Case Report

Closed reduction of scapulohumeral joint luxation in an Icelandic horse after general anaesthesia

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Summary

This report describes the clinical, ultrasonographic and radiographic findings in an 8-year-old Icelandic mare with unilateral shoulder luxation after general anaesthesia. Reduction of the luxated humerus was performed in a closed fashion using a calving jack under general anaesthesia. The horse recovered well and ultimately returned to its previous level of performance.

Introduction

Shoulder luxation is a rare occurrence in horses (Ross and Dyson 2003). Well documented in small animals, there are only a few reports about treatment options and outcome in horses. The scapulohumeral joint is stabilised by the joint capsule and the rotator cuff. This cuff consists of the tendons of the supraspinatus, subscapularis, infraspinatus and teres minor muscles as well as the glenohumeral ligaments, which insert around the scapulohumeral joint. The biceps brachii muscle offers only limited support to the stability of the joint, as it does not insert on the humerus. Shoulder joint luxation in horses is in most cases of traumatic origin and can be complicated by fractures especially of the glenoid cavity, which delay healing and worsen prognosis. Extensive soft tissue damage can accompany these luxations especially after external trauma. In the cases reported in the literature where direction of displacement was documented, the humerus was mostly displaced in a proximo-lateral direction (Stashak 2002). The incidence of shoulder joint luxation is generally higher in ponies (Stashak 2002). In the literature relaxation after repositioning of the humerus is described in dogs (Vasseur and Talcott 2002) and other species. In cases of shoulder joint luxation in equids, this has not yet been described after closed reduction techniques (Dyson 1986; Zilberstein et al. 2005).

Treatment options for shoulder joint luxation in horses often apply closed reduction techniques, using a calving jack (Madison et al. 1991) or a hoist (Zilberstein et al. 2005). The reports about these closed reduction techniques describe a positive outcome in a 3-year-old Thoroughbred and a 500 kg mare, respectively. In 2 further reports on closed reduction in 2 ponies (Wilson and Reynolds 1984; Dyson 1986) reduction was achieved, but 4 and 6 weeks after reduction, both ponies were lame. Open reduction without internal fixation has been performed in ruminants, swine and attempted in one equid (Semevolus et al. 1998). In that report 5 out of 7 animals, including the horse, with concurrent fractures had to be subjected to euthanasia. Open reduction with internal fixation has been described in alpacas and one miniature steer (Watts et al. 2008) as well as in one horse (Semevolus et al. 1998). While the ruminants showed a positive outcome the horse had to be subjected to euthanasia after implant failure and relaxation 6 days after surgery. Arthrodesis techniques of the scapulohumeral joint are described in miniature horses with scapulohumeral dysplasia and osteoarthropathies (MacDonald et al. 1995; Semevolus et al. 2003). These techniques are described as salvage procedures for 4 miniature horses and resulted in a decrease of lameness. All ponies survived the procedure and the first post operative phase, even though complications such as implant failure and infections were experienced (Semevolus et al. 2003). Transposition of the biceps brachii including a greater tuberosity osteotomy have been described as open reduction techniques in ruminants (Semevolus et al. 1998) with scapulohumeral joint luxation.

Only closed reduction techniques resulted in a long-term sound outcome in horses (Hardy and Marohn 1989; Madison et al. 1991).

Case details

An 8-year-old Icelandic mare with a bodyweight of 320 kg was submitted to hospital for elective vitrectomy. For this procedure the horse was held off feed 12 h prior to the
operation. All clinical and haematological findings were within reference limits. For surgery, a catheter was placed in the right jugular vein. The horse received a single dose of sulphadimethoxine and trimethoprim (20 mg/kg bw). Afterwards it was premedicated with romifidine (0.08 mg/kg bw) and butorphanol (0.05 mg/kg bw). Anaesthesia was induced with diazepam (0.05 mg/kg bw) and ketamine (2.5 mg/kg bw). The horse was intubated and anaesthesia maintained for 95 min with isoflurane in oxygen. Moving the horse to the surgery table and into the recovery stall was achieved using a hoist. During surgery, the horse was placed in left lateral recumbency. After shifting the mare to the rubber-padded recovery box she was positioned in left lateral recumbency again. Recovery was without assistance, which is the usual procedure at this clinic. Two attempts were required to reach a standing position. Recovery quality was rated as uneventful. The first unsuccessful attempt to reach a standing position did not cause abnormal abduction of the leg or severe impacts during falling. Time from extubation to standing was 37 min.

After recovery the horse showed severe lameness of the left front limb with unwillingness to move forward or to put weight on the limb. On palpating the limb, no significant abnormalities were found, with the exception of focal swelling and slight asymmetry in the left shoulder region. Passive motion of the left front limb elicited no signs of pain. Standard radiographic views of the distal limb and the shoulder were obtained (Fig 1) and no abnormal findings were identified. Muscle enzymes were within normal limits.

