How to Inject the Medial Femorotibial Joint Recess Under Ultrasound Guidance

Nick Kleider, DVM

1. Introduction
Injection of the medial femorotibial (MFT) joint is frequently a requisite for the diagnosis and management of equine lameness. The technique is important for the localization of lameness through diagnostic analgesia and the determination of the significance of pathology when identified on other diagnostic tests (imaging or arthroscopy). Furthermore, joint injection is an inherent component of lameness management through the administration of intra-articular medications ranging from chondroprotective agents, anti-inflammatories, and, more recently, biological products. Although several different injection techniques have been described, each method has some disadvantages. To circumvent these disadvantages, the author has developed and will describe a technique for ultrasound-guided injection of the MFT joint that can be performed solo.

Ultrasonographic examination reveals that the size and depth of the MFT joint recess varies. Minimal effusion or fibrosis may result in a smaller recess. Placement of a needle properly within the recess may not allow fluid to become visible at the needle hub because proliferative synovial membrane may plug the needle or the needle size may be too small relative to the viscosity of the synovial fluid. If fluid is noted, the attachment of the needle to the syringe followed by injection does not guarantee proper deposition of the medication within the recess. Movement of the needle too deeply results in deposition of the product beneath the synovial membrane and too superficially into the subcutus.

Recently, a detailed description of an alternative technique for injection of the MFT joint and relevant anatomy has been presented. This technique utilized a standard 1.5-inch, 20-gauge needle to inject the MFT joint recess. The advantages of the technique is that injecting the MFT joint recess, which is located proximal to the meniscus, decreases the potential of needle contact with cartilage or the medial meniscus. The disadvantages are (1) it is a blind technique relying on anatomical landmarks that may vary with limb positioning and (2) the technique is dependent on noting fluid to be present at the hub of the needle before injection.

Validation of a cranial injection technique with the use of cadaver limbs was recently published that compared a cranial approach with a medial approach to the MFT joint. However, the former was successful in approximately 50% of cases, whereas the latter was successful in only 93% when no effusion was present.
The technique for ultrasonographic examination of the MFT joint has been well described. Ultrasound examination allows determination of the location, size, and depth of the MFT joint recess. Therefore, we used ultrasound monitoring to prevent inadvertent injection of the medial recess of the femoropatellar joint.

This study describes the technique for solo ultrasound-guided injection of the MFT joint recess and overviews its use in 147 injections of 77 clinical cases.

2. Materials and Methods

Seventy-seven horses undergoing this technique were tracked prospectively. Data were collected on type of injection (diagnostic, therapeutic), dosage and volume administered, frequency of injection, and any complications.

Technique

The site for injection of the MFT joint recess is proximal to the medial meniscus, cranial to the medial collateral ligament, and caudal to the medial patellar ligament.

The tail was wrapped, and the area was aseptically prepared. Clipping was usually unnecessary in this area because of the sparsity of hair. The ultrasound machine was positioned caudally for convenient viewing. We routinely used a 7.5-MHz linear transducer and prepared it with acoustic gel and a sterile probe cover. A sterile syringe was filled with the anesthetic, contrast, or medication to be used for the intra-articular injection, and a new 20- or 22-gauge needle was aseptically preplaced onto the syringe.

When this procedure was used for the purpose of desensitizing the MFT joint during a lameness examination, immobilization of the hind limb was frequently accomplished by lifting the ipsilateral forelimb. The horse was distracted at the time of needle insertion by having the owner feed the horse some grain or horse treats. Most horses acclimated to having their stifles handled when given food during the scrubbing process. This form of restraint was preferred to a twitch, which was only used in the horse that was not food-motivated and/or remained unruly. Horses that were difficult to jog received an extremely low intravenous dose of detomidine HCL (0.002 mg/kg). This allowed for more consistent jogging and less apprehension during the blocking procedure. Warm alcohol was applied to the injection site and used as the external acoustic medium between the probe, within its sterile sheath, and the skin. The ultrasound probe was placed longitudinally over the medial recess (Fig. 1) by use of the three anatomical landmarks previously mentioned as references. Once the recess was identified on the screen (Fig. 2) the probe was then rotated 90° into a transverse position (Fig. 3). The probe could then be moved slightly proximally or distally to ensure positioning over the most distended part of the recess (Fig. 4). A subcutaneous 2-mL “bleb” of 2% lidocaine HCL was injected adjacent to the cranial margin of the ultrasound probe (Fig. 5) with the use of a 27-gauge needle. This

