

An Updated Evaluation of Rotator Cuff Anatomy: Unraveling the Complexities for Enhanced Understanding of Injury Etiology and Modern Treatment Strategies

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Abstract:

Objective: The main purpose of this study is to find the incidence and rate of re rupture of ACL after Tibial stump preserving ACL Reconstruction.

Materials & Methods: From January 2021 to July 2022 having total study duration of 1.5 years, about 130 patients consisting of 10 females and 120 Male who were having torn ACL whether Acute or chronic underwent reconstruction of ACL with tibial stump of ACL preservation to retain vascular supply of ACL and proprioception function of knee joint.

Individuals were carefully monitored for the rate of re rupture of ACL after Tibial stump preserving ACL Reconstruction.

BMI was ranging from 25.4-30.62 kg/m² in all patients who participated in this study

Results: This study included total 130 patients, out of these A nodules scar tissue development was identified in 30 out of the 130 patients during the subsequent arthroscopic examination. Nevertheless, the rate of rupture was 2.3%

Conclusion: rate of re rupture of ACL after Tibial stump preserving ACL Reconstruction is a not commonly occurring complication which usually happens after the Anterior Cruciate ligament reconstruction (ACLR).

Keywords: ACL, Tibial Stump, ACL reconstruction

Introduction: Injuries to the Anterior cruciate ligament (ACL) usually occur in youthful and energetic patients, with a yearly frequency of over 200,000 in the United States solely (1). Roughly 65% of these individuals experience ACL reconstruction, but there is an ongoing argument about the most fitting methods (2). Earlier investigations have analyzed the significance of burrow arrangement, join selection, join fixation, and rehabilitation procedures, but recent concentration has centered on the function of double-bundle reconstruction (3)

The Inherent ACL comprises of two distinct anterior-medial and posterior-lateral bundles, which individually contribute to translational and rotational steadiness (4). Double-strand ACL reconstruction entails reconstructing both of these bundles autonomously and is believed to more accurately reinstate the natural knee configuration and mechanics (5). In a tibial stump-preserving ACL reconstruction, the surgeon only removes the damaged portion of the ACL and preserves the tibial stump. The surgeon then attaches the new graft to the preserved tibial stump and secures it with screws or other fixation devices (3) Anterior cruciate ligament (ACL) reconstruction (ACLR) is a frequently performed surgical procedure to restore knee stability and enable a return to athletic activities following ACL injury. Despite favorable to exceptional clinical results, graft failure remains a concern, and there are numerous factors contributing to failure. (10) Histopathological studies have confirmed the existence of a circulatory system and viable

mechanoreceptors within the ACL remnants, and preservation of these elements may stimulate cell proliferation and the restoration of proprioceptive function, as well as the reestablishment of blood supply to the graft and its synovial covering post-surgery (6) . Though the post-operative occurrence frequency of complications is low, the deprivation of knee elongation might require corrective surgery (7). After a tibial stump-preserving ACL reconstruction, there is still a risk of re-rupture of the ACL. Although the procedure aims to preserve the tibial stump of the torn ACL and create a new ligament using grafts, it doesn't guarantee complete immunity to future injuries(8,9).

Several factors can contribute to re-rupture, such as:

(10,11)

Excessive stress on the knee joint during activities or sports.

Failure of the graft to fully integrate and heal.

Insufficient rehabilitation or not following post-operative instructions.

Engaging in high-impact activities too soon after surgery.

Pre-existing conditions that affect the stability of the knee joint.

The main aim of this methodical analysis of literature was to assess the rate of re rupture of ACL after tibial stump Preserving ACL reconstruction.

Materials & Methods: From January 2021 to July 2022 total 130 patients consisting of 10 females and 120 Male who were having torn ACL whether Acute or chronic underwent reconstruction of ACL with tibial stump preservation.

Acute reconstruction was defined as procedure performed within six weeks of torn ACL.

Total 40 forty patients were there who went under Acute reconstruction.

Individuals were carefully monitored for the re rupture of ACL after Tibial stump preserving ACL Reconstruction.

