*PICO: In middle-aged individuals status post anterior cruciate ligament reconstruction (ACL-R), does an allograft or autograft lead to better return to premorbid activity levels?*

Anterior cruciate ligament (ACL) ruptures are one of the most common injuries in active and athletic populations.1-3 While operative management has been considered standard for younger populations, treatment for older individuals with ACL-deficient knees has been controversial.2,5-7 Middle-aged individuals are staying active and becoming increasingly unwilling to compromise or modify their activity levels after sustaining an ACL injury.5,8 Early surgical stabilization is recommended to restore knee joint function. Both autograft and allograft tissues have distinct advantages and disadvantages. Briefly, autograft tissue has advantages of no risk of disease transmission and faster incorporation and healing11; disadvantages include donor site morbidity11 and unpredictability in graft sizes and quality.9 Allograft tissue has advantages of absence of donor site morbidity and greater availability and predictability of graft sizes11; disadvantages include risk of disease transmission, delayed incorporation time, and variability in mechanical strength due to secondary sterilization techniques.10 Thus, it is important to know the surgical options available and how this might impact the ability to return to desired activity levels.

Joint laxity is a common objective measurement taken after ACL-R, with frequent use of Lachman testing or KT-1000 arthrometer measurements. Barrett et al. and Gorschewsky et al. directly compared middle-aged autograft and allograft groups in their studies.2,15 Both sets of authors reported more laxity in their allograft group, with significance only being reached in the latter study.15 The investigators stated allograft tissue takes longer to incorporate into the body than does autograft tissue2, but Gorschewsky et al. observed significant re-rupture rates in their allograft group, hypothetically due to employment of a particular sterilization technique.15 Other studies did not find significant laxity differences when comparing auto- or allograft groups to younger patients with the same surgical tissue.7,8,16,17 Conclusively, it appears allograft tissue has the propensity for delayed incorporation, which may result in increased laxity in the ACL-R of middle-aged individuals. More direct comparison studies between allograft and autograft ACL-R in this population are needed to ascertain this statement.

When examining selected outcome measures and return to activity across studies, an assortment of measures are used including the Lysholm Knee Scoring Scale, Tegner Activity Scale, and International Knee Documentation Committee evaluation form (IKDC). Barrett et al. found no significant differences between groups in postoperative Lysholm or Tegner scores at each follow-up, and IKDC scores showed 88% and 84% of the allo- and autograft group returned to normal levels of activity, respectively.2 Across other studies, return to normal knee function and previous levels of activity was noted regardless of graft selection.7,16 A small percentage of subjects reported a reduction in their activity level, opting to participate in safer, lower level activities postoperatively.16 Other authors have compared autograft and allograft tissue between middle-aged and younger patients, ultimately finding comparable results in subjective and objective function.5,8,17

The present review of evidence cannot detect a superior graft choice; both seem to restore adequate function and joint stability in the middle-aged population. Additionally, operative treatment proves better than nonoperative treatment in restoring stability and function and is comparable to results in younger patients. However, the delayed incorporation of allograft tissue and the general decreased healing ability of middle-aged individuals can prolong recovery time. Although this review was a comparison of surgical interventions, PTs need to be aware of graft choice and how the ligamentization process may impact rehab, recovery time, and return to premorbid activity levels.References:

