

Complete Posterior Lateral Meniscal Root Lesion is Associated with High-Grade Pivot-Shift Phenomenon in Noncontact Anterior Cruciate Ligament Injuries

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Summary:

Complete PLMRL is Associated with High-grade Pivot-shift Phenomenon in Noncontact ACL Injuries

Abstract:

Background: Recent biomechanical study has shown that a posterior lateral meniscal root lesion (PLMRL) further destabilizes the ACL-deficient knee during a simulated pivot-shift loading. However, as the PLMRL may present in variable forms clinically, [e.g. partial versus complete root lesion; presence versus absence of meniscofemoral ligament (MFL)/lateral meniscal extrusion (LME)], the real PLMRL-related risk factor that is associated with the high-grade pivot-shift phenomenon in noncontact ACL injuries is still unknown to us.

Hypothesis: Complete but not the partial PLMRL would be associated with high-grade pivot-shift phenomenon in noncontact ACL injuries.

Study Design: Case series; Level of evidence, 4.

Methods: From January 2013 to December 2015, a total of 1095 consecutive patients were diagnosed as having noncontact ACL injuries and underwent primary ACL reconstructions. Among them, 140 patients were arthroscopically verified to have concomitant PLMRLs. Study exclusion criteria included partial ACL rupture, multiligamentous injury, associated medial/lateral meniscal lesions other than PLMRL, severe osteoarthritis of knee joint (Outerbridge grade III or IV), general joint laxity, severe malalignment of lower extremity, history of knee surgery, discoid lateral meniscus, and lack of available pre-operative magnetic resonance imaging (MRI). Patients with either $\leq 10.0^\circ$ of lateral posterior tibial slope (LPTS) or anterolateral ligament (ALL) abnormality presented on pre-operative MRI scans were additionally excluded. This left 74 patients who were finally allocated into high-grade pivot-shift (grade II & III) group (group 1, n = 51) and low-grade pivot-shift (grade 0 & I) group (group 2, n = 23) according to the results of pre-operative pivot-shift tests performed under anesthesia. Predictors of high-grade pivot-shift phenomenon, including degree of PLMRLs, integrity of MFLs, status of LME, age, sex, body mass index (BMI), and KT-1000 arthrometer side-to-side difference (SSD), were assessed by multivariable logistic regression analysis.

Results: The proportion of patients with complete PLMRL in group 1 was statistically significantly larger than that in group 2. In addition, complete PLMRL was significantly (odds ratio [OR], 4.044; 95% CI, 1.125 – 14.534; P = .032) associated with high-grade pivot-shift phenomenon in noncontact ACL injury, especially for those with a TFIS of = 12 weeks (OR, 16.593; 95% CI, 1.073 – 56.695; P = .014). However, no significant association was identified between neither the integrity of MFL nor the status of LME and the high-grade pivot-shift phenomenon.

Conclusion: Complete PLMRL is identified to be an independent risk factor of high-grade pivot-shift phenomenon in noncontact ACL injuries, particularly for those with a TFIS of = 12 weeks. The study data add to the literature that complete PLMRLs should be repaired at the time of ACL reconstruction especially for those in chronic injury phase, unless residual rotational knee joint laxity may present.