Journal of Surgery and Surgical Specialities
Volume 1, Issue 2, June 2025; pp: 50-56
eISSN: 2455-2860 DOI: 10.65129/surgical.v1i2.27

ORIGINAL RESEARCH ARTICLE

A Prospective Study on Functional Outcome of Arthroscopic Anterior Cruciate Ligament Reconstruction with Autologous Peroneus Longus Tendon Graft

S. Urmil Kumar*, P. Maharajothi and K. Muthukumar

Department of Orthopaedics, Government Chengalpattu Medical College and Hospital, Chengalpattu - 603001, Tamil Nadu, India; kumarurmil.11@gmail.com

Abstract

Background: Anterior Cruciate Ligament (ACL) injuries are among the most common knee ligament injuries, significantly affecting joint stability and function. While traditional graft options like Bone-Patellar Tendon-Bone (BPTB) and hamstring tendons are widely used in ACL reconstruction, they are associated with donor site morbidity and functional limitations. The Peroneus Longus Tendon (PLT) has emerged as a potential alternative autograft due to its favourable biomechanical properties and minimal donor site morbidity. **Aim**: To evaluate the functional outcomes and safety of using the autologous peroneus longus tendon as a graft in arthroscopic ACL reconstruction. **Methods**: This prospective study involved 10 patients with ACL injuries who underwent arthroscopic ACL reconstruction using the peroneus longus tendon autograft at Government Chengalpattu Medical College Hospital from May 2024 to March 2025. Patients were followed up at 1, 3, and 6 months postoperatively. Functional outcomes were assessed using the Lysholm Knee Score, while donor site morbidity was evaluated using the Foot and Ankle Disability Index (FADI). **Results**: The mean age of the patients was 35.3 ± 10.3 years. The average graft length and diameter were 28.69 ± 0.859 cm and 8.27 ± 0.632 mm, respectively. Postoperative assessments showed significant improvement in knee function, with mean Lysholm and FADI scores of 94.1 ± 3.1 and 97 ± 1.4, respectively ($p = 0.001$). No significant donor site morbidity or ankle function impairment was observed. **Conclusion**: The use of the peroneus longus tendon as an autograft in ACL reconstruction demonstrates excellent short-term functional outcomes with minimal donor site morbidity. It presents a viable, safe, and effective alternative graft option for arthroscopic ACL reconstruction.

Keywords: Arthroscopy, Anterior Cruciate Ligament (ACL) Injury, Foot and Ankle Disability Index (FADI), Lysholm Score, Peroneus Longus Tendon (PLT)

1. Introduction

The Anterior Cruciate Ligament (ACL) is among the most commonly injured ligaments in the knee, often resulting from sports-related activities. However, non-sports injuries, such as road traffic accidents or falls during household tasks, are also increasingly recognised causes. ACL injuries can significantly impair knee stability and function, prompting the need for surgical reconstruction in many cases to restore normal daily activity or facilitate a return to sports[1].

Over the years, ACL reconstruction techniques have evolved, with various graft options being explored, including autografts, allografts, and synthetic materials[2]. Among autografts, the hamstring tendon and the Bone-Patellar Tendon-Bone (BPTB) grafts are widely used. BPTB grafts offer the advantage of bone-to-bone healing and faster integration, but are associated with complications such as anterior

*Author for correspondence

Article Received on: 25 Feb 2025 Revised on: 20 April 2025 Accepted on: 15 June 2025

knee pain, patellofemoral discomfort, and donor site morbidity[3,4]. Conversely, hamstring tendon grafts are easier to harvest and cause less donor site morbidity, yet they may lead to reduced hamstring strength and variability in graft size, which can be limiting for athletes[3,4].

Given these challenges, there has been growing interest in alternative graft sources. The PLT, which acts synergistically with the peroneus brevis and plays a role in ankle stability, has emerged as a promising option. Already used in various reconstructive procedures, the PLT has shown favourable outcomes in a few early studies on ACL reconstruction, with minimal donor site morbidity and biomechanical strength comparable to traditional grafts[5-9].

This study explores whether the peroneus longus tendon is a viable, functionally effective graft for arthroscopic ACL reconstruction.

2. Aim and Objectives

To identify patients with Anterior cruciate ligament injury.

To reconstruct the ACL with an autologous peroneus longus tendon graft.

To evaluate the functional outcome of Arthroscopic Anterior cruciate ligament reconstruction with autologous Peroneus longus tendon graft.

