnormalities, usually related to the gastrointestinal tract. The colic puzzle may be relatively simple in some cases where a specific diagnosis can be made easily based on patient history and specific findings on clinical examination (e.g. pelvic flexure impaction in a horse that has been on box-rest). For other colic cases, the puzzle is more challenging requiring knowledge about the epidemiology of colic together with interpretation of the results of clinical examination and diagnostic tests to assist decision-making.

The study by Dunkel and others (2017) summarised on p\*\*\* of this week’s *Veterinary Record* examined risk factors for specific locations and causes of colic based on horse type, sex and age. Knowledge of factors that increase or decrease the likelihood of colic in general or specific forms of colic can assist the practitioner when trying to make a diagnosis or when providing advice about ways in which the risk of colic recurrence can be minimised, particularly where risk factors can be modified. The latter is important given that colic recurrence occurred within 12 months in 36% of horses examined for colic in first opinion practice (Scantlebury and others 2011). The work reported by Dunkel and others (2017) has identified some new risk factors for specific types and locations of colic and confirms the findings of other studies. This helps to strengthen and expand our knowledge about the epidemiology of colic by adding evidence from an additional population of horses.

**Turning anecdote into fact**

Epidemiological studies are important in determining whether anecdotal observations can be validated scientifically and also enable any risk factors to be quantified. For many years, horse owners and veterinary surgeons recognised that colic appeared to be more common in spring and autumn months. Using an epidemiological approach, a seasonal pattern of colic with peaks in the spring and autumn for colic admissions in a UK hospital was confirmed (Archer and others 2006). This work also identified different seasonal patterns for specific types of colic such as pelvic flexure impactions and epiploic foramen entrapment which further assists diagnosis and generates new hypotheses about why these specific forms of colic may develop. Many practitioners who deal with colic cases on a frequent basis are likely to recognise that lesions such as large colon displacements / torsions are relatively infrequent in ponies compared to horses. The study by Dunkel and others (2017) not only scientifically confirms this finding but also quantifies this; Miniature and pony breeds are around 9 times less likely to develop this type of colic compared to light breed horses.

**Finding something new**

Epidemiological studies may also identify new risk factors for disease, which may assist diagnosis and development of new hypotheses about disease causation. The finding that draft horses were more likely to be diagnosed with caecal disease compared to light breed horses in the study by Dunkel and others (2017) is interesting and is worthy of further investigation. Such findings also open up new avenues for investigation such as why epiploic foramen entrapment (EFE) is associated with crib-biting / windsucking behaviour (Archer and others 2008) and why idiopathic focal eosinophilic enteritis (IFEE) is more frequent in horses kept in specific locations in the UK (Archer and others 2014). Another area of research that is providing exciting new ideas about why colic develops and how some forms might be prevented in the future is investigations into the equine gut microbiome, such as the relationship between the gut microbiota and large colon torsion in brood mares (Weese and others 2015). Whilst microbiome studies are expensive and limited funds are available, further research in this area is important.

**Ongoing epidemiological studies**

The study by Dunkel and others (2017) is based on a referral population of horses which, as acknowledged, does introduce bias as the study population is more likely to have severe forms of colic. Relatively few epidemiological studies investigating colic have been performed in non-referral hospital populations. Some recent studies undertaken in first opinion practice populations in the UK have shown that between 21-24% of colic cases seen in practice are more critical in nature requiring potential hospital admission (Bowdenand others 2017, Douglas and others 2017) highlighting the importance of early identification of these cases. Additionally, most epidemiological studies investigating colic have been undertaken in the USA, UK and some parts of Europe and more are needed from other parts of the world, including working horse populations (Salem and others 2017).

**Colic challenges in the 21st century**

A key challenge for the practitioner remains early identification and treatment of horses with surgical forms of colic. The search for novel therapeutic agents that can improve the outcome of horses with endotoxaemia / SIRS and intestinal compromise continues. However, prompt surgical management where required remains critical; survival both in the short and long term is maximised in horses that undergo surgery prior to the development of cardiovascular derangements and severe intestinal compromise (Salem, Proudman and Archer 2016). Knowledge about the epidemiology of colic may alert the practitioner to the possibility that an individual horse or pony may require surgery or more intensive medical management. Basic parameters such as heart rate and response to analgesia remain key factors that are important in the latter cases. It is also important to consider the role of the horse owner / carer as the gatekeeper to horses’ health and decisions that horse owners make around colic (Scantlebury and others 2014) including whether or not to undertake surgery (Blikslager and Mair 2017), making it important for the practitioner to have the most upto date information to assist informed decision-making in the colic case.

Figure 1. Early surgical management remains critical in maximising survival in horses with surgical lesions and two different cases of Epiploic Foramen Entrapment are shown. A horse that has advanced strangulation of several metres of small intestine is not particularly difficult to diagnose (a); the challenge is diagnosing intestinal obstruction an early stage and undertaking surgery early enough to avoid the need to perform intestinal resection (b), as resection is associated with reduced post-operative survival.

