

FUNCTIONAL OUTCOMES OF PERONEUS LONGUS TENDON AUTOGRAFT ARTHROSCOPIC RESTORATION OF AN ANTERIOR CRUCIATE LIGAMENT TEAR

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Abstract: *The study was conducted to assess the functional outcome of arthroscopic reconstruction of anterior cruciate ligament tear by using peroneus longus tendon autograft. A prospective study was conducted in the Orthopaedics Department of Bakhtawar Amin Memorial Trust, Multan from 22 June 2021-22 June 2022. A total of 24 patients from the out-patient department were included in the study. Patients were clinically examined, and MRI was performed to confirm the presence of tears. Arthroscopic reconstruction was done. IKDC was used to assess the final outcome after 6 months, MRC was used to evaluate ankle stability with normal side as control. IKDC was normal in 22 patients (91.6%) and abnormal in only 2 patients (20%). The average IKDC score was 82.44. Lachman test showed normal results in 17 (70.8%) patients, 1+ laxity in 4 (16.6%), 2+laxity in (8.3%) and 3+laxity in 1 (4.1%) patient. 14 (58.3%) patients had negative pivot shift and 10 (41.6%) had positive glide. Peroneus longus tendon autograft is an effective option for anterior cruciate ligament reconstruction with less complications and maintains ankle function.*

Keywords: Anterior cruciate ligament, Peroneus longus tendon autograft, Ankle movement

Introduction

Different grafts are used for reconstruction of anterior cruciate ligament (ACL). Success rates of synthetic, allografts and auto grafts are variable (Oluwadamilola et al., 2019). Autografts have consistently produced reliable clinical results. Most acceptable among the autografts are patella bone tendon grafts and hamstring grafts. Among other autografts are fascia lata, patellar tendon and quadriceps etc. Though these are used commonly but have some disadvantages due to which debate over suitable graft persists. ACL reconstruction has become better through use of peroneus longus tendon autograft (PLT). It is advantageous due to its similarity in thickness and strength to the local ACL (Rhatomy et al., 2019; Yu et al., 2020). Removing PLT does not affect ankle stability (Anghthong et al., 2015). The aim of this study is to assess the functional outcome of arthroscopic reconstruction of anterior cruciate ligament tear by using peroneus longus tendon autograft.

Methodology

A prospective study was conducted in the Orthopaedics Department of Bakhtawar Amin Memorial Trust, Multan from 22 June 2021-22 June 2022. Patients for the study were chosen randomly from the hospital OPD. Clinical tests including pivot shift test, Lachman test and anterior drawer test were done. Tests for excluding posterior cruciate ligament and the posterior lateral corner tear were also done. MRI and x ray of knee joint were performed to confirm tear. The patients aged between 18 to 50 years, having functional instability and complete ACL tear were included in the study. Patients with posterior cruciate ligament were excluded. Baseline investigations were performed. Informed consent of the included patients was recorded. The Ethical Board of the hospital approved the study. The study was conducted on 24 patients (22 male, 2 females). The mean age of patients was 27 years.

Spinal anesthesia was administered before surgery. A 2 cm incision was given above and behind the



ipsilateral limb and PLT was harvested. long tendon stripper was used for harvesting PLT. Non absorbable sutures were used for closing incision. Harvested graft was pre tensioned on tendon board. Triple graft was constituted by looping the graft. Cylindrical sizers were used for determining exact triple graft size that matches with tibial and femoral tunnel.

A guided wire was put into lateral femoral condyle using femoral offset aimer. A suitable sized reamer was used for making femoral tunnels. Tibial drill guide was placed in position after flexing the knee 70-90 degree. The drill sleeve was positioned opposite the medial tibial cortex. Triple layered graft was appropriately marked and placed into femoral tunnel using arthroscopic guidance. Guided wire placed in tibial tunnel after applying maximal traction on graft and was tightened using biodegradable screw. X ray was done post operatively.

The suture was removed on 12 post operative day and patients were discharged. Parameters including range of ankle and knee movement, suture line and effusion or swelling were checked. Knee braces were used for a month. On the first post operative day continuous passive movement was started. After discharge exercises including wall slides, stationary bicycling, toe raises, and partial squats were advised. Brace is removed between the first and third post operative month, and tread mill was initiated. Sport activities were allowed 6 months post operatively.

Results

Most common causes of injury were road traffic accidents occurring in 10 (41.6%), sports injury in 9 (37.5%) and falls in 5 (20.8%) patients. Wasting of thigh was present in 10 (41%) patients and knee effusion in 4 (17%) patients. Partial tear of the medial menisci was present in 9 patients, of whom partial meniscectomy was required in only 4. Mid substance tear of ACL was present in 19 patients, ACL avulsion from femoral and tibial attachment site was present in 1 and 3 patients respectively.

