What Is Your Diagnosis?

History

The left forelimb of a 13-month-old Thoroughbred filly was examined because of abnormal findings on standard presale radiographs (ie, dorsomedial-palmarolateral oblique, dorsolateral-palmaromedial oblique, and lateromedial [obtained with the joint flexed] views) of the carpus. No previous abnormalities were reported concerning the yearling’s forelimb conformation. Six months earlier, the yearling had normal findings on radiographs of the left carpus, apart from the presence of a radiolucency on the ulnar carpal bone. The yearling had been sound (ie, had no signs of lameness) during controlled exercise for sale preparation.

On palpation, mild effusion in the left antebrachiocarpal joint was detected. Findings on palpation of the middle carpal joint and carpal flexor tendon sheath were unremarkable. At the walk, the yearling tracked its forelimbs normally. Findings on carpal flexion of both forelimbs were negative for signs of pain.

Radiographic findings on standard presale views of the right carpus appeared normal. The standard presale radiographs of the left carpus were further evaluated (Figure 1).

Determine whether additional imaging studies are required, or make your diagnosis from Figure 1—then turn the page →

Figure 1—Dorsomedial-palmarolateral oblique (A), dorsolateral-palmaromedial oblique (B), and flexed lateromedial (C) radiographic views (ie, standard sale repository carpal radiographs) of the left carpus of a 13-month-old Thoroughbred filly.

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Diagnostic Imaging Findings and Interpretation

On the dorsolateral-palmaromedial oblique projection, a well-marginated, oval (approx 1-cm-diameter) bone fragment is visible along the palmarodistolateral aspect of the radius. The bone fragment is proximal to the accessory carpal bone (Figure 2). A congruent defect corresponding to a fracture bed is visible on the dorsoproximal border of the accessory carpal bone. A second small and round bone fragment is also present off the palmarodistolateral aspect of the radius, in the antebrachio-carpal joint compartment (as evident on the dorsolateral-palmaromedial oblique and flexed lateromedial views). Moderate-sized periarticular osteophytes are present on the dorsodistal aspect of the radius and the dorsoproximal edge of the radial carpal bone, which are visible on all radiographic views. Additional findings include irregularities and new bone formations of the dorsal surface of the intermediate carpal bone and mild periarticular soft tissue thickening over the antebrachiocarpal joint. Finally, a focal oval area of decreased mineral opacity that is surrounded by bone sclerosis is noticed in the ulnar carpal bone (approx 5 mm long); this finding was observed 6 months earlier on a dorsolateral-palmaromedial oblique projection.

On the basis of radiographic findings, diagnoses included the following: a simple, articular osteochondral chip fracture of the dorsodistal portion of the radius; a simple, articular, minimally displaced chip fracture of the proximal aspect of the accessory carpal bone; and osteoarthritis of the antebrachiocarpal joint. The primary differential diagnosis was a simple traumatic fracture of the dorsoproximal border of the accessory carpal bone and traumatic fragmentation of the distal portion of the radius with secondary osteoarthritis. The small bone cyst within the ulnar carpal bone, which had been observed 6 months earlier, had not progressed; it was recorded as an incidental developmental finding that was unrelated to the other lesions.

An alternative diagnosis for the mineral opacity along the palmarodistolateral aspect of the radius included soft tissue calcification. However, the presence of the fracture bed on the dorsoproximal border of the accessory carpal bone made a diagnosis of soft tissue calcification unlikely. An alternative diagnosis for the second small bone fragment off the palmarodistomedial aspect of the radius was osteochondrosis dissecans. However, the articular surface of the distal portion of the radius is not a common site for osteochondrosis dissecans. Given that osteochondral fragmentation and osteoarthritis of the antebrachiocarpal joint were not identified in the radiographic survey performed 6 months earlier, a developmental cause of the mineral opacity was disregarded.

The bone fragment of the palmar aspect of the accessory carpal bone was suspected to be within the lateral palmar pouch of the antebrachiocarpal joint; however, its relation to the carpal flexor tendon sheath was unclear. Ultrasonography (with a 13-to 6-MHz linear transducer at a scanning depth of 6 cm) of the palmaromedial aspect of the left carpus...

