

# Editorial Commentary: Medial and Lateral Meniscus Allografts Using Bone Plug Fixation in Patients Without Advanced Arthritis Have 80% Positive Outcomes at 10 Years



Thomas Carter, M.D.

**Abstract:** Meniscal allograft transplantation (MAT) for symptomatic knees after meniscectomy decreases pain and often improves function, but it does not replicate a normal meniscus. The ability of MAT to delay arthritic changes is an ongoing area of study, and it is known that outcomes and graft survivorship deteriorate with longer follow-up. Recommended indications are symptomatic patients after meniscectomy with mild (or at most moderate) degenerative changes and absence of (or surgically corrected) associated malalignment or ligament deficiency. When these indications are followed, 80% of patients improve, with survivorship of 83% at 10 years and 56.2% at 20 years. Medial or lateral MAT shows no difference with respect to graft survivorship or patient-reported outcome measures. Meniscus allografts fixed with bone have less graft extrusion than soft tissue fixation alone. While MAT can be beneficial in an arthritic knee in the short term, the survivorship in knees with advanced arthritis is much smaller, with an extensive rehabilitation requirement, and there is a limited supply of meniscal allograft tissue.

See related article on page 3061

Isolated meniscal allograft transplantation (MAT) began in the mid-1980s and was considered by many as experimental—a salvage procedure before knee replacement.<sup>1,2</sup> The procedure has evolved significantly and is now considered acceptable, with insurance companies commonly giving authorization (within strict parameters).<sup>3</sup> The general indications are typically stated as a symptomatic patient after meniscectomy with mild to at most moderate degenerative changes and associated pathology, such as malalignment or ligament deficiency, that can be corrected.<sup>4</sup>

Indications and surgical technique for MAT continue to undergo debate, with extensive studies ongoing. One topic is whether medial or lateral meniscal allografts have better results. The purpose often stated is to have additional information available as a prognostic

indicator. In the article “Medial and Lateral Meniscus Allograft Transplantation Showed No Difference With Respect to Graft Survivorship and Clinical Outcomes: A Comparative Analysis With a Minimum 2-Year Follow-Up” by Kim, Bin, Kim, Lee, Song, Park, and Lee,<sup>5</sup> the authors sought to further answer this question. They made a very thorough and extensive study of a large study group of 299 knees with 249 lateral (LMAT) and 50 medial (MMAT) meniscal allograft transplantations. The number of LMATs alone is possibly the largest series reported. They evaluated what they described as clinical and graft failure, with the parameters well defined in their paper. Their conclusion was that “no significant differences in clinical survivorship, graft survivorship, and [patient-reported outcome measures] were found between LMAT and MMAT groups.”

The authors are to be congratulated on such an extensive study, but a few items of interest are raised upon looking at the paper in more detail. Although the authors followed the accepted inclusion parameters of symptomatic patients and pathology that can be corrected, a significant number of patients had high-grade arthritic changes. They divided the degree of degenerative changes into ideal (International Cartilage Repair Society [ICRS]  $\leq 2$ ) or relative (ICRS 3 or 4) on either

Banner University of Arizona

The author reports the following potential conflicts of interest or sources of funding: T.C. reports personal fees, Arthrex, Active Implants, Moximed; patent, Arthrex. Full ICMJE author disclosure forms are available for this article online, as [supplementary material](#).

© 2020 by the Arthroscopy Association of North America  
0749-8063/201630/\$36.00

<https://doi.org/10.1016/j.arthro.2020.09.050>

the femoral or tibial side, and salvage as high grade on both sides. They reported that cartilage status was associated with the risk of failure, but none in the salvage group or in the entire series went on to arthroplasty.

Another study at the authors' institution, using the same cartilage group classification, reported on 222 patients with an estimated 5-year cumulative graft survival rate of ideal, 93.8%; relative, 90.9%; and salvage, 62.2%.<sup>6</sup> Their conclusion was that "MAT was an effective symptomatic treatment in knees with advanced bipolar chondral lesions."

Although MAT can be beneficial in arthritic knees in the short term, the survivorship in less-arthritic knees is much greater. Considering the limited supply of meniscal allografts and the extensive rehabilitation requirement, I have often stated that grafts should be used wisely. I would thus caution those with an interest in meniscal allografts to follow the more commonly accepted parameters and avoid placing them in knees with advanced arthritis.

In my experience, I have followed stringent criteria, including no diffuse grade 4 changes. Although the outcomes were not as high as in the paper by Kim et al.,<sup>5</sup> I was able to report 80% improvement in patient-reported outcome measures, 10-year survivorship of 83% in the initial 41 patients, and 20-year survivorship of 56.2% of the initial 48 patients.<sup>7,8</sup> Eight of the patients had arthroplasty after an average of 12.7 years (range 9.9 to 19). I too found no significant difference in the outcomes for MMAT or LMAT, with 20-year survivorship of 56.4% for medial and 55.5% for lateral.

