The PTT is located in the proximal and medial region of the talus. The anatomic features of this portion of the talus are complex, with a variety of ligaments and synovial attachments associated with the PTT. Fragmentation of the PTT in horses has rarely been mentioned in the literature, to our knowledge, and its clinical importance in horses has not been investigated. The etiopathogenesis of FPTT is unknown, but osteochondrosis has been suggested to have a role. Although rare, OCD lesions have been identified on the proximoplantar articular surface of the medial ridge of the talus in horses. Arthroscopic removal of osteochondral fragments from the plantar pouch of the tarsocrural joint has also been reported. It was speculated that these fragments were the result of OCD lesions of the proximal surface of the medial or lateral ridge of the talus or loose small bony fragments derived from other OCD predilection sites. Nevertheless, fragments originating from the plantaroproximal aspect of the medial trochlear ridge have also been identified and have been related to traumatic events; those fragments may be removed via a plantar arthroscopic approach. Subchondral cyst-like lesions in the equine tarsus, possibly of septic or developmental origin, have been reported.

Although few references have been made to FPTT, and the radiographic appearance, clinical relevance, and outcome in horses have not been studied in detail, to our knowledge. The aim of the study reported here was to retrospectively evaluate the incidence of FPTT in a hospital population of horses and review the signalment, clinical signs, diagnostic methods and findings, treatment, and outcome to elucidate the clinical relevance of FPTT in affected horses.

Materials and Methods

Anatomic dissection—Four tarsi from 2 horses euthanized via IV administration of pentobarbital sodium for reasons other than tarsal disease were obtained for

EQUINE

Fragmentation of the proximal tubercle of the talus in horses: 9 cases (2004–2010)

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Objective—To identify the prevalence of fragmentation of the proximal tubercle of the talus (FPTT) in a hospital population of horses, characterize the anatomic features of the affected area and fragments, and describe clinical findings, diagnosis, treatment, and outcome for horses with FPTT.

Design—Retrospective case series.

Animals—9 horses with FPTT.

Procedures—2,543 radiographic views of the tarsal region of 1,526 horses that were evaluated between June 2004 and December 2010 were reviewed. Medical case records for horses with detectable FPTT were retrieved, and signalment, history, clinical signs, diagnostic methods, treatment, and outcome were recorded for assessment.

Results—9 horses (median age, 5 years; age range, 1 to 12 years) with FPTT were identified. Seven horses were warmbloods. Diagnosis was made on the basis of radiographic findings, occasionally along with results of ultrasonography and CT. The only horse that was lame in the affected limb had a history of a prior traumatic event and resultant lateral tibial malleolus fracture. One horse underwent arthroscopy, but fragments were not found and were presumed to be extra-articular. Outcome was available for 7 horses; mean ± SD duration of stable radiographic and clinical examination findings was 3 ± 1 years (range, 1 to 4 years).

Conclusions and Clinical Relevance—FPTT appeared to occur more frequently in warmbloods and was not usually associated with lameness. Affected horses remained clinically and radiographically stable over time. These data have provided some information regarding the importance of FPTT for practitioners who perform radiographic screenings during prepurchase examinations.
examination. After euthanasia, each tibia was disarticulated from the stifle joint. The skin was cut longitudinally on the medial region of the tarsus. After superficial dissection, the tarsocrural joint and medial digital flexor tendon sheath were identified and injected with 40 mL of iodine solution (10%) and 8 mL of methylene blue solution (1%), respectively. Structures related to the PTT were then identified and dissected.

Case selection—All digital radiographs of the tarsi of equine patients obtained between June 2004 and December 2010 at our institution were first reviewed for evidence of FPTT by 1 of the investigators (PE). For inclusion in the study, horses had to be ≥3 months of age, with a lateromedial radiographic view and at least 1 other view of a tarsus available. Cases in which radiographic views were of poor diagnostic quality were excluded from the study.

A diagnosis of FPTT was made when fragmentation of the PTT was observed on at least 2 radiographic views. The selected radiographic views were then subsequently reviewed on a dedicated workstation by a board-certified veterinary radiologist for consensus agreement on the presence of FPTT.

