

ACL RECONSTRUCTION GRAFT CHOICE

Once the decision has been made that cruciate ligament reconstruction is required, most people want to talk about the choice of graft. My first advice in this regard is, do not stress too much about the choice in graft as there are many other factors that will have much greater bearing on the success of surgery. In fact the single most important factor in determining the success of surgery is the placement of the graft. This is your surgeon's job and there is very little room for error. Graft placement must be accurate down to the millimetre. If the new ligament is placed in the correct position, it will work well almost irrespective of what type of graft has been used. Conversely, if the graft is put in the wrong position, no amount of rehabilitation will make it work properly.

The reason we need a "graft" is that this surgery is a reconstruction not a repair. The torn cruciate ligament is not repairable. Usually there is not enough tissue left to repair – the torn ends look like the end of a paint brush and rapidly shrink into a smaller stump. One reason for this is the environment of the ligament – it is "underwater" so to speak. The knee joint is full of synovial fluid. Ligaments outside a joint (eg. the medial ligament) have a better blood supply, and do not have the same capacity to shrink down – they are attached to surrounding tissues. This means they can heal, or can be repaired rather than reconstructed.

You will receive advice about the graft choice from many sources. Most physiotherapists will have an opinion on the preferred graft based on patients they have treated. You may have friends who have had the surgery, you may have read about it on the internet, and followed the progress of high profile athletes in the popular press. And of course your surgeon will have a preferred method based on his own experience. In this setting it is easy to get confused. Here is a summary of the popular methods and their advantages and disadvantages:

1. Hamstring graft

Three hamstring tendons converge towards an attachment on the bone at the upper end of the tibia on the inner side of the knee. Two of the three tendons are usually harvested (that is the medical term and yes, it does sound quite agricultural). The two tendons are folded in half to create a bundle of four tendons which is usually eight or nine millimetres in diameter. You would think this would drastically weaken the hamstring muscles but amazingly, in practice it does not. Hamstring tendons are the most popular choice for cruciate reconstruction at this point in time. They are easily fashioned into a strong graft and because the graft is made of your own tissue, it integrates quickly and permanently. They also have low donor site morbidity. This is a medical term which

essentially says that you have to rob Peter to pay Paul. We are taking tissue from one part of your body and implanting it in another site. There will always be some pain and loss of function at the site where that tissue has been taken. Hamstring harvesting rarely causes long term hamstring problems but there is always a low risk of this complication. In a patient who has a history of recurrent hamstring tears we might consider an alternative graft.

2. Patellar tendon graft (PTG)

This method involves taking a strip of the middle third of the patella tendon including a small piece of bone from the patella (knee cap) where the tendon starts and from the tibia where the tendon attaches. This gives us a very strong tendon graft with a piece of bone attached at each end. There are some inherent advantages to a patellar tendon graft. Firstly the bone blocks at each end of the graft allow very secure immediate fixation in the new location and the bone blocks integrate in the new position quickly. For this reason a brace may not be required. Another potential advantage of the patellar tendon graft is that it has very low stretch when compared with the hamstring graft. If the graft stretches, it can lead to a slightly loose reconstruction. Patellar tendon grafting might be more appropriate in a larger, solidly built male patient. Just as we see with the hamstring graft, there may be the complication of pain at the site of graft harvest. Patients with a history of knee cap pain or patellar tendon problems may consider an alternative graft.

Hamstrings and patellar tendons could well be considered the Ford Falcon and Holden Commodore of graft choice. They are two very comparable options with only minor differences and disadvantages. They can be relied on to provide good service over the long term with few problems. The alternative graft choices might be considered the Ferraris and Lamborghinis.

3. Allograft

An allograft is donor tissue from a deceased person. Bone and tendon tissues can be collected in patients who choose to donate their organs. These tissues are collected after vital organs for transplant such as kidney, liver, heart and lungs. This is an important point. Allograft reconstruction should still be considered transplant surgery. It consists of tissue from another person and implanting it in your body. This is not to be undertaken lightly and for that reason it is not commonly used for cruciate reconstruction in Australia. The graft tissue is irradiated prior to use which greatly reduces the risk of infection and rejection. However irradiated tissue may not incorporate into the body as well as fresh donor tissue. Allograft is more popular in America where fresh tissue is

used and the donors are screened carefully for possible infectious diseases (Hepatitis and AIDS). My advice to patients is that it is quite reasonable to accept the risks of transplanted tissue where a new kidney or liver might save your life, but it is a completely different equation when we start to talk about a reconstructive operation where there are other options. Furthermore, recent studies suggest allografts have a higher failure rate.

4. Synthetic ligaments – the LARS graft

This is a relatively new development in reconstruction. The LARS graft is a synthetic ligament which is threaded through the stumps of the torn cruciate ligament with the intention that the torn ligament then heals. Cells grow into the woven ligament which acts as a scaffold for new tissue to form. The advantage is that there is no pain or weakness from the graft site. The LARS graft is only appropriate for recent injuries as it requires some of the old ligament stump to be present to provide healing tissue. In this sense it is closer to a repair than a reconstruction. It was never intended to be used for revision surgery (ie. second or subsequent reconstruction) and when it has been used in that situation the results are very poor. One disadvantage of the LARS ligament is that if the body does not grow into the ligament over time it will eventually fail. No artificial ligament has ever been able to withstand the repetitive forces a cruciate ligament is subjected to over many years (bearing in mind that if we take ten thousand steps a day, that is over three million cycles a year and thirty million cycles in a decade).

5. Hybrid reconstruction or Augmented LARS reconstruction

In this method the LARS graft is combined with a conventional hamstring reconstruction in an attempt to achieve the best of both worlds. The LARS ligament provides immediate stability for accelerated rehabilitation and the hamstring tissue provides the basis for a long term living ligament. This is an option I use for people with physically demanding occupations who wish to return to work quickly. It may also be the best choice for some athletes looking for a quicker return to sport. It can be used for redo reconstruction.

6. Quadriceps tendon graft

This graft is uncommonly used but can provide an excellent source of strong tendon tissue. It involves taking a strip of tendon from the quadriceps in continuity with a small bone block from the top of the patella.

In summary, for most people the tried and tested methods of hamstring or patellar tendon grafting will be appropriate. These methods have a high success rate and have been evaluated over many decades. The LARS ligament has opened up some new options. All of these methods can be used to create a successful reconstruction. Remember, the choice of graft is not the make or break issue when it comes to the success of surgery.

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