




ALL Repair and Reconstruction: Techniques From the SANTI Study Group

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Background: Combining an anterior cruciate ligament (ACL) reconstruction with an anterolateral ligament (ALL) reconstruction results in significant advantages including reduced graft rupture rates, a lower risk of reoperation for secondary meniscectomy, improved knee stability, and higher rates of return to preinjury levels of sport.

Indications: The previously reported indications for combined ACL and ALL reconstruction are as follows: ACL reconstruction revision; high-grade pivot shift test; long-term ACL rupture; young patients; pivoting activities; concomitant medial meniscus repair, and, specifically, regarding the ALL repair, it must be an acute surgery (within 15 days from injury).

Technique Description: Several modern techniques have been described to repair and reconstruct the ALL. This technical note details a number of these techniques performed by the Scientific Anterior Cruciate Ligament Network International (SANTI) Study Group.

Results: First, we describe a combined ACL reconstruction and double-bundle ALL reconstruction using hamstring autograft. Secondly, we describe a single-bundle ALL reconstruction using gracilis autograft. Thirdly, we describe an ALL reconstruction technique using a knotless soft anchor, which provides shallow fixation and prevents tunnel convergence. Finally, we describe a technique for ALL repair.

Conclusion: Several techniques have been described to repair and reconstruct the ALL, all offering significant advantages over an isolated ACL reconstruction.

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: anterolateral ligament; anterolateral ligament reconstruction; lateral extra-articular procedure; anterior cruciate ligament; anterior cruciate ligament reconstruction

VIDEO TRANSCRIPT

This video presents the anterolateral ligament (ALL) Repair and Reconstruction Techniques from the Scientific Anterior Cruciate Ligament Network International (SANTI) Study Group.

Author disclosures are presented here and available online.

Indications for combining ALL reconstruction and repair to an anterior cruciate ligament (ACL) reconstruction are listed here:

- ACL revision
- High-grade pivot shift test

- Chronic ACL rupture
- Young patients
- Pivoting activities
- Concomitant medial meniscus repair
- Acute surgery (within 15 days from injury) for ALL repair

Specifically regarding ALL repair, it must be an acute surgery. The previously reported outcomes of combined ACL and ALL reconstruction are better ACL graft survivorship, lower rates of overall reoperation, and lower failure rates for medial meniscus repair.

Postoperative protocol consists of brace-free, immediate full weight bearing, and progressive range of motion exercises (with restriction of range of motion from 0° to 90° for 6 weeks for those patients who underwent meniscal repair). Early rehabilitation focused on maintaining full extension and quadriceps activation exercises. Return to sports is



allowed at 4 months for non-pivot sports, 6 months for pivot non-contact sports, and 9 months for pivot contact sports.

The indications are the same for all the ALL reconstruction techniques, and although the SANTI group shares the same philosophy, the decision to choose between these techniques is based on the surgeon's preference. The technique with independent ALL graft allows the surgeon more freedom regarding the technique for ACL reconstruction.

Firstly, we describe a combined ACL reconstruction and double-bundle ALL reconstruction.^{4,7,9,11} Appropriate landmarks are identified and marked including the joint line, Gerdy tubercle, fibular head, and lateral epicondyle. Three stab incisions are made in preparation for the ALL reconstruction. The first incision is made 1 cm distal to the joint line at the posterior aspect of Gerdy tubercle, and a second incision is made 2 cm posterior to this. The final incision is made proximal and posterior to the lateral epicondyle.

Using a 4.5-mm drill, two 15-mm sockets are created in the tibial incisions. An ALL jig is then used to connect these sockets, and a number 2 suture is looped through the tunnel to be used for ALL graft passage later in the procedure.

A femoral outside-in guide is positioned at the mid-anteromedial bundle position, and the bullet is positioned through the previously made incision, posterior and proximal to the lateral epicondyle. A guidewire is inserted followed by the appropriately sized reamer based upon graft size to create the femoral tunnel for the ACL. The tibial tunnel is then created in a standard fashion.

The previously prepared hamstring graft which is 3 parts semitendinosus and 1 part gracilis with an additional extension of the gracilis for the ALL is then passed through the tunnels using a passing suture. The graft is secured with interference screws. Attention is then turned to the ALL.

A suture grasper is used to pass the gracilis graft under the iliotibial band to the previously prepared posterior tibial stab incision. The prepared suture loop is then used to pass the graft through the tunnel to the anterior incision; then, it is passed under the iliotibial band to the femoral incision.

The graft is then secured to the suture ends of the ACL graft with appropriate tension in extension and neutral rotation.

Secondly, we describe a single-bundle ALL reconstruction.^{5,6} Appropriate landmarks including Gerdy tubercle and the lateral epicondyle are identified, and stab incisions

are made posterior to Gerdy tubercle and posterior and proximal to the lateral epicondyle.

The ACL graft is prepared in a similar fashion and secured to the femur using an interference screw. A guidewire is then inserted from the incision posterior to Gerdy tubercle to the graft harvest incision under direct vision. A full tunnel is created using a 5-mm drill.

The ALL graft is then passed under the iliotibial band to the stab incision on the tibia before being passed through the tunnel using the passing pin. A nitinol wire is then inserted, and the ALL graft is secured using an interference screw with appropriate tension in extension and neutral rotation.

Thirdly, we describe an ALL reconstruction technique using a knotless soft anchor, which provides shallow fixation and prevents tunnel convergence.^{3,10} Subsequent to establishment of the ACL tunnels, the scope is introduced through the anteromedial portal into the femoral tunnel and transillumination is used to aid in anchor placement. A 2.6-mm tunnel is drilled through the cannula posterior and proximal to the lateral epicondyle. The anchor is then inserted and impacted into the tunnel.

The previously prepared ACL graft is then passed and secured on the femoral side with a button and on the tibial side with an interference screw.

The ALL reconstruction is then performed using the previously harvested gracilis graft. The graft is folded in half, and the loop is secured on the femoral side using the fixation suture of the anchor. A second anchor is positioned posterior to Gerdy tubercle; then, the distal part of the graft is tightened and secured in full extension and neutral rotation.

Finally, we describe a technique for ALL repair.^{1,2,8} Firstly, we describe a case with fixation of a Segond fracture then a case with ALL repair only.

A hockey stick incision is made extending from Gerdy tubercle to the lateral epicondyle. An area of the iliotibial band which is more mobile is identified as it is likely the lesion is beneath this. The iliotibial band is incised longitudinally and mobilized from the underlying tissue planes. The iliotibial band insertion into Gerdy tubercle is stable, and a Segond fracture is identified in a deeper plane. The bony fragment is then released.

A 5.5-mm anchor is inserted at the level of the tibial plateau into the fracture, and its resistance is tested. High-strength sutures from the anchor are then passed into the avulsed anterolateral complex. The stability of the

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anterolateral complex is then tested, and the sutures secured. Reinforcement of the repair is performed using an absorbable suture.

As previous, a hockey stick incision is made, and the bruising within the iliotibial band is identified. The fascia is opened and released, and a complete ALL injury is found which is then released to its bony insertion. A suture is then inserted to ensure the ALL complex can be reduced and to test its tension. In this case, given the distal nature of the lesion and the tension that may be exerted on the sutures, bony fixation is performed with high strength sutures. A 5.5-mm anchor is placed at the level of Gerdy tubercle; then, the high strength sutures are passed into the avulsed ALL. The sutures from the anchor are secured first, followed by the previously positioned vicryl sutures.

In conclusion, several techniques have been described to repair and reconstruct the ALL, all offering significant advantages over an isolated ACL reconstruction.

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