Medical records review—The selected medical records of the horses with FPTT were retrieved for assessment. Information assessed included signalment, weight, primary activity, historical presence of trauma and lameness (nature, duration, and severity), physical examination findings on admission to the hospital, results of lameness investigation, other radiographic findings, and medical and surgical treatment. Lameness was graded on the basis of the American Association of Equine Practitioners grading scale. Response to dynamic flexion test and presence of joint effusion were graded as none, moderate, or severe.

Follow-up information (including development of lameness of joint effusion, performance level, and outcomes related or not related to FPTT) was obtained via telephone from owners, trainers, and referring veterinarians; information from follow-up hospital reevaluations was also used. In the case of 1 horse, information was obtained from the competition results at the Canadian Equestrian Federation website.

Examination of radiographic views and other diagnostic images—For each case, the size of the PTT fragments was measured electronically by a board-certified veterinary radiologist (KA) on the dorsal 45° medial-plantarolateral oblique view or lateromedial view. In cases where the fragments were visible on both of these views, measurements were made on the radiographic view that most clearly defined the fragment margins. In diagnostic and nondiagnostic views (views in which fragments were or were not visible, respectively), presence of other tarsal abnormalities was also recorded. In some cases, results of ultrasonography or CT were also available for assessment.

Results

Anatomic features in relation to the PTT—The PTT is a bony prominence on the proximomedial surface of the talus. The PTT provides a groove for the medial digital flexor tendon, the tendon sheath fibers of which insert on the PTT. The medial digital flexor tendon divides the PTT in 2 parts: a medial and a plantar aspect (Figure 1). The short (deep) portion of the medial collateral ligament of the tarsocrural joint is divided in 2 branches: a shorter and thinner branch that inserts on the medial and proximal part of the talus, with some fibers also inserting on the PTT (talian branch), and another longer and thicker branch that inserts onto the medial extremity of the sustentaculum tali (calcanean branch). The plantar talocalcaneal ligament originates from the plantar and medial aspect of the talus and inserts on the sustentaculum tali. Some fibers of this ligament are attached more medially on the plantar aspect of the PTT; those fibers are identified as the medial talocalcaneal ligament. Other soft tissue structures related to this area are the tarsal sheath, plantar ligament, and tarsocrural joint capsule and associated synovial membrane.

Prevalence of FPTT in horses—Of the 7,023 horses evaluated at the hospital during the period of the study, 1,030 (14.6%) were warmbloods. Of the 1,526 horses that underwent tarsal radiographic examination (including a lateromedial radiographic view and at least 1 other radiographic view), 226 (14.8%) were warmbloods. Fragmentation of the PTT was detected in 9 horses (0.59% of horses for which radiographic views of the tarsi were available). The horses were assigned a number from 1 through 9 (Table 1). Of the 9 horses with FPTT, 7 (77.8%) were warmbloods. Prevalence of FPTT in the 226 warmbloods that underwent radiography was 3.09%.

Radiographic findings—A total of 2,543 tarsal radiographic examinations were assessed. Radiograph-
ic examinations of both tarsi were available for 1,017 (66.6%) horses. In 8 of the 9 affected horses, radiographic views available for assessment included standard lateromedial, dorsoplantar, dorsolateral-plantaromedial oblique, and dorsal 45° medial-plantarolateral oblique views; for the other affected horse (horse 2), only lateromedial, flexed lateromedial and dorsoplantar views were available (Table 2). Additional radiographic views of the tarsus were available for some affected horses; these views included flexed lateromedial (n = 4), flexed dorsoplantar (1), and plantaroproximal-plantarodistal oblique views (ie, calcaneal skyline; 4). Eight of the affected horses had bilateral radiographic views available; unilateral FPTT was identified in 7 of these horses (5 were affected in the left hind limb and 2 were affected in the right hind limb) and 1 horse had bilateral FPTT.

