

# Editorial Commentary: Another Take on the Anterolateral Ligament: High-Grade Are Worse Than Low-Grade Injuries, But the Categorization Is Problematic



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**Abstract:** The anatomy, function, and existence of the anterolateral ligament (ALL) is still hotly debated and a controversial topic. Currently both basic biomechanical and clinical studies are not providing sufficient and strong evidence to either support or refute that the ALL plays an important role for knee stability. One could argue that stability is provided by the anterolateral complex, including the iliotibial band, Kaplan fibers, and the anterolateral capsule, which may contain a structure called the ALL. Magnetic resonance imaging (MRI) is routinely performed in patients with anterior cruciate ligament (ACL) injury, but unfortunately ALL injuries cannot be reliably diagnosed in patients with concomitant ACL tears. When dividing ALL injuries into high and low grade using preoperative MRI and investigating clinical outcomes after double-bundle ACL reconstruction, patients with high-grade injuries have inferior outcomes and a significantly greater revision rates. However, the limitations of this research reduce the validity of these conclusions: high rate of loss to follow-up above accepted standard, unequal size of their study groups, fragility index of zero, the inaccuracy of diagnosing ALL injuries in the presence of ACL tears on MRI, and the dilemma with randomly classifying high- and low-grade ALL injury based on MRI.

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The anterolateral ligament (ALL) remains one of the most debated structures of the knee, and one could easily argue that there is still much mystery surrounding the ALL. As always, if there is controversy, the camps are generally divided into 2 rival groups fighting for superiority. It seems that this split is almost religious, and you either believe in it or you do not.

Unfortunately, both basic biomechanical and clinical studies are not too helpful in providing strong evidence-based arguments for either of the 2 groups. For example, basic anatomy studies reported that the ALL cannot always be identified as a distinct structure.<sup>1-5</sup> These studies also have reported that this ligament is not always present, and the documented percentages ranged from 45% to 83%.<sup>1-5</sup> In contrast, other studies have

shown that the ALL is always present.<sup>2,6</sup> As always with anatomic cadaver studies, sample sizes were low and these studies may all suffer from low observational power. Van der Watt et al.<sup>7</sup> performed a systematic review 5 years ago and pooled the results of 19 available studies with a total of 449 knees. The ALL was present in 96%, and the authors concluded that the ALL is a distinct structure with a consistent origin and insertion with a clear course.<sup>7</sup> However, the conclusions also state that the function of the ALL is based on theory only and the supposed mechanism is to provide anterolateral knee stability.<sup>7</sup>

Does the current evidence support this theory? Spencer et al.<sup>8</sup> tested ALL sectioning and subsequent reconstruction and concluded that the ALL had a role in controlling anterolateral laxity yet ALL reconstruction alone did not reduce anterolateral rotational laxity. In contrast, Al Saiegh et al.<sup>9</sup> added an ALL lesion to an anterior cruciate ligament (ACL)-deficient knee and demonstrated that a tear of the ALL did not increase tibiofemoral instability. Kittl et al.<sup>10</sup> showed that the ALL and anterolateral capsule had only a minor role to play in restraining internal rotation; the main restraint

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was provided by the iliotibial band. This is a possible explanation why anterolateral tenodesis rather than ALL reconstruction may have a role to play.<sup>11</sup> Parsons et al.<sup>12</sup> demonstrated that the contribution of the ALL for internal rotation increased with knee flexion and exceeded the ACL at angles greater than 30° of knee flexion. The authors concluded that the ALL is an important stabilizer for internal rotation at flexion angles greater than 35°. <sup>12</sup> Maybe we can all agree that the anterolateral complex including the iliotibial band, Kaplan fibers, and the anterolateral capsule (which may contain a structure called the ALL) as whole is important for rotatory knee stability.<sup>13,14</sup>

And now Ahn, Lee, Mun, and Kim have performed a study titled “Degree of Anterolateral Ligament Injury Impacts Outcomes After Double-Bundle Anterior Cruciate Ligament Reconstruction” in which they have divided the ALL into high- and low-grade injuries and compared the clinical outcomes for these 2 groups following ACL double-bundle reconstruction.<sup>15</sup> They have clearly demonstrated that high-grade ALL injuries resulted in more anterior tibial translation, had more cases with persistent pivot shift, had inferior clinical outcomes, and also had substantially greater revision rates.<sup>15</sup> In fact, the revision rate in high-degree injuries was 11% and zero in low-grade injuries.<sup>15</sup> The authors have also included patient acceptable symptom state and minimal clinically important difference and showed that minimal clinically important difference was achieved by all patients in both groups but patient acceptable symptom state was achieved by 75% in the high-grade compared with 97% in the low-grade group.<sup>15</sup> These findings could provide a very powerful argument to add a lateral tenodesis or similar if a high-grade ALL injury has been identified on the magnetic resonance imaging (MRI).

However, these conclusions seem a bit premature and possibly based on false pretenses. As the authors have highlighted in their limitations section, there were several flaws that may have limited the validity of these conclusions. The loss to follow-up is almost 30% and above the widely accepted standard of 20%. The fragility index is zero, indicating that the statistical results are not robust. The groups were unequal with a substantially lower sample size in the low-grade group. The most important problem is the categorization of low- and high-grade ALL injury on the MRI. The question must be asked whether the ALL can be visualized on MRI at all and, if yes, whether potential tears can be reliably diagnosed on these images. And this may not be the case. Young et al.<sup>16</sup> demonstrated that the ALL can be reliably visualized on MRI but ALL injuries cannot be reliably diagnosed in the setting of an ACL tear. Devitt et al.<sup>17</sup> concluded that the diagnosis of an ALL injury in the presence of ACL injury is not accurate due to the inability to visualize the ligament in its entirety.

Muramatsu et al.<sup>18</sup> showed that only early 3-dimensional MRI with a concomitant ACL injury allows reasonable accuracy for lower grade injuries but low accuracy with greater-grade injuries. Monaco et al.<sup>19</sup> correlated MRI to the findings at surgical exploration. For complete ALL/capsule tears, the sensitivity was 79%, specificity 42%, and accuracy 61%.<sup>19</sup> So, can we believe in what we see or believe in what we feel?<sup>20</sup> I will leave it to the reader to make up his/her own mind.

Despite our beliefs, we have to congratulate the authors for thinking outside the box and consider other factors that can influence clinical outcomes. ACL injuries are not isolated and twisting knee injuries often involve many other structures. Ultimately, the deforming forces at the time of injury determine injury severity and subsequent clinical outcomes. Maybe this is the ultimate message of this study and a stern reminder to look out for injuries to anatomic structure we tend to forget?

For me, this is a thought-provoking study, well designed and executed. Thank you to the authors for their innovative and out-of-the box thinking. So, do I believe in what I feel? That clinically meaningful conclusions most likely are not possible here, given the limitations with study design and lack of accuracy of identifying the ALL reliably in the presence of ACL injuries? Absolutely, but aren't we all suffering from “my-side” bias?

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