1. Escamilla RF, Macleod TD, Wilk KE, Paulos L, Andrews JR. Anterior cruciate ligament strain and tensile forces for weight-bearing and non-weight-bearing exercises: a guide to exercise selection. J Orthop Sports Phys Ther. 2012;42(3):208-20.
2. Barrett G, Stokes D, White M. Anterior cruciate ligament reconstruction in patients older than 40 years: allograft versus autograft patellar tendon. Am J Sports Med. 2005;33(10):1505-12.
3. Lewek MD, Chmielewski TL, Risberg MA, Snyder-Mackler L. Dynamic knee stability after anterior cruciate ligament rupture. Exerc Sport Sci Rev. 2003;31(4):195-200.
4. Poehling GG, Curl WW, Lee CA, Ginn TA, Rushing JT, Naughton MJ, Holden MB, Martin DF, Smith BP. Analysis of outcomes of anterior cruciate ligament repair with 5-year follow-up: allograft versus autograft. Arthroscopy. 2005;21:774-85.
5. Blyth MJ, Gosal HS, Peake WM, Bartlett RJ. Anterior cruciate ligament reconstruction in patients over the age of 50 years: 2- to 8-year follow-up. Knee Surg Sports Traumatol Arthrosc. 2003;11(4):204–211.
6. Carey JL, Dunn WR, Dahm DL, Zeger SL, Spindler KP. A systematic review of anterior cruciate ligament reconstruction with autograft compared with allograft. J Bone Joint Surg Am. 2009;91(9):2242-50.
7. Plancher KD, Steadman JR, Briggs KK, Hutton KS. Reconstruction of the anterior cruciate ligament in patients who are at least 40 years old: A long-term follow-up and outcome study. J Bone Joint Surg Am. 1998;80(2):184-97.
8. Barber FA, Aziz-Jacobo J, Oro FB. Anterior cruciate ligament reconstruction using patellar tendon allograft: an age-dependent outcome evaluation. Arthroscopy. 2010;26(4):488-93.
9. Baer GS, Harner CD. Clinical Outcomes of Allograft Versus Autograft in Anterior Cruciate Ligament Reconstruction. Clinical Journal of Sports Medicine. 2007; 26(4):661-681.
10. Cohen SB, Sekiya JK. Allograft Safety in Anterior Cruciate Ligament Reconstruction. Clinical Journal of Sports Medicine. 2007; 26(4):597-605.
11. Vyas D, Rabuck SJ, Harner CD. Allograft anterior cruciate ligament reconstruction: indications, techniques, and outcomes. J Orthop Sports Phys Ther. 2012;42(3):196-207.
12. Gross M. Effects of aging on musculoskeletal system. [Voicethread]. University of North Carolina at Chapel Hill: Division of Physical Therapy; 2012.
13. Gulotta LV, Rodeo SA. Biology of autograft and allograft healing in anterior cruciate ligament reconstruction. Clin Sports Med. 2007;26(4):509-24.
14. Ozenci AM, Inanmaz E, Ozcanli H, et al. Proprioceptive comparison of allograft and autograft anterior cruciate ligament reconstructions. Knee Surg Sports Traumatol Arthrosc. 2007;15(12):1432-7.
15. Gorschewsky O, Klakow A, Riechert K, Pitzl M, Becker R. Clinical comparison of the Tutoplast allograft and autologous patellar tendon (bone-patellar tendon-bone) for the reconstruction of the anterior cruciate ligament: 2- and 6-year results. Am J Sports Med. 2005;33(8):1202-9.
16. Kuechle DK, Pearson SE, Beach WR, Freeman EL, Pawlowski DF, Whipple TL, Caspari-Dagger RB, Meyers JF. Allograft anterior cruciate ligament reconstruction in patients over 40 years of age. Arthroscopy. 2002;18(8):845-53.
17. Brandsson S, Kartus J, Larsson J, Eriksson BI, Karisson J. A comparison of results in middle-aged and young patients after anterior cruciate ligament reconstruction. Arthroscopy. 2000;16(2):178-82.
18. Higgins LD, Taylor MK, Park D, Ghodadra N, Marchant M, Pietrobon R, Cook C. Reliability and validity of the International Knee Documentation Committee (IKDC) Subjective Knee Form. J Bone Spine. 2007;74(6):594-9.
19. Briggs KK, Lysholm J, Tegner Y, Rodkey WG, Kocher MS, Steadman JR. The reliability, validity, and responsiveness of the Lysholm score and Tegner activity scale for anterior cruciate ligament injuries of the knee: 25 years later. Am J Sports Med. 2009;37(5):890-7.
20. Cohen SB, Yucha DT, Ciccotti MC, Goldstein DT, Ciccotti MA, Ciccotti MG. Factors affecting patient selection of graft type in anterior cruciate ligament reconstruction. Arthroscopy. 2009;25(9):1006-10.