In the dorsal 45° medial-plantarolateral oblique views available for 9 of 10 tarsi, FPTT was detected in all instances. Fragmentation of the PTT was easier to identify when the angulation of this view was closer to the dorsoplantar axis (ie, in dorsal 30° medial-plantarolateral oblique views; Figure 2). Each of the calcaneal skyline views available for 4 of the 10 tarsi also revealed the fragmentation; the fragments were superimposed over the plantar aspect of the talus and

Table 1—Signalment and history obtained from medical records for 9 horses with FPTT.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Signalment</th>
<th>Weight (kg)</th>
<th>Use</th>
<th>Reason for evaluation</th>
<th>History of trauma</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5-year-old warmblood stallion</td>
<td>660</td>
<td>Dressage</td>
<td>Neurologic examination</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>12-year-old warmblood mare</td>
<td>565</td>
<td>Dressage</td>
<td>Lameness</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>3-year-old warmblood stallion</td>
<td>670</td>
<td>Show jumping</td>
<td>Stallion agreement</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>4-year-old warmblood gelding</td>
<td>496</td>
<td>Unknown</td>
<td>Lameness</td>
<td>Yes (1 mo before examination)</td>
</tr>
<tr>
<td>5</td>
<td>11-year-old Thoroughbred gelding</td>
<td>520</td>
<td>Show jumping</td>
<td>Lameness</td>
<td>No</td>
</tr>
<tr>
<td>6</td>
<td>1-year-old Standardbred mare</td>
<td>377</td>
<td>Activity not defined</td>
<td>Radiographic screening for osteochondrosis</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>8-year-old warmblood stallion</td>
<td>674</td>
<td>Show jumping</td>
<td>Radiographic screening for osteochondrosis</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>8-year-old warmblood gelding</td>
<td>Unknown</td>
<td>3-day eventing</td>
<td>Prepurchase examination</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>4-year-old warmblood gelding</td>
<td>Unknown</td>
<td></td>
<td>Prepurchase examination</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 2—Clinical and radiographic findings obtained from medical records for the 9 horses with FPTT in Table 1.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Affected hind limb</th>
<th>Llameness* (hind limb, grade)</th>
<th>Flexion test response† (hind limb evaluated)</th>
<th>Tarsocrural joint effusion† (hind limb evaluated)</th>
<th>Fragment size‡ of fragmentation of PTT in radiographic view</th>
<th>DC radiographic views</th>
<th>Non-DC radiographic views</th>
<th>Fragment bed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Right</td>
<td>No</td>
<td>None (right)</td>
<td>None (right)</td>
<td>11.9 (LM) [Plantar (confirmed via CT)]</td>
<td>LM, DMPLO, and SK</td>
<td>DP, DMPLO, and LM-flex</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Left</td>
<td>None (left)</td>
<td>None (left)</td>
<td>14.6 (DMPLO)</td>
<td>[Plantar (confirmed via CT)]</td>
<td>LM, LM-flex, DMPLO, and SK</td>
<td>DP and DMPLO</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Left</td>
<td>Yes (right) (1); right)</td>
<td>Moderate (right); none (left)</td>
<td>Moderate (both)</td>
<td>11.7 (LM) [Plantar]</td>
<td>LM, LM-flex, and DP</td>
<td>DP and DMPLO</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Left</td>
<td>No</td>
<td>None (both)</td>
<td>None (left)</td>
<td>16.1 (LM) [Plantar]</td>
<td>LM, LM-flex, DMPLO, and SK</td>
<td>DP and DMPLO</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Left</td>
<td>Yes (right; 2)</td>
<td>Unknown (right)</td>
<td>Moderate (right)</td>
<td>18.1 (LM) [Plantar]</td>
<td>LM, DMPLO, and DP</td>
<td>DMPLO</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>Right</td>
<td>Yes (right; 2)</td>
<td>Unknown (right)</td>
<td>Local subcutaneous edema and swelling (right)</td>
<td>7 (DMPLO) [Medial]</td>
<td>DP, DP-flex, and DMPLO</td>
<td>LM, LM-flex, and DMPLO</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>Left</td>
<td>No</td>
<td>Unknown (both)</td>
<td>None (left)</td>
<td>3.9 (LM) [Plantar]</td>
<td>LM and DMPLO</td>
<td>DP and DMPLO</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>Left</td>
<td>None (both)</td>
<td>Moderate (both)</td>
<td>None (left)</td>
<td>7.5 (DMPLO) [Plantar]</td>
<td>DP and DMPLO</td>
<td>DMPLO and LM</td>
<td>Yes</td>
</tr>
<tr>
<td>8</td>
<td>Right</td>
<td>No</td>
<td>None (both)</td>
<td>None (right)</td>
<td>10 (DMPLO) [Plantar]</td>
<td>LM and DMPLO</td>
<td>DP and DMPLO</td>
<td>Yes (possible multiple fragments)</td>
</tr>
<tr>
<td>9</td>
<td>Left</td>
<td>No</td>
<td>None (both)</td>
<td>None (left)</td>
<td>9.1 (DMPLO) [Plantar]</td>
<td>LM, DMPLO, and SK</td>
<td>DP and DMPLO</td>
<td>No</td>
</tr>
</tbody>
</table>

