

A New Algorithm to Treat Chronic Combined ACL/MCL Injuries: Let's Come Back to the “Rotatory Instability Test”

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Background: Chronic combined medial collateral ligament (MCL) and anterior cruciate ligament (ACL) injuries are frequent. Medial residual laxity is a risk factor for ACL rupture. It should be treated at the same time as the ACL reconstruction (ACLR) if necessary, but there are still questions surrounding the indications for abstention or surgery of the medial plan, especially for grade 2 MCL injuries of the Fetto and Marshall classification.

Indications: The purpose is to come back to a simple test, the “Rotatory Instability Test” as described by Slocum and Larson in 1968 for systematic clinical examination of the knee to improve the sensitivity and accuracy of the deep MCL (dMCL) and superficial MCL (sMCL) examination and to propose a decision-making algorithm for the treatment of the chronic combined ACL/MCL injuries based on the assessment of anteromedial rotatory instability (AMRI).

Technique Description: Examination of the ACL with Lachman test, anterior drawer in neutral rotation, and pivot shift test confirm the ACL injury. Valgus laxity is tested in extension and at 20° of flexion. Then, an anterior drawer test at 90° of flexion with external rotation is done (the anterior drawer in external rotation [ADER] test) allowing to identify isolated dMCL, dMCL + sMCL, or MCL + posterior oblique ligament (POL) injuries.

Discussion: As persistent medial laxity is a risk factor for ACL graft failure and there is no reliable method of instrumented laxity assessment, careful clinical examination remains essential. Systematic examination of the medial side with valgus laxity testing at 0° and 20° flexion combined with the ADER test assessment of AMRI can guide treatment of the MCL injury component. Where there is no valgus laxity and the ADER test is negative, isolated ACLR is indicated. If there is significant medial laxity at 0°, this suggests combining sMCL and POL reconstruction with ACLR. Where the knee is stable at 0° but there is valgus laxity at 20° and a positive ADER test, the dMCL can be reconstructed using a gracilis graft or a combined sMCL and dMCL reconstruction can be added to the ACLR depending on the degree of laxity.

Patient Consent Disclosure Statement: The author(s) attests that consent has been obtained from any patient(s) appearing in this publication. If the individual may be identifiable, the author(s) has included a statement of release or other written form of approval from the patient(s) with this submission for publication.

Keywords: ACL; MCL; clinical examination; anterior drawer in external rotation; AMRI

VIDEO TRANSCRIPT

Here is the presentation of a new algorithm to treat chronic combined anterior cruciate ligament/medial collateral ligament (ACL/MCL) injuries: let us return to the “rotatory instability test.” My name is Nicolas Bouguennec. Thank you to my coauthors Thibault Marty Diloy, Philippe Colombet, Nicolas Gravelleau, and James Robinson.

First, our disclosure slide.

Combined MCL and ACL injuries occur frequently.⁹ While many MCL injuries can heal with conservative treatment, residual medial laxity is a risk factor for ACL graft rupture. For these chronic cases, it would seem prudent to address the MCL at the same time as the ACL surgery.⁷ However, there are still questions about the indications for treatment of the chronic cases. How much

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laxity is acceptable to treat conservatively? And what warrants surgery? Generally speaking, for grade 1 MCL injuries of Fetto and Marshall,⁴ nonsurgical treatment is indicated. For grade 3 laxity, meaning laxity in extension and at 20° of flexion, surgical reconstruction is indicated.⁵ However, for grade 2 patients—those who are “a little bit lax” at 20° of flexion—there is still debate about the treatment because indication for surgical treatment remains uncertain. Decision-making can be difficult as common medial reconstructions, such as the LaPrade and Lind reconstructions, are big surgeries and there is a risk of stiffness and medial pain. In addition, these reconstructions address the superficial MCL (sMCL) and posterior oblique ligament (POL) but not the deep MCL (dMCL).

Several biomechanical studies have shown that the key passive restraining structures on the medial side of the knee are sMCL, the dMCL, and the POL.^{1,8} The medial structures not only restrain valgus but also are important to restrain the rotation. Whilst the POL restrains internal rotation in the extended knee, combined ACL and MCL injuries can lead to an anteromedial rotatory instability, so-called AMRI. Studies have shown that both the dMCL and sMCL act to restrain external tibial rotation with some suggesting a more important role for the dMCL. Yet, AMRI is not routinely assessed by clinicians. In 2020, a classification of AMRI was proposed by Wierer et al,⁸ based on assessing both external rotation and anteromedial drawer. The anteromedial drawer test was described by Slocum and Larson⁶ in 1968. The test is best performed with the knee at 90° flexion with the foot held in 15° of external rotation. The anterior drawer in external rotation (ADER) test is positive if an anterior displacement of the tibia on the femur is noted in the described position.

