

Radiography of the Carpus and Hock

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1. Introduction

Radiography of the carpus and hock are routine procedures performed by most equine veterinarians. When evaluating a performance issue or obtaining radiographs for purchase examination, use of the proper technique to obtain radiographs of the carpus and hock is essential. Use of the proper technique produces radiographs of diagnostic quality, allowing for a detailed analysis and interpretation of the joints and associated structures. Poor-quality radiographs make interpretation much more challenging. Many excellent textbooks and review articles are available for a more in-depth discussion of this topic.^{1,2}

General Comments

High-quality radiographs are a sum of various components that must come together effectively to create diagnostic images. Some important factors are as follows.

- Safety first. Do not forget that radiographic procedures involve ionizing radiation that is not seen or felt. Follow all safety protocols to minimize exposure to the horse, handlers, and those in the area.
- Know your equipment. A thorough understanding of the generator and imaging system is imperative to obtain quality images. Not

all systems function the same, and a complete understanding of how a particular system works in conjunction with the generator is imperative.

- Develop a technique chart. A technique chart for the various anatomic regions that is based on the available equipment will improve image quality. Although most digital systems are very tolerant of poor technique, they will excel when proper techniques are used.
- Know your anatomy and do not be afraid to experiment. Knowledge of the anatomy of the region allows for better radiographs. Sometimes, routine positioning will not highlight a problem as well as does a novel position. In particular, specialized oblique projections can be extremely useful.
- Develop a routine. Repetitive, practiced motions result in better, high-quality images. Although not everyone's routine will be the same, staying with a routine will help to obtain consistent, high-quality images.
- Use physical markers. Whereas most digital systems provide digital markers for laterality, relying on these markers can be risky. If the digital plate is positioned in a way not envisioned by the programmers, the laterality may be mis-marked. Physical markers that are properly placed allow for quick and easy con-

NOTES

Table 1. Routine Radiographic Projections of the Carpus

Projection	Racing (Thoroughbred)	Western Performance (Quarter Horse)	English Performance (Warmblood)	Arabian
Dorsal-palmar	X	X	X	X
Lateral-medial	X	X	X	X
Dorsal 35° lateral-palmar medial oblique	X	X	X	X
Dorsal 25° medial-palmar lateral oblique	X	X	X	X
Flexed-lateral	X	±	±	±
Dorsal proximal–dorsal distal oblique–distal row of carpal bones	X	–	–	–
Dorsal proximal–dorsal distal oblique–proximal row of carpal bones	±	–	–	–
Dorsal proximal–dorsal distal oblique–distal radius	±	–	–	–

X indicates strongly recommended on all examinations; ±, should be considered if clinically warranted; –, indicates not routinely performed but may be considered if clinically indicated.

formation of laterality. Additionally, the application of radio-opaque markers directly on the skin or region of interest can help to identify lesions on challenging cases.

The Carpus

The carpus is essentially round, from an external standpoint, and this allows relatively free access to all sides of the limb for excellent evaluation of the bony structures within the knee. Views will often depend on the age, breed, and use of the horse. A list of the “routine” projections and the relative frequency of the views on the basis of use is provided in Table 1.

Examples of routine radiographic projections of the carpus are shown in Figs. 1–6.

The views shown in Figs. 7 and 8 would be con-

sidered specialized views. Good information is given in these radiographs, but would you call them routine?

The Tarsus

The hock is essentially round, from an external standpoint, with a protuberance at the proximal calcaneus. Similar to the carpus, there is relatively free access to all sides of the limb for excellent evaluation of the bony structures. The views will depend on the age, breed, and use of the horse. A list of the routine projections by discipline is provided in Table 2.

Examples of routine radiographic projections of the tarsus are shown in Figs. 9–12.

Specialized views are shown in Figs. 13 and 14.

