Case Report

Cervical vertebral fracture in a Thoroughbred filly with minimal neurological dysfunction

J. Muno*, V. Samii, L. Gallatin, J. Robertson and J. Chase

Department of Veterinary Clinical Sciences, The Ohio State University, 1900 Coffey Road, Columbus, Ohio 43210, USA.

Keywords: horse; cervical vertebral fracture; deroofing injury

Summary

Vertebral fractures in horses are relatively common and often occur due to trauma. Clinical signs may range from neck pain and mild neurological dysfunction to tetraplegia and death. Severity of signs and prognosis depends on extent of damage to the spinal cord. In this Case Report, serial radiographs, which track the bony changes associated with fracture healing, were performed over one year. Although surgical techniques have been described to repair fractures to the vertebrae, patients with minimal neurological deficit may have a favourable outcome with conservative medical management, as in this case.

Introduction

Trauma resulting in neurological dysfunction is relatively common in horses. Often the trauma is not observed, but can be inferred from the injuries present. Damage to the central nervous system as well as cranial nerve or peripheral nerve damage such as radial nerve paralysis may occur. In regard to injuries to the spinal cord, it has been reported that the cervical spine is the most common site and that foals are more likely to injure the cranial cervical spine (including the dens), whereas mature horses are more likely to injure the caudal cervical spine and the thoracolumbar region (DeBowes 1990). These patients may have a wide range of presenting signs from pain and decreased range of motion to tetraplegia or acute death if complete transection of the spinal cord occurs (Tyler et al. 1993). Various imaging modalities such as radiography, myelography, computed tomography and magnetic resonance imaging (MRI) may be used to identify the location and degree of spinal cord compression if a fracture or subluxation is present (Barnes et al. 1995; Pinchbeck and Murphy 2001).

This report describes a case of fracture to the cervical spine in an 11-week-old Thoroughbred filly with minimal neurological dysfunction.

Case history

An 11-week-old Thoroughbred filly was examined for continued signs of depression and a mild cough presumably attributable to an upper respiratory infection. She had been seen one week previously and treated with 15 mg/kg bw trimethoprim sulphamethoxazole1 per os b.i.d. and 0.5 mg/kg bw flunixin meglumine (Banamine paste)2 per os b.i.d. The upper respiratory infection was also affecting other horses stabled in the same barn. The caretakers had also noted a small swelling on the left side of her neck, which had not been present previously. There was no known history of trauma, but the filly was regularly turned out with other broodmares and foals.

Clinical and diagnostic findings

Initial injury

Physical examination

On presentation, the filly was showing mild signs of depression and had a normal rectal temperature of 38.4°C. The heart rate was normal at 68 beats/min, but the respiratory rate was increased at 60 breaths/min. The filly was still nursing normally. An approximately 5 cm diameter swelling was identified on the left ventral aspect of the mid-cervical region and the cervical trachea was deviated ventrally and to the right. The filly resented manipulation and bending the neck to the left, but was not sensitive to palpation of the swelling. No neurological abnormalities were noted on a limited neurological examination, which included observing the foal walk and trot after the mare. Digital radiographs of the cervical region were obtained in the field under light sedation.
Radiographs

A compression injury had occurred causing a fracture through the ventral portion of the caudal epiphysis of the third cervical vertebra (C3) with the fractured portion displaced caudally and ventrally (Fig 1). Fracture of the pedicles of C3 with elevation and deroofing of the spinal canal, and subluxation of the C3-4 articulation were also evident. The floor of the spinal canal at C3 was dorsal to that of C4 and there was excessive dorsoflexural malalignment of the spine at C3-4. The C3-4 disc space was narrow and the trachea was displaced ventrally but no compression was present. On the dorso-ventral projection, axial alignment was maintained (Fig 2).

Treatment

The filly was treated initially with conservative medical management. She was confined to a box stall with her dam for 4 weeks. For the first week, she was treated with phenylbutazone \(^2\) 2.2 mg/kg bwt per os s.i.d.

Six weeks post injury

Physical examination

The filly was able to ambulate normally based on observation of the foal walking and trotting with the mare. The only abnormalities noted on physical examination were an asymmetric contour to the neck and an inability to bend the head and neck completely to the left. The filly was able to bend the head to the right and raise and lower the head and neck with no apparent discomfort. No neurological abnormalities were evident.

Radiographs

Resorptive remodelling was noted around the fracture lines of C3 (Fig 3). The epiphyseal displacement was unchanged. The fracture margins were irregular and bony remodelling was present at the C3-4 articular processes and the fracture site. Axial alignment of the cervical vertebrae was maintained on the dorso-ventral projection (Fig 4).
Treatment

After 4 weeks of stall rest, the filly was allowed small paddock turn out with her dam for an additional 4 weeks. At 6 months of age, the filly was weaned from her dam and turned out to pasture with other horses.

Thirteen months post injury

Physical examination

The filly was able to walk, trot and canter normally at pasture. She showed neurological deficits while turned out and while exercised in hand which were worse in the hindlimbs than the forelimbs. The cranial nerve examination was within normal limits. Palpation of her neck revealed that the muscle on the right side was enlarged, compared with the left, and she was unable to fully turn her head to the left elbow, but could turn it normally to the right elbow. The panniculus reflex was normal bilaterally. When circling, the filly would circumduct her outside leg and would often interfere in both hindlimbs. The tail pull was weak to both sides indicating some hindlimb weakness. When backing or walking with her head raised, the gait would become hypermetric and she would pace with her head elevated. Overall, she was found to have symmetrical neurological deficits in all 4 limbs, which were more pronounced in the hindlimbs (grade 3/5) than in the forelimbs (grade 1/5) (deLahunta 1983). The clinical abnormalities on the neurological examination were consistent with a lesion in the cervical spinal cord.

