

ARTHROSCOPIC RECONSTRUCTION OF THE ANTERIOR CRUCIATE LIGAMENT USING HAMSTRING GRAFT: TECHNIQUE AND RESULTS

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Abstract: Anterior cruciate ligament (ACL) rupture is one of the most common ligament injuries in the knee, particularly during sport activities, and is the main reason of knee instability. The evaluation of ACL surgery is based on 3 main factors: Laxity control, global functional results using the Lysholm and Tegner score and resuming pre-injury sports. We made up a global approach for anterior cruciate ligament using hamstring graft, in which we discussed different aspects of this technique and its results. As an outcome of our work, more specific aspects of this technique have been uncovered and will be the subject of our future studies.

Keywords: Knee-Reconstruction of the ACL-Arthroscopy-ACL injury-Hamstring graft.

Introduction:

Anterior cruciate ligament (ACL) reconstruction has experienced a great development in these last decades, especially with the advent of arthroscopy, using many transplants and many techniques of ligamentoplasty. The Hamstring technique, using the autologous gracilis and semitendinosus tendons, makes it possible to reduce the site-donor morbidity compared to the Bone-Patellar Tendon-Bone (BPTB) but raises the question about immediate stability of the graft, depending on the fixation mode.

Material and Methods:

Our work is a retrospective descriptive study conducted on 9 patients, undergoing single bundle arthroscopic ACL reconstruction using Hamstring graft, in the orthopedic B4 surgery department of HASSAN II University Hospital Center in Fez, between February 2020 and December 2022.

Results:

- The mean age is 38 years, ranging from 23 to 54 years.
- There was a marked male predominance with a sex ratio of 3/1.
- 78 % of the tears occurred from sports accident.
- In 45 % of the cases, the injury occurred from a valgus flexion external rotation mechanism.
- 67 % of our patients were recreational athletes.
- The right knee was injured in 67 % of cases.
- All patients presented with anterior knee pain and chronic knee instability.
- A positive Lachman and anterior drawer tests were found in all patients.
- Primary signs of ACL tear were found in all MRI performed on all our patients.
- The mean time from injury to surgery is 27 months.
- No perioperative nor postoperative complications occurred.
- Residual postoperative pain was reported in 3 cases (33 %).
- The Lachman test as well as the anterior drawer test were negative in all patients postoperatively.
- The average time off work was 3 months.

- 56 % resumed sporting activities within 10 months.
- The average post-operative Lysholm and Tegner scale score was 88.

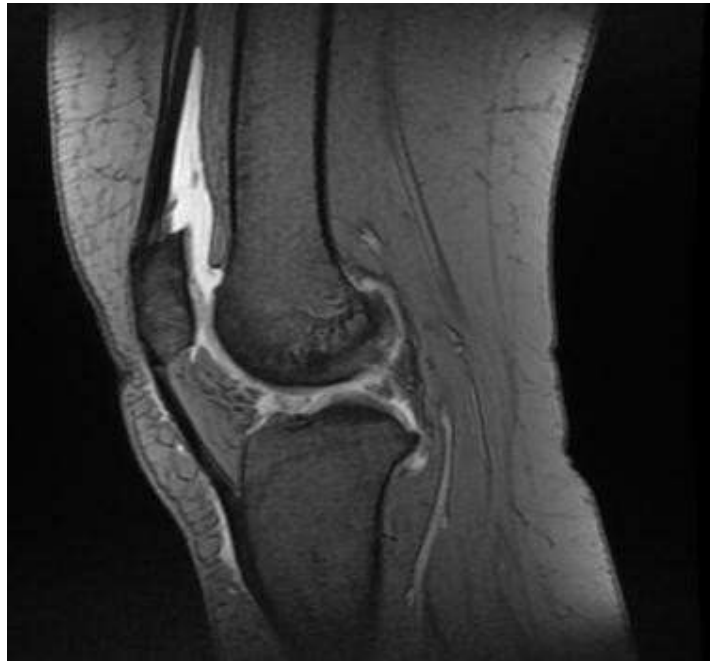


Figure 1: Sagittal view that shows injury of the lateral meniscus associated to ACL tear.



Figure 2: Release of both tendons from their distal common tibial insertion



Figure 3: The end of the gracilis is whip stitched with a #2 suture, and the semitendinosus is harvested with an open loop tendon stripper



Figure 4: Drilling of the tibial (Left) and femoral (Right) bone tunnels



Figure 5: Fixation of the graft

Discussion:

We observe the highest incidence of ACL injuries in the young population between 15 and 25 years old, especially those who participate in pivoting sports[1]. Females have been reported to have 2 to 8 times greater injury risk than males, with the rates for each sex differing slightly for type of sport[2,3-5]. It has also been reported that the risk for ACL injury increases with the level of competition (high school and college levels)[6].

Abnormal knee kinematics in the transverse plane have also been investigated as potential mechanisms for ACL injury. Markolf et al.[7] found that ACLs of cadaveric knees experienced twice the tensile force when applied quadriceps force was combined with an internal knee rotation moment than when quadriceps force was applied alone.

A most recent meta-analysis of studies made by Kwok et al.[8] that employed a modern accelerated rehabilitation protocol found no significant difference in the risk of adverse outcomes between early and delayed ACL reconstruction is performed as early as 1 week after injury.

Kennedy et al.[9] found a significantly higher chance of a medial meniscal tear when ACL reconstruction was performed 6 months after injury and of knee degenerative changes with surgery performed a year post-injury.

Ideally, the graft used for ACL reconstruction should reproduce the anatomic and biomechanical properties of the native ligament, and allow solid fixation and rapid biological integration, with minimal donor-site morbidity. Both BPTB and HT autografts fail to reproduce the complexity of native ACL, whether anatomically (entheses, twisted ribbon shape) or functionally (ultrastructural and biomechanical properties).

Before reconstruction begins, a complete arthroscopic evaluation of the knee joint is essential for treatment of cartilage defects and also meniscus preservation if required, guided by data from preoperative magnetic resonance imaging.

Graft placement in single-bundle ACL reconstruction is essential for knee mechanic and transplant survival, thus the choice of both tunnel position has a significant effect on the outcome of ACL reconstruction.

Positioning of ACL tunnel represent a critical part of the surgical procedure, it influences the length and tension of the ACL replacement graft and therefore control the success of the procedure.

The success of ACL reconstruction also depends on the graft fixation. The biomechanical properties of femur-graft-tibia complex are more important rather than that of the graft itself, from the view of clinical situation. The graft fixation site is considered as the weakest portion until completion of the graft-tunnel healing, thus insufficient fixation strength compromises the physical exercises in early-phase rehabilitation after ACL reconstruction to be decelerated.[10]

Conclusion:

The results obtained by our study has shown that the use of arthroscopic single- bundle ACL reconstruction technique using hamstring graft allows good results not only for the control of laxity and release of pain but also confers a low rate of morbidity, and thus our patients could regain their every day's autonomy. However, the time-lapse of follow-up was restricted; a study with a longer follow-up and a larger number of patients is necessary.

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