3. Review of Literature

The Anterior Cruciate Ligament (ACL) plays a pivotal role in maintaining knee joint stability. Its injury, whether due to sports activities or non-sporting incidents, has been extensively studied over the decades. Frank and Jackson[1] laid the foundational understanding of ACL reconstruction science, emphasising biomechanical principles and surgical advancements that have shaped modern approaches[10].

Graft selection is one of the most critical considerations in ACL reconstruction. Miller and Gladstone[3] discussed various graft options, highlighting the strengths and limitations of autografts such as the BPTB and hamstring tendons. Each graft type carries unique benefits and complications—BPTB allows for bone-to-bone healing but is often associated with anterior knee pain, while hamstring grafts, although less invasive, may lead to muscle weakness and unpredictable graft size.

With the emergence of anatomical reconstruction techniques, van Eck *et al.*[2] emphasised the importance of replicating native ligament anatomy for better clinical outcomes in both primary and revision surgeries.

Furthermore, Murawski *et al.*[11] supported the operative treatment of ACL injuries in adults, reinforcing the efficacy of surgical intervention in restoring knee function.

Postoperative muscle atrophy, particularly of the quadriceps, remains a significant concern. Thomas *et al.*[12] reported that muscle atrophy substantially contributes to postoperative quadriceps weakness, which can delay functional recovery.

Recently, alternative graft sources such as the Peroneus Longus Tendon (PLT) have gained attention. Otis *et al.*[5] demonstrated that although the peroneus brevis is a more effective evertor, harvesting the peroneus longus does not significantly compromise ankle function. This insight opened avenues for using PLT in reconstructive surgeries beyond the ankle.

Angthong *et al.*[8] and Kerimoğlu *et al.*[9] conducted clinical and biomechanical evaluations of the peroneus longus tendon as a graft for ACL reconstruction, reporting encouraging outcomes with minimal donor site morbidity.

Similarly, Sasetyo *et al.*[10] regarded the PLT as a promising graft choice, particularly valuable for patients where hamstring preservation is critical, such as athletes relying on hamstring strength[8].

These findings suggest that the peroneus longus tendon is a viable and functionally competent autograft for ACL reconstruction, offering a favourable balance between graft strength and donor site safety.

4. Materials and Methods

This prospective study was conducted on 10 patients with ACL injuries who underwent arthroscopic ACL reconstruction using autologous peroneus longus tendon graft at the Department of Orthopaedics, Government Chengalpattu Medical College and Hospital from May 2024 to March 2025. All patients provided informed consent prior to surgery. Patients more than 18 years with anterior cruciate ligament

injury who are willing to give consent are included in the study.

Under spinal anaesthesia and in supine position, with pneumatic tourniquet, each surgery began with a diagnostic arthroscopy to confirm ACL injury, with or without associated meniscal or ligamentous injuries. Following confirmation and arthroscopic debridement, the femoral footprint was prepared and the femoral tunnel made (Figure 1). Harvesting of the peroneus longus tendon was performed through a longitudinal incision over the posterolateral aspect of the distal fibula on the ipsilateral limb (Figure 2). The peroneus longus tendon was then harvested using a closed tendon stripper. The graft was prepared by folding into double or quadruple strands for single-bundle ACL reconstruction (Figures 3, 4).

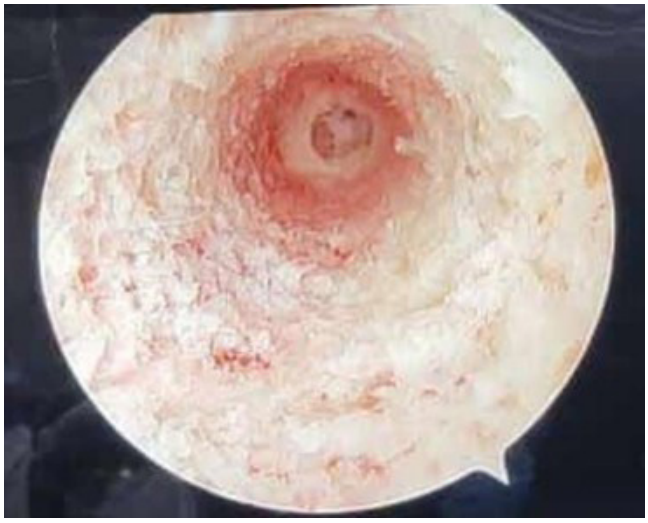


Figure 1. Femoral tunnel.

