

## THE RESULTS OF SURGICAL TREATMENT OF PATIENTS WITH ACUTE KNEE INJURY IN THE NEAR AND LONG-TERM PERIOD THROUGH THE INTRODUCTION OF TACTICS OF EARLY ARTHROSCOPY

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## РЕЗУЛЬТАТЫ ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ ПАЦИЕНТОВ С ОСТРОЙ ТРАВМОЙ КОЛЕННОГО СУСТАВА В БЛИЖАЙШЕМ И ОТДАЛЕННОМ ПЕРИОДЕ ПУТЕМ ВНЕДРЕНИЯ ТАКТИКИ РАННЕЙ АРТРОСКОПИИ

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## ТИЗЗА ЖАРОҲАТИНИНГ ЎТКИР ДАВРИДА ЯҚИН ВА УЗОҚ МУДДАТЛИ ЖАРОҲАТЛАРИ БЎЛГАН БЕМОЛЛАРНИ ЖАРРОҲЛИК ЙУЛИ БИЛАН ДАВОЛАШ НАТИЖАЛАРИНИ ЖОРИЙ ЭТИШ ВА ЭРТА АРТРОСКОПИК ТАКТИКАСИНИ ҚЎЛЛАШ

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**Цель:** улучшение результатов хирургического лечения пациентов с острой травмой коленного сустава в ближайшем и отдаленном периоде путем внедрения тактики ранней артроскопии. **Материал и методы:** были проведено проспективное исследование с изучением долгосрочных результатов лечения 75 больных с посттравматическим гемартрозом, находившихся в отделении травматологии 2-й клиники ТМА. **Результаты:** артроскопическое вмешательство позволило диагностировать упущенные на МРТ разрыв мениска у 10 (27%) больных основной группы, повреждение передней крестообразной связки у 5 (13,5%), задней крестообразной связки у 1 (2,7%); субхондральные и хондральные повреждения у 18 (48,6%), повреждение тела Гоффа у 13 (35,1%), повреждение синовиальной оболочки, являющейся основной причиной возникновения гемартроза, у 17 (45,9%). **Выводы:** раннее артроскопическое вмешательство решает вопросы ранней диагностики и лечения внутрисуставных повреждений коленного сустава: повреждения менисков, разрыв связок, позволяет точно диагностировать место кровотечения и проведение гемостаза, что предупреждает развитие поздних осложнений, способствует ранней активизации пациентов и повышению качества жизни.

**Ключевые слова:** мениск, острая травма, синовит, связка, артроскопия.

**Мақсад:** тизза жароҳати ўтқир давридаги беморларда яқин ва узоқ муддатли жароҳатларини эрта артроскопик тактикани қўллаш орқали хирургик давони яхшилаш. **Материал ва усуллар:** қўйилган мақсадга эришиш учун ТТА 2-клиникаси травматология бўлимида узоқ муддатли даволаш натижаларини кўриш учун, жароҳатдан кейинги гемартроз билан оғриган 75 бемор ўрганилди. **Натижа:** артроскопияни қўллаш орқали асосий гуруҳда бизга МРТ да аниқланмаган мениск жароҳати 10 (27%) ҳолатда, олдинги крестсимон бойлам (13,5%) ва орқа крестсимон бойлам 1 (2,7%); субхондрал ва хондрал жароҳатлар 18 (48,6%), Гоффа танаси жароҳати 13 (35,1%). Гемартрознинг асосий сабаби бўлган синовиал мембранага зарар этиши, 17 (45,9%). **Хулоса:** тизза бўғими ўтқир жароҳатларида эрта артроскопик тактикани қўллаш эрта ташхис қўйиш ва бўғим ичи структураларини даволашда кенг ёрдам беради: мениск шикастланиши, бойлам жароҳати, қон кетиш ва гемостаз ўрнини аниқ топиш имконини беради, асоратларни кеч ривожланишига тўсқинлик қилади, беморлар ҳаёт сифатини яхшилайди ва тез актив ҳаётга қайтаради.

**Калит сўзлар:** мениск, ўтқир жароҳат, синовит, бойлам, артроскопия.

The knee is one of the main joints that provide mobility and stability during physical activity, as well as a constant balance [4]. These injuries often occur in active sports and can lead to disability [20]. Injuries of the knee joint occupy a significant place in the structure of injuries and account for up to 60% of all joint injuries and up to 30% of all lower limb injuries [16]. In acute knee injury, along with lesions of other intra-articular structures, damage to the articular cover is detected in 41.8% of cases [13]. According to many authors [12, 18], 80% of injuries in the knee joint are due to soft tissue structures. The use of magnetic resonance imaging also in most cases does not allow estimating the actual prevalence of cartilage lesions. Currently, the only method that combines high-precision diagnosis with minimally invasive surgical treatment of

