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DOENÇAS DO SISTEMA LOCOMOTOR DE EQUÍDEOS NA ROTINA CLÍNICA DO HOSPITAL VETERINÁRIO DA UFCG

Patos/PB
2020

Julie Heide Nunes Paz

Doenças do sistema locomotor de equídeos na rotina clínica do Hospital Veterinário da UFCG

Dissertação submetida ao Programa de Pós-Graduação em Ciência e Saúde Animal, da Universidade Federal de Campina Grande, como requisito parcial para obtenção do grau de Mestre em Ciência e Saúde Animal.

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DEDICATÓRIA

Aos meus Pais!
Albérico de Amorim e Joseleide Nunes
Obrigado pelo amor, os cuidados, o apoio e a confiança de sempre.

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RESUMO

A dissertação inclui dois artigos relacionados a doenças do sistema locomotor. O primeiro é referente a um estudo retrospectivo de afecções do sistema locomotor de equídeos atendidos no Hospital Veterinário Universitário "Prof. Dr. Ivon Macedo Tabosa" do Centro de Saúde e Tecnologia Rural da Universidade Federal de Campina Grande (HVU/CSTR/UFCG), Patos - PB, entre o período de agosto de 2009 à julho de 2019. Foi realizada uma revisão de 1.052 prontuários, onde o critério de inclusão foram os casos de lesões do sistema locomotor ou que causaram claudicação, a fim de determinar a prevalência dessas lesões, suas etiologias e fatores predisponentes em diferentes categorias de idade e atividades exercidas. Para tanto, os casos foram divididos em 4 grupos: adultos de esporte, trabalho e lazer, e jovens menores de 3 anos. A casuística, os membros afetados e a ocorrência dessas lesões por grupo, além do número de óbitos, foram submetidos a uma análise de significância e risco de ocorrência, através do Teste de Qui-Quadrado (X^2) e uma estimativa pontual e intervalar da Odds Ratio (OR). Constatando-se uma maior chance de comprometimento em membro pélvico no grupo de lazer e de membro torácico e pélvico no de esporte. Das estruturas do aparelho locomotor, a frequência de lesões ligamentares foi baixa no grupo jovem e alta no grupo de esporte. Lesões articulares tiveram risco de ocorrência maior em jovens. Nesse grupo, as lesões de casco apresentaram baixo risco de ocorrência, assim como as feridas e pitiose, que causaram claudicação, no grupo de esporte. Sobre o desfecho dos casos, ocorreram 104 (9,9%) óbitos, com alto risco em animais com lesão óssea, predominando fraturas de óssos longos (59/104 - 56,73%) e lesões na coluna, especialmente nos jovens. Entre os animais com lesões nos tendões, o risco de morte foi baixo. No segundo artigo foram relatados cinco casos de equinos atendidos no HVU/ CSTR/ UFCG, com lesões dos tendões extensores na região radiocárpica. O objetivo foi caracterizar seus aspectos clínicos e ultrassonográficos para fins de diagnóstico, visto que há poucos relatos atuais na literatura, especialmente quanto às imagens ultrassonográficas. Dois casos relatados envolviam o tendão do músculo extensor digital comum, com lesões de tenossinovite aguda e crônica, e três envolvendo o tendão do músculo extensor radial do carpo, com tendinite, tenossinovite séptica e ruptura. Conclui-se que a idade e tipo de atividade exercida tem impacto direto na prevalência de determinadas lesões do sistema locomotor. Embora a maioria tenha sido de etiologia traumática, o manejo inadequado teve uma importante influência. Atualmente, lesões de tendões extensores são poucos relatados na literatura, principalmente quanto às imagens ultrassonográficas, essencial para o diagnóstico e tratamento adequado.

Palavras-chaves: afecções locomotoras; cavalo; tendinites dos extensores; ultrassom; vaquejada

ABSTRACT

The dissertation includes two articles related to diseases of the locomotor system. The first refers to a retrospective study of diseases of the equidae locomotor system treated at the University Veterinary Hospital "Prof. Dr. Ivon Macedo Tabosa" of the Centro de Saúde e Tecnologia rural at the Federal University of Campina Grande (HVU/ CSTR/ UFCG), Patos – PB, between the periods of August 2009 to July 2019. A review of 1.052 medical records was performed, where the inclusion criteria were the cases of injuries of the locomotor system or that caused lameness, to determine the prevalence of these injuries, their etiologies and predisposing factors in different age categories and performed activities. Therefore, the cases were divided into 4 groups: adults of sports, work and leisure and young, under 3 years. The Casuistry, the affected limbs and the occurrence of these injuries by group, beyond the number of deaths, were submitted to an analysis of significance and risk of occurrence, through the Chi-Square (X^2) Test and a point and interval estimate of the Odds Ratio (OR). It was observed a greater chance of pelvic limb involvement in the leisure group and of the thoracic and pelvic limb in the sport group. Among the structures of the locomotor system, the frequency of ligament injuries was low in the young group, and high in the sports group. Joint injuries were at higher risk for young. In this group, hoof injuries presented a low risk of occurrence, such as wounds and pythiosis, which caused lameness, in sport group. Concerning the outcome of the cases, 104 (9,9%) deaths occurred, with high risk in animals with bone injuries, prevailing long bone fractures (59/104 - 56,73%), and spine injuries, especially in young equidae. Among animals with tendon injuries, the risk of death was low. In the second article, five cases of horses treated at HVU/ CSTR/ UFCG were reported, with injuries to the extensor tendons in the radiocarpal region. The objective was to characterize its clinical and ultrasound aspects for diagnostic purposes, since there are few current reports in the literature, especially regarding ultrasound images. Two reported cases involved the common digital extensor muscle tendon, with acute and chronic tenosynovitis lesions, and three involving the radial carpal extensor muscle tendon, with tendinitis, septic tenosynovitis, and rupture. It is concluded that age and type of activity exerted have direct impact on the prevalence of injuries in the locomotor system. Although most were traumatic etiology, inadequate management had an important influence. Currently, injuries to extensor tendons are rarely reported in the literature, especially regarding ultrasound images, essential for the diagnosis and adequate treatment.

Keywords: extensor tendonitis; horse; locomotor disorders; ultrasound; vaquejada

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LISTA DE ABREVIATURAS

CDEMT	Common digital extensor muscle tendon
CI	Confidence interval
CSTR	Centro de Saúde e Tecnologia Rural
ECRMT	Extensor carpi radialis muscle tendon
F	Female
HV	Hospital Veterinário
LTL	Left thoracic limb
M	Male
MB	Mixed Breed
MC	Male castrated
MCLA	Medical Clinic of Large Animals
NI	Not informed
OR	Odds Ratio
P	Level of significance
PB	Paraíba
PL	Pelvic limb
QM	Quarter mile
RTL	Right thoracic limb
TL	Thoracic limb
UFCG	Universidade Federal de Campina Grande
US	ultrasound
X^2	Chi-Square Test

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INTRODUÇÃO GERAL

A criação de equídeos, como uma tradição antiga, não só movimenta a economia como também está inserida na cultura brasileira. Desde sua domesticação, os cavalos, muares e asininos são utilizados em diversas atividades na sociedade, onde são destinados ao trabalho, esporte ou lazer.

Os asininos e muares, são geralmente utilizados como animais de tração (carroça) ou encontrados como errantes nos grandes centros urbanos ou regiões periféricas, sendo frequentemente propensos a acidentes automobilísticos ou maus tratos. Em um estudo retrospectivo, realizado por Pessoa et al. (2014), de 200 asininos e 58 muares atendidos em um período de 10 anos (2002-2012), no HVU/UFCG, foi constatada uma maior ocorrência de lesões de natureza traumática, sendo o aparelho musculoesquelético o segundo mais afetado, em 30% dos casos de asininos e 29% em muares, ficando para trás apenas do sistema tegumentar.

Os cavalos geralmente são submetidos a atividades equestres que vão desde corridas, saltos e a lida com gado, seja na condução de rebanho bovino a campo ou em competições. Essas englobam apartação, laço individual, laço comprido, pega de boi e vaquejada, a maioria certificada pela Associação Brasileira de Quarto de Milha (ABQM). Sendo a vaquejada a mais frequente na região Nordeste, em que os animais são submetidos a uma carga de trabalho diferenciada das outras modalidades equestres, além de ser uma modalidade esportiva pouco estudada no meio científico.

É evidente que esses animais passam por um inadequado manejo nutricional e atividades intensas, sendo muitas vezes os fatores predisponentes à ocorrência das lesões osteomusculares, levando a diminuição de desempenho ou a interrupção precoce da carreira (THOMASSIAN, 2005; FRANÇA, et al., 2013).

