

The anterior cruciate ligament is a main stabilizing structure of the knee joint, responsible for both anteroposterior and rotational stability. Its complete rupture leads to knee instability and is often associated with concomitant injuries to the menisci and articular cartilage. The standard treatment for such injuries is arthroscopic reconstruction, most commonly using a hamstring tendon autograft. Despite the effectiveness of this procedure, a group of patients experience graft failure, persistent instability, and an inability to return to pre-injury levels of physical activity. One of the primary causes of these failures is insufficient restoration of rotational stability, often due to damage to the anterolateral complex of the knee, particularly the anterolateral ligament. To improve clinical outcomes, it is increasingly common to perform concurrent reconstruction of the anterolateral ligament or a non-anatomic extra-articular lateral tenodesis during anterior cruciate ligament reconstruction. Both procedures aim to reduce rotational instability and demonstrate comparable biomechanical and clinical outcomes. The use of extra-articular lateral tenodesis may significantly reduce the forces acting on the anterior cruciate ligament graft and enhance its durability. The most frequently employed method of extra-articular lateral tenodesis is the modified Lemaire technique, which involves harvesting a strip of the iliotibial band, passing it under the lateral collateral ligament, and fixing it to the femur. The choice of specific technique depends on the surgeon's experience, as no significant differences in clinical outcomes have been observed among the available methods.

The study population consisted of patients aged 18 to 64 years with a complete anterior cruciate ligament rupture, knee joint instability, and pain, and expectations of returning to pre-injury levels of sports performance. These patients underwent either primary or revision arthroscopic anterior cruciate ligament reconstruction combined with extra-articular lateral tenodesis using a minimally invasive, modified technique with a self-punching all-suture anchor. Each patient underwent pre- and postoperative assessment using the KOOS, IKDC, Lysholm, and WOMAC scales. Additionally, postoperative clinical tests including Lachman, McMurray, pivot shift, anterior and posterior drawer tests, and ultrasound examinations were performed. Intra- and early postoperative complications were also recorded. Subsequently, a systematic review based on 29 out of 1027 analyzed studies was conducted according to PRISMA guidelines to evaluate the indications for extra-articular lateral tenodesis.

The study included 32 patients with a mean age of 35.7 years, 87.5% of whom were male. The mean follow-up duration was 234.5 days. Primary anterior cruciate ligament reconstruction with extra-articular lateral tenodesis was performed in 27 patients (84.4%), and revision surgery in 5 patients (15.6%). Intraoperatively, additional meniscal injuries were diagnosed in 20 patients (62.5%), and cartilage lesions of varying degrees in 7 patients (25%). Postoperative physical examination revealed a positive grade 1 pivot shift test in 4 patients (12.5%) and a positive grade 1 anterior drawer test in 1 patient (3.1%). Lachman, posterior drawer, and McMurray tests were negative. No intraoperative or early postoperative complications were observed with the applied technique of extra-articular lateral tenodesis. Moreover, clinical scores (KOOS, IKDC, Lysholm, and WOMAC) improved compared to preoperative assessments. Ultrasound examination identified the harvested iliotibial band graft in 31 patients (96.9%). The typical sonographic morphology of the iliotibial band graft was as follows: mean width of 5.0 mm, mean thickness of 4.6 mm, hyperechoic structure (87.1%), level of femoral location (58.1%), absence of surrounding fluid band (83.9%), and absence of Doppler signal (100%). A fluid band surrounding the graft negatively correlated with KOOS-symptoms scores ( $p=0.011$ ). No other morphological features demonstrated statistically significant correlations. The systematic review identified a total of 4041 participants across all included studies, with a mean age of 24.4 years. Twenty-one studies were retrospective and eight prospective. The levels of evidence were as follows: level 1 – 4 studies, level 3 – 13 studies, and level 4 – 12 studies. The most common indications for extra-articular lateral tenodesis were: participation in sports with a high risk of ACL injury (16 studies), meniscal injuries requiring repair (11 studies), and a positive grade 2 or 3 pivot shift test (11 studies).

The minimally invasive, modified extra-articular lateral tenodesis technique using a self-punching all-suture anchor, performed concurrently with arthroscopic anterior cruciate ligament reconstruction, is a safe method that reduces the risk of complications. This technique results in smaller surgical scars compared to traditional methods, and the self-punching all-suture anchor eliminates the need for additional surgical instruments for iliotibial band graft fixation to the femur. Ultrasound imaging is a valuable tool for identifying the iliotibial band graft used in extra-articular lateral tenodesis during simultaneous anterior cruciate ligament reconstruction. Sonographic identification and morphological assessment of the iliotibial band graft can serve as a quick method for evaluating the effectiveness of the surgical intervention. The most common indications for performing extra-articular lateral tenodesis during simultaneous arthroscopic anterior cruciate ligament reconstruction are:

participation in high-risk sports, meniscal injuries requiring repair, and a positive grade 2 or 3 pivot shift tes