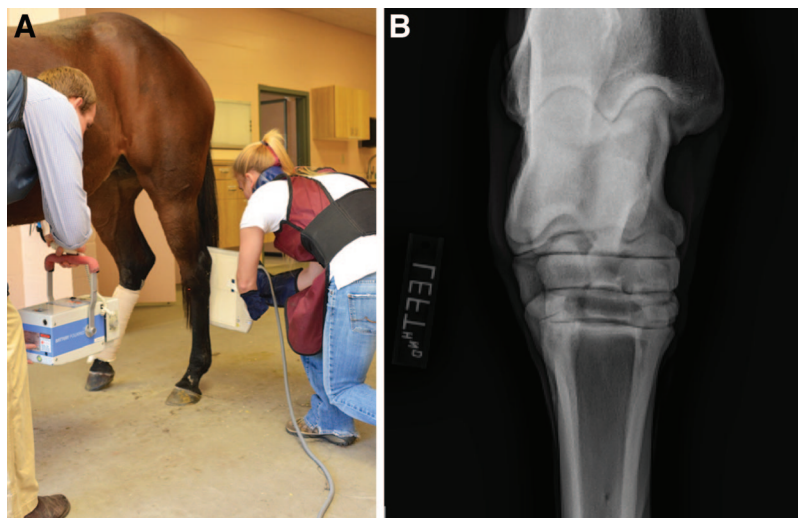


Fig. 1. Routine radiographic projection of the carpus: Dorsal-palmar view.

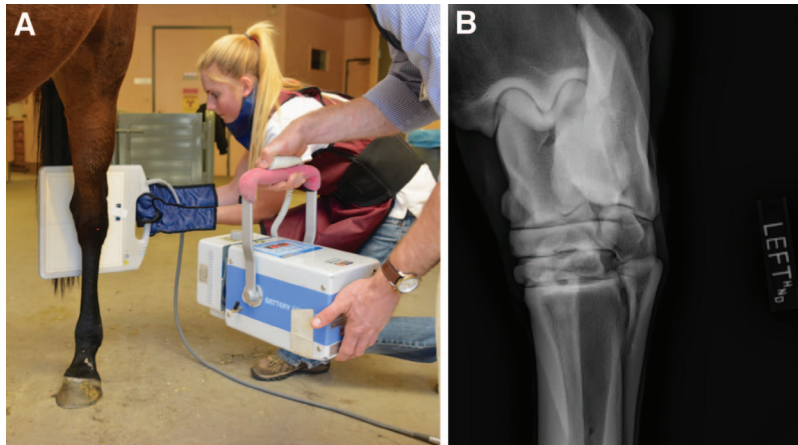


Fig. 2. Routine radiographic projection of the carpus: Flexed lateral view.

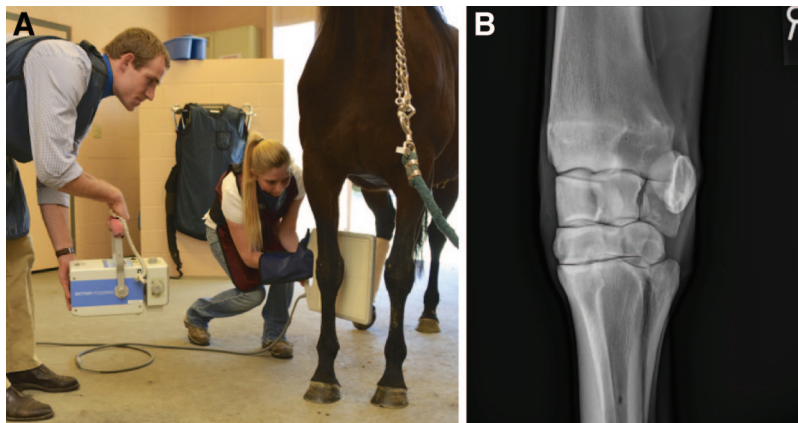


Fig. 3. Routine radiographic projection of the carpus: Dorsal 35° lateral-palmar medial oblique view.

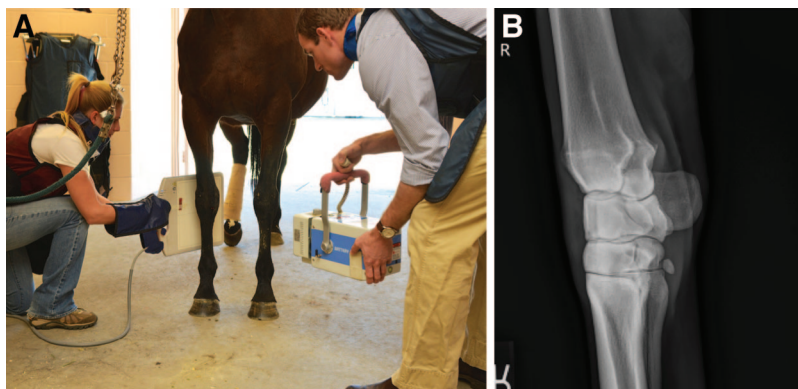


Fig. 4. Routine radiographic projection of the carpus: Dorsal 25° medial-palmar lateral oblique view.