The positioning of the tibial tunnel was assessed using side-view X-rays. The ratio of the gap between the front part of the tibia and the tunnel at the joint level (A) to the combined width of the upper tibia (A+B) was computed.

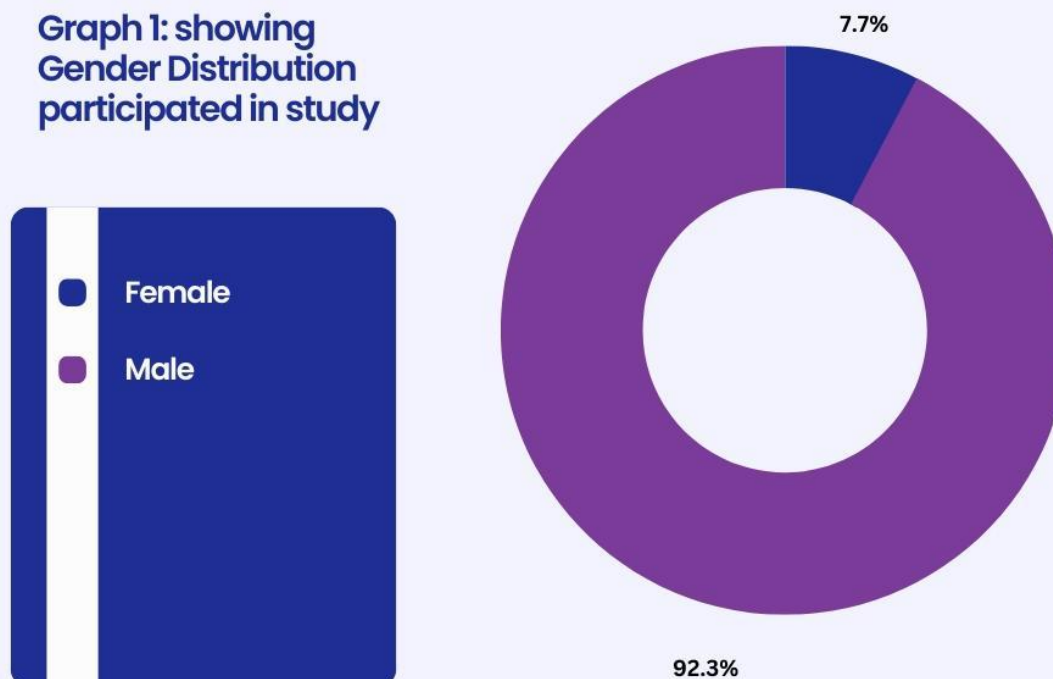
After a monitoring period of no less than 18 months, individuals were summoned for a follow-up assessment. The evaluation encompassed a medical inspection, evaluation of personal symptoms and operational testing, and radiography. The extent of movement was quantified using a goniometer while the individual was lying on their back.

Results: This study included total 130 patients, out of these A nodules scar tissue development was identified in 30 out of the 130 patients during the subsequent arthroscopic examination . Nevertheless, the rate of re rupture of ACL after Tibial stump preserving ACL Reconstruction was seen in only three patients, comprising of just 2.3% of total.

Table 1: showing Baseline Demographic details of patients (n=130)

Parameter	Frequency	Percentage
Age		
25-30 years	80	61.53%
31-40 years	50	38.46%
Gender		
Male	120	93.7%
Female	10	7.7%
BMI(kg/m²)	25.4-30.62	---

**Graph 1: showing
Gender Distribution
participated in study**



Those patients who participated in this study were both male and female. Total patients ranging 25-30 years were 80 in number making 61.53% major portion in study. While remaining age was ranging 31-40 years. These were total 50 patients out of 130 having participating age of 38.46%. Females participants were higher in number contributing 53.84% of total participants while remaining 60(46.15%) were male patients. BMI was ranging from 25.4-30.62 kg/m².

