Contents under pressure: vascular fibrous proliferation and gliosis within the brain of Cavalier King Charles spaniels affected with syringomyelia

Clare Rusbridge^{1,2}, Silvia Guil-Luna³, Daniela Menezes¹, Duncan Grainger¹, Anna Tauro², Nicholas Jeffery⁴, Fernando Constantino-Casa⁵, Penny Watson⁵, Francisco Salguero¹

- 1 School of Veterinary Medicine, University of Surrey, Guildford, UK
- 2 Fitzpatrick Referrals, Godalming, UK
- 3 Department of Comparative Pathology, University of Cordoba, Cordoba, Spain
- 4 College of Veterinary Medicine, Iowa State University, Iowa, USA
- 5 Department of Veterinary Medicine, University of Cambridge, Cambridge, UK

Chiari-like malformation (CM) is characterised by shortening of the basicranium, reduced supraoccipital bone convexity, invagination of the cerebellum under the occipital lobes and into the foramen magnum and increased proximity of the atlas to the occiput. The neural tissue overcrowding within the craniocervical junction results in obstruction of cerebrospinal fluid pathways and failure to accommodate the arterial pulse wave leading to variable ventriculomegaly and syringomyelia (SM). The mechanism of SM is debated. The most accepted hypothesis is that there is a mismatch in timing between arterial and CSF pulse peak pressure resulting in fluid flowing into

the perivascular space. However this theory is not well supported by histopathological studies of the spinal cord in the cavalier King Charles spaniel (CKCS). In this breed with a high prevalence of CM and SM, the dominant feature is angiogenesis and fibrous tissue proliferation in blood vessels adjacent to syrinx cavities suggesting a response to elevated intra-cord pressure. An alternative hypothesis of SM is that there is reduction in venous compliance resulting in increased pulse pressure, disruption of the blood brain barrier, increased interstitial fluid (pre-syrinx) and ultimately SM. In this retrospective cohort study we investigate the vascular changes related to CM and SM in the cerebral cortex.

The formalin fixed brains from 26 CKCSs (18 affected by CM and SM with ventriculomegaly and 8 without SM) were processed for histopathological analyses. The pathological material had been obtained from dogs humanely destroyed and donated by their owners. Tissue sections were stained with haematoxylin and eosin, trichrome martius scarlet blue and immunohistochemistry for glial fibrillary acidic protein. Morphometric and digital image analyses were used to quantify the number of vessels, width of the arteriolar wall and number of astrocytes in the cerebrum adjacent to the lateral ventricles. SM affected animals showed a significant increase in the number of blood vessels, associated with an increase in the width of the arteriolar walls due to a proliferative fibrous response. Moreover, there was a significant astrogliosis and astrocytosis in the areas adjacent to the ependymum. The logical explanation of this histomorphological change is a mechanical response to elevated arterial pressure. This arterial stiffening may further affect the ability to reduce the arterial pulse wave and decrease the CNS compliance.

Funded by Cavalier Tissue Collection Fund and Cavalier Matters

Linear traction-stabilisation for traction-responsive cervical spondylomyelopathy.

Matej Matiasovic, Viktor Palus, Salih Eminaga, Giunio B. Cherubini

Dick White Referrals, Six Mile Bottom, UK

INTRODUCTION

Surgery is currently the treatment of choice for traction-responsive cervical spondylomyelopathy (TRCSM). Determination of the traction-responsive component is essential for the selection of the appropriate surgical technique, and has been described using traction magnetic resonance imaging (MRI). Traction/distraction during surgery has been reported to being performed via manual traction, or directly with various distractors or retractors. This way the degree of distraction achieved may not be identical to that seen with traction MRI. By using the identical traction for the surgical procedure as during the MRI study, identical spinal cord decompression is expected to be achieved.

OBJECTIVE

The objective of this retrospective study is to present a

technique using linear traction during surgical stabilisation for treatment of TRCSM and the outcomes of this procedure.

METHODS

On examination, dogs were graded based on their neurological status. Magnetic resonance imaging diagnosis of single or multiple adjacent traction-responsive cervical spondylomyelopathy lesions was made. Twenty-one dogs met the inclusion criteria. Dogs were treated solely by traction-stabilisation with positive threaded pins and polymethylmethacrylate, without performing ventral slot. Traction was achieved using the identical apparatus that alleviated spinal cord compression during MRI. Traction was applied by weight-loading a soft tie secured to the superior canine teeth of the dorsally recumbent patient, with the fore limbs retracted and secured caudally. Neurological grading was assessed at time of discharge, and on short- and long-term follow up.

