NETERINARY PROTOCO

Facial nerve paralysis resulting from a dentigerous cyst in a Thoroughbred racehorse

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History

A 3-year-old Thoroughbred filly initially presented in October 2016 with two draining fistulas and a firm swelling at the base of the right ear. A presumptive diagnosis of a dentigerous cyst was made based on clinical findings. As there were no other clinical signs at that time, no treatment was recommended. As the horse was in full race training, a decision was made to attempt surgical resection at the end of the racing preparation. Three months later, the horse returned for surgical removal of the dentigerous cyst. Radiographs (Fig. 1.) identified two large molar teeth positioned adjacent to the zygomatic arch. Surgery was not attempted due to a high risk of damaging the underlying bone structures distal to the base of the ear including the tympanic bulla.

Computed Tomography

The horse horse was referred to The University of Melbourne for computed tomography (CT) of the head, in order to fully assess the surgical opportunity of removing the dentigerous cyst. CT scan revealed there were three tooth structures (rostral, middle and caudal teeth), closely adhered to the right temporal bone, at the caudal aspect of the zygomatic arch **(Fig 3)**. There was evidence of compression of the stylomastoid foramen, external acoustic meatus and internal acoustic meatus associated with the dentigerous cyst The right tympanic bulla was distorted by the caudal tooth, the volume was reduced to less than half the of the left. The right lateral wall and right side of the floor of the cranium were also deformed **(Fig . 4)**. There was less than 2mm of temporal bone between the rostral tooth and the cranial vault.

Clinical Outcomes

The condition was considered inoperable due to the proximity of the teeth to vital bone structures identified by the CT scan.

The facial nerve and vestibulocochlear nerve pass through internal acoustic meatus to enter the facial canal and the inner ear respectively. The facial nerve exits the skull via the stylomastoid foramen (**Fig 5.**). In this horse, the compression of the right facial nerve and its branches by the caudal tooth at the stylomastoid foramen is believed to be responsible for the facial nerve paralysis: drooping right ear (caudal auricular nerve and auriculopalpebral nerve), drooping right eyelid (auriculopalpebral branch) and muzzle deviation to the left (dorsal buccal branch).



Fig. 1. Radiograph showing large molar teeth (red arrows) adjacent to the right zygomatic arch.



Fig. 3. 3D reconstruction image of the affected right side. Red arrows point at the three dental structures closely adhered to the temporal bone and the blue arrow shows that the external acoustic meatus is deformed. Note the caudal most tooth located at the caudo-ventral aspect of the external acoustic meatus, where the facial nerve exits the stylomastoid foramen.

The development of facial nerve paralysis associated with the dentigerous cyst, suggested a likelihood of further loss of other neurological functions over time. One major concern was the loss of hearing and vestibular function, due to the compression of the internal acoustic meatus where the vestibulocochlear nerve passes through. Loss of vestibular function could result in head tilt and loss of balance with a tendency to lean, drift, or fall to one side. This could cause injury to the horse or the handlers of the horse. As a result, a decision was made to euthanise the horse.

Clinical Relevances

A dentigerous cyst is a congenital defect arising from a failure of the first branchial cleft to close during embryonic development.² It is typically recognised as a swelling with mucoid discharge from a fistula at the base of an ear.^{2,3,4} A clinical case report of facial nerve paralysis resulting from a dentigerous cyst in a horse does not exist to the authors' knowledge.

Facial Nerve Paralysis

Two months later, the horse was identified to have developed clinical evidence of right facial nerve paralysis. A drooping right ear and right upper eyelid, reduced strength of the right palpebral reflex and muzzle deviation to the left were noted **(Fig. 2.)**. It was assumed that the tooth structures within the dentigerous cyst were compressing the cranial nerve VII (facial nerve) and resulting in the right facial nerve paralysis.





Fig. 4. CT Cross section image of the head. Red arrows highlight the deformed right lateral wall of the cranium. Dentigerous cysts have been considered a benign condition not requiring treatment.² The clinical syndrome resulting from a dentigerous cyst is considered unlikely to worsen over time.⁴ Surgical removal of dentigerous cysts is typically performed for cosmetic reasons at the owner's request. The finding of facial nerve paralysis in this case challenges the current understanding of dentigerous cysts. There have been reported cases of dental elements closely adhered onto the cranium.^{5,6} Given the close proximity to a number of important nerves and boney foramina, a dentigerous cyst in advanced cases could have the potential to cause neurological dysfunction such as facial nerve paralysis.

In this case, it would seem the dental structures increased in size between the the diagnosis of the dentigerous cyst and development of facial nerve paralysis. While radiographs were able to confirm the diagnosis of a dentigerous cyst, they were unable to predict the progressive nature of this condition in this horse.

Surgical removal is contraindicated if the dental structures are

Fig. 2. Drooping right ear and deviation of the muzzle to the left hand side, which are consistent with a right facial nerve paralysis.



Fig. 5. 3D reconstruction image of the unaffected left side showing a normal external acoustic meatus (blue arrow) and diagram¹ showing the cranial nerves of the horse. The red arrow points at the location where facial nerve exits the skull through stylomastoid foramen.

extensively attached to cranium as it may result in permanent neurological damage and death.⁷ The use of a head CT scan is recommended if surgical intervention is planned for dentigerous cysts that have firm attachment to the skull. The high level of anatomical detail obtained from this imaging modality will allow for accurate assessment and decision making regarding surgical intervention.

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