*Llameness was graded on the basis of the American Association of Equine Practitioners grading scale (0 to 5).
†Response to dynamic flexion test and presence of joint effusion were graded as none, moderate, or severe.‡The PTT fragments were measured (in mm) electronically on the DMPLO or LM view; in cases where the fragments were visible on both of these views, measurements were made on the radiographic view that most clearly defined the fragment margins.
Concurrent tarsal abnormalities were detected radiographically in 4 horses. A mildly comminuted, displaced lateral malleolar fracture of the distal portion of the tibia was observed in horse 5. An OCD lesion of the distal aspect of the lateral ridge of the talus was present in 1 horse. Two horses (horses 3 and 9) had radiographic evidence of mild osteoarthritis at the distal intertarsal and tarsometatarsal joints in the limb with FPTT.

Clinical features—Selected data retrieved from the medical records were summarized. The mean age of the total population of 7,023 horses at the hospital was 9.4 years, and the mean age of all 1,030 warmbloods was 7.2 years. Among the 1,526 horses that underwent tarsal radiographic examinations, mean age was 5.2 years. The median age of the 9 horses with FPTT was 5 years (range, 1 to 12 years). The mean age of the warmblood group (n = 226) that underwent tarsal radiographic examination was 5.5 years, and the mean age of the warmbloods with FPTT (n = 7) was 6.28 years.

Of the 9 horses with FPTT, 2 were mares, 3 were stallions, and 4 were geldings (Table 1). In addition to the 7 warmbloods, 1 Thoroughbred and 1 Standardbred were affected. Median body weight (n = 7 horses) was 565 kg (1,243 lb; range, 377 to 674 kg [829.4 to 1,482.8 lb]). Horses were used for jumping (n = 4), dressage (2), and 3-day eventing (1). The horse with an OCD lesion of the distal aspect of the lateral ridge of the talus had just begun training at the time of examination, and the information regarding use was not noted in the medical record for another horse.

Reasons for radiographic examination were lameness investigation (n = 3), prepurchase examination (2), OCD radiographic survey (2), bilateral hind limb ataxia (1), and stallion health evaluation (1). Lameness in the affected limb was detected in the horse (horse 5 with FPTT located medially) that also had the displaced lateral malleolar fracture. Tarsocurial joint effusion was detected in 2 horses (Table 2). One horse (horse 2) had a bilateral moderate joint effusion and was grade 1 lame on the contralateral FPTT limb; another horse (horse 7) also had bilateral moderate joint effusion, with no lameness identified. Evident periarticular swelling was present on the lateral aspect of the tarsus in horse 5. Tarsal joint flexion tests were performed in 6 horses; only 1 horse had a moderate positive response on the contralateral limb, and results of the flexion test performed in the FPTT limb were negative.

Surgical procedure and postoperative care—One of the horses with radiographic evidence of mild osteoarthritis at the distal intertarsal and tarsometatarsal joints in the limb with FPTT (horse 3) underwent bi-
lateral femoropatellar arthroscopy for OCD lesions on the distal aspect of the femur. During the same anesthetic episode, plantar tarsocrural joint arthroscopy was also performed for assessment of the FPTT site at the request of the owner and referring veterinarian. No evidence of an intra-articular fragment in the plantar compartment of the tarsocrural joint was noted in the medical record. The articular cartilage of the ridges of the talus was macroscopically normal. The FPTT was not visible, and the surgeon elected not to perform further invasive exploration of the area because no lameness had been detected before surgery. The horse received standard postoperative arthroscopic care.

