# Factors affecting outcome of extensor tendon lacerations in the distal limb of horses

## A retrospective study of 156 cases (1994–2003)

C. Mespoulhès-Rivière[1], A. Martens[2], L. Bogaert[2], H. Wilderjans[3]
[1]Dierenkliniek De Morette, Asse, Belgium
[2]Department of Surgery and Anaesthesiology of Domestic Animals, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium
[3]Dierenkliniek De Bosdreef, Moerbeke Waas, Belgium

**Summary**
Distal limb lacerations are common injuries in horses, with a better prognosis reported for extensor tendons lacerations compared to flexor tendons lacerations. The objective of the present study was to determine the influence of type and location of injury, modalities of treatment and post surgical complications on the outcome of extensor tendon lacerations. The medical records of 156 horses surgically treated for extensor tendon lacerations over a 10-year period were analysed retrospectively. Information was obtained for 124 horses with a minimum of 18 months follow-up. Statistical analysis was performed on 129 horses (five horses were euthanized during hospitalization) in order to determine factors affecting outcome. Seventy-four percent of the horses returned to soundness, 17% had moderate gait impairment and 9% remained lame. Approximately 60% of the sports horses returned to an equal or higher level of performance, and 17.5% returned to a lower level. In the multivariate statistical analysis, the only significant factor that favourably influenced outcome was complete suture of the wound. A significant association could not be detected between outcome and absence of a functional extensor tendon, The most important post-surgical complication was extensive scarring of the wound. The present results report outcome of extensor tendon lacerations in a large number of horses and outline the importance of primary wound healing in order to avoid major scarring with potential functional consequences.

**Keywords**
Horse, extensor tendon, laceration, wound suture, scarring

**Vet Comp Orthop Traumatol 2008; 21: 358–364**

**Prepublished online February 14, 2008**
**doi: 10.3415/VCOT-07-07-0069**

## Introduction

Distal limb lacerations are common injuries in horses and may involve numerous soft tissue structures, including extensor and/or flexor tendons, ligaments and joint capsule. Several studies have focused on the treatment of flexor tendons lacerations and most authors agree that this condition has a worse prognosis compared to extensor tendons lacerations (1–3). These lesions can nevertheless also result in a large scar and gait impairment as they are often complicated with wound sepsis, sequestrum formation and exuberant granulation tissue (4). One author (5) even reported a worse prognosis for extensor tendons lacerations compared to flexor tendons lacerations with only 31.6% of horses returning to their original level of performance.

Distal limb injuries involving extensor tendons are more common in the hind limb and have been associated with a better outcome compared to the forelimb (2, 4, 6). Partial extensor tendon lacerations also seem to have a better prognosis compared to complete section (7). The impact of injury to the lateral digital extensor tendon has not yet been studied, although some clinicians have a subjective impression of a more favourable outcome in horses with an intact lateral digital extensor tendon.

Treatment of extensor tendons lacerations may be conservative or surgical. Surgery involves wound and tendon débridement and lavage, and tenorrhaphy if the tendon ends can be apposed. The wound can then be closed or left to heal by second intention. External coaptation is required in most cases in order to protect the wound, to assist soft tissue healing and to correct the inability to extend the digit (2, 6).

Up to now, studies on extensor tendons lacerations have only included a limited number of cases (8 to 57 cases) with follow-up results (1, 2, 4, 5, 7). The present study aimed to report the outcome following treatment of traumatic extensor tendons lacerations in a large number of horses and to evaluate factors affecting outcome. The hypotheses for the study were that extensor laceration would have a favourable prognosis, with the outcome depending upon the presence or the absence of a functional extensor tendon (i.e. complete section of both extensor tendons or a section beyond the point of fusion of the long digital extensor tendon (LDE) and the lateral digital extensor tendon (LaDE) in the hind limb).

## Material and methods

### Case selection and assessment

The medical records of horses with lacerations of the distal limb that had been admitted to three equine referral hospitals (Ghent University, Equine Clinic De Bosdreef and Equine Clinic De Morette, Belgium) over a 10-year period (January 1994 to December 2003) were reviewed. All of the horses with traumatic lacerations of the extensor tendons were included in the study, even if concurrent lesions of flexor tendons and/or lesions of synovial structures were present.