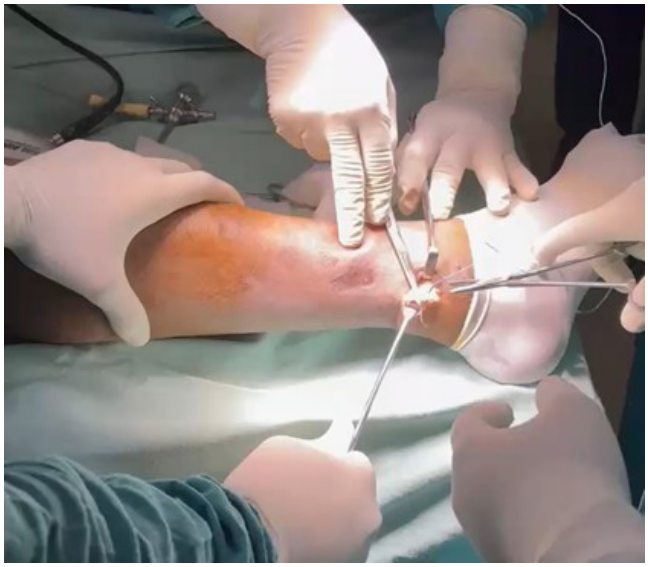


Figure 2. Peroneus tendon graft harvest.

Subsequently, appropriate tibial tunnels were created using a tibial jig, and the graft was fixed at the anatomical footprints of the femur and tibia using an endo button and, titanium screw. The stability of the reconstructed ligament was confirmed intraoperatively using the Lachman's test, which demonstrated no residual laxity.

Postoperatively, patients began static quadriceps exercises, ankle pump exercises, and knee range of motion exercises from Day 1, along with partial weight-bearing. Patients were encouraged to perform active ankle stretching to maintain ankle function. Full weight-bearing was permitted from the third postoperative week.

Patients were followed up at 1 month, 3 months, and 6 months postoperatively (Figure 5). Functional outcomes were assessed using the Lysholm Knee Score. Ankle

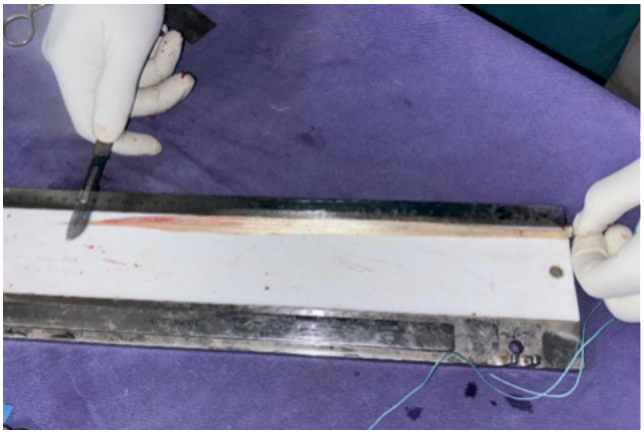
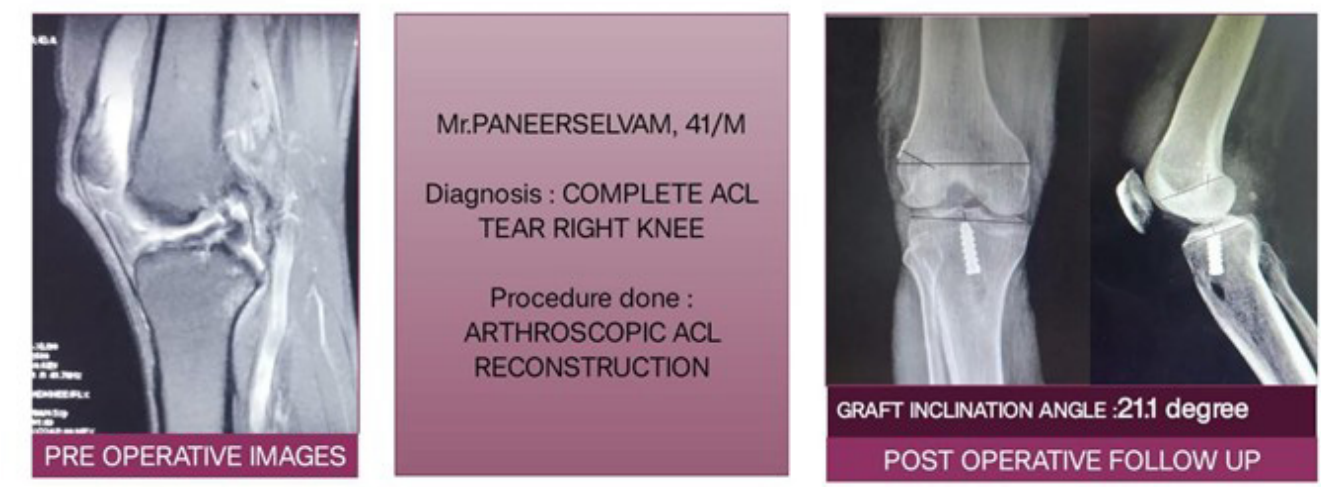