Additional imaging—The horse with bilateral FPTT (horse 1) was euthanized because of marked ataxia attributable to cervical stenotic myelopathy. Postmortem helical single-slice CT was performed on both tarsi of the disarticulated limbs to determine the PTT fragment location. The fragmentation was located at the insertion site of the medial talocalcaneal ligament (Figure 4) at the plantar aspect of the PTT in both tarsi. The medial aspect of the PTT was intact in both limbs.

Ultrasonographic images of the FPTT were obtained of one of the horses with radiographic evidence of mild osteoarthritis at the distal intertarsal and tarsometatarsal joints in the limb with FPTT (horse 3) with a 10-MHz linear transducer. The ultrasonographic examination revealed that the short and long portions of the medial collateral ligament of the tarsocrural joint and the medial and lateral digital flexor tendon had a normal ultrasonographic appearance. The fragment margins and size were determined with this technique (Figure 5).

Outcome—Long-term follow-up information was available for 7 of 9 horses; the follow-up period ranged from 1 to 4 years after initial examination. The horse with bilateral moderate joint effusion and grade 1 lameness on the contralateral FPTT limb (horse 2) and one of the horses with radiographic evidence of mild osteoarthritis at the distal intertarsal and tarsometatarsal joints in the limb with FPTT (horse 3) underwent a second complete clinical and radiographic examination. For horse 2, the hind limb with FPTT had no signs of lameness but effusion of the tarsocrural joint had increased mildly over a 4-year period. The radiographic appearance of the PTT fragment was unchanged. For horse 3, lameness of the contralateral tarsocrural joint effusion and grade 1 lameness on the contralateral FPTT limb (horse 2) and one of the horses with radiographic evidence of mild osteoarthritis at the distal intertarsal and tarsometatarsal joints in the limb with FPTT (horse 3) underwent a second complete clinical and radiographic examination. For horse 2, the hind limb with FPTT had no signs of lameness but effusion of the tarsocrural joint had increased mildly over a 4-year period. The radiographic appearance of the PTT fragment was unchanged 2 years after detection.

Figure 3—Radiographic views of the affected left tarsal region of a horse with radiographic evidence of mild osteoarthritis at the distal intertarsal and tarsometatarsal joints in the limb with unilateral FPTT (horse 3). A—Lateromedial view of the left tarsus. B—Flexed lateromedial view of the left tarsus. In panels A and B, notice the presence of a bony fragment (white arrow) in the plantar region of the tarsus. Application of joint flexion reveals that there is no connection between the fragment and the plantar aspect of the tibia but does not change superimposition between the fragment and talus or calcaneus.

Figure 4—Computed tomographic images of the tarsi of a horse with bilateral FPTT (horse 1). A—Plantaromedial image (after 3-D reformatting) of the left tarsus. B—Plantaromedial image (after 3-D reformatting) of the right tarsus. In panels A and B, the medial digital flexor tendon groove (black dotted line) is illustrated. 1 = Distal tubercle of the talus. 2 = Medial malleolus of tibia. 3 = Insertion site of the calcaneal branch of the short medial collateral ligament on the sustentaculum tali. C—Transverse CT image of the left tarsus at the level of the talocalcaneal joint. The white dotted arrow indicates the optimal beam direction for a dorsoplantar radiographic view; the black dotted arrow indicates the optimal beam direction for a dorsal 30° medial-planlarolateral oblique radiographic view. D—Transverse CT image of the right tarsus at the level of the talocalcaneal joint. In all panels, the medial aspect (white arrow) and fragmented aspect (black arrow) of the FTT are visible.
The fragmentation plane is indicated (white arrows).

Information obtained through follow-up interviews with owners, trainers, and referring veterinarians via telephone was available for an additional 5 horses. The horse with bilateral moderate joint effusion and no lameness (horse 7) developed complications following a subsequent castration surgery at the farm and was euthanized; no joint effusion or lameness was noticed in the period between the FPTT detection and euthanasia 3 years later. All others horses were performing at their expected level, and no lameness or joint effusion was reported during the follow-up period.