Das lesões do sistema locomotor de equinos, as tendinites são as mais comumente diagnosticadas em animais de esporte, normalmente acometendo os tendões flexores (THOMASSIAN, 2005). Sendo escassos relatos atuais de tendinites dos extensores na literatura, especialmente quanto às referências ultrassonográficas, o que é imprescindível para o diagnóstico dessas lesões.

A realização de um estudo retrospectivo tem uma importância significativa na clínica, por permitir o conhecimento da etiologia de determinadas lesões, auxiliando não só no diagnóstico primário como também na conscientização para preveni-las.

A dissertação tem como objetivo a realização de um estudo dos casos clínicos de afecções do sistema locomotor diagnosticadas na CMGA/HVU/UFCG, durante o período de agosto de 2009 à julho de 2019. A mesma é composta por dois artigos, o primeiro intitulado: "Retrospective study of lesions of the locomotor system in equidae by age category and activities - Veterinary Hospital / UFCG", submetido à revista *Research in Veterinary Science*, determinando a prevalência e relações epidemiológicas dessas lesões. E o segundo artigo, intitulado: "Diagnosis of Injuries to Extensor Tendons of the Radiocarpal Region in Equines: Case Studies", submetido à revista *Equine Veterinary Education*, tendo como objetivo o relato de casos de lesões dos tendões extensores de equinos da rotina na CMGA/HVU/UFCG, com princípio diagnóstico e caracterização das imagens ultrassonográficas.

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CAPÍTULO I

Retrospective study of lesions of the locomotor system in equidae by age category and activities - Veterinary Hospital / UFCG

Autores

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Retrospective study of lesions of the locomotor system in equidae by age category and activities - Veterinary Hospital / UFCG

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ABSTRACT

The medical records of horses with locomotor injuries, attended at the Veterinary Hospital of the Federal University of Campina Grande, were reviewed in order to determine their prevalence, etiologies and predisposing factors in different age

categories and performed activities. The groups were: youth and adults for sport, work and recreation. The prevalence of injuries was analyzed using the Chi-Square Test as well as point and interval estimation of the Odds Ratio. Regarding 3.376 attended horses, 1.052 had locomotor impairment. Distributing on the groups, 54,37% animal were allocated on sport group, 5,79% on draft (work), 1,61% recreation and 22,71% were young equidae. There was a greater chance of injury in pelvic limbs in recreation group and in thoracic and pelvic limbs in sport group. The frequency of ligament injuries was low in the youth group, and high in the sports group. Joint injuries were more significant in young. In this group, hoof injuries presented a low risk of occurrence, such as wounds and pythiosis, which caused lameness in sport group. Concerning the outcome of the cases, 104 (9,9%) deaths occurred, with high risk in animals with bone injuries, prevailing long bone fractures (59/104 - 56,73%), and spine injuries. Among animals with tendon injuries, the risk of death was low. In conclusion, age and type of activities have a direct influence on the prevalence of these injuries and the majority occurred due to handling errors, especially in young equines.

Keywords: locomotor disorders, horses, sport, youth, recreation, work

INTRODUCTION

The different populations of equidae, since their domestication, establish a fundamental role in the economic and socio-cultural formation in different regions of Brazil. Equines are submitted mainly to sport activities and dealing with cattle, which is common in Northeast region, whether in the maintenance of cattle in the field or in disputes, especially in the "*vaquejada*" sport. The latter, composed of "*esteira*" and "*puxada*" horses, two different functions that predispose them to locomotor injuries.

Donkeys and mules, on the other hand, due to their rusticity and resistance, present greater aptitude for load and traction.

These animals usually undergo inadequate and intense work management, which predisposes to the occurrence of musculoskeletal injuries, establishing a reflection of the locomotor system condition, and presenting lameness as the main clinical sign. This results in economic damage to breeders, and often leads to decreased performance or early career interruption for these animals (Thomassian, 2005; Betto Filho et al., 2007; França et al., 2013).

Due to the expressive casuistry of equines treated with injuries of the locomotor system at the Medical Clinic of Large Animals (MCLA) of the Veterinary Hospital (HV) of the Federal University of Campina Grande (UFCG), Patos-PB, the present work aims to determine the prevalence of these injuries in equidae in the northeastern semiarid in their different age categories and activities, looking for their etiologies and predisposing factors.

MATERIAL AND METHODS

The research was carried out by reviewing the medical records of equines with injuries to the locomotor system attended at the MCLA/HV/UFCG, from August 2009 to July 2019. In the case survey, total number of cases was obtained and the number of animals with injury. As a main criterion, animals that presented lameness or diseases of the locomotor system were included in the study. Subsequently, from the records, identification data (species, sex, age, race, weight and origin), anamnesis, possible cause of the injury, management and exploration system, clinical signs, diagnosis and

outcome of the cases were explored. When the information was not on the registros médicos, they were referred to with the acronym NI (not informed).

Based on age and type of exploration, equines were classified into four groups: adults for sport, work and recreation (horseback riding or walking), and young horses (under three years old) in the process of taming or not. Wandering, breeding and NI animals were classified as others.

Orthopedic injuries were subdivided by elements that make up the locomotor system, among them: tendon, ligament, muscle, joint, bone, hoof, alar cartilage, spine and others that led to the clinical condition of lameness. The casuistry, the affected limbs and the occurrence of these injuries by group, in addition to the relationship between the condition and the outcome of the cases were analyzed for the level of significance and risk of occurrence. The variables considered were species, young animals and type of aptitude (sport, work, recreation) among adults.

Variables were subjected to univariate analysis of frequency distribution using the Chi-Square Test (X2), where the level of significance adopted was 5% ($P \leq 0,05$). Each independent variable was crossed with the dependent variable (the group), with a point and interval estimate of Odds Ratio (OR) with a 95% confidence interval (Thrusfield, 2007), using the Graph Pad Prism 5.1 software.

RESULTS AND DISCUSSION

During the study period, a general casuistry of 3.376 equidaes attended at MCLA/HV/UFCG was evidenced, of which 1.052 (31,2%) presented impairment of the locomotor system, totalizing 995 horses, 44 donkeys and 13 mules, showing no significant difference in occurrence of these lesions between species ($P>0,05$) (Table 1).

However, in general, there is a high expressiveness of diseases involving the locomotor system, suggesting a higher prevalence if compared among diseases of other systems.

Among studied animals, 694 (66,0%) were males and 358 (34,0%) females, with ages ranging from three days to 28 years of age. Horses were from Brazilian municipalities in Paraíba, Pernambuco and Rio Grande do Norte States and donkeys and mules were from the municipality of Patos-PB, Brazil. The most prevalent breed was Quarter Mile Horse (QM) or crossbred QM, followed by mixed breed animals (MB), Paint Horse, Criollo Gaúcho, Thoroughbred English, Appaloosa, Mangalarga Marchador and Pony. The Associação Brasileira de Criadores de Cavalo Quarto de Milha - ABQM (2020) reported a progressive growth in the number of these horses registered in Brazil. It also defines the QM breed as the most versatile horse in the world, due to its characteristics of speed, docility and versatility in performing athletic functions in the most varied modalities over the years specializing in working with cattle, which explains its higher prevalence in sport in the Northeast region.

Table 1. Casuistry of general care and locomotor injuries registered in the MCLA/HV /CSTR/UFCG sector, from August 2009 to July 2019, highlighting the percentages, risk of occurrence and frequency distribution by species.

	Casuistry (number of animals)			
Species	**General care**	**Locomotor injuries (%)**	**OR (CI 95%)**	**P**
Equines	3.171	995 (31,4)	1,007 (0,9117-1,112)	0,891
Asinines	161	44 (27,3)	0,877 (0,623-1,233)	0,448
Mules	44	13 (29,5)	0,948 (0,508-1,767)	0,866
TOTAL	3.376	1.052	1	

P≤0,05: level of significance; CI: confidence interval; OR: Odds Rat

As for handling, 239 (22,7%) horses were raised loose in the pasture (in extensive farming), 508 (48,3%) arrested during the day and released at night (semi-intensive),

280 (26,6%) kept in stalls 24 hours (intensive), 25 (2,4%) of the cases were not informed.

In the analysis of the type of exploration, among the sport horses it was revealed an expressive use for *vaquejada*, 569 (99,5%), and only three animals (0,5%) were used in the modalities of barrel racing, "*argolinha*" (similar to *corrida de sortija*) and jumping. Among the animals used for work, 18 (29,5%) horses were used to round up cattle in the pasture and 43 (70,5%) for traction (24 donkeys, 12 mules and 7 horses). In the recreation group, 17 horses were used in horseback riding or walking. Among the 239 foals (230 horses, 8 donkeys and 1 mule), 72 (30,12%) were in the process of initial taming or beginning training for *vaquejada*. Among the animals classified as others, 151 (93,0%) adults that did not have their exploitation modality identified, 11 (6,7%) were wanderers and 1 (0,6%) intended only for reproduction, included in the statistics, however, they were not discussed as it is not a significant category.

