Arthroscopic Meniscal Treatment

Brian S. Beale DVM, DACVS, ACVS Fellow MIS-Ortho
H-Town Veterinary Specialists
3015 S. Main ST, Stafford, TX 77477

Anatomy and function: The lateral and medial menisci are two semilunar fibrocartilage discs interposed between the femur and tibia. (Fig.1) They are positioned in the joint with the open side of the "C" facing the midline and are held in place by cranial meniscotibial ligaments, caudal meniscotibial ligaments, and meniscocapsular ligaments. The lateral meniscus has an additional ligament which inserts into the caudal intercondyloid fossa of the femoral condyles. Athroscopic view of the lateral and medial meniscus are shown below. Note the femoral ligament of the lateral meniscus.

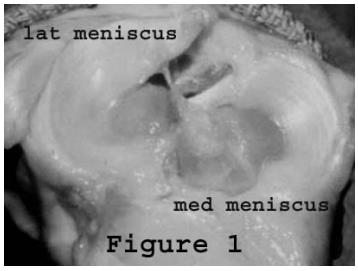
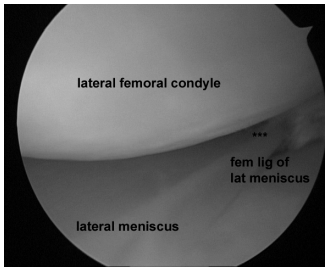
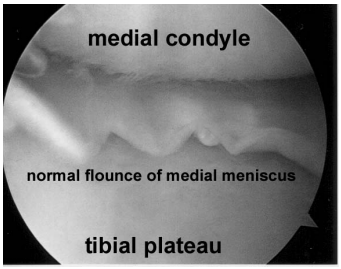


Figure 1

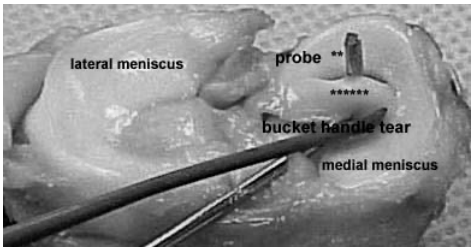




The femoral ligament of the lateral meniscus coupled with the loose meniscocapsular ligaments, render the lateral meniscus more mobile than the medial meniscus. This fact makes the lateral meniscus less prone to injury in the ACL deficient stifle. Whitney has reported small axial radial tags of the lateral meniscus being present in the majority of ACL deficient stifle joints. The clinical significance of these tears is not known but they do not appear to result in long term pathology. The medial meniscus is more firmly attached to the medial tibial plateau predisposing it to injury in the ACL deficient stifle joint. With few exceptions meniscal tears in dogs are associated with cranial cruciate ligament ruptures. The incidence of meniscal tears in conjunction with CCL ruptures may be as high as 75% and almost always involve the caudal body of the medial meniscus. This is because the craniocaudal instability associated with CCL rupture displaces the medial femoral condyle caudally during flexion of the stifle joint. The caudal body of the medial meniscus becomes wedged between the femur and tibia and is crushed upon weight bearing and extension of the joint. The most common type of tear is a "bucket handle tear" of the medial meniscus. This is a transverse tear in the caudal body of the medial meniscus which extends from medial to lateral in a transverse direction. The free portion of the meniscus is frequently folded forward with these tears.
Isolated meniscal injuries are not common in the dog. Occasionally, the author has seen isolated meniscal tears involving the mid-body of the lateral meniscus; these have been associated with a fall and twisting motion.

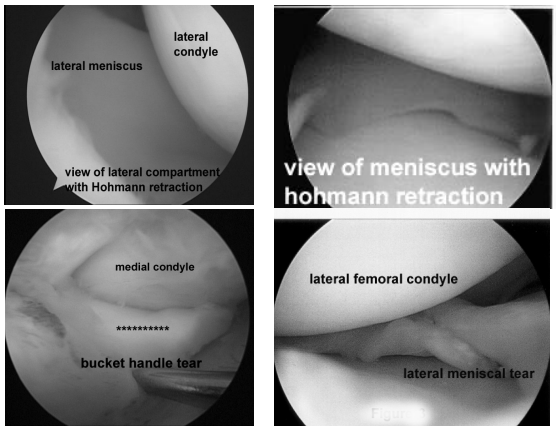
Physical examination findings: Often the client will report a popping sound when the dog walks or one will feel a “click” upon examination of the stifle. This is due to movement of the "bucket handle” section of the meniscal tear. As the stifle is flexed, the femoral condyles are displaced caudally relative to the tibial plateau. This action forces the torn bucket handle to displace cranial relative to the femoral condyles (figure to the right shows the meniscal tear displaced cranially when the stifle is flexed). As the stifle is extended, the femoral condyles move forward over the displaced meniscus. The displaced bucket handle is forced caudally and “flips” back into position causing the popping or clicking often heard or felt. Not all patients with meniscal tears will present with an audible or palpable click. Close inspection of the medial and lateral menisci at surgery will provide a definitive diagnosis.

