

Clinical and radiological evaluation of bucked shin cases in race horses

Evaluación clínica y radiológica de casos de tibia arqueada en caballos de carreras

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ABSTRACT

Bucked shin is a common condition that primarily affects young racing and fast-walking horses and causes exercise intolerance. It is usually characterized by pain and swelling in the dorsomedial surface of metacarpal III. This study contributes to the practice of horse medicine by evaluating the cases of bucked shin encountered during a racing season. The study material consisted of thoroughbred Arabian and English racehorses (n=19) aged 2-4 years old brought to the Diyarbakır Hippodrome Directorate Horse Hospital with complaints of stumbling, swelling on the dorsal and dorsomedial surface of the metacarpus, sensitivity, frequent foot changes during training, and training intolerance during a racing season. Based on the clinical and radiological examinations of the horses included in the study, local periostitis and osteolysis were determined in 7 cases, stress fracture in 2 case, exostosis in 7 cases, and thickening of the bone cortex in 6 cases. It was learned from the horse owner that 2 4-year-old horses evaluated within the scope of the study had been treated before, but had relapsed. Relapse occurred in 1 case treated within the scope of the study. In one case, an open metacarpus fracture occurred during a race after being diagnosed with bucked shin. As a result, bucked shin cases can be frequently encountered in young and under-trained horses and this situation should be taken seriously. Since ignoring the stress and lesions in the metacarpal III bone can cause fractures and major disasters, it can be said that this situation can be prevented by exercising the horse in controlled and suitable conditions during the foaling period.

Key words: Distal extremity; metacarpus; periostitis; racehorse

RESUMEN

La tibia arqueada es una patología común que afecta principalmente a caballos jóvenes de carreras y de paso rápido, y causa intolerancia al ejercicio. Generalmente se caracteriza por dolor e inflamación en la superficie dorsomedial del tercer metacarpiano. Este estudio tuvo como objetivo, contribuir a la práctica de la medicina equina mediante la evaluación de los casos de tibia arqueada detectados durante una temporada de carreras. El material de estudio consistió en caballos de carreras pura sangre árabes e ingleses (n=19) de 2 a 4 años de edad, llevados al Hospital Ecuestre de la Dirección del Hipódromo de Diyarbakır con síntomas de tropiezos, inflamación en la superficie dorsal y dorsomedial del metacarpo, sensibilidad, cambios frecuentes de pie durante el entrenamiento e intolerancia al entrenamiento durante una temporada de carreras. Con base en los exámenes clínicos y radiológicos de los caballos incluidos en el estudio, se determinó periostitis local y osteólisis en 7 casos, fractura por estrés en 2 casos, exostosis en 7 casos y engrosamiento de la cortical ósea en 6 casos. Uno de los propietario informó que dos de sus caballos de 4 años evaluados en el marco del estudio habían recibido tratamiento previo, pero habían sufrido una recaída. Asimismo, un caso tratado en el marco del estudio presentó una recaída. En un caso, se produjo una fractura expuesta de metacarpo durante una carrera tras ser diagnosticado con tibia arqueada. Por lo tanto, los casos de tibia arqueada son frecuentes en caballos jóvenes y poco entrenados, y esta situación debe tomarse en serio. Dado que ignorar el estrés y las lesiones en el tercer metacarpiano puede causar fracturas y graves consecuencias, se puede afirmar que esta situación se puede prevenir ejercitando al caballo en condiciones controladas y adecuadas durante el período de parto.

Palabras clave: Extremidad distal; metacarpo; periostitis; caballo de carreras

INTRODUCTION

Bucked shin is a painful condition caused by periostitis that occurs due to stress and fatigue on the dorsal surface of metacarpal III and/or metatarsal III in young racehorses and fast-walking horses (*Equus caballus*) [1, 2]. It is referred to as dorsal metacarpal disease in some sources. Because it is more frequently defined as periostitis characterized by pain on the dorsal and dorsomedial surfaces of the metacarpal III bone [1, 3].

Bucked shin is usually observed bilaterally and the extremities are usually affected in order. The direction in which racehorses are trained is important. For example, in horses trained and raced clockwise, the right extremity is affected first, followed by the left extremity [4].

The metacarpus is an integral part of the shock-absorbing, weight-bearing system of the forelimb. Excessive body weight and the fact that the majority of the body weight is carried by the front extremities, the thin structure of the metacarpus relative to the body structure and weight, among others, cause stress and fatigue in the metacarpus in young racehorses in training [4].