As for the injury site (Table 2), the frequency of involvement of at least one of the thoracic limbs, pelvic limbs or thoracic and pelvic limbs simultaneously, was not significant (P>0,05) per group, showing no relationship of the affected member with each variable. However, there was a greater chance of impairment in pelvic limb (PL) in recreation group and in the thoracic and pelvic limb (TL and PL) in sport group (OR≈1,5). In the first, there were cases of tarsal osteoarthritis (n=4), traumatic myositis (n=3), fracture of the tibia and fibula, exostosis in proximal sesamoid, foot osteitis and sole hematoma. In general, studies show that injury of the thoracic limbs is more common, as they support most of the body weight and function as shock absorbers (Maranhão, 2008; Dyce et al., 2010; Adams, Stashak's, 2011). However, these injuries in the PLs of riding animals occurred due to kicking, stony ground, accidents with gate,

braking during gallop and persistence of the exercise after injury, being in accordance with the activity performed. Fact also observed by Maranhão (2008) in a study with cavalry animals, such injuries attributed to the animal's defense attitude, especially due to kicking and trauma in physical structures.

Among sport horses that had TL and PL simultaneously impairment, laminitis (45,45% - 15/33) and stress myopathies (36,36% - 12/33) predominated. The first, considered a clinical syndrome associated with systemic disease with manifestation in the hooves (KANE, 2018), occurred frequently in the thoracic limbs (68,75% - 33/48) and occasionally in all limbs (31.25% -15/48), due to digestive disorders, attributed to excess food (up to 12 kg/day) or after colic; mechanical damage due to intense physical activity; infectious or after childbirth or abortion. According to Thomassian et al. (2000), in this last condition, laminitis can occur regardless of uterine infection or retained placenta.

Among the animals diagnosed with stress myopathy, among the common clinical signs of the disease, those associated with locomotion were a slight change in gait, rigid walking to reluctance to walk, intolerance to exercise and muscle tension, commonly in the croup and thigh muscles. Causes were related to high carbohydrate consumption and, usually or not, after training, followed or not by a long period of rest. In general, it occurred during or shortly after some form of strenuous activity. It is currently divided into myopathy due to polysaccharide storage and sporadic or recurrent strain rhabdomyolysis, the latter in the most chronic form and although PLs are commonly the most affected, TLs may be involved (Chilvers, 2018).

Table 2. Frequency associated with the risk of involvement of the thoracic limb (TL), pelvic limb (PL) or TL and PL per group.

	Site of lesion								
Groups	**TL (%)**	**OR (IC 95%)**	**P**	**PL (%)**	**OR (IC 95%)**	**P**	**TL e PL (%)**	**OR (IC 95%)**	**P**
Sport	324 (56,64)	1,054 (0,888-1,250)	0,546	200 (34,96)	0,915 (0,751-1,116)	0,383	33 (5,77)	1,413 (0,887-2,249)	0,143
Work	39 (63,93)	1,211 (0,799-1,833)	0,365	18 (29,51)	0,772 (0,451-1,324)	0,347	1 (1,64)	0,375 (0,05-2,768)	0,317
Recreation	6 (35,29)	0,656 (0,257-1,675)	0,375	11 (64,71)	1,695 (0,786-3,651)	0,172	-	-	-
Young	116 (48,13)	0,895 (0,701-1,143)	0,374	110 (45,64)	1,196 (0,928-1,540)	0,166	6 (2,49)	0,569 (0,240-1,350)	0,195
Others	81 (50,00)	0,930 (0,699-1,238)	0,619	63 (38,89)	1,019 (0,744-1,393)	0,907	6 (3,70)	0,847 (0,356-2,017)	0,708
TOTAL	566	1		402	1		46	1	

P≤0,05: level of significance; CI: confidence interval; OR: Odds Ratio.

According to Table 3, fifty two different diseases of the locomotor system or that caused lameness were recorded. It can be seen that the total number of injuries (n=1.272) was higher than that of equidaes treated with a locomotor problem (n=1.052), as shown in Table 1. This was because there were diagnoses of mixed pathologies per animal, almost always associated, mainly among animals of *vaquejada* (sport), which can be attributed to the distribution of forces between different structures of the locomotor system during intense sports activity, in addition to the susceptibility to trauma during running, which is generally continuous, triggering chronic injuries. In isolation, out of 1.272 diagnosed injuries, 725 (57,0%) were in the sports group, with a higher occurrence of tendonitis (12,69% - 92/725), followed by fractures (8,83% - 64/725), osteoarthritis (6,90% - 50/725), laminitis (6,62% - 48/725), periostitis (5,66% - 41/725), desmites (5,52% - 40/725) and exostoses (5,38% - 39/725). From the total of 71 (5,58%) injuries in work animals, fractures prevailed (18,31% - 13/71). In recreation category, 20 injuries (1,57%) were found, with osteoarthritis prevailing (20% - 4/20). In

young animals, 273 injuries (21,46%) were found, with a higher occurrence of fractures (16,12% - 44/273) and septic arthritis (8,79% - 24/273).

Among the structures that make up the locomotor system, were found 351 (27,59%) bone injuries, 260 (20,44%) articular injuries, 252 (19,81%) tendon, 147 (11,56%) hoof, 105 (8,25%) muscular, 64 (5,03%) ligamentous, 23 (1,81%) spine, 18 (1,42%) alar cartilage and 52 (4,09%) other injuries with impaired skin and adjacent structures that caused lameness. Through the statistical assessment of frequency and risk of occurrence of these injuries by group (Table 3), a significant relationship of ligament injuries was observed, with a high risk of occurrence in the sports group ($P \approx 0,05$; $CI > 2$). Among them, desmitis (76,92% - 40/52) prevailing, especially in the branches of suspensory ligament, and mostly associated with other adjacent pathologies such as tendonitis of the superficial and deep digital flexors and sesamoid lesions, often in TLs. These injuries at the metatarsophalangeae region may be associated with the intense extension and overload of the joint, cushioning the weight during the support phase in running and *puxada* in horses that exercise this function in the *vaquejada*, in addition to the occurrence of repetitive traumas in animals that hit the pelvic limbs to the thoracic limbs, which was quite reported by the owners.

In general, in *vaquejada* animals, tendonitis (12,69%) prevailed in relation to desmite (5,52%). In the study by Trump et al. (2014), it was shown that in dressage and jumping horses, where the main workload is canter and landing after jumps, the branches of suspensory ligament is the most frequently injured structure, with the superficial digital flexor tendon being the second most affected. So, even if the sports modality determines the prevalence of injuries, due to the biomechanics that differs

between them, in both cases the compromise of the branches of suspensory ligament seems to be related to the hyperextension of the joint.

In contrast, ligament injuries, as well as hoof injuries, were significantly less frequent in the youth group (P<0,05; OR<1,0). In the first, dorsal patellar fixation (n=3) and desmite (n=2) in animals in the process of taming were highlighted, beginning training for *vaquejada*. Although the dorsal fixation of the patella can be attributed to traumatic causes, other predisposing factors must be considered, such as nutritional deficiency, heredity, neuromuscular disorder or low physical conditioning, especially because they are young (Silva et al., 2004; Facin, 2019). Rupture was associated with a traumatic laceration of the branches of suspensory ligament in conjunction with the flexor tendons, in a foal in intensive system. The low occurrence of hoof injuries was attributed to inflammatory or infectious processes after contusions or perforations, in animals of extensive or semi-intensive creation, with ages varying from 1 to 2 and a half years. The cases of laminitis (n=4) had no determined cause, but it can be attributed to the high feed consumption associated with the low performance of these animals that were starting in training. In general, foal's locomotor disorders are more associated with external traumatic, infectious or developmental causes, and as the musculoskeletal system is constantly growing, they are not practicing intense activities or only exercise taming activities, thus low incidence of these injuries is justified.

Joint injuries did not have a significant frequency in either group (P>0,05), but the risk of occurrence was higher among young animals (OR>1), with septic arthritis (35,29% - 24/68) prevailing in animals from 5 days to 2 years of age, with prevalence in neonates, most of which are of extensive handling, of lacerating traumatic etiology (n=13), unknown (n=4) and after omphalitis (n=6) and dog attack, triggering

polyarthritis (n=7). In general, the factors were associated with management errors, exposing the immature immune system to external pathogens. Higher prevalence in very young animals, reinforces the hypothesis that the main factors that predispose these animals to the disease is the failure in the passive transfer of immunoglobulins and in the navel healing, since the main route of contamination is the umbilical, but it can be associated with any primary sepsis site in the body (Thomassian, 2005; Souza et al., 2017).