Discussion

Data from the present retrospective case series regarding FPTT have confirmed and expanded the information about this condition for equine practitioners. Anatomic dissection of 4 normal hind limbs revealed that the PTT worked as a groove for the medial digital flexor tendon, which divides the PTT into medial and plantar portions. Although fragmentation occurred almost exclusively on the plantar aspect of the PTT in the present study, fragmentation on the medial aspect of the PTT was detected in 1 of the 9 horses (horse 5). In the authors’ opinion, in that case, FPTT could be susceptible to trauma-induced fracture. It appeared that the medial aspect of the PTT can be more easily evaluated in dorsal 30° medial-plantarolateral oblique views and was even more evident on the dorsal 30° medial-plantarolateral oblique view. However, in the single horse where fragmentation was suspected at the medial aspect of the PTT (horse 5), the lateromedial radiographic view was not diagnostic because this part of the PTT protrudes in the lateromedial axis and superimposition prevents proper evaluation.

The calcaneal skyline view was diagnostic in all cases in which it was obtained; this view allowed better discrimination between the plantar and the medial aspects of the PTT and showed the exact location of fragments that were located slightly axial to the plantar aspect of the PTT in 3 of 4 tarsi. Computed tomography confirmed this location in 2 tarsi. The technique for the calcaneal skyline view may be modified to optimize visualization of the PTT fragment; exposure factors must be greater than those used for standard views of the tuber calcanei in addition, a 15° plantar angulation appears to reduce superimposition between the plantar aspect of the PTT and the proximal medial trochlear ridge of the talus. However, a tarsocrural joint flexed view does not enhance visualization of the fragmentation site, compared with a standard lateromedial view, because it does not prevent PTT superposition over the sustentaculum tali. In 1 horse in the present study, the lesion was visible on the lateromedial view but not the flexed lateromedial view. Nevertheless, flexed views are important for identification of pathologic changes on the proximal articular surface of the medial or lateral ridges of the talus and may be helpful to differentiate FPTT from distal tibial fragments, other OCD lesions on the proximal articular surface of the talus, or fragments originating from the plantarproximal aspect of the medial trochlear ridge.

Those fragments originating from the plantarproximal aspect of the medial trochlear ridge have been related to traumatic events (e.g., horse kicked while preparing to kick another horse) and are also visible in the proximolateral-distalomedial oblique (flexed) view. Plantar arthroscopic approaches to remove such fragments have been documented. Flexed dorsoplantar and dorsoplantar views revealed fragmentation of the medial aspect of the PTT in 1 horse in the present study. The flexed position may have changed the relationship between the fragment line and the x-ray beam or placed tension on ligamentous attachments, thereby aiding fragment identification. A lateral 45° proximal-medial distalomedial oblique view may also be helpful to confirm FPTT.

In a prospective study focusing on evolution of radiographic findings in 62 horses, including 53 (85%) warmbloods that were 3 to 16 years of age, the author...
classified FPTT as radiographic findings with uncertain clinical expression, as was the classification of OCD lesions of the intermediate ridge of the distal portion of the tibia. None of the horses in the present study had lameness attributable to FPTT, and tarsocrural joint effusion was rare; moreover, flexion testing (when performed) did not reveal any gait abnormalities. The results of the present study generally supported the viewpoint that the clinical importance (lameness or other clinical signs) of FPTT is very low. However, the low number of cases evaluated in the present study and the lack of reports of other large clinical studies preclude defining a strong position concerning the clinical importance of FPTT. A thorough lameness examination remains essential in cases of FPTT to justify surgical intervention, considering that none of the affected horses in the present study for which follow-up information was available had evidence of problems associated with this condition.

