

Fracture of the lesser tubercle of the humerus in a colt - a case report

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ABSTRACT

This report describes the case of an unusual humeral fracture in an eighteen month old Warmblood horse. The animal was admitted with a history of 5 weeks severe right forelimb lameness. A pronounced shortening of the caudal phase of the stride was evident at a walk. Intraarticular analgesia of the shoulder just partially abolished the lameness, however arthrocentesis revealed serosanguinous synovial fluid. Several radiology projections were performed, but the findings were inconclusive. The ultrasonographic examination revealed tendonitis of the biceps brachii tendon, bicipital bursitis. Furthermore, a step defect and irregular bone surface were noted on the proximomedial humerus, indicating a lesser humeral tubercle fracture, confirmed by necropsy. This case emphasises the utility of ultrasonography in cases of proximal humeral fracture with inconclusive radiology findings.

Key words: horse; proximal humerus; fracture; ultrasonography; lameness

Introduction

The scapulohumeral (shoulder) joint is characterised by the absence of collateral ligaments, and therefore its stability depends on muscular support on the medial and lateral side (DYSON, 2011). Cranial support of the joint is provided by the biceps brachii muscle. The biceps brachii tendon is surrounded by the intertubercular (bicipital) bursa although, considering its embryological development, it could be classified as a tendon

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sheath (DYSON, 2011). The lesser tubercle is located on the craniomedial aspect of the proximal end of the humerus, and forms an insertion of the subscapularis muscle tendon (TNIBAR et al., 1999).

Shoulder injuries are frequently suspected by owners (DYSON, 1986), although rarely diagnosed by veterinarians (DYSON, 1985; FORTIER, 2012; TROLINGER-MEADOWS et al., 2017). Soft tissue injuries are considered a common cause of shoulder lameness in the horse (DYSON, 1986; COUDRY et al., 2005; WHITCOMB et al., 2006) but limited studies involve bone pathologies as a cause of shoulder lameness (MEZ et al., 2007; LEVI et al., 2011). Physical examination and radiological findings often do not provide sufficient data to make it possible to localise the specific structure causing shoulder lameness. Nuclear scintigraphy is widely used to help localise lameness to a particular region of the shoulder, but radiography and ultrasonography are mandatory in delineating the exact cause of increased radiopharmaceutical uptake (WHITCOMB, 2009).

Literature about lesser tubercle fractures is scarce, with just one case report describing a complete comminuted sagittal fracture of the medial aspect of the humeral head and lesser tubercle in a 27 year old Arabian gelding (LEVI et al., 2011). To the best of our knowledge, no detailed clinical evaluation of a lesser tubercle fracture without fragment displacement has been described until now.

The purpose of this case report was to describe an unusual cause of severe forelimb lameness in a horse, and point out ultrasonography as a valuable tool in lesser tubercle fracture diagnosis in horses.

Case presentation

An eighteen month old Warmblood colt (500 kg body mass) was referred for evaluation of severe right forelimb lameness lasting for 5 weeks. The horse was found at pasture, where it was kept with other horses, reluctant to bear weight on the affected limb. It had been treated previously with a nonsteroidal anti-inflammatory drug (NSAID), phenylbutazone, at a dose of 2.2 mg/kg p/o bid during the first three weeks and rest, without any clinical improvement.

The horse was in a poor body condition (3/9) on presentation (HENNEKE, 1983), with marked supraspinatus and infraspinatus muscle atrophy on the right limb. The horse was bright and alert with a rectal temperature of 37.7 °C, a heart rate of 52 beats/minute and a respiratory rate of 24 breaths/minute. The colt showed grade 5/5 lameness of the right forelimb (ANONYM, 1991), but would intermittently bear weight on the limb while standing and walking. The fetlock of the left front leg had a dropped appearance and the digital pulse was increased. The caudal phase of the stride of the right forelimb was markedly shortened at a walk. When it attempted to trot, the horse would start canter.