In our study, mean length of peroneus longus graft was 282 mm and mean thickness was 8.25 mm (Table I).In 10 (41.6%) 8mm thick graft was harvested. Bony notchplasty was required in 1 patient only. In 1 patient microfracture was performed because of osteochondritis desiccans. Lachman test was used for assessing knee stability. It

showed normal results in 17 (70.8%) patients, 1+ laxity in 4 (16.6%), 2+laxity in 2 (8.3%) and 3+laxity in 1 (4.1%) patient (Table II). 14 (58.3%) patients had negative pivot shift and 10 (41.6%) had positive glide (Table III). IKDC criteria was used to assess results after 6 months, according to which 22 (91.6%) patients were normal or almost normal and 2 (8.3%) were abnormal or severely abnormal. At the end of 6 months flexion or extension was normal in all patients functions of ankle preserved in all patients. Stiffness of knee joint occurred in 1 patient and was mobilized 10 days after treatment. In 2 patients hemarthrosis occurred for which arthroscopic lavage was performed 3 weeks post operatively. 2 patients were injured resulting in re rupture.

Table I PLT Graft Thickness

Graft Thickness (mm)	Frequency	Percentage
7.5	2	8.33%
8.0	12	50%
8.5	7	29.1%
9.0	1	4.1%
9.5	2	8.33%

Table II Findings of Lachman test

Grade	Preoperative	Post operative
Negative	2	17
1+	12	4
2+	3	2
3+	2	1

Table III Findings of Pivot Shift Test

Pivot Shift	Preoperative	Post operative
Negative	9	14
Positive	11	10
Gross	6	1

Discussion

ACL has a significant role in stability and functionality of knee. Most common causes of its rupture are road traffic accidents and sports injuries (Grassi et al., 2022). Most common injury mechanism is forceful rotation of valgus external. ACL reconstruction is a common procedure. Most commonly used grafts are allografts, bone-patellar tendon-bone complex and hamstring tendon autografts. Gold standard for reconstruction is BPTB graft due to its ease of harvesting, size consistency, strength and bone to bone healing (Levy et al., 2022).

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Patella tendon bone graft has different complications including patellar/tibial fracture, anterior knee pain, loss of full extension, patellar tendon rupture, quadriceps Weakness, numbness and difficulty in kneeling. Thus it is not preferable in patient who need frequent kneeling due to occupation or any other need (Poehling-Monaghan et al., 2017). Mechanical strength of hamstring tendon graft is greater as compared to bone patellar tendon bone graft. Hamstring tendon graft is less frequently associated with extension loss and patella femoral pain (Chee et al., 2017). The strength of hamstring muscle is significantly changed through use of hamstring tendon. Anterior drawer force is damaging for reconstructed ACL, it is protected from this force through hamstring (Shichman et al., 2022). Allograft offers different advantages like good cosmetic results and short duration of operation and anesthesia. However, there are limitations including immunological reaction, disease transmission, delayed incorporation and high cost (Zhao et al., 2022). Synthetic grafts are becoming increasingly popular due to its significant strength, abundant supply and absence of donor morbidity (Bottoni et al., 2015). Different artificial biomaterials including polypropylene, polyester, Dacron and Carbon etc. are available. Their disadvantages include knee Osteoarthritis, foreign-body synovitis, femoral and tibial fractures, tunnels osteolysis, immunological responses, cross-infections, inflammatory synovitis, deposition of Carbon, wear and tear and early breakage. Because of these reasons in current study peroneus longus (PLT) was used for ACL reconstruction. Strength of PLT matches with native ACL. Native ACL has maximum tensile load of 1725N, a study showed that single strand PLT has maximum tensile load of 1950 N (Wang et al., 2018). In current study, the mean thickness of graft was 8.25mm, it is way better than thickness of hamstring graft. No loss of extension or flexion was reported. Patella-femoral pain was also not reported in any of the patients. These results and IKDC score are better as compared to a previous study (Zheng et al., 2019). Ankle dysfunction associated with graft harvest was also not reported. A study conducted Trung et al., by also showed by also that peroneus longus is good choice for reconstruction of ACL and its resection does not influence ankle joint (Trung et al., 2019). The limitation of this study is that ankle function was not

assessed through the latest devices instead grading of muscle power was used. Single bundle reconstruction was used while there is increasing trend of double bundle reconstruction due stability and physiology (Mayr et al., 2016).

Conclusion

Peroneus longus tendon autograft is an effective option for anterior cruciate ligament reconstruction with less complications and maintains ankle function.

Conflict of interest

The authors declared absence of conflict of interest.

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