



Chauché, C., and Kennedy, R. (2017) Science-in-brief: Clinical highlights from BEVA Congress 2016. *Equine veterinary journal*, 49(1), pp. 10-12.

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Deposited on: 23 March 2017

Science-in-brief: Clinical highlights from BEVA Congress 2016

All clinical research abstracts presented at the 56th British Equine Veterinary Association (BEVA) Congress have been included in a supplementary issue of Equine Veterinary Journal and can be found via Wiley Online Library at <http://onlinelibrary.wiley.com/doi/10.1111/evj.2016.48.issue-S50/issuetoc> and the highlights of clinical research sessions are summarised below.

General medicine

The emergence of antimicrobial resistance in pathogens is a growing problem for veterinary and human medicine and prescribing habits of veterinarians in first opinion equine practice are potentially a strong driver of antimicrobial resistance. A number of antimicrobial groups have been suggested to be suitable as first line treatments in horses and indiscriminate veterinary use of third and fourth generation cephalosporins and fluoroquinolone antibiotics is discouraged to preserve their efficacy in serious human infections. However, a retrospective study of the use of antimicrobials in first opinion UK equine veterinary practice revealed that fluoroquinolone and fourth generation of cephalosporins were frequently the first antimicrobials to be prescribed [1]. Additionally, a retrospective study on prescription habits of veterinarians in US first opinion equine practices from Dr Claire Welsh (University of Glasgow) showed that the use of restricted antimicrobials was common and on the increase, and culture and sensitivity testing was not recorded in 95.4% of cases [2].

Clinical relevance: Fluoroquinolones and fourth generation cephalosporin are too often selected as the first choice of antimicrobial treatment and the prevalence of culture and sensitivity testing is low for both reserved groups.

Equine grass sickness (EGS) is a polyneuropathy affecting both the central and peripheral nervous systems of horses. Equine grass sickness almost exclusively affects grazing horses and is associated with a characteristic array of clinical signs, most of which can be attributed to neuronal degeneration in the autonomic and enteric nervous systems. Extensive neuronal degeneration, as seen in acute and subacute forms of EGS, results in intestinal dysmotility, the severity of which is incompatible with survival. In

comparison, a proportion of chronic forms of EGS, characterised by less severe neuronal degeneration, will survive [3]. Rachel Jago from the Royal (Dick) School of Veterinary Studies and Roslin institute of Edinburgh, showed that β -amyloid precursor protein (β -APP) immunoreactivity was increased in neuronal perikarya and axons in sections of cranial cervical ganglia, ileum and rectum from EGS horses compared with controls. Dr Jago developed a promising antemortem diagnostic test for EGS based on histological assessment of immunolabelled β -APP on rectal biopsies [4]. Furthermore, a cross-sectional study of chronic cases of EGS (cEGS) based on postal questionnaires reported that the most prevalent signs observed by owners were muscle fasciculations, hyperhidrosis and inappetence/anorexia. Additionally, colic was most frequently reported as the first sign observed [5].

Clinical relevance: An accurate minimally invasive antemortem diagnostic test for EGS is currently lacking and histological examination of haematoxylin-eosin stained rectal mucosal biopsies is an insensitive diagnostic test for EGS. However, histological assessment of β -APP immunolabelled rectal biopsies is more accurate, but require further validation before being used for clinical cases.

The sleep behaviour of horses was studied by Dr Anna-Caroline Woehr from the University of Munich [6]. She described that rapid eye movement (REM)-sleep was detected every night in every horse and only occurred when horses were lying down and mostly in sternal recumbency. Dr Christine Fuchs, also from the University of Munich, further explained that ‘narcolepsy’ of adult horses is not a neurological disorder, but rather a REM-sleep deficiency due to recumbent sleep deprivation [7].

Clinical relevance: These studies suggest that different ‘sleep-types’ exist in horses and could lead to different demands on stabling and handling horses. Additionally, illness, ethological deficits or husbandry shortcomings can lead to a lack of REM-sleep and cause narcolepsy.