Flexion and extension of the right shoulder joint elicited pain and the shoulder flexion test was positive. No crepitus was evident on proximal limb manipulation. Evaluation of the distal limb (negative response to hoof tester and perineural analgesia) ruled out distal limb lameness. Arthrocentesis of the scapulohumeral joint was performed using the approach previously described (BASSAGE and ROSS, 2011), and revealed a serosanguinous synovial fluid that, on cytology examination, showed moderate numbers of erythrocytes, without any signs of inflammation. Bacteriological analysis of the synovial fluid was negative. Intraarticular analgesia of the affected joint, with 25 mL of 2% lidocaine (Lidokain B. Braun 20 mg/mL, Germany), showed a short term slight positive response (lameness improvement of about 50%). Radiography of the right shoulder was performed (mediolateral extended, cranial 45 ° medial-caudolateral oblique and skyline projection) with no visible pathological findings. Further, several nonstandard oblique views were also obtained (mediolateral flexed, cranial 45 ° medial-caudolateral oblique flexed view). The only evident finding was the indistinct irregularity of the contour and texture of the proximal aspect of the lesser tubercle (Fig. 1). No fracture line or dislocation effect were found in the proximal humeral area.

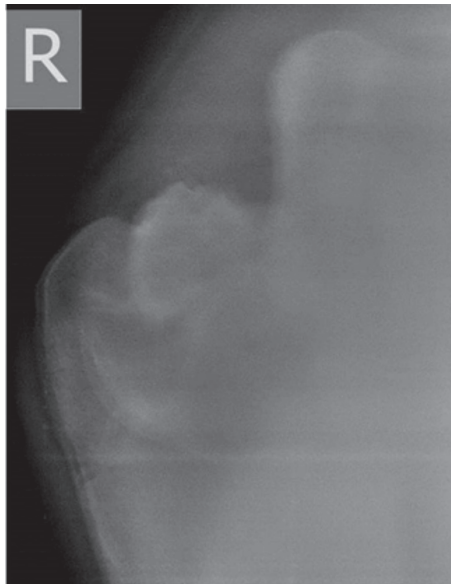


Fig. 1. Mediolateral (extended) image of the scapulohumeral joint with the focus on the cranial part of the proximal humerus. The cranial is to the left. There is an indistinct irregularity of the proximal aspect of the lesser tubercle, but no evidence of fracture line or dislocated bone fragments.

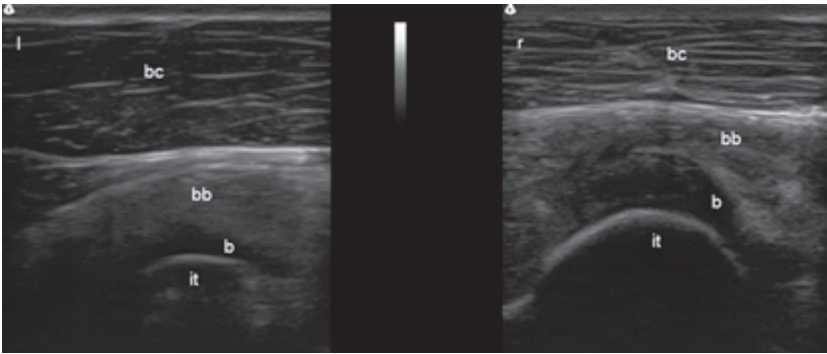


Fig. 2. Transverse ultrasonographic image of the biceps brachii tendon at the level of its passage over the intertubercular groove of the left (l) and right (r) legs. bc, brachiocephalicus muscle; it, intermediate tubercle; bb, biceps brachii tendon; b, bicipital bursa. Medial is to the left. On the image of the right leg there are evident hypoechoic and heterogeneous areas in the biceps brachii tendon, and an increased amount of hypoechoic space between the tendon and the humerus, indicating bicipital bursitis.