The data obtained from patient files included age, gender, clinical signs at presen-

Received July 14, 2007
Accepted September 25, 2007

tation (e.g. knuckling over fetlock), limb(s) affected, wound location, extensor tendon(s) involved, degree of laceration and involvement of other anatomic structures. The limb was divided in four areas to describe the wound location (Fig. 1): P (proximal third of metacarpus/metatarsus including dorsal carpus and tarsus); M (middle third of metacarpus/metatarsus); D (distal third of metacarpus/metatarsus including dorsal fetlock) and Pa (pastern region). The patients were also divided into two groups: horses in Group 1 had at least one functional extensor tendon left (sometimes partially lacerated), whereas horses in Group 2 did not have any functional tendon remaining. Group 2 included horses with a complete sectioning of both extensor tendons or a sectioning beyond the point of fusion of the long digital extensor tendon (LDE) and the lateral digital extensor tendon (LaDE) in the hind limb.

The surgical treatment applied and the use of one or more form(s) of external coaptation were also retrieved from the patient records.

Follow-up information was obtained by telephone questionnaires to the owner (all performed by the first author) in order to determine whether the horse was sound (as perceived by the owner) and whether the horse returned to the previous level of work. Wound complications, length of convalescence, degree of scarring and owner satisfaction were also established. The following classification was used in order to categorize subjective assessment by the owners of the cosmetic appearance of the previously-injured limbs:

- Grade 1, minimal scarring with scar barely visible;
- Grade 2, moderate but acceptable scarring;
- Grade 3, severe scarring;
- Grade 4, unacceptable cosmetic appearance of the limb, including exuberant scar or a constantly oedematous limb.

## Statistical analysis

Statistical analysis was performed using the SPSS 12.0. Chi-squared and Fisher exact tests were used to evaluate the potential interaction between several clinical variables. Odds ratios were calculated simultaneously.

Univariable logistic regression was performed to determine any correlation between the outcome variables 'lameness' and 'level of work', respectively, and several other variables: referral hospital, fore- or hind limb involvement, presence of periosteum or bone damage, involvement of synovial structures, number and type of injured tendon (lesion of the LDE, common digital extensor tendon (CDE) or LaDE), wound location, presence of a functional tendon, knuckling over before surgery, tendon suture, wound suture, use of a cast, age (< 3 years or > 3 years) and scarring.

Variables with P value < 0.2 were considered for the inclusion in a multivariable logistic regression model which was built using the forward stepwise method. Variables were excluded from the model if the analysis for interaction revealed significant association with another variable already present in the model or if the variable was a result of the treatment rather than having a causative role. Variables were added to the model if they significantly improved the fit of the model (assessed by the changes in deviance) or if removal resulted in substantial changes in the effect of other variables.