knee injury is arthroscopy. The main source of bleeding in acute knee injury and the cause of hemarthrosis is damage to the anterior cruciate ligament (ACL), and early diagnosis of knee hemarthrosis and arthroscopic examination reduces the number of adverse outcomes and the number of post-traumatic complications [10]. Posttraumatic complications are caused by hemarthrosis with the development of secondary fibrous adhesions, scarring involving capsular or ligamentous tissue, muscle contractures, joint contractures, arthrofibrosis, infrapatellar contracture syndrome, complex regional pain syndrome, infection, prolonged immobilization, and scarring of the extensor mechanism [8]. A significant number of patients with serious knee injuries have problems with recovery of capacity to work with a return

to the usual way of life, which is a direct consequence of the complication [19].

The importance of correct diagnosis and early treatment in patients with knee hemarthrosis has been demonstrated in various studies [6, 11], as clinical examination may not demonstrate the severity of many of these injuries. The need for modern surgery is a timely and accurate diagnosis with a complete characterization of damage to all structures of the knee joint [14]. In some studies, MRI, being a non-invasive method, exceeds the value of diagnostic arthroscopy and is recommended as a primary diagnostic tool for assessing sports injuries of the knee joint [9]. At the same time, the quality and accuracy of diagnosis by MRI and only if the examination is carried out by a qualified specialist, the results will be accurate, and i.e. it is completely subjective [15].

Although imaging techniques such as magnetic resonance imaging (MRI) provide valuable information, arthroscopy is the diagnostic gold standard. Arthroscopy is considered to be an invasive method of diagnosis, but in addition to an accurate diagnosis, it provides a clear image of intra-articular structures and the possibility of therapeutic procedures [5]. In patients with posttraumatic knee hemarthrosis, arthroscopy is a minimally invasive and effective method for correct diagnosis and appropriate treatment to prevent late complications such as meniscal rupture and cartilage damage [10]. Arthroscopy is currently the only method of early accurate diagnosis and targeted cartilage surgery [7]. Arthroscopic examination is necessary in patients with acute traumatic hemarthrosis of the knee and exceeds such methods of radiation diagnosis as MRI. The possibility of visualization of the bleeding site and obtaining pathogenetic treatment are the arguments confirming the indications for arthroscopy. Do not underestimate the possibility of MRI, especially if there is a possibility of MRI as a primary method of research, but in unclear cases there is a direct indication for arthroscopic examination [3]. Objective: to improve the results of surgical treatment of patients with acute knee injury in the near and long-term period by introducing tactics of early arthroscopy. Materials and methods. To achieve this goal, we conducted a prospective study of the long-term results of treatment of 75 patients with post-traumatic hemarthrosis treated in the Department of traumatology of the 2nd clinic of TMA. The patients were predominantly male (59 males and 16 females). The average age of patients was  $34.3 \pm 2.4$  years (from 18 years to 49 years), the largest number of patients were in the age group of 24-36 years. In 67% of cases, the injury was home accident, 33% - sports injuries.

All patients were examined shortly after the knee injury; the average time from injury to examination was 3 days. The inclusion criteria were clinically significant acute knee injury within the last 3 weeks; age 18-55 years; knee effusion confirmed clinically or by MRI; presence of  $\geq 1$  specified structural injury on MRI (Siemens, 1.5 Tesla). The criteria for exclusion were the presence of severe OA of the knee joint (III-IV degree by Kellgren-Lawrence, 1978); inflammatory / septic

arthritis of the affected knee; active or treated systemic inflammatory disease; recent infection. During the initial examination, the majority of patients had moderate or severe pain in the knee joint ( $>4$  points according to VAS), as well as primary questioning of patients with the help of the KOOS questionnaire [17].

All patients had initial clinical signs hemodynamica or preliminary data at the conclusion of MRI, MRI was performed in 100% of cases. Damage to the menisci was evaluated according to the classification of ISAKOS Classification of meniscal tears [1], cartilage damage according to the classification of Bauer and Jackson [2], Goff's body condition was assessed by the presence of contusion, hematoma, local disruption of the structure, estimated damage to the synovial membrane on the sign of the presence of hematoma and bleeding vessels. According to the results of the MRI, the following injuries were observed: meniscus rupture in 29 (38%) cases, of which 24 (32%) cases showed damage to the medial meniscus, 3 (4%) cases - lateral meniscus and 2 (2.6%) cases - damage to both meniscus; damage to the anterior cruciate ligament (ACL) in 11 (14.6%) cases and posterior cruciate ligament (PCL) in 1 (1.3%) case; presence of subchondral and chondral lesions in 20 (26.6%) cases) cases with the presence of free bodies in the joint cavity in 2 (2.6%) cases.