Figure 3. Graft preparation.

Figure 4. Making a single bundle.



Figures 5. Case pre OP and post OP image.

Figure 6. Post op clinical follow-up.

biomechanics were evaluated using the Foot and Ankle Disability Index (FADI). Eversion power of the ankle was monitored at each follow-up and was found to be preserved and comparable to preoperative levels in all cases, (Figure 6), indicating no significant donor site morbidity.

5. Results (Including Observations)

In our study, the average age of patients was 35.3 ± 10.349 years (Chart 1). Road traffic accident was seen in the majority of our cases as the cause of ACL injury, accounting for about 50% followed by sports injury with 30% in our study (Chart 2). And also, there were 7 (70%) males and 3 (30%) females (Chart 3). All patients were operated on within two to six months following injury (Chart 4), so this one can avoid complications like arthrofibrosis. The time of surgery also correlated to a higher risk of arthrofibrosis if surgery was done within two weeks post injury[13]. The mean length of the harvested Peroneus longus graft was 28.69 ± 0.589 cm, and the obtained mean diameter was 8.27 ± 0.632 mm (Table 1). All 10 patients had a complete follow-up of 6 months. At final follow-up, the anterior drawer test showed normal findings in 80%, while 20% of all examined patients had 1+ anterior laxity, with excellent results in final follow-up. The majority of patients experienced an improvement in their Lysholm knee score and FADI score. A significant difference (p=0.001) was found in Lysholm scores between the pre-operative and final follow-up assessments, with an average post op Lysholm score of 94.1 ± 3.107 (chart 5) and FADI score of 97 ± 1.414 (chart 6, Table 2).

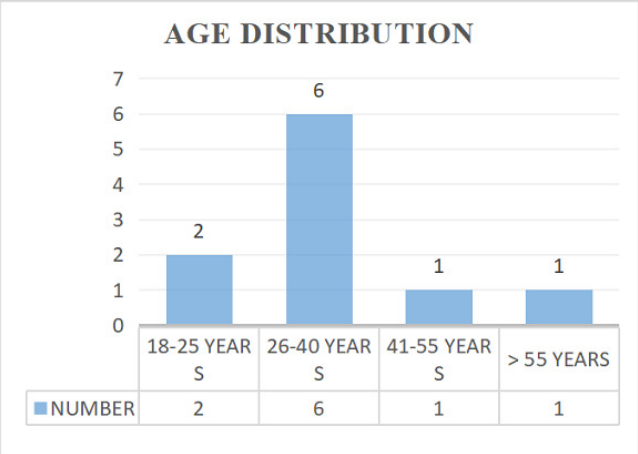


Chart 1. Age distribution.

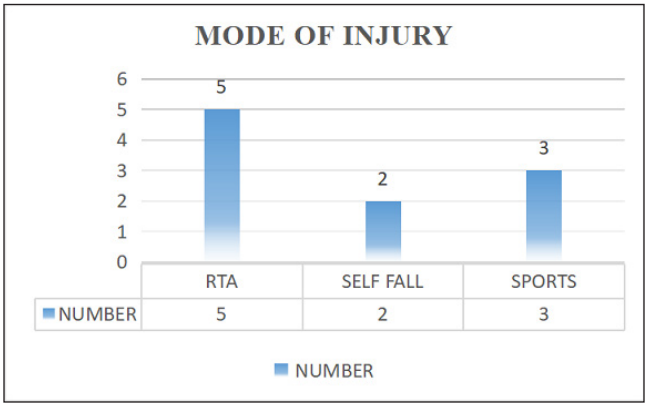


Chart 2. Mode of injury.

