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TREATMENT OF ANTERIOR CRUCIATE LIGAMENT INJURIES: A CASE CONTROLLED STUDY

Traumatic injuries of the musculoskeletal system take a significant place in the structure of morbidity. Injuries of the knee joint are most often, it accounts for about 50% of all joints injuries and up to 24% of lower limb.

Purpose of the work: to evaluate our experience of treating anterior cruciate ligament injuries

50 patients with the multisystem injury of the cruciate ligament, 28 of them were men and 22 were women, were operated in Almaty City Clinical Hospital 4 in the period from 2014 to 2015. The age of the patients ranged from 20 to 40 years.

Among 50 postoperative patients, excellent results was approached in 30 cases, good results was in 10 cases, satisfactory result was in 9 cases and unsatisfactory was in 1 case. The complication was related to the surgery time and absence of a pneumatic tourniquet.

Injuries of a knee joint in combination with other structures of knee joints undoubtedly have effect on the fate. When a multisystem injury of knee joint occurs a rehabilitative period of a patient is increased and functional recovery of the knee joint spread more difficult.

Keywords: *anterior cruciate ligament, knee ligament injuries, reconstructions, outcomes*

INTRODUCTION Traumatic injuries of the musculoskeletal system take a significant place in the structure of morbidity. Injuries of the knee joint are most often, it accounts for about 50% of all joints injuries and up to 24% of lower limb [1].

One of the most common ligament injuries is the rupture of anterior cruciate ligament [2], which leads to the development of knee instability [3] and, consequently, leads to appearance and progression of severe degenerative changes of joints [4]. Functional disability of knee joint leads to a significant deterioration in quality of life of the patient, and for a professional athlete it can lead to long treatment and rehabilitation, and even professional unsuitability [5].

Conceptual point in determining treatment strategies for acute joint injuries is choice of treatment method. Previously traumatologists used conservative treatment for acute injuries of the knee joint, but analysis of long-term results in this case showed a high percentage of unsatisfactory outcomes [6]. Most patients with a cruciate ligament injury, who were treated conservatively, were subjected to later recovery and/or reconstructive operations on the knee joint. Typically, patients have been forced to limit their motor activity by reason of instability feeling in the joint.

A large percentage of unsatisfactory results led to treatment strategy changed in favor of surgery. Different methods of suturing the damaged ligaments of the knee joint were used [7]. The results of this method of surgical treatment have been encouraging [7], but high percentage of unsatisfactory results during long-term observation has been also observed. So, now damaged cruciate ligament are not sutured [8].

Well-known method of treatment and diagnosis of knee pathology is a technique of arthroscopy, which has been winning recognition of orthopedic traumatologists in Europe and North America since 70's [9]. Throughout the world, the role of arthroscopic treatment and diagnosis of knee injuries has increased significantly, that is clearly demonstrated by the data of the French Arthroscopic Society [10]. In 1994 reconstruction of the anterior cruciate ligament in only 68% of cases was performed by arthroscopic technology, whereas during next 8 years this figure rose up to 94%. This method is undeniably preferable in the diagnosis and treatment of intra-articular pathology, as only arthroscopy allows visualizing interaction between intra-articular structures without disturbing their integrity and acting on them noninvasively.

One of the major issues in the arthroscopic anterior cruciate ligament reconstruction technique remains to be choice of graft fixation method. Currently, there are many different types of implants for fixation of the anterior cruciate ligament graft; meanwhile the available literature does not contain clear information about benefits of various fixation methods depending on the transplant type [11].

At the same time, the proportion of used implants made of various polymer or biopolymer - absorbable materials «bioabsorbable implants» [12], which are to be replaced by bone tissue within different terms depending on their composition, growth [13]. Herewith in the world literature there is no scientific consensus on long-term results of such resorbable implants in Traumatology and Orthopedics: opinions vary from those assuring that bone tissue cannot replace graft [14]. That implant can be replaced by bone tissue in short time: up to 36 weeks [15].

The good late fates of applying resorbable implants are open to question in different opinions [16]. The mechanical resistances of the anchorage and anchor in vivo that can be varied with time are still critical moments in using of the resorbable implants [17]. Resorbable implants reaction of the bony tissue can be different: from an unexpressed, faint reaction till appearance of massive ossifluence, onset of cystiform cells at the site of the implant attachment [18].

