



Clinical and radiographic findings of Monteggia fracture in a one-year-old-male mule

Samaneh Ghasemi, Ali Mirshahi, Omidreza Raei Abbasabadi, Negin Rahimdoust

Mozhdehi, Alireza Safarzadeh

Department of Clinical Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran.

ABSTRACT

The elbow joint is between the distal humerus and proximal radius and ulna. In uncommon cases, severe traumatic injury to the elbow may result in concomitant fracture and luxation or subluxation of its structure. The Monteggia fracture is defined as dislocation of radial head associated with proximal ulnar fracture. This injury is rare in the horse and to the authors' knowledge, no previous reports in mule. Concurrent fractures of the ulna and radius can be particularly challenging. Because of the extensive soft tissue and articular cartilage injuries, cases with Monteggia fracture have an unfavorable prognosis. Although, successful surgical management has been documented in some cases. Even though the successful reports of repair of Monteggia fracture, these cases are as pasture-sound animals. This report describes a type I Monteggia fracture in a one-year-old male mule. Clinical examination revealed severe swelling, pain, crepitation and non-weight-bearing lameness. Radiographic evaluation confirmed the Monteggia fracture. Given the little information available regarding Monteggia fracture in equine, a better understanding of treatment of this injury is warranted.

Keywords

Elbow joint, Equine, Luxation, Monteggia fracture, Young mule, Radius, Ulna

Number of Figures: **2**
Number of Tables: **0**
Number of References: **10**
Number of Pages: **5**

Abbreviations

No abbreviations

Introduction

The humeroradial (elbow) joint is between the distal humerus and proximal radius and ulna. The stability of the elbow joint is supported by collateral ligaments, while its joint capsule attaches to the margins of the articular surfaces of the humerus, radius, and ulna bones [1]. In equines, elbow lameness is commonly associated with direct trauma, falls, or even collisions with objects or other animal. In uncommon cases, severe trauma may lead to concomitant luxation of the humeroradial joint and fracture of the proximal part of the ulna, a condition known as a Monteggia fracture [1, 2, 3]. This injury was first described in 1814 by Giovanni Battista Monteggia [4]. Originally Monteggia is rare condition in equines [5, 6, 7, 8] and to the authors' knowledge, this condition has not previously been reported in mule. The present case report describes clinical and radiographic findings of a type I Monteggia fracture in a one-year-old male mule.

Case Presentation

Ethical Considerations

This manuscript reports a clinical case managed as part of routine veterinary care. All diagnostic procedures were performed in accordance with accepted standards of veterinary clinical practice and relevant animal welfare guidelines.

History and clinical finding

A one-year-old 180 kg male mule was referred to the Veterinary Clinic of Ferdowsi University of Mashhad with a history of a sudden acute lameness of the left forelimb.

The mule became trapped by a rope wrapped around a tree and sustained trauma while attempting to escape. On clinical examination a non-weight bearing lameness with a dropped elbow posture of the affected limb was observed. The elbow joint and antebrachium were severely swelled (Figure 1). Palpation of the affected region elicited severe pain, crepitation and bone displacement. Based on the clinical findings, a fracture or dislocation was suspected.

Radiographic Findings and Interpretation

Mediolateral and craniocaudal radiographic views of the left elbow were obtained (X-ray machine (Soyeet SY-HF-110, Soyeet Product, Inc., Kangnam-Ku, Seoul, Gyeonggi, 135-729, Korea, 2.5 mA s, 74 kV)). Radiographs revealed complete anterior luxation of the humeroradial joint associated with a comminuted fracture of the proximal ulna (Figure 2). These radiographic findings were consistent with a type I Monteggia fracture.

Treatment

Surgical correction was recommended and the available treatment options were described with the owner. However, the owner declined surgical intervention.

Results and Discussion

The elbow is a hinge (ginglymus) joint. Articulation of the radial head with the semi-lunar notch of the ulna formed the humeral capitulum. During extension of the elbow joint, the anconeal process of the proximal part of the ulna rests into the olecranon fossa of the humerus. This provides an interlocking mechanism that stabilizes the elbow joint. The radius and ulna are closely associated with each other through four important interosseous ligaments including the cranial, caudal, medial and lateral collateral ligament. These ligaments provide broad-based attachments that distribute the high tensile forces generated during flexion and extension of the elbow joint. Because of these anatomical characteristics, the injuries of the elbow joint are rare, and often involve external trauma or association with a catastrophic event [1].

Monteggia fractures are classified into four types based on the direction of the radial head dislocation and the associated ulnar fracture pattern. Type I consists of anterior radial head dislocation with an ulnar fracture. Type II involves posterior or posterolateral radial head dislocation with an ulnar fracture. Type III is characterized by lateral or anterolateral radial head dislocation with an ulnar fracture. Type IV consists of anterior radial head dislocation with a fracture of both radius and ulna [4, 9].

