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Peroneus Tendon Autograft in a Revision Anterior Cruciate Ligament Reconstruction

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Abstract

Introduction: The tendon graft option in revision surgery for anterior cruciate ligament re-tear still represents a debatable subject, regarding which is the best. As a primary option, the peroneus longus tendon (PLT) auto graft used in the reconstruction of the anterior cruciate ligament has been reported with success in many studies, but there are few reports about the uses of PLT in revision surgeries. This study aimed to assess the functional result of PLT autograft in revision ACL surgeries.

Methods: A retrospective study was done on 16 young male patients, who underwent revision surgeries for ACL re-tear, using double or triple folded full thickness peroneus longus tendon autograft graft, functional results of the knee and ankle using Lysholm score and American orthopaedic foot and ankle disability index, evaluated after two years of surgeries.

Results: After two years of surgery, the Lysholm score was good – an excellent result in 11 patients (73.33%), fair-good in 3 patients (20%) and poor in one patient only (6.66%). American foot and ankle score was 100 in 14 patients and 95 only in one patient.

Conclusion: It has been concluded that PLT auto graft, represents a good graft option in revision ACL surgeries with no or little donor site morbidity.

Keywords: tendon graft; anterior cruciate ligament; peroneus longus tendon (PLT); Lysholm score

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INTRODUCTION

One of the most often injured knee joint structures is the anterior cruciate ligament (ACL), which has a primary incidence of 1.5% to 1.7% in the general population per year[1,2]. According to the Norwegian Knee Ligament Registry, anterior cruciate ligament repair is usually regarded as a safe and successful treatment with a high success rate of return to sport (75-97%), and a low re-rupture rate (4.9%) after a mean 8.1 years[3]. The number of ACL revisions is naturally rising as a result of the yearly increase in ACL reconstructions[4]. Revision surgery is more complicated than first reconstruction, and disagreement exists about the best graft options. There is not enough data to determine whether the ST/G and BTB transplant options have different long-term functional outcomes[5]. Despite the preference for autografts, some authors recommend the use of allografts as the least traumatic option[6]. However, there is no general agreement on the choice of the most appropriate graft. Peroneal tendon grafting was recommended for graft selection due to various complications of BTB, ST/G and Qaud knee joint. There are no tendon grafts, so it does not cause secondary damage to the knee and its adjacent structures[7,8]. Recent studies reported that the PLT graft retained potential superior ACL replacement due to its tensile strength and regenerative capacity[9]. So, this study was aimed at the evaluation of clinical functional outcomes of arthroscopic revision anterior cruciate ligament reconstruction using peroneal tendon autograft.

PATIENTS AND METHOD

A retrospective study conducted at Iraq- Aldiwanyia Teaching Hospital, includes fifteen cases of redo surgery for cases with anterior cruciate ligament reconstruction failure from 2021-2022. Nine cases were right knee and six cases, were left knee. A Thorough history was taken, regarding the previous surgery, postoperative rehabilitation and types of traumas after first surgery if present.

Clinical examination was done for all our patients to ass's integrity of cruciate, meniscus and to look for underlying causes of failure if present, which include limb alignment in coronal and sagittal plane, screening for infection and proper assessment of tibial and femoral tunnel by CT-Scan and MRI.

Patients with concomitant meniscus, multi-ligament, cartilage injuries or limb malalignment, have been excluded from this study, all our patients were male, between 20-35 years old. The period between the first Surgery and revision of ACLR was between 2-5 years. All cases included in this study underwent primary revision ACLR, done by the same surgical team.

Surgical technique. Peronius tendon graft harvesting.

1-During surgery, first of all, is EUA of the knee for anterior-lateral instability of the knee by Lachmann and pivot shift test and exclude other types of instability, then diagnostic arthroscopy is performed through standard anterolateral and anteromedial s port to confirm the diagnosis. After that, we proceeded to graft harvesting by A 2 cm longitudinal skin incision made 2 finger breadth above the lateral malleolus and 1cm posterior, tendons of perionus longus and brevis were identified, then cut the tendon of perionus longus about 1cm above lateral malleolus, then the tendon stripped by appropriate size stripper with protection of common peroneal nerve by putting the hand over the fibular head and neck. Fig1.

Figure 1. Surgical technique for PLT graft harvesting.

The wound is closed in layers, and the stripped graft is prepared by stander maneuver to obtain at least 8 mm graft diameter and 9 cm long (double or triple strand graft).

2-ACLR-Revision surgery.
After graft harvesting and preparation, arthroscopic debridement of the previous ACL graft remnant, with screw removal from the tibia, then proceed with the trans-portal femoral tunnel by using trans-portal Amir (6 or 7 mm Arthrx amir) to achieve the ideal femoral tunnel, then tibial tunnel drilling by using 55-degree tibial jig (Arthrex) after that suitable size graft trell through the tunnels and fixed by adjustable tight rope on femoral side and peek screw on tibial site, while putting the knee in 20-degree flexion, and backwards push of tibia during screwing,

No additional fixation is used on either side of the graft.

3-Post-operative rehabilitation and follow-up visit.
All cases, were undergo the same rehabilitation program, by the same center for at least 1 year, those that failed to continue with the rehabilitation program were discarded from the study. during that time follow-up visits are arranged, every 2 weeks for the first 2 months, after that every month till 6 months after surgery, then every 3 months until the end of the first year, then every 6 months, and the final visit at the end of 2 years after surgery. At the end of the second year (24 months), knee assessment for functional outcome was done using Lysholm knee score, and foot and ankle function assessment was done according to the American orthopaedic foot-and ankle disability index (AOFAS). Fig2.