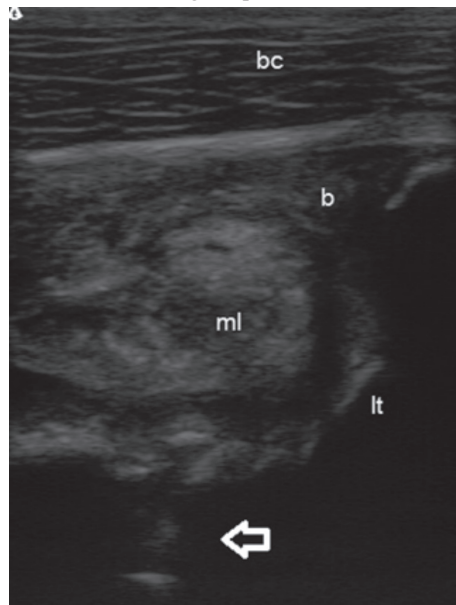


Fig. 3. Transverse ultrasonographic image of lesser tubercle fracture (arrow). On the medial lobe of triceps brachii tendon there are evident several heterogeneous areas and loss of tendon margin definitions. lt, lesser tubercle; ml, medial lobe of biceps brachii tendon; bc, brachiocephalicus muscle; b, bicipital bursa. Medial is to the right.

Ultrasonography of the shoulder region was performed using a portable ultrasound Terason t-300 (Terason, 77 Terrace Hall Avenue, Burlington, MA 01803, United States), with a veterinary straight linear array transducer 5-12 MHz. The examination revealed distention and thickening of the joint capsule, with unhomogeneous synovial fluid. There were evident distortions of the biceps brachii tendon shape at the level of humeral tubercles, as well as loss of margin definition, and pronounced hypoechoic and heterogeneous areas (Fig. 2), mostly evident on the medial lobe (Fig. 3). There was concurrent evidence of bicipital bursitis, characterised by an increased amount of hypoechoic space between the tendon and the humerus (Fig. 2). The step defect and irregular bone surface on the lesser humeral tubercle indicated a lesser tubercle fracture (Fig. 3).

Due to the poor prognosis for athletic soundness, the owner elected euthanasia. Post-mortem examination of the right humerus confirmed a fracture of the lesser tubercle with a fracture line involving the medial part of the humeral head and a whole lesser tubercle. The fragment displacement was minimal. Scant to moderate haemorrhage and oedema of the soft tissue were noted medial to the shoulder joint.

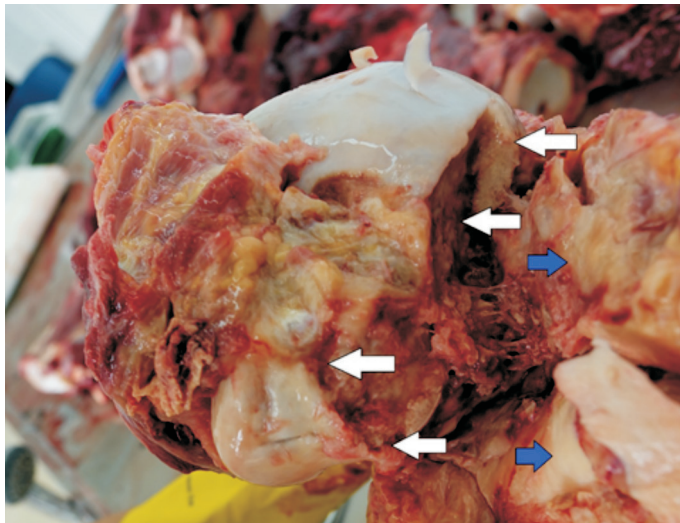


Fig. 4. Necropsy finding; proximal humerus: the fracture line (white arrow) involves the medial part of the humeral head and a whole lesser tubercle. The fragment (blue arrow) is imbedded in the medial soft tissue of the shoulder joint. Medial is to the right.

Discussion

In the present report, a case of a lesser tubercle fracture, presumably caused by direct trauma, was reported in a young horse. Proximal limb fractures are rare in horses.