The pathophysiology of Monteggia fracture in animals has not yet fully understood. The proposed mechanism involves the application of force or trauma to the caudal aspect of the antebrachium while the limb is fully extended and weightbearing [5]. Differential diagnoses for this condition include fractures of the humerus, radius or olecranon, as well as brachial plexus paralysis, all of which can be differentiated radiographically.

Only a limited number of reports describing surgical correction of Monteggia fractures in horses are available in the veterinary literature [5-8]. Management of Monteggia fractures can be challenging in horses because it needs extensive excision and reduction of the radius is difficult. Complete reduction of the radius requires traction supplemented by neuromuscular blockade and the use of a mechanical distractor, followed by the ulnar fracture stabilization using a caudally positioned dynamic compression plate

Type I Monteggia fracture in a mule

(DCP) engaging the radius, with or without additional plate applied to the lateral or craniolateral aspect of the radius [3, 5-7, 10]. However, in addition to ulnar fracture repair, determination of the lateromedial stability of the elbow joint and interdigitation of the three bones is necessary to provide sufficient stability. Although partial damage to one collateral ligament may be amenable to repair, complete disruption of one ligament or disruption of both ligaments substantially worsens the prognosis. In such cases, euthanasia may be warranted [8].

To the authors' knowledge, only five cases of Monteggia fracture in horses have been reported previously. Levine et al. described successful surgical treatment of a Monteggia fracture in a three-year-old Arabian horse using a dynamic compression plate, and reported that this filly was free of any apparent lameness [7]. Trostle et al. reported successful surgical treatment of a 27 month-old Rocky Mountain horse using a DCP. In that case, wound dehiscence and surgical site swelling, lameness and infection developed ten days after surgery. This horse became sound several months after management of these complications, although radiographic examination revealed bony proliferation and dystrophic mineralization along the proximolateral aspect of the ulna and distolateral aspect of the humerus associated with collateral ligament trauma [5]. Jalim et al. reported surgical treatment of a Monteggia fracture in a four-month-old, Anglo-Arab filly using a DCP plate; however, mild flexural deformity and advanced secondary degenerative joint disease subsequently occurred [6]. Janicek reported a fourteen-year-old Tennessee Walking gelding horse with Monteggia fracture that was finally euthanized because of the poor prognosis associated with maintaining elbow joint congruity and stability [8]. In another case with Monteggia fracture, the horse euthanized because of the concurrent radius fracture and the small size of the proximal radial fragment, which precluded adequate fixation [10]. In the present case, different aspects of this condition, including its treatment options, outcomes, prognosis and animal welfare, were fully discussed with the owner; however, the surgical treatment was refused by the owner.

It confirms that one of the possible consequences of elbow injuries, especially after fractures and soft tissue injuries is osteoarthritis [2]. The evidence of this condition may be affected by the degree of articular disruption due to severity of initial trauma [1]. Consequently, degenerative joint disease of elbow joint is generally associated with a guarded prognosis. These patients are as pasture-sound animals.

Recovery from anesthesia presents another challenge; so, it should be assisted for prevention of im-

plant failure, humeroradial luxation or refracture of the ulna [8].

Surgical site infection is another complication of horses undergoing surgical repair of Monteggia fractures and prevention of this condition is necessary [5].

A well-recognized complication of olecranon fracture repair is acquired flexural deformity. Therefore, timely removal of the initial instigating factor including orthopedic implants and prevention of permanent joint capsule contracture are necessary [1].

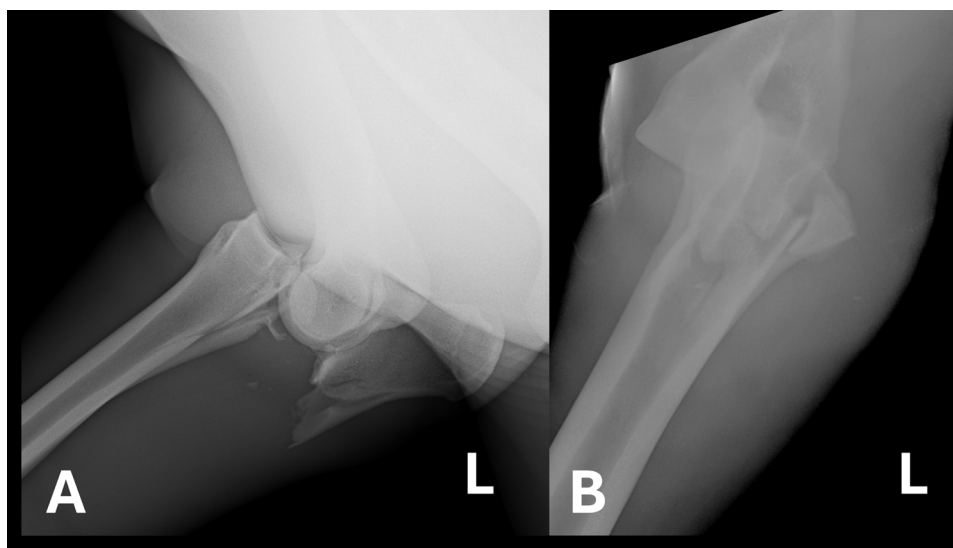
Although the successful reports of repair of Monteggia fracture in horses have been reported, the prognosis of this condition for athletic performance remains guarded. The extensive destruction of soft tissue, articular cartilage and joint capsule, types of bone fracture, osteoarthritis and limb deformity often preclude a successful outcome and surgical management preserve the horse for pasture or breeding soundness [5, 6].



