Proceedings of the 12th International Congress of the World Equine Veterinary Association
WEVA

November 2 - 5, 2011
Hyderabad, India

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Ultrasonographic examination of the stifle and hock in horses

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Ultrasonographic examination of the stifle

Injuries of the equine stifle are frequent causes of hind limb lameness. The stifle joint presents a lot of soft tissues that cannot be imaged with radiography. Therefore, the use of ultrasonography to examine this joint may provide useful information that can be essential for the diagnosis and management of many stifle conditions.

Indications

Indications for performing imaging evaluation of the stifle in clinical cases are based on the results of physical, dynamic examination, diagnostic analgesia and/or scintigraphic examination. In this process, ultrasonography is now systematically associated to radiography.

Femoropatellar joint

Technique

Adequate instrumentation to examine the femoropatellar (FP) joint anatomical structures is composed of 5 to 10 MHz linear probes with a thin stand off pad. Clipping the hair and washing the skin with hot water is useful to get a better contact.

Abnormal findings and lesions

- Every patellar ligament can present injuries which can be identified with ultrasonography. Medial patellar desmopathy is usually iatrogenic following desmotomy made to treat upward fixation of the patellar. Intermediate patellar desmopathy is usually functional and found in athletic horses. Lateral patellar desmopathy is often traumatic in nature.
- Osteochondrosis of the trochlear ridges is an easy condition to diagnose and document with ultrasonography. This technique provides information about the extension of the lesion (especially in a lateromedial direction), the size and location of the osteochondral fragments and the severity of the subchondral bone alteration.
- Evaluation of the synovial fluid and membrane is also useful to assess the consequences of ligament and osteochondral lesions on the joint.

Femorotibial joint

The femorotibial (FT) joint is an underestimated site of lesions causing lameness. Examination with radiography has limitations because of the number of soft tissues that cannot be seen with this procedure.

1- Medial femorotibial joint

- Medial recess of the femorotibial joint

The medial recess of the MFT joint can be considered as the mirror of the femorotibial joint as its size and content are influenced by every lesions of this joint. A wide variety of abnormal findings of this recess can be observed, in relation with different types of FT lesions, such as: synovial fluid effusion, chronic proliferative synovitis, echogenic spots compatible with fibrine, cartilaginous or meniscal debris, hemarthrosis, or even osteochondral fragments and calcinosis circumscripta.
- Medial collateral ligament
Medial collateral desmopathy is not a rare condition in horses. As this ligament is subcutaneous and present parallel fibres, this diagnosis is easy with ultrasonography and is much more reliable than with mobilisation tests. Lesions of this structure can be found alone but are also frequently associated with other injuries. They include: acute rupture (with hemarthrosis and/or avulsion fracture) with instability of the FT joint; subacute lesion with or without avulsion fracture of other ligaments such as the caudal cruciate ligament; chronic lesion with secondary degenerative joint disease of the FT joint.

- Medial meniscus
Meniscal injuries can be observed alone or in association with other ligaments or condylar injuries. In our patients, more than 80% of these lesions are found in the MM and less than 20% in the LM. Relatively more lesions of the LM are found in young horses. A wide range of variety and severity of MM injuries can be observed in horses: acute lesions were found in the intermediate part of the meniscus (body) following trauma to the stifles or falls; progressive degenerative lesions with hypoechogenic fiber disruption and increased cellularity as well as medial prolapsus are found in horses with slowly progressive degenerative joint disease of the FT joint; hyperechogenic material casting acoustic shadow has been found in the body as well as horns of the MM; collapsus and prolapsus of the MM are usually indicative of severe degenerative changes of the FT joint. When the stifles is examined in flexion the cranial attachment of the MM in the cranial intercondylar area of the tibia can be imaged. Cranial enthesopathy of the MM can be suspected when alteration of the bone surface profile and heterogenous appearance of this cranial ligament are present.

- Articular margins
When the probe remains vertical and is displaced in caudocranial direction, a complete examination of the articular margin of the medial femoral condyle is possible. This procedure is more sensitive than radiography to detect periarticular osteophytes in this particular location. When marginal modeling is severe it can produce secondary trauma on the MM and mechanical interference with it.

- Articular surfaces
When the stifles is examined in flexion the cartilage and subchondral bone surface of the femoral condyles can be imaged. Alteration of the subchondral bone surface profile and echogenicity can be diagnosed. The diagnosis of subchondral bone cysts can be made with ultrasonography and this technique is more sensitive then radiography to small alterations of the subchondral surface.

2- Lateral femorotibial joint
- Lateral collateral ligament
Lateral collateral desmopathy is a quite rare condition in our clinical cases.