Figure 2—Same radiographic images as in Figure 1. Two oval bone fragments are present: the first is off the dorsodistal border of the radius (black arrowheads), and the second is along the proximal border of the accessory carpal bone (white circle). Notice the moderate-sized periarticular osteophytes along the dorsodistal portion of the radius and the dorsoproximal edge of the radial carpal bone (white arrows). Mild periarticular soft tissue thickening is present over the antebrachiocarpal joint (gray arrow). A cyst-like lesion surrounded by bone sclerosis is present within the ulnar carpal bone (black arrows). Some irregularities and bone proliferation along the dorsal cortex of the intermediate carpal bone are also visible (white arrowheads).
As performed. No abnormalities of the carpal flexor sheath, superficial digital flexor tendon, and deep digital flexor tendon were detected. The accessory carpal bone fragment was identified dorsolateral to the flexor tendons when the transducer was placed longitudinally, with the direction of the beam from palmaromedial to dorsolateral at the level of the dorsal aspect of the accessory carpal bone. The absence of synovitis within the carpal flexor sheath suggested that the fragment was entirely outside of the carpal canal. Unfortunately, the proximal ligaments of the accessory carpal bone were not distinctly identified in any orientation of the transducer, and their integrity could not be assessed during ultrasonography.

**Treatment and Outcome**

The yearling underwent arthroscopy of the antebrachio-carpal joint for further evaluation and treatment. Surgical removal of the osteochondral fragment of the distal portion of the radius was successfully achieved, but the osteophytes were left intact. The decision to conservatively manage the accessory carpal bone fragment was made on the basis of soundness of the yearling prior to surgery, the absence of carpal flexor sheath synovitis, and its minimal displacement from the fracture bed on the accessory carpal bone.

Considering the extensive radiographic and arthroscopic signs of cartilage damage in the antebrachio-carpal joint of the yearling, the prognosis for racing was considered poor. The yearling was withdrawn from the auction. Follow-up information regarding postoperative soundness was limited to the first month of recovery. At that time, no complication or lameness at the walk were reported by the farm manager.

**Comments**

Osteochondral fragmentation of the dorsodistal aspect of the radius and the carpal bones is a common injury in racehorses and often results in worse racing performance outcomes. Nonetheless, these lesions remain relatively uncommon in untrained yearlings. In a retrospective study compiling information from prepurchase and postpurchase examinations of 1,162 North American Thoroughbred yearlings, intercarpal joint disease was found in 2.7% of the yearlings and was most often unilateral. The proximal border of the accessory carpal bone is also an unusual location for an osteochondral (chip) fracture, with only 0.4% of yearlings in that study having an accessory carpal bone chip fracture. In another study, 45 Thoroughbred yearlings with bone fragments of the dorsoproximal aspect of the accessory carpal bone had significantly lower race earnings at 2 and 3 years of age, compared with their maternal siblings that served as control horses.

For the yearling of the present report, there had been no radiographic abnormalities of the carpus 6 months earlier (apart from a radiolucency on the ulnar carpal bone). Chip fractures of the distal portion of the radius are commonly the result of compressive forces created by carpal hyperextension. Traumatic carpal hyperextension during sale preparation was the most likely cause of both chip fractures in the yearling of the present report. The accessory carpal bone is attached by 4 ligaments (ie, accessorio-ulnar, accessorio-carpoular, accessorio-quartal, and accessorio-metacarpal ligaments [listed proximal to distal]). Altogether they transmit the forces generated by the flexor muscles that insert on the dorsal aspect of the accessory carpal bone and contribute to the stability of the rest of the carpus. The size and location of the accessory carpal bone fracture in the case described in the present report suggested that the fracture resulted from partial avulsion of the accessorio-ulnar ligament.

Unfortunately for the yearling of the present report, exploration of the carpal attachments of the accessory carpal bone and the fragment was not achieved, which would have required advanced imaging modalities. Magnetic resonance imaging could potentially have identified accessory-ulnar ligament tears, but it was not available, and MRI findings would not have changed the treatment plan.

Communication between the antebrachio-carpal joint and the carpal flexor sheath secondary to accessory carpal bone fracture has been previously described. However, on the basis of radiographic and ultrasonographic findings for the yearling of the present report, it was determined that the fragment was within the lateral palmar pouch of the antebrachio-carpal joint but did not involve the carpal flexor sheath. On carpal radiography, the dorsolateral-palmaromedial oblique projection minimizes superimposition of the palmar processes of the radius with the dorsoproximal aspect of the accessory carpal bone. For the case described in the present report, it was the most valuable projection to highlight the fragment associated with the accessory carpal bone.

Some authors have reported that arthroscopic removal of fragments present on the dorsoproximal edge of the accessory carpal bone results in a better athletic outcome than conservative management, providing that the intervention is performed before the development of osteoarthritis. Destabilization of the left antebrachio-carpal joint of the yearling of the present report related to the accessory carpal bone avulsion fracture may have contributed to rapid progression of osteoarthritis, thereby depreciating potential athletic ability.

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Footnotes


References


Correction: Pathology in Practice

In the Pathology in Practice article published in the October 15, 2017, issue (J Am Vet Med Assoc 2017;251:903–905), corrections are necessary in regard to the author’s institutional affiliations.

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