The wounds and pythiosis in this study are not typical locomotor injuries, but they did cause lameness. These injuries were significantly less frequent and with a low risk of occurrence among sport animals ($P<0.05$; $OR<1$). The wounds (1,38%) frequently occurred in metatarsus, gluteal and scapular regions, due to traumatic lacerating or piercing-cutting causes in towing, stakes or during running, and pythiosis (0,28%), in regions of thigh and pastern. In general, the lower occurrence of these injuries in sport animals can be attributed to the semi-intensive breeding system that decreases the susceptibility to trauma and access to rivers, in addition to the fact that lameness is not always noticed in these diseases, assuming which rarely involve important structures of the locomotor system.

Regarding the cases outcome (Table 3), the majority resulted in discharge (90,11% - 948/1,052) after instituted therapeutic conduct, and a total of 104 (9,9%) deaths due to poor prognosis, because of the location and characteristic of the lesion, clinical involution and often the impossibility of providing quality of life to the animal, opting for euthanasia. In the statistical analysis, by structure that makes up the locomotor system, by the injuries that caused death, a significant frequency was observed with high risk of occurrence ($P<0,0001$; $OR>2$) among animals with bone

injury, with prevalence of cases of long bone fractures (59/104 - 56,73%), with a higher incidence in young from 40 days to 2 years old (18/59 - 30,50%) and in the group of others (24/59 - 40,67 %), with 9 wandering and 15 NI. Causes attributed to this outcome were car accidents, recoil or indeterminacy in animals of extensive system. In young animals, the hyperactive temperament itself and the dangerous environment make them more susceptible and, according to Pierezan et al. (2009), may be related to the non-closure of the epiphyseal plaque and low bone resistance. This high rate and the causes attributed to it, corroborate with other studies, in which the indication of euthanasia was justified by the low zootechnical value of the animals, especially when donkeys and mules, and the difficulty of surgical correction (Pierezan et al., 2009; Pessoa et al, 2014).

High risk ($P<0,05$; $OR>3$) was also demonstrated in animals that presented spinal injuries, with six (26,08%) deaths in 23 cases, including compressive myelopathies, fractures and dislocations of vertebrae. This outcome was more expressive in young (83,33% - 5/6), from 5 days to 1 year old, all due to trauma or accidents with rope. In a study by Borges et al. (2003), vertebral fractures were widely observed in horses, all with probable traumatic origin, and with no significant difference in relation to age, although the highest occurrence in animals up to 12 months.

Low risk of death was found among animals with tendon injuries ($P<0,05$; $OR<1$), only in cases of flexural deformity (n=3), rupture (n=3), and septic tenosynovitis. The first in young horses (3 days to 1 year old) with associated congenital deformities and one with severe congenital contracture in both TLs. The second, due to traumatic laceration, in a draft donkey (cart) and another (NI); and to septic tenosynovitis in a *vaquejada* horse, after a lacerating wound. This low death rate

suggests that the prognosis for tendon injuries is good, unless they involve complete or septic lacerations, or when sports ability is compromised, since tendon injuries are common in athletes and can lead to decreased performance, with long recovery periods and high recurrence rate, and even early retirement.

Table 3. Record and frequency associated with the risk of injury to the structures that make up the locomotor system in equidaes by group, their total and deaths.

Locomotor System Injury		Groups						
		Adults			Young (< 3 years) (%)	OTHERS (%)	TOTAL	DEATH
		Sport (%)	Work (%)	Recreation (%)				
Tendinous	tendonitis	92 (12,69)	2 (2,82)	2 (10,00)	22 (8,06)	8 (4,37)	126 (9,91)	-
	tenosynovitis	37 (5,10)	2 (2,82)	-	9 (3,30)	3 (1,64)	51 (4,01)	1 (0,96)
	carpal tunnel syndrome	3 (0,41)	-	-	-	-	3 (0,24)	-
	bursitis	17 (2,34)	-	-	8 (2,93)	5 (2,73)	30 (2,36)	-
	harp	-	-	-	1 (0,37)	-	1 (0,08)	-
	flexural deformity	1 (0,14)	3 (4,23)	-	13 (4,76)	-	17 (1,34)	3 (2,88)
	rupture	7 (0,97)	3 (4,23)	-	8 (2,93)	6 (3,28)	24 (1,89)	3 (2,88)
	Total (%)	157 (21,66)	10 (14,08)	2 (10,00)	61 (22,34)	22 (12,02)	252 (19,81)	7 (3,19)
	OR (IC 95%)	1,093 (0,8779-1,361)	0,7109 (0,3617-1,397)	0,5048 (0,1172-2,174)	1,128 (0,8282-1,536)	0,606 (0,382-0,963)	1	0,339 (0,1562-0,7392)
	P	0,426	0,32	0,349	0,444	0,032*		0,004*
Ligaments	desmite	40 (5,52)	-	1 (5,00)	2 (0,73)	3 (1,64)	46 (3,62)	-
	dorsal patella fixation	5 (0,69)	1 (1,41)	-	3 (1,10)	-	9 (0,71)	-
	rupture	7 (0,97)	-	-	1 (0,37)	1 (0,55)	9 (0,71)	1 (0,96)
	Total (%)	52 (7,17)	1 (1,41)	1 (5,00)	6 (2,20)	4 (2,19)	64 (5,03)	1 (1,56)
	OR (IC 95%)	1,426 (0,977-2,079)	0,279 (0,038-2,048)	0,993 (0,131-7,525)	0,436 (0,187-1,019)	0,434 (0,156-1,207)	1	0,191 (0,026-1,392)
	P	0,0642*	0,1803	0,9952	0,0489*	0,1001		0,0681
Muscular	traumatic myositis	38 (5,24)	2 (2,82)	3 (15,00)	12 (4,40)	9 (4,92)	64 (5,03)	-
	fibrotic myopathy	5 (0,69)	-	-	-	-	5 (0,39)	-
	atrophy	2 (0,28)	-	-	2 (0,73)	-	4 (0,31)	-
	rupture	-	1 (1,41)	-	1 (0,37)	-	2 (0,16)	-
	muscle abscess / degeneration	6 (0,83)	1 (1,41)	-	1 (0,37)	1 (0,55)	9 (0,71)	-
	sinus	-	-	-	2 (0,73)	1 (0,55)	3 (0,24)	-
	stress myopathies	16 (2,21)	1 (1,41)	-	-	1 (0,55)	18 (1,42)	3 (2,88)
	Total (%)	67 (9,24)	5 (7,04)	3 (15,00)	18 (6,59)	12 (6,56)	105 (8,25)	3 (2,85)
	OR (IC 95%)	1,120 (0,813-1,541)	0,853 (0,337-2,159)	1,817 (0,531-6,271)	0,798 (0,476-1,339)	0,794 (0,428-1,473)	1	0,349 (0,109-1,121)
	P	0,488	0,737	0,334	0,393	0,463		0,0644