RESULTS

At the time of discharge and short-term follow up (<3 months), 76% and 95% of dogs had improved neurological scores, respectively. Twelve dogs (60%) had an improved CSM-related neurological status from admission until data collection or death from unrelated causes. Progression of suspected CSM signs occurred in 8 dogs (40%), however,

Delivered by BSA
Guest (guest)

IP: 54.81.137.203

On: Wed, 26 Apr 2023 13:48:20

Oral presentations

none of these occurred in the initial 12 months post surgery. Mean and median time of onset of suspected CSM progression was 23.5 months. No major complications occurred. Minor complications included pin failure (15%), cement loosening (5%) and cervical spinal pain (5%).

CONCLUSION

A traction-responsive lesion can successfully be addressed by traction-stabilisation alone. We demonstrate a standardised, simple and controlled method for achieving vertebral distraction, also applicable in conjunction with other stabilisation techniques. In selected patients where spinal cord compression resolves during traction MRI, ventral slot is not required prior to stabilisation.

Axis dorsal laminotomy (doffing) in 8 dogs

Giunio Bruto Cherubini, David Barker, Salih Eminaga, Viktor Palus

Dick White Referrals, Six Mile Bottom, Newmarket, Suffolk, UK

OBJECTIVE

To assess the postoperative morbidity/mortality of the elevation of the cranial dorsal process of the axis and evaluate the short and long term consequence of this procedure.

METHODS

Eight dogs diagnosed with variety of pathologies – subarachnoid diverticulum (5) syringohydromyelia (2) and GME (1) – effecting dorsal aspect of C2 spinal cord underwent C2 cranial dorsal process laminotomy in a similar manner. Following the specific procedure per the underlying pathology bone flap was then repositioned and fixed into place using absorbable suture material.

RESULTS

The technique was carried out without significant perioperative complications and all dogs survived to discharge from hospital and continued the medical treatment as indicated based on the underlying pathology. The follow up time was from 6 months to over 5 years. Six dogs improved neurologically, while 2 dogs were euthanised due to the persistency of the primary neurological diseases (post mortem examination in one of the dog confirmed correct anatomical placement of the bone flap). Two months post-operative radiographs confirmed correct placement in two dogs but no radiographic evidence of fusion was present.

CONCLUSION

This study shows that cranial dorsal laminotomy “doffing of the axis is a safe and easy to perform surgical technique. Considering there were no morbidity or mortality directly related to this technique, we propose that “axis doffing” gives very good access to the dorsal aspect of cervical spinal cord within the axis without causing any instability.

Comparing antiepileptic drug effects on gait through quantification of ataxia in dogs with idiopathic epilepsy.

Emma Suiter, Holger Volk

Royal Veterinary College, London, UK

Idiopathic epilepsy (IE) is often seen in first opinion practice and can be extremely distressing for dog, and owner. Studies into IE often focus on seizure frequency reduction when comparing drug choices; however studies in human medicine and into owner perceptions suggest that acceptable side effects are just as important as seizure frequency.

Antiepileptic drugs (AED) such as phenobarbitone, a licensed first line treatment, is associated with the side effect ataxia. In people balance is impaired in phenobarbitone users, but to the author's knowledge this has yet to be objectively studied in dogs. The aim of this study is to evaluate the gait of dogs with IE who are being treated chronically with phenobarbitone, or imepitoin. It is hypothesized that dogs on phenobarbitone will show a larger variability in their gait parameters compared to imepitoin and control groups.

A collection of 50 stride parameters in walk have been taken from 10 age-matched control dogs, 5 imepitoin dogs with IE and 7 phenobarbitone treated dogs with IE. Mean length of time on phenobarbitone was 16 ± 2.1 months and serum levels averaged at 22 ± 0.34 $\mu\text{g/ml}$. Time on imepitoin had a larger range, with a mean value of 13 ± 3.5 months. The preliminary results show that the lateral distance between pelvic paw placements during a walking gait are significantly more variable in the phenobarbitone treated dogs than in the imepitoin (p value = 0.006) and control treated groups (p value = 0.005). Similar results were seen in when comparing phenobarbitone thoracic paw lateral placement to imepitoin (p value = 0.03) and control (p value = 0.001) groups.

Our preliminary results have established that dogs treated with phenobarbitone have an increase in lateral paw placement variability compared to controls and imepitoin treated dogs. On the other hand this parameter did not differ in imepitoin treated dogs compared to controls. Lateral paw placement variability has been formerly associated with ataxia from spinal cord injuries and can be seen as a good indicator to measure the level of ataxia seen in a patient. Further research is needed to compare the level of side effects seen between the different AEDs and how this affects the quality of life of the owner and patient.