

SOI: [1.1/TAS](http://s-o-i.org/1.1/TAS) DOI: [10.15863/TAS](https://doi.org/10.15863/TAS)
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) e-ISSN: 2409-0085 (online)
Year: 2020 Issue: 12 Volume: 92
Published: 23.12.2020 <http://T-Science.org>

QR – Issue



QR – Article



M.E. Irismetov
Republican Scientific and Practical Medical Center of Traumatology and Orthopedics (RSSPMCTO)
Researcher

F.R. Rustamov
Republican Scientific and Practical Medical Center of Traumatology and Orthopedics (RSSPMCTO)
Researcher

N.B. Safarov
Republican Scientific and Practical Medical Center of Traumatology and Orthopedics (RSSPMCTO)
Researcher

SURGICAL OF TREATMENT OF THE MEDIAL COLLATERAL LIGAMENT OF THE KNEE JOINT

Abstract: *The reconstruction of the medial collateral ligament of the knee joint has lost its relevance to our time. There are still difficulties in reconstructing the rupture of the medial collateral ligament. In order to improve the results of treatment of this pathology, we set a goal to improve the method of surgical treatment and thereby reduce the rehabilitation time. During the period of 2015 - 2020 about 78 patients with rupture of the medial collateral ligament were operated using our method.*

Key words: *medial collateral ligament, knee joint, gracilis muscle (m. gracilis), knee joint instability, frontal instability.*

Language: English

Citation: Irismetov, M. E., Rustamov, F. R., & Safarov, N. B. (2020). Surgical of treatment of the medial collateral ligament of the knee joint. *ISJ Theoretical & Applied Science*, 12 (92), 282-287.

Soi: <http://s-o-i.org/1.1/TAS-12-92-55> **Doi:**  <https://dx.doi.org/10.15863/TAS.2020.12.92.55>

Scopus ASCC: 2700.

Introduction

UDC 616.71.002-089

Relevance

The knee joint (KJ) takes one of the first places in the frequency of joint damage and its damage accounts for up to 25% of all injuries of the musculoskeletal system. This is due to many factors, one of the main is the increasing frequency of doing sports[14;16].

The medial collateral ligament (MCL) is a major stabilizer of the knee joint. It is the most common ligament injured in the knee, particularly in athletes, and has been reported to be torn in 7.9% of all knee injuries[12].

Ruptures of the ligamentous apparatus of the knee joint, which are the cause of chronic instability, occupy the second place in frequency in the structure

of traumatic pathology of the knee joint after damage to the menisci, amounting, according to various authors, from 27 to 52%. Among isolated injuries of ligamentous structures, injuries of the anterior cruciate ligament occupy the first place (33–92%), followed by the complex of the medial collateral ligaments (19–77%) [3;8;9].

It is necessary to know anatomy of the knee in treatment of medial collateral ligament injuries. The anatomy of the medial side of the knee is complex, being composed of three tissue layers and multiple components with interconnections to the joint capsule, the muscle-tendon units, and the medial meniscus. The ligamentous sleeve spans the entire medial side of the knee from the medial aspect of the extensor mechanism to the posterior aspect of the knee adjacent to the posterior cruciate ligament. The majority of the

Impact Factor:

ISRA (India) = 4.971
ISI (Dubai, UAE) = 0.829
GIF (Australia) = 0.564
JIF = 1.500

SIS (USA) = 0.912
PIHII (Russia) = 0.126
ESJI (KZ) = 8.997
SJIF (Morocco) = 5.667

ICV (Poland) = 6.630
PIF (India) = 1.940
IBI (India) = 4.260
OAJI (USA) = 0.350

basic anatomy has been described by James, Warren, Hughston, and others[1;6;7;15].

There are several diagnostic methods to reveal of medial collateral ligament injuries: x-ray, ultrasound investigation, MRI. Each method has its advantages and disadvantages[2;5;10;11].

Despite a significant number of works devoted to injuries of the medial collateral ligament, there is still no common approach in the recommendations for surgical or conservative treatment, depending on the severity of the injury, the degree of instability, the timing and the extent of surgical intervention. There is also no consensus regarding the plastic material for replacing injuries of the medial collateral ligament [4;13].

Considering the above, we decided to improve the results of surgical treatment of patients with injuries of the lateral collateral ligament of the knee joint, by means of an individual approach, depending on the accompanying intra-articular injuries, where patients were divided into 3 groups: combined medial collateral ligament rupture with cruciate ligament ruptures; combined medial collateral ligament rupture with meniscus tears and combined medial collateral ligament rupture with ruptures of the cruciate ligaments and menisci.

