Editorial review: *American Journal of Sports Medicine "Anatomic Reconstruction of the Anterior Cruciate Ligament of the Knee With or Without Reconstruction of the Anterolateral Ligament"*

Seper Ekhtiari, Ryan P. Coughlin, Olufemi R. Ayeni

Division of Orthopaedic Surgery, McMaster University, Hamilton, ON, Canada

Correspondence to: Olufemi R. Ayeni. Division of Orthopaedic Surgery, McMaster University, Hamilton, ON, Canada. Email: simunon@mcmaster.ca.

Comment on: Ibrahim SA, Shohdy EM, Marwan Y, *et al.* Anatomic Reconstruction of the Anterior Cruciate Ligament of the Knee With or Without Reconstruction of the Anterolateral Ligament: A Randomized Clinical Trial. Am J Sports Med 2017;45:1558-66.

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Since it was first described (though not named) by Dr. Segond in the context of his eponymous fracture in 1879 (1), the anterolateral ligament (ALL) of the knee has drawn limited attention through the years. More recently, however, there has been a renewed interest in the definition and study of the ALL (2). While exact descriptions vary between cadaveric studies, it is universally described as originating from the lateral femoral condyle and inserting into the anterolateral part of the proximal tibia, midway between Gerdy's tubercle and the head of the fibula (3). Biomechanical studies have revealed it to be a stabilizer of the knee joint in internal rotation, with its maximal stabilizing effect seen between 30 and 90 degrees of flexion depending on the study (3).

While its involvement in the Segond avulsion fracture is the most commonly described clinical significance of the ALL, it is less clear how the ALL is affected in other ligamentous knee injuries. Claes *et al.* found that 79% of patients with anterior cruciate ligament (ACL) injuries showed concomitant ALL abnormalities on magnetic resonance imaging (MRI) (4). In a case series of 92 patients undergoing combined ACL and ALL reconstruction, Sonnery-Cottet *et al.* showed positive two-year outcomes with no specific complications related to ALL reconstruction (5). In a prospective comparative study of sixty patients, Zhang *et al.* compared isolated single bundle ACL reconstruction (SB), isolated double bundle ACL reconstruction (DB), and combined single bundle ACL reconstruction plus ALL reconstruction (SBL). They found no significant differences between SBL and DB, but both techniques were significantly better than SB in terms of functional outcomes and clinical examination (6).

Thus, Ibrahim *et al.*'s clinical trial comes at an important and opportune time (7). The authors randomized 110 male patients into two groups: isolated ACL reconstruction (n=50 at final follow-up) and ACL + ALL reconstruction (n=53 at final follow-up). The allocation was performed using patient's birthdates (odd *vs.* even days). A single orthopedic sports surgeons performed blinded clinical examinations pre- and post-operatively. Semitendinosus and gracilis were used to reconstruct the ACL and ALL, respectively. Only 7 patients (6.4%) were lost to follow-up. Mean follow-up was 27 months, with a minimum of 25 months. Pre-operative characteristics were not significantly different between the groups.

The primary finding of the study was that there was no statistically significant difference between the two groups on functional outcomes (Lysholm score, Tegner activity score, and IKDC score) or clinical examination (pivot shift, Lachman test, and anterior drawer test). However, there was a statistically significant difference on instrumented knee laxity testing with an arthrometer. As the authors point out, while their findings support the importance of the ALL as a biomechanical stabilizer, its clinical importance remains unclear. To our knowledge, this is the first attempt at a prospective, comparative trial to compare isolated ACL reconstruction with ACL + ALL reconstruction.

Certainly, some of this study's strengths include its

sample size, which is one of the largest to date on the topic and high rate of retention at follow-up. As well, blinding of experienced examiners, and a minimum two-year follow-up contribute to an overall strong methodology. The originality of the study is perhaps its biggest strength, as it sets the foundation for future studies to build upon.

The study does have some limitations, most of which the authors do acknowledge. The method used to allocate patients to groups (birthdate) is not a truly random method and represents an example of quasi-randomization (8). In addition, the population group is entirely male, which limits its generalizability for the remaining half of the population. Furthermore, all patients were recruited from a single centre in a single country, which once again limits the general applicability of the findings. In addition, while mean operative time is not reported, it is an important consideration in this context as an additional reconstruction is being undertaken. Finally, the lack of a power calculation makes it unclear whether the study was simply underpowered or whether the lack of differences is indeed accurate. For example, given that the ALL is an anterolateral rotational stabilizer, it is rather surprising that there is a difference in anteroposterior translation between the two groups, but no difference in rotational stability. This could either be due to the subjective nature of the pivot shift test, the inherent sensitively of the test, or a lack of statistical power. Lastly, while there were no differences in participant characteristics in terms of age, weight, chronicity and concomitant meniscal injury, there was no mention with regards to multi-ligamentous injury or rates of meniscal debridement versus repair. The latter may be of particular interest as the medial meniscus plays an important role in providing secondary stability to anterior translation, and thus could impact KT-1000 testing.

Ultimately, while this study does have its limitations and does not provide a definitive answer on the question of whether or not the ALL reconstruction should be performed in the context of ACL injury, it represents an important and well-executed stepping stone towards further investigation of the role of the ALL in knee anatomy and function. It remains to be seen whether or not there truly is a clinical or functional difference between patients undergoing isolated ACL reconstruction and those undergoing combined ACL and ALL reconstruction. Of interest will be the long-term results of these patients, and whether or not the added stability provided by the ALL confers any long-term benefit, such as better function or lower rates of symptomatic instability. On the other hand, there are concerns about over-constraint of the lateral compartment with ALL reconstruction, which may predispose patients to earlier onset of osteoarthritis. In addition, it may be the case that ALL reconstruction is indicated in certain cases, but not necessarily for all patients with ACL tears. For example, patients who require a revision ACL reconstruction, those with symptomatic high-grade rotational instability, anterolateral capsular disruption, or those with generalized ligamentous laxity. Future large, prospective, randomized controlled trials are needed to help answer these questions.

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Footnote

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