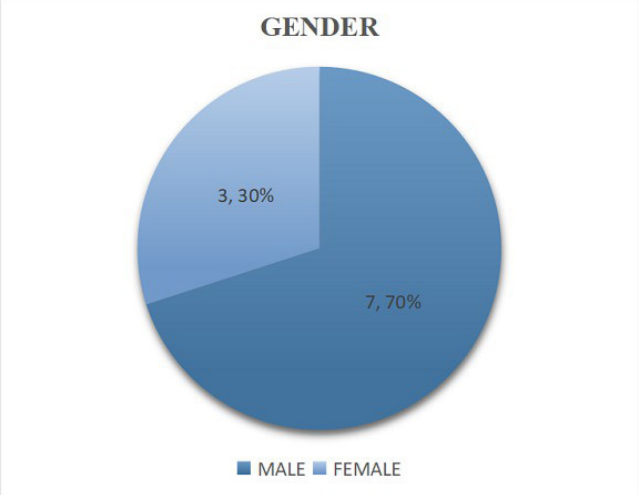


Chart 3. Gender distribution.

Chart 4. Time since injury.

Table 1. Graft parameters.

Parameter	Pernoeous Longus Graft	
	Mean	SD
Length	28.69 cm	0.859
Diameter	8.27 mm	0.632

Table 2. Clinical score outcome

Patient	Pre OP lysholm score	Post OP Lysholm score at final follow-up	Post OP FADI score at final follow-up	Results
1	60	95	95	Excellent
2	46	97	97	Excellent
3	49	97	96	Excellent
4	52	88	97	Good
5	55	95	95	Excellent
6	59	95	99	Excellent
7	61	89	97	Good
8	63	95	98	Excellent
9	54	96	99	Excellent
10	59	94	97	Excellent

6. Discussion

Anterior Cruciate Ligament Reconstruction (ACLR) is the most common surgery to restore the injured ACL using the placement of graft material. The most crucial part of the operative plan is to make the correct choice of graft material in order to get the appropriate graft that helps to prevent re-injury or re-rupture incidents and provides optimal knee stability. Mohtadi *et al.*[12] reported that HT graft and BPTB are related to post-operative complications, including anterior knee pain

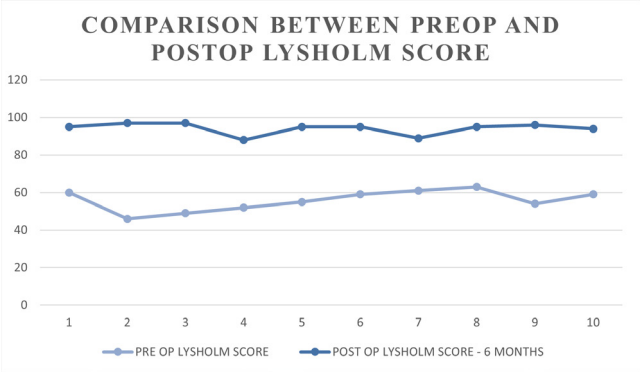


Chart 5. Comparison of pre- and post Op lysholm score.

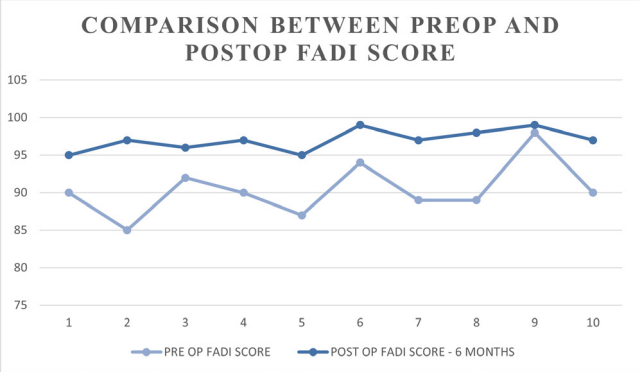


Chart 6. Comparison of pre- and post Op FADI score.

and stiffness. In our study, we used an autologous peroneus longus tendon graft to replace the injured ACL. It has also had the advantage of a larger graft diameter and simplicity of technique, and minimal donor site morbidity. Our study showed significant improvement in the result of the Lysholm score even at the final follow-up. Angthong *et al.*[8] referred to a possible donor site morbidity using peroneus longus autograft, such as reduced peak torque eversion and inversion, decreased ankle functions and concerns about ankle stability. In our study mean for the FADI score is 97 ± 1.414, which shows minimal donor site morbidity and no significant deterioration in ankle function. Peroneus longus autograft produced an excellent functional score (Lysholm scoring system) in 80% of our patients, and the remaining 20% patients had a good functional score.