ESTBERG et al. (1996) reported just 10 out of 157 cases of humeral fracture in adult horses among fatal musculoskeletal injuries in racing Thoroughbreds. However, a survey of proximal limb and pelvic fracture among racehorses in Hong Kong (McGLINCHEY et al., 2017) noted that the humerus was the most commonly fractured upper limb bone.

In a study by MEZ et al. (2007), describing 15 cases of greater humeral tubercle fractures, most horses had a palpable swelling over the shoulder region. In the present case, no palpable abnormalities were evident during clinical examination. It is speculative if some abnormalities could have been detectable during the first few days of lameness onset. Taking into consideration the fracture position, it remains questionable, however, if concomitant soft tissue injuries could have caused the clinical findings in the acute stage. At the time of presentation, there was already obvious muscle atrophy making an objective assessment of the related structures more difficult.

Proximal forelimb injuries, especially in the shoulder region, are characterised by a shortening of the cranial phase of the stride (DYSON, 1986; COUDRY et al., 2005). However, in the present case, the horse had a marked reduction in the caudal phase of the stride. Similarly to our case, MEZ et al. (2007) found just two out of 15 horses with obvious reduction in the cranial phase of the stride in a case series of humeral greater tubercle fractures. DYSON (1985) also noted a supporting and swinging lameness component in a case series of horses with shoulder region fractures (with the exclusion of supraglenoid fractures). Considering diagnostic analgesia, just a partial improvement of lameness after a scapulohumeral joint analgesia in the present case highlights the lesion's severity. False negative results from intra-articular analgesia of the scapulohumeral joint have also been experienced in horses with advanced osteoarthritis (DYSON, 2009).

Radiological diagnosis of lesser tubercle fractures is often challenging due to the superposition of the intermediate and great tubercles, soft tissue swelling, especially in the acute phase, and the inability to completely abduct the leg in order to make a proper dorsopalmar projection. In the case report presented by LEVI et al. (2011) the fracture was evident due to the caudal and distal fracture fragment displacement, which was not the case in this report. In the present case, radiography failed to detect the fracture due to the fragment location and minimal fragment displacement. Better quality radiographs are obtained with the horse under general anaesthesia in lateral recumbency, due to the absence of motion artefacts and easier patient positioning (BUTLER et al., 2017). However, this carries the risk of fracture progression especially in cases of several rising attempts during recovery. In the cases where surgery would be a treatment option, it could be done under the same anaesthesia, although this implies longer anaesthesia duration, with consequently more common complications. With the use of assisted recovery, these risks could be diminished, although the possibility of aggravation of the pathology remains. Since ultrasonography in the present case revealed signs of bone disruption, and

the synovial fluid had a serosanguinous appearance, clearly indicating humeral fracture, further radiography evaluation under general anaesthesia was not proposed.

A similar ultrasonography finding in a case of fracture of the lesser tubercle was reported by WHITCOMB (2009), although no clinical findings or additional diagnostic procedures were described.

In the present case, concomitant bicipital tendon and bursa injuries were clearly evident by ultrasonography (TNIBAR et al., 1999). The extensive soft tissue damage of the joint structures further indicated the severity of the pathology present, although the exact fracture involvement was assessed at necropsy, confirming the diagnosis.

Fractures of the greater tubercle of the humerus have been associated with bicipital bursitis (FORTIER, 2012), however, an association with a medial (lesser) tubercle fracture has not been described until now. In the present case, the soft tissue structures were presumably damaged at the time of shoulder trauma causing the fracture. Although not witnessed, a direct trauma was suspected as the cause of the fracture and concomitant soft tissue injuries. Similarly, in a case series of 15 fractures of the greater tubercle of the humerus, the majority of horses were found lame on pasture without data of an obvious traumatic episode (MEZ et al., 2007).