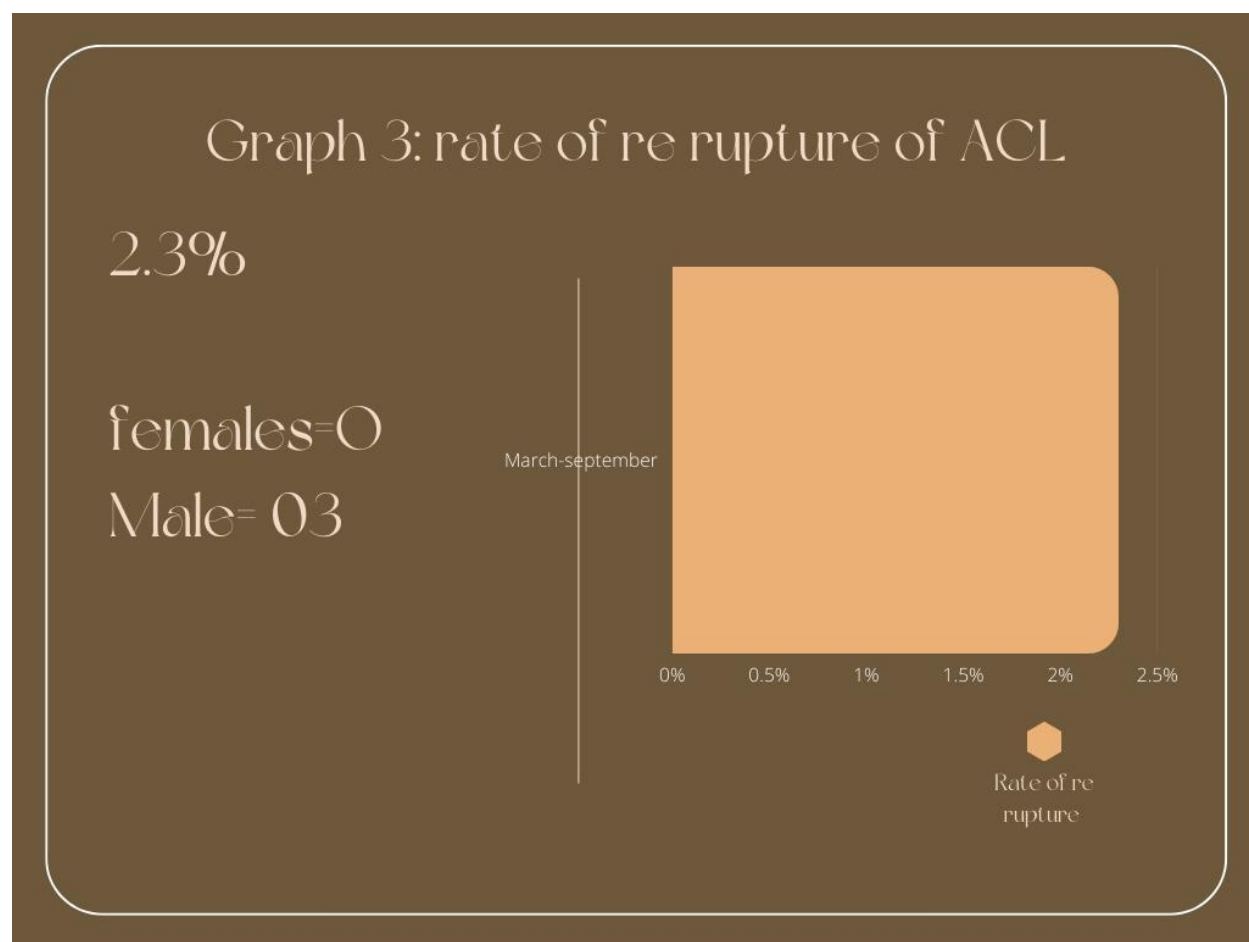
Table 2: Incidence of cyclops Lesions clinically and Radiologically.

Sr.No	Gender	Incidence of cyclops lesions		Total	Percentage	Rerupture of ACL	Percentage
		Clinical	Radiological				

1.	Male	12	15			3	
2.	Female	1	2			0	
		13.	17	Total=30	23.07%	Total=03	2.3%

Clinical symptoms noted in 13 patients.

Incidence of re rupture of ACL was seen in only three male patients. No re rupture noted in any female patients.



Total recurrence rate was only 2.3%. This is because tibial stump may increase the vascular supply and thus decreases the recurrence rate.