Fig. 1. Step 1: Longitudinal positioning of the ultrasound probe and centering it on the MFT joint recess.

Fig. 2. Longitudinal reference sonogram of the MFT joint recess through the use of the cranio medial approach pictured in Fig. 1. Proximal is to the left and distal to the right. 1, Femoral fascia; 2, MFT joint recess; 3, femoral condyle; 4, medial meniscus.
“bleb” was used as a landmark (Fig. 6) for replacement of the probe once the local anesthetic had taken effect and decreased any further discomfort that could arise from introduction of the needle used for injection. The syringe with the 22-gauge needle attached was slowly introduced through the skin (Fig. 7) at the cranial margin of the ultrasound probe. The needle was pushed through the femoral fascia into the recess, and the plunger was depressed (Fig. 8). The contents of the syringe were observed to enter the recess (Fig. 9). The syringe and needle were then withdrawn.

When the procedure was used to administer medications or for a contrast study of the MFT joint, the horse was sedated intravenously with detomidine HCLb (0.01 mg/kg) and butorphanol tartrate (0.01 mg/kg). Because food is not an incentive to a sedated horse, the level of sedation was tested before injection by carefully palpating the outer sheath or}

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**Fig. 3.** Step 2: Rotate the ultrasound probe 90° into a transverse position, staying centered over the MFT joint recess.

**Fig. 4.** Transverse reference sonogram of the MFT joint recess through the use of the cranialmedial approach pictured in Fig. 3. Cranial is to the left and caudal to the right. 1, Femoral fascia; 2, MFT joint recess; 3, femoral condyle.

**Fig. 5.** Step 3: Inject a 1- to 2-mL bleb of local anesthetic cranial and adjacent to the probe.

**Fig. 6.** Step 4: Replace the probe transversely with the skin bleb used as a landmark.
mammary area. Additional detomidine HCL (0.005 mg/kg) was given if required. Local anesthesia was frequently not necessary when this level of sedation was used. The technique was similar except that a slightly larger needle (20-gauge) was used to allow for easier injection of more viscous products. If the area was not desensitized, putting slight pressure on the cranial aspect of the probe at the time of needle insertion helped to prevent a surprise reaction from the horse.

The operator resisted the temptation of becoming “mesmerized” by the screen and focused on maintaining a parallel alignment between the syringe and probe. Malalignment resulted in losing sight of the needle, which also could occur by simply having a wet needle that is not sufficiently echogenic. Injection of a small test volume allowed visualization of fluid swirling and movement of echogenic gas/medication within the recess. The echogenicity of products that were not very echogenic was enhanced by adding a small volume of air to the contents of the syringe when preparing the injections.

The technique is versatile and can be performed with a microconvex or linear probe. A rectal probe is slightly more difficult to hold but has the advantage that no chord projects into a male horse’s sheath.

3. Results

One hundred forty-seven ultrasound-guided injections of the MFT joints were performed on 77 horses over a 3-year period. The signalment included seven Thoroughbreds, 12 Standardbreds, nine Quarter Horses, and 49 Warmbloods, including crosses. There were 59 geldings, 16 mares, and two stallions. The median age was 8 years, with a range from 2 to 18, and the average age was 8.4 years.

