MANAGING MENISCAL INJURIES - RELEASE, RESECT, OR REJECT
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Key Points

- Normal menisci are critical to function of the stifle joint. Meniscal release or resection induces osteoarthritis. Any surgical intervention on menisci should be carefully considered 1-3.
- Meniscal injuries are associated with pain necessitating surgical intervention. Release or resection may be performed arthroscopically in medium-large breed dogs. The size and type of meniscal injury may dictate the surgical approach. Resection of meniscal tears improves short-medium term outcome but carries a poorer long-term outcome 4.
- Occasionally meniscal replacement (allograft) may be considered but tissue banking processes need to be quality assured and carefully coordinated.

A meniscus is a C-shaped disc of fibrocartilage interposed between the condyles of the femur and tibia. The two menisci are integral components in the complex biomechanics of the knee joint and loss of integrity of either will lead to knee osteoarthritis (OA). This lecture will use case-based data to illustrate the principles of treatment of meniscal injury.

The menisci are fibrocartilage discs, which serve to deepen the articular surfaces of the tibial plateau to accommodate the femoral condyles. The peripheral border (abaxial) is wedge shaped and tapers to the opposite border (axial), which is a thin free edge. The menisci are anchored to the tibia and femur by five meniscal ligaments (cranial tibial and caudal tibial ligaments of the lateral and medial menisci and the femoral ligament of the lateral meniscus) and to each other by the intermeniscal ligament. The intermeniscal ligament is an important landmark as it overlies the tibial attachment of the cranial cruciate ligament (CCL) and may be used to anchor grafts used in CCL reconstruction. The meniscal ligament attachments are referred to as the horns and the section of meniscus between the horns is known as the body. In addition to these ligamentous attachments, both menisci are attached peripherally to the joint capsule and the medial meniscus is also attached to the medial collateral ligament. This anatomical difference is important as it renders the medial meniscus less mobile than the lateral meniscus making it more susceptible to injury. The collagen fibrils of meniscus are mainly radial in orientation on the femoral and tibial surfaces of the meniscus and more circumferential in the central body of the meniscus. This organisation is directly related to the function of the meniscus.

Unlike articular cartilage, menisci have a vascular and nerve supply, however this is mostly limited to the periphery of the menisci. This blood supply originates predominantly from the lateral and medial genicular arteries and the joint capsule which give rise to a perimeniscal capillary plexus. In the dog, the inner two thirds of the menisci have been shown to be devoid of blood supply. Innervation of the menisci tends to be concentrated in the cranial and caudal horns, and is thought to play a role in joint proprioception and prevention of joint overloading.

The main functions of the menisci include load bearing, shock absorption, joint stability, joint lubrication, proprioception and prevention of synovial impingement. The meniscus plays a vital role in load bearing and at least 50% of the compressive load is transmitted through the meniscus with the joint in extension and 85% in flexion. Load bearing is markedly reduced with both total meniscectomy and less so with partial meniscectomy but both will result in articular cartilage damage and OA. The circumferential fibres in the central zone of the meniscal body are stabilised by the radial fibres in the superficial zone and this helps in the containment of “hoop stresses”. The menisci are thought to contribute to joint...
stability by relieving incongruities peripheral to the weight-bearing surfaces of the femur and tibia and may act as a “stop” to cranial drawer in the CCL deficient stifle. The film of synovial fluid between the menisci and weight bearing parts of the joint may act as a shock absorber.

Injury to the meniscus is most commonly associated with complete or partial tears of the CCL. An incidence of 50-70% of meniscal injury, identified at the time of surgery for CCL reconstruction, has been reported in dogs. The medial meniscus is most commonly damaged as it is more firmly attached to the joint capsule and medial collateral ligament than the lateral meniscus. However lateral discoid tears, and longitudinal tears of the lateral meniscus are reported. The lateral meniscus is attached to the femur by a ligamentous attachment and when cranial drawer occurs in a CCL deficient knee, the lateral meniscus remains with the femur and is loaded normally. However the medial meniscus moves cranially resulting in the caudal horn being loaded abnormally. Classification of meniscal injury detailing six types of tears has been reported in dogs. The most common types are folding of the caudal horn and longitudinal tears of the medial meniscus. Other types include multiple longitudinal tears, fibrillation of the femoral surface, axial fringe tear and transverse tears.

Postliminary (“late”) meniscal injuries are reported in dogs. These injuries have been reported to occur from 3 weeks to 9 months post-operatively, with an average of 6 months after the first surgical procedure. Dogs with this injury will typically present as having had a normal recovery after the first surgery and then present with an acute lameness 6 weeks to 6 months in the previously operated limb. The affected joint may have a stifle effusion and a sample of joint fluid may be increased in volume, with reduced viscosity but turbidity and an elevated cell count are not present. A differential diagnosis for this condition is joint sepsis, therefore if a joint aspirate is turbid with an elevated cell count (predominantly neutrophils) then bacterial culture and sensitivity would be advisable prior to further surgical intervention. It is very important to be able to inspect the menisci thoroughly either at arthroscopy or arthrotomy to determine if damage is present. Arthroscopy does provide an excellent means of examining both menisci but significant investment in time and equipment is required. The author uses a range of “small joint” arthroscopic punches and scissors for meniscal resection. The portion of damaged meniscus is identified and removed using these instruments. In smaller dogs, space restrictions may necessitate meniscal release or mini-arthrotomy.

In cases of severe meniscal disruption, meniscal allograft may be considered. This approach poses challenges associated with tissue donation and preservation, quality assurance, size matching and fixation. However, limited experience in dogs suggests that clinical outcomes can be very rewarding.

References