What's Trending in ACL Reconstruction?

Anterior cruciate ligament rupture is one of the most common sporting injuries of the knee. Most patients who rupture their ACL are active and wish to return to sport. ACL reconstruction is advisable in these patients, to provide knee stability and protect the meniscus and chondral surfaces of the knee. ACL reconstruction techniques have been around since the 1960s but are constantly developing. This article covers some of the trends in ACL reconstruction I have seen over the past five or so years.

Graft options

There are many autograft (harvested from the patient) options for surgeons to use to reconstruct the ACL. Over the past 15 years, hamstring (semi-tendinosis and gracilis) tendon has been the most commonly used graft in Australia. But here are some trends I've seen recently.

Short hamstring graft reconstruction: Traditionally, both the gracilis and semitendinosis tendons are harvested and each is folded in half, to create a "4-strand" reconstruction. In the past few years, many surgeons have adopted a "short graft" technique, whereby only the semitendinosis tendon is harvested, and folded into four, to create a shorter, thicker graft. This technique tends to reliably produce graft thicknesses > 7mm, which is recognised as a factor for graft survivorship (1). There is also some evidence that by harvesting a single hamstring tendon only, it may reduce residual hamstring weakness (2). It should be noted though, there are no high quality randomised trials demonstrating the superiority of this technique over the traditional technique, in terms of graft survivorship.

Patella tendon: Patella tendon remains an excellent graft option, but its use in primary ACL reconstruction has become far less common than hamstrings, due to the relatively high incidence of anterior knee pain. The New Zealand ACL registry suggests that graft failure rates are lower with patella tendon than with hamstrings (3). It will be interesting to see whether this finding leads to an increased utilisation of patella tendon grafts by Australian surgeons in coming years.

Quadriceps tendon: Quadriceps tendon autograft is increasing in popularity as a graft for both revision and primary ACL reconstructions. Proponents feel it provides a strong, thick graft with less morbidity than patella tendon. Studies suggest it produces comparable graft survivorship and clinical outcomes to both hamstrings and patella tendon (4).

Allograft: Allograft, or cadaveric tendons, can also be used for ACL reconstruction, and has the major advantage of negating any donor site morbidity. In the past, most grafts were irradiated in the sterilisation process, which weakened collagen and lead to high rates of rupture. Newer techniques for the sterilisation of cadaveric tendons, such as the use of supercritical CO2, do not denature collagen to the same extent (5), and may lead to a resurgence in the use of allograft in coming years. Watch this space.



Figure 1: ACL graft options.

From https://www.childrenscolorado.org/conditions-and-advice/sports-articles/sports-injuries/acl-graft-options/

Lateral extra-articular tenodesis (LEAT)

LEAT is not a new technique. In fact, versions of LEAT were used to stabilise ACL injuries before arthroscopic reconstruction techniques were developed. In recent years though, there has been a resurgence in the use of LEAT to augment an ACL reconstruction in patients at high risk for rerupture. LEAT reduces anterolateral rotatory instability of the knee (seen clinically as the presence of a positive pivot shift test), which is a recognised risk factor for graft re-rupture. There are various techniques for a LEAT, which involve harvesting a strip of the iliotibial band, and re-routing this under the lateral collateral ligament to create a restraint to excessive internal rotation of the tibia (figure 2).

The addition of a LEAT to an ACL reconstruction is being used increasingly commonly due to high quality evidence that it significantly reduces graft re-rupture rates in high-risk individuals. The STABILITY randomised controlled trial demonstrated that graft re-rupture rates at 2 years post surgery reduced from 11% to 4% with the addition of a LEAT (6).

The procedure adds approximately 15-20minutes to an ACL reconstruction and involves an additional lateral incision, but generally doesn't necessitate any additional weight bearing or range of motion restrictions. Expect to see many more patients receiving a LEAT to augment their ACL reconstructions, particularly those aged < 20, those with generalised ligamentous laxity, or those planning to return to high-risk, collision sports.



Figure 2: The modified LeMaire technique for Lateral Extra-articular Tenodesis

Adapted from https://www.arthroscopyjournal.org/article/S0749-8063(20)30272-3/fulltext

Return to sport training and testing post ACL reconstruction

Unfortunately, the rates of return to sport (particularly to pre-injury levels of sport) are not as good as we would like following ACL reconstruction. Around 35% of people may not return to pre-injury levels as sport (7). This has created renewed interest in specialised return-to-sport rehabilitation programs, and formal return-to-sport testing prior to returning to sport. Some studies suggest that participation in specific return-to-sport training sessions, improves functional outcomes post ACL-reconstruction (8). Over the past few years, a growing number of surgeons are recommending patients undergo specific return-to-sport testing with their physiotherapist or exercise physiologist, prior to giving them the go-ahead to return to sport. An example is the Melbourne Return to Sport Score (https://www.melbourneaclguide.com/docs/ACL_Guide.pdf). In addition, sport-specific injury prevention programs such as the FIFA 11+ warm-up program in soccer, have demonstrated significant reductions in the incidence of ACL injuries, and should be recommended to patients who return to sport after ACL reconstruction (9).

Future directions

There are many areas of research and development in ACL rupture and reconstruction. Here are some to look out for in the future:

- ACL repair (as opposed to reconstruction) techniques
- Biological augmentation of ACL reconstructions
- Patient-specific graft positioning techniques.
- Non-operative management of certain subsets of ACL injuries, with bracing at 90 degrees of knee flexion.

I look forward to seeing what the future holds!

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