Corticosteroids are thought to be a risk factor for acute laminitis; however, there is little scientific evidence to support this association. Dr Katya Potter (Royal Veterinary College) investigated the prevalence of acute laminitis following corticosteroid administration, as well as the association of laminitis with a specific corticosteroid, the route of administration, the condition treated and the phenotype of the horse. Over 884 horses, of which 38.5% were mares, 58.6% were geldings and 2.9% were stallions, aged between 7 and 17 years old, laminitis prevalence after corticoids administration was as low as 0.6%. No significant association was found between laminitis development and body condition, age, route of administration, or condition requiring treatment. However, there was a significant association of laminitis development with breed and with the presence of a pre-existing laminitis risk factor (i.e. endocrine disease or previous laminitis) [8]. In parallel, Dr Edward Knowles from the Royal Veterinary College, tested if oral sugar test (OST), which is recommended for assessment of insulin dysregulation, could distinguish between ponies

with a history of recurrent pasture-associated laminitis (PL) and nonlaminitic ponies (NL), when performed with or without fasting. Interestingly, the insulin response to OST, at pasture in spring, was greater in most PL compared with NL ponies whether the test was performed with or without prior fasting [9].

Clinical relevance: Laminitis is more likely to occur in ponies or in animals with pre-existing laminitis risk factor, rather than in animals receiving corticosteroids. Oral sugar test, recommended for insulin dysregulation assessment, may be a useful tool to differentiate previously laminitic from nonlaminitic ponies, without the need of fasting prior to testing, which is impractical for pastured ponies.

Orthopaedics

Tendon injury in horses is frequent and represents a major problem for the industry, consequently there is a growing interest in finding new therapeutic strategies aiming at improving tendon healing processes. Equine tendinopathy is characterised by over-expression of structurally inferior collagen 3 (col3) at the site of tendon injury. A research group from the University of Glasgow studied in detail the relationship of col3 transcript expression and microRNA-29a (miR-29a) transcript in tendon explant cultures of Thoroughbred horses [10]. They used an ex vivo model of collagenase-induced lesion of the superficial digital flexor tendon isolated from three Thoroughbred horses, ranging in age from 2 to 5-years-old. They showed that, similarly to man, col3 transcript level was increased at the site of tendon injury, while miR29a expression was downregulated. Furthermore, introduction of synthetic miR29a into culture equine tenocytes reduced col3 expression.

In parallel, Helen Morrell from Harper Adams University studied the biomechanical benefits of therapeutic shortwave ultrasound alongside bone marrow-derived stem cell (BM-MSCs) infusion, through an in vitro 3D tendon-like construct model. Equine BM-MSCs were cultured for 24 days with the application of different levels of therapeutic ultrasound on alternate days and the author found that the number of cells, their degree of maturation, migration and differentiation capacity and the structural integrity of the construct were optimal when the level of ultrasound applied was between 0.1 and 0.4 W/cm². The therapeutic application of ultrasound to BM-MSCs in vitro resulted in greater levels of cell maturity with a significantly higher ultimate breaking strain than seen in control groups or those treated with high power [11].

Clinical relevance: Reintroduction of miR29a and the application of low levels of therapeutic ultrasound alongside bone marrow-derived stem cell infusion show promise for the treatment of equine tendinopathy.

Intra-articular injection of platelet rich product (PRPr) is a potential therapeutic option for osteoarthritis

(OA). A research group from the University of Pretoria [12] analysed clinical and synovial changes after intra-articular injection of PRPr in normal and OA joints. They found that intra-articular injection of PRPr is followed by a short lived synovial inflammatory reaction, with a significant increase in synovial nucleated cells, predominantly neutrophils associated with a significant decrease of TGF- β 1 at Day 1 post-injection compared with controls.