The metacarpal bone is less rigid in young horses and therefore, greater strains occur in the dorsal cortex during high-speed exercise than in older horses. This situation causes pain as a result of high-tension cyclic fatigue caused by excessive stress on the bone on the dorsal surface of the metacarpus. A new bone layer formation can form on the stress line in the stressed metacarpus. This new bone tissue is weaker. This situation causes inflammation in the periosteum and pain due to inflammation [1, 3].

Bucked shin is one of the most common causes of loss in young racehorses during training and race days. This condition, commonly known as “bucked” or “sore” shinbone, is initially very painful. It usually occurs early in training and can cause concern for horse owners [3]. The aim of this study is to evaluate cases of bucked shin in young racehorses that do not have a specific treatment during a race season (7 months) and to contribute to equine practice.

MATERIALS AND METHODS

The study material consisted of 19 racehorses of Arabian and English racehorses and 2-4 years old brought to the Diyarbakır Hippodrome Directorate Equine Hospital with complaints of stumbling during racing and exercise, frequent foot changes, local swelling, curvature (convexity) and local tenderness on the dorsal surface of metacarpal III.

After clinical examination of the horses, radiographs were taken with a CR X-ray device (Fujifilm FCR Prima T2 Veterinary Set, Japan) in the mediolateral, dorsopalmar lateromedial oblique positions and horses diagnosed with bucked shin were included in the study. Periostitis, exostosis, and thickening of the bone cortex were determined on the radiograph.

All but one case diagnosed with bucked shin were treated. Cold hydrotherapy, 3 doses of local subcutaneous corticosteroid (Dexamethasone, Dekort ampoule 8 mg/2 mL, Deva, Türkiye)

injections every other day (d), rest and controlled exercise after treatment, and a longer period of rest (1 month) was recommended for cases with stress fractures. In cases where bone curvature (convexity) and thickening of the bone cortex were determined, cold hydrotherapy and 3 doses of nonsteroidal anti-inflammatory injections (Phenylbutazone, Equi-Butazone, Alivira, Türkiye) were applied until local heat and regional inflammation symptoms were eliminated, then cryosurgery was performed and a protective dressing was applied for 1 week.

In cases where bone growth was formed, point cauterization was performed after rest and medical treatment and a protective dressing was applied for 10 d. Protective dressings were renewed at 3-d intervals. During the protective dressings and until the wounds healed, the horses were tied up and suspended.

After the cryotherapy and cauterization procedures, a protocol of 1 week of complete rest, 1 week of walking, and 1 week of riding was applied to the horses, and then gradual training (gradual from light to strenuous exercise) was recommended.

In cases with stress fractures, the rest period was kept longer. After the fracture healing was achieved in radiological controls, they were allowed to train.

RESULTS AND DISCUSSION

The 19 horses included in the study were Purebred Arabians (n=10) and English horses (n=9). 8 of the Arabian horses were 3 years old and 2 were 4 years old. All of the English horses were 2 years old. It was learned from the anamnesis that the 4-year-old Arabian horses had bucked shin after starting their first intensive exercises and had been treated before, but had relapsed again.

Clinical examination revealed that the cases mostly occurred on the dorsomedial side of the metacarpus and all had local pain. Regional warmth was present in all cases except for the 2 cases that recurred. Radiographic examination revealed local periostitis on the dorsomedial side of the metacarpus in 7 cases (FIG. 1), stress fractures in 2 cases (FIG. 2), bone proliferations in 7 cases, and thickening of the bone cortex in 6 cases.

All of these findings were also present in cases where they occurred together. In one case (FIG. 2), stress fracture, bone proliferation and thickening of the bone cortex were detected together, and in another case (FIG. 3), local periostitis and stress fracture were detected.

All cases were observed in the front extremities. It was determined to be unilateral in 13 cases and bilateral in 6 cases. In one case in which periostitis was detected in radiographic examination and treatment was not requested by the patient's caregiver (FIG. 1), an open metacarpus fracture occurred while running a race 2 weeks after the diagnosis was made.

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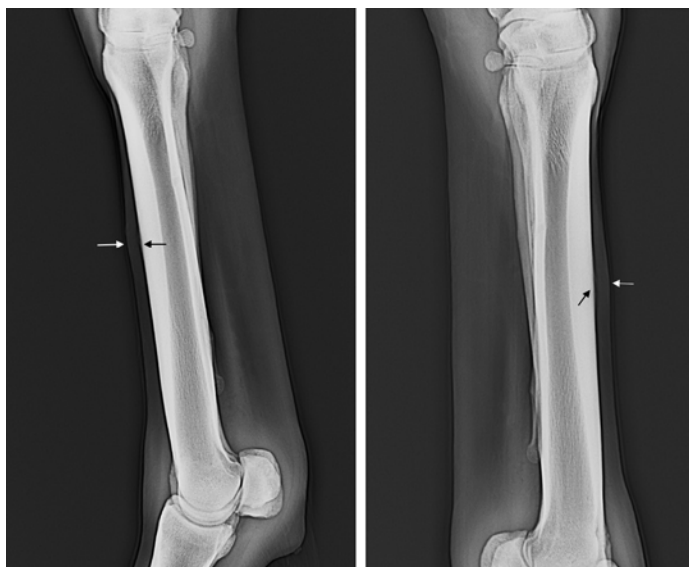