Patients with acute knee injury were divided into 2 groups: the main group consisted of 37 patients who underwent early arthroscopic intervention. A number of structural injuries of the knee joint in the main group of patients were classified after arthroscopic surgery in addition to MRI findings: meniscus rupture in 10 (27%) cases, of which 8 (21.6%) cases showed damage to the medial meniscus, 1 (2.7%) case - lateral meniscus and 1 (2.7%) case - damage to both meniscus; ACL injury in 5 (13.5%) cases in the form of partial rupture or damage to the ligament attachment site and ACL in 1 (2.7%) case; presence of subchondral and chondral injuries in 18 (48.6%) cases, with the presence of free bodies in the joint cavity in 2 (5.4%) cases, which are parts of the meniscus or a consequence of chondral injuries. Also, in 13 (35.1%) cases among patients of the main group, the presence of structural damage to the body of Goff was detected, in 17 (45.9%) cases, signs of damage to the synovial membrane, with the presence of hematomas and causing hemarthrosis from damaged vessels were found. Of the total number of the main group of patients, 95% of them underwent arthroscopic intervention  $<24$  hours after admission to hospital treatment. All types of injuries were identified and listed in order of increasing the degree of injury, diagnosed by arthroscopy (arthroscopic stand "Karl Storz"), compared with MRI, the advantage of arthroscopy is not only diagnostic, but also therapeutic procedures.

The control group consisted of 38 patients who refused surgical intervention, which was conducted conservative treatment (puncture and evacuation of fluid hemsynovial, extremity immobilization and anti-inflammatory therapy).

To assess the effectiveness of the method of treatment, we compared the indicators of KOOS [17] in

both groups in dynamics: at the initial examination, 3, 6 and 12 months after treatment.

### Results and discussions

Arthroscopic intervention in patients of the main group, allowed us to diagnose missed on MRI meniscus rupture in 10 (27%) cases, damage to the ACL in 5 (13.5%) and PCL in 1 (2.7%) case; the presence of subchondral and chondral lesions in 18 (48.6%) cases, in 13 (35.1%) – damage to the body of Goff in 17 (45.9%) cases, and also damage to the synovial membrane is the main cause of hemarthrosis.

The results of arthroscopy prove its incomparable value as a method of diagnosis of intra-articular injuries of the knee joint, as well as the possibility of simultaneous medical procedures [3].

Evaluation of the immediate and long-term results of patients with acute knee injury was demonstrated using the KOOS questionnaire. Conducted initial study of all patients with acute trauma of the knee joint showed that initial indicators such as symptoms (a total of  $81.25 \pm 3.31$ ), pain ( $85.10 \pm 2.54$  mm), daily activity ( $88.90 \pm 2.29$ ), sports activity (of  $76.75 \pm 3.58$ ), quality of life ( $80.31 \pm 3.91$ ) was low and fluctuated widely in the main group of patients (table 1). The average score of the patients during the initial survey made up  $86.61 \pm 2.71$ .

**Table 1**  
*Primary indicators of KOOS in patients with posttraumatic hem arthrosis in the acute period, M±m*

Signs of all	All, n =75
S (symptoms) $81.25 \pm 3.31$	$81.25 \pm 3.31$
P (pain) $85.10 \pm 2.54$	$85.10 \pm 2.54$
A (daily activity) $88.90 \pm 2.29$	$88.90 \pm 2.29$
SP (sports activity) $76.75 \pm 3.58$	$76.75 \pm 3.58$
LQ (quality of life) $80.31 \pm 3.91$	$80.31 \pm 3.91$
Σ (total) $86.61 \pm 2.71$	$86.61 \pm 2.71$

Based on the data obtained, we analyzed the effectiveness of early arthroscopic intervention in acute knee injury and knee hemarthrosis syndrome in long-term prognosis (total score KOOS). Analysis of the above indicators, depending on the ratio of treatment tactics in groups of 3, 6 and 12 months (table 2). The average score of patients of the 1st group (main) in 3 months after arthroscopic intervention was  $81.36 \pm 0.55$ , with the lowest rates in the categories of “household activity”, “sports activity” and “quality of life”, which can be the result of ongoing inflammatory processes in the early postoperative period. The average score of patients of the 2nd (control) group after 3 months was  $68.81 \pm 5.61$  with a relative equal decrease in scores for all indicators. By the end of the follow-up period for patients with acute knee injury after 3 months, the average severity of pain in patients of the control group is 17% more, and the frequency of complaints is 13% more than in the main group, household activity is reduced by 5.6%, and sports by 15.3%, the overall quality of life is reduced by 14.1%. Analysis of the above indicators, depending on the method of treatment in groups of 6 months showed the same direction of changes: the average

score of patients of the 1st (main) group- $79.28 \pm 0.32$ , the 2nd (control) group –  $66.40 \pm 5.23$ . By the end of the follow up period for patients with acute knee injury after 6 months, the average severity of pain and the frequency of complaints in patients of the control group was 14% higher compared to the main group, household activity was reduced by 8.6%, and sports by 13%, the overall quality of life was reduced by 11.3%. Analysis of the above indicators, depending on the ratio after 12 months showed that the average score in the 1st (main) group- $81.10 \pm 0.10$ , in the 2nd (control) group –  $70.34 \pm 4.98$ .

