Case Report

An acute subchondral cystic lesion of the equine shoulder causing lameness

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Introduction

Subchondral bone cysts (subchondral cystic lesions or osseous cyst-like lesions) are relatively uncommon in the horse (Baxter 1996). They may be articular or extra-articular, and may, or may not, result in lameness (Baxter 1996), although most cystic lesions that contribute to lameness are articular in nature (Bramlage 1993). Horses from all breeds are susceptible, and whilst the disease has been more commonly reported in individuals less than 3 years of age, any age can be affected (McIlwraith 1982, 1987).

Multiple theories as to the pathogenesis of subchondral bone cysts (SCBs) have been proposed, with 2 currently being the most accepted. The first is linked to osteochondrosis, where a disruption to the normal pattern of endochondral ossification occurs at the metaphysis or epiphysis, resulting in a failure of normal cell differentiation and calcification and retention of a thickened and structurally inferior cartilage matrix. Mineralised new bone forms around the margins, but articular involvement and therefore clinical signs only become evident following further physical insult to the weakened site (Rooney 1975; McIlwraith 1982, 1987).

The second theory supports articular trauma as an initiating factor. Microfracture of subchondral bone within the epiphysis could result in bone resorption (Yovich and Stashak 1989). Synovial fluid then gains access through the surface defect, and the repeated hydraulic forces created during normal weightbearing result in the formation of a subchondral cyst-like lesion (Jeffcott et al. 1983; Verschooten 1982; Kold 1986).

Subchondral cystic lesions can appear at single or multiple sites (McIlwraith and Trotter 1996) in the same animal, those affecting immature horses often occurring bilaterally. The earliest clinical account in the literature was in 1968 by Petterson and Sevelius, where lesions involving the phalanges and radiocarpal bone were discovered. The most frequently recorded and investigated site in the horse is the medial femoral condyle in the stifle (Bramlage 1993). Other less frequently affected sites pertaining to the shoulder include the glenoid of the scapula (McIlwraith and Trotter 1996), intermediate tubercle (Ramzan 2004) and lateral intertubercular groove (McDiarmid 1999) of the proximal humerus.

Although most cases of shoulder OCD present as a unilateral lameness, both forelimbs may be affected (McIlwraith 1993b). Osteochondrosis with, or without, subchondral cystic lesions located at the glenoid, humeral head, or both, often have little palpable synovial effusion due to the degree of muscular and tendinous coverage (McIlwraith 1993b). This is similar clinically to subchondral bone cysts of the medial femoral condyle and metacarpophalangeal/metatarso-phalangeal joints, whereby varying degrees of unilateral or bilateral lameness are evident with, or without, the presence of synovial effusion (Petterson and Sevelius 1968; Verschooten and DeMoor 1982; Jeffcott and Kold 1982a,b; McIlwraith 1990).

This case report details the clinical, radiographic and scintigraphic investigation and interpretation of an active subchondral bone cyst of the glenoid of the scapula, causing lameness in a mature horse. Interestingly, the horse became sound enough to be used for light work after 3 months of conservative treatment with no clinical evidence of lameness up to 12 months later.

Case details

History

An 8-year-old Thoroughbred cross Hanoverian mare presented for investigation of an intermittent left forelimb lameness of varying severity, which had been initially observed 10 weeks previously subsequent to a fall in the field. A severe lameness had been noted for the initial 5 days, and while this had resolved enough to allow light ridden work and pasture turnout, a continuing mild lameness was still present.
Clinical examination

Physical examination revealed a mare in good overall body condition. No lameness was observed at the walk. Trotting in a straight line on a firm surface revealed a 4/10 left forelimb lameness with a reduced cranial phase of stride. Carpal and fetlock flexion failed to alter the degree of lameness. At the lunge on a sandy base, a 3/10 left forelimb lameness was apparent on the left rein and a 4/10 left fore lameness on the right rein. There was mild atrophy of the supraspinatus and infraspinatus muscles of the left forelimb. No other detectable abnormality or painful response was elicited after palpation and manipulation of either forelimb.