From a technique standpoint relevant to outcomes, I would like to include that in their series and mine, the grafts were all secured with bone. There has been some debate about taking the extra time and effort to secure grafts with bone instead of soft tissue, since several clinical series have reported no difference.<sup>9,10</sup> Studies have shown, however, that meniscus allografts fixed with bone have less graft extrusion than with soft tissue alone.<sup>11</sup> A recent publication by Lee et al.,<sup>12</sup> again at the same institution as Kim et al.,<sup>5</sup> found that allografts with less extrusion had a significantly lower rate of progression of joint space narrowing beyond the 8-year point. Thus securing the horns with bone provides support.

Probably a more important point brought out by the paper is how survivorship and outcomes are determined. The authors used the Lysholm scale for clinical outcomes,<sup>5</sup> whereas I initially used International Knee Documentation Committee (IKDC) because many of my grafts were done in association with anterior cruciate ligament reconstructions. Kim et al.<sup>5</sup> considered failure if the tear extended out to the meniscal

capsular junction or >50% of the graft was removed. I reported any meniscectomy of the graft or conversion to arthroplasty as a failure. They were fortunate enough to obtain sequential postoperative magnetic resonance (MR) scans to determine graft failure. My ability to obtain MR scans was logistically more difficult, and I have found that meniscal allografts often have an abnormal appearance on MR scans, including shrinkage.<sup>13</sup> If there was a question of graft integrity on an MR scan, I would proceed with an arthroscopy rather than base failure solely on a scan. Thus one can see that the rate of graft survivorship can vary widely by how conservative or liberal the parameters are,<sup>14,15</sup> illustrating the need for uniform evaluation and reporting methods for meniscal allografts, as for several other orthopedic procedures.

In closing, much is still to be learned regarding meniscal allografts. However, with the results of the current study by Kim et al.<sup>5</sup> and other reports, the question of whether there are any differences in outcomes and survivorship between medial and lateral meniscal allografts can be put to rest.<sup>16</sup> It really makes little if any difference.

## References

1. Milachowski KA, Weismeier K, Wirth CJ. Homologous meniscus transplantation. Experimental and clinical results. *Int Orthop* 1989;13:1-11.
2. Garrett JC. Meniscal transplantation: A review of 43 cases with 2- to 7- year follow-up. *Sports Med Arthrosc Rev* 1993;1:164-167.
3. Blue Cross Blue Shield of Arizona. Coverage guidelines for meniscal allografts-2020. Available at: <https://p3portal.p3hp.org/EZ-NET60/Webportal/EZNET/Forms/2020 BCBS Prior Auth List 12.12.2019.pdf>.
4. Getgood A, LaPrade RF, Verdonk P, et al. International Meniscus Reconstruction Experts Forum (IMREF) 2015 consensus statement on the practice of meniscal allograft transplantation. *Am J Sports Med* 2017;45:1195-1205.
5. Kim C, Bin S-I, Kim J-M, Lee B-S, Song J-H, Park J-G, Lee J. Medial and lateral meniscus allograft transplantation showed no difference with respect to graft survivorship and clinical outcomes: A comparative analysis with a minimum 2-year follow-up. *Arthroscopy* 2020;36:3061-3068.
6. Lee BS, Bin SI, Kim JM, et al. Survivorship after meniscal allograft transplantation according to articular cartilage status. *Am J Sports Med* 2017;45:1095-1101.
7. Carter T, Rabago M. Meniscal allograft transplantation: 10 year follow-up. *Arthroscopy* 2012;28:e17-e18 (suppl 1).
8. Carter TR, Brown MJ. Meniscal allograft survivorship and outcomes 20 years after implantation. *Arthroscopy* 2020;36:2268-2274.
9. Jauregui JJ, Wu ZD, Meredith S, et al. How should we secure our transplanted meniscus? A meta-analysis. *Am J Sports* 2018;46:2285-2290.

10. Zaffagnini S, Grassi A, Marcheggiani GM, et al. Survivorship and clinical outcomes of 147 consecutive isolated or combined arthroscopic bone plug free meniscal allograft transplantation. *Knee Surg Sports Traumatol Arthrosc* 2016;24:1432-1439.
11. Abat F, Gelber PA, Erquicia JI, et al. Suture-only fixation technique leads to a higher degree of extrusion than bony fixation in meniscal allograft transplantation. *Am J Sports Med* 2012;40:1591-1596.
12. Lee SM, Bin SI, Kim JM, et al. Long-term outcomes of meniscal allograft transplantation with and without extrusion: Mean 12.3-year follow-up study. *Am J Sports Med* 2019;47:815-821.
13. Carter T, Economopoulos K. Meniscal allograft shrinkage. *J Knee Surg* 2013;26:167-172.
14. Novaretti JV, Patel NK, Lian J, et al. Long-term survival analysis and outcomes of meniscal allograft transplantation with minimum 10-year follow-up: A systematic review. *Arthroscopy* 2019;35:659-667.
15. Noyes FR, Barber-Westin SD. Long-term survivorship and function of meniscus transplantation. *Am J Sports Med* 2016;44:2330-2338.
16. Bin SI, Nha KW, Cheong JY, et al. Midterm and long-term results of medial versus lateral meniscal allograft transplantation: A meta-analysis. *Am J Sports Med* 2018;46:1243-1250.