

# How to Inject the Tarsal Joints

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## 1. Introduction

The tarsocrural (tibiotarsal), talocalcaneocentral (proximal intertarsal), centrodistal (distal intertarsal), and tarsometatarsal joints are the four major joints that compose the hock. (Incorrect but commonly used anatomic names are shown in parentheses.<sup>1</sup>) Because the hock is a common site of pain, arthrocentesis of these joints is commonly performed for diagnosis and treatment of lameness. Because the tarsocrural joint (for which arthrocentesis is easily accomplished) communicates directly with the talocalcaneocentral joint, the talocalcaneocentral joint is rarely approached. How commonly the centrodistal (CD) joint communicates directly with the tarsometatarsal (TMT) joint is controversial. Studies report that these two joints occasionally communicate directly (ie, anatomically), but the reported frequency of direct communication varies from 8.3% to 35%.<sup>2-7</sup> Using hocks from cadavers and injecting latex into the TMT joint, Sack and Orsini found direct communication between the TMT and CD joints in 8.3% of hocks when latex was injected until resistance was felt and in 23.8% of hocks when injection was continued until resistance was overcome.<sup>2</sup> Brown and Valko injected methylene blue into the TMT joint of 34 postmortem specimens and found direct communication with the CD joint in 8.8% of the specimens.<sup>7</sup> Investigators in

another study found direct communication between the two joints in 31% of cadaver limbs but found no correlation between pressure of injection of radiopaque contrast solution and the incidence of communication.<sup>3</sup> An in vivo study reported diffusion of diluted latex from the TMT joint to the CD joint in 26% of hocks.<sup>4</sup> In another in vivo study, in which positive radiographic contrast agent was injected into both TMT joints of 10 horses, direct communication between the TMT and CD joints was observed radiographically in 35% of limbs.<sup>5</sup>

Functional communication of the TMT and CD joints was demonstrated by Gough et al, who found, using cadaver limbs, that a therapeutic concentration of mepivacaine HCl diffused from one joint to another, even when the joints did not communicate directly.<sup>8</sup> Functional communication of the TMT and CD joints was also found by Serena et al, who found in an in vivo study a therapeutic concentration of methylprednisolone acetate in the CD joint of horses soon after administration of the drug into the TMT joint.<sup>9</sup> Because direct communication between the TMT and CD joints is inconsistent, clinicians often inject each joint either with local anesthetic solution to diagnose pain in the distal joints of the hock as a cause of lameness or with a corticosteroid to treat horses affected with osteoarthritis of the distal tarsal joints. Other clinicians,

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## NOTES

however, do not inject the CD joint and rely on diffusion of local anesthetic solution or corticosteroid into it from the TMT.<sup>9-14</sup>

**2. Materials and Methods**

A lip-twitch usually provides adequate restraint for arthrocentesis of the tarsal joints. The joints are usually entered with the limb bearing weight, but to increase safety of arthrocentesis of the TMT joint when dealing with horses likely to kick, the joint can be entered with the limb extended caudally.<sup>9</sup> With the limb held, the technique for arthrocentesis is the same. When working with poorly behaved horses, sedation or tranquilization may make the procedure safer, but before diagnostic analgesia is performed, the authors prefer to observe the effect that sedation or tranquilization has on the horse's gait.