7. Summary and Conclusion

In summary, a favourable functional outcome (Lysholm score and FADI) was achieved by the use of the peroneus longus tendon autograft in ACL reconstruction. FADI score for donor ankle functional test was impressive, and it proves that the peroneus longus can be considered as a safe, effective, and promising graft of choice for arthroscopic primary ACL reconstruction.

8. References

1. Frank CB, Jackson DW. The science of reconstruction of the anterior cruciate ligament. J Bone Joint Surg Am. 1997; 79:1556-1576. https://doi.org/10.2106/00004623-199710000-00014 PMid:9378743
2. van Eck CF, Schreiber VM, Liu TT, Fu FH. The anatomic approach to primary, revision and augmentation anterior cruciate ligament reconstruction. Knee Surg Sports Traumatol Arthroscopy. 2010; 18:1154-1163. https://doi.org/10.1007/s00167-010-1191-4 PMid:20532865
3. Miller SL, Gladstone JN. Graft selection in anterior cruciate ligament reconstruction. Orthop Clin North Am. 2002; 33:675-683. https://doi.org/10.1016/S0030-5898(02)00027-5 PMid:12528909
4. Mohtadi NG, Chan DS. A randomized clinical trial comparing patellar tendon, hamstring tendon, and double-bundle ACL reconstructions. J Bone Joint Surg. 2019; 101(11):949-960 https://doi.org/10.2106/JBJS.18.01322 PMid:31169571
5. Otis JC, Deland JT, Lee S, Gordon J. Peroneus brevis is a more effective evertor than peroneus longus. Foot Ankle Int. 2004; 25:242-246. https://doi.org/10.1177/107110070402500408 PMid:15132932
6. Angthong C, Chernchujit B, Apivatgaroon A, Suchao-in K. The anterior cruciate ligament reconstruction with the peroneus longus tendon: a biomechanical and clinical evaluation of the donor ankle morbidity. J Med Assoc Thai. 2015; 98:555-560
7. Kerimoğlu S, Aynaci O, Saraçoğlu M, Aydin H, Turhan AU. Anterior cruciate ligament reconstruction with the peroneus longus tendon. Acta Orthop Traumatol Turc. 2008; 42:38-43 https://doi.org/10.3944/AOTT.2008.038 PMid:18354276
8. Sasetyo DR, Rhatomy S, Pontoh LA. Peroneus longus tendon: The promising graft for anterior cruciate ligament reconstruction surgery. Asia Pac J Sport Med Arthrosc Rehabil Technol. 2017; 9:25. https://doi.org/10.1016/j.asmart.2017.05.033
9. Sharma D, Agarwal A, Shah K, Shah R, Shah H. Peroneus longus: Most promising autograft for arthroscopic ACL reconstruction. Indian J Orthop Surg. 2019; 5(3):172-175. https://doi.org/10.18231/j.ijos.2019.033
10. Frank CB, Jackson DW. The science of reconstruction of the anterior cruciate ligament. J Bone Joint Surg Am.

1997; 79:1556-1576. https://doi.org/10.2106/00004623-199710000-00014 PMid:9378743

11. Murawski CD, van Eck CF, Irrgang JJ, Tashman S, Fu FH. Operative treatment of primary anterior cruciate ligament rupture in adults. J Bone Joint Surg Am. 2004; 96:685-694. https://doi.org/10.2106/JBJS.M.00196 PMid:24740666
12. Thomas AC, Wojtys EM, Brandon C, Palmieri-Smith RM. Muscle atrophy contributes to quadriceps weakness after anterior cruciate ligament reconstruction. J Sci Med Sport. 2016; 19:7-11. https://doi.org/10.1016/j.jsams.2014.12.009 PMid:25683732 PMCid:PMC4500756
13. Shelbourne KD. Wilckens JH. Mollabashy A, DeCarlo M. Arthrofibrosis in acute anterior cruciate ligament reconstruction. The effect of timing of reconstruction and rehabilitation. Am J Sports Med. 1991; 19(4):332-336. https://doi.org/10.1177/036354659101900402 PMid:1897645