Diagnostic aids

Perineural anaesthesia

Perineural anaesthesia using mepivicaine 2% w/v (20,000 mg/l) solution (Intra-Epicaïne) was employed up to, and including, median and ulnar nerves as described previously (Dyson 1984). There was no change in the character or severity of the lameness. The mare’s temperament at that point precluded the further use of intra-articular analgesic techniques and she was then referred to the University of Liverpool for further investigation.

Radiography

Radiography was performed on the elbow and scapulohumeral joints of the left forelimb under standing sedation. Routine mediolateral (and cranio-caudal views of the elbow) were obtained, with the head elevated and the affected limb protracted and closest to the cassette (Butler 1998).

No radiological abnormalities of the elbow were identified. Radiological examination of the scapulohumeral joint identified a single circular osseous cyst like lesion, measuring approximately 14 mm in diameter, situated centrally in the glenoid cavity, and disrupting the normally uniform architecture of the subchondral bone plate (Fig 1). The cyst appeared adjacent to the articular surface and was bordered by a mild sclerotic reaction. No other radiographic abnormalities of the shoulder were evident. The contralateral shoulder appeared radiographically normal.

Scintigraphy

Bone phase gamma scintigraphy was performed 3 h subsequent to i.v. injection with technectium-99 conjugated to methylene di-phosphonate (99Tc-MDP), at a dose rate of

Fig 1: Medio-lateral radiograph of the left scapulohumeral joint, displaying a discrete articular radiolucency in the glenoid of the scapula, disrupting the subchondral bone plate, and surrounded by a sclerotic margin.

Fig 2: Latero-medial bone phase scintigraphic images of the left and right fore shoulder regions. Regions of interest indicate a 400% increase in uptake of radiopharmaceutical over the left glenoid of the scapulohumeral joint.
10 MBq/kg bwt (5500 MBq). Images were collected laterally of both elbow and shoulder joints, and analysed using Hermes softwear. The scintigraphic images identified a focal intense increase of radiopharmaceutical uptake in the region of the left shoulder joint (Fig 2). Region of interest analysis demonstrated a 400% uptake in the left scapula glenoid in comparison to the contralateral limb.

**Diagnosis/treatment**

A diagnosis of an osseous cyst-like lesion resulting in lameness, situated in the glenoid cavity of the left scapulohumeral joint was reached.

Treatment options were discussed with the owner. Arthroscopic evaluation and debridement of the joint was declined by the owner, after consideration of age, use, temperament of the horse, and likely prognosis post surgery. A conservative treatment plan was selected. An initial 6 week period of complete box rest was followed by 6 weeks of limited small paddock turnout. Oral phenylbutazone (Equipalazone) at a dose rate of 2.2 mg/kg bwt q. 12 h was prescribed for the first 14 days, then 2.2 mg/kg bwt q. 24 h for a further 7 days.

**Outcome**

Light hacking exercise was commenced, 3 times a week, at 3 months, followed by ridden schooling 3 times a week from 6 months. No significant episodes of lameness were reported by the owner over this period. Repeat veterinary examination after 3 and 6 months revealed no clinical evidence of lameness at the trot and lunge on both hard and soft surfaces, or muscle atrophy over the shoulder region. Repeat radiological assessment of the shoulder was declined by the owner.

Paddock turnout and schooling exercise were continued, in accordance with the exercise expectations of the owner. Clinical follow-up at 12 months revealed no evidence of lameness at the trot or lunge. The owner similarly reported the horse to have remained sound since the previous examination.

**Discussion**

Subchondral bone cysts affecting the scapulohumeral joint of both immature and mature horses have been recorded in limited numbers in comparison with other more common sites (Baxter 1996).

In this particular case, a traumatic incident is suspected as an initiating factor. This may have produced an intra-articular fracture of the glenoid with subsequent cyst formation; however, without prior radiographic evidence closer to the initial incident, it is impossible to confirm. Evidence supporting trauma as a pathogenesis for subchondral cyst formation has been documented (Verschooten and DeMoor 1982; Jeffcott et al 1983; Kold and Hickman 1986; Yovich and Stashack 1989). Experimentally, subchondral bone cysts have developed following the creation of defects in both articular cartilage and subchondral bone (not just articular cartilage) of the medial femoral condyle (Ray et al. 1996).