**Arthrocentesis of the TMT Joint**

The most commonly used technique for arthrocentesis of the tarsometatarsal joint is a plantarolateral approach reported by Brown and Valko.<sup>7</sup> The palpable anatomic landmark for needle placement is the head of the fourth metatarsal bone. A 20- or 21-gauge needle is inserted about 0.25 inch (0.6 cm) above the head of the lateral splint bone and 0.5-inch (1.3 cm) lateral to the lateral edge of the superficial digital flexor tendon. Most authors advise directing the needle slightly downward, toward the dorsomedial aspect of the hock (Fig. 1), but, when aiming the needle in this manner, Brown and Valko found a 10% incidence of failure<sup>7</sup> and Dyson and Romero experienced a 5% rate of failure.<sup>5</sup> Sack and Orsini, in a large study using cadaver limbs, had an incidence of failure of 2.4% when they advanced the needle dorsodistally, directing it in a nearly a sagittal plane (Fig. 1).<sup>2</sup> Generally, the first 3 to 5 mL of anesthetic solution is easily injected. Forcing more solution into the joint may cause a distinct "pop" and loss of resistance, indicating incorrectly that solution has then entered the centrodistal joint. For most horses, injection of fluid into the tarsometatarsal joint under pressure causes the fluid to accumulate subcutaneously rather than in the centrodistal joint.<sup>2,3</sup> The gait of some horses with lesions outside the hock joint (such as lesions in the proximal portion of the suspensory ligament) may improve after injecting local anesthetic solution into the tarsometatarsal joint because medial and lateral outpouchings of the joint on the plantar surface of the third metatarsal bone (Fig. 2) may cause perineural analgesia of plantar and plantar metatarsal nerves, which lie in close proximity to these outpouchings.<sup>5</sup>

Because of the possible lack of specificity of analgesia of the TMT joint, some clinicians prefer to desensitize the CD joint to diagnose osteoarthritis of the distal tarsal joints.<sup>15</sup> Although Serena et al showed that a therapeutic concentration of methylprednisolone acetate is able to diffuse from the TMT joint into the CD joint, some clinicians prefer to directly inject the CD joint with a corticosteroid

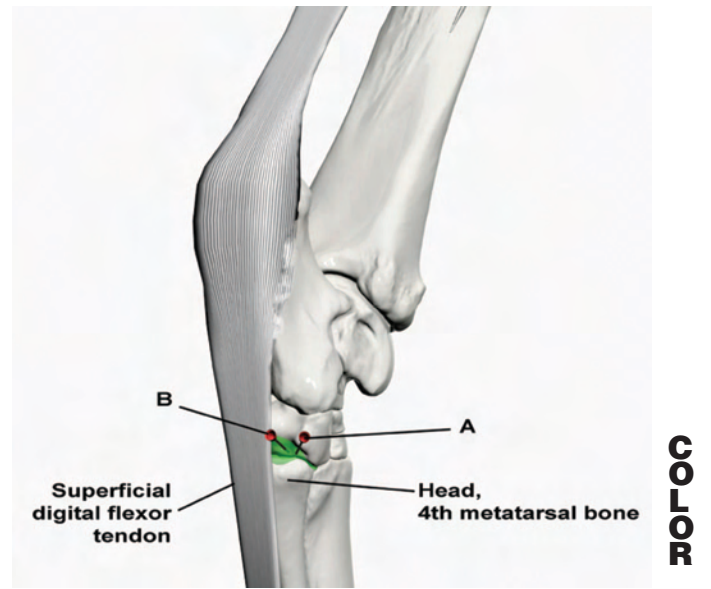


Fig. 1. Using a plantarolateral approach to the tarsometatarsal joint, a needle (A) is inserted above the head of the 4<sup>th</sup> metatarsal bone and directed in a dorsomedial direction. Approaching the tarsometatarsal joint by directing the needle (B) dorsodistally in a sagittal plane may increase accuracy of arthrocentesis of this joint.<sup>2</sup> A right hock is shown.