Joint	synovitis	14 (1,93)	1 (1,41)	-	5 (1,83)	1 (0,55)	21 (1,65)	-
	serous arthritis	33 (4,55)	3 (4,23)	-	11 (4,03)	8 (4,37)	55 (4,32)	-
	septic arthritis	10 (1,38)	3 (4,23)	-	24 (8,79)	4 (2,19)	41 (3,22)	9 (8,65)
	osteoarthritis	50 (6,90)	2 (2,82)	4 (20,00)	8 (2,93)	8 (4,37)	72 (5,66)	1 (0,96)
	ankylosing arthritis	10 (1,38)	2 (2,82)	-	1 (0,37)	4 (2,19)	17 (1,34)	-
	osteochondrosis / osteochondritis	7 (0,97)	-	-	5 (1,83)	1 (0,55)	13 (1,02)	-
	dislocation / subluxation	14 (1,93)	2 (2,82)	-	8 (2,93)	4 (2,19)	28 (2,20)	7 (6,73)
	angular deformity	7 (0,97)	-	-	6 (2,20)	-	13 (1,02)	-
	Total (%)	145 (20,00)	13 (18,31)	4 (20,00)	68 (24,91)	30 (16,39)	260 (20,44)	17 (6,53)
	OR (IC 95%)	0,978 (0,783-1,223)	0,895 (0,488-1,642)	0,978 (0,331-2,887)	1,219 (0,905-1,641)	0,802 (0,533-1,207)	1	0,799 (0,470-1,359)
	P	0,848	0,721	0,968	0,191	0,288		0,407
Bones	fracture	64 (8,83)	13 (18,31)	2 (10,00)	44 (16,12)	35 (19,13)	158 (12,42)	59 (56,73)
	periostitis	41 (5,66)	2 (2,82)	1 (5,00)	10 (3,66)	10 (5,46)	64 (5,03)	-
	epiphysitis	1 (0,14)	-	-	4 (1,47)	-	5 (0,39)	-
	sesamoiditis	15 (2,07)	2 (2,82)	-	6 (2,20)	1 (0,55)	24 (1,89)	-
	navicular syndrome	5 (0,69)	-	1 (5,00)	-	-	6 (0,47)	-
	foot osteitis	11 (1,52)	1 (1,41)	1 (5,00)	3 (1,10)	1 (0,55)	17 (1,34)	-
	exostosis	39 (5,38)	1 (1,41)	1 (5,00)	14 (5,13)	10 (5,46)	65 (5,11)	-
	osteomyelitis	4 (0,55)	1 (1,41)	-	3 (1,10)	3 (1,64)	11 (0,86)	2 (1,92)
	subchondral cyst	1 (0,14)	-	-	-	-	1 (0,08)	-
	Total (%)	181 (24,97)	20 (28,17)	6 (30,00)	84 (30,77)	60 (32,79)	351 (27,59)	61 (17,37)
	OR (IC 95%)	0,904 (0,739-1,106)	1,021 (0,612-1,700)	1,087 (0,433-2,728)	1,115 (0,849-1,463)	1,188 (0,867-1,628)	1	2,056 (1,462-2,890)
	P	0,329	0,936	0,858	0,431	0,282		<0,0001*
Hoof	haematoma	11 (1,52)	3 (4,23)	1 (5,00)	1 (0,37)	3 (1,64)	19 (1,49)	-
	sole ulcer	1 (0,14)	1 (1,41)	-	-	-	2 (0,16)	-
	abscess	16 (2,21)	3 (4,23)	3 (15,00)	4 (1,47)	8 (4,37)	34 (2,67)	-
	white line disease	1 (0,14)	-	-	1 (0,37)	1 (0,55)	3 (0,24)	-
	exudative dermovilitis	3 (0,41)	1 (1,41)	-	-	2 (1,09)	6 (0,47)	-
	vesicular stomatitis	-	-	-	-	2 (1,09)	2 (0,16)	-
	septic pododermatitis	5 (0,69)	4 (5,63)	-	-	4 (2,19)	13 (1,02)	-
	hoof fracture / crack	2 (0,28)	-	-	-	2 (1,09)	4 (0,31)	-
	exungulation	-	-	-	1 (0,37)	4 (2,19)	5 (0,39)	1 (0,96)
	laminitis	48 (6,62)	1 (1,41)	-	4 (1,47)	6 (3,28)	59 (4,64)	8 (7,69)
	Total (%)	87 (12,00)	13 (18,31)	4 (20,00)	11 (4,03)	32 (17,49)	147 (11,56)	9 (6,12)
	OR (IC 95%)	1,038 (0,784-1,374)	1,584 (0,856-2,932)	1,731 (0,583-5,133)	0,348 (0,186-0,652)	1,513 (1,002-2,286)	1	0,748 (0,371-1,511)
	P	0,792	0,139	0,316	0,0006*	0,047*		0,417
Alar cartilage	chondritis	3 (0,41)	-	-	-	-	3 (0,24)	-
	calcification	-	1 (1,41)	-	-	1 (0,55)	2 (0,16)	-
	fracture	12 (1,66)	-	-	1 (0,37)	-	13 (1,02)	-
	Total (%)	15 (2,07)	1 (1,41)	-	1 (0,37)	1 (0,55)	18 (1,42)	-
	OR (IC 95%)	1,462 (0,732-2,919)	0,995 (0,130-7,566)	-	0,258 (0,034-1,948)	0,386 (0,051-2,911)	1	-
	P	0,278	0,996	-	0,157	0,337		-

Spine	myelopathy	9 (1,24)	2 (2,82)	-	3 (1,09)	3 (1,63)	17 (1,33)	2 (1,92)
	luxation	-	-	-	3 (1,10)	-	3 (0,24)	2 (1,92)
	fracture	-	-	-	1 (0,37)	2 (1,09)	3 (0,24)	2 (1,92)
	Total (%)	9 (1,24)	2 (2,82)	-	7 (2,56)	5 (2,73)	23 (1,81)	6 (26,08)
	OR (IC 95%)	0,686 (0,315-1,492)	1,558 (0,360-6,741)	-	1,418 (0,602-3,339)	1,511 (0,567-4,025)	1	3,191 (1,271-8,012)
	P	0,339	0,549	-	0,421	0,405		0,0092*
Others	wounds	10 (1,38)	6 (8,45)	-	14 (5,13)	15 (8,20)	45 (3,54)	-
	pythiosis	2 (0,28)	-	-	3 (1,10)	2 (1,09)	7 (0,55)	-
	Total (%)	12 (1,66)	6 (8,45)	-	17 (6,23)	17 (9,29)	52 (4,09)	-
	OR (IC 95%)	0,404 (0,214-0,763)	2,067 (0,858-4,976)	-	1,523 (0,867-2,675)	2,272 (1,286-4,015)	1	-
	P	0,0039*	0,097	-	0,14	0,0037*		-
TOTAL OF LESIONS		725 (100,0)	71 (100,0)	20 (100,0)	273 (100,0)	183 (100,0)	1272 (100,0)	104 (100,0)

P≤0,05: level of significance; CI: Confidence interval; OR: Odds Ratio.

CONCLUSION

The age and type of activity performed directly influence the prevalence of certain injuries to the locomotor system, increasing susceptibility according to equidaes aptitude. Lesions had a greater attribution to the mechanical etiology, being the congenital or infectious ones commonly observed in young equidaes. In general, they were attributed to management errors, especially in neonates, and in adults, due to nutritional issues and the practice of intense exercise or without complete recovery from the injury. Preventive measures should be taken by means of guidelines both in the creation and use of these animals.

Declarations

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CAPÍTULO II

Diagnosis of Injuries to Extensor Tendons of the Radiocarpal Region in Equines: Case Studies

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Diagnosis of Injuries to Extensor Tendons of the Radiocarpal Region in Equines: Case Studies

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ABSTRACT

This article reports tendon injuries to the extensors of the radiocarpal region of five "*vaquejada*" horses treated at the Medical Clinic of Large Animals the University Veterinary Hospital of the Federal University of Campina Grande (MCLA / HVU/ UFCG), Patos - PB, describing the clinical signs and alterations in images, especially ultrasound, which are scarce in the current literature. Two cases presented acute and chronic tenosynovitis of the tendon of the common digital extensor muscle (CDEMT), and three with tendonitis, septic tenosynovitis and rupture of the tendon of the extensor carpi radialis muscle (ECRMT) of traumatic

etiology. On physical examination, the affected tendon was easily noticeable in three cases. Bone alteration in the radiographic exam was observed in two cases, however, one of them related to the carpal tunnel syndrome. The ultrasound images demonstrated different characteristics and degrees of tendon and its sheath involvement, allowing the classification of injuries in acute and chronic. The clinical treatment instituted was effective in acute cases, but not very responsive in the chronic one. It is concluded that the dorsal radiocarpal region is susceptible to trauma that can easily compromise the extensor tendons and that the ultrasound determination is essential for the diagnosis and adequate treatment.

Keywords: carpus extensor, horse, tendinitis, tenosynovitis, ultrasound

INTRODUCTION

In the “vaquejada”, typical sport in the northeastern region of Brazil, there are two different categories practiced by the horses, predisposing them to direct damage to the thoracic limbs. That of “esteira”, which leads the ox to the line on the arena, along with the “puxada”, and the latter that leads the cowboy in the overthrow of the ox by the tail, immediately exerting a perpendicular movement. After the fall of the ox, the “esteira” returns to its front, keeping it within the lines.

Soft tissue injuries are common in sport horses, usually associated with intense overload or trauma. Those involving tendons occur more frequently, especially in the flexors, with few reports in the literature on injuries of the extensors, especially with regard to ultrasound characteristics. Few studies describe the pattern of normality of these tendons through ultrasound studies of the carpal joint (Tnibar et al. 1993; Hage et al. 2017; El-Bably and Abdelgalil 2018), being even more scarce as the images that characterize the injury patterns.

The carpal and digital extensor muscles occupy the craniolateral portion of the forearm (Dyce et al. 2010). The extensor carpi radialis muscle tendon (ECRMT), the most robust, follows the middle groove at the distal dorsal end of the radius until it is inserted into the metacarpal tuberosity. The common digital extensor muscle tendon (CDEMT), immediately lateral to the ECRMT, from its origin, follows dorsolaterally at the level of the radiocarpal region, and dorsally until its final insertion in the distal phalanx. These tendons have the function of extending and fixing the carpal and digital joint, in addition to flexing the elbow joint (Getty 1986; Frandson et al. 2011). This anatomical and morphofunctional knowledge allows us greater reliability in the interpretation of clinical and ultrasound findings for diagnosis of tendon injuries.

