



Meniscus allograft transplantation for biologic knee preservation: gold standard or dilemma?

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“There are in fact two things, science and opinion; the former begets knowledge, the latter ignorance.”—Hippocrates

During the past few decades in the United States, meniscal allograft transplantation (MAT) has become a state-of-the-art surgical procedure for selected patients with chronic knee pain due to post meniscectomy syndrome. However, many countries are still struggling to provide MAT, thus leading to an ethical dilemma in sports medicine—How can equitable care be provided for patients when the same treatment is not available for everyone?

Since its start, MAT has primarily focused on restoring the function of the meniscus and relieving meniscectomy-related symptoms [11]. Different indications for MAT have been described, leading to variation in treatment recommendations within different countries and continents. However, there are some universally accepted indications for MAT, including symptomatic meniscal deficiency in the absence of uncorrected ligamentous tears, joint malalignment, or focal cartilage loss [7]. Thus, the target population usually consists of younger individuals with ipsilateral knee pain affecting participation in activities of daily living [5, 6]. While MAT has gained increasing popularity in the United States,

only a few other countries have been able to implement MAT into daily clinical practice. What may be the underlying reasons for this discrepancy? There is likely no simple answer. However, it is most likely multifactorial, making solution finding more than challenging.

Several factors have been identified as contributors to the disparity in the use of MAT. First has been lack of evidence [19]. While there are several studies presenting beneficial results of MAT, no consensus regarding the long-term success in preventing future osteoarthritis has been made [19]. Next, issues related to reimbursement and jurisdictions of the allograft processing system in Europe make acquiring meniscal transplants an expensive and time-consuming process [11, 20]. Furthermore, ethical matters surrounding the clinical use of allografts have contributed to the inaccessibility of MAT for example in Japan [15]. Solid organ transplantation has grown over recent decades, but social and legal issues still limit orthopaedic allograft usage [15]. Finally, in contrast to the United States, only a small number of non-American surgeons have had the opportunity to experience MAT training in sports medicine fellowships. Yet, despite these barriers, some countries have created local tissue banks or have started to order tissues from other countries, allowing their surgeons to offer MATs to the appropriate patient demographic. An example is IRCCS Istituto Ortopedico Rizzoli located in Bologna, Italy, which has increased the country’s accessibility to MAT through the creation of an in-house tissue bank [1] and the publication of supportive literature [9, 24, 26].

Of course, implanting new, allogenic tissue into the knee comes with risks, such as refractory pain, unimproved patient-reported outcomes, and the need for subsequent surgery including debridement or even revision [3, 12, 16, 22]. So, when should MAT be performed? While there are surgeons who feel comfortable enough to perform MAT in individuals > 50 years old, it seems as though a majority of American and European surgeons prefer to save MATs for younger individuals. Current literature supports MAT in

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Table 1 Meniscal Allograft Transplantation: What We've Learned from an International Survey

A smaller proportion of non-American surgeons surveyed have experienced MAT training in sports medicine fellowships compared to American surgeons
A majority of surgeons surveyed in the United States have access to meniscal allografts, yet fewer non-American countries have been able to create local tissue banks or provide access to grafts
Most surgeons surveyed prefer to perform MAT for younger individuals (<45 years) with chronic knee pain due to post meniscectomy syndrome
Generally, surgeons' opinions on the benefits of MAT include pain relief, improved stability, chondroprotective effects, and return to activities of daily living

MAT meniscal allograft transplantation

patients < 50 years with symptomatic meniscal deficiency [5, 7, 21, 23]. Recently published research [25] also reports functional improvement and symptom relief following MAT in an older population (> 50 years). Opinions differ widely on whether MAT should be performed in patients with chondral changes [19]. While there is literature supporting adequate long-term graft survivorship in patients with greater degrees of chondral changes, many surgeons still prefer to avoid implanting new meniscal tissues into chondral-damaged knee joints because of the higher risk of failure [6]. Overall, despite these variations in indication for MAT, most research generally reports adequate pain relief, improved knee stability, chondroprotective effects, return to work and, in some cases, even return to sport with the surgery [2, 4, 8, 10, 13, 14, 17].

Today, implementing MAT for patients with meniscus-related symptoms may seem controversial. Surgeon experience may dictate the level of confidence in performing the transplant [18, 20]. Yet, most surgeons do agree that MAT is a realistic option and should be considered for selected patients [6, 20] with proper expectations. Furthermore, MAT is an integral part of biologic knee preservation and thus, all patients with appropriate indication should be equally offered to undergo MAT. Yet, inconsistency still exists in its implementation across the world, resulting in health care inequality: while some patients can undergo meniscal transplantation and successfully return to daily activities, others are subject to the continued pain and functional limitation caused by post meniscectomy syndrome.

To secure equitable healthcare for patients with symptomatic meniscal deficiencies, further information on the success of MAT, barriers to its access, and indications for its use should be elucidated. Perhaps, increasing international collaboration in research and MAT training courses would help not only to improve evidence and experience but motivate healthcare providers and government agencies to simplify the allograft acquisition process. Surgeons are responsible for offering optimal healthcare. Based on the proven success of MAT, it is only fair that all patients should have this option when the indications are met. Providing access to MAT is current, which will require further international partnership, education, and training (Table 1).

The success of biologic knee preservation will hinge, in part, on the availability of allografts, such as MAT. Therefore, it will be important to find new and innovative ways to facilitate MAT to both secure equitable healthcare for patients with symptomatic meniscal deficiencies and prevent further complications following meniscectomy.

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