Fractures of the proximal humerus are rare and scarce data about treatment is available in the literature (FORTIER, 2012). Considering the fracture characteristics in the present case, it could have been treated surgically using a cortex screw placed in a lag fashion. Conservative treatment would not be suitable due to the supporting limb pathologies already present, despite rest and analgesic therapy. In addition, long term NSAID administration in our case could have had a negative effect on bone healing. A study (ROHDE et al., 2000) investigated the effects of phenylbutazone administration on tibial cortical defects. In horses receiving phenylbutazone, a lower mineral apposition rate has been noted. Although it appears that NSAID administration decreased the healing rate of cortical defects, it is still debatable whether the effect could be clinically relevant (BARRY, 2010). However, athletic soundness was doubtful in the present case, despite possible treatment and therefore the owner opted for euthanasia.

Conclusions

The present case highlights ultrasonography as a valuable diagnostic technique in the case of inconclusive radiographic evidence of a lesser humeral tubercle fracture, thereby, avoiding the need for general anaesthesia. Furthermore, this case emphasized the inconsistent shortening of the cranial phase of the stride in proximal humeral fractures involving the shoulder joint.

References

- ANONYMOUS (1991): Guide to veterinary services for horse shows. American Association of Equine Practitioners Horse Show Committee. 7th ed., Lexington, Kentucky, USA.
- BARRY, S. (2010): Non-steroidal anti-inflammatory drugs inhibit bone healing: a review. *Vet. Comp. Orthop. Traumatol.* 23, 385-92.
DOI: 10.3415/VCOT-10-01-0017
- BASSAGE, L. H. II., M. W. ROSS (2011): Diagnostic analgesia. In: *Diagnosis and Management of Lameness in the Horse.* (Ross, M. V., S. J. Dyson, Eds.), 2nd ed., Saunders Elsevier, St. Louis, pp. 100-135.
- BUTLER, J. A., C. M. COLLES, S. J. DYSON, S. E. KOLD, P. W. POULOS (2017): The shoulder, humerus, elbow and radius. In: *Clinical Radiology of the Horse,* (Butler, J. A., C. M. Colles, S. J. Dyson, S. E. Kold, P. W. Poulos, Eds.), 4th ed., Wiley Blackwell. West Sussex, UK, pp. 301-348.
- COUDRY, V., A. K. ALLEN, J. M. DENOIX (2005): Congenital abnormalities of the bicipital apparatus in four mature horses. *Equine Vet. J.* 37, 272-275.
DOI: 10.2746/0425164054530588
- DYSON, S. (1985): Sixteen fractures of the shoulder region in the horse. *Equine Vet. J.* 17, 104-110.
DOI: 10.1111/j.2042-3306.1985.tb02061.x
- DYSON, S. (1986): Shoulder lameness in horses: an analysis of 58 suspected cases. *Equine Vet. J.* 18, 29-36.
DOI: 10.1111/j.2042-3306.1986.tb03531.x
- DYSON, S. (2009): Lesions of the proximal aspect of the humerus and the tendon of biceps brachii. *Equine Vet. Educ.* 21, 67-70.
DOI: 10.2746/095777309X400621
- DYSON, S. J. (2011): The elbow, brachium, and shoulder. In: *Diagnosis and Management of Lameness in the Horse.* (Ross, M. V., S. J. Dyson, Eds.), 2nd ed., Saunders Elsevier, St. Louis, pp. 456-474.
- ESTBERG, L., S. M. STOVER, I. A. GARDNER, B. J. JOHNSON, J. T. CASE, A. ARDANS, D. H. READ, M. L. ANDERSON, B. C. BARR, B. M. DAFT, H. KINDE, J. MOORE, J. STOLTZ, L. W. WOODS (1996): Fatal musculoskeletal injuries incurred during racing and training in Thoroughbreds. *J. Am. Vet. Med. Assoc.* 208, 92-96.
- FORTIER, L. A. (2012): Shoulder. In: *Equine Surgery.* (Auer, J. A., J. A. Stick, Eds.), 4th ed., Saunders Elsevier, St. Louis, Missouri, pp. 1379-1388.
- HENNEKE, D., G. POTTER, J. KREIDER, B. F. YEATES (1983): Relationship between condition score, physical measurements and body fat percentage in mares. *Equine Vet. J.* 15, 371-372.
DOI: 10.1111/j.2042-3306.1983.tb01826.x
- LEVI, O., B. VAUGHAN, S. M. PUCHALSKI, M. H. MacDONALD (2011): What is your diagnosis? *J. Am. Vet. Med. Assoc.* 238, 431-432.
DOI: 10.2460/javma.238.4.431