Clinical relevance: The intra-articular injection of moderately concentrated PRPr is an interesting method of delivery of a collection of bioactive molecules, such as growth factors, which could help treating conditions like OA.

Dentistry and soft tissue surgery

Nonsurgical oral extraction (NOE) of equine cheek teeth reduces risk of post-operative complications in comparison with surgical approaches. In addition, computed tomography (CT) is increasingly being used to definitively diagnose dental pathology and provide a prognosis for the likelihood of successful nonsurgical oral cheek tooth extraction. Benjamin Dubois from the Royal Veterinary College described a 64.7% success rate of cheek teeth extraction by NOE. However, the presence of a dental fracture and the type of fracture (simple or comminuted) had a significant effect upon outcome [13].

Clinical relevance: Nonsurgical oral extraction should be considered as first line treatment due to lower complication rate in comparison with other techniques. Computed tomography can provide valuable information, helping veterinary surgeons perform evidence-based dentistry when selecting the most appropriate method of tooth removal.

Primary closure of laryngotomy incisions are frequently followed by post-operative complications [14]. A research group from the Goulburn Valley Equine Hospital described and analysed a novel method of primary closure for laryngotomy procedures, where the incision is closed in two layers, a simple continuous pattern in the cricothyroid membrane, followed by a vertical mattress suture pattern penetrating the sternohyoideus muscle and skin [15]. They retrospectively analysed the post-operative complications following this novel primary closure method in 71 horses, and showed that only 34% of horses had post-operational complications, i.e. peri-incisional swelling (n = 19), seroma formation (n = 18) and subcutaneous emphysema (n = 1) and only 15% of cases required a post-operative intervention. Overall, this method of laryngotomy primary closure required fewer post-operative interventions and was associated with less post-operative complications.

Clinical relevance: With this new closure method for laryngotomy procedures, the majority of equine

laryngotomy incisions will heal without need for further intervention.

Dorsal displacement of the soft palate (DDSP) is definitively diagnosed with exercising endoscopy (EE) and treatment options include laryngeal tie-forward (LTF). Dr Sam Offord from the Rosssdales Equine Hospital analysed retrospectively the post-operative racing performance of horses after a LTF procedure. He reported that median earnings and placings were significantly improved by LTF. Over 83 cases, 12 horses improved their placing index following LTF, while 1 worsened and 34 horses improved their earnings, while 18 worsened. However, having a definitive diagnosis of DDSP did not influence significantly post-operative racing performance [16].

Clinical relevance: Laryngeal tie-forward surgery significantly improves racing performance based on median earnings and placings.

Gastroenterology

Dr Jeremy Kemp-Symonds assessed the prevalence and epizootiology of salmonellosis in equids entering a quarantine unit at a rescue and welfare charity by retrospectively analysing serial faecal cultures and associated clinical records. It was concluded that the prevalence of salmonellosis was similar to that reported in previous hospital-based studies. In addition, the three confirmed cases reported in this study were shedding intermittently and a marked seasonality was noted [17].

Clinical relevance: Due to intermittent and seasonal shedding, a minimum of four consecutive negative faecal cultures may be required to identify an animal as no longer being infected with the organism.

Dr Ben Sykes from the University of Queensland described the pharmacodynamics of a long-acting injectable formulation of omeprazole in the horse. With administration of a single 2 g dose of a long-acting omeprazole formulation intramuscularly, median intragastric pH was significantly higher for at least 5 days [18]. It has been well recognised that omeprazole monotherapy may result in suboptimal healing rates in horses with gastric glandular disease and a research group from the University of Nottingham [19] reported that misoprostol was superior to omeprazole and sucralfate therapy for the treatment of equine gastric glandular disease.

Clinical relevance: A long-acting injectable formulation of omeprazole warrants further investigation as a once weekly injectable medication for the treatment of equine gastric ulcer syndrome. Additionally, misoprostol shows promise as a treatment for equine gastric glandular disease.

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