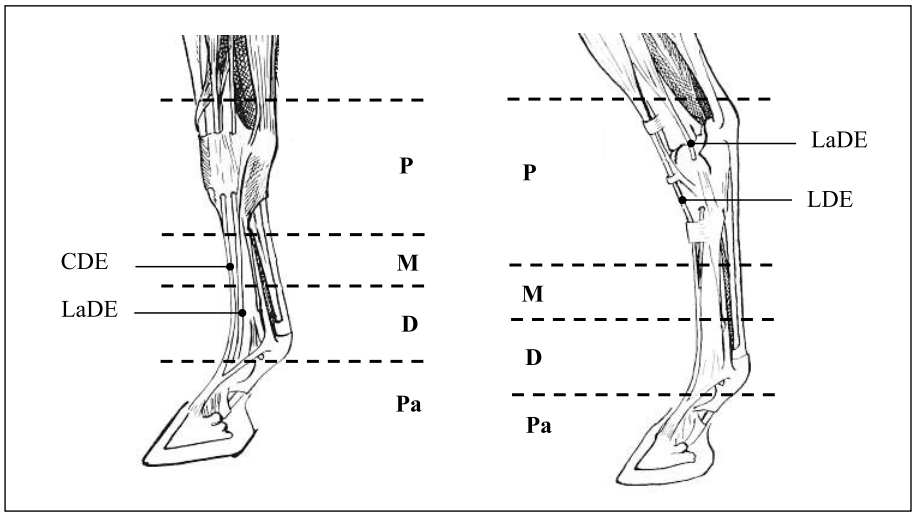


**Fig. 1** Diagram of the four areas for wound location in the distal forelimb and hind limb: P (proximal third of metacarpus/metatarsus including dorsal carpus and tarsus); M (middle third of metacarpus/metatarsus); D (distal third of metacarpus/metatarsus including dorsal fetlock) and Pa (pastern region). LDE long digital extensor tendon; CDE common digital extensor tendon; LaDE lateral digital extensor tendon. Adapted with permission from Denoix JM.

# Results

## Incidence and presentation

One hundred fifty-six horses with extensor tendon lacerations were included in the study. Mean and median ages of affected horses were 5.1 years (range: one month to 20 years) and 4.4 years, respectively. The age of three horses was unknown and 74 horses (47.4%) were < three years old. There were 29 stallions (19%), 91 females (58%) and 36 geldings (23%).

At presentation, 22 horses (14.1%) were 'knuckling over' at the fetlock. A total of 163 limbs were injured (five horses with two limbs injured and one with three limbs injured) with 91.4% (149/163) being hind limbs. More than half of the wounds (54.5%) were located in the P area, the other wounds being located in the M- and D-areas (respectively 28.2 and 14.7%). Only four horses (2.6%) presented a laceration in the Pa-area.

Tendon lacerations involved the long/common digital extensor tendon in 103 limbs, the lateral digital extensor tendon in nine limbs or both tendons in 51 limbs. According to prior definition, no functional tendon was present in 81 limbs (51.9%), including 79 hind limbs and two forelimbs.

| | Sound (%) | Lame (%) |
|---|---|---|
| All horses (n=129)* | 92 (74) | 37 (26) |
| Limb concerned | | |
| Forelimb (n=11) | 10 | 1 |
| Hind limb (n=118) | 82 | 36 |
| Wound location | | |
| P (n=69) | 46 | 23 |
| M (n=38) | 28 | 10 |
| D (n=18) | 14 | 4 |
| Pa (n=4) | 4 | 0 |
| CDE laceration | | |
| Total disruption | 68 | 31 |
| Partial disruption | 20 | 2 |
| No lesion | 4 | 4 |
| LDE laceration | | |
| Total disruption | 28 | 14 |
| Partial disruption | 2 | 1 |
| No lesion | 62 | 22 |
| Presence of a functional tendon | | |
| Yes | 44 | 19 |
| No | 48 | 18 |
| Periost/bone involvement | | |
| Present | 40 | 19 |
| Not present | 52 | 18 |
| Wound suture | | |
| Sutured | 61 | 16 |
| Not sutured | 31 | 21 |
| Tendon suture | | |
| Performed | 9 | 2 |
| Not performed | 79 | 35 |
| Tendon ends sutured to tissues | 4 | 0 |
| Half limb cast application | | |
| Used | 50 | 26 |
| Not used | 42 | 10 |
| Unknown | 0 | 1 |
| Grade of wound scarring (n=120) | | |
| Grade 1 | 23 | 0 |
| Grade 2 | 35 | 12 |
| Grade 3 | 24 | 13 |
| Grade 4 | 8 | 5 |
| Unknown | 2 | 7† |

* Horses with follow-up information available (124 horses discharged and five horses euthanatized during immediate postsurgical period; percentages were calculated for the 123 remaining horses with 18 months follow-up). † Including the five horses euthanatized during immediate postsurgical period. P: proximal third of metacarpus/metatarsus including dorsal carpus and tarsus; M: middle third of metacarpus/metatarsus; D: distal third of metacarpus/metatarsus; Pa: pastern region; LDE: long digital extensor tendon; CDE: common digital extensor tendon; LaDE: lateral digital extensor tendon.

