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Cochrane in **CORR**®: Double-bundle Versus Single-bundle Reconstruction for Anterior Cruciate Ligament Rupture in Adults (Review)

Raman Mundi MD, Mohit Bhandari MD, PhD, FRCSC

Importance of the Topic

Anterior cruciate ligament (ACL) injuries most commonly occur in young, active patients, with an annual incidence of more than 200,000 in the United States alone [8, 11, 13]. Approximately 65% of these patients undergo ACL reconstruction, but there is ongoing debate about the most appropriate techniques [6]. Earlier studies have explored the

importance of tunnel placement, graft selection, graft fixation, and rehabilitation protocols, but recent attention has focused on the role of double-bundle reconstruction [2]. The native ACL consists of two discrete antero-medial and posterolateral bundles, which respectively account for translational and rotational stability [9, 10, 13]. Double-bundle ACL reconstruction involves reconstructing each of these bundles separately and is

purported to more closely restore native knee anatomy and biomechanics. However, double-bundle ACL reconstructions are more technically demanding than conventional single-bundle techniques, they require greater operative time, and are more difficult to revise when they fail [10].

Multiple randomized controlled trials have been recently performed to evaluate whether double-bundle ACL reconstruction is superior to single-bundle

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(<http://www.thecochranelibrary.com>) should be consulted for the most recent version of the review.

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R. Mundi MD, M. Bhandari MD, PhD, FRCSC
Division of Orthopaedics, Department of Surgery, McMaster University, Hamilton, ON, Canada

R. Mundi MD (✉)
Center for Evidence-Based Orthopaedics, 293 Wellington Street North, Suite 110, Hamilton, ON L8L 8E7, Canada
e-mail: raman.mundi@medportal.ca

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reconstruction. In this meta-analysis of seventeen randomized and quasi-randomized trials ($n = 1433$), there were no differences between the two techniques for functional outcomes at long-term followup (5 years) or for total adverse events. However, the double-bundle technique resulted in superior knee stability and higher rates of return to preinjury levels of activity, and it was associated with a lower rate of new meniscal tears and repeat ACL injuries [13].

Upon Closer Inspection

Methodological flaws in each of the included trials limit the results of this meta-analysis. Only four of the randomized controlled trials reported satisfactory methods of randomization, and none reported appropriate methods for allocation concealment. Allocation concealment means that the intervention to which each patient will be assigned remains unknown prior to enrollment [3], and it serves to protect the randomization process and prevent selection bias. It can sometimes be achieved through the use of sequentially numbered and sealed opaque envelopes, but the best method is to use a centralized independent randomization system such as a call-in center or a web-based program.

In randomized controlled trials of surgical therapies, disparities in the expertise with which the competing interventions are performed can lead to “differential expertise bias” [12]. In this meta-analysis, an imbalance in skill level could have led to an underestimation of double-bundle ACL reconstruction’s effectiveness if surgeons who were not proficient with this technique performed some of the procedures. Fifteen of the trials described that an experienced surgeon or multiple senior surgeons performed all of the procedures, but they did not clarify whether their expertise in the double-bundle technique matched their expertise in the single-bundle technique. A minimum caseload of 60 ACL reconstructions has been suggested as necessary to minimize the risk of patients requiring revision ACL surgery [2].

Take-Home Messages

There have been nine meta-analyses published on this topic since 2008, and Mascarenhas et al. [7] identified that this meta-analysis was one of only three that provided high-quality evidence [5, 13, 14]. In each of these three, the double-bundle technique achieved better anteroposterior and rotational knee stability according to the KT-1000 Arthrometer and the pivot shift test, but

it was similar to single-bundle techniques for functional outcomes (Lysholm, Tegner, IKDC) [7].

Despite these advantages, double-bundle ACL reconstruction remains uncommonly used in clinical practice [1, 4]. In a recent survey of team surgeons in professional and college football, only one out of 137 surgeons preferred double-bundle reconstruction [4], and only 3% of more than 16,000 ACL procedures in the Swedish National ACL Register were double-bundle reconstructions [1]. There may be merit to double-bundle ACL reconstruction among those surgeons who are highly skilled in its technique, but a paradigm shift in practice patterns will likely require high-quality evidence that favors double-bundle ACL reconstruction for long-term functional outcomes and the prevention of degenerative changes [2].

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