

Posterior Cruciate Ligament Reconstruction

**How do do a reliable, predictable reconstruction : Use the
Transtibial tunnel technique.**

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The outcome of PCL reconstruction has been somewhat inconsistent, and this may be due to a number of factors:

- Anatomy – the double bundle ligament
- Continuous stress of gravity on the graft.
- Technique of transtibial creating a ‘killer tunnel angle’
- The use of the single femoral tunnel as opposed to the double femoral tunnel
- The choice of graft, autogenous versus allograft

Transtibial tunnel PCL reconstruction

The traditional reconstruction of the posterior cruciate ligament has been by drilling a transtibial tunnel from anterior to posterior, similar to the ACL reconstruction, see fig 1. The position of this tunnel is critical, it has to exit 1 cm below the joint line, and slightly lateral. Due to this position, the popliteal artery is vulnerable to injury. The second problem with the tibial tunnel was the acute bending angle as the graft exits the back of the tibia, the so called “killer turn”, see fig 2. The open posteromedial approach of the inlay graft, as described by Berg, to the back of the tibia, was a solution to these problems of potential vascular injury during creation of the tibial tunnel. This technique also reduced the acute graft angle at the back of the tibia.

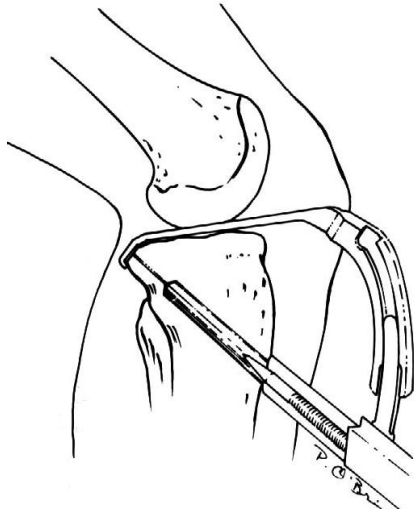


Fig 1. The transtibial tunnel for PCL reconstruction.

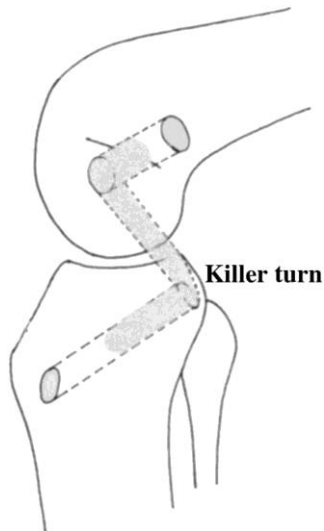


Fig 2. The 'killer turn' around the posterior tibia.

Which technique is superior?

There is lab support, by Bergfeld, for the posterior inlay technique. He demonstrated that with cyclic loading of the transtibial graft there was thinning and eventual rupture of the graft at posterior margin of the tibia. However, Markoff has shown that if the bone block of the graft is put in the proximal end of the tibial tunnel, the angle is eliminated. Harner has shown that there is very little difference in the kinematics of the 2 procedures when tested in the lab.

The Transtibial Technique of PCL Reconstruction

The transtibial approach has been the traditional method of posterior cruciate ligament reconstruction. The guide should have a spatula tip that is placed through the anteromedial portal and over the back of the tibia. The guide wire should be restrained by the tip of the guide. The drill bit should be hand turned, or drilled slowly, to prevent posterior penetration of the guide wire and drill bit. The popliteal artery lies a few millimeters from the back of the tibia just lateral to the midline. One should always make a posterior medial portal to visualize the posterior aspect of the tibia.

Advantages of the Transtibial Technique

- The drilling technique is similar to ACL tunnels and is familiar
- Soft tissue grafts may be used without bone plugs
- The procedure may be done when there has been previous vascular surgery.

Disadvantages of the Transtibial Technique

- There is risk of neurovascular injury with the K-wires or drill bits.
- It is difficult to pass the graft around the back of the tibia

Results:

Fanelli, and Chen have published good results with transtibial single bundle reconstructions. The use of the Achilles tendon allograft is the most common graft in North America, while the quads tendon autograft is more popular in regions where allografts are not available.

The innovation of Ohkoski to drill the tibial tunnel from the lateral side of the tibia, and using autogenous hamstring tendons, has given the author good results. This approach reduces the killer angle. DeBerardino has used the split stacked Achilles tendon allograft to increase the size of the graft, and have a split tailed graft to create two femoral tunnels.

Richards, Noyes, and Chen have published results using the quads tendon, which is very similar in appearance to the Achilles allograft.

Rehabilitation

Post-operatively the rehab is much slower after PCL reconstruction. The patient is braced in full extension, with a pad under the calf to push the tibial forward. Prone lying range of motion exercises only are allowed for the first few weeks. Gradual increase in range of motion is permitted after 3-4 weeks. The strengthening exercises for the quadriceps are started only after 6 weeks. If there has been any additional collateral ligament or posterolateral corner reconstruction the knee is braced for at least 6 months. Gradual return to exercises in the gym occurs after 3 months. There is normally some loss of full flexion with a PCL reconstruction.

Conclusion. The jury is still out on which technique is superior. The conventional wisdom favors the trans-tibial approach for the arthroscopic surgeon and the open posterior inlay for those more comfortable with open procedures. The message is to learn one technique, and become proficient at performing it well.

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