Figure 1.
Left forelimb non-weight bearing lameness with severe swelling of elbow region.

Authors' Contributions

All authors have participated sufficiently in this study reported in the manuscript and approved the manuscript and this submission.

**Figure 2.**

Radiographic images obtained in mediolateral (A) and craniocaudal (B) projections of the left forelimb. The images demonstrate a Type I Monteggia fracture, characterized by a spiral and comminuted fractures of the proximal ulna associated with proximal and cranial luxation of the radial head, along with caudal displacement of the proximal ulnar fragment. Luxation of the humeroradial joint is evident, with the humeral condyle positioned caudal to the proximal radial metaphysis.

Acknowledgements

The authors received no financial support for this article. The authors declare that no artificial intelligence (AI)-assisted technologies were used in the preparation of this manuscript.

Competing Interests

The authors declare that there is no conflict of interest.

Reference

1. Hu AJ, Scheuch B, Cannon J. Repair of a Complete Luxation of The Humeroradial Joint in a Foal with Securos Suture. *Equine Veterinary Education*. 2007;19(8): 424-8. Doi: 10.2746/095777307X220498.
2. Baccarin RYA. Accessing the equine elbow joint: new insights on an old approach. *Vet Rec*. 2016;179(7):170-72. Doi:10.1136/vr.i4427.
3. Wright IM. Fractures of the ulna. In: Wright I, editor. *Fractures in the horse*. 1st.ed. John Wiley & Sons Ltd: 2022. p. 561,580.
4. Delpont M, Louahem D, Cottalorda J. Monteggia injuries. *Orthop Traumatol: Surg Res*. 2018; 104 (1S):S113-20. Doi:10.1016/j.otsr.2017.04.014.
5. Trostle SS, Peavey CL, King DS, Hartmann FA. Treatment of Methicillin-resistant *Staphylococcus epidermidis* Infection Following Repair of an Ulnar Fracture and Humeroradial Joint Luxation in a Horse. *J Am Vet Med Assoc*. 2001; 218(4):554-9. Doi: 10.2460/javma.2001.218.554.
6. Jalim SL, McKinnon AO, Russell TM. Repair of a Type IV Monteggia Fracture in a foal: Case Report. *Aust Vet J*. 2009;87(11):463-6. Doi:10.1111/j.1751-0813.2009.00508.x.
7. Levine SB, Meagher DM. Repair of an Ulnar Fracture with Radial Luxation in a Horse. *Vet Surg*. 1980;9(2):58-60. Doi: 10.1111/j.1532-950X.1980.tb01653.x.
8. Janicek JC. What Is Your Diagnosis? Type 1 Monteggia fracture. *J Am Vet Med Assoc*. 2005;227(11):1743-4. Doi:10.2460/javma.2005.227.1743.
9. ElKhouly A, Fairhurst J, Aarvold A. The MonteggiaFracture: Literature Review and Report of a New Variant. *J Orthop Case Rep*.2018;8(4):78-81. Doi:10.13107/jocr.2250-0685.1170.
10. Nixon AJ. Equine fracture repair. In: Nixon AJ, editor. *Equine Fracture Repair*. 1st ed. John Wiley & Sons: 2019; p. 555.

COPYRIGHTS

©2026 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers.

**How to cite this article**

Ghasemi S, Mirshahi A, Raei Abbasabadi O, Rahimdoust Mozhdehi N, Safarzadeh A. Clinical and radiographical findings of Monteggia fracture in a one-year-old-male mule. Iran J Vet Sci Technol. 2026; 18(3): 72-76.

DOI: <https://doi.org/10.22067/ijvst.2026.97447.1635>

URL: https://ijvst.um.ac.ir/article_48495.html