



Diagnostic Exercise
From The Latin Comparative Pathology Group*

Catastrophic scapular fracture in a stallion

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Clinical History:

A 4-year-old Thoroughbred stallion suffered a fracture of the left thoracic limb while racing. Because of the poor prognosis, the horse was euthanized.

Follow-up questions:

- *Morphologic diagnosis?*
- *Etiopathogenesis?*
- *Risk factors?*

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Consider submitting an exercise! A final document containing this material with answers and a brief discussion will be posted on the CL Davis website:

<https://davisthompsonfoundation.org/diagnostic-exercise/>

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Gross changes:

This animal suffered closed, comminuted, articular, displaced, transverse fracture through the distal end of the spine of the scapula. The fracture line extended distally into the glenoid fossa. There was evidence of a large bone fragment that included most of the scapula. The smallest fragments were missing for the complete reconstruction of the bone (Figure 1). The fracture edges were irregular. In the ventral angle there was a horizontal line that divided the supraglenoid tubercle and reached the edge of the glenoid cavity (Figure 2). The presence of a periosteal callus with a rough surface, 2 cm in diameter (chronic) was observed at the level of the distal aspect of the scapular spine (Figure 3).

Morphologic diagnosis:

Scapula: Closed, comminuted, articular, displaced, transverse fracture through the distal end of the spine, with a chronic periosteal callus.

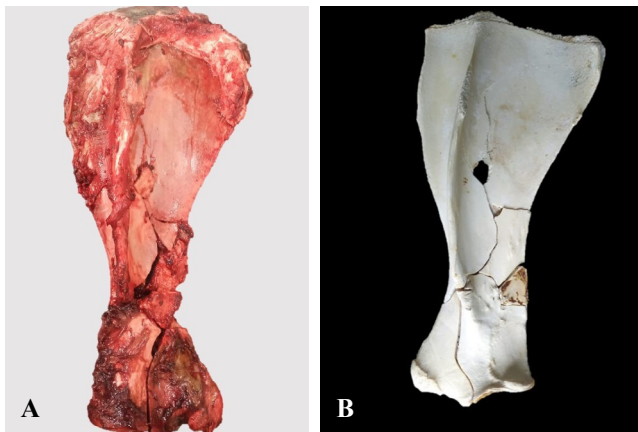


Figure 1. Left scapula. **A.** During the necropsy. **B.** After lye tank treatment.

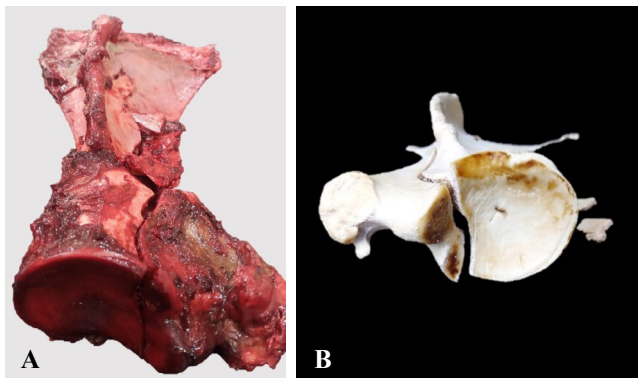


Figure 2: Glenoid fossa of left scapula. **A.** During the necropsy. **B.** After lye tank treatment.

Etiopathogenesis

The chronic periosteal callus is an indication of damage that occurred over time and is concentrated in the sites of greatest bone stress, consequence of loads transmitted from the ground and muscle groups and ligaments during gallop at high speeds. At the microscopic level it can be observed that microdamage due to fatigue causes the death of the osteocytes, thus inducing intracortical bone remodeling (1,7). The problem can arise in the period in which a transient focal osteopenia occurs, characterized by fragile bone tissue, with increased porosity within an area of hyperemia that weakens the bone structure and facilitates initiation of complete scapular fracture and propagation. At this time, pain and lameness are mild or not present (3) and the fracture probably occurs during normal sporting activities (5). Catastrophic scapular fractures are acute, severe and complete; they carry a poor clinical prognosis that almost always leads to euthanasia of the animal (2). Catastrophic complete scapular fractures accounted for 2% of Thoroughbred (TB) racehorse musculoskeletal fatalities in California (4). A typical scapular fracture configuration in racehorses involves the scapular neck and glenoid (4) and pre-existing stress fracture etiopathogenesis has been implicated due to presence of periosteal callus bridging the fracture fragments on the scapular spine (6). The fracture configuration and sites of remodeling provide some insight into the biomechanical loading circumstances that precipitate scapular fracture. Biomechanical circumstances likely to be involved in scapular fracture include 1) mediolateral bending of the scapula that causes high strains at the junction of the spine and the neck and 2) tension of the biceps brachii muscle-tendon on the supraglenoid tubercle and cranial aspect of the neck (6). In the present case, the race, age, sex, fracture configuration and location of the preexisting lesion are consistent with previous reports of catastrophic