**Table 1**
Injury / treatment variables and outcome in 129 horses surgically treated for extensor tendon lacerations.

Eighty-nine horses (57%) had other injured structures. Periosteum/bone lesions were identified in 70 horses (45%) and synovial structures were involved in 23 horses (14.7%). Other lesions included: flexor tendons laceration (six horses), vascular or nerve lesions (eight horses), fracture of splint bones (two horses) and rupture of the fibularis tertius muscle (one horse).

## Treatment protocol

Due to the seriousness of injury and/or financial constraints of the owner, eight horses were euthanized without treatment. One hundred forty-eight horses (153 wounds) were treated, six of them standing, the remainder under general anaesthesia. Treatment consisted of thorough wound débridement, lavage and curettage when the underlying bone was exposed. When synovial cavities were penetrated, lavage was performed followed by intrasynovial administration of antimicrobials. Necrotic and contaminated tendon stumps were trimmed back to healthy tissue. In 13 horses (8.5%), tendon ends could be apposed with minimal tension and were sutured (polyglactin 910, polydioxanone or nylon; suture size and pattern were rarely recorded). In six horses, tendon ends were sutured to the subcutaneous tissue or periosteum, whereas tendon ends were not sutured in the remaining horses. Wound closure was considered when the degree of wound contamination and the associated soft tissue lesions were assumed to be compatible with primary wound healing. Eighty-eight wounds (58.1%) were closed by first intention and 31 wounds (20.3%) were partially closed. A drain was used in eight wounds. Thirty-three wounds (21.6%) were left open for second intention healing.

External coaptation consisted of half limb cast in 89 horses (60%), Robert Jones bandage with incorporated PVC splint in seven horses (5%) and a simple bandage for the other horses, depending on the severity of initial injury. The mean casting period was five weeks (range two to 10 weeks).

Five horses were euthanatized during the post-surgical hospitalization period as a result of complications (two with joint sepsis, two with necrosis of the digit, and one horse with contra-lateral limb laminitis). Three other horses with joint sepsis were treated successfully and 143 horses (96.6% of the treated horses) were discharged.

## Outcome of extensor tendon laceration

Follow-up information was obtained at a minimum of 18 months after injury for 124 horses. One horse had been euthanized because of the owner's inability to manage the wound. Complete information was obtained for the remaining 123 horses (Table 1).

Wound complications during convalescence included: wound hypergranulation (27 horses), wound dehiscence (12 horses), sequestrum formation (eight horses; all of them with lesions of the underlying peri-

osteum/bone at admission), tarsometatarsal joint infection (two horses) and generalized wound sepsis (two horses). Only two horses required skin grafting during wound management in order to accelerate healing and improve cosmetic appearance of the final scar. Pressure sores from casting were reported in four horses.

The mean time for return to normal activity after surgery or treatment of injury was four months (range 1 to 12 months). Of the 123 horses with follow-up information available, 91 (74%) were sound and 11 horses (9%) were lame (Fig. 2). The remaining 21 horses (17%) had moderate gait impairment. Thirteen horses were admitted with an intermittent gait irregularity at the trot, including very slight and intermittent lameness (mostly at the beginning of work), a slower forward movement of the previously-injured leg or stiffness of the fetlock compared to the contralateral limb. Other gait abnormalities were a slower forward movement of the limb during high speed exercise only (diagnosed by the driver or trainer) which precluded their racing activity (three of the four race horses of the study), intermittent knuckling over at the fetlock (four horses) or stringhalt (one horse). All of these gait abnormalities were nevertheless compatible with leisure activity.

Of the 57 horses in sports activity before wounding, 34 (59.7%) returned back to their previous activity, at an equal or higher level (Table 2). Ten horses (17.5%) returned to sport activity but at a lower level and 13 horses (22.8%) were retired. Fifty-seven younger horses were not in work at the time of initial injury. Thirty-two (56.1%) could be used for their intended sport activity, 12 horses (21%) were used as leisure horses and 11 horses were retired (19.3%). Two horses are still too young to be used, but both are sound. The remaining nine horses were already breeding or lived at pasture at the time of initial injury.

Follow-up information on cosmetic appearance of the previously-injured limbs was available in 120 horses and revealed that 23 horses (19.2%) had minimal scarring (grade 1), 47 horses (39.2%) had moderate scarring (grade 2) and 50 horses (41.6%) had severe scarring (grade 3 and 4).