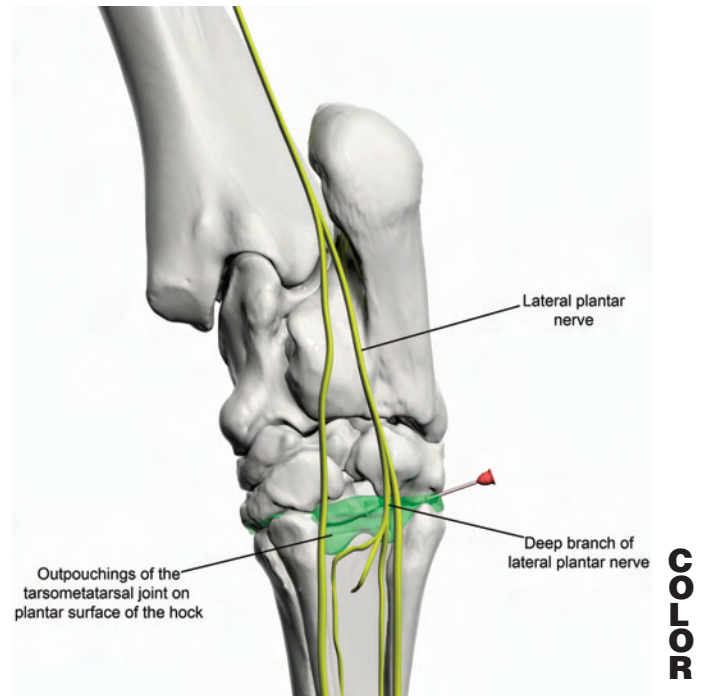


Fig. 2. Medial and lateral outpouchings of the tarsometatarsal joint may put local anesthetic solution in contact with plantar and plantar metatarsal nerves, causing anesthesia of structures outside the joint that lead to misinterpretation of analgesia of the tarsometatarsal joint block. A right hock is shown.

because they believe the decreased concentration of diffused drug may have a decreased therapeutic effect.<sup>16</sup>

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Fig. 3. The centrodistal joint can be entered at a site on the dorsal aspect of the hock at a site found by placing an index finger perpendicular to the long axis of the limb below the distal border of the easily palpated medial trochlea of the talus. The centrodistal joint should be in close proximity to the ventral edge of the finger. Right hocks are shown.

Arthrocentesis of the CD Joint

The CD joint can be injected by using dorsal, medial, or dorsolateral approaches, but regardless the method of approach, arthrocentesis of the centrodistal joint is technically difficult. The joint can be entered at a site on the dorsal aspect of the hock at a site found by placing an index finger perpendicular to the long axis of the limb below the distal border of the easily palpated medial trochlea of the talus.<sup>a</sup> The centrodistal joint should be in close proximity to the ventral edge of the finger (Fig. 3). A 21-gauge, 1-inch (2.5-cm) needle is inserted along this line probing for the joint space. For this approach, it is important that the horse stand squarely.

The CD joint can be entered on the distomedial aspect of the hock, midway between the plantar and dorsal aspects of the distal portion of the tarsus, with the limb bearing weight. The site of arthro-

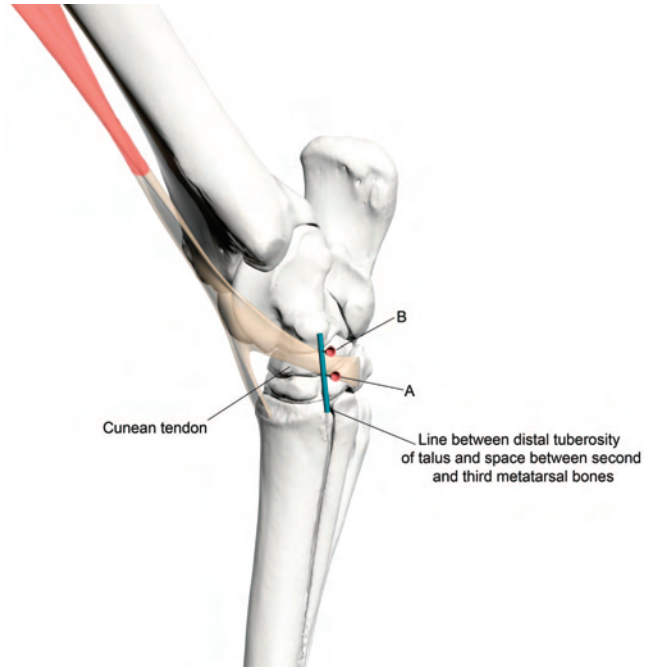


Fig. 4. The centrodistal joint can be accessed on the distomedial aspect of the hock, midway between the plantar and dorsal aspects of the distal portion of the tarsus, with the limb bearing weight. A technique for identifying the site of needle insertion is to imagine a line between the palpable distal tuberosity of the talus to the palpable space between the second and third metatarsal bones. The needle (A) is inserted near where the line intersects the palpable distal border of the cunean tendon. To enter the talocalcaneocentral joint, a small gauge needle (B) is inserted proximal to the proximal border of the cunean tendon on this line. A right hock is shown.