The majority of subchondral bone cysts appear in weightbearing sites as in this case, in comparison with OCD lesions, which appear in nonweightbearing sites (Rooney 1975; McIlwraith 1987). The location of the subchondral cyst is similar to those encountered by Dyson (1986a) and Doyle and White (2000). The anatomical site specificity of this lesion may suggest a predisposing vulnerability, either related to timing of endochondral ossification, biochemical stress, excessive trauma or a combination of these (Bramlage 1993; McIlwraith 1993a).

Further evidence supporting this theory was demonstrated by Baird (1998), who found that subchondral cystic lesions developed on the medial and/or the middle region of the tibial plateau following transection of the cranial cruciate ligament in the left stifle of 6 healthy adult mongrel dogs.

The clinical signs noted were consistent with those encountered by Petterson and Sevelius (1968), Nyack et al. (1981) and Dyson (1986b), although changes in hoof pastern conformation and partial flexion of the carpus/fetlock while at rest were not seen. This may be due to the relatively short duration of clinical signs, the intermittent nature of the lameness, and the relatively low intensity of work to which the animal performed.

Perineural anaesthesia was advocated to eliminate lower limb causes of lameness, as muscle atrophy of the shoulder region is not necessarily specific for shoulder lameness (Dyson 1986b). Radiography was performed initially to discount the presence of a fracture. The radiographic findings ideally would have been substantiated using intra-articular analgesic techniques (Dyson 1986a), where a significant improvement in the degree of lameness would have been anticipated, although this is not always the case, even when significant joint pathology is present (Dyson 1986c). More specialised diagnostic positive and double contrast arthrography (Nixon and Spencer 1990) may have been beneficial in determining communication of the cyst with the articular surface, and the presence of OCD lesions that may be clinically silent on plain radiography. Unfortunately, general anaesthesia is required in the majority of cases to obtain diagnostic images, therefore arthroscopic evaluation, with or without curettage and debridement as described previously (Bertone 1987; Nixon 1987; McIlwraith 1990) would be the most accurate and informative aid to diagnosis and treatment.

During arthroscopy, Doyle and White noted 2 distinct clinical presentations whilst evaluating 15 cases of shoulder lameness. Those less than 4 years of age displayed fracturing of articular cartilage or lesions suspected to be secondary to OCD, and those between 4- and 11-years-old, which appeared to manifest lesions either the result of traumatic cartilage damage or old OCD lesions. If arthroscopic evaluation had been elected in this case, the degree of cartilage damage suspected from both scintigraphic and radiographic evaluations may have been more extensive in relation to areas of cartilage infolding, and the presence of further small subchondral cysts in the glenoid, not previously detected radiographically.

In general, subchondral cystic lesions of the glenoid cavity or distal aspect of the metacarpus and metatarsus are...
considered to have the worst prognosis compared with other locations, regardless of lesion size and type of therapy (Bramlage 1993). Success for arthroscopic debridement of OCD lesions of the shoulder is approximately 50% (McIlwraith 1993b), and as subchondral cystic lesions are often accompanied by OCD lesions of the humeral head, the prognosis for these horses diminishes dramatically. However, there appears to be a paucity of follow-up information in the literature, therefore we are unable to identify whether surgery is truly indicated, or indeed give a true prognosis. A correspondingly poor prognosis post surgery and, in some cases, cystic enlargement, is supported by Rechenberg et al. (1998, 2000), who concluded that the fibrous tissue from subchondral cystic lesions in horses produced nitric oxide (NO), prostaglandin E2 (PGE2), and neutral metalloproteinases (NMPs) in explant culture, which resulted in the activation of osteoclasts in vitro. PGE2 appears to be a potent resorbing agent, and may be responsible for the osteolytic behaviour observed in subchondral cysts, thus partly explaining beneficial effects of intralesional corticosteroids.

This case demonstrates some of the clinical and diagnostic techniques used during the investigation of a shoulder lameness secondary to a subchondral bone cyst of the glenoid. Specifically, this horse became sound for its intended use with conservative treatment alone. This may be due solely to the low level of exercise performed, or a cessation of active pathology, inflammation and therefore lameness. No subsequent anti-inflammatory medication has been required to maintain soundness at this exercise level.

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Manufacturers’ addresses

1Arnolds Veterinary Products Limited, Shrewsbury, Shropshire, UK.
2Hermes, Nuclear Diagnostics, Sweden.

References


