Sagittal fracture of the proximal phalanx in a horse complicated during induction of anesthesia by complete fragmentation of the bone: a case report

Z. Zert, J. Mezerova, R. Kabes, S. Krisova

University of Veterinary and Pharmaceutical Sciences, Brno, Czech Republic

ABSTRACT: The case of a sagittal fracture P1 in the pelvic limb that was complicated during the flexion of the limb by lying down at the beginning of anesthesia, by complete fragmentation of bone is presented. Fragments were not seriously dislocated, but there was no stabile strut between the metatarsophalangeal and proximal interphalangeal joints. The immediate fixation with lag screws and cast application resulted in complete primary healing and a successful return to training for flat racing. The real danger of complete fragmentation during the induction of anesthesia is documented in this case. For the prevention of such a complication it is recommended to put the horse into recumbence with the affected limb casted. The successful treatment of the comminuted P1 fracture by application of lag screws in the absence of a strut between both joints is described.

Keywords: horse; fracture; P1; anesthesia; complication

Incomplete midsagittal fractures of the first phalanx are reported to be most common in thoroughbred and standardbred racehorses (Markel and Richardson, 1985; Tetens et al., 1997). The generally accepted treatment is the application of a cortical bone screw placed in lag fashion (Richardson, 1995). The procedure is quite simple and routinely performed in surgical facilities around the world. In this report we describe the case of an incomplete sagittal fracture of the proximal phalanx in the hind limb, which was complicated during induction of anesthesia for routine treatment by complete fragmentation into three slightly dislocated fragments. We also report its management and follow up. Most professional literature concerning the comminuted P1 fracture does not recommend internal fixation in the absence of a stabile interarticular strut between metacarpo-/metatarsophalangeal and proximal interphalangeal joints (Richardson, 1995). Only recently was treatment with lag screws recommended in the case of comminution with a reduced (two to three) number of fragments (Kraus et al. 2004).

Case report

A three year old thoroughbred racing colt was referred with lameness of grade 3/5 on the right pelvic limb for orthopaedic examination. During the clinical examination of the effusion of the proximal plantar recessus, a painful passive flexion and torsion of the fetlock joint was found. X-ray examination revealed the sagittal intraarticular fracture of the first phalanx, which was 35 mm in length (Figure 1).

The grade of lameness, intraarticular position of the fracture line and the need to get the horse back on the racetrack directed the decision to make a lag screw fixation. The induction of general anesthesia after the administration of xylazine, diazepam and ketamine resulted in an overflexion of the fetlock joint, followed by the P1 fracture. After the distinct sound of the fracture, a physical examination was carried out and revealed slight crepitus and mobility of the fragments. The horse remained in the lying position without putting weight on the broken leg. ImmediateX-ray examination discovered a

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Figure 1. DP X-ray of the sagittal intraarticular fracture of the P1

Figure 2. DP X-ray of P1 fracture during the anesthetic induction

multiple P1 fracture (Figure 2). The P1 was broken into two large proximal fragments and one distal. The fine fracture line was intraarticular and slightly parasagittal. All fragments were in good alignment and therefore minimal periosteal disruption was assumed.

The initial plan for a single lag screw fixation of the P1 simple sagittal fracture was changed to multiple introductions of lag screws through small stab incisions from the lateral surface of the fetlock bone. Compression and stabilisation of the fragments were achieved by application of five 4.5 mm cortical bone screws (Figure 3).

A low cast was applied to the operated limb to the level of the tarsal joint. The cast was changed twice. The X-ray reexamination revealed small periosteal reaction. The external fixation was removed 6 weeks postoperatively. There was no lameness and the fetlock joint was not distended. The horse was released from the clinic after 2 months and after a further two months; implants were removed from the standing horse under sedation and local anesthesia.

X-ray after the removal of the skin suture showed light periosteal reaction on the surface of the bone without signs of osteoarthritis in the metacarpophalangeal joint (Figure 4). After two weeks of convalescence the horse returned to training. The following season he was able to race without difficulties.