centesis can be found by first identifying the easily palpated distal tuberosity of the talus. Distal and plantar to this tuberosity is a less discernible eminence of the central tarsal bone. The site for needle insertion is halfway between these landmarks and 0.5 inch (1.3 cm) distal to the eminence of the central tarsal bone.<sup>10</sup> An alternate technique for identifying the site of needle insertion was described by Sack and Orsini, who identified the site by imagining a line between the palpable distal tuberosity of the talus to the palpable space between the second and third metatarsal bones.<sup>2</sup> The needle is inserted near where the line intersects the palpable distal border of the cunean tendon (Fig. 4). A 5/8- to 1-inch (1.6- to 2.5-cm), 23- to 25-gauge needle is inserted into the proximal part of the small, T-shaped gap formed by the junction of the fused first and second tarsal bones, the third tarsal bone, and the central tarsal bone. This gap can usually be palpated using a fingernail. The needle should be inserted as proximally as possible in this gap to avoid entering the TMT joint, which occupies the distal portion of the gap.<sup>2</sup> The site may be difficult to find, especially if the joint has severe degenerative disease. The needle is determined to be within

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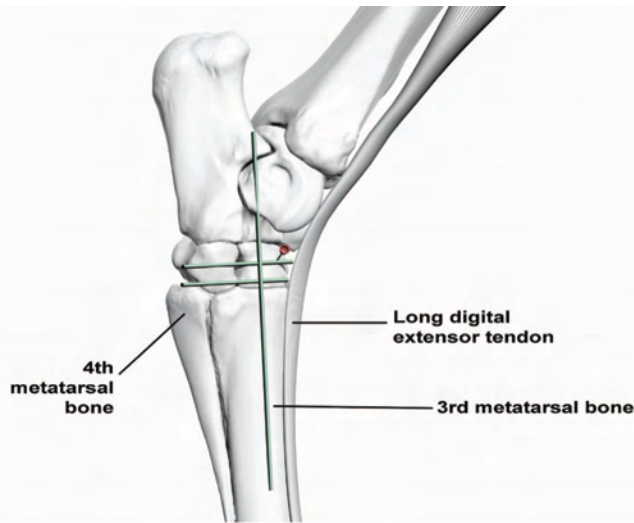


Fig. 5. A site of injection of the centrodistal joint is 2 to 3 mm (~1/8 inch) lateral to the long digital extensor tendon and 6 to 8 mm (1/4 to 1/3 inch) proximal to a line drawn perpendicular to the axis of the third metatarsal bone through the proximal end of the fourth metatarsal bone. The needle is directed plantaromedially at an angle of approximately 70° from the sagittal plane. A right hock is shown.

the CD joint by low resistance to injection without development of subcutaneous swelling and the ability to aspirate the injected contents of the syringe. Contrast arthrography confirms accurate arthrocentesis of the joint.<sup>9</sup>

Because the medial approach to the CD joint places the clinician in a vulnerable position for injury, some clinicians prefer a dorsolateral approach to this joint. As described by Just et al, the site of injection is 2 to 3 mm (~1/8 inch) lateral to the long digital extensor tendon and 6 to 8 mm (1/4 to 1/3 inch) proximal to a line drawn perpendicular to the axis of the third metatarsal bone through the proximal end of the fourth metatarsal bone.<sup>16</sup> The needle is directed plantaromedially at an angle of approximately 70° from the sagittal plane (Fig. 5).

