Reply to the Letter to the Editor

Reply to the Letter to the Editor: Does Combined Intra- and Extraarticular ACL Reconstruction Improve Function and Stability? A Meta-analysis

Fernando Cury Rezende MD, Vinicius Ynoe de Moraes MD, Marcus Vinícius Luzo PhD, Carlos Eduardo da Silveira Franciozi MD, João Carlos Belloti PhD

We would like to thank Dr. Tashman for his interest in our article, and for raising interesting questions concerning the combined ACL reconstruction technique.

Regarding the potentially damaging increased forces on cartilage, it is impossible to confirm the association of an additional extraarticular proce-

dures with osteoarthritis (OA) with the present data. There are studies addressing both this correlation and its absence [4, 6]. A long-term study correlated the OA with medial meniscectomy, but not with the additional extraarticular procedure. There was no associated lateral OA, and the medial OA was related to medial meniscectomy in a study including 54 patients with 11 years followup [4]. Nevertheless, studies correlating the extraarticular procedure with OA of the lateral compartment [6] can also be found. Therefore, we agree that this topic requires further clarification regarding biomechanical aspects to elucidate whether the addition of the extraarticular procedure contributes to an overconstrained knee.

The assessment of different extraarticular techniques, and their varying degrees of rotation for graft fixation, are needed in order to determine if there is any overtightening in internal rotation. Due to the evolution of these graft procedures, randomized clinical studies examining the current techniques are also needed. However, the present meta-analysis did not find an association of OA with the addition of an extraarticular procedure at 2 to 7 years followup (Fig. 1). Even so, we do agree that longer-term followup studies are needed; confounding factors such as meniscal and chondral lesions should be excluded in order to determine the extent of overconstraining the joint after combined ACL reconstruction.

As mentioned, further studies are necessary to determine the possible clinical benefits of extraarticular procedures when performing ACL reconstructions. However, the important finding of reduced laxity added by the combined extraarticular procedure leads to the current question: What are the most-appropriate indications for an

(RE: Rezende FC, de Moraes VY, Martimbianco AL, Luzo MV, da Silveira Franciozi CE, Belloti JC. Does Combined Intra- and Extraarticular ACL Reconstruction Improve Function and Stability? A Meta-analysis. *Clin Orthop Relat Res*. 2015; 473:2609–2618).

Each author certifies that he or she has no commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.

All ICMJE Conflict of Interest Forms for authors and *Clinical Orthopaedics and Related Research*® editors and board members are on file with the publication and can be viewed on request.

The opinions expressed are those of the writers, and do not reflect the opinion or policy of *CORR*® or The Association of Bone and Joint Surgeons®.

F. C. Rezende MD (✉), V. Y. de Moraes MD, M. V. Luzo PhD, C. E. da Silveira Franciozi MD, J. C. Belloti PhD
Department of Orthopedics and Traumatology, Federal University of São Paulo, Borges Lagoa Street 783, Sao Paulo, SP 04038-032, Brazil
e-mail: rezendefernando@hotmail.com

Reply to the Letter to the Editor

Fig. 1 Degenerative changes after ACL reconstruction are shown. The forest plots show that these rates did not differ significantly between patients who underwent intraarticular ACL reconstruction only and those who underwent combined intra and extraarticular ACL reconstruction in a 2 to 7 years followup.

additional extraarticular procedure? Certainly it is not indicated for all ACL lesions, but it has its place in some situations. Identifying those indications should be the motivation for adding an additional procedure that might indeed further constrain AP laxity and internal rotation. As suggested by Dr. Baumfeld [2], further randomized trials comparing current anatomic ACL reconstruction techniques with and without an anterolateral ligament reconstruction are required to determine whether the procedure is worthwhile, in light of its added surgical time and risk. Perhaps the best way to reconcile Dr. Baumfeld's call for randomized trials with Dr. Tashman's concerns about extra-articular procedures would be to focus on his idea that extra-articular procedures should not be used "routinely," to identify those knees that might

really benefit from the additional procedure, and then to compare anatomic ACL reconstructions with extra-articular procedures in only these situations. Based on our meta-analysis and recent relevant work [7–9], we believe those indications might include in knees at particular risk for failure, perhaps those with a Grade 3 pivot shift, those with chronic ACL lesions, and those presenting with a positive pivot shift after ACL reconstruction and undergoing revision as supported by recent studies. Additional indications could include (with some discretion and discussion needed in each case) high-level athletes, athletes who participate in pivoting sports, knees with a lateral femoral notch sign, those presenting with a Second fracture, and revision procedures using intraarticular allograft material [5, 7–9]. We believe that extraarticular

additional procedures are only used in specific situations, rather than routinely.

