

Scientific Report

Cast immobilization for treatment of dorsally subluxated proximal interphalangeal joint in a Thoroughbred mare

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(Received 22 Jun 2008; revised version 24 Dec 2008; accepted 2 Mar 2009)

Summary

Subluxation of the proximal interphalangeal joint (PIPJ or pastern joint) is an uncommon condition that occurs in the forelimb or hindlimb. Thoroughbred racehorses rarely show dorsal pastern subluxation (Thoroughbred ringbone) secondarily to an injury to the soft tissues supporting the fetlock. A 4-year-old Thoroughbred mare was presented with signs of lameness, swelling of the dorsal aspect of the pastern region of the right forearm and audible clicking sound when weight was placed on the limb. The condition seemed to have been developed as a consequence of extreme overexertion 4 days before referral. Radiographic examination of a non-weight bearing limb showed dorsal subluxation of the pastern joint. Under general anesthesia the affected limb was immobilized by cast after reduction of the luxated bone into the PIPJ. The affected limb was kept immobilized for four weeks. Then the cast was removed and the animal was given rest for two months. Consequently, weight bearing on the affected limb was improved and no signs of lameness were observed after six months.

Key words: Cast immobilization, Proximal interphalangeal joint, Dorsal subluxation

Introduction

Luxation or subluxation of the proximal interphalangeal joint (PIPJ) or pastern joint occurs rarely in horses (Harrison and May, 1992). Complete luxation usually occurs in the lateromedial plane and is sometimes associated with external injury (Stashak, 2002). Luxation or subluxation can present with the PIPJ either open or closed, and forelimbs seem a greater risk for the injury (Steenhaut *et al.*, 1985). Dorsal subluxation can occur after traumatic disruption of the suspensory apparatus and arthrodesis of the fetlock joint, but most commonly occurs in horses with progressive-sever suspensory desmitis. This is particularly true in Standardbred or Thoroughbred racehorses. Swelling along the dorsal aspect of the pastern region is the first clinical sign

recognized, but progressive dropping of the fetlock joint is usually present (Ross and Dyson, 2003).

Dorsal subluxation of the PIPJ can occur without any identifiable abnormality of the pastern or metacarpal/tarsal soft tissue structures. This occurs primarily in the hind limb of young horses, and lameness is usually absent or mild (Ross and Dyson, 2003). Surgical reduction and arthrodesis have been described for the treatment of PIPJ subluxations (Martin *et al.*, 1984; Caron *et al.*, 1990; Stashak, 2002). Treatment options for palmar/plantar subluxation include both conservative and surgical management. External coaptation often is successful in adult horses managed acutely. The surgery needs to be performed soon after injury, because fibrosis of the palmar support structures hinders joint

reduction (Stashak, 2002). Cast immobilization can be successful, but instability of the PIPJ may preclude successful realignment with this method (Ross and Dyson, 2003).

To the best of our knowledge, there is no published information describing cast immobilization for dorsal subluxation of PIPJ. This report describes a case of unilateral, dorsal subluxation of the PIPJ in the forelimb of a mare that was managed successfully by cast immobilization.

Case presentation

A 4-year-old thoroughbred mare was presented with right forelimb lameness. The owner found a problem in weight bearing on the right front limb four days previously, although there had been no known history of trauma. The affected limb was bandaged 4 days prior to referral. At admission, physical examination revealed normal vital parameters. The horse had weight bearing lameness, swelling of the dorsal aspect of the pastern region (Fig. 1); and an audible clicking sound was being heard when weight was placed on the affected limb. The fetlock appeared to be slightly dropped compared with the contralateral limb (Fig. 1).



Fig. 1: Arrow shows swelling of the dorsal aspect of the pastern region. The fetlock is dropped compared with the contralateral limb (lines show the difference between fetlock angles)

On palpation and manipulation of the pastern region heat and swelling were evident. Moreover, instability and pain were identified during flexion and rotation of the phalanges. Pain was also elicited during

manipulation of the slightly swelled fetlock region. With a tentative diagnosis of either ring bone or subluxation of the pastern joint, radiographs were taken in latero-medial and dorso-palmar views of the affected limb.

Radiography showed that the distal aspect of the proximal phalanx was displaced dorsally relative to the proximal aspect of the middle phalanx. New bone formation was present on the dorsal aspect of the middle phalanx (ring bone) as well (Fig. 2), and the DIP joint was not luxated (Fig. 3).



Fig. 2: X-ray of the right affected PIPJ. Note the dorsally displaced proximal phalanx. Arrows show new bone formations on the dorsal aspect of the middle phalanx (high ring bone)



Fig. 3: a) The AP view of the full distal limb. There is no malalignment in the lateromedial direction in the pastern joint. b) Note the dorsally subluxated pastern joint. The distal interphalangeal joint (partially seen) is not luxated or subluxated

Cast immobilization of the affected limb was performed. The mare was premedicated using xylazine, 1 mg/kg. Anesthesia was then induced by 5% ketamine (2 mg/kg) plus

diazepam (0.05 mg/kg) and maintained with an O₂-halothane mixture delivered by a large animal circle system. The horse was positioned in left lateral recumbency with the affected limb uppermost. The limb was pulled using a rope tied around the hoof. While manual pressure was exerted on the distal part of the proximal phalanx to reduce the luxation, the limb was casted. The mare recovered uneventfully.