Material and methods:

78 patients with rupture of the medial collateral ligament were operated according to our method during the period of 2015 to 2020. Of these, 63 are men and 15 women. The patients' age was from 15 to 64 years. The duration of the injury varied from 7 days to 3 years. Among the injuries of the medial collateral ligament there were 65 old ones and 13 cases were fresh damage. The side of injury in 40 patients was right, in 38 patients it was left. Isolated ruptures of the medial collateral ligament were observed in 8 patients, 70 patients had injuries of other elements of the knee joint (combined). We divided the combined damage into three groups:

1. Combined medial collateral ligament rupture with cruciate ligament ruptures:

- a) anterior cruciate ligament - 22 cases;
- b) posterior cruciate ligament - 11 cases.

2. Combined medial collateral ligament ruptures with meniscus tears - 2 cases.

3. Combined ruptures of the medial collateral ligament with ruptures of the cruciate ligaments and menisci - 35 cases.

When restoring the medial collateral ligament, we used three types of operative placement based on the duration of the injury and the presence of concomitant injuries to the elements of the knee joint. In the Department of Sports Injury (Republican Scientific and Practical Medical Center of Traumatology and Orthopedics) under the Ministry of Health of the Republic of Uzbekistan a new surgical method of surgical recovery in the treatment of the medial collateral ligament ruptures of the knee joint has been developed using an autograft from the gracilis muscle. This method was applied in 20 patients, ligament suturing was used in 24 cases, lavsanoplasty - in 34 cases.

To clarify the nature of structural changes in the elements of the knee joint, providing the stability of the knee joint, all patients underwent clinical and radiological examination, densitometry, arthroscopy, ultrasound and MRI studies.

Operation technique

When the limb is bent at the knee joint at an angle of 20 °, the first incision 2-3 cm long is made in the area of affixion of the gracilis muscle on the medial surface of the proximal part of the lower thigh. Soft tissues are dissected in a sharp and blunt way layer by layer. Then, an autograft is isolated and cut off from the tendon of the gracilis muscle (m. gracilis tendon) 25-30 cm long from the place of distal affixion of the ligaments on the tibia (Picture 1). A second 3 cm incision is made in the medial femoral condyle. The skin and underlying tissues are mobilized. Then the isolated autograft is drawn with the help of an instrument from the distal place of attachment to medial femoral condyle (Picture 2).

Skeletonization of the femur from the medial epicondyle to the adductor tubercle is performed. Then, through the incisions made, a horizontally V-shaped bone canal is shaped at an angle of 45° to the femoral condyle with a diameter of 4 mm.

(Picture 3)

Impact Factor:

ISRA (India) = 4.971
ISI (Dubai, UAE) = 0.829
GIF (Australia) = 0.564
JIF = 1.500

SIS (USA) = 0.912
ПИИЦ (Russia) = 0.126
ESJI (KZ) = 8.997
SJIF (Morocco) = 5.667

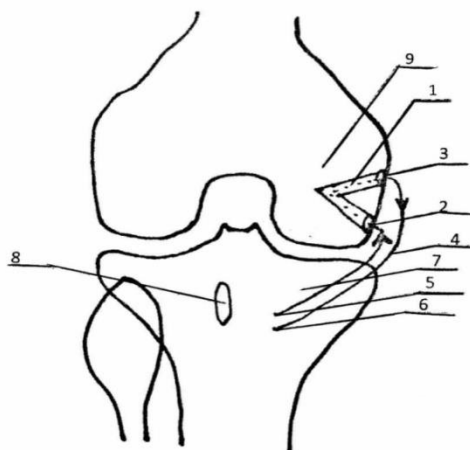
ICV (Poland) = 6.630
PIF (India) = 1.940
IBI (India) = 4.260
OAJI (USA) = 0.350



Picture 1. Skin incision and extraction of autograft



Picture 2. The isolated autograft is drawn with the help of an instrument from the distal place of attachment to the medial femoral condyle.



