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**THE STUDY OF ARTHROSCOPIC RECONSTRUCTION  
FAILURE RATES IN PATIENTS WITH COMPLETE RAPTURES  
OF ANTERIOR CRUCIATE LIGAMENTS**

***Abstract.** The study involved 84 patients similar in gender, age, and the causes of traumas examined in 3, 6, and 12 months after their surgeries, and was based on the revealing the true signs of the anterior cruciate ligament failure – Lachman and anterior drawer tests. The results suggested the absence of a significant correlation between the failure rate and the method of arthroscopic reconstruction.*

***Keywords:** knee joint, anterior cruciate ligament, arthroscopic reconstruction, methods, outcomes.*

The capacities of the contemporary arthroscopic reconstruction for complete raptures of anterior cruciate ligament (ACL) are rather ample. The injured ACL is reconstructed with 1, 2, or 4 bundles, the ligament is replaced with synthetic implants and autotransplants that have various stress and strength properties and different effects on immune-inflammatory reactivity of the surrounding tissues, and thus define the conditions of fixation and size of the remaining sections of donor areas. These factors to a great extent determine the incidence of poor outcomes for this kind of surgical intervention [1-3].

There are a lot of studies of arthroscopic ACL reconstruction failures [4-6], however, no integrated data on the incidence rate through the dependency of the transplants and methods of their placement has been yet available.

The **objective of this research** was the comparison of arthroscopic reconstruction failure rates in patients with complete ACL raptures based on their Lachman test results in the post-surgery period.

**Material and methods.** The study involved 84 patients who underwent management in the Scientific Research Institute of Traumatology, Orthopedics and Neurosurgery, Federal State Budgetary Educational Institution of Higher Education ‘V.I. Razumovsky Saratov State Medical University’, the Russian Federation Ministry of Healthcare in 2011-2020. The group was consistent in gender and age, all individuals had closed injuries of their knee joints with the complete ACL rupture due to various reasons. All patients underwent arthroscopic ACL reconstructions: 22 had single-bundle reconstructions with Dona implants (Group 1), 29 had double-bundle reconstructions with Dona implants (Group 2), and 33 had their ligaments reconstructed with autografts of semitendinosus and gracilis ligaments (Group 3).

The indication of the poor outcome of arthroscopic reconstruction in patients was the true clinical sign of ACL failure – the positive Lachman test along with the corresponding complaints of knee instability in regular physical load revealed in 3, 6, and 12 months after surgeries.

The analysis of indicants affecting surgical outcomes was performed on contingency tables for each dyad of the comparison groups; Group 1 and 2, Group 1 and 3, Group 2 and 3 on [7]; the event rate in the treatment group (TER), the event rate in the comparison group (CER), the relative reduction of the failure rate (RRF), the absolute risk reduction (ARR), the number of patients who needed to be treated within a certain period to avoid one poor outcome (NNT), the odds ratio (OR), and the relative risk (RR) were calculated.

The assumption of the absence of relation between the risk factor and the surgical outcome in this context was considered as the absence of dependency of failure and arthroscopic ACL reconstruction method for three aggregates was verified by the Fisher exact test. According to the test, the assumption of the absence

of relation between the risk factor and the surgical outcome in the analyzed aggregates was considered at  $\chi^2=0.167$  and  $p=0.919$ .

**Results.** In patients of three analyzed groups in 3 months after their surgeries, no failures of arthroscopic ACL reconstructions featured by the positive Lachman test along with the corresponding complaints of knee instability in regular physical load were revealed.

In Group 1 in 6 and 12 months the number of failures featured by the clinically measurable positive Lachman test was 3 and 3, respectively, in Group 2 – 1 and 1, respectively, and in Group 3 – 2 and 2, respectively.

Since the Lachman test was not considered positive in any patients of all analyzed groups in 3 months of their arthroscopic ACL reconstructions the parameters defining the effect of the surgical intervention were calculated in 6 months of observation. The arthroscopic reconstruction outcomes in patients with complete ACL raptures for 3 groups of aggregates are presented below in contingency tables (Tables 1-3).

