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Ultrasound and joint disease

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The information generated by ultrasonographic equipment has escalated over the last decade. Ultrasonography is now commonly used in combination with other diagnostic modalities to investigate a spectrum of musculoskeletal injuries including synovial cavities, i.e. bursae, tendon sheaths and diarthrodial articulations. Operator interpretation of images, anatomical knowledge and experience of normal variants are important to provide rational information and are necessary for accurate diagnosis and the formulation of appropriate management strategies.

Localising lameness to a joint frequently can be made by clinical examination commonly in combination with local analgesic techniques. Establishing a cause for the joint pain requires additional techniques usually in the form of radiography and ultrasonography which are both noninvasive and readily available. Ultrasonographic examination of joints provides information regarding the synovial fluid, synovium, joint capsule, ligaments associated with joints (intra-articular, periarticular and extra-articular), articular cartilage, menisci, subchondral bone and the extra-articular soft tissues. Other noninvasive imaging techniques including nuclear scintigraphy, computed tomography and magnetic resonance imaging can yield further information but have significant cost implications.

In considering ‘joint disease’ the range of causes are numerous and frequently interrelated. These include genetic, dietary, traumatic (whether single event or repetitive), conformational and infective aetiologies. The clinical history, presentation and other diagnostic techniques provide useful information to maximise the contribution of an ultrasonographic evaluation. However, the latter should be performed before synoviocentesis or delayed until the day following local analgesic techniques to optimise assessment.

For the majority of structures a 10 MHz (7.5–10.0 MHz) linear probe and standoff pad are required. Lower frequency transducers and an increased depth of field can be useful for imaging the coxofemoral and caudal femorotibial joints. Image quality is dependent upon both the individual machine and transducer properties, and is also greatly improved by patient preparation; the hair should be clipped from the region of interest, grease removed using surgical spirit and Hibiscrub and acoustic coupling gel applied.

The approach to ultrasonographic assessment of joints has been recorded in the literature by several authors. The examination should be performed in a systematic manner, which becomes routine, to ensure complete evaluation. The shape of the area to be imaged, and therefore probe contact, the depth of structures and their orientation, degree of joint distension, presence of wounds or gas in the soft tissues and patient cooperation all influence the information generated.

Ligaments associated with joints

The accuracy for predicting articular involvement of disrupted ligaments can be variable and depends on the size of the defect (shallow areas of disruption are usually harder to define) and the degree of surface disruption (extruded fibrils being easier to identify).

Dorsal (articular) tears of the suspensory ligament branches

Lesions have been associated with lameness localising to the metacarpophalangeal or metatarsophalangeal joints, which frequently have increased distension of the palmar or plantar pouch compared to the dorsal pouch. There usually are no radiological abnormalities and palpable thickening of the suspensory ligament branch is not a consistent feature. It is recommended that ultrasonographic examination of these structures should form part of the routine evaluation in lameness localising to this area and should precede confirmatory/therapeutic arthroscopy.

Tears of the patellar ligaments

Trauma to stifles is common with damage to the patella, associated fibrocartilage, patellar ligaments and joint capsule. Tears of the patellar ligaments can also occur without known trauma. Localisation in the acute phase may be made by palpation, alternatively horses may present with chronic lameness which improves to intra-articular analgesia of the femoropatellar joint. Ultrasound assists in lesion localisation and thus indications for and direction of surgery.

Articular tears of the collateral ligaments of the tarsus

Disruption to the short collateral ligaments frequently results in extrusion of identifiable fibrillar material into the synovial environment. These injuries commonly but not invariably have concomitant capsular tears.
PLICAE
The dorsal metacarpophalangeal and metatarsophalangeal plicae in the Thoroughbred racehorse are frequently seen to be thickened or disrupted. With recurrent injury hypertrophy, osteochondral erosion and adhesion formation can result. Sometimes there also may be tearing of the adjacent joint capsule.

JOINT CAPSULE TEARING
The precise localisation and extent of capsular tearing is frequently difficult to ascertain. The appearance of adjacent periarticular soft tissues and associated intra-articular echogenic material can give indications for involvement.

CARTILAGE
Erosion, thickening, fragmentation and mineralisation of cartilage can be identified. Evaluation of the contralateral joint (in unilateral cases) can assist greatly the confidence of interpretation as marked location, age, breed and individual variations are present in ‘normal’ horses.

SUBCHONDRAL BONE
Defects and surface irregularities of subchondral bone can be readily imaged. Again, comparison with the contralateral limb is important. Ultrasonography is also useful for intralesion guided injections.

JOINT CAPSULE PENETRATION
In cases of suspected joint capsule penetration ultrasonography can help to localise the optimal sites for safe and productive synoviocentesis. It also aids in identification and localisation of foreign bodies. Arthroscopy is the gold standard for treatment of traumatic joint penetrations however, in cases where needle lavage is considered, ultrasonographic examination can provide information regarding the presence of foreign material, pannus, additional soft tissue injuries or osteochondral defects which would greatly reduce the effectiveness of nonarthroscopic management.

SURGICAL PLANNING
When ultrasonographic assessment provides evidence of joint capsule or collateral ligament disruption, the indications for, timing of and risks versus benefits ratio can be factored into decision making and client counselling.

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