Thus, this article aims to characterize the clinical and the alterations of images, especially ultrasound, seeking to reference the different patterns of injuries to the extensor tendons at the level of the radiocarpal region, through case reports from MCLA/ HVU/ UFCG.

CASUISTRY

Five reports of “vaquejada” horses with tendon injuries to the extensors in the radiocarpal region are summarized in Table 1. Patients 1 and 2 had acute and chronic tenosynovitis, respectively, from CDEMT, while patients 3, 4 and 5, developed tendonitis, septic tenosynovitis and rupture, respectively, of the ECRMT.

Case histories

Regarding the history, all of them were running *vaquejada*, but animals 1, 2 and 4 were away from the sport, days before the problem started. The main complaint of the owners was the increase in volume in the carpal joint and lameness reported in all, except in cases 2

and 5, which occurred only at the beginning of the problem, with a history of continuous trauma in the stall in cases 1 and 2. In animals 3 and 5, the clinical signs started after the race, the first one had returned from a competition dragging the limb, improving with the anti-inflammatory treatment instituted in the property, however, he limped again at intermittent periods. Animal 5, on the other hand, was from "*esteira*" and had been purchased with a dorsiproximal scar to the carpus, but without any sign of pain. Case 4 had no definite cause.

The animals were raised in an intensive system, stall for 24 hours (case 1); semi-intensive, stabled during the day and released in the paddock at night (cases 2 and 5); and extensive, loose in the pasture (cases 3 and 4).

Clinical findings

In the specific physical examination of the locomotor system, the tendon was visible and palpable in cases 1 and 2, delimiting the CDEMT, and very sensitive to palpation (case 1). Patients 3 and 4 had another lesion in the carpal region, in case 4 associated with ECRMT involvement, which was also palpable. In patient 5, there was an effusion involving the entire dorsal surface of the carpus, but with no evidence of tendon involvement on inspection or palpation. Grade III claudication was evident in walk in patients 1, 3 and 4, and discreet in patient 2, only after joint flexion for 30 seconds followed by guided trot.

Table 1: Presentation of the cases of five horses treated at CMGA / HVU / CSTR / UFCG with injuries to the extensor tendons

Case	Breed/ sex/ age	System	Sport	Start	History	Limb	Increase in volume / consistency / location	Pain on palpation / Claudication	Lesion/ Tendon	Associated lesion	Bone alteration on X-ray	Alteration on US
1	QM/ M/ 3 years	Intensive	Vaquejada/ esteira	3 days	20 days without training. Usually springs in the stall.	RTL	Discreet / soft / bounded on the dorsolateral face of the radio-carpal region.	Yes / grade III support, at walk.	Acute tenosynovitis/ CDEMT	No	No	Yes
2	QM/ F/ 6 years	Semi-intensive	Vaquejada/ pull right	60 days	90 days without training. It usually hits the limb in the trough. It only hobbled at the beginning.	LTL	Discreet / firm / bounded on the dorsolateral face of the radiocarpal region.	No/ grade I support, at a trot after flexing for 30 seconds.	Cronic tenosynovitis/ CDEMT	No	Yes	Yes
3	MB/CM / 6 years	Extensive	Vaquejada/ pull right	16 days	After the race it was pulling the limb and the next day the joint started to swell.	LTL	Diffuse / soft / on the dorsal and lateral palmar side of the carpus.	Yes, with reluctance and limited degree of flexion/ Mixed grade III, at walk.	Acute tendonitis/ ECRMT	Carpal tunnel syndrome	No	Yes
4	MB/ F/ 10 years	Extensive	Vaquejada/ pull right	21 days	Had not trained for 4 months. Advanced pregnancy. No report of trauma.	RTL	Diffuse / fluctuating, mainly on the medial surface and firm on the dorsal surface, distal from the radius to the proximal metacarpal region.	Yes, with reluctance to flexion/ Mixed grade III, at walk.	Septic tenosynovitis/ ECRMT	Carpal arthritis	No	Yes
5	MB/ F/ 6 years	Semi-intensive	Vaquejada/ esteira	45 days	The day after the race, its knee was swollen, and it limped at first.	LTL	Diffuse / soft / on the dorsal radiocarpal face, with an oblique scar of 4 cm proximal to the carpus.	No/ no	Rupture/ ECRMT	No	No	Yes

QM= quarter mile; MB= mixed breed; M= male; F= female; MC= male castrated; RTL= right thoracic limb; LTL= left thoracic limb; US= ultrasound.

Diagnostic imaging

After physical examination, the animals were sent to the Diagnostic Imaging Sector. Initially, lateralomedial and dorsopalmar radiographic projections of the joint were performed. Only patients 2 (Fig 1) and 3 had bone involvement, although the latter was not related to the extensor lesion, with an area of bone neoformation on the caudal surface of the distal end of the radius. The radiographic images showed swelling in the carpal or radiocarpal dorsal region in all cases.

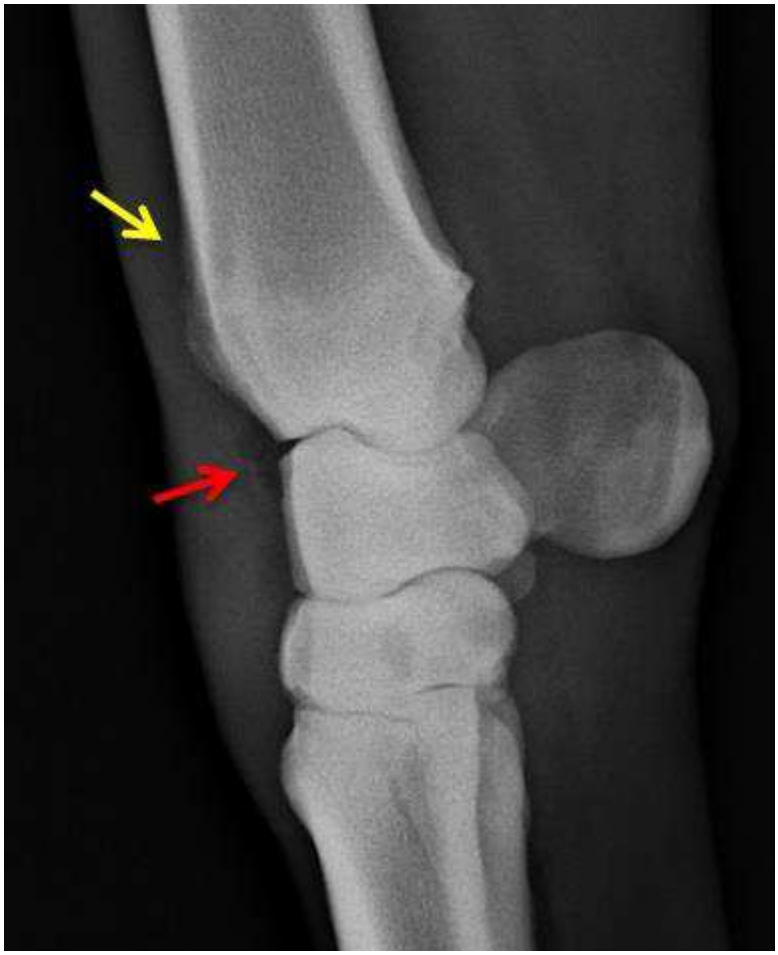

Fig 1: Lateromedial radiography - Case 2. Discreet periosteal reaction on the cranial surface of the distal end of the radius (yellow arrow); radiolucent area in the dorsal soft tissue region of the radiocarpal joint (red arrow); slight increase in density and swelling of the soft tissue on the dorsal surface.

Ultrasonographic examination of the dorsal radiocarpal face was performed in all animals, with a linear transducer of frequency ranging from 8-10 MHZ (model Mindray Z5 Vet and INFINIT 6V expert). Changes observed in Figures 2A and B characterize, respectively, acute (case 1) and chronic (case 2) tenosynovitis of the CDEMT. While figures 3A and B show, respectively, acute tendonitis (case 3) and septic tenosynovitis (case 4) of ECRMT and figure 4, rupture of ECRMT (case 5).

In case 4, ultrasound examination also showed thickening of the carpal joint capsule, with increased echogenicity and irregular margins; increase in synovial fluid with a hypoechoic aspect in an anechoic medium and presence of mobile hyperechoic filaments suggestive of fibrin. When associated with images of the tendon and its sheath and leukogram, which revealed mild leukocytosis with neutrophilia, it directed to the diagnosis of septic tenosynovitis.