FIGURE 1. Radiographs of a bilateral bucked shin case detected in a 2-year-old English horse. Black arrows show local periostitis on the metacarpal surface, white arrows show swelling and curvature (convexity) on the skin surface



FIGURE 2. Radiogram of a bucked shin case detected in a four-year-old Arabian horse. In this case, there is thickening of the bone cortex between the thin white arrowheads, the thick white arrow shows local bone proliferation, and the black arrow shows a stress fracture formed due to the bucked shin



FIGURE 3. Radiograph of a case with local periostitis and stress fracture in a three-year-old Arabian horse. The white arrowheads show signs of irregularity and inflammation in the periosteum, while the black arrow shows the stress fracture due to damage to the bucked shin and bone

In one of the 5 cases with local periostitis and treated with hydrotherapy and local corticosteroids, cryosurgery was performed as a second treatment because of the persistence of local pain and exercise intolerance. In the 2 cases with recurrence at the age of 4, it was determined in the anamnesis that cryosurgery had been performed before, and point cauterization was applied as a second treatment. No recurrence was encountered after the treatments.

Dorsal metacarpal pain is one of the most common injuries affecting young racehorses and sometimes horses that have not been exercised or competed intensively. It is usually observed more in the forelimbs [1, 3, 5, 6, 7]. Initially, lameness may not be seen, but there is tenderness on palpation of the dorsal and/or dorsomedial cortex of metacarpal III [3, 5]. It is reported that it constitutes 24.1% of all musculoskeletal injuries in these horses [8] and that approximately 70% of horses starting competition exercise may be affected [3, 9].

The young horses evaluated in this study and the pain on the dorsomedial surface of metacarpal III are parallel to these studies. However, since its prevalence among musculoskeletal diseases was not examined, comparison could not be made. The disease has an acute onset and becomes most pronounced after intense exercise. There is usually a minimal change in the horse's

gait, especially after short rest periods. A visible convex swelling covering the surface of the affected part of the metacarpus can be seen. On palpation, the dorsal cortex of metacarpal III is painful to pressure.

Often the horse withdraws its leg in response to pain [1, 3]. Sometimes no pathology can be detected on radiographs taken in the acute phase; however, fractures and minimal superficial cortical osteolysis, periostitis can sometimes be detected [1, 10]. In this study, local periostitis and mild osteolysis were detected in 6 cases with local temperature increase and tenderness, and no fractures were encountered.

It is emphasized that the reason for pain in the metacarpus in young horses is that the bone of the metacarpus is softer than in adult horses and therefore, stress occurs in the dorsal cortex during high-speed exercises. It is reported that pain occurs due to excessive stress in the dorsal and dorsomedial parts of the metacarpus and causes the formation of a new bone layer in this region and that the newly formed bone tissue is weak and may be prone to fracture [1, 3].

Gray *et al.* [11] and Riggs [12] emphasized in their studies that the causes of metacarpal bone fractures are not fully known, catastrophic fractures in racehorses are not spontaneous events, and stress fractures may be related to bone damage and repair. A relationship between complete fractures and dorsal cortex stress fractures has also been reported in some studies [11, 13, 14].

Metacarpal III is one of the bones most frequently affected by stress fractures. In addition, when racehorses that start training are started on high-speed exercises, the dorsal cortex of MC III is usually affected, and as a result, dorsal cortex stress fractures may develop in some horses [11].

In this study, stress fractures occurred in 2 cases, and an open fracture was detected in 1 case during the race. It can be said that in the case where an open fracture occurred, it may be due to the patient's reluctance to receive treatment and continuing to do intense exercise, and that this situation may be due to the weakening of metacarpus III due to inflammation.

The diagnosis of bucked shin can be easily made with clinical examination and auxiliary imaging techniques. Radiography can help identify pathologies formed in metacarpal III [1, 3]. For this purpose, radiographs can be taken in dorsopalmar (DP), lateral-medial (LM), dorsal palmar lateral medial oblique (DPLMO) and dorsal palmar medialolateral oblique (DPMLO) positions [1, 3, 15]. DPLMO and LM best determine dorsal medial bone proliferation, and DPMLO and LM best determine dorsal lateral cortex fractures. Horses that continue to exercise and compete with bucked shin pain are predisposed to fracture development [1, 3].

