

Clinical and Diagnostic Algorithm for Arthroscopic Treatment of Osteoarthritis of the Knee

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Abstract Purpose of current investigation was to improve the arthroscopy technique of patients with osteoarthritis of knee, by the introduction of complex clinic and diagnostic algorithm. **Materials and methods.** The investigation was carried out on the basis of 218 patients' data of the clinic of Sport traumatology department of Republican Scientific and practical medical Centre of Traumatology and Orthopedics during 2014-2019 yy. with osteoarthritis of knee by different degrees (0-IV st.) according to Kellgren and Lawrence classification. All patients were carried out 5 types of arthroscopic operations depending on the stage of morphologic alteration, based on the development of clinic and diagnostic algorithm. The **results** were studied at nearest (3-6 months) and long term (6 months - year) periods. At postoperative period the medications, early rehabilitations and physiotherapy were recommended to patients. In our data, in 96,5% had positive results. **Conclusion.** Arthroscopy with using of clinic and diagnostic algorithm is allowed to rise of share good results, to activate patients and to begin the early rehabilitations at postoperative periods.

Keywords Osteoarthritis of knee, Arthroscopy, Clinic and diagnostic algorithm

1. Relevance

Osteoarthritis (OA) is a heterogeneous disease in which articular cartilage, subchondral bone, ligaments, capsule, synovial membrane and periarticular muscles are involved in the pathological process. Such terminological definitions as "osteoarthrosis", "arthrosis", "osteoarthritis", "deforming arthrosis" are presented as synonyms in the X International Classification of Diseases (ICD 10) (Artroses: M15-M19) [3].

Degenerative-dystrophic diseases of the joints are one of the most common pathologies in the elderly. In the affected joints, the lubrication of the articular cartilage is deteriorated, their gliding and proper functioning are disrupted. Degenerative changes in articular tissues lead to defects in cartilage coating, especially in the loaded areas of articular surfaces [8].

Osteoarthritis occurs in 54.5% of patients with degenerative-dystrophic lesions of the joints. OA is one of the main causes of disablement, which in leads to disability 6.5% of cases. [1]

Their characteristic features are constant pain, changes in

articular function, the reducing quality of life. The incidence of OA clearly correlates with age and reaches 50% in people over 65 years of age. [4,6,7,9] Treatment of osteoarthritis of the knee joint is one of the most problems in orthopedics of current interests. The last decades have been characterized by the introduction of arthroscopic techniques into the knee joint surgery, which greatly expanded the possibilities of diagnosing and treating of the osteoarthritis [2]. The importance of arthroscopy in the treatment of osteoarthritis of the knee is currently increasing. There is still no comprehensive clinical diagnostic algorithm that would have indications and contraindications in the treatment of osteoarthritis of the knee joint.

Objective: To improve the results of arthroscopic treatment of patients with osteoarthritis of the knee joint, through the introduction of a comprehensive clinical diagnostic algorithm.

2. Materials and Methods

218 patients treated in 2014–2019 from the Department of Sports Traumatology of Republican Specialized Centre of Traumatology and Orthopedics, underwent arthroscopic treatment with osteoarthritis of the knee joint at various degrees. The age of patients was ranged from 40 to 80 years. 156 (71.6%) were women and 62 (28.4%) were men. In the diagnosis of osteoarthritis of the knee joint, clinical,