Discussion:

The rate of re-rupture after tibial stump preserving ACL reconstruction is generally lower compared to traditional ACL reconstruction techniques. This is because tibial stump preserving procedures aim to retain the native ACL tissue, which may improve the stability and healing process (15,16) .

A re-rupture of the ACL (anterior cruciate ligament) after a tibial stump preserving ACL reconstruction can occur in some cases. There could be various reasons for this, such as inadequate healing, improper rehabilitation, or a return to high-impact activities too soon (14). After a tibial stump preserving ACL reconstruction, a re-rupture of the ACL refers to the occurrence of a subsequent tear in the reconstructed anterior cruciate ligament (ACL) (17,18). This situation can happen when the ACL graft fails to heal properly or when excessive stress is placed on the new ligament during activities. (19). Gradually

returning to physical activities and sports while ensuring proper strengthening and stability exercises can also help prevent future ACL injuries.(20,22).

Those patients who participated in this study were both male and female. Total patients ranging 25-30 years were 80 in number making 61.53% major portion in study. While remaining age was ranging 31-40 years. These were total 50 patients out of 130 having participating age of 38.46%.

In our particular research writing paper, Incidence of re rupture of ACL was seen in only three male patients. No re rupture noted in any female patients. Total recurrence rate was 2.3%.

According to our research, A tibial stump preserving ACL reconstruction is a surgical procedure in which the original tibial insertion of the ACL is preserved while the damaged ligament is reconstructed using graft tissue. Despite this approach, there is still a risk of re-rupture, which can be caused by several reasons, including:

Re-injury: Engaging in activities or sports too soon after surgery, without adequate healing time and rehabilitation, can lead to a new ACL tear.

Graft failure: The reconstructed ACL graft may not integrate properly or may fail to withstand the stress placed on it during physical activities.

Insufficient rehabilitation: Proper post-surgery rehabilitation is crucial for restoring strength, flexibility, and stability. Inadequate rehab can increase the risk of re-rupture.

Returning to high-risk activities too early: Engaging in high-impact or high-risk activities before the knee has fully healed and regained strength can lead to re-injury.

Poor surgical technique: In some cases, the failure may be due to surgical errors during the initial reconstruction (24,26). It is uncertain if the formation of a singular-eyed scar can metamorphose into a cyclops autonomously or conceivably via cellular modification instigated by compressive forces. (25).

Prevention:

After Tibial stump preserving ACL reconstruction, it's essential to take certain precautions to minimize the risk of re-rupture: (21-26).

Follow Rehabilitation Protocol: Adhere to the prescribed rehabilitation program and work closely with a physical therapist to ensure a gradual and safe recovery process.

Avoid High-impact Activities: Stay away from activities that put excessive stress on the knee, such as jumping, running, or sudden changes in direction, especially during the initial recovery phase.

Strengthen Muscles: Focus on strengthening the muscles around the knee, including quadriceps, hamstrings, and calf muscles, to provide better support and stability to the reconstructed ACL.

Maintain Proper Form: Practice good body mechanics and technique during physical activities to reduce the strain on the knee joint.

Wear Protective Gear: In sports or activities that carry a higher risk of injury, consider wearing appropriate knee braces or supports to provide added protection.

Listen to Your Body: Pay attention to any signs of pain, swelling, or discomfort in the knee. If you experience any issues, consult your doctor promptly.

Gradual Return to Sports: Before returning to sports or high-intensity activities, ensure that your knee is fully healed, and you have regained sufficient strength and flexibility.

Regular Check-ups: Continue with regular follow-up visits to your orthopedic surgeon to monitor the progress of your knee and identify any potential issues early on.