By the end of the follow-up period for patients with acute knee injury after 12 months, the average severity of pain and the frequency of complaints in patients of the control group was 12% higher compared to the main group, household activity was reduced by 8.4%, and sports by 13.4%, the overall quality of life was reduced by 12.5%.

**Table 2**  
*Indicators of KOOS in patients with posttraumatic hemarthrosis 3.6 and 12 months after treatment, M±m*

	3 month		6 month		12 month	
	I group	II group	I group	II group	I group	II group
S	$82.85 \pm 1.34$	$65.82 \pm 4.60$	$77.14 \pm 1.43$	$62.76 \pm 3.29$	$80.71 \pm 1.43$	$68.88 \pm 2.67$
P	$83.32 \pm 1.52$	$70.24 \pm 5.31$	$81.88 \pm 1.03$	$67.85 \pm 5.48$	$83.82 \pm 0.56$	$71.82 \pm 5.36$
A	$80.00 \pm 1.36$	$74.37 \pm 5.78$	$80.88 \pm 0.80$	$72.27 \pm 5.42$	$83.82 \pm 0.80$	$75.42 \pm 5.23$
SP	$71.00 \pm 1.87$	$55.71 \pm 6.21$	$68.00 \pm 1.22$	$55.00 \pm 6.64$	$72.00 \pm 1.22$	$58.57 \pm 6.14$
LQ	$77.50 \pm 1.54$	$63.39 \pm 7.52$	$70.00 \pm 1.25$	$58.93 \pm 6.52$	$75.00 \pm 0.00$	$62.50 \pm 6.68$
Σ	$81.36 \pm 0.55$	$68.81 \pm 5.61$	$79.28 \pm 0.32$	$66.40 \pm 5.23$	$81.10 \pm 0.10$	$70.34 \pm 4.98$

In patients of the control group of patients who have been treated conservatively, there is a significant decrease in all indicators of KOOS, which indicates the development of late, complications of acute trauma, due to the development of fibrotic processes in the joint, a significant decrease in the functional activity of the joint and disability of patients.

### Summary

1. MRI is undoubtedly the leading non-invasive method of research in the diagnosis of intra-articular injuries of the knee joint, but the use of arthroscopy as a diagnostic and therapeutic method has proved its effectiveness. After arthroscopy, the diagnosis was clarified in 100% of cases.

2. Early arthroscopic intervention solves the issues of early diagnosis and treatment of intra-articular injuries of the knee joint: meniscus damage, ligament rupture, allows to accurately diagnosing the place of bleeding and hemostasis, which prevents the development of late complications, contributes to the early activation of patients and improve the quality of life.

3. In the absence of arthroscopic intervention in acute trauma of the knee joint in patients increases the duration of rehabilitation, and reduced quality of life, 12% more common pain, 8.4% more likely to violation of the activity in everyday life, and by 13.4% in sports activities, there is a General decline in the quality of life by 12.5%.

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**Objective:** To improve the results of surgical treatment of patients with acute knee injury in the near and long-term period by introducing tactics of early arthroscopy. **Materials and methods:** Were conducted a prospective study of the long-term results of 75 patients treatment with post-traumatic hemarthrosis in the Department of traumatology of the 2nd clinic of TMA. **Results:** Arthroscopic intervention in patients of the main group, allowed us to diagnose missed on MRI meniscus rupture in 10 (27%) cases, damage to the ACL in 5 (13.5%) and PCL in 1 (2.7%) case; the presence of subchondral and chondral lesions in 18 (48.6%) cases, in 13 (35.1%) – damage to the body of Goff in 17 (45.9%) cases, and also damage to the synovial membrane is the main cause of hemarthrosis. **Conclusions:** Early arthroscopic intervention solves the issues of early diagnosis and treatment of intra-articular injuries of the knee joint: meniscus damage, ligament rupture, allows to accurately diagnose the place of bleeding and hemostasis, which prevents the development of late complications, contributes to the early activation of patients and improve the quality of life.

**Key words:** meniscus, acute injure, synovitis, ligament, arthroscopy.