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radiographic, goniometric, MRI and X-ray densitometric studies were performed. Clinical studies included: clarifying complaints, collecting history, examination, palpation of the damaged area, determining the range of motion in the joint. We used the Kellgren and Lawrence classifications to determine the degree of osteoarthritis [7]. In this classification there were 5 degrees from 0 to IV degree. 0 and IV degree was not included in our study. We believe that with IV degree of osteoarthritis arthroscopy is not effective. In 0 degree of osteoarthritis, if no structural changes are identified, it can be treated conservatively. In our study, the following degrees of osteoarthritis were determined in patients: grade I - 19 patients (8.7%), grade II - 104 patients (47.7%), grade III - 95 patients (43.6%). In 158 (72.4%) patients, osteoarthritis was accompanied by synovitis. All 218 patients underwent arthroscopic diagnostic and simultaneous treatment. Knee arthroscopy was performed with a KARL STORZ arthroscope (Germany). 0.9% saline was used in the operating environment. The operations were performed under the general and spinal anesthesia. Arthroscopy was performed with standard antromedial and antrolateral approaches. If necessary, additional access was used. Arthroscopy was carried out using standard research methods. In the process of arthroscopic intervention, cruciate ligaments, the integrity and thickness of the capsule, the state of hyaline cartilage, damage of menisci, degenerative-dystrophic changes, the presence and amount of free fluid in the joint cavity and its character, the state of synovial folds were investigated. In synovitis, when the synovial membrane is hypertrophied, debridement is performed. If a free osteochondral fragment is detected in the chamber of the knee joint, it is removed from the joint with a special arthroscopic clamp. With limited movements in the joint, the patella is mobilized with arthroscopic scissors. A damaged or degeneratively altered posterior horn of the medial meniscus is resected. The edges of the meniscus are aligned by shaver. Foci of chondromalacia in the joints are treated with shaver. The chondromal lesion of the femur or tibia is tunneled through the articular surfaces towards the medullary canal with a drill, using $\varnothing = 2$ mm knitting needles. Moreover, the perforation of the tunnels on the femoral and tibial bones is performed at a distance of at least 5 mm from each other. Based on clinical complaints, goniometric, x-ray, MRI, x-ray densitometric analysis, we developed a clinical diagnostic algorithm for the treatment of OA of the knee joint. (1 table)

We have conducted 5 types of arthroscopic surgery in 218 patients with OA knee. The first type of operation — local debridement with meniscectomies was performed in 1– and 5 cases (on a table 1.) in 35 (16%) patients, the second type of operation — local debridement with subchondral tunneling was performed on 2,6,7 and 10 cases (on a table 1) in 41 (18.8%) patients, the third type of operation - partial debridement standard of subchondral tunneling was carried

out 2,3,6,7,9 and 10 cases (according to the table 1) in 58 (26,6%) patients, the fourth type of operation is shown in table 3, 4,7,8 and 11, full debridement with standard subchondral tunneling in 53 (25.2%) patients, the fifth type of operation is given (in the table 1) 4,7,8,11 and 12, complete debridement with deep subchondral tunneling in 31 (13.4%) patients.

This operation allows to solve several problems simultaneously, including improving nutrition and remodeling of cartilage tissue, and reduces pressure in the subchondral zone, and increases bone density, improves the arthro-kinematics of the knee-femoral and femoral-tibial joint, normalizes the regulation of synovial fluid formation (1 – table).

3. Results and Its Discussion

The study included patients with osteoarthritis of the knee at various degrees. This disease is most common in elderly patients, and the presence of secondary diseases affects the outcome of the surgery. In all 5 types of performed operations excellent and good results were achieved. After operation, pain at rest has disappeared the next day. From the next day, a dose load on the operated leg, followed by a gradually increasing of the load were prescribed to patients. In for 3-5 days after surgery, the development of the joint has begun. After 10 days, full load was allowed on the operated limbs. Full flexion was allowed after 2 weeks. In all patients, the function of the knee joint was restored, the amplitude of movement increased, the discomfort in the joint decreased and disappeared. In all patients after surgery, no somatic changes were observed. The closest (from 3 to 6 months) and remote (from 6 months to 1 year) results were analyzed in all patients. In 194 patients, the pain at rest in the knee joint disappeared completely, in 24 patients pain remained with the load. After surgery, four patients had synovitis with arthralgia for up to 6 months. The condition of these patients has improved after the conservative treatment with active therapeutic exercise (exercise therapy). Effective results were obtained in 191 patients within 3-6 months, while 214 patients received good results from 6 months to 1 year. This is based on the long duration of treatment in some patients. During the period of rehabilitation treatment, walking with orthopedic unloading of the joint and subsequent, gradually increasing load to the leg is recommended. In the postoperative period, patients are recommended medication, early rehabilitation and physiotherapy.

