



Clinical and Functional Outcome of All-Inside Anterior Cruciate Ligament Reconstruction at a Minimum of 2 Years' Follow-up

Mark Schurz, M.D., Thomas M. Tiefenboeck, M.D., Markus Winnisch, M.D., Stefanie Syre, M.D., Fabian Plachel, Gernot Steiner, Stefan Hajdu, M.D., and Marcus Hofbauer, M.D.

Purpose: To evaluate the clinical and functional outcomes for anatomic anterior cruciate ligament (ACL) reconstruction using the all-inside technique with a minimum follow-up of 24 months. **Methods:** Patients undergoing anatomic ACL reconstruction via the all-inside technique between January 2011 and October 2012 were reviewed for inclusion in this study. Functional outcome measures, including the Lysholm score, International Knee Documentation Committee score, visual analog scale score, and Tegner Activity Scale, were used to evaluate outcomes before surgery and at 3, 6, 12, and > 24 months. At final follow-up, anteroposterior knee stability was assessed with KT-2000 (MEDmetric, San Diego, CA) measurements. **Results:** Of the 92 patients who underwent primary all-inside ACL reconstruction, 79 patients returned to final follow-up with a minimum of 2 years. There were 53 men and 26 women with a mean age of 29 years (range, 18 to 54 years) and a mean follow-up of 29 months (range, 24 to 45 months). The International Knee Documentation Committee score (44.6 v 89.7, $P < .0001$), Lysholm score (53.4 v 93.1, $P < .001$), visual analog scale score (5 v 0.1, $P < .001$), and Tegner activity score (2 v 6, $P < .001$) showed a significant improvement between baseline and final clinical follow-up. The mean side-to-side KT-2000 difference at final follow-up was 1.7 mm (range; 0 to 6 mm). Overall 10 patients (12.7%) sustained an ACL graft rerupture after a mean of 17.6 months (range, 6.9 to 28.6 months). **Conclusions:** The current data support our first hypothesis that primary anatomic ACL reconstruction using the all-inside technique leads to improved functional outcomes between baseline and clinical follow-up at 24 months. Further, there was no difference in knee stability between the ACL reconstructed- and the contralateral normal knee at 24 months, which confirms our second hypothesis. **Level of Evidence:** Level IV, retrospective case series.

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Anterior cruciate ligament (ACL) reconstruction has evolved tremendously during the past decade primarily by focusing on anatomically ACL femoral tunnel placement to restore normal kinematics and post-operative function of the knee. The femoral tunnel traditionally has been created by a transtibial technique;

however, with the recent trend of anatomic ACL reconstruction, several authors have advocated independent femoral tunnel drilling using the anteromedial (AM) portal technique.¹⁻³ This technique, however, is associated with several potential pitfalls (e.g., socket blowout or difficulty visualizing the position of the guide when the knee is brought to the hyperflexion position).⁴

To avoid these pitfalls, the creation of the ACL femoral tunnel using an outside-in technique has been recommended by some authors.^{5,6} Because of technical improvements to this technique, a relatively new minimally invasive procedure of ACL reconstruction has been developed called the all-inside technique.⁷ Advantages of the all-inside ACL reconstruction technique are that (1) creating the ACL femoral socket is performed in the comfortable position of 90° of knee flexion; (2) it allows for independent anatomic femoral tunnel placement; and (3)

From the Department of Trauma Surgery, Medical University Vienna, Vienna, Austria

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Address correspondence to Marcus Hofbauer, M.D., Medical University Vienna, Department of Trauma Surgery, Waehringerguertel 18-20, 1090 Vienna, Austria. E-mail: marcus.hofbauer@meduniwien.ac.at

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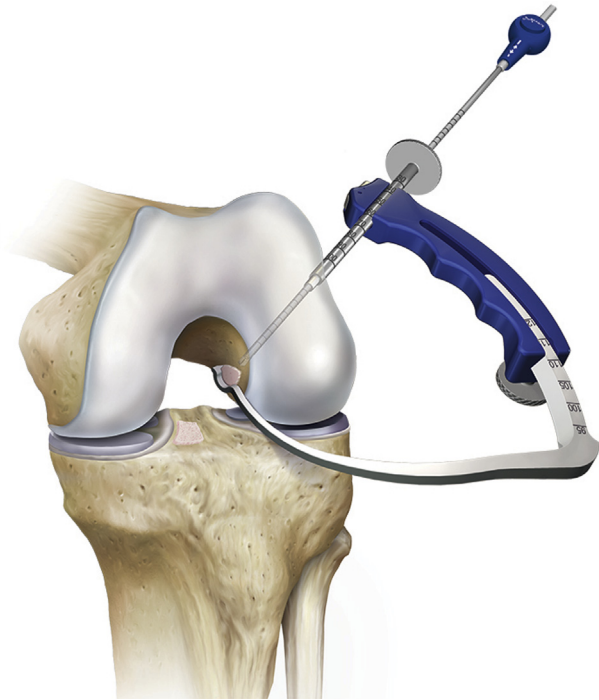