Figure 1. Foot and ankle movement one year after PLT harvesting.

RESULTS

At the end of second year (24 months) after revision surgery, assessment of the knee and ankle were done for all our patients, using Lysholm knee score and American ankle and foot score to look for functional results and donor site morbidity for both knee and ankle by same surgical team.

ALL our patients, were male, mean age 26 years old, 9 cases were right knee, 6 cases were left knee. The mean of time between the primery surgery and second surgery was 3 years (2-5 years)

Sports injury was the main cause of re-rupture of ACL in 10 cases, work trauma in 3 cases and no history of trauma in 2 cases.

Preoperative lysholm score was between 60-75 (poor-fair) for all our patients, after two years of revision surgery, the mean score was 87-95 (good-excellent) in 11 patients (73.33 %), only 3 patients with 80-85 score(fair-good) (20%). And one patient with a 70 (poor) score (6.66%) without any evidence of trauma during the follow-up period. (table 1).

American foot and ankle score was 100 in 14 cases (93.33%) and 95 only in one case (6.66%).

Table 1. Results of Lysholm score, 24 months after ACLR revision.

Lysholm Score	No. of patient s	%
Good-excellent	11	73.33
Fair-good	3	20
Poor	1	6.66

DISCUSSION

Anterior cruciate ligament reconstruction revision surgery, represents a dilemma for sports surgeons, despite improvement of skill, instruments, fixation implants and rehabilitation, failure is still there in about (10-15%). Graft choices represent one of the challenges for surgeons and patients especially in developing countries, because of the patient's lifestyle, education and lack of artificial or allograft. A proper graft helps prevent repeated injuries or tears and ensures optimal knee stability. Donor site morbidities with common popular autograft options such as ipsilateral patellar tendon (BTB), quadriceps tendon autograft, and HT

graft of the contralateral limb, such as anterior knee pain, stiffness of the knee and weakness of the contralateral knee, might represent a big problem in patients that use kneeling sitting pattern in daily activity and praying, that's why most of our patients with revision surgeries refused to use these sites as graft donor site.

Recently, peroneus longus tendon graft (PLT) (anterior half or whole tendon), has emerged as a good alternative as a donor graft, used in many studies in primary ACL reconstruction or multi-ligament knee reconstruction. Despite the concern of some surgeons that PLT grafts compromise ankle eversion and flexion, Kerimogly et al. found that PLT grafting had little or no effect on foot and ankle function. These findings are supported by Shi et al. that there were no significant differences in ankle joint strength and range of motion in ankle joint function before and after the graft.[8] Bi et al. compared the use of a single bundle anterior half of the peroneus longs tendon and semitendinosus tendon in primary ACLR, at 2 years of follow-up, the study found no difference between the two groups, concluding that the peroneus tendon graft provides greater strength and is relatively safe for reconstruction.[9]

Agus Eka et al. reported a good result in primary ACLR used peroneus longus tendon graft, considering it as the first option graft choice in primary ACLR with absence postoperative donor site morbidity as compared to donor site morbidity with ST autograft as thigh hypo-atrophy and weakness of knee flexion, and others donor site morbidity with BTB graft or quadriceps graft[10]. Kumar VK et al. reported that the peroneus longus tendon is a suitable source for primary ACL reconstruction because of its easy harvest method, adequate size, good postoperative knee score, and no effect on gait parameters or ankle stability[11].

Tarun Goyal et al, consider the full-thickness peronus tendon graft as a potential autograft option in ACLR and multi-ligament knee injuries in their study that included 10 cases of ACL revision and 27 cases of multi-ligament knee surgeries, they reported a significant improvement in VAS score of pain, Lysholm and IKDC scores at two years follow up and no significant donor site morbidity was noted at follow up.[12]

Sholahuddin Rhatomy et al. The study showed that single-bundle ACL reconstruction with peroneus longus autograft had excellent functional results, minimal foot and ankle complications, and no difference in thigh circumference.[13] Fu-Dng Shi et al. study found that the safety of the Peronus tendon graft, and usefulness as graft choice in ACL surgery with associated MCL tear reconstruction, in addition to its efficacy in revision situation or as supplement to other graft choices.[14] Mingguang Bi, MD et al. decided that there were no differences in anterior knee stability or clinical functional outcomes between the ST and peroneus longus tendon groups at two-year follow-up 1. Despite all this literature on using peronus longus tendon graft in primary ACL reconstruction. Its uses in revision ACL surgeries are still rare and the literature about that, is little and small sample size one, such as Shafiq H, Sahil S et al. study of six cases of revision ACL reconstruction using ipsilateral peronus tendon graft, reported a good clinical outcome and minimal morbidity at the donor site after 1 year of follow up[16-19] which is comparable to the results of our study that include 16 cases of revision ACL with longer follow up period extend to two years.

CONCLUSION

Peronus tendon autograft, represents a good donor site autograft in revision ACL reconstruction, with a good functional outcome which is comparable to other grafts with no or minimal donor site morbidity, especially in developing countries when other options of graft are problematic.

Limitation.
Lack of other literature evidence and a small sample study with a short follow-up period.

The authors declare that all the procedures and experiments of this study respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2008(5), as well as the national law. Informed consent was obtained from all the patients included in the study.

Conflicts of interest
There are no conflicts of interest regarding this article.

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