According to our data, the department of Sports trauma at the Republican Centre of Traumatology and orthopaedics achieved 96.5% of the effect simultaneously from arthroscopic techniques of local, partial, extended debridement, standard and deep subchondral tunneling with osteoarthritis of the knee joint at different stages.

Table 1. Clinical and diagnostic algorithm for arthroscopic treatment of osteoarthritis of the knee joint

№	Clinical examination			X-ray	MRI	X-ray densitometry		Arthroscopic locale debridement	Arthroscopic Locale Debridement Subchondral tunneling		Partial arthroscopic debris standard subchondral tunneling		Full debridement standard subchondral tunneling		Full debridement deep subchondral tunneling	
	Complaints	Goniometry				Norm	Osteopenia, Osteoporosis		until 3	5 and more	until 3	5 and more	until 3	5 and more	until 3	5 and more
		Movement of the knee°	Amplitude of movement													
1	Pain in the knee joint	Knee movement 180-0-50	130°	Gonarthrosis I degree.	Chondromalacia -0 Meniscopathy with damage	>-0.9		+	-	-	-	-	-	-	-	
2	Local pain in the knee joint	Knee movement 175-0-65	110°	Gonarthrosis I degree	Chondromalacia I - II degree. Meniscus infection, Meniscopathy with damage	>-0.9		-	-	+	+	-	-	-	-	-
3	Common, diffuse pain in the knee joint	Knee movement 175-0-65	130° - 110°	Gonarthrosis I degree	Chondromalacia II - III degree meniscopathy with damage, synovitis	>-0.9	From -1 to -2.4 - 2,5 >	-	-	-	+	-	+	-	-	-
4	Widespread, diffuse pain in the knee joint	Knee movement 170-0-65	130° – 105°	Gonarthrosis I degree	Chondromalacia III IV degree. Meniscopathy with damage, synovitis, cyst baker	>-0.9	From -1 to -2.4 - 2,5 >	-	-	-	-	-	+	-	+	-
5	Local pain in the knee joint	Knee movement 170-0-70	130°– 100°	Gonarthrosis II degree	Chondromalacia -0 Meniscopathy with damage	>-0.9	From -1 to -2.4 - 2,5 >	+	-	-	-	-	-	-	-	-
6	Common, localized knee pain	Knee movement 170-0-70	130° – 100°	Gonarthrosis II degree	Chondromalacia I - II degree. Meniscopathy with damage, synovitis	>-0.9	From -1 to -2.4 - 2,5 >	-	-	+	-	+	-	-	-	-
7	Common, pain in the knee joint	Knee movement 165-0-80	130° – 85°	Gonarthrosis II degree	Chondromalacia II - III degree. Meniscoscosis Meniscopathy with damage, synovitis	>-0.9	From -1 to -2.4 - 2,5 >	-	-	+	-	+	-	+	-	+