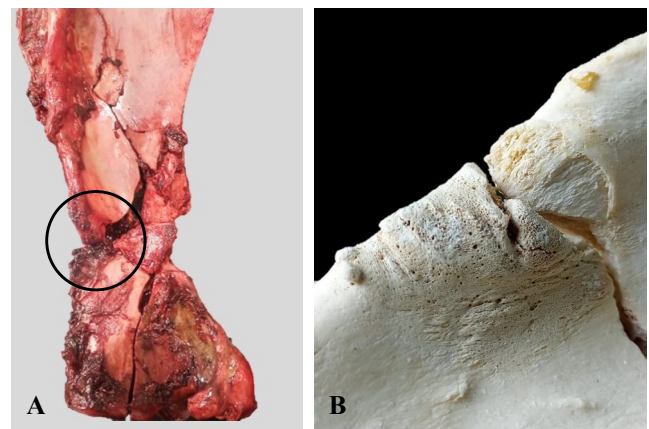


Figure 3: Distal aspect of the spine of the scapula (neck region). **A.** During the necropsy; the ellipse highlights the area of periosteal callus at the distal end of the spine. **B.** After lye tank treatment.

scapular fractures. This complete scapular fracture was pre-disposed by pre-existing periosteal bone proliferation that bridged the transverse fracture line at the distal end of the spine. In this case, the fracture occurred in the left thoracic limb (contrary to what is described in the bibliography for most scapular fractures).

Risk factors

- ✓ Breed
- ✓ Horse age
- ✓ Sex
- ✓ Limb distribution
- ✓ Race type
- ✓ Number of career races
- ✓ Race distance

References:

1. Cardoso L, Herman BC, Verborgt O, Laudier D, Majeska RJ, Schaffler MB. Osteocyte apoptosis controls activation of intracortical resorption in response to bone fatigue. *J Bone Miner Res.* 2009;24(4):597-605. doi:10.1359/jbmr.081210
2. Diab SS, Stover SM, Carvallo F, Nyaoke AC, Moore J, Hill A, Arthur R, Uzal FA. Diagnostic approach to catastrophic musculoskeletal injuries in racehorses. *J Vet Diagn Invest.* 2017a; 29 (4): 405-13. <https://doi.org/10.1177%2F1040638716685598>
3. Entwistle, R.C., Sammons, S.C., Bigley, R.F., Hazelwood, S.J., Fyhrie, D.P., Gibeling, J.C. and Stover, S.M. (2009) Material properties are related to stress fracture callus and porosity of cortical bone tissue at affected and unaffected sites. *J. orthop. Res.* 27, 1272-9.
4. Stover SM, Murray A. The California Postmortem Program: leading the way. *Vet Clin North Am Equine Pract.* 2008; 24(1):21-36. <https://doi:10.1016/j.cveq.2007.11.009>
5. Stover SM. Stress Fracture Diagnosis in Racehorses. En: Robinson's Current Therapy in Equine Medicine. Kim A. Sprayberry, N. Edward Robinson, eds. Seventh Edition, W.B. Saunders, 2015, chapter 202, p. 879-85, <https://doi.org/10.1016/B978-1-4557-4555-5.00202-8>
6. Vallance SA, Spriet M, Stover SM. Catastrophic scapular fractures in Californian racehorses: pathology, morphometry and bone density. *Equine Vet J.* 2011;43(6):676-85. <https://doi:10.1111/j.2042-3306.2010.00346.x>.
7. Verborgt O, Gibson GJ, Schaffler MB. Loss of osteocyte integrity in association with microdamage and bone remodeling after fatigue in vivo. *J Bone Miner Res.* 2000;15(1):60-7. <https://doi:10.1359/jbmr.2000.15.1.60>