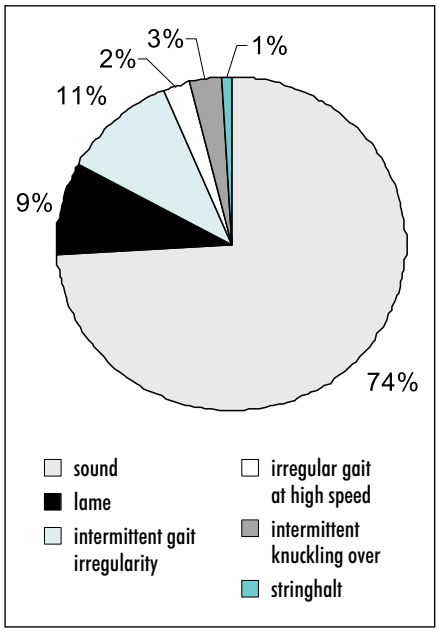


**Fig. 2** Distribution of gait outcome for 123 horses surgically treated for extensor tendon lacerations with 18 months follow-up.

Thirteen horses of the latter group presented an ugly and exuberant scar (cheloid) or a constantly oedematous limb.

Most owners (89%) in the present study were satisfied with the final outcome.

## Statistical analysis

Statistical analysis was performed on the 129 horses for which follow-up information was available: 124 horses were discharged with follow-up and five horses were euthanatized during immediate postsurgical hospitalization time.

A significant association was found between cast application and absence of a functional tendon. Horses without a functional tendon (Group 2) were 4.7 times more likely to have half limb cast application compared to horses with a functional tendon (Group 1). There was also a significant association between cast use and ability to suture the wound, with horses with a completely sutured wound being 3.6 times more likely to have half limb cast application if the wound could be completely sutured. The grade of postsurgical scarring was significantly associated with the ability to suture the wound completely, with achievement of better cosmetic result when the wound had been sutured.

The univariable associations between the outcome (return to soundness or not) and other variables are shown in Table 3. Complete suture of the wound and grade of scarring were both significantly correlated with

**Table 2** Performance outcome in 123 horses surgically treated for extensor tendon lacerations with 18 months follow-up.

| | Original/higher or intended level of use (%) | Lower level of use (%) | Retired (pasture/breeding) (%) | Not in activity yet (%) |
|---|---|---|---|---|
| Horses with follow-up (n=123) | 66 (54) | 22 (18) | 33 (27) | 2 (1) |
| Activity at time of injury : | | | | |
| Sport horses (n=57) | 34 (60) | 10 (17) | 13 (23) | 0 |
| Jumping / high level (n=19) | 9 | 4 | 6 | |
| Dressage / high level (n=1) | 1 | 0 | 0 | |
| Jumping-Dressage / leisure level (n=27) | 20 | 1 | 6 | |
| Military / high level (n=2) | 0 | 2 | 0 | |
| Race (n=4) | 1 | 3 | 0 | |
| Driving (n=3) | 3 | 0 | 0 | |
| Show (n=1) | 0 | 0 | 1 | |
| Young horses (n=57) | 32 (56) | 12 (21) | 11 (19) | 2 (4) |
| Jumping | 28 | | | |
| Dressage | 3 | | | |
| Military | 1 | | | |
| Pasture horses (n=9) | 0 | 0 | 9 | 0 |

| Variable | P value | Odds ratio |
|---|---|---|
| **Equine referral clinic** | ***0.092*** | |
| **Fore- or hind limb involvement** | ***0.133*** | 0.23 |
| Periosteum/bone involvement | 0.417 | 1.37 |
| Synovium involvement | 0.861 | 1.12 |
| Number of tendons affected | 0.868 | 0.93 |
| Wound location | 0.422 | |
| Presence of a functional tendon | 0.717 | 1.15 |
| Suture of the tendon | 0.421 | 0.53 |
| **Suture of the wound** | **0.017** | 0.39 |
| Half limb cast application | ***0.064*** | 2.18 |
| Age (<3 and >3 years) | 0.301 | 1.50 |
| Scarring of the wound | **0.004** | |
| Knuckling over fetlock at admission | 0.302 | 1.72 |
| ***LDE/CDE laceration*** | ***0.068*** | |
| LaDE laceration | 0.694 | |

Bold but not italic numbers are significant (P ≤0.05). Bold and italic numbers are not significant but show a tendency for association with return to soundness. The variables in bold and/or italic were considered for the multivariable logistic regression analysis.