For clarity, in this presentation, we are going to call this test the ADER test. Clinical examination remains the most reproducible method for assessing AMRI as instrumented devices are not useful. We do not use stress fluoroscopy for the diagnostic.

The objective of this presentation was to revisit the simple clinical examination of rotatory instability as described by Slocum and Larson in 1968 with a drawer test at 90° of flexion with the foot held in 15° of external rotation and to include that test systematically for ACL injuries because as we will see, AMRI can exist without any laxity in valgus. Based on the 2 consensus of Chahla et al in 2020, Guenther et al in 2021, and the Wierer classification, the purpose was to propose a new algorithm for the treatment of chronic combined MCL/ACL injuries based upon the assessment of AMRI with this test.

So we propose a new algorithm for the treatment of combined ACL/MCL based on the classification of AMRI instability.

When examining a patient planned for ACL surgery, if there is a valgus laxity in extension, this suggests that a reconstruction of the ACL and the MCL and the POL should be performed.

If there is no valgus laxity in extension, valgus should be assessed at 20° of flexion and AMRI should be assessed with the ADER test.

We can note that the Lachman test and the anterior drawer test are positive but no valgus laxity in extension, no valgus laxity at 20° of flexion, and no anterior drawer test in external rotation (ADER test).

If the ADER test and valgus laxity at 20° of flexion are negative, it is grade 0 of the modified Wierer classification. If the ADER test is positive but no valgus laxity at 20° of flexion, it is grade 1 of the modified Wierer classification. For these 2 grades, we would recommend an isolated ACL reconstruction (ACLR), with no requirement for MCL surgery.

If there is a positive ADER test with a slight laxity at 20° of flexion, this indicates grade 2 of modified Wierer classification with a dMCL lesion and minimal sMCL laxity, and for this, we would recommend that an isolated reconstruction of the dMCL should be performed with the ACLR.

If there is a positive ADER test without valgus laxity at 20° of flexion, we would recommend also an isolated reconstruction of the dMCL with the ACLR for some specific cases as professional players, especially for soccer.

If there is a significant laxity at 20° of flexion with a positive ADER test, the dMCL and sMCL should be reconstructed in addition to the ACLR. In this presentation, external dial test is not discussed. It is an additional test but does not change the grade in the Wierer classification. The following case example is a patient with grade 3 AMRI—with no valgus laxity at 0°, but with valgus laxity at 20° and a strongly positive ADER test.

Preoperatively, we recommend systematic assessment of the ACL with the Lachman and additionally the ADER test to evaluate combined ACL and MCL injury. The video shows a patient without any laxity in extension but with a valgus laxity at 20° of flexion and a positive ADER test. The pivot shift test should be done with caution in this case as it may be affected by the injured medial structures and misinterpreted. We have confirmation with the medial joint line opening.

Next is a case example of a patient with no valgus laxity at 20° of flexion but a positive ADER test.

We can note for this case of a professional player that the Lachman test is positive. There is no valgus laxity in extension or at 20° of flexion. The anterior drawer in neutral rotation and the ADER test are positive. The arthroscopic view of the medial compartment confirms no opening of the medial joint line. So it is an AMRI grade 1 but the specific case of a professional player and an isolated dMCL reconstruction could be proposed with the ACL.

The examination can be repeated after surgery following isolated dMCL and ACLR. Postoperative examination shows there is no laxity in valgus extension or at 20° of flexion, and the anterior drawer in neutral rotation and the ADER test are now negative.

For isolated dMCL reconstruction associated with an ACLR, a gracilis can be used percutaneously to reconstruct the dMCL.³ For dMCL + sMCL reconstruction, an anteromedial reconstruction using gracilis can be performed to control external rotation and can be combined with a flat sMCL reconstruction² to biomechanically best restore medial knee stability. In all MCL surgeries, the position of femoral insertion of the graft is critical. Therefore, radiograph should be used during the surgery to accurately

determine the landmark for insertion on the medial femoral condyle.

In summary, not all MCL injuries require surgical intervention when injured with the ACL for chronic cases. Therefore, more accurate evaluation of MCL injuries is necessary to determine between conservative or surgical treatment of the medial side. Clinical examination should include systematically an examination of a potential AMRI, especially with the ADER test ever described in 1968 by Slocum and Larson to evaluate dMCL and sMCL injuries. We propose a new algorithm based on a modified Wierer classification to help to decide when to do:

- No surgery of the MCL
- Or isolated dMCL reconstruction with ACLR
- Or sMCL + dMCL reconstruction with ACLR.

Here are the references.

Thank you very much.

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