In this study, radiographs were mostly taken in LM and DPLMO positions, and most of the lesions were determined in the dorsomedial part of metacarpus III. Therefore, in cases of bucked shin, radiographic examination may be recommended in lateromedial and dorsopalmar oblique positions.

Racehorses have thin and delicate legs according to their body structure. McCarthy and Jeffcott [16] emphasized in their study that horses that completed the training program

without any fractures had more mineral bone content and that the exercises that the foals did with age significantly increased the mineral density of the metacarpal bone and that lack of exercise delayed normal bone development. During the rigorous training of young racehorses, the stress on the long bones often increases and the biological response may cause a curvature on the dorsal surface of metacarpal III without inflammation.

When the curvature on the dorsal surface of the metacarpus increases or progresses, intensive exercise cannot be performed even though race training is very important for the horse's career. Therefore, early diagnosis is important [3, 10, 17].

In this study, thickening of the bone cortex and curvature on the dorsal surface of the metacarpus were detected in 6 cases. This may be due to the fact that the patients' caregivers did not notice the bone fatigue in the metacarpus due to the absence of lameness complaints and this fatigue may have resulted in thickening of the bone cortex after ongoing training.

Age, breed, genetic characteristics, race track, age of starting exercise and intensity, among others are effective in the etiology of scurvy. In a study conducted by Crevier-Denoix *et al.* [18], it was reported that a synthetic track caused lower hoof acceleration than grass and soil and also changed the angle at which the hoof entered the surface, Setterbo *et al.* [19] reported that the soil surfaces commonly used in the United States were the hardest and that dorsal metacarpal diseases were more common.

A study conducted by Davies [20] reported that the track surface had no effect on the frequency of dorsal metacarpal diseases in 16 to 19 month old Thoroughbreds in training. In this study, races and exercises were performed on a synthetic sand track. Since it was the only sand track belonging to the Diyarbakır Hippodrome Directorate, comparisons could not be made with other tracks.

CONCLUSION

As a result, in horses that are training for competition, high loads can create low cyclic fatigue in the bone, which can lead to microdamage or eventual bone failure. Horses with painful metacarpus should not be considered to lose a race day, and pain should not be taken lightly, and sufficient rest should be given to foals preparing for competition. In addition, a good preparation of the exercise program for foals preparing for competition can prevent this situation and training on soft ground can be recommended.

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Availability of data and materials

The data that support the findings of this study are available on request from the corresponding author (EÇ).

Bucked shin cases in race horses / Çatalkaya y Ersöz-Kanay

Conflict interests statement

The authors declare that they have no conflicting interests.

Informed consent

It is declared that this study, whose information is given above, is among the studies that do not require ethics committee approval, since it is a retrospective study.