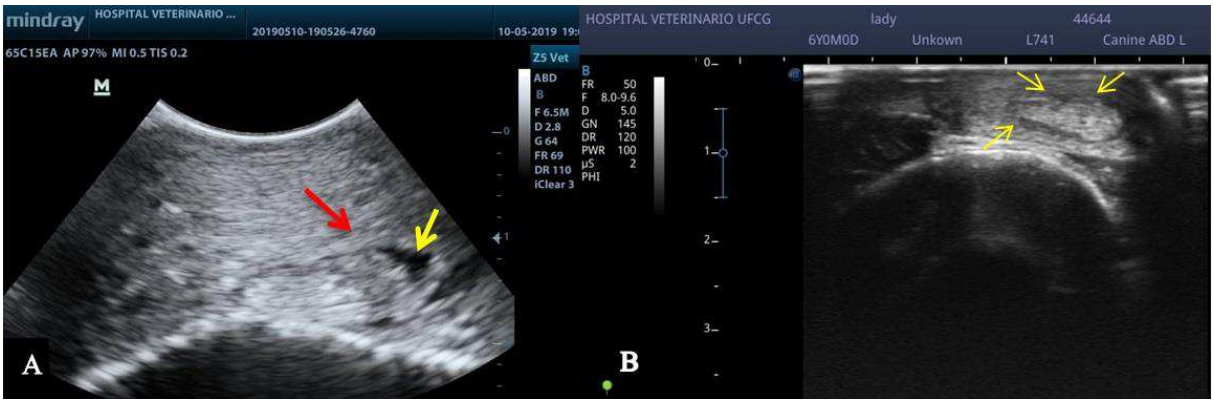

Fig 2: Transverse ultrasound images of the CDEMTin the craniolateral aspect of the distal end of the radius of two horses - (A) Case 1. A slight increase in focal synovial fluid (yellow arrow) with an anaechoic characteristic; sheath thickening (red arrow); hypoechoic area extending from the cranial margin of the tendon to the caudal face of the sheath, suggestive of tenosynovitis. (B) Case 2. Thickening of the sheath, marked by an evident increase in echogenicity around the tendon; slight amount of hypoechogenic aspect synovial fluid with some points of adhesion between the tendon and the sheath (yellow arrows), and irregularity of its parietal and visceral margins, suggestive of chronic tenosynovitis.

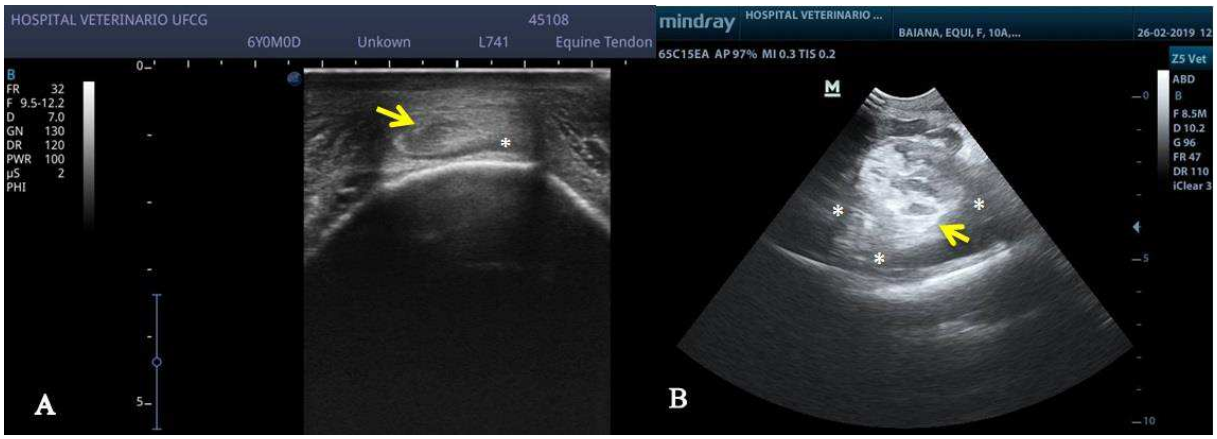

Fig 3: Transverse ultrasound images of the ECRMT in the cranial aspect at the level of the radiocarpal region of two horses - (A) Case 3. Hypoechoic lesion in the medial portion of the tendon (yellow arrow); discrete amount of synovial fluid with an anechoic characteristic (asterisk), suggestive of acute tendonitis. (B) Case 4. Thickening of the tendon, with a circular aspect, containing hypoechoic areas in almost all its extension and hyperechoic focal area in its caudal margin (yellow arrow); marked degree of hyperechoic synovial effusion in a diffuse hypoechogenic medium (asterisks). Lesions suggestive of tenosynovitis.

Fig 4: Longitudinal ultrasound image of the ECRMT in the cranial aspect at the level of the radiocarpal region of an horse - Case 5. Loss of continuity of ECRMT fiber parallelism with anaechoic area (asterisk) amid the two stumps of hypoechoic aspect (yellow arrows), characteristic of reorganization of tendon fibers.

Treatments

All patients were discharged on the same day with prescription of conventional treatment. Anti-inflammatory treatment was instituted, using Firocoxib[1], oral, 0,1mg/kg, for 12 days; Triamcinolone acetonide 0,2g[2], 0,02ml/kg, intramuscular, single dose; cold compress followed by topical application of Ekyflogyl®[3], for 15 days in cases 1 and 3. For patient 2, treatment in two stages was prescribed, initially with the use of revulsant (10% glycerin iodine) for seven days, followed by anti-inflammatory treatment for 15 days, with repetition of the steps. To patient 4 was given a systemic antibiotic with benzantine penicillin[4], at a dose of 20.000 IU/kg, intramuscularly and regional infusion with amikacin sulfate 1g[5], every 48 hours, five applications, in addition to alternating local compresses (warm and cold), followed by topical application Antiphlokin®[6]. To patient 5 was prescribed topical Ekyflogyl® for 15 days. Rest was recommended for all patients and supplement based on chondroitin sulfate and glucosamine[7] for 60 days, except for patient 3.

Outcome of cases

Subsequently, contact was made with the owners by telephone to monitor the cases. There was complete recover of animals 1 and 3, with 90 days after the start of treatment, the first animal returned to the sport, the second was being mounted daily. Animal 2 showed a slight reduction in swelling, with no signs of pain or gait changes, returning to training 4 months after the start of treatment. Animal 4 also responded satisfactorily to the treatment and there was no response regarding the animal 5.

DISCUSSION

The occurrence of injuries to the extensor tendons in horses is currently little reported in the literature, probably because they do not suffer so much overload in biomechanics

during athletic activities compared to the flexor tendons. In a retrospective study of horses treated for tendon lacerations, it was observed that 80% (12/15) of animals with extensor tendon involvement returned to activities, higher than the 59% (13/22) of those who presented flexor injury (Foland et al. 1991).

Although the involvement of the extensor tendons is more frequent in pelvic limbs (89%), due to lacerations on the dorsal surface of the limb, although it may occur due to overload (Belknap et al. 1993; Kidd et al. 2014), there are occurrences of septic tenosynovitis resulting from wounds involving the dorsal face of the carpus (Platt and Wright 1997; Booth et al. 2004). The first case of CDEMT traumatic tendonitis resulting from a periarticular osteophyte in the carpal region and evolving to chronic tenosynovitis was reported by Gray et al. (2019).

In general, the extensor tendons and their sheaths seem vulnerable to direct damage due to the lack of soft tissue covering these structures in their dorsal aspect. However, the thoracic limbs act as shock absorbers, being more exposed to continuous tension and constant risk of damage (Dyce et al. 2010). Its occurrence in the radiocarpal region can be associated with the excess flexion of this joint, being able to easily reach solid objects, as suggested by Wallace (1972). This is consistent with the reported cases 1 and 2, where the stabled animals presented behavior that may have led to traumatic episodes, causing direct and continuous damage to the CDEMT and its sheath.

In cases 3 and 5, the injuries appear to be related to the practice of sport, due to overload or direct trauma. Although case 3 had another disease on the palmar face of that region, the sign presented by the animal shortly after the race suggests involvement of the ECRMT. The cause of the carpal tunnel syndrome was pre-existing, since this pathology is characteristic of chronic injuries (Adams and Stashak's 2011).

In a study of the pathogenesis of total or partial tendon rupture, Fackelman (1973) divides it into two categories: mechanical and degenerative, both related to previous trauma. Even though it still not rules out the possibility, even if rare, of the occurrence of rupture is due to momentary change and intense stress, caused by a direct loss of elasticity of its fibers. However, in patient 5, the scar shown in the proximal region of the carpus and the absence of clinical signs reported before the race suggest that the animal mechanically injured the tendon before it was purchased, through lacerating trauma. When it was exercised again, it developed a recurrent post-traumatic inflammatory process in the same location, showing acute signs of effusion and lameness. This theory becomes more conclusive due to the function of *esteira* exerted by the animal in the *vaquejada* that runs in line with the ox until it is dropped by the *puxada*, when it immediately returns, remaining in the front, becoming a propitious moment to trauma in the thoracic members.