**Table 3**
Univariable logistical regression analyses of categorical variables investigated for their association with return to soundness (129 surgically treated horses).

return to soundness. No other variables, including wound localization, presence of a functional tendon or synovial structures involvement, were significantly associated with outcome. However, some factors had a non-significant trend to decrease the probability for return to soundness (equine referral hospital, hind limb involvement, cast application, complete section of LDE/CDE). Univariable logistic regression analysis between the same variables and return to the original level of activity did not result in any significant association.

The final multivariable model included variables with P < 0.2 in the univariable model except cast application and degree of scarring because of their association with the presence or absence of wound suture. In this model, only the ability to suture the wound completely remained as a factor with significant influence (P=0.017) on return to soundness. Horses with a completely sutured wound were 2.6 times more likely to return to soundness compared to horses with only a partial or unsutured wound. None of the other variables were significant in combination with this variable. There was a non-significant trend for complete transection of the LDE/CDE to decrease the probability for return to soundness (P=0.056) compared with partial transection or absence of LDE/CDE lesion.

## Discussion

Extensor tendons in the horse are prone to injury as they course over the dorsal surface of the metacarpus/metatarsus. In the forelimb, the common digital extensor tendon (CDE) merges with the lateral digital extensor tendon (LaDE) on the dorsoproximal aspect of the proximal phalanx and ends on the extensor process of the distal phalanx (8). The same pattern is found in the hind limb, but with often a fusion point between the long digital extensor tendon (LDE) and the lateral digital extensor tendon at a variable level in the metatarsus. Both tendons can also course side by side as in the forelimb (anatomic variation).

Traumas with wire fences are often the cause of extensor tendons lacerations, and they occur more commonly in the hind limb, as found in the present study (91.4% of injured limbs). Laceration of the tendon can be partial or complete, the panic reaction of horses resulting more often in a complete section of the tendon, and in lesions to underlying structures such as periosteum and/or bone (5). A better outcome has been reported for partial disruption compared to complete laceration of extensor tendons (5, 7). A significant correlation between outcome and partial or complete transection of extensor tendons was not found in the present study, but there was a non-significant trend for complete transection of the LDE/CDE to reduce the probability for return to soundness in the multivariable logistic regression model. There was also an absence of significant correlation between outcome and synovial structure involvement, with 69% of sound horses (nine of the 13 horses for which follow-up was available). This finding is consistent with the results of other studies (4, 5), but the results may eventually have been different as 10 horses with synovial structure involvement were lost for follow-up and seven of the eight horses that were euthanatized without treatment (and were thus not included in statistics) also had joint involvement.

The results of this study support previous findings regarding the prognosis for extensor tendon lacerations (1, 2, 4), with 74% of sound horses at time of follow-up and 59.7% of the sport horses back to their previous activity at an equal or higher level. This last result is probably underestimated as seven sport horses were deliberately used at a lower level or retired by the owner in order to avoid re-injury. Other reasons for retirement in both sport- and young horses groups were lameness and/or severe scarring of the previously injured limb (grade 3 to 4). In warmblood horses though, return to previous activity is not only dictated by the intrinsic capacity of horses to perform, but often also by the wish or personal opinion of the owner.