It's essential for patients to follow their surgeon's post-operative instructions carefully, undergo proper rehabilitation, and gradually return to sports and activities to minimize the risk of re-rupture. However, no surgical technique guarantees 100% protection against re-injury, and the outcome varies depending on individual circumstances

Conclusion: rate of re rupture of ACL after Tibial stump preserving ACL Reconstruction is a not commonly occurring complication which usually happens after the Anterior Cruciate ligament reconstruction (ACLR)

Conflict of interest: In this study Author did not find any conflict of interest

References:

1. Bierke S, Häner M, Karpinski K, Hees T, Petersen W. No increased rate of cyclops lesions and extension deficits after remnant-preserving ACL reconstruction using the sparing technique. *J Orthop Surg.* 2022;17(1):1–8.
2. Delaloye JR, Murar J, Vieira TD, Franck F, Pioger C, Helfer L, et al. Knee extension deficit in the early postoperative period predisposes to cyclops syndrome after anterior cruciate ligament reconstruction: a risk factor analysis in 3633 patients from the SANTI study group database. *Am J Sports Med.* 2020;48(3):565–72.
3. Hishimura R, Kondo E, Suzuki Y, Matsuoka M, Iwasaki K, Onodera T, et al. Occurrence Rate of Cyclops Lesion After Anatomic Double-Bundle ACL Reconstruction: Comparison Between Remnant Tissue Preservation and Resection Methods. *Orthop J Sports Med.* 2022;10(10):23259671221130690.
4. Kambhampati SB, Gollamudi S, Shanmugasundaram S, Josyula VV. Cyclops lesions of the knee: a narrative review of the literature. *Orthop J Sports Med.* 2020;8(8):2325967120945671.
5. Noailles T, Chalopin A, Boissard M, Lopes R, Bouguennec N, Hardy A. Incidence and risk factors for cyclops syndrome after anterior cruciate ligament reconstruction: a systematic literature review. *Orthop Traumatol Surg Res.* 2019;105(7):1401–5.
6. Hopper GP, Philippe C, El Helou A, Campos JP, Vieira TD, Döbele S, et al. Single AnteroMedial Bundle Biological Augmentation: SAMBBA Plus Technique for Combined ACL Repair and Reconstruction. *Arthrosc Tech.* 2023;12(1):e135–9.
7. Su C, Kuang S da, Liu W jie, Li Y sheng, Xiong Y lin, Zhao X, et al. Clinical Outcome of Remnant-Preserving and IDEAL Femoral Tunnel Technique for Anterior Cruciate Ligament Reconstruction. *Orthop Surg.* 2020;12(6):1693–702.
8. Rashwan AS, Ali MAE, Soluman HM, Moharram AN, Alqalyubi AS. Assessment of Proprioception Improvement After Anterior Cruciate Ligament Reconstruction with Tibial Remnant Preservation Versus Non Remnant Preservation. *Int J Health Sci. (II):*5403–19.
9. Liu Y, Li C, Ma N, Qi W, Gao F, Hu B, et al. Proprioceptive and Clinical Outcomes after Remnant Preserved Anterior Cruciate Ligament Reconstruction: Assessment with Minimal Confounding Factors. *Orthop Surg.* 2022;14(1):44–54.
10. Sunil S, Kumar H, Muralidhar N, Ratna B. ACL reconstruction preserving the ACL remnant achieves good clinical outcomes: A case control study. *Int J Orthop.* 2020;6(1):1300–4.
11. Singh I, Singh A. Remnant-Preserving Anterior Cruciate Ligament Reconstruction: Remnant Envelope Technique. *Arthrosc Tech.* 2020;9(11):e1805–12.
12. Ganguli R, Jash S. Functional result of anterior cruciate ligament reconstruction by remnant preservation in a tertiary center in Eastern India. *Int J Res Orthop.* 2021;7(4):820.
13. Kobayashi EF, Tang K, Grant JA. Is ACL repair really back? A review of modern techniques. *Oper Tech Sports Med.* 2021;29(2):150828.
14. Kayaalp ME, Sürücü S, Cerci MH, Aydın M, Mahiroğulları M. Anterior cruciate ligament repair using dynamic intraligamentary stabilization provides a similarly successful outcome as all-inside anterior cruciate ligament reconstruction with a faster psychological recovery in moderately active patients. *Jt Dis Relat Surg.* 2022;33(2):406.
15. Wang HD, Wang FS, Gao SJ, Zhang YZ. Remnant preservation technique versus standard technique for anterior cruciate ligament reconstruction: a meta-analysis of randomized controlled trials. *J Orthop Surg Res.* 2018;13(1):231