Fig 1. Retrograde drill (FlipCutter) and anterior cruciate ligament femoral guide with marking hook in a left knee. The guide is shown in the anterolateral portal position. Flipping a switch on the handle (top) of the FlipCutter will change the guide pin into a retrogradedrill to create the femoral socket.

it may result in a longer socket compared with the AM portal technique and is associated with reduced surgical invasion.^{5,8}

A recent clinical study has shown that the all-inside ACL reconstruction technique results in a lower visual analog scale (VAS) pain score compared with baseline⁹; however, few all-inside ACL reconstruction clinical outcome studies currently are available in the literature.⁹ The purpose of this study was to evaluate the clinical and functional outcomes for anatomic ACL reconstruction using the all-inside technique with a minimum follow-up of 24 months. First, we hypothesized that the functional outcome would increase between baseline and clinical follow-up at 24 months, and second, that there would be no difference in knee stability between the ACL reconstructed- and the contralateral normal knee.

Methods

After we obtained approval by the local ethics committee and patient informed consent, a retrospective analysis of prospectively collected data was performed of patients who underwent primary anatomically ACL reconstruction using the all-inside technique from January 2011 to October 2012 at a single institution, performed by one experienced sports medicine orthopaedic-trauma surgeon (M.S.) or under his guidance. The inclusion criteria were as follows: (1) single-bundle (SB) ACL reconstruction

using the all-inside technique and (2) minimum of 2 year of clinical follow-up. Exclusion criteria were as follows: (1) age younger than 18 years; (2) revision cases; (3) multiple ligament injuries; (4) chondral lesions greater than grade 2 according to the Outerbridge classification¹⁰; (5) additional injuries to the collateral ligaments greater than grade 2 and history of a contralateral ACL injury. Patients younger than 18 years of age were excluded because of the potential of iatrogenic physeal damage. Although the all-inside procedure allows for physeal sparing ACL reconstruction in skeletally immature patients, the authors decided to exclude this specific patient population for this analysis.

Surgical Technique

The anatomic all-inside ACL reconstruction technique has been described extensively in a previous technical-note paper.¹¹ This is a brief overview of the most crucial surgical steps: The semitendinosus tendon was harvested through a small incision over the pes anserinus. The tendon was loaded onto 2 adjustable suspensory devices

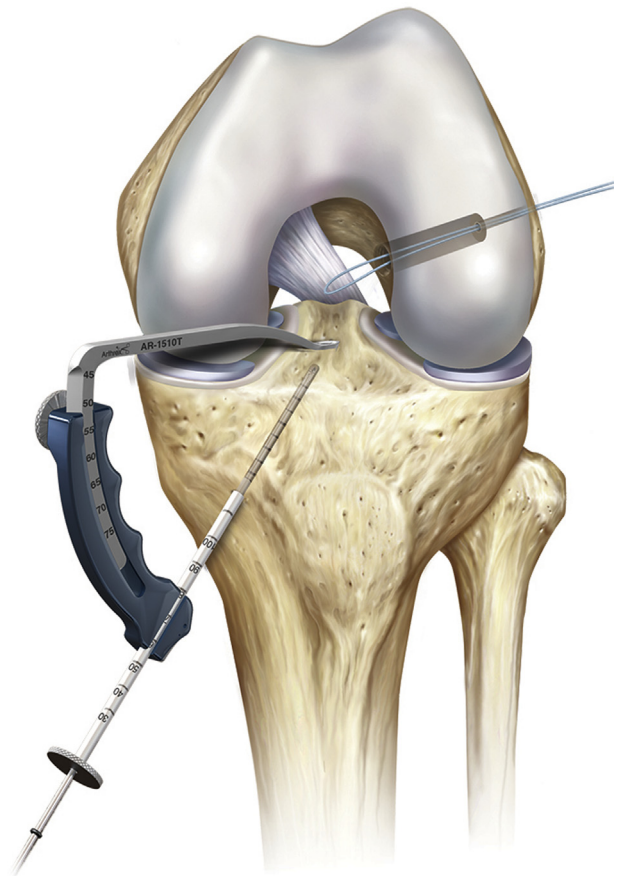


Fig 2. Second-generation retrograde drill (FlipCutter) and anterior cruciate ligament tibial guide with marking hook in a left knee. The guide is shown in the anteromedial portal position. Flipping a switch on the handle (top) of the FlipCutter will change the guide pin into a retrogradedrill to create the tibial socket.

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