We believe that ACL lesions and relesions, due to their great myriad of clinical presentations, should not be treated with standard isolated intraarticular reconstruction for every case. But our present data do not show any clear association between the combined procedure and the development of OA at followup of 1 to 7 years.

References

1. Acquitter Y, Hulet C, Locker B, Delbarre JC, Jambou S, Vielpeau C. [Patellar tendon-bone autograft reconstruction of the anterior cruciate ligament for advanced-stage chronic anterior laxity: is an extra-articular plasty necessary? A prospective randomized study of 100 patients with five-year follow-up] [In

Reply to the Letter to the Editor

- French]. *Rev Chir Orthop Reparatrice Appar Mot.* 2003;89:413–422.
2. Baumfeld J. *CORR Insights*[®]: Does combined intra- and extraarticular ACL reconstruction improve function and stability? A meta-analysis. *Clin Orthop Relat Res.* 2015;473:2619–2620.
 3. Goertzen M, Schulitz KP. [Isolated intraarticular plasty of the semitendinosus or combined intra- and extra-articular plasty in chronic anterior laxity of the knee] [In French]. *Rev Chir Orthop Reparatrice Appar Mot.* 1994;80:113–117.
 4. Marcacci M, Zaffagnini S, Giordano G, Iacono F, Presti ML. Anterior cruciate ligament reconstruction associated with extra-articular tenodesis: A prospective clinical and radiographic evaluation with 10- to 13-year follow-up. *Am J Sports Med.* 2009;37:707–714.
 5. Mascarenhas R, McConkey MO, Forsythe B, Harner CD. Revision anterior cruciate ligament reconstruction with bone-patellar tendon-bone allograft and extra-articular iliotibial band tenodesis. *Am J Orthop (Belle Mead NJ).* 2015;44:E89–93.
 6. O'Brien SJ, Warren RF, Wickiewicz TL, Rawlins BA, Allen AA, Panariello Rand A, Kelly AM. The iliotibial band lateral sling procedure and its effect on the results of anterior cruciate ligament reconstruction. *Am J Sports Med.* 1991;19:21–25.
 7. Rasmussen MT, Nitri M, Williams BT, Moulton SG, Cruz RS, Dornan GJ, Goldsmith MT, LaPrade RF. An in vitro robotic assessment of the anterolateral ligament, Part 1: Secondary role of the anterolateral ligament in the setting of an anterior cruciate ligament injury. [Published online ahead of print December 18, 2015]. *Am J Sports Med.* DOI: [10.1177/0363546515618387](https://doi.org/10.1177/0363546515618387).
 8. Sonnery-Cottet B, Thaumat M, Freychet B, Pupim BH, Murphy CG, Claes S. Outcome of a combined anterior cruciate ligament and anterolateral ligament reconstruction technique with a minimum 2-year follow-up. *Am J Sports Med.* 2015;43:1598–1605.
 9. Trojani C, Beaufils P, Burdin G, Busière C, Chassaing V, Djian P, Dubrana F, Ehkirch FP, Franceschi JP, Hulet C, Jouve F, Potel JF, Sbihi A, Neyret P, Colombet P. Revision ACL reconstruction: Influence of a lateral tenodesis. *Knee Surg Sports Traumatol Arthrosc.* 2015;20:1565–1570.
 10. Zaffagnini S, Marcacci M, Lo Presti M, Giordano G, Iacono F, Neri MP. Prospective and randomized evaluation of ACL reconstruction with three techniques: a clinical and radiographic evaluation at 5 years follow-up. *Knee Surg Sports Traumatol Arthrosc.* 2006;14:1060–1069.