Figure 2. Epidemiological investigations have identified risk factors for specific types of colic; Idiopathic focal eosinophilic enteritis (IFEE) is an unusual cause of colic but is more likely in younger horses, the autumn months and in the North-West of the UK.

**What you need to know:**

* Colic has a multifactorial aetiology and specific forms of colic have different risk factors
* Knowledge of risk factors can assist diagnosis when considering forms of colic that are more or less likely to occur in an individual horse
* Early diagnosis and treatment of surgical forms of colic remains crucial for maximising short- and long-term survival
* A specific diagnosis is not always possible nor is it essential; non-response to analgesia remains one of the key indicators of horses with forms of colic that require potential surgical intervention

**References**

ARCHER, D. C., PINCHBECK, G. L., PROUDMAN, C. J. & CLOUGH, H. E. (2006) Is equine colic seasonal? Novel application of a model based approach. *BMC Veterinary Research* **2**, 27.

ARCHER, D. C., PINCHBECK, G. K., FRENCH, N. P. & PROUDMAN, C. J. (2008) Risk factors for epiploic foramen entrapment colic: an international study. *Equine Veterinary Journal*, **40**, 224-30.

ARCHER, D. C., COSTAIN, D. A. & SHERLOCK, C. (2014) Idiopathic focal eosinophilic enteritis (IFEE), an emerging cause of abdominal pain in horses: the effect of age, time and geographical location on risk. *PLoS One* **9**, e112072.

BLIKSLAGER, A.T. & MAIR, T.S. (2017) Trends in management of horses referred for evaluation of colic: 2004-2016. *Equine Veterinary Education* **29** S8, 37.

BOWDEN, A., ENGLAND, G.C.W., BURFORD, J.H., MAIR, T.S., FURNESS, W. & FREEMAN, S.L. (2017) Early indicators of ‘critical’ outcomes in horses presenting with abdominal pain (colic): Prospective study of ‘out of hours’ first opinion emergency cases from two practices over a three year period (2011-2013). *Equine Veterinary Education* **29** S8, 34.

COHEN, N. D., GIBBS, P. G. & WOODS, A. M. (1999) Dietary and other management factors associated with colic in horses. *Journal of the American Veterinary Medical Association*, **215**, 53-60.

DOUGLAS, E.L, SMITH, E. & ARCHER, D.C. (2017) Investigation of colic cases in a first opinion practice in the UK. *Equine Veterinary Education* **29** S8, 17.

DUNKEL. B., BUONPANE, A. & CHANG, Y-M (2017) Differences in gastrointestinal lesions in different horse types. *Veterinary Record* \*, \*\*-\*\*

KANEENE, J. B., MILLER, R., ROSS, W. A., GALLAGHER, K., MARTENIUK, J. & ROOK, J. (1997) Risk factors for colic in the Michigan (USA) equine population. *Preventive Veterinary Medicine* **30**, 23-36.

LEBLOND A, VILLARD I, LEBLOND L, SABATIER P, & SASCO AJ. (2000) A retrospective evaluation of the causes of death of 448 insured French horses. *Veterinary Research Communications* **24**, 85–102.

MELLOR, D.J., LOVE, S,, WALKER, R., GETTINBY, G. & REID, S.W.J. (2001) Sentinel practice-based survey of the management and health of horses in Northern Britain. *The Veterinary Record* **149**, 417-423.

REEVES, M. J. (1997) What really causes colic in horses? Epidemiology's role in elucidating the ultimate multi-factorial disease. *Equine Veterinary Journal* **29**, 413-4.

SALEM, S. E., PROUDMAN, C. J. & ARCHER, D. C. (2016) Prevention of postoperative complications following surgical treatment of equine colic: Current evidence. *Equine Veterinary Journal* **48**, 143-151.

SALEM, S.E., SCANTLEBURY, C.E., EZZAT, E., ABDELAAL, A.M. & ARCHER, D.C. (2017) Colic in a working horse population in Egypt: Prevalence and risk factors. *Equine Veterinary Journal* **49**, 201-206.

SCANTLEBURY, C. E., ARCHER, D. C., PROUDMAN, C. J. & PINCHBECK, G. L. (2011) Recurrent colic in the horse: Incidence and risk factors for recurrence in the general practice population. *Equine Veterinary Journal*, 43 (Suppl. 39), 81-88.

SCANTLEBURY, C. E., PERKINS, E., PINCHBECK, G. L., ARCHER, D.C. & CHRISTLEY, R.M. (2014) Could it be colic? Horse-owner decision making and practice in response to equine colic. *BMC Veterinary Research* 10 (Suppl. 1), S1.

WEESE, J. S., HOLCOMBE, S. J., EMBERTSON, R. M., KURTZ, K. A., ROESSNER, H. A., JALALI, M. & WISMER, S. E. (2015) Changes in the faecal microbiota of mares precede the development of post partum colic. *Equine Veterinary Journal* **47**, 641-9.