Many factors may play a role in the improved prognosis for extensor tendons lacerations compared with flexor tendons lacerations. Most authors (2, 4, 7, 9, 10) agree that extensor tendons of the distal portion of the limb do not have a primary weight-supporting role and that their main function is to oppose the palmar/plantar flexion of the fetlock joint during the swing phase and to facilitate extension of the distal joints prior

to impact with the ground (7, 11). The effect of extensor tendon on the gait is minimal, as most protraction of the limb and digit arises from the upper limb and momentum of the foot (10). However, experimental low radial neurectomy made the horses unable to extend the digit in a study (12), but this abnormality resolved after five to six days. Experimental section of the long digital extensor tendon also prevented extension of the fetlock and digit in the hind limb (13), but the limb movement returned to nearly normal within 24 hours. These anatomical and physiological considerations help to understand why loss of the extensor function does not appear to significantly affect the gait, as shown by a large number of horses in the present study. The current study also failed to demonstrate a significant association between loss of a functional extensor tendon and decreased probability for return to soundness. These findings are consistent with a recent report (14) in which complete resection of the common digital extensor tendon was performed as treatment for septic tenosynovitis in seven horses, with complete recovery and return to the athletic performance level in the six horses for which follow-up was available.

External coaptation has been used in 65% of the treated horses in the present study. The stabilization of completely severed extensor tendons occurs by adhesions of the tendons ends to the surrounding structures (especially the distal portion) which prevent knuckling of the fetlock and foot (4, 6). The horse quickly learns to flip its foot forward before ground impact to prevent knuckling, and this is helped by the use of immobilization. External coaptation further helps migration of extrinsic cells into the tissue deficit (15) and healing of the gap between tendon ends by reducing the detrimental effects of movement, providing a moist environment and increasing wound temperature. The mean casting time was five weeks, which is consistent with usual recommendations (16) but is longer than in previous reported studies (1, 7). Casting was not associated with extensive pressure sores (four horses out of 89) in the present study. A relative long immobilization period can be advantageous knowing that the presence of an intact wound suture and a low grade of scarring were significantly correlated with a successful outcome in this study. Although some authors (17, 18) have underlined the importance of early re-mobilization in flexor tendon lesions to avoid adhesions, this may be less important in extensor tendon lacerations.

Nevertheless, some horses in the present study (16.3%) displayed gait abnormalities at work, such as intermittent irregularity at the trot, slower forward movement of the previously injured leg, intermittent knuckling over or stringhalt. Stringhalt has previously been reported secondary to trauma to the dorso-proximal aspect of the metatarsal region in horses (19). The authors assumed this hyperflexion of the tarsocrural joint to be secondary to adhesions of the long and lateral digital extensor tendons to the proximal aspect of the third metatarsal bone, as had also been indicated by previous studies (20, 21). The only horse with stringhalt in our study had sustained a complete laceration of the LDE, with concurrent periosteal lesion, but many other horses sustained the same injury without developing stringhalt. The occurrence of this gait abnormality can therefore not directly be explained.

The only factor in this study which remained of significant influence on the outcome in the final statistic model is the presence of a complete wound suture, with those horses being 2.6 times more likely to return to soundness compared with only a partial or an unsutured wound. This result is completely different from previous studies in which a statistical association between method of wound treatment and outcome was not found (2, 7). The present study also found the grade of scarring as factor possibly affecting the outcome. Both variables are associated, first intention healing minimizing development of abnormal scar tissue. Complications of extensor tendons lacerations in previous reports included exuberant tissue and sequestrum formation (1, 5, 10). Cortical sequestrae have even been reported in 50% of the wounds with extensor tendon damage (1), all of them involving the dorsal metatarsus (n=8). The wounds had not been sutured in this study, and the large avulsion injuries reported may explain these results. The incidence of this complication in our study was much lower, with only eight horses developing bone sequestration, all of them having primary lesions of the underlying periosteum or bone at admission.

Tendon suture was not associated with a better outcome in the present study, and this finding is in accordance with previous studies (2, 4, 7). Suture of the tendon ends could only be performed in 13 horses, as most of the wounds presented retracted tendon ends, or necrotic and contaminated tendon ends which were debrided up to healthy tissues. Follow-up was available for four out of six horses in which the tendon ends were sutured to the underlying tissues, all of them showing minimal scarring. This procedure may be recommended in the treatment of extensor tendons lacerations, as it minimizes movement of the severed tendon ends in the wound and granulation tissue formation, thereby improving the quality of scarring and chances for a successful outcome without functional sequela.