- McGLINCHEY, L., M. J. HURLEY, C. M. RIGGS, S. M. ROSANOWSKI (2017): Description of the incidence, clinical presentation and outcome of proximal limb and pelvic fractures in Hong Kong racehorses during 2003-2014. *Equine Vet J.* 49, 789-794.
DOI: 10.1111/evj.12696.
- MEZ, J. C., R. M. DABAREINER, R. C. COLE, J. P. WATKINS (2007): Fractures of the greater tubercle of the humerus in horses: 15 cases (1986-2004). *J. Am. Vet. Med. Assoc.* 230, 1350-1355.
DOI: 10.2460/javma.230.9.1350
- ROHDE, C., D. E. ANDERSON, A. L. BERTONE, E. S. WEISBRODE (2000): Effects of phenylbutazone on bone activity and formation in horses. *Am. J. Vet. Res.* 61, 537-543.
DOI: 10.2460/ajvr.2000.61.537
- TROLINGER-MEADOWS, K. D., L. E. GASCHEN, L. M. RIGGS (2017): What is your diagnosis? *J. Am. Vet. Med. Assoc.* 250, 275-277.
DOI: 10.2460/javma.250.3.275
- TNIBAR, M. A., J. A. AUER, S. BAKKALI (1999): Ultrasonography of the equine shoulder: technique and normal appearance. *Vet. Radiol. Ultrasound* 40, 44-57.
DOI: 10.1111/j.1740-8261.1999.tb01838.x
- WHITCOMB, M. B., S. S. LE JEUNE, M. M. MACDONALD, L. D. GALUPPO, C. E. JUDY (2006): Disorders of the infraspinatus tendon and bursa in three horses. *J. Am. Vet. Med. Assoc.* 229, 549-556.
DOI: 10.2460/javma.229.4.549
- WHITCOMB, M. B. (2009): Ultrasound of the shoulder. In: *Current Therapy in Equine Medicine* (Robinson N. E., K. A. Sprayberry, Eds.), 6th ed., Saunders Elsevier, St. Louis, Missouri, pp. 500-505.

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SAŽETAK

Prikazan je slučaj neuobičajenog prijeloma nadlaktične kosti kod toplokrvnog konja starog osamnaest mjeseci. Ždrijebac je zaprimljen sa znakovima visokog stupnja hromosti na prednjem desnom ekstremitetu u trajanju od pet tjedana. Pri pregledu u hodu je bilo naglašeno skraćenje kaudalne faze koraka. Intraartikularnom analgezijom ramenog zgloba blago je smanjen intenzitet hromosti. Punkcijom je uzeta sinovijalna tekućina čija je kvaliteta upućivala na krvarenje unutar zglobne šupljine. Rendgenskim snimanjem ramenog zgloba u više projekcija nisu jasno utvrđene promjene. Ultrazvučnim pregledom ramenog zgloba uočeni su znakovi tendinitisa tetive dvoglavog nadlaktičnog mišića (m. biceps brachii) i burzitisa bicipitalne burze. Nadalje, nađen

je stepeničasti defekt i nejasno ograničena koštana struktura u proksimalnom dijelu humerusa medijalno što je uputilo na prijelom malog tuberkula humerusa, a potvrđeno je patoanatomskim nalazom. Opisani slučaj naglašava potrebu i važnost ultrazvučne pretrage u slučajevima prijeloma proksimalnih dijelova humerusa s nedovoljno jasnim rendgenskim nalazom.

Ključne riječi: ždrijebac; proksimalni humerus; fraktura; ultrazvuk; hromost
