

Editorial Commentary: Combined Anterior Cruciate Ligament Reconstruction and Medial Meniscal Transplantation Improve Functional Outcomes When Properly Indicated



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Abstract: The anterior cruciate ligament (ACL) and medial meniscus both contribute to anteroposterior translation of the tibia. Biomechanical studies have found increased translation at both 30° and 90° when transecting the posterior horn of the medial meniscus, and clinically, medial meniscal deficiency has been shown to have a 46% increase in ACL graft strain at 90°. Medial meniscal deficiency is a risk factor for failure after ACL reconstruction, with a hazard ratio of 15.1. The combination of meniscal allograft transplantation and ACL reconstruction is technically demanding but results in mid- to long-term clinical improvement in well-indicated patients. Patients with medial meniscal deficiency and failed ACL reconstruction or with ACL deficiency and medial-sided knee pain due to meniscal deficiency are candidates for combined procedures. On the basis of our experience, acute meniscal injury is not an indication for primary meniscal transplantation in any setting. Surgeons should repair the meniscus if reparable or perform partial meniscectomy and see how the patient responds. There is insufficient evidence to show that early meniscal transplantation will be chondroprotective. We reserve this procedure for the indications previously described. Severe osteoarthritis (Kellgren-Lawrence grades III and IV) and Outerbridge grade IV focal chondral defects of the tibiofemoral compartment that are not amenable to cartilage repair are absolute contraindications to the combined procedure.

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Studies have shown that medial meniscal deficiency can exacerbate anteroposterior translation in an anterior cruciate ligament (ACL)-deficient knee. Biomechanical studies have found increased translation at both 30° and 90° when transecting the posterior horn of the medial meniscus.¹ Clinically, partial medial meniscectomy has been shown to be associated with increased tibial translation after ACL reconstruction, whereas meniscal deficiency has been shown to have a 46% increase in graft strain at 90°.² Medial meniscal deficiency is a significant risk factor for failure after ACL reconstruction, with a hazard ratio of 15.1, and is

associated with poor clinical outcomes and greater secondary knee osteoarthritis.³ In addition, studies have shown that meniscal allograft transplantation (MAT) can restore ACL strain, decrease tibial translation, and lower tibiofemoral contact pressure.⁴ Therefore, combined medial meniscal transplantation and ACL reconstruction should be considered to restore proper kinematic relations in the knee.

In their article, “Combined Meniscal Allograft Transplantation and Anterior Cruciate Ligament Reconstruction Show Good 2- to 14-Year Outcomes: A Systematic Review,” Shun, Tan, Chua, Yeo, and Bin Abd Razak⁵ reviewed all existing literature on outcomes after combined procedures. Their pooled cohort consisted of 6 studies and 363 patients. The average follow-up period was 4 years, with the longest study having a follow-up period of 14 years. The studies reported significant improvements in Lysholm and Tegner activity scores, with most studies also reporting improvements in International Knee Documentation Committee (IKDC) scores. Shun et al.⁵ concluded that

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combined MAT–ACL reconstruction is the optimal choice for patients with ACL injury and an irreparable meniscus.

In our opinion, indications are key for this topic, and these were not adequately distinguished in this article. Shun et al.⁵ draw the conclusion that combined ACL reconstruction and MAT should be performed in patients with ACL deficiency and an “irreparable meniscus.” This could imply that if a meniscus was found to be irreparable intraoperatively in an otherwise primary ACL tear setting, the authors would recommend proceeding with the meniscal transplantation. Therefore, we would like to offer some clarity on what types of patients are best suited for this combined procedure. We believe there are 2 scenarios in which this combined operation is indicated. The first scenario is a patient with medial meniscal deficiency in whom this deficiency is believed to be contributing to failure of a prior ACL reconstruction. Typically, such a patient will have undergone subtotal meniscectomy during the primary ACL reconstruction procedure, and over time, the increased tibial translation and strain on the graft lead to loosening. Therefore, restoring the meniscus to prevent revision ACL graft failure is crucial. The second scenario is in a patient who has medial-sided knee pain due to meniscal deficiency and also presents with ACL deficiency (primary or previously reconstructed ACL). Restoring the meniscus in this setting depends on whether pain relief is a concomitant patient goal. On the basis of our experience, an acute meniscal injury is not an indication for primary meniscal transplantation in any setting. Surgeons should either repair the meniscus if reparable or perform partial meniscectomy and see how the patient responds. Meniscal transplantation leads to “meniscal-dependent patients” whereby they need to consider respecting the transplant owing to concerns for unintentional sport-specific injury to the transplanted tissue. There is insufficient evidence to show that early meniscal transplantation will be chondroprotective. We generally reserve this procedure for the indications previously described.

Shun et al.⁵ also discussed a staged approach versus a single-stage approach for the combined procedure. We believe if the surgeon selects the correct patient as discussed earlier, then a combined procedure is safe, albeit technically challenging, and allows a shorter total rehabilitation time for the patient. Early motion rehabilitation will help with recovery and prevent stiffness and arthrofibrosis. In addition, it is key to identify

whether patients have concomitant cartilage defects or malalignment that needs to be addressed.⁶ If cartilage defects are not addressed during MAT, the clinical efficacy of treating these injuries alone may be compromised.⁷ It is important to note that severe osteoarthritis (Kellgren-Lawrence grades III and IV) and Outerbridge grade IV focal chondral defects of the tibiofemoral compartment that are not amenable to cartilage repair would be absolute contraindications to the combined procedure.

In conclusion, combined ACL reconstruction and MAT can significantly improve patients’ clinical outcomes in the mid to long term. Although complex and technically challenging, this procedure should be strongly considered in properly indicated patients. It is our opinion that early MAT indicated at the time of ACL reconstruction and meniscectomy is not a common indication for this procedure.

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