## References

1. Baxter GM. Retrospective study of lower limb wounds involving tendons, tendon sheaths or joints in horses. In: Proceedings of the 33rd Annual Convention of the American Association of Equine Practitioners 1987; 715–728.
2. Foland JW, Trotter GW, Stashak TS et al. Traumatic injuries involving tendons of the distal limbs in horses: a retrospective study of 55 cases. Equine Vet J 1991; 23: 422–425.
3. Taylor DS, Pascoe JR, Meagher DM et al. Digital flexor tendon lacerations in horses: 50 cases (1975–1990). J Am Vet Med Assoc 1995; 206: 342–346.
4. Belknap JK, Baxter GM, Nickels FA. Extensor tendon laceration in horses: 50 cases (1982–1988). J Am Vet Med Assoc 1993; 203: 428–431.
5. Gasthuys F, Van Brantegem L, Vlaminck L et al. Retrospective study of tendon wounds of the distal limb segments in horses. Vlaams Diergeneeskundig Tijdschrift 1998; 67: 172–180.
6. Nixon AJ. Tendon lacerations. In: Current practice of equine surgery, White II NA, Moore JN (eds), Philadelphia, J. B. Lippincott Company 1990; 455–461.
7. Jansson N. Digital extensor tendon lacerations in horses: a retrospective evaluation in 22 cases. J Equine Vet Sci 1995; 15: 537–540.
8. Budras KD, Sack WO, Rock SO. The thoracic limb. In: Anatomy of the horse, an illustrated text. London: Mosby and Wolfe 1994; 5–13.

9. Booth TM, Clegg PD, Singer ER et al. Resection of the common digital extensor tendon in a gelding. Vet Rec 2000; 146: 373–376.
10. Davis CS, Smith RKW. Diagnosis and management of tendon and ligament disorders. In: Equine surgery, 3rd ed. Auer JA, Stick JA (eds). Philadelphia: W. B. Saunders Company 2006; 1107–1109
11. Rooney JR. Passive function of the extensor tendons of the fore and rear limbs of the horse. J Equine Vet Sci 1987; 7: 29–30
12. Firth EC. Thoracic limb digital denervation in young horses. Am J Vet Res 1987; 47: 43–45.
13. Von Marlot J, Bego U, Zobundzija M et al. Lokomotionsstorungen bei experimenteller durchtrennung der sehne des gemeinschaftlichen zehenstreckers beim pferd. Deutsche Tierartliche Wochenschrift 1982; 88: 375–378.
14. Booth TM, Abbit J, Clements A et al. Treatment of septic common digital extensor tenosynovitis by complete resection in seven horses. Vet Surg 2004; 33: 107–111.
15. Peacock EE. Repair of tendons and restoration of gliding function. In: Wound Repair, 3rd ed. Peacock EE. Philadelphia: W. B. Saunders Company 1984: 263–331.
16. Bertone AL. Tendon lacerations. Vet Clin North Am, Equine Practice 1995; 11: 293–314.
17. Kessler I, Nissim F. Primary repair without immobilization of flexor tendon division within the digital sheath. Act Orthop Scand 1969; 40: 587–601.
18. Gelberman RH, Van De Berg JS, Lundborg GN et al. Flexor tendon healing and restoration of the gliding surface. J Bone Joint Surg 1983; 65: 70–80.
19. Crabill MR, Honnas CM, Taylor DS et al. Stringhalt secondary to trauma to the dorsoproximal region of the metatarsus in horses: 10 cases (1986–1991). J Am Vet Med Assoc 1994; 205: 867–869.
20. Cahil JI, Goulden BE, Pearce HG. A review and some observations on stringhalt. NZ Vet 1985; 33: 101–104.
21. Huntington PJ, Jeffcott LB, Friend SCE et al. Australian sringhalt – Epidemiological, clinical and neurological. Equine Vet J 1989; 21: 266–273.

**Correspondence to:**
Céline Mespoulhès-Rivière, DVM
Clinique Equine, Ecole Nationale Vétérinaire de Maisons-Alfort
7 avenue Du Gal de Gaulle
94700 Maisons-Alfort, France
Phone: +33 143967107, Fax: +33 143967310
E-mail: cmespoulhes@vet-alfort.fr