In the aforementioned prospective study, 9 of 62 (3.2%) horses had radiographic evidence of FPTT at 3 years of age. In another study in which 676 warmbloods underwent radiographic screening, FPTT was detected more frequently (1% of cases) than were osteochondroses of the lateral trochlear ridge of the talus (0.7% of cases) and lateral (0.3% of cases) and medial (0.1% of cases) malleolus of the tibia. The prevalence of FPTT in the hospital population of horses undergoing tarsal radiographic examination in the present study was 0.59%, but 3.1% of warmbloods were affected. Because the percentage of warmbloods in the population undergoing tarsal radiography was similar to the percentage of warmbloods (14.6%) in the total hospital population, we consider that this result is an accurate estimate of the real prevalence of FPTT in warmbloods. Compared with the study group of affected horses that included all breeds, there was a 5-fold increase in prevalence of FPTT in warmbloods, which suggested a breed predisposition for this lesion.

The etiopathogenesis of FPTT is unclear. It is unlikely to be due to a single external traumatic event because of its typical site of occurrence. It does bear some similarities with the extra-articular ununited proximal palmar-plantar eminence of the first phalanx described as part of the OCD complex in horses. Ununited proximal palmar-plantar eminence of the first phalanx in horses is rarely associated with clinical signs and considered to be an incidental radiographic finding. Ununited proximal palmar-plantar eminence of the first phalanx fragments may be fractures, separated centers of ossification, or the result of osteochondrosis. We speculate that FPTT may be either a rare form of OCD or an avulsion fracture produced by tension on the medial talocalcaneal ligament or tarsal plantar ligament during extreme flexion. Radiographic studies of young horses with histologic assessment of lesions would allow clarification.

Additional imaging techniques provided further information regarding FPTT in the present study. One horse underwent an ultrasonographic examination that confirmed FPTT and the absence of abnormalities in the adjacent soft tissue structures. Postmortem CT examination provided valuable information as to the exact location of the fragments. It revealed that both fragments (right hind limb and left hind limb) were extra-articular, distal to the synovial capsule attachments, and mildly lateral to the plantar aspect of the PTT. Contrast CT arthrography or MRI may help to clarify the relationship of the fragments to the tarsocrural joint, although it was not necessary in the present study. If fragments were deemed to contribute to lameness, prior CT or MRI examination could potentially facilitate surgical planning, and ultrasound-assisted anatomic landmarking prior to incision would be of great assistance.

Diagnosis and treatment of clinical conditions affecting the plantar pouch of the tarsocrural joint of horses, such as proximal OCD lesions of the medial and lateral trochlear ridges, loose OCD fragments, intra-articular fracture fragments, sepsis, and osteomyelitis, by use of a plantar arthroscopic approach have been described. In the present study, 1 horse underwent plantar tarsocrural arthroscopy but no fragments were observed, a finding that corroborated the suspected extra-articular location of PTT fragments.

Desmitis, enthesopathy, or avulsion of the talian branch of the short medial collateral ligament should be considered in the case of fragmentation of the medial aspect of the PTT because that ligament has fibers inserting in this region. When medial FPTT is suspected, accurate ultrasonographic and radiographic examinations, including dorsoplantar radiographic views, may be helpful to elucidate a diagnosis.

On the basis of the results of the present study, FPTT in horses appeared to be rarely associated with tarsocrural joint effusion or lameness and remained clinically stable over time. In the context of a prepurchase examination, these study findings should help practitioners to downgrade the clinical relevance of these fragments. Diagnosis of these lesions required accurate radiographic positioning, with the dorsal 30° medial-plantarolateral oblique and lateromedial views being the best radiographic views to characterize FPTT. Fragmentation of the PTT could be easily overlooked during routine radiographic examination of the tarsal region, likely making its reported prevalence artificially lower than it is in reality. An extra-articular location of these fragments is suspected in horses with similar radiographic findings. This opinion is based on the anatomic dissections performed, the CT examination of 2 hocks, and the arthroscopic exploration of one of the joints included in the study. This information is important for surgeons planning a surgical exploration of horses with FPTT. Further studies with larger numbers of cases are needed to better understand etiopathogenesis of FPTT and to confirm the low clinical relevance of the condition in horses.

b. IMPAX workstation, Agfa HealthCare Corp, Greenville, SC.
c. Hi-Speed ZXi, General Electric (GE), Mississauga, ON, Canada.
d. ALOKA SSD-4000, Aloka America, Wallingford, Conn.
References