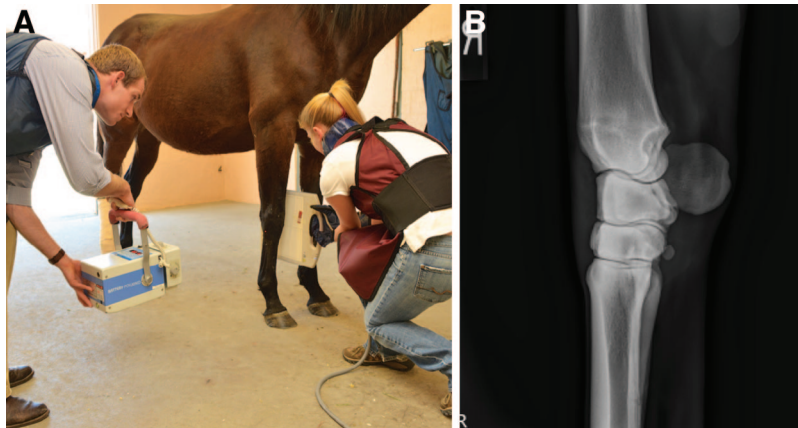


Fig. 5. Routine radiographic projection of the carpus: Lateral-medial view.

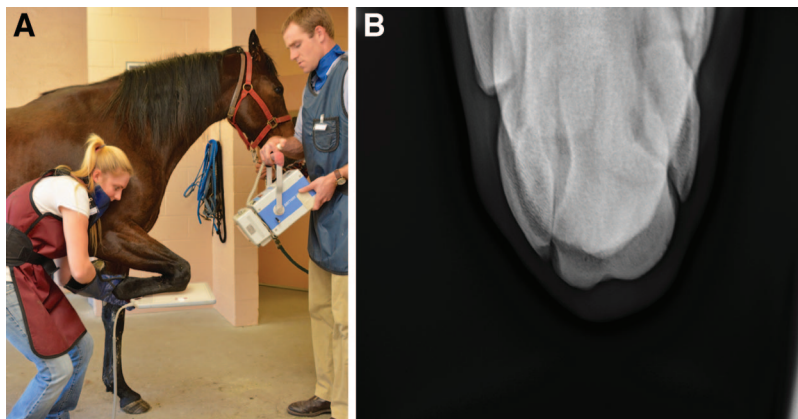


Fig. 6. Routine radiographic projection of the carpus: View of the dorsal proximal–dorsal distal oblique–distal row of carpal bones.

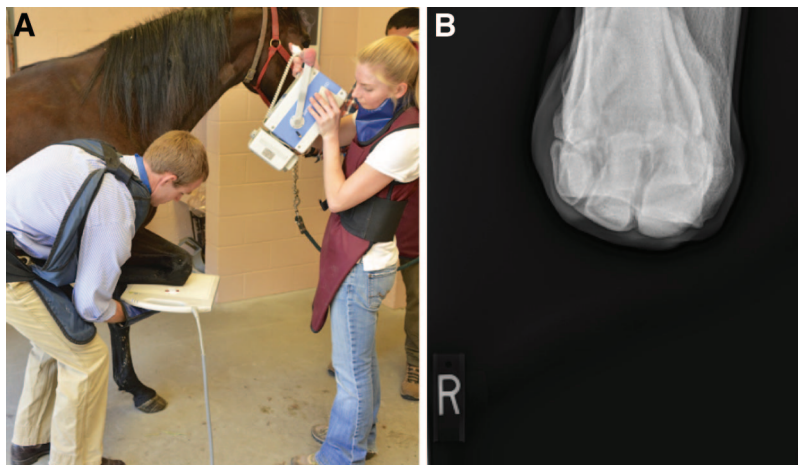


Fig. 7. Specialized view: dorsal proximal–dorsal distal oblique–proximal row of carpal bones.