Methods. 50 patients with the multisystem injury of the cruciate ligament, 28 of them were men and 22 were women, were operated in Almaty City Clinical Hospital 4 in the period from 2015 to 2016. The age of the patients ranged from 20 to 40 years.

The injuries of the cruciate ligament by the nature of injury diagnosed by means of the arthroscopic diacrisis:

1. I group: the injury of the medial meniscus (40 patients)
2. II group: the injury of the lateral meniscus (5 patients)
3. III group: the injury of the posterior cruciate ligament (2 patients)
4. IV group: the injury of the medial meniscus and medial collateral ligament, so called "unfortunate triple" of symptoms (2 patients)
5. V group: the rupture of the anterior cruciate and collateral ligament. (1 patient)

The mechanism of injury is given in the Table 1.

Table 1 – The mechanism of injury

No.	The mechanism of injury	Number of cases
1	The athletic injury	32 cases
2	The road traffic accident	10 cases
3	The street injury	5 cases
4	The home accident	3 cases

The reconstruction of the anterior cruciate ligaments was conducted by the arthroscopic method using tedious auto transplants. The diametrical attachment Ricidifix, the bioabsorbable and oxidized screws were used for the attachment of the auto transplant.

The indication for the operative therapy delivery was caused by comprehensive medical examination including a clinical exam, Computerized Tomography, Magnetic Resonance Tomography, X-ray and Arthroscopy.

The surgical aggressions in the first group of the patients were conducted as follows: the arthroscopic revision of the knee joint, where injuries of the anterior cruciate ligament and the medial meniscus were found, was conducted by a standard approach. Then the discussions of the size of 3 centimeters were made in the view of a leg and semitendinosus muscle. The autotransplants were taken by an occlusive stripper and the assistant prepared a tedinous transplant in order to save time. At this time the surgeon conducted the arthroscopic fractional meniscectomy and arranged a tunnel of the femoral and shin bones. The 4-fascicular tedinous transplant was fixed under control of the arthroscope and the femoral bile was attached by one of the above listed attachments and then they were pulled as much as possible with power of 15 kilograms. The tibial bone was attached. After that followed an examination and an orthosis for knee joint was tyred.

In the second group the reconstruction of the anterior cruciate ligament and the fractional revision of the lateral meniscus were conducted. The reconstruction of the anterior cruciate ligament was conducted in the third group.

In the fourth group we conducted reconstruction of the anterior cruciate ligament and the fractional resection of the medial meniscus, then a discission was made in the view of the medial collateral ligament and a medial collateral ligament was found. The sealing of ligaments was conducted at comparatively recent injure of the medial collateral ligaments (till 2 months), and plastic reconstruction of the medial ligament with remains of the tedinous transplant was conducted after more late ruptures.

The surgical aggression in the firth group was conducted in two stages:

- The first stage was the plastic reconstruction of the collateral ligament by means of a mylar band and then, after functional recovery of the knee joint (6 months after date), the second stage would be held.
- The second stage was the recovery of the anterior cruciate ligament.

Results. All patients during the postoperative period were appointed analgesics, antibiotics, anticoagulants, local treatment and rehabilitation.

Postoperative rehabilitation was carried out according to the generally accepted course, which includes five stages, each of which has specific goals after reaching of which it is possible to move on to the next stage; the course is prescribed for 24 weeks.

Stage 1 – up to 4th week

Purpose: to reduce pain and edema in a joint and to improve the wide range of motions in a joint, to recover quadriceps muscle of thigh, to achieve walking without crutches (no earlier than in 4 weeks).

After surgery of reconstruction the anterior cruciate ligament the “activation” of the internal part of quadriceps muscle of thigh is difficult, that is associated with preoperative atrophy, operative trauma and plaster immobilization. Electrical stimulation is used to restore normal proprioceptive afference of the quadriceps muscle of thigh. Massage helps to improve peripheral blood circulation and increasing of contractility of the quadriceps muscle of thigh. General health improving exercises in a gym are also conducted at this stage.

Stage 2 - up to 10th week

Purpose: complete elimination of edema, returning of the full range of motions, improving of the strength of the thigh muscles, achieving of the total control while walking.

In order to achieve this goal the following tasks are to be solved: restoring of the range of motion, muscle strength, muscle endurance to long static load, which provide restoration of the operated leg support. Therapeutic exercises are the main tool at this stage and it includes physical exercises designed to gradually increase the mobility in the knee joint and to strengthen extensor mechanism of the operated limb, mainly of internal head of the quadriceps muscle of thigh. Massage (manual, underwater), exercises in water (bath, basin), the active electrical stimulation are also used to achieve this goal.