- Lateral meniscus
Lateral meniscal injuries can be observed alone or in association with other ligaments or condylar injuries. They are usually found in the cranial horn and consist in cleavage, fissuring or laceration (tear). Traumatic injuries of the body of the LM were found in association with MCL rupture. Progressive degenerative injuries were found alone or associated with OCD lesion of the lateral tibial or femoral condyles.

- Recesses of the lateral femorotibial joint
Synovial fluid distension of the subextensorius recess of the lateral femorotibial joint can be observed in either lateral femorotibial arthropathy or femoropatellar lesions. Synovial fluid effusion of the cranial recess of the lateral FT Joint can be found in the infrapatellar fat pad close to the intermediate patellar ligament.
3- Cruciate ligaments injuries
Diagnostic imaging of cruciate ligaments injuries is still difficult and ideally requires combination of radiography, ultrasonography and nuclear scintigraphy.

- Cranial cruciate ligament
Ultrasonographic imaging of the CrCL is a technical challenge and can be done with a 5MHz convex probe. The tibial part can be seen when the stifle is in flexion and the probe located cranial to the lateral femoral condyle. The femoral attachment can be imaged with a caudal approach, the probe being placed at the caudomedial aspect of the thigh.

- Caudal cruciate ligament
Ultrasonographic imaging of the CdCL is also difficult and can be done with a 5MHz convex probe. The femoral part can be seen when the stifle is in flexion and the probe located at the lateral aspect of the FT joint. The tibial (caudal) part can be investigated with a caudolateral approach, the probe being placed at the caudolateral aspect of the thigh.

Ultrasonographic examination of the tarsus
Soft tissues enlargement and injuries of the hock are difficult to assess clinically and with radiography, but their evaluation with ultrasonography may provide essential data to identify the anatomical structure(s) involved.

Collateral aspects of the hock
Ultrasonographic assessment of the collateral ligaments injuries of the must be performed in horses with synovial distension, collateral (medial or lateral) enlargement of the hock, or history of hindlimb trauma.
- If recently injured, the long medial collateral ligament looks thickened and hypoechogenic. Occasionally, avulsion fracture from the medial malleolus of the tibia or the distal tuberculum of the talus have been observed radiographically and ultrasonographically. In old injuries, the long medial collateral ligament remains thickened and focal sites with mineralisation can be found within it.
- Proximal avulsion fracture of the calcanean part of the short medial collateral ligament has been observed in weanlings; old bony fragmentation and/or desmopathy has been found in adult horses.
- The most frequent injuries observed on the lateral collateral ligament were: avulsion fracture at the proximal insertion on the lateral crural malleolus (distal portion of the fibula), and desmopathy of the short collateral ligament associated to sudden synovial distension of the proximal hock.

Dorsal aspect of the hock
Superficial dilaceration of the long digital extensor tendon are frequently found in horses presenting a tenosynovitis at the dorsolateral aspect of the hock. Evaluation of the articular surfaces of the ridges of the talus is useful to assess cartilage degeneration/erosion. Comparison with the opposite controlateral limb is mandatory for objectiviation of any changes. Evaluation of the synovial fluid and membrane can be useful in horses with chronic distension of the proximal hock. Similarly to other joints, tissue debris, fibrin, hemarthrosis, and synovial membrane proliferation can be documented especially in the dorsomedial recess of the proximal tarsus. Osteochondris lesions (sagittal ridge of the tibia, lateral ridge of the talus, medial malleolus) can be diagnosed ultrasonographically and this is particularly useful when the radiographic findings are not conclusive.
Plantar aspect of the hock
When swelling is present ultrasonographic examination of the point of the hock is very useful to determine the anatomical structures involved.
When the problem is induced by fluid accumulation, this procedure allows to determine the amount of fibrine present and this information is useful for the treatment of the condition. Nevertheless in the author’s experience, contrast tenography is often indispensable to determine which synovial structure is involved.
Ultrasoundography is also very valuable to assess the superficial digital flexor tendon (SDFT) itself. With this procedure, the diagnosis of SDF tendinopathy, instability or luxation as well as evaluation of the SDFT attachments are possible.
Tenosynovitis at the plantar tarsal sheath is also a good indication for ultrasonographic examination. Evaluation of the synovial fluid and membrane, lateral digital flexor tendon and sustentaculum tali can be made.
Curb-like deformation at the tarsometatarsal junction benefits from both radiography and ultrasonography. With radiography, collapse of the distal row of the tarsus can be assessed; ultrasonography allowed us to demonstrate that fibrous curbs are rarely induced by a long plantar demopathy but more often by a thickening of the plantar tarsal fascia.

Conclusions
For a complete imaging of the stifle and hock, ultrasonography and radiography are ideal complementary procedures before considering more expensive procedures such as nuclear scintigraphy and cross sectional imaging under general anesthesia (CT scan and MRI).