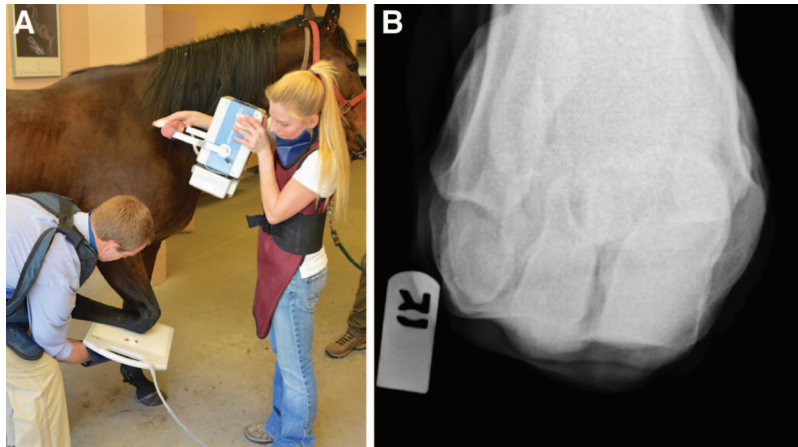


Fig. 8. Specialized view: dorsal proximal–dorsal distal oblique–distal radius.

Table 2. Routine Radiographic Projections of the Tarsus

Projection	Racing (Thoroughbred)	Western Performance (Quarter Horse)	English Performance (Warmblood)	Arabian and General Purpose	Other
Dorsal-plantar (dorsal 10° lateral–plantar medial oblique)	X	X	X	X	X
Lateral-medial	X	X	X	X	X
Dorsal 45° lateral–plantar medial oblique	X	X	X	X	X
Dorsal 65° medial–palmar lateral oblique	X	X	X	X	X
Flexed-lateral	–	–	–	–	–
Flexed caudal proximal-caudal distal oblique (Sustentaculum Tali Skyline projection)	–	–	–	–	–

X indicates strongly recommended on all examinations; –, indicates not routinely performed but may be considered if clinically indicated.

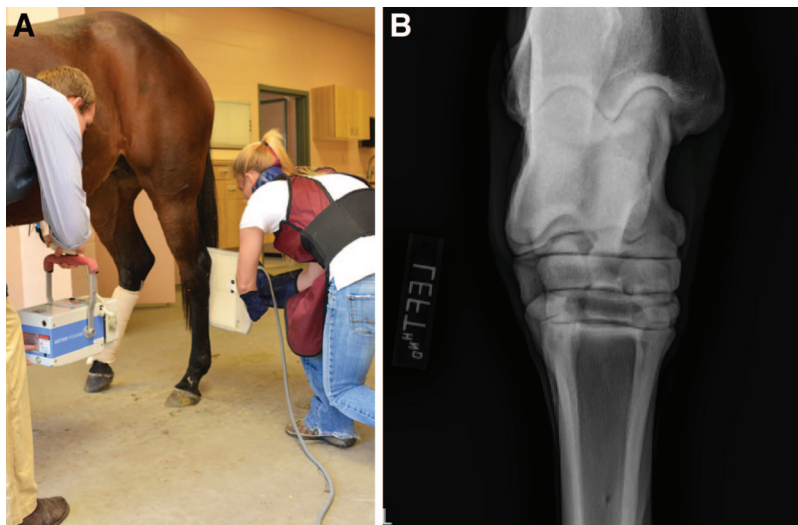


Fig. 9. Routine radiographic projection of the tarsus: Dorsal-plantar view.

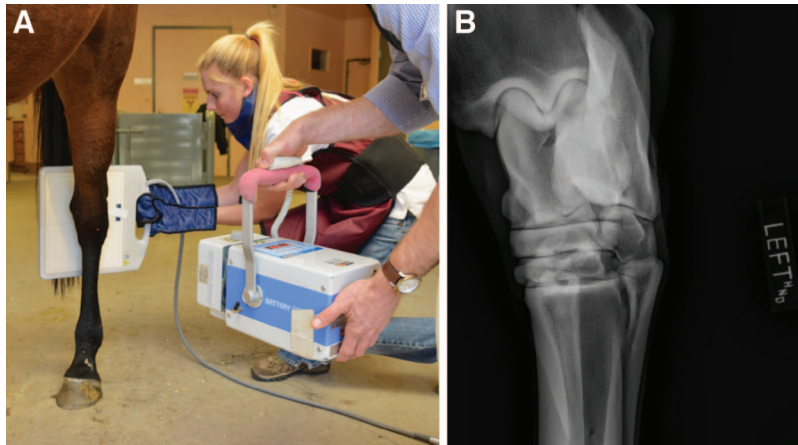


Fig. 10. Routine radiographic projection of the tarsus: Dorsal 45° lateral–plantar medial oblique view.