Picture 3. Shaping a horizontal V-shaped bone canal at an angle of 45° to the femoral condyle with a diameter of 4 mm.

in which: 1 - V-shaped bone tunnel on the medial femoral condyle; 2 - distal entrance to the tunnel, 3 - proximal entrance to the tunnel, 4 - autograft from the tendon of the gracilis muscle (m. gracilis tendon); 5 - the place of attachment of the gracilis muscle (m. gracilis tendon); 6 - the place of fixation of the autograft from the tendon of the gracilis muscle (m. gracilis tendon) on the medial side of the tibial

tuberosity; 7 - internal (medial) condyle of the tibia; 8 - tibial tuberosity, 9 - internal (medial) condyle of the femur.

Then, along the obtained bone canal, from the distal end to the proximal and back to the place of distal attachment of the gracilis muscle on the tibia, an autograft is carried through from the tendon of the gracilis muscle (m. Gracilis tendon) (Рис.4).

Impact Factor:

ISRA (India)	= 4.971	SIS (USA)	= 0.912	ICV (Poland)	= 6.630
ISI (Dubai, UAE)	= 0.829	ПИИЦ (Russia)	= 0.126	PIF (India)	= 1.940
GIF (Australia)	= 0.564	ESJI (KZ)	= 8.997	IBI (India)	= 4.260
JIF	= 1.500	SJIF (Morocco)	= 5.667	OAJI (USA)	= 0.350



Рис. 4. Through the resulting tunnel, from the distal exit to the proximal one, an autograft is carried through from the tendon of the gracilis muscle (m. gracilis tendon)

The free end of the autograft from the tendon of the gracilis muscle (m. Gracilis tendon) is sutured under tension with non-absorbable transosseous

sutures to the place of distal attachment of the ligaments on the tibia (Picture 5).



Picture 5. Reverse excretion to the site of distal attachment of the gracilis muscle on the tibia.

The free end of the autograft from the tendon of the gracilis muscle (m. Gracilis tendon) is sutured under tension with non-absorbable transosseous sutures.

The wound is treated, sutured in layers. An aseptic bandage is applied. The limb is immobilized with a plaster cast or special orthoses for three weeks.

Postoperative management.

Immediately after the surgery, a special orthosis is placed on the operated limb for the period of 3 weeks. To reduce edema and hemarthrosis, ice is placed on the operated knee area for 10-15 minutes every 1 hour for up to 10 days. From the next day, isometric exercises are prescribed: movements of the patella, raising the limb by 10-15 cm to prevent hypotrophy of the thigh muscles. A course of antibiotic therapy, anticoagulants of indirect action, anti-inflammatory drugs is prescribed. The orthosis is

removed on days 20-21, the working out of the joint is prescribed. In the first week after immobilization, dosed flexion is allowed, with a gradual increase in flexion. Walking is allowed with crutches for two weeks, from the 14th day, walking without crutches is allowed with partial load. Also, patients are recommended special exercises to prevent hypotrophy of the thigh muscles. A full rehabilitation program is recommended for a period of 3 months. Patients are allowed to go in for sports after 6 months.

Results and its discussion

The patients were examined after 6-7 months after operation. The condition of the knee joint was assessed using the Lysholm scale. This scale evaluates the assessment of the knee joint on several indicators, like lameness; the use of additional walking devices, such as crutches, sticks; descending and ascending the

Impact Factor:

ISRA (India) = 4.971
ISI (Dubai, UAE) = 0.829
GIF (Australia) = 0.564
JIF = 1.500

SIS (USA) = 0.912
PIIHQ (Russia) = 0.126
ESJI (KZ) = 8.997
SJIF (Morocco) = 5.667

ICV (Poland) = 6.630
PIF (India) = 1.940
IBI (India) = 4.260
OAJI (USA) = 0.350

stairs; squatting; stability; edema; pain and atrophy of the thigh muscles.

According to this scale, when trauma was isolated, 6 (75%) patients showed excellent results (more than 90 points), 2 (25%) patients had good results (84-90 points). When trauma was combined, 51 (65.4%) patients had excellent results (more than 90 points), 27 (34.6%) patients had good results (84-90 points). By the time of the examination, lameness disappeared in all patients, all patients walked without additional devices, they did not notice any difficulties descending and ascending stairs. When the injury was combined in 8 patients, there was a hypotrophy of the thigh muscles, for which the strengthening of the thigh muscle was recommended, we associate this with the severity of the injury. No one had edema. Radiographs in stress valgus in the preoperative period averaged 6.2 mm on the side of the rupture in comparison with the contralateral normal knee joint, and in the postoperative period this indicator was 1.3 mm.