BIBLIOGRAPHIC REFERENCES

- [1] Bertone AL. Metacarpus and metatarsus. In: Baxter GM, Editor. Adams & Stashak's Lameness in Horses. 6th Ed. Wiley Blackwell: USA. 2011. p. 1182-1193.
- [2] Yanmaz LE, Okumuş Z. Thermographic assessment of extremity temperature alterations of cases with bucked shin complex, splints, carpal osteoarthritis and sesamoiditis in sport horses. Erciyes Univ. Vet. Fak. Derg. [Internet]. 2018 [cited 22 May 2025]; 15(1):41-45. Available in: <https://goo.su/GzYdpc0>
- [3] Ersöz-Kanay B, Çatalkaya E, Arserim NB, Ketani MA, Demirtaş B. Clinical and Radiological Evaluation of Distal Extremity Lesions in Racehorses. Rev. Cientif. FCV-LUZ. [Internet]. 2024; 34(1):e34321. doi: <https://doi.org/p6xr>
- [4] Couch S, Nielsen B. A review of dorsal metacarpal disease (bucked shins) in the flat racing horse: prevalence, diagnosis, pathogenesis, and associated factors. J. Dairy Vet. Anim. Res. [Internet]. 2017 [cited 2 June 2025]; 5(6):228-236. Available in: <https://goo.su/06BWZBW>
- [5] Michelotto BL, Rocha RM, Michelotto Jr PV. Thermographic detection of dorsal metacarpal/metatarsal disease in 2-year-old thoroughbred racehorses: a preliminary study. J. Equine Vet. Sci. [Internet]. 2016; 44:37-41. doi: <https://doi.org/f832nk>
- [6] Carpenter RS. How to treat dorsal metacarpal disease with regional tiludronate and extracorporeal shock wave therapies in thoroughbred racehorses. Proceedings of the 58th Annual Convention of the American Association of Equine Practitioners. 2012 Dec 1-5. Anaheim, USA: AAEP Proceedings. 2012; 58:546-549. Available in: <https://goo.su/FD9Nrfa>
- [7] de Olivera FG, Brass KE, de La Corte FD, da Silva JHS, Silva CAM. Periostite metacarpiana dorsal: incidência e fatores pré-disponentes. Braz. J. Vet. Res. Anim. Sci. [Internet]. 2006; 43(2):233-241. doi: <https://doi.org/p6xt>
- [8] Cogger N, Perkins N, Hodgson DR, Reid SWJ, Evans DL. Risk factors for musculoskeletal injuries in 2-year-old Thoroughbred racehorses. Prev. Vet. Med. [Internet]. 2006; 74(1):36-43. doi: <https://doi.org/c9mjqx>
- [9] Nunamaker DM. On bucked shins. Proceedings of the 48th Annual Convention of the American Association of Equine Practitioners. 2002 Dec 4-8. Florida, USA: AAEP proceedings. 2002; 48:78-89. Available in: <https://goo.su/vxigje>
- [10] Palmer SE. Treatment of dorsal metacarpal disease in the thoroughbred racehorse with radial extracorporeal shock wave therapy. Proceedings of the 48th AAEP Annual Convention; 2002 December 4-8; Orlando, FL, USA. Lexington, KY, USA: AAEP proceedings. 2002; 48:318-321. Available in: <https://goo.su/8iBM3>
- [11] Gray SN, Spriet M, Garcia TC, Uzal FA, Stover SM. Preexisting lesions associated with complete diaphyseal fractures of the third metacarpal bone in 12 Thoroughbred racehorses. J. Vet. Diagn. Investig. [Internet]. 2017; 29(4):437-441. doi: <https://doi.org/gbnvvr>
- [12] Riggs CM. Fractures-a preventable hazard of racing Thoroughbreds? Vet. J. [Internet]. 2002; 163(1):19-29. doi: <https://doi.org/br5ppz>
- [13] Dyson SJ. Proximal metacarpal and metatarsal pain: a diagnostic challenge. Equine Vet. Educ. [Internet]. 2003; 15(3):134-138. doi: <https://doi.org/cdf6dz>
- [14] Ramzan PH. Transverse stress fracture of the distal diaphysis of the third metacarpus in six Thoroughbred racehorses. Equine Vet. J. 2009; 41(6):602-605. doi: <https://doi.org/cmc5sr>
- [15] İzci C, Erol M, Gökşahin E. Clinical and Radiological Evaluation of the Bone Lesions in Lower Extremity and Foot Region in Draft Horses. Erciyes Univ. Vet. Fak. Derg. [Internet]. 2018; 15(1):30-36. Available in: <https://goo.su/XOBdTOT>
- [16] McCarthy RN, Jeffcott LB. Effects of treadmill exercise on cortical bone in the third metacarpus of young horses. Res. Vet. Sci. [Internet]. 1992; 52(1):28-37. doi: <https://doi.org/dn8pxz>
- [17] Tsubata T, Suzuyama H, Chiba K, Mita H, Tamura N, Matsukawa M. Axial transmission technique for screening bucked shin in a horse leg. Jpn. J. Appl. Phys. [Internet]. 2023; 62(SJ):SJ1026. doi: <https://doi.org/p6x2>
- [18] Crevier-Denoix N, Falala S, Holden-Douilly L, Camus M, Martino J, Ravary-Plumioen B, Vergari J, Desquilbet L, Denoix JM, Chateau H, Pourcelot P. Comparative kinematic analysis of the leading and trailing forelimbs of horses cantering on a turf and a synthetic surface. Equine Vet. J. [Internet]. 2013; 45(S45):54-61. doi: <https://doi.org/f5j6dt>
- [19] Setterbo JJ, Garcia TC, Campbell IP, Reese JL, Morga JM. Hoof accelerations and ground reaction forces of Thoroughbred racehorses measured on dirt, synthetic, and turf track surfaces. Am. J. Vet. Res. [Internet]. 2009 [cited 18 June 2025]; 70(10):1220-1229. Available in: <https://goo.su/oo64H>
- [20] Davies HM. The effects of different exercise conditions on meta carpal bone strains in Thoroughbred Racehorses. Pferdeheilkunde. [Internet]. 1996 [cited 18 June 2025]; 12(4):666-670. Available in: <https://goo.su/JSwjdv>