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#### Arthrocentesis of the Tarsocrural Joint

The tarsocrural joint is the easiest of all joints of the horse to inject. It is easily accessed at its dorsomedial pouch on either side of the saphenous vein or at a lateroplantar pouch that protrudes between the calcaneus and the lateral malleolus of the tibia (Fig. 6). By applying pressure to the dorsomedial pouch, the lateroplantar pouch may become more obvious.

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#### Arthrocentesis of the Talocalcaneocentral (Proximal Intertarsal) Joint

The talocalcaneocentral joint is seldom accessed directly because it communicates directly with the tarsocrural joint. The talocalcaneocentral joint can be entered directly at a site along a line drawn from the distal tuberosity of the tibial tarsal bone to a



FOF06

Fig. 6. The tarsocrural joint is easily accessed at its dorsomedial pouch on either side of the saphenous or at a lateroplantar pouch that protrudes between the calcaneus and the lateral malleolus of the tibia. By applying pressure to the dorsomedial pouch, the lateroplantar pouch (arrow) may become more obvious. A right hock is shown.

space between the head of the 2<sup>nd</sup> metatarsal bone and the 3<sup>rd</sup> metatarsal bone.<sup>17</sup> A small-gauge needle is inserted proximal to the proximal border of the cunean tendon on this line (Fig. 4).

#### Centesis of the Cunean Bursa

The cunean bursa is occasionally injected with local anesthetic solution or with a corticosteroid when bursitis of that structure is suspected to be a cause of lameness. The validity of cunean bursitis as a cause of lameness, however, is questionable. The cunean bursa occasionally communicates with the CD joint,<sup>9</sup> which may explain why administration of local anesthetic solution or a corticosteroid into the bursa can temporarily resolve or ameliorate lameness in a horse whose lameness is caused by osteoarthritis of the distal tarsal joints. Centesis of the cunean bursa is accomplished by inserting a needle directly through the tendon into the bursa. The needle can also be inserted at the distal edge of the cunean tendon and directed proximally beneath the tendon, which travels in a proximodorsal, plantaro-

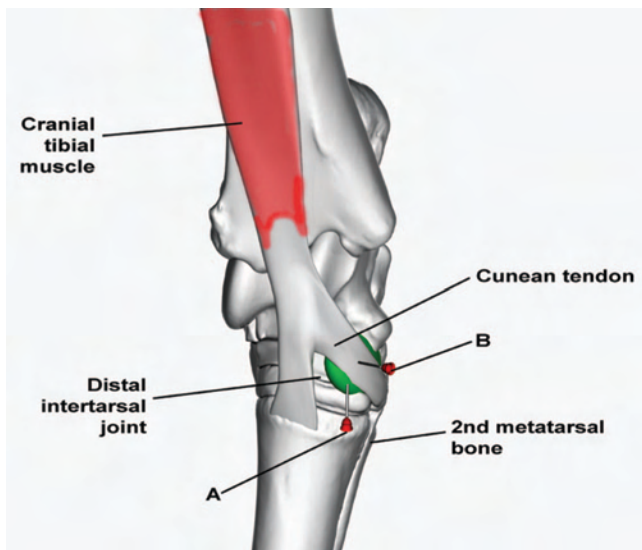


Fig. 7. Centesis of the cunean bursa is accomplished by inserting a needle directly through the tendon into the bursa (B). The needle can also be inserted at the distal edge of the cunean tendon and directed proximally beneath the tendon (A), which travels in a proximodorsal, plantarolateral direction on the medial aspect of the hock. A right hock is shown.

lateral direction on the medial aspect of the hock (Fig. 7).

**3. Conclusion**

The distal tarsal joints are among the most frequently injected joints in horses, but the authors are not aware of studies that have compared the accuracy of techniques for arthrocentesis of these joints. The clinician should be aware that a positive result of intra-articular analgesia of the CD or TMT joint is not always an indication that there is disease of these joints and that negative results of intra-articular medication may be the result of administration of drug outside the joint, which may be unrecognized by the clinician.

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