№	Clinical examination			X-ray	MRI	X-ray densitometry	Arthroscopic locale debridement	Arthroscopic Locale Debridement Subchondral tunneling	Partial arthroscopic debris standard subchondral tunneling		Full debridement standard subchondral tunneling		Full debridement deep subchondral tunneling
	Complaints	Goniometry							until 3	5 and more	until 3	5 and more	
		Movement of the knee °	Amplitude of movement					until 3					5 and more
8	Widespread, diffuse pain and swelling in the knee joint	Knee movement 165-0-80	130° – 85°	Gonarthrosis II degree	Chondromalacia III - IV degree. Meniscopathy with damage, synovitis, Becker cyst	Norm	Osteopenia, Osteoporosis	-	-	-	-	-	+
						>0.9	From -1 to -2.4 - 2.5 >	-	-	-	+	-	-
9	Common, localized knee pain	Knee movement 165-0-95	130° – 70°	Gonarthrosis III degree	Chondromalacia -0 Meniscopathy synovitis	Norm	From -1 to -2.4 - 2.5 >	-	-	-	-	-	-
						>0.9	From -1 to -2.4 - 2.5 >	-	-	-	+	-	-
10	Common, diffuse pain and swelling in the knee joint	Knee movement 165-0-95	130° – 70°	Gonarthrosis III degree	Chondromalacia I - II degree. Meniscopathy with damage, synovitis	Norm	From -1 to -2.4 - 2.5 >	-	-	-	-	-	-
						>0.9	From -1 to -2.4 - 2.5 >	-	-	-	+	-	-
11	Widespread, diffuse pain and swelling in the knee joint	Knee movement 160-0-100	130° – 60°	Gonarthrosis III degree	Chondromalacia II - III degree Meniscopathy, synovitis, Becker cyst	Norm	From -1 to -2.4 - 2.5 >	-	-	-	-	-	+
						>0.9	From -1 to -2.4 - 2.5 >	-	-	-	-	+	-
12	Widespread, diffuse pain and swelling in the knee joint	Knee movement 160-0-100	130° – 60°	Gonarthrosis III degree	Chondromalacia III IV degree. Meniscopathy with damage, synovitis, Becker cyst	Norm	From -1 to -2.4 - 2.5 >	-	-	-	-	-	+
						>0.9	From -1 to -2.4 - 2.5 >	-	-	-	-	+	-

4. Conclusions

1. The introduction of a clinical diagnostic algorithm for the arthroscopic treatment of osteoarthritis of the knee joint has made it possible to obtain good results through selective intervention.
2. Arthroscopic treatment using the clinical diagnostic algorithm allows activating patients and starting the rehabilitation measures in the post-operative period.

REFERENCES

- [1] Makushin V.D. "Surgical treatment of heterogeneous deforming arthrosis of the knee joint" *Genius Orthopedics* No. 1, 2001. From 18-24.
- [2] A.A. Gritsyuk "Tactics of treating the initial manifestations of deforming arthrosis of the knee joint" *Genius Orthopedics* No. 2, 2004. C 94.
- [3] Stogov M.V. "Laboratory tests in preclinical diagnosis of osteoarthritis analytical review" *Genius Orthopedics* number 1, 2016 from 96-103.
- [4] Ingrid Möller¹, Myriam Gharbi², Helena Martinez Serrano³, Marta Herrero Barbero³, Josep Verges Milano³ and Yves Henrotin⁴ "Effect of chondroitin sulfate on soluble biomarkers of osteoarthritis: osteoarthritis patients »*BMC Musculoskeletal Disorders* (2016) 17: 416.
- [5] Tarasenko L.L. "MRI-picture of the knee joint in the long-term period after medical arthroscopy in the pathology of articular cartilage" *Genius of Orthopedics* No. 4, 2008. C 96-103.
- [6] Ray Marks "Depressive Symptoms among Community-Models Knee Osteoarthritis: Extent, Interrelationships, and Predictors" *American Journal of Medicine Studies*, 2013, Vol. 1, No. 3.
- [7] Rodionova S.S. "Rational choice of treatment for the initial stages of gonarthrosis in patients suffering from systemic osteoporosis" *Bulletin of Traumatology and Orthopedics named after NNPriorov* №2 2014 g 52-56.
- [8] V. Tatarenkov "The immediate results of the clinical application of arthromedullary shunting in degenerative-dystrophic diseases of the knee joint" *Bulletin of Traumatology and Orthopedics named after NNPriorov* No. 4 of 2015. C 32-38.
- [9] Bukin I.E. "Possibilities of arthrosonography for the diagnosis of subclinical synovitis in patients with early stages of gonarthrosis" *Scientific – Practical Rheumatology* No. 2 of 2002. C 10-13.