Stage 3 – up to 16th week

Purpose: improving of strength, power and endurance of muscles without pain, a gradual returning to functional activities specific to kind of sport, the ability to normally run.

Free active movements, self-exercises, squats, lunges are used. The following task is to increase muscle endurance to dynamic load. A treadmill and bicycle ergometer is used at all stages of post-surgical treatment to maintain fitness.

4th and 5th stages were used only by athletes.

Stage 4 (pre-training period) - up to 24th week

Purpose: complete range of active movements, no pain or edemas during activities, the maximum strength and endurance, neuromuscular coordination.

The duration of the pre-training period is up to 6 months. Its main task is to restore muscle endurance to prolonged static and dynamic loads. Physical exercises with the vertical load on the operated limb with the gradual complication of locomotion's: lunges, walking on tiptoes, in the full height and half squatting, slow pace running in a straight line, with acceleration, skipping over the rope at the place, with moving forward and changing the direction, riding a bike is used at this stage.

Stage 5 (training period) - up to 28th week

Purpose: complete range of active movements, no pain or edemas during and after physical activities, result of more or equal 90% in functional testing from akinetic, concentric, eccentric, and mean and peak torque for the quadriceps and popliteal muscles.

The aim of the training period is to restore specific motor skills according to the sports specialization. At this stage there made an individual fitness restoration program, which promotes the acquisition of a high overall fitness and focus on the restoration of the

technical and tactical skills, of a particular state (endurance, strength, speed, agility), which allows athletes to adapt to the specific requirements of the sport.

Discussion and conclusion. The results of treatment are considered by the following parameters: stability in a knee joint after surgery (running, jumping), tolerability to functional loads, synovitis and pain in the joint after surgery; range of motions in the joint, condition of the quadriceps muscle of thigh. The radiographic, biomechanical and electrophysiological examinations are conducted in order the results to be impartial.

Among 50 postoperative patients, excellent results was approached in 30 cases, good results was in 10 cases, satisfactory result was in 9 cases and unsatisfactory was in 1 case. The excellent results took place in the first and second groups of patients. The good results were approached in the first and second group, where clinical picture of the meniscus injury (frequent blocks resulted in the femurs muscle atrophy). The satisfactory results were approached in the first and the second group of the patients (where frequent blocks resulted not only in the femurs muscle atrophy but also in the gonarthrosis) and the third group of patients where injury of the posterior cruciate ligament was not recovered (the patient had no complain on knee instability but a positive symptom of “a back drawer” was registered at examination), and the fourth and the fifth group of the patients, who was in a cylinder plaster cast during the postsurgical period because of the injury of lateral ligaments. The unsatisfactory result took place in one case from the fourth group and was connected with complication of deep venous thrombosis of the lower limbs. The complication was related to the surgery time and absence of a pneumatic tourniquet.

In conclusion, by reference to the achieved results, injure of a knee joint in combination with other structures of knee joints undoubtedly has effect on the fate. When a multisystem injury of knee joint occurs a rehabilitative period of a patient is increased and functional recovery of the knee joint spread more difficult.

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ТІЗЕ БУЫНЫНЫҢ АЛДЫҢҒЫ КРЕСТ ТӘРІЗДІ БАЙЛАМЫНЫҢ ЗАҚЫМДАНУЫН ЕМДЕУ

Түйін: Тірек-қимыл жүйесінің жарақаттар сырқаттанушылық құрылымында елеулі орын алады. Тізе жарақаты көбінесе барлық буындары жарақаттарының ішінде шамамен 50% және төменгі аяқ сүйектерінің 24% құрайды.

Жұмыстың мақсаты: алдыңғы крест тәрізді байламның жарақаттарын емдеу, біздің тәжірибемізді бағалау.

Түйінді сөздер: Алдыңғы крест тәрізді байлам, тізе байламының жарақаты, реконструкция, қорытынды

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ЛЕЧЕНИЕ ТРАВМАХ ПЕРЕДНЕЙ КРЕСТООБРАЗНЫХ СВЯЗОК КОЛЕННОГО СУСТАВА

Резюме: Травматические повреждения опорно-двигательного аппарата занимают значительное место в структуре заболеваемости. Травмы коленного сустава встречаются чаще всего, на их долю приходится около 50% всех травм суставов и до 24% от травм нижней конечности.

Ключевые слова: связки, травма коленных связок