DISCUSSION

This case study shows the possibility of correcting a complication in fixing a simple fracture, including management methods. In the process of controlled lying down for lag screw treatment during the injection of anesthesia, the affected hind limb of the horse was placed in such an overflexion and passive overweighting that the partially damaged bone disrupted and was divided completely into three separated fragments. Such a complication is rarely seen and supports the reasoning that the horse should be anesthetised with the cast on the limb due to better tolerance of the cast during

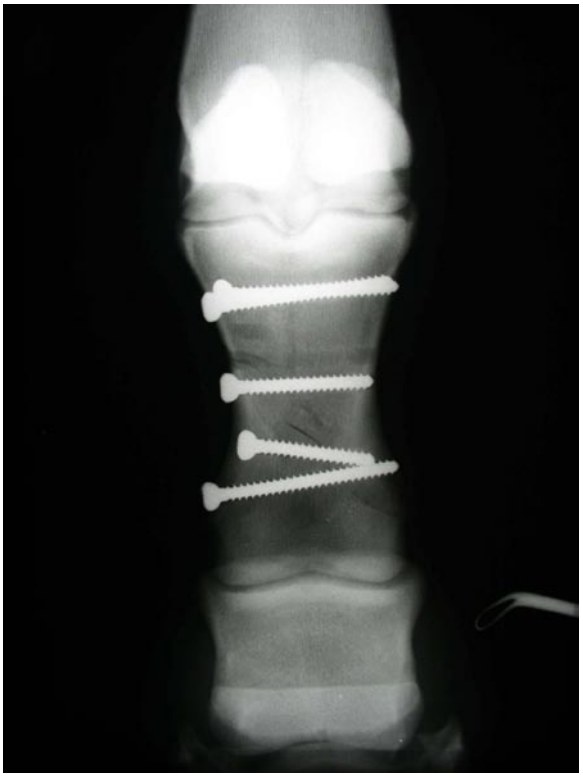

Figure 3. Fracture stabilised by five 4.5 mm cortical bone screws, both proximal fragments are joined by two parallel screws, distal fragment is connected by three screws to the medial proximal fragment

recovery from general anesthesia. In our case we had an affected hind limb and before the fall we disregarded such a recommendation in the case of incomplete fractures of the P1 and cannon bone on the front limbs. When we repeatedly saw flexion of the hind limb whilst lying down during the induction of anesthesia, we found that the hind limb is more predisposed for this type of complication of a sagittal P1 incomplete fracture.

In the case of the comminuted P1 fracture, it is routinely recommended to do internal fixation in case of the presence of a complete interarticular strut between metacarpo-/metatarsophalangeal and proximal interphalangeal joints (Markel et al., 1985; Richardson, 1995). The P1 fracture in our patient was complete without the stabile part of the fractured bone between both joints. Fragmentation was complete into three pieces and immediate recumbence and removal of weight from the limb caused only minimal or no dislocation of the fragments. For this reason, we did not respect the above mentioned recommendation and attempted the stabile fixation with lag screws. The position of the fracture lines allowed us to stabilise the fragments after temporary fixation through two point reposition forceps by introducing five lag screws. All of them were implicated through small stab

Figure 4. Control X-rays 3 weeks after removal of implants

incisions from the lateral side of the digit without opening the fracture line and doing an arthroscopic check of the fragment reposition. Good and quick planning determined by the X-ray allowed us to stabilise all fragments as described recently (Kraus et al., 2004).

Because of the referred successful treatment of the comminution P1 by cast application (Markel and Richardson, 1985; Richardson, 1995) and good previous personal experience, we decided to support the insufficient fragment lag screw fixation with a half-limb cast application. We found the casting of the affected limb necessary and sufficient. Transfixation casting (McClure et al., 1996) or an external skeletal fixation device (Nunamaker et al., 1986) was found inadequate, due to the serious traumatisation of the cannon bone. The follow up examination, our decision was proven suitable, as the stabilisation and apposition of the fragments was excellently healed, and without irritation of the fetlock joint and its osteoarthritic degeneration.

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Corresponding Author:

MVDr. Zdenek Zert, CSc., Dipl. ECVS, University of Veterinary and Pharmaceutical Sciences, Faculty of Veterinary Medicine, Equine Clinic, Palackeho 1–3, Brno, Czech Republic
Tel. +420 602 742 483, fax +420 541 562 395, e-mail: zertz@vfu.cz