Fig. 11. Routine radiographic projection of the tarsus: Lateral-medial view.

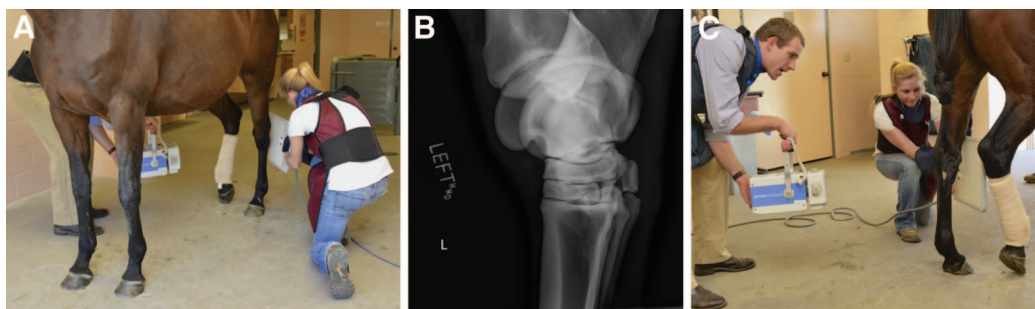


Fig. 12. Routine radiographic projection of the tarsus: Dorsal 65° medial–palmar lateral oblique view.

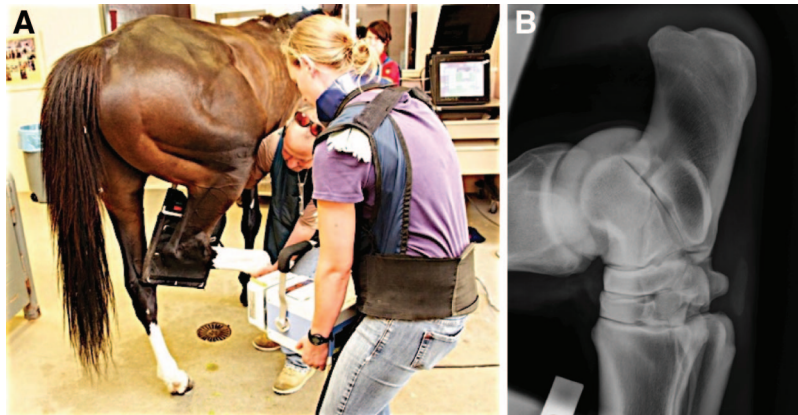


Fig. 13. Specialized view: Flexed lateral.

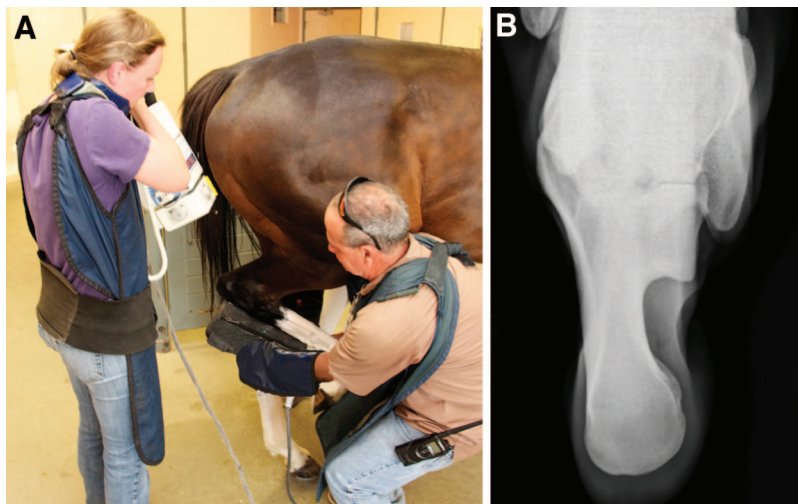


Fig. 14. Specialized view: Flexed caudal proximal-caudal distal oblique (Skyline projection of calcaneus).

References

1. O'Brien T. *O'Brien's Radiology for the Equine Ambulatory Practitioner*. Jackson, Wyoming: Teton New Media; 2005.
2. Baxter GM. *Adams and Stashak's Lameness in Horses*. Ames, Iowa: Wiley-Blackwell; 2011.