Arthroscopic diagnosis of meniscal injury: Arthroscopic diagnosis of meniscal injury is dependent upon direct observation of the torn meniscus. Observation of the medial and lateral compartments requires a good field of view and adequate “opening’ of the space between the femoral condyles and tibial plateau. Initially, view of the lateral and medial compartments will be hidden by the fat pad. One method used to inspect the medial and lateral compartments is to direct the tip of the arthroscope



between the fat pad and articular surface. Observation of the menisci is often adequate with this maneuver; however, difficulty arises if one needs to treat meniscal injury. With this approach, the field of view is very limited making instrument manipulation and treatment difficult. In the figure to the right, one can appreciate the limited view using the above technique.

Alternative to the above technique is ablation of the fat pad to create a viewing window; this allows inspection of both compartments and facilitates treatment. Ablation is effectively completed with a motorized shaver. One mistake often made is to use too small of a shaver. The author recomm ends a 3.5mm – 4.0mm full radius shaver blade (one may use the same blade 2-3 times making the system more cost efficient). Also, efficiency (and speed) is improved if one uses the large shaver handpiece. A second mistake is to use an arthroscope with a limited field of view and or poor optics. For example, a 4.0mm scope has a superior field of view as compared to a 2.7mm scope; a 2.7mm scope superior to a 1.9mm scope. The larger the field of view, the easier one will find manipulation and treatment of meniscal injury. Hemorrhage will be encounte red when creating the viewing window; this is controlled by increasing fluid flow and radiofrequency coagulation.



Once a viewing window is created, inspection of the medial compartment is achieved by placing a valgus stress at the joint line coupled with external rotation. Alternatively, a Hohmann retractor can be placed into a superior portal and the joint levered open. Inspection of the lateral compartment is achieved by placing a varus stress at the joint line coupled with internal rotation. Alternatively, a Hohmann retractor can be placed into the standard instrument portal and the joint levered open.

T*reatment of meniscal injury:* There are three meniscal treatments to be discussed in this lecture: 1. Partial meniscectomy, 2. meniscal release, and 3. meniscal ablation. Proper positioning of arthroscopic port sites and availability of appropriate instrumentation are essential when treating the meniscus through the arthroscope. Equipment needed for meniscal manipulation include small joint hand instruments (probe, graspers, biters), and if possible, a tissue ablation unit.

Partial meniscectomy: The most common type of meniscal tear requiring excision is a bucket handle tear of the medial meniscus. The caudal body of the meniscus is torn in a transverse direction. The torn meniscus retains an attachment at the lateral border near the meniscotibial attachment (axial) and at the medial border near the center of the meniscal body (abaxial). The treatment method that results in the least long term OA is partial meniscectomy. Through the instrument port, insert a right angled probe or small grasping forcep beneath the torn meniscus and pull it forward maintaining slight tension. Transect the abaxial attachment of the Abucket handle@ with a hand instrument or tissue ablator placed through the instrument port adjacent to the angled probe. Next transect the axial attachment of the bucket handle. Force the joint open with the Hohmann retractor to inspect the remaining meniscus.

Meniscal release: Meniscal release is a technique describe by Slocum to prevent meniscal injury following a TPLO. Slocum believes the TPLO procedure will place the caudal body of the medial meniscus in a position where it can be frayed postoperatively. Releasing the meniscus allows caudal retraction of the body to a position where it is unlikely to be crushed by the medial femoral condyle.

The technique of arthroscopic meniscal release can be approached from inside the joint or from outside the joint. To perform an outside to in meniscal release, pass a guide needle into the joint. The point of guide pin entry is caudal to the medial collateral ligament. The guide pin is then directed to triangulate with the arthroscope. Once the guide pin is visualized and in position, pass a number 11 scapel adjacent to the pin and transect the body of the meniscus. An intra-articular meniscal release can be performed at the caudal tibial meniscal insertion or through the central meniscal body. Visualize the area to be released and insert the cutting instrument through the instrument port. Transect the meniscus under arthroscopic guidance. **Note** recent studies (ESVOT 2004) have shown that meniscal release alters load transmission and results in more radiographic DJD as compared to no meniscal release. Additionally investigators have

found no increase in latent meniscal tears following TPLO without a meniscal release (unpublished data – 2004)

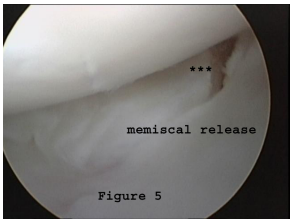


Figure 5

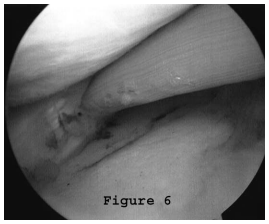


Figure 6

Meniscal ablation: meniscal ablation is a technique used for frayed menisci or for prophylaxis with TPLO in lieu of a meniscal release. The medial meniscus is visualized arthroscopically. If frayed or if incomplete radial tears are present, ablate the damaged meniscus. Place an ablation probe through the instrument port and under arhtroscopic guidance ablate the damaged meniscus. (Fig. to the right) Meniscal ablation can be used with TPLO. The premise of this procedure is that by prophylactically removing the thin central section of the meniscus, the incidence of future meniscal injury is decreased. Also, this procedure simulates a partial meniscectomy and partially preserves the mechanical function of the meniscus. This is conjecture and is not proven scientifically. Visualize the medial meniscus. Under arthroscopic guidance, ablate the central section of the meniscus caudally to the peripheral rim.