After the operation, the operated limb is immobilized with special orthoses for 3 weeks, after which the special orthosis is removed, movements in the knee joint are allowed. At the end of the first week,

knee flexion is allowed. The load on the limb is allowed after a month. In all patients, the immediate (from 3 weeks to 6 months), long-term (from 6 months to 12 months) results were traced, they were noted as good and excellent. The criteria for evaluating good results were the restoration of frontal instability of the knee joint. The objective of the proposed method is to simplify and shorten the operation time, reduce trauma and reduce postoperative complications.

Conclusion

Thus, the proposed method is a relatively simple and affordable, it can improve the results of surgical treatment of injuries of the medial collateral ligament of the knee joint, reduce postoperative complications, and allow patients early working out of the knee joint. It minimizes the use of additional tools and assistants. Shaping of a V-shaped bone tunnel increases the strength of fixation, reduces the invasiveness of the operation, since an autograft from the tendon of the gracilis muscle (m. gracilis tendon) is carried through along anatomical projections and replaces the function of the medial collateral ligament of the knee joint.

References:

1. Buckwalter, J. (2003). Iowa and Eugene, Oregon, Orthopaedics. *Iowa Orthopaedic Journal*, 23:123–129. [[PMC free article](#)] [[PubMed](#)] [[Google Scholar](#)]
2. De Maesener, M., et al. (2014). Ultrasound of the knee with emphasis on the detailed anatomy of the anterior, medial and lateral structures. *Skeletal Radiol*, 43: 1025.
3. Derscheid, G.L., & Garrick, J.G. (1981). Medial collateral ligament injuries in football. Nonoperative management of grade I and grade II sprains. *Am J Sports Med*, 6 9(6):365–8.
4. Futryk, A.B. (2002). *Diagnostics, treatment and rehabilitation of patients with injuries of the ligaments of the knee joint in the acute period of injury*: author. dis. ... Cand. medical sciences. (p.19). Moscow.
5. Ghosh, N., et al. (2017). Comparison of point-of-care ultrasound (POCUS) and MRI for the diagnosis of medial knee injuries. *J Med Ultrasound*, 25: 167.
6. Hughston, J.C., & Eilers, A.F. (1973). The role of the posterior oblique ligament in repairs of acute medial (collateral) ligament tears of the knee. *J Bone Joint Surg Am.*, 55(5):923–940. [[PubMed](#)] [[Google Scholar](#)]
7. James, S.L. (1978). Surgical anatomy of the knee. *Fortschr Med.*, 96(4):141–146. 166. [[PubMed](#)] [[Google Scholar](#)]
8. Kornilov, N.V. (2006). Traumatology. Traumatology and orthopedics: a guide for doctors in 4 volumes / under general ed. N.V. Kornilov. - SPb. : Hippocrates, - T. 3. - pp. 284–312.
9. LaPride, R.F., et al. (2015). Clinically significant anatomy and what is anatomical reconstruction. *Knee surgery Sports Traumatol Arthrosc*, 23: 2950.
10. Lundblad, M., et al. (2013). UEFA Injury Survey: 11-year data on 346 MCL injuries and time to return to play. *Br J Sports Med*, 47: 759.
11. Majewski, M., Suzanne, H., & Klaus, S. (2006). Epidemiology of athletic knee injuries: a 10-year study. *Knee*. 13 (3): 184-188. [[PubMed](#)] [[Google Scholar](#)]
12. Malygina, M.A. (1999). *Strength characteristics of the anterior cruciate ligament of the knee joint and its endoprotheses* / M.A. Malygina, A.M. Nevzorov, N.S. Gavryushenko // Sat. materials III Congr. Russian arthroscopic society. (p.103). Moscow.
13. Nawfal Al-Hadithy, Panagiotis Gikas, Anant M Mahapatra, George Dowd (2011). Review

Impact Factor:	ISRA (India) = 4.971	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 0.829	ПИИЦ (Russia) = 0.126	PIF (India) = 1.940
	GIF (Australia) = 0.564	ESJI (KZ) = 8.997	IBI (India) = 4.260
	JIF = 1.500	SJIF (Morocco) = 5.667	OAJI (USA) = 0.350

- article: Plica syndrome of the knee; *Journal of Orthopaedic Surgery*, 19(3):354-8.
14. Ostashko, K.G. (1999). *Redko*. (p.240). SPb.: Hippocrates.
 15. Patel, D.R., & Villalobos, A. (2017). Evaluation and management of knee pain in young athletes: overuse injuries of the knee; *TranslPediatri.*, Jul;6(3):190-198.