Routine knee MRI: CORRELATION OF FINDINGS WITH ARTHROSCOPY

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Purpose

Magnetic resonance imaging (MRI) is of great aid in the diagnosis of knee lesions. Most diagnostic studies comparing MRI and arthroscopy have shown good diagnostic performance in detecting lesions of the menisci and cruciate ligaments. Nevertheless, arthroscopy has remained the reference standard.

The purpose of this study is to evaluate MRI findings of knee and correlate with arthroscopic findings and physical examination.

Methods and Materials

Data from consecutive knee arthroscopes performed by one experienced knee surgeon the previous 6 months were prospectively collected. All patients had clinical examination, MRI and arthroscopy for suspected meniscal and ligament injuries.

All patients were examined by experienced orthopedic consultant. Clinical tests included McMurrays for meniscal damage, Draw tests for cruciate damage and valgus and varus stress tests for collateral ligament integrity. A clinical diagnosis was made and an MRI of the affected knee was requested. MRI was requested for confirmation of clinical diagnosis and for obtaining additional information.

MRI examinations were performed in a 1.5T magnet using a standard routine protocol (T1WI, T2WI/STIR, PD-FS in 3 planes). All MRI examinations were reviewed by two general radiologists with special interest in MSK radiology. Later on, arthroscopy was performed. Data were recorded and compared with MRI findings and physical examination findings.

The examined patients were 16 (13M, 3F) of mean age 37.46 years who referred to our hospital orthopedic clinic due to complaints. Half of them had a previous history of direct knee trauma whereas the rest of them had a history of knee pain of undetermined reasons.

Results
MRI and arthroscopic findings were almost similar in 13 out of 16 cases with few differences. In all of these cases were relative physical examination findings.

In these cases, additional arthroscopic findings that were not recognized in MRI examination were patellar chondropathy-grade 2(n=1), medial femoral condyle chondropathy-grade 2(n=1) and tear of posterior horn of medial meniscus (n=1).

In these cases, additional MRI findings that were not mentioned in arthroscopic reports were: oblique tear of posterior horn of medial meniscus (Fig.1), vertical tear of posterior horn of lateral meniscus (Fig.2) and horizontal tear of medial meniscus extending undersurface (Fig. 3). In all of these cases meniscal tears were undersurface.

Also, in these cases were additional MRI findings such as bone bruise, muscle hematoma, Baker cyst, soft tissue edema and accidental bone lesions that could not be detected by arthroscopy.

In the 3 cases that MRI and arthroscopic findings were totally irrelevant were according to arthroscopic findings patellar chondropathy-grade 2 (n=1), femoral and tibial chondropathy (n=1).

MRI results that were not proved by arthroscopic examination were radial tear of lateral meniscus (image 4) and undersurface tear of posterior horn of medial meniscus (image 5).

MRI is the non invasive imaging technique of choice in evaluating knee pain. According to previous study (1), it is able to detect most internal derangements of the knee efficiently. MRI has a higher specificity than sensitivity. It has a higher negative predictive value than positive predictive value. Thus, if a patient is given a result of negative MRI scan, the high specificity and negative predictive value of the scan mean that this is likely to be a true negative result.

Due to the high negative predictive value and high specificity the use of MRI as a screening tool is highly predictive in avoiding unnecessary arthroscopies. It should be used in connection with clinical findings and history to provide a more complete picture, especially in complex injuries.

In a study (2), it is mentioned that the sensitivity of MRI for the detection of tears of the posterior horn of the lateral meniscus is lowest compared with that for tears at other meniscal locations and the presence of simultaneous acute anterior cruciate ligament injury decreases overall MRI sensitivity for meniscal tears. Clearly evident missed posterior horn lateral meniscal tears would not have missed if the two touch slide rule had been strictly applied at prospective MRI interpretation. This rule is previously described by De Smet and Tuite: a tear is highly likely present if two or more MR
images show meniscal distortion or abnormal signal extending to an articular surface (3). They suggest that unavoidably MRI missed tears were not clinically significant and we classified as incomplete tears (2).

In another study they suggest that clinical examination after an acute knee trauma has a low diagnostic value. Further assessment with MRI improves the chances of a correct diagnosis and is recommended in the early phase after a rotational knee trauma (4).

Also, MRI of the knee with acute, traumatic extension deficit in the acute or subacute phase is a safe method to identify the patients that have a mechanical reason for locking and therefore can benefit from arthroscopic treatment (5).

Additional study suggests that there is no significant difference between the specificity and sensitivity of 3T MRI and those of 1.5 T in diagnosis of meniscal tear. The causes of false positive and false negative MRI diagnosis of meniscal tear are similar for 3-T and 1.5T MRI (6).

In our study there was underestimation of patellar and femoral condyle cartilage lesions. We think that cartilage is underestimated because we did not perform cartilage special sequences. There were also some difference concerning some meniscal tears.

There are some limitations in our study.

First of all, the number of examined knees is small, but since this work is in progress we expect to extend it more.

Secondly, examinations were reviewed by general radiologists and some of the MRI examinations were performed in an outside clinic MRI who provided only paper printed MRIs and not hard copies.

Images for this section:
Fig. 1: Oblique tear of posterior horn of medial meniscus.
Fig. 2: Vertical tear of posterior horn of lateral meniscus.
Fig. 3: Horizontal tear of medial meniscus extending undersurface.
Conclusion

There is a good correlation between MRI, physical examination and arthroscopic findings. Special attention should be made in evaluating cartilage lesions and posterior meniscal tears. In all cases there should be careful physical examination and close cooperation between radiologists and orthopedic surgeons in order to avoid mistakes.

References


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