

Arthroscopic exploration of the equine stifle – advantages and limitations in respect to MRI-findings

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Arthroscopic exploration in horses was first reported in Germany literature in the 1970's¹. Thereafter, this technique was also introduced to the United States and was refined ever since then. Today, arthroscopy is a routine diagnostic and therapeutic procedure. Main advantages include minimal trauma and therefore, low postoperative complications and morbidity². Nowadays, almost all equine joints have been arthroscopically explored. Among the joints, arthroscopic exploration and treatment of stifle joint disorders have been more challenging due to its complex anatomy². The joint is quite voluminous and consists of dorsal and plantar pouches. Furthermore, the joint is subdivided into femoropatellar and medial/lateral femorotibial joint pouches, that can communicate with each other³. Also, several soft tissue structures including menisci, tendons and ligaments can challenge the arthroscopist during exploration. Until now, arthroscopy of the equine stifle has been considered as the „Gold Standard“ for diagnosis and treatment of stifle disorders. Mostly, the horse is placed under general anesthesia in dorsal recumbency². More recently, standing arthroscopy of the dorsal pouches has been advocated⁴. Preoperatively, pathology should be confirmed by intraarticular anesthesia independent on the approach being chosen. Among the non-invasive pre-OP diagnostic tools, radiographic, ultrasonographic and scintigraphic examinations are routinely used³. More recently though, computed tomographic⁵ and magnetic resonance examinations of the stifle have been described⁶.

Arthroscopical examination of the femoropatellar joint is performed with the limb in extension and the arthroscopy portal is located between the middle and lateral patellar ligament, half-way between proximal tibia and distal aspect of the patella. The obturator is directed slightly lateral and this approach allows for almost complete diagnostic exploration and treatment. OCD of the lateral trochlear ridge is the most common surgical lesion followed by patellar and medial trochlear ridge lesions or a combination thereof². Most superficial femoropatellar pathologies can be accessed and therefore, diagnosed well with arthroscopy.

Several techniques have been described for examination of the medial femorotibial joint pouch. The stifle is flexed in a 90° position independent on the approach preferred². Either a *direct* cranial, lateral and cranio-lateral approach², or an *indirect* approach via the femoropatellar pouch can be chosen⁷. Most common lesions include medial femoral cysts, meniscus and/or OCD-lesions. Similarly, the lateral femorotibial pouch can be approached *directly* or visualised *indirectly* via the femoropatellar pouch^{2,7}. OCD-lesions followed by meniscal pathologies are commonly diagnosed. In general, *indirect* approaches allow for a good visualization of the more axial structures (cruciate ligament and menisci) but a rather limited access to more abaxial aspects of the joint². In contrast, *direct* approaches allow more access to abaxial structures². Several superficial lesions of the femorotibial joints can be diagnosed arthroscopically. However, pouches are always incompletely visualised due to anatomic restrictions. Particularly, extent of cruciate- and meniscopathies cannot be pursued.

Exploration of the medial and lateral plantar pouches is technically more challenging and surgical manipulation is rather limited⁸. The procedure is always performed under general anesthesia with the stifle positioned in 90-120° flexion⁸. The caudal compartments are entered about 3cm caudal to the collateral ligaments and 2.5cm proximal to the corresponding meniscus/tibial rim⁸. More caudally located structures, such as the peroneal nerve, should be strictly avoided⁸. The caudal ligament of the medial meniscus, parts of the caudal cruciate ligament, the femoral condyles as well as the menisci can be partially visualized². However, correct placement of instrument portals and surgical manipulation of accessible lesions can be challenging.

At the Equine Hospital Aschheim in Germany, MRI-examination of the equine stifle replaced arthroscopy as the „Gold Standard“ for diagnoses of equine stifle pathology since 2011⁶. More than 120 stifles were examined with MRI so far and until submission of the abstract, 70 stifles were statistically analysed⁶. The procedure is performed under general anesthesia in dorsal recumbency with the limb to be examined in extension and a flexible extremity coil is placed dorsally to the stifle. If bilateral lesions are suspected, a second anesthetic procedure is performed. Different sequences (T1-, T2-, PD- and STIR) were acquired at frontal, sagittal and axial planes⁶. The average scanning time is about 60 minutes. Among the horses that were examined with MRI, only 33% of the cases underwent subsequent arthroscopic exploration⁶. Based on pre-OP MRI-images, lesions were determined to be inaccessible via arthroscopy and/or pathologies were so advanced and complex that arthroscopic treatment was considered to be either of low therapeutic value or invaluable for changing the overall prognosis. All superficial lesions were confirmed and treated in patients that underwent arthroscopy. MRI-Scans prior to surgery allows an excellent orientation, preparation and targeting. However, the extent of cruciate desmopathies, meniscopathies and bone lesions was underestimated in surgery as compared to MRI. In contrast, low-grade cartilage lesions and synovial adhesions were more clearly delineated during arthroscopy as compared to MRI. Main disadvantages of MRI include additional cost and need for general anesthesia.

In summary, arthroscopic exploration frequently reveals no significant stifle pathology despite of positive intraarticular anesthesia. This may originate either in incomplete joint exploration due to anatomical restrictions or intra-structural defects (bone, menisci etc.), that cannot be visualised completely. Thus, inaccessible lesions may remain undiagnosed or untreated in surgery. Therefore, arthroscopy has limitations for making a correct diagnosis and for defining the overall prognosis. However, stifle arthroscopy is a great diagnostic and therapeutic tool for superficial lesions and may remain the „Gold Standard“ for most equine hospitals for economical reasons. In contrast, MRI is an excellent non-invasive diagnostic tool that allows for complete examination of all stifle structures. Pathologies are more clearly and thoroughly delineated as compared to arthroscopy. Particularly, extent and location of intralesional soft tissue and bone lesions can be better diagnosed on MRI. This allows better targeting during arthroscopy but may also prevent unnecessary surgeries. Therefore, MRI-scanning of the stifle has a more prognostic value, is an excellent complementary tool for pre-OP planning and may potentially be the „Gold Standard“ for investigating stifle pathology, treatment and prognosis in the near future.

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