16. Ouanezar H, Blakeney WG, Fernandes LR, Borade A, Latrobe C, Temponi EF, Sonnery-Cottet B. Clinical outcomes of single anteromedial bundle biologic augmentation technique for anterior cruciate ligament reconstruction with consideration of tibial remnant size. *Arthrosc J Arthrosc Relat Surg.* 2018;34:714–22
17. Kirizuki S, Matsumoto T, Ueha T, Uefuji A, Inokuchi T, Takayama K, Hashimoto S, Hayashi S, Matsushita T, Kuroda R. The influence of ruptured scar pattern on the healing potential of anterior cruciate ligament remnant cells. *Am J Sports Med.* 2018;6:1382–8.
18. Kim BH, Il KJ, Lee O, Lee KW, Lee MC, Han HS. Preservation of remnant with poor synovial coverage has no beneficial effect over remnant sacrifice in anterior cruciate ligament reconstruction. *Knee Surg Sport Traumatol Arthrosc.* 2018;26:2345–52.
19. Hamrin Senorski E, Svantesson E, Beischer S, Grassi A, Krupic F, Thomeé R, Samuelsson K. Factors affecting the achievement of a patient-acceptable symptom state 1 year after anterior cruciate ligament reconstruction: a cohort study of 343 patients from 2 registries. *Orthop J Sport Med.* 2018.
20. Buscayret F, Temponi EF, Saithna A, Thauinat M, Sonnery-Cottet B. Three-dimensional CT evaluation of tunnel positioning in ACL reconstruction using the single anteromedial bundle biological augmentation (SAMBBA) technique. *Orthop J Sport Med.* 2017.
21. Ahmad SS, Schreiner AJ, Hirschmann MT, Schröter S, Döbele S, Ahrend MD, Stöckle U, Ateschrang A. Dynamic intraligamentary stabilization for ACL repair: a systematic review. *Knee Surg Sports Traumatol Arthrosc.* 2019;27(1):13–20
22. Naraoka T, Kimura Y, Tsuda E, Yamamoto Y, Ishibashi Y. Is remnant Preservation truly beneficial to anterior cruciate ligament reconstruction healing? Clinical and magnetic resonance imaging evaluations of Remnant-preserved reconstruction. *Am J Sports Med.* 2017;45(5):1049-1058.
23. Wang H, Liu Z, Li Y, et al. Is remnant preservation in anterior cruciate Ligament reconstruction superior to the standard technique? A systemic review and meta-analysis. *Biomed Res Int.* 2019;2019:1652901.
24. Kambhampati SBS, Gollamudi S, Shanmugasundaram S, et al. Cyclops lesions of the knee: a narrative review of the literature. *Orthop J Sports Med* 2020;8:2325967120945671
25. Ficek, K., Rajca, J., Cholewiński, J. et al. Analysis of intercondylar notch size and shape in patients with cyclops syndrome after anterior cruciate ligament reconstruction. *J Orthop Surg Res* 16, 554 (2021).
26. Tomihara, T., Hashimoto, Y., Nishino, K. et al. Bone–patellar tendon–bone autograft and female sex are associated with the presence of cyclops lesions and syndrome after anterior cruciate ligament reconstruction. *Knee Surg Sports Traumatol Arthrosc* (2022)
27. Klein, Lauren BS1; Sakryd, Gary MS, PAC, AT(ret), DFAAPA2,a. Case Report: Arthrofibrosis of the Knee After Anterior Cruciate Ligament Reconstruction: Anterior Interval Scarring and Cyclops Lesion. *JBJS Journal of Orthopaedics for Physician Assistants* 10(3):p e22.00008, July-September 2022.
28. R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, for the SCARE Group The SCARE 2020 guideline: updating consensus Surgical Case Report (SCARE) guidelines *Int. J. Surg.*, 84 (2020), pp. 226-230
29. Y. Kodama, T. Furumatsu, T. Hino, Y. Kamatsuki, Y. Okazaki, S. Masuda, et al. Thymol turbidity test is associated with the risk of cyclops syndrome following anterior cruciate ligament reconstruction *BMC Musculoskelet. Disord.*, 19 (2018), p. 367