Case 4 had no known determining factor, with no reported wound or local puncture. Sepsis in the lesions was suggestive when the US findings of the joint, tendon and its sheath were associated with the WBC. In addition, in periarticular damage, tendons and/or their sheaths can be affected in isolation or in conjunction with the joint (Kidd et al. 2014).

Occasionally, when it comes to the tendon, the specific clinical examination of the locomotor system, composed of inspection, palpation and assessment of lameness associated with a well-explored anamnesis, allows us to locate the lesion and assume the diagnosis. In cases 1, 2 and 4, the increase in volume delimiting the tendon made it visible and/or palpable, with localized painful sensation (cases 1 and 4), being important starting points to guide the diagnosis. However, regardless of the clinical diagnosis, imaging resources for injuries to the locomotor system are essential. In a complementary way, these resources allowed us to accurately determine the location of the lesion, its extent and prognosis, which would not be

possible only in the clinic. It is important that tendon injuries are classified according to time, extent, severity and pathogenesis (Fackelman 1973).

The diagnosis of carpal tunnel syndrome, case 3, occurred due to history, clinical signs, and radiographic alterations, consistent with Nixon (2002) and Adams, Stashak's (2011). These conditions, when there are associated lesions, are often difficult to differentiate in their clinical presentation, demanding a more detailed assessment of the structures surrounding the joint.

Although the suspicion was of a soft tissue lesion, the radiographic image allowed us to assess the existence of associated bone involvement, with a periosteal reaction in the area of insertion or passage of tendon structures, as observed in case 2 (Fig 1). It was also evidenced radiolucent area in the dorsal region of the radiocarpal joint soft tissue, suggesting involvement of the synovium, probably due to chronic inflammation of the adjacent tendon. In all cases, there was a noticeable increase in soft tissue radiopacity on the dorsal radiocarpal face, apparently related to tendon injury.

In general, in the tendon images, the echogenicity, thickness, shape, margins and pattern of the fibers should be evaluated with the transducer in the longitudinal and transversal section (Smith 2008; Kidd et al. 2014). As a normal ultrasound pattern, in a cross-sectional scan, the ECRMT at the level of the distal region of the radius is described as a homogeneous echogenic structure with an oval shape, becoming more flattened and broad as it approaches the carpus, and elliptical at the level of the radiocarpal region, increasing its volume in the intercarpal portion, and becomes flatter and wider at the level of the carpometacarpal joint. The CDEMT, initially, at the distal end of the radius, is viewed as a triangle and then as an echogenic oval structure, becoming flat as it passes through the groove, already close to the carpus; at the radiocarpal level it narrows slightly and first

acquires a concave shape dorsally, later becoming elliptical; in the intercarpal portion, the tendon acquires a more flattened shape, being fusiform at the interface between the third and fourth carpian bones; gradually becoming elliptical and less echogenic as it leans medially under the third metacarpal bone (Tnibar et al. 1993; El-Bably and Abdelgalil 2018).

According to Smith (2008), acute tendon changes are described as hypoechoic areas, similar to those seen in Figure 3A, case 3. On the other hand, chronic lesions are characterized by a heterogeneous pattern of variable hypoechogenicity and hyperechogenicity, as seen in figure 3B, case 4, although the evident hyperechoic area is small, and when associated with the clinic and time of occurrence suggest injury tending to chronicity.

Tendon sheaths are classified according to echogenicity, thickness and amount of internal fluid. Inside, there is usually little or no free liquid, and when present, it is characterized with an anechoic appearance, when in excess, it is a transudate; if this liquid in abundance is hypo or hyperechoic, it represents an increased cellularity or protein content (Kidd et al. 2014), as in Figure 3B, case 4, turning a better investigation necessary.

In chronic tendosynovitis, as described by Wallace (1972) and Adams, Stashak's (2011), an incessant synovial effusion is observed, in addition to fibrous thickening of the sheath, which may be associated with internal stenosis or adhesion between the visceral layer of the sheath and parietal layer of the tendon. Similar to that observed in Figure 2B, case 2, with the exception of synovial effusion, a condition that may be related to the time of injury, which contributed to intense fibrosis and adherence of the tendon to its sheath. Figure 2A, case 1, shows a sheath thickening, also characteristic of a chronic injury, however, the time of occurrence, exacerbated signs of pain and the habit of “spring” in the bay, suggest that the pre-existing injury was exacerbated with the reported trauma.

In a case of CDEMT tenosynovitis of septic nature reported by Booth et al. (2000), the ultrasound examination revealed an enlarged tendon, with multiple hypoechoic spots and a marked synovial effusion in the sheath. These changes were similar to those observed in Figure 3B, in case 4, however, in the case of Booth et al. (2000) there was a sinus tract between the sheath and the wound, and the confirmation of septic injury was obtained through microbiological analysis of the synovial fluid. Although in case 4, analysis of the synovial fluid was not performed, the US images associated with the leukogram and the positive response to antibiotic therapy, it was possible to diagnose it as a septic lesion.

In the longitudinal image, tendon ruptures are characterized by loss of echogenicity and normal fiber alignment, usually represented by an anaechoic region, surrounded by an echogenic line, the paratendon. Normally it remains intact unless the injury has occurred by lacerating trauma, in which case there is evidence of damage in the vicinity of the rupture (Smith 2008; Kidd et al. 2014). This same intact echogenic structure is seen in Figure 4, case 5. Although we have assumed a percutaneous laceration due to the scar present on the skin, adjacent to the rupture site, the time of occurrence may justify the reconstitution of the paratendon and the absence of clinical signs of pain.

Conventional clinical treatment using systemic and topical anti-inflammatory drugs associated with term methods and cryotherapy proved to be sufficient in cases of tendonitis or acute tenosynovitis, with satisfactory results in cases 1 and 3. In septic tenosynovitis, antibiotic therapy also associated with topical treatment, proved to be satisfactory in case 4. In chronic tenosynovitis (case 2), there was no efficacy regarding the total resolution of fibrosis. Different surgical methods are described in the literature for the treatment of chronic tenosynovitis (Wallace 1972; Platt and Wright 1997; Booth et al. 2004). In aseptic cases, tenoscopic debridement appeared to be more prudent and effective (Booth et al. 2004; Gray et

al. 2019). However, surgery requires thorough attention and should not be performed unless the facilities are available and the time and cost ratios are appropriate (Fackelman 1973).

Tendon injuries to the extensors generally have a good prognosis when compared to flexor injuries, even in cases of lacerations. Different functions in biomechanics and weight-bearing are more significant in the flexors, demonstrating greater consequences on sports performance for the horse (Williams 2019).

In conclusion, the present case study shows that the occurrence of injuries to the extensor tendons at the level of the carpal region is more related to direct trauma. Few reports have been found in the literature, especially with regard to diagnosis, and not up-to-date. Even more scarce are the references of ultrasound images of these lesions, which proved to be essential for the diagnosis and appropriate therapeutic conduct. Finally, it becomes questionable if it is really difficult to occur or if the cases are underestimated due to the low severity that these injuries are able to cause to sport horses.

Declarations

Authorship: All the authors contributed to the accomplishment of this article, either in the attendance of the cases, in the writing or in the review of the manuscript, aware of the final version.

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CONSIDERAÇÕES FINAIS

Há muitos estudos sobre a prevalência de lesões do Sistema locomotor em equinos, porém de forma isolada tanto com relação ao tipo de lesão ou na categoria animal. Este trabalho abrange todas as afecções passíveis de comprometimento do sistema locomotor dos equídeos do semiárido nordestino por categoria animal, permitindo aos profissionais da área o acesso a lista de diagnósticos mais frequentes na nossa região.

Pode-se concluir que a idade e tipo de atividade exercida tem impacto direto na prevalência de determinadas lesões do sistema locomotor, demonstrando forte influência do manejo inadequado, sugerindo que medidas preventivas devem ser tomadas por meio de orientações. E como a ocorrência dessas lesões envolveram com maior frequência os animais de vaquejada, mais estudos devem ser realizados com relação à biomecânica dos cavalos neste esporte, por ser um assunto deficiente na literatura atual.

Embora o diagnóstico clínico das lesões de tendões extensores seja possível, a ultrassonografia tem um papel fundamental na conduta médica, o trabalho permite referenciar alguns padrões de lesão, porém estudos devem ser realizados quanto aos padrões de normalidades.