The postoperative treatment included phenylbutazone (IV, 2.2 mg/kg, for 5 days) and strict restriction of movement for four weeks while the mare was confined to a stall. After one month, the mare referred again for removal of the cast. The cast was removed and a latero-medial radiograph was then taken from the limb. On radiography, no evidence of displacement on the pastern region was detected. Osteopenic changes from disuse were evident in the bones of the fetlock, pastern, and foot. There was marked improvement in the weight bearing capacity of the right front limb. No evidence of swelling or pain was noticed on palpation of the affected region. Nevertheless, minor pain was elicited upon deep palpation of the pastern region. Accordingly, a supporting bandage was applied to the affected limb. The owner was instructed to keep the mare confined to a stall for at least two more months, and change the bandage as needed. After three months, the mare was placed in a small paddock for another 30 days and then turned out to pasture for two months before returning to training.

Discussion

Dorsal subluxations in the horses are thought to be secondary to flexure deformities or contracture and may occur acutely secondary to collateral ligament injury (Adams *et al.*, 1995). Thoroughbred racehorses may sustain injury to the supportive structures of the metacarpophalangeal joint, which secondarily may affect the PIPJ. This condition has been referred to as thoroughbred ringbone (Stashak, 2002). As in the case illustrated in this report, there was a mild swelling around the metacarpophalangeal joint, and pain was elicited in manipulation of this region. This condition could be a reflection of mild

inflammation caused by possible previous trauma to this site. New bone formation (ring bone) seen on the middle phalanx is another sign indicating previous repetitive trauma or over exertion affecting the animal's foot. The trauma may cause pulling or tearing of the periosteal attachments of the extensor tendons, ligaments and joint capsules, resulting in periostitis and new bone formation. If the soft tissue injury is severe enough to cause joint instability or subluxation, direct cartilage damage and degenerative joint disease (DJD) may follow (Stashak, 2002). Since the PIPJ is a low-motion, high load joint, the articular cartilage and subchondral bone are placed under a greater workload, making these structures more susceptible to injury from non physiologic loading (Pool and Meagher, 1990). Deep digital flexor tendon contracture is believed to be responsible for dorsal subluxation in the pelvic limbs of three horses (ages 5 months, 2 years, and 4 years) in a report (Shiroma *et al.*, 1989). Dorsal subluxation of the PIPJ has resulted from corrective desmotomy of the suspensory ligament in treating cases of flexural deformities of the metacarpophalangeal joint (Grant, 1982). In cases of traumatic origin, it had been believed that the PIPJ would not realign itself when weight is placed on the limb (Shiroma *et al.*, 1989), but recently it is mentioned that dorsal subluxation is most often dynamic in nature and resolved during full weight bearing. The horse in this report had no known history of trauma but the sudden and acute onset of action could reflect the traumatic origin. The aforementioned new bone formation also implies the condition of animal exertion.

PIPJ arthrodesis has been advocated as an alternative method of treatment for subluxations/luxations of this joint as well as for end stage DJD, selected proximal and middle phalanges fractures, and joint sepsis (Caron *et al.*, 1990). It is supposed that conservative treatment including cast immobilization can be successful, but instability of the PIPJ may preclude successful realignment with this method (Ross and Dyson, 2003). As a matter of fact, surgical arthrodesis has been highly recommended for treatment of the PIPJ

luxations or subluxations (Caron *et al.*, 1990; Stashak, 2002). Although cast immobilization of the affected PIPJ may cause instability, in our experiment no joint mal-alignment has been evident following cast application. The occurrence of mal-alignment, as an important possible complication, depends on the status of both reduction and cast immobilization either at the time of cast application or in the early convalescent period. It can also be subjected to the degree of trauma affecting the joint. In our experience, there are several factors affecting the usefulness of cast immobilization including: reducible subluxation (depending on the amount of trauma, the time passed from the initial trauma and accompanying fractures in the joint bones), proper application of the cast, toleration by the animal and cooperation of the horse owner during the long period of convalescence. Therefore, cast immobilization could be an alternative in situations in which surgical arthrodesis is not possible due to economic considerations, owner persistence against surgery or the lack of facilities. But it should be noted that prolonged aftercare is essential for complete improvement and alignment.

This case provides an example of how PIPJ cast immobilization can successfully salvage a limb and return a horse to normal activities after trauma-induced subluxation. The major disadvantage of this treatment modality is its prolonged convalescent period. It could take up to 6 months or more for the affected horse to return to soundness. Accordingly, lack of owner cooperation during this lengthy period can adversely affect the results. Nonetheless, cast immobilization of PIPJ can be considered as an alternative to PIPJ arthrodesis when

arthrodesis is not possible.

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