Radiographs

The C3-4 disc space had progressively narrowed with near complete fusion (large black arrows). Ankylosis of the C3-4 articular processes is evident (large white arrows). The C4-5 disk space is now malaligned with dorsal tipping of C5 relative to C4, resulting in focal ventroflexion of the cervical spine at this site (subluxation).

Discussion

Vertebral fractures in horses are relatively common with the cervical and thoracic vertebrae most often being involved (Nixon 1996). Trauma is a common cause of injury.
to the spinal cord of the horse. In one survey of 450 cases of neurological dysfunction, 119 cases were due to trauma and about 50% of these involved spinal cord trauma (Tyler et al. 1993). Of the horses that underwent necropsy, 76% of the spinal cord injuries were caused by a fracture with the cervical region involved in 55% of the cases.

The clinical presentation of cervical fractures may range from severe neurological abnormalities or death to signs of neck pain without obvious ataxia (Pinchbeck and Murphy 2001). Some horses with severe vertebral fractures may be recumbent and/or tetraplegic, whereas others may not have neurological signs, as was the case with the filly in this report. The main determinant of degree of neurological dysfunction depends on the magnitude of spinal cord compression and damage that occurs at the time of injury (DeBowes 1990). Several reports exist of horses with forelimb lameness caused by a cervical vertebral fracture or other cervical vertebral abnormality (Ricardi and Dyson 1993).

Falls where the neck is hyperextended may result in a fracture through the caudal end plate of the vertebral body. The caudal physis of the vertebrae is seen radiographically until age 4–5 years but only separates during fractures up to age 2 years. In severe hyperextension injuries, the pedicles of the caudal articular processes fracture and elevate which results in deroofing of the spinal canal (Robertson and Samii 2005). Although these fractures often result in obvious malalignments of the spine, as in the filly of this report, the neurological deficits may be minimal.

Various methods have been described to repair vertebral fractures in horses and the best surgical method depends on the type of fracture. In one report of an articular facet fracture of C5 in a 2-year-old Thoroughbred filly, a Bagby basket with a modified Cloward technique was used for vertebral stabilisation (Smyth 1993). Lag screw stabilisation has been used to repair a cervical vertebral body fracture (Barnes et al. 1995) whereas bone plating with pins has been used to repair a fractured dens (Owen and Maxie 1978). Strict stall rest without surgical intervention, as in the filly of this report has been used successfully in other cases (Ricardi and Dyson 1993; Pinchbeck and Murphy 2001). Application of a neck splint for immobilisation has also been described previously (Schneider 1982). Stabilisation of the callus occurs within 90 days and may eventually lead to union of the fracture (Nixon 1996).

Surgical management of cervical fractures may be indicated if deterioration of the neurological status continues (Pinchbeck and Murphy 2001). Some degree of spinal stabilisation may be achieved with surgical fusion or fragmentary compression techniques. Unfortunately, many surgical techniques fail because of the inability of the vertebrae or implants to sustain required stresses (DeBowes 1990). Other complications associated with surgery include difficulty in recovery, risk of implant infection and worsening neurological signs due to further spinal cord damage.

The prognosis for horses with cervical vertebral fracture depends largely on the degree of instability and associated spinal cord injury or compression. The likelihood of resolution may be difficult to predict. Cases most likely to resolve are those involving the cranial cervical spine, which have minimal displacement and neurological dysfunction (DeBowes 1990). If minimal spinal cord compression has occurred, spontaneous bone healing may take place. More comminuted fractures that severely damage the spinal cord can result in quadriplegia. A common outcome to healed hyperextension fractures in young horses is a ‘domino-effect’ of instability at adjacent sites, which may lead to the development of neurological dysfunction later (Nixon 1996).

In the filly of this report, neurological deficits were evident after healing of the fracture site was complete. This finding may have been due to the bony changes evident at the C4-5 site, consisting of dorsal tipping and wedging of the floor of the spinal canal. Other possible sites of spinal cord compression include the healed fracture site at C3-4, degenerative changes at the fracture site or in adjacent articulations or further damage sustained during trauma at a later time. To diagnose the location of the spinal cord impingement definitively, a myelogram would have been necessary. To the authors’ knowledge, there are no reports in the equine veterinary literature of instability at sites adjacent to surgical fusion. However, it has been shown in human models that cervical spine fusion can increase intradiscal pressure and segmental motion in adjacent intervertebral sites, which could lead to early disc degeneration (Eck et al. 2002).

**Conclusion**

As a result of the catastrophic nature of most cervical fractures, euthanasia is often considered or recommended. The urge to subject a horse with an injury such as this to euthanasia should be tempered by consideration of the associated clinical picture. In this case, the foal was still standing, ambulating and remarkably free of severe neurological signs. Obviously this was because of the unique nature of a deroofing injury like this. Additionally, a rush to surgery would bring with it associated complications in an animal with an unstable cervical fracture. As in this particular foal, equids with this injury often do best without surgery. The future athletic potential of a horse that has sustained such an injury would depend largely upon safety issues surrounding the development of residual neurological deficits. The veterinary practitioner may be best able to make recommendations for the horse’s intended use by performing serial neurological examinations.

**Manufacturers’ addresses**

1Amneal Pharmaceuticals, Hauppauge, New York, USA.
2Schering-Plough Animal Health, Kenilworth, New Jersey, USA.
References


Help Us Help the Unwanted Horse

Tens of thousands of horses end their days unwanted, unneeded or unusable. Every owner – and the equine industry as a whole – has a responsibility to ensure the humane care and treatment of unwanted horses.

If you’d like to decrease the number of unwanted horses and learn more about owning responsibly, visit unwantedhorsecoalition.org today.
Full pge colour
Poynton