What Do We Really Know About Allografts?

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• Osteochondral • Meniscal

The use of allografts in sports medicine is becoming increasingly popular, and, therefore, this issue of *Clinics in Sports Medicine* is dedicated, in a timely fashion, to the use of allografts in sports medicine. The majority of indications are related to the use of soft tissue grafts for ligament reconstruction, OC allografts for articular surface reconstruction, and meniscal allografts for meniscal transplantation. There is an increasing amount of science and literature dealing with healing and outcomes, but many questions still remain. There are a number of issues, controversies, and lack of long-term outcomes to make definitive statements on what is really known about allograft use in sports medicine.

There are number of important factors that one must consider when deciding to use allografts for soft tissue reconstruction. The risk of disease transmission and the safety of use of allograft tissue, the processing and preparation of allograft tissue, which may effect biologic and biomechanical properties, and the biologic healing and incorporation of allograft tissue once it is used in surgery are all significant concerns and considerations. These issues, as well as the use of allograft tissue within the various specific indications, are covered in detail in other sections. The purpose of this article is to look at, in a concise fashion, what is known about autograft versus allograft tissue in terms of advantages and disadvantages, morbidity, the actual biology of these 2 tissue graft types, and evidence with respect to clinical outcomes.

AUTOGRAFT VERSUS ALLOGRAFT FOR LIGAMENT RECONSTRUCTION

Allografts have been commonly used for multiple-ligament injuries to the knee because of the pure practicality and lack of autograft tissue to reconstruct the severely

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compromised knee. Using multiple autografts in these situations would compromise the knee joint even further. Allografts have also been used in the reconstruction of the posterior cruciate ligament most commonly, again, to have enough available graft tissue for reconstruction and to produce a biomechanically stable construct for the posterior cruciate ligament. The anterior cruciate ligament (ACL) has become increasingly popular in indications in which allografts have been used, in particular for revision surgery. However, controversy exists in using allografts for primary anterior cruciate ligament reconstruction (ACLR), particularly in the young athlete. A number of issues, concerns, and questions remain in the use of allografts for ACLR.

ACL Reconstruction

Surgeons are still searching for the ideal ACLR in the athlete. Every aspect of ACLR has been studied and written on, and it is probably one of the most popular subjects with respect to the number of publications in the literature. The type of graft, allograft versus autograft, remains a significant area of interest and research with respect to ACLR. The search continues for the ideal graft substitute that will reproduce the biologic and biomechanical characteristics of the normal ACL. Some of these ideal qualities would include the ability to heal and incorporate into the host tissues and revascularize, allowing the patient's return to sport participation quickly; low surgical-site morbidity, risk of infection , and disease transmission; appropriate size and length for reconstruction; and ready availability for the number of surgical procedures that are performed.

Currently, the autografts that are used most commonly include the patellar tendon graft, the hamstrings (gracilis and semitendinosis) graft, and, much less frequently, the quadriceps tendon graft. In terms of allografts, the most common grafts that are used include bone-patellar tendon-bone constructs, Achilles tendon grafts, and soft tissue grafts that can be derived from hamstring, tibialis anterior or posterior, and peroneal tendons.

DONOR-SITE MORBIDITY

Numerous clinical studies have shown relatively good long-term results using bone-tendon-bone (BTB) autografts and hamstring autografts.[1] Despite the clinical success in using autografts, both BTB and hamstring autografts are associated with a significant amount of donor-site morbidity. These include anterior knee pain, which is common in both procedures, and kneeling pain. Spindler and colleagues[1] did a systematic review of the literature, which demonstrated that there was a similar incidence of anterior knee pain using patellar tendon and hamstring autograft and a more significant incidence of kneeling pain using patellar tendon autograft. In addition, anterior and anterolateral numbness when an anterior incision is used, because of injury to the pre-patellar branch of the saphenous nerve, causes consistent skin abnormalities in these patients. Additional complications have been reported with the patellar tendon harvest, which can be quite severe, including a patellar tendon fracture[2,3] and infrapatellar fibrosis.[4–6] One of the main issues with hamstring autograft is harvesting of the hamstring tendon itself. Some investigators have gone to a more proximal and posterior approach to the hamstring tendon because of concern about the difficulty of harvest.[7] Because of the gastrocnemius attachments of the hamstring tendons, particularly the semitendinosis, there is a risk of rupture of the tendon when trying to harvest the tendon in a closed fashion. This obviously yields a very short graft that is not useable for ACLR.

These issues do not exist with allografts in terms of difficulty with graft harvest, skin denervation, and increased sensitivity from the harvest site, risk to the extensor mechanism, and inadequate amount of tissue, as presented earlier.