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Original article

Evaluation of the anterolateral ligament of the knee by means of magnetic resonance examination☆

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ABSTRACT

Objective: To evaluate the presence of the anterolateral ligament (ALL) of the knee in magnetic resonance imaging (MRI) examinations.

Methods: Thirty-three MRI examinations on patients' knees that were done because of indications unrelated to ligament instability or trauma were evaluated. T1-weighted images in the sagittal plane and T2-weighted images with fat saturation in the axial, sagittal and coronal planes were obtained. The images were evaluated by two radiologists with experience of musculoskeletal pathological conditions. In assessing ligament visibility, we divided the analysis into three portions of the ligament: from its origin in the femur to its point of bifurcation; from the bifurcation to the meniscal insertion; and from the bifurcation to the tibial insertion. The capacity to view the ligament in each of its portions and overall was taken to be a dichotomous categorical variable (yes or no).

Results: The ALL was viewed with signal characteristics similar to those of the other ligament structures of the knee, with T2 hyposignal with fat saturation. The main plane in which the ligament was viewed was the coronal plane. Some portion of the ligament was viewed clearly in 27 knees (81.8%). The meniscal portion was evident in 25 knees (75.7%), the femoral portion in 23 (69.6%) and the tibial portion in 13 (39.3%). The three portions were viewed together in 11 knees (33.3%).

Conclusion: The anterolateral ligament of the knee is best viewed in sequences in the coronal plane. The ligament was completely characterized in 33.3% of the cases. The meniscal portion was the part most easily identified and the tibial portion was the part least encountered.

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Avaliação do ligamento anterolateral do joelho por meio de exame de ressonância magnética

Palavras chave:
Joelho
Instabilidade articular
Imagem por ressonância magnética
Anatomia

RESUMO

Objetivo: Avaliar a presença do ligamento anterolateral (LAL) do joelho em exames de ressonância magnética (RM).

Métodos: Foram avaliadas 33 RM de joelho de pacientes feitas por indicações não relacionadas a instabilidade ligamentar ou trauma. Foram obtidas imagens no plano sagital ponderadas em T1 e imagens nos planos axial, sagital e coronal ponderadas em T2 com saturação de gordura. As imagens foram avaliadas por dois radiologistas experientes em patologias musculoesqueléticas. Na avaliação da visualização, dividimos a análise do ligamento em três porções: origem femoral até o seu ponto de bifurcação, da bifurcação até a inserção meniscal e da bifurcação até a inserção tibial. Considerou-se com variável categórica dicotômica (sim ou não) a capacidade de visualizar o ligamento em cada uma das porções e no seu todo.

Resultados: O LAL foi visualizado com característica de sinal semelhante às demais estruturas ligamentares do joelho, com hipossinal em T2 com saturação de gordura. O principal plano em que o ligamento foi identificado foi o coronal. Alguma porção do ligamento foi visualizada com clareza em 27 (81,8%) joelhos. A porção meniscal ficou evidente em 25 (75,7%) dos joelhos, a porção femoral em 23 (69,6%) e a tibial em 13 (39,3%). As três porções foram visualizadas em conjunto em 11 (33,3%) joelhos.

Conclusão: O ligamento anterolateral do joelho é mais bem visualizado em sequências no plano coronal. O ligamento foi caracterizado por completo em 33,3% dos casos. A porção meniscal foi a mais facilmente identificada e a tibial a menos encontrada.

Introduction

The anterolateral ligament (ALL) of the knee was mentioned in the orthopedic literature for the first time by Segond in 1879 with Vincent et al.[1] Although it was described more than 120 years ago, this ligament was named recently by Vieira et al.[2] in a study on the iliotibial tract. Subsequently, starting in 2012, some anatomical studies came out, with the objective of defining parameters for the origin and insertion of the ALL, its path and other particular features.[1,3–5]

Recent studies have demonstrated that the origin of the ALL is anterior and distal to the origin of the lateral collateral ligament (LCL). The ALL is located between the LCL and the tendon of the popliteal muscle, in the lateral femoral condyle. It has an oblique path toward the tibia, with two distinct insertions: one in the lateral meniscus and the other in the proximal tibia, between Gerdy's tubercle and the head of the fibula.[5]

Weber cited some aspects of the ALL in a study using magnetic resonance imaging (MRI) of the knee. This author reported that its length varied from 4.2 cm in flexion to 3.9 cm in extension, which suggests that it is under greater tension in flexion.[6] Claes et al.[7] evaluated 350 MRI scans on anterior cruciate ligament (ACL) injuries, searching for visualization of the ALL, and reported having viewed this structure in 95.7% of the cases.

Recently, greater importance has been placed on this ligament. There have been suggestions that this structure may present an association with ACL injuries and with the genesis of anterolateral knee instability.[1,3–5,8] Thus, studies in which the ALL is identified by means of imaging examinations have become necessary.

The aim of the present study was to evaluate the presence of the ALL in knee MRI examinations. As a secondary objective, the aim was to assess what the best orientation for viewing the ALL would be.

Materials and methods

Thirty-three MRI scans on the knees of patients who underwent the examination due to clinical indications unrelated to knee ligament stability or trauma were evaluated with regard to lesions of the patellar cartilage. None of the patients presented any ligament lesions, meniscal lesions or chondral lesions in locations other than the patella. The patients' mean age was 32.5 ± 8.1 years (ranging from 21 to 49). Seven patients were male and 26 were female.

The examinations were performed in a machine with a 1.5-Tesla magnetic field (Sigma HDxT, General Electric Medical Systems, Milwaukee, Wisconsin, USA), using an eight-channel knee coil (HD TR knee array). T1-weighted images were obtained in the sagittal plane (TR/TE, 400–700/9–16) and T2-weighted images with fat saturation in the axial, sagittal and coronal planes (TR/TE, 3200–4500/40–50), with slice thickness of 3 mm and spacing of 0.5 mm.

The MRI scans were evaluated by two radiologists with experience of musculoskeletal pathological conditions, especially knee ligament injuries. Each evaluator made two