The time period between repeat injections into the same joint varied from 1 day to 3 years. The left MFT joint was injected in 49 horses and the right MFT joint was injected in 20 horses. Fifty-four
horses had bilateral injections. Seventy-seven MFT joints received a single injection and 25 MFT joints received multiple injections. Twenty-nine horses had additional ultrasound-guided injections of the femoropatellar (FP) and/or lateral femorotibial (FT) joint in conjunction with the MFT joint(s).

Injectable products used were therapeutic and diagnostic. Therapeutic agents included corticosteroids, chondroprotective agents, and biological agents. Diagnostic products included local anesthetics and contrast media. Total volumes and products were variable. The total volume injected ranged from 3 to 20 mL. Combined products never exceeded a volume of 15 mL, whereas single diagnostic agents were injected at volumes up to 20 mL.

We found that ultrasound-guided needle placement and injection allowed monitoring of the needle position and accurate drug deposition. Last, the technique was not dependent on the presence of effusion or on fluid acquisition; therefore, a smaller needle could be used, which is less painful and less traumatic.

Insertion of the needle with the syringe already attached was not problematic because the horse was either sedated or had the insertion site desensitized with local anesthetic. Inadvertent movement resulted in a temporary delay in administration, needle withdrawal, or positional change but no needle breakage. Movement was rare if the described restraint procedures were followed. No infections occurred in this study. A slight learning curve was necessary to depress the plunger of the syringe with the left hand for a right-handed operator when injecting the horse’s right stifle. Sitting on a rolling mechanic stool allows one’s hands to remain steady and maintain more consistent alignment of needle and probe. Confirmation of the medication being injected into the recess was immediately noted by visualizing the medication exiting the needle on the ultrasound screen.

4. Discussion

Reasons for injecting the MFT joint include desensitization for the purpose of lameness diagnostics, therapeutic administration of medications, or contrast studies. Contrast studies were recently initiated to see if there is communication between the femoropatellar and MFT joint for the purpose of selective administration of therapeutic medications such as interleukin-1 receptor antagonist protein (Fig. 10).

This technique is similar to the blind technique previously described, with the addition of ultrasound monitoring with the use of an ultrasound probe placed caudal to the insertion site. This ultrasound-guided technique was developed because of inconsistency or difficulty with previous techniques. Fluid is not always visible or obtainable when a blind technique is used. Obtaining fluid does not always provide assurance that the MFT joint has been penetrated because the medial recess of a distended femoropatellar joint can lie adjacent to the MFT joint recess and may be inadvertently penetrated (Fig. 11).
Ultrasound-guided injections allow for accurate needle placement and drug deposition. They are frequently performed by two operators, one holding the probe and the other guiding the needle into the beam (ultrasound field of view). The spatial limitations of the medial aspect of the horse’s stifle does not allow for convenient maneuverability of two operators; therefore this technique for a solo operator was developed to overcome that obstacle.

Injection time was not recorded in this study but subjectively appears to be less when ultrasound guidance is used. The injection time was quite rapid with ultrasound guidance because there was no delay associated with waiting for fluid to appear at the hub or incorrect manipulation of the needle into the wrong plane or direction. On one bilateral case, the time taken from application of the probe to completion of the injection was less than 30 seconds per side.

Simultaneous injection and ultrasound monitoring requires strict attention to maintaining the needle in the ultrasound beam. If the needle tip disappears from view, injection of a small amount of medication usually allows for rediscovery. Leaving the needle attached allows for more sterility because the open hub of the needle is not exposed or manipulated. The majority of the population were geldings, and two stallions were included. Sheath or scrotal contamination of the back of the hand holding the ultrasound probe can occur, but the syringe hand remains guarded, and contamination of the injection site was not a complication.

Because the needle is pre-attached, the whole process of watching the needle enter the recess and the administration of its contents can be accomplished very rapidly. With the needle trajectory being constantly visible, redirection is easily accomplished. Clients enjoy visualizing the process and appreciate the benefits of all upper-limb ultrasound-guided injections. This technique has become extremely valuable because it is simple and ensures consistent intrasynovial injection of the MFT joint recess.

References and Footnotes


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