

HISTORY AND FUTURE OF ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Primary repair of the anterior cruciate ligament used to be the standard treatment for the torn anterior cruciate ligament. However subsequent follow up of these patients have shown poor healing potential of the anterior cruciate ligament. Biomechanical studies have shown that the anterior cruciate ligament is the primary anterior stabilizer of the knee. Also different bundles of the anterior cruciate ligament have been shown to play different roles in different knee flexion angle against anterior and rotational load. From 1980's anterior cruciate ligament reconstruction with some type of the graft became standard treatment technique. Among the factors that influence the results of ACL reconstruction, selection of graft materials, tibial and femoral graft position placement, orientation of the drill holes, fixation and tensioning of a graft are known to be important intra-operative factors when performing ACL reconstruction surgery. Reconstructed anterior cruciate ligament grafts with an autogenous bone-patellar tendon-bone graft and a hamstrings graft have been shown to be revascularized and remodeled after the implantation and are therefore thought to be biologically suitable materials. Thus, the use of one of these graft materials has become a common procedure. The graft material, fixation technique, preconditioning, and tensioning will influence the early postoperative graft load. We have shown that interference fit type fixation provides better stability and advantageous mechanical properties of the reconstructed graft [1].

Regarding graft positioning, the recommended placement of the tibial graft placement has changed from an eccentric anterior medial position to a more posterior anatomic position. Theoretically more anatomically placed femoral graft

positioning will also provide better biomechanical function and clinical result. Currently we are trying to do two bundle ACL reconstruction through two femoral and tibial tunnels [2]. Femoral tunnels can be prepared through two tibial tunnels or far anterior medial arthroscopic portals. Femoral positioning of the posterolateral bundle should be more posterior and distal than conventional femoral drill hole placement. Damage of the posterior neurovascular bundle and breakage of the posterior wall of the drill hole can be a possible intraoperative complication. This problem can be avoided by making deeper knee flexion angle when creating a femoral drill hole. Once two bundle grafts are passed through drill holes created they can be tensioned and fixed separately. We fix a posterolateral bundle graft first in 15 degree knee flexion angle and then an anteromedial bundle graft is fixed in 70 degree knee flexion angle. Advantages and disadvantages and technical pitfalls of this procedure will be discussed both in basic and clinical aspects.

1. Kurosaka M, Yoshiya S, Andrish JT: A biomechanical comparison of different surgical techniques of graft fixation in anterior cruciate reconstruction. *Am J Sports Med* 15:225-229, 1987.
2. Yagi M, Kuroda R, Yoshiya S, Kurosaka M: Anatomic anterior cruciate ligament reconstruction. The Japanese experience. *Operative techniques in orthopaedics*. 15: 116-122, 2005.