

Do We Need Extra-Articular Reconstructive Surgery?

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KEYWORDS

- Anterolateral rotational instability • ALRI • ACL • Anterior cruciate ligament
- Lateral tenodeses • ALL • Anterolateral ligament

KEY POINTS

- Extra-articular anterolateral procedures have undergone a renaissance in combination with anterior cruciate ligament (ACL) reconstruction in selected cases.
- Biomechanical studies suggest that traditional lateral tenodeses are most efficient in restoring native knee kinematics in combined ACL and anterolateral injured knees.
- In optimizing technical details, such as graft path, tension, and angle of flexion at graft fixation, complications such as overconstraint can be avoided.
- There is a clear need for more high-level clinical evidence to support the routine use of lateral extra-articular procedures.

INTRODUCTION

Anterior cruciate ligament (ACL) tears are among the most common injuries in sports medicine, and although selected patients can function well with a nonoperative approach, surgical reconstruction is a mainstay in the treatment of these patients.^{1,2} The surgical techniques have been evolving since the early twentieth century, using different approaches to eliminate the hallmark “giving way” symptoms of an ACL-deficient knee.³

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Former generations of knee surgeons used extra-articular tenodeses, originally often in isolation, for ACL insufficiency. A variety of eponymous techniques, like the Loose sling, Müller, Lemaire, Andrews, and MacIntosh procedures, were found effective in stabilizing the knee at the time of surgery and were widely used.⁴⁻⁸ Clinical evaluations did, however, show variable outcomes and the tenodeses were suspected to cause lateral compartment osteoarthritis due to overconstraint.⁹⁻¹¹ With advance of reliable intra-articular ACL reconstruction, providing better clinical results and a less invasive approach, the use of extra-articular procedures declined and was continued in only a few centers and countries as an adjuvant procedure to modern intra-articular ACL reconstruction.¹²⁻¹⁴

Despite decades of research focusing on surgery for the ACL-deficient knee, there is still a significant failure rate after ACL reconstruction.^{15,16} Findings of persistent rotational instability are not uncommon and suggest an inability of the intra-articular graft to normalize knee kinematics.¹⁷⁻¹⁹ In response to this awareness, there has been a focus on optimizing the intra-articular graft function, such as in double-bundle ACL reconstruction, or changing graft tunnel positions. Recently, a renewed interest in anterolateral soft tissue structures, their clinical significance, and potential extra-articular procedures has provided a range of anatomic and biomechanical studies that give us new insights. The hope is to advance our understanding of anterolateral rotational instability (ALRI) and improve the results after surgery to avoid cases in which abnormal knee kinematics persist despite a technically well-done isolated intra-articular ACL reconstruction.

The aim of the current review was to make use of recent evidence, but keeping the historical perspective in mind, when discussing the rationale for applying extra-articular anterolateral procedures in combination with ACL reconstruction. Our intent is to display what is known on the topic, but also point out areas in which future investigation should provide us with new and currently unavailable knowledge.

WHY WERE EXTRA-ARTICULAR PROCEDURES LEFT BEHIND?

The extra-articular tenodeses were for many a mainstay in the treatment of ACL insufficiency from the late 1960s until the 1980s.^{3,9} Most techniques did use some sort of graft from the iliotibial band (ITB), either free or left attached to the Gerdy tubercle. Although all these procedures aimed at, and to a large extent succeeded in, controlling ALRI, the dawning era of arthroscopically assisted ACL reconstruction saw a decline in their popularity. At this time, in 1989, an American Orthopedic Society for Sports Medicine consensus meeting was held to enlighten the future place of lateral extra-articular reconstructions (ER) in addressing ACL insufficiency.¹¹ A selected expert panel of well-renowned knee surgeons discussed a series of statements in light of available biomechanical and clinical evidence. Uniform conclusions were that “*extra-articular procedures (ER) were biomechanically inferior to intra-articular reconstruction (IR)*” and that “*ER was unable to restore normal biomechanics in an ACL-injured knee.*” Regarding adjuvant use of ER with concomitant IR, little evidence was available. Interestingly, a common notion was that knee injuries leading to an ACL tear were understood to involve more than the intra-articular lesion (ie, anterolateral injuries) and that selected patients could benefit from a combined ER and IR approach. Although unanswered questions remained after the meeting, it did effectively end the era of extra-articular tenodeses in the United States. In European countries, such as the United Kingdom and France, a continued adjuvant use of the extra-articular procedures was thought to protect the intra-articular graft during healing, and has later provided us with important new knowledge on their effect.^{14,20,21}

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