*Table 1*

**The outcomes of arthroscopic ACL reconstructions in patients of Group 1 and 2 in 6 and 12 months after their surgeries**

Groups	Group 1	Group 2	Total
Failure rate	3	1	4
Success rate	19	28	47
Total	22	29	51

*Table 2*

**The outcomes of arthroscopic ACL reconstructions in patients of Group 1 and 3 in 6 and 12 months after their surgeries**

Groups	Group 1	Group 3	Total
Failure rate	3	2	5
Success rate	19	31	50
Total	22	33	55

Table 3

**The outcomes of arthroscopic ACL reconstructions in patients of Group 2 and 3 in 6 and 12 months after their surgeries**

Groups	Group 2	Group 3	Total
Failure rate	1	2	3
Success rate	28	31	59
Total	29	33	62

As Table 1 shows, in patients of Group 1, the event rate of positive the Lachman test along with the corresponding complaints of knee instability in regular physical load (TER) was 13.6% as compared to patients of Group 2 who had their TER as low as 3.4%. The comparison of these groups revealed the decrease of RRF to 295.5% in the values of confidence interval (CI95%) 123.2-345.1, ARR to 10.2% in CI95% 2.03-27.1, NNT 10 in CI95% 3-37, OR to observe the ACL incompetence in Group 1 as compared to Group 2 was 4.421 in CI95% 0.427-45.758, and RR to observe a failure was 3.955 in CI95% 0.441-35.488. As values of criterion  $\chi^2$  show, the OR difference in both groups was statistically insignificant ( $0.181 > p$ ) suggesting that the failure rate difference in 6 months was not conditioned by the method of arthroscopic ACL reconstruction.

As Table 2 shows, in patients of Group 2, the event rate of positive the Lachman test along with the corresponding complaints of knee instability in regular physical load (TER) was 13.6% as compared to patients of Group 3 who had their TER as low as 6.1%. The comparison of these groups revealed the decrease of RRF to 125.0% in the values of confidence interval (CI95%) 97.3-270.5, ARR to 7.6% in CI95% 1.3-20.1, NNT 13 in CI95% 2-41, OR to observe the ACL incompetence in Group 1 as compared to Group 2 was 2.247 in CI95% 0.374-16.009, and RR to observe a failure was 2.250 in CI95% 0.409-12.390. As values of criterion  $\chi^2$  show, the OR difference in both groups was statistically insignificant ( $0.339 > p$ ) suggesting that the failure rate difference in 6 months was not conditioned by the method of arthroscopic ACL reconstruction.

As Table 3 shows, in patients of Group 2, the event rate of positive the Lachman test along with the corresponding complaints of knee instability in regular physical

load (TER) was 3.4% as compared to patients of Group 3 who had their TER as high as 6.1%. The comparison of these groups revealed the decrease of RRF to 43.1% in the values of confidence interval (CI95%) 17.0-89.9, ARR to 2.6% in CI95% 0.5-7.8, NNT 38 in CI95% 3-62, OR to observe the ACL incompetence in Group 2 as compared to Group 3 was 0.554 in CI95% 0.048-6.443, and RR to observe a failure was 0.569 in CI95% 0.054-5.955. As values of  $\chi^2$  criterion show, the OR difference of in both groups was statistically insignificant ( $0.633 > p$ ) suggesting the failure rate difference in 6 months was not conditioned by the method of arthroscopic ACL reconstruction.

The assumption of the absence of relation between the risk factor and the surgical outcome in this context was considered as the absence of dependency of failure and arthroscopic ACL reconstruction method for three aggregates was verified by the Fisher exact test. According to the test, the management methods did not differ in failure rate at  $p=0.432 > 0.05$

We also tested the assumption of the equality of failure rates in three aggregates with the  $\chi^2$  criterion at  $\chi^2=2.0536$  and  $P=0.3581 > 0.05$ . Arguably, the ACL failure rate difference in the three groups was statistically insignificant.

As the examination of the patients in all groups in 12 months revealed the same values of the analyzed parameters, their statistical processing would result in the same conclusion.

**Conclusion.** The analysis of failures of arthroscopic ACL reconstruction suggests the absence of a statistically insignificant relation between their rates and the reconstruction method.

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