



SHOCKWAVE THERAPY FOR KNEE OSTEOARTHROSIS

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Osteoarthritis is a widespread disease affecting 10% of the world's population. According to various authors, frequency of this pathology ranges from 30 to 55% among all orthopedic patients who visit the doctor [1]. Among all degenerative-dystrophic joint diseases deforming knee osteoarthritis occurs in 54.7-69.7% of patients, at the same time the advanced stages of disease occur in 75% of patients [3,7].

Gonarthrosis often occurs in young people, including those engaged in sports activities and active labor activity [2,6]. In case of gonarthrosis 80% of patients note the decrease in quality of life, and invalidation rates from 10 to 21