A presumptive diagnosis of a neuropathy was made and a full limb Robert Jones bandage with a palmar splint was applied to the left front limb. With the bandage the horse was putting weight on the left front limb. Additionally, the horse received flunixin meglumin 1.1 mg/kg bw s.i.d. per os for 7 days and sulphadimethoxine and trimethoprim 20 mg/kg bw s.i.d. per os for 5 days, the routine post operative treatment after a vitrectomy at this clinic. Within the next 7 days the lameness did not significantly improve. A repeated evaluation of the mare was performed. In this examination it was recognised that the left forelimb appeared shorter and a swelling was noted in the left shoulder region (Fig 2a). The left pastern had a more upright position and the distal radial physis was located more proximally in the left limb (Fig 2). On palpation the greater tubercle of the left humerus was found to be located more proximally in the left limb. A luxation or fracture in the shoulder region was suspected and additional radiographic views were obtained. On a caudolateral to craniomedial projection of the left shoulder in a weightbearing position, the diagnosis of a scapulohumeral joint luxation was made (Fig 3).

To evaluate soft tissue damage, an ultrasonographic evaluation of the shoulder region was performed using a 5 MHz linear probe (Sonoline Elegra), which revealed dislocation of the humerus (Figs 4 and 5). In Figure 4 the ultrasonographic panoramic image shows parts of the articular surface of the dislocated humerus. The tendon of...
The supraspinatus muscle was clearly identified on the right side but showed irregularities suggestive of full or partial rupture on the left side.

For reduction of the luxation the horse was prepared for general anaesthesia again. Premedication with romifidine (0.08 mg/kg bwt) and butorphanol (0.05 mg/kg bwt) was used. Anaesthesia was induced with diazepam (0.15 mg/kg bwt) and ketamine (2.5 mg/kg bwt). A higher dose of diazepam than usually used at this clinic (0.05 mg/kg bwt) was administered to achieve good muscle relaxation for the repositioning procedure. The horse was intubated and anaesthesia was maintained with isoflurane in oxygen; the expiratory volume was kept at 1.5%. The horse was placed in right lateral recumbency. The left leg was connected to a calving jack in the pastern region (Fig 6), the counterpart of the calving jack being placed against the sternum. By exerting constant and slowly increasing distraction with the calving jack in a vertical direction, combined with slight pressure applied by hand onto the proximal humerus in a medio-caudal direction, the humerus was repositioned. Repositioning was recognised by a sudden twitch in the shoulder joint and was confirmed by radiography.

During recovery from anaesthesia the horse was assisted with head and tail suspension ropes. Diazepam was antagonised with flumazenil (0.1 mg/kg bwt) prior to extubation. Recovery was rated as uneventful with one attempt to stand. Time from extubation to standing was 90 min.

Immediately after recovery, the position of the humerus was determined radiographically and an anatomically correct position of the left humerus was confirmed. The mare was immediately able to advance the limb and walked with a moderate degree of lameness. In the following 4 weeks the horse was cross tied in the stall to prevent it from lying down. In the first 7 days after surgery the horse received phenylbutazone 2 mg/kg bwt per os; this dose being subsequently reduced to 2 mg/kg bwt s.i.d. per os for a further 6 days.

Two weeks after reduction of the luxation a light exercise programme was introduced starting with handwalking (5 min daily) and increasing this to 10 min twice daily over the following 2 weeks. The horse was able to walk soundly 2 weeks after reduction and this remained the case when being discharged from hospital 24 days after reduction.

The horse was bred about 3 months after being discharged from hospital. The owner reported in a telephone follow-up that there were no signs of lameness when walking or trotting at that time. However, during the following month a moderate degree of lameness developed. After examination, the referring veterinarian injected a corticosteroid and hyaluronan into the left scapulohumeral joint and the horse received...
phenylbutazone for one week. Following this treatment the horse developed severe signs of colic and the phenylbutazone was withdrawn because of suspected colitis. The mare fully recovered from colic and has since not shown any signs of lameness when walking or trotting. Two years after being discharged from the hospital the owner intends to ride the horse, this not having been attempted previously because of her use as a broodmare. To date the owner has not recognised any lameness at walk, trot or canter.

**Discussion**

Only few cases of shoulder luxation in horses have been published (Wilson and Reynolds 1984; Dyson 1986; Madison et al. 1991; Rapp and Weinreuter 1996; Semevolus et al. 1998; Zilberstein et al. 2005). It is a rare pathology in horses (Ross and Dyson 2003; Auer and Stick 2006), usually being associated with trauma and often being complicated by fractures (Ross and Dyson 2003; Auer and Stick 2006). In one other case report, shoulder luxation was described in a horse as a complication after general anaesthesia (Zilberstein et al. 2005). Similar to our case both animals were operated for reasons other than orthopaedic disease and the animal was lifted with a hoist. There were no differences in the anaesthesia regime or the lifting procedure in this horse from that in other horses or procedures regularly performed at this clinic. The mare presented in this report may have had some predisposing factors for scapulohumeral joint luxation, such as dysplasia of the shoulder joint, which has been described by Boswell et al. (1999), who compared Shetland ponies showing clinical and radiological signs of shoulder joint arthritis with healthy ones and a mixed group of horses of various sizes and breeds. The authors showed that Shetland ponies with shoulder joint arthritis had a significantly lower glenoid ratio (maximum depth of the glenoid cavity divided by the glenoid length) than healthy ones. They also showed significantly lower values of the glenoid ratio in healthy Shetland ponies compared to a mixed group of horses. The authors assumed that there could be a relationship between possibly inherited ‘flattening’ of the glenoid cavity of the shoulder and arthritis or even instability in the shoulder joint. It is believed that dysplasia could be inherited, especially in miniature horses and could be a predisposing factor for shoulder joint luxation. In the Icelandic mare reported in this study a ratio between the length and the depth of the glenoid was evaluated. The glenoid ratio in this horse was 0.284, which is higher than the normal range of healthy horses of different breeds and sizes (mean ± s.e. 0.243 ± 0.004). No reference parameters have been defined for Icelandic horses, but we found no clinical or radiological signs of shoulder joint dysplasia or instability in the horse presented in this report.

Treatment options described for shoulder luxation in large animals include closed reduction (Dyson 1986; Madison et al. 1991; Rapp and Weinreuter 1996; Zilberstein et al. 2005) or open reduction with (Watts et al. 2008) and without internal fixation (Semevolos et al. 1998). The
prognosis of shoulder luxation in horses has been reported as poor (Semevolus et al. 1998) in a series of 5 horses. All animals had to be subjected to euthanasia eventually due to different reasons such as implant failure or severe fracture. Other reports suggest a poor prognosis after open reduction especially due to the development of osteoarthrosis as well as relaxation and implant failure (Ross and Dyson 2003; Auer and Stick 2006). There are some reports of shoulder joint luxation in the literature with a good outcome after closed reduction (Hardy and Marohn 1989; Madison et al. 1991; Zilberstein et al. 2005). These cases showed differences in the amount of bony and soft tissue trauma. Zilberstein et al. (2005) described a closed reduction technique with the help of a hoist in a horse with suspected uncomplicated shoulder joint luxation. Later, a fracture of the lesser tubercle of the humerus and a possible fracture of the lateral margin of the glenoid cavity were diagnosed. Six months after reduction the horse remained slightly lame. Madison et al. (1991) also used a closed reduction technique but removed debris from the lateral glenoid labrum in an arthroscopic procedure performed after reduction. Eight months after surgery the horse was able to perform light work. Hardy and Marohn (1989) described a closed reduction in a 5-day-old foal without major soft tissue or bony trauma. Closed reduction of a scapulohumeral joint luxation has been widely accepted as the method providing the best outcome (Stashak 2002).

The current report shows that in cases of severe front limb lameness after recovery from general anaesthesia shoulder luxation should be considered in addition to fractures, fissures and radial as well as supraspinatus nerve paralyses. The luxation in our case was not discovered in the first 7 days despite radiographic evaluation of the scapulohumeral joint (Fig 1). In the standard medio-lateral image, no abnormal findings were diagnosed, although in hindsight it has to be considered that on this image the caudal width of the joint space seems to be increased compared to the cranial width. This finding, if noticed, should have led to additional radiographic views (caudolateral-cranio medial), which could have resulted in an earlier diagnosis. Whether the delayed discovery and treatment of the scapulohumeral luxation could have an influence on the long-term prognosis is unclear, but it seems to have had no severe consequences in this case. Soft tissue trauma in our case was moderate and no signs of fracture were detected. An attempt at closed reduction was made. The calving jack was easy to use and offered the possibility of slowly exerting controlled traction while being able to additionally apply pressure by hand. Also the horse was not lifted from the table as would have been likely if a hoist had been attached to one limb. By using the calving jack method both points of fixation are on the horse proximal and distal to the scapulohumeral joint. In this manner tension can be applied to this limb specifically. With the use of a high dose of benzodiazepines, a deep plain of anaesthesia using isoflurane in oxygen and the use of butorphanol and α2 agonists, we could achieve good muscle relaxation and excellent analgesia. This enabled easy repositioning of the humerus without indicating signs of nociception, including increase of heart rate or blood pressure. Furthermore, by antagonising the benzodiazepine after surgery sufficient muscle tone was achieved during recovery. If sufficient muscle relaxation is not achieved peripheral muscle relaxants such as atracurium could also be considered and are reversed by using edrophonium. Local anaesthetics decreasing sensitisation in the thoracic limb could also be used by performing a cervicothoracic (Stellate) ganglion block (Muir and Hubbell 2009). Blocking this ganglion with local anaesthetics is described in the standing horse and signs of desensitisation can last up to 75 min.

In conclusion, the calving jack was a useful tool for the reduction of a scapulohumeral joint luxation. Specific radiographic views gave a more precise diagnosis of presence and degree of luxation than standard medio-lateral images alone. Ultrasonography was useful to evaluate the amount of soft tissue trauma. The horse had a good outcome 2 years after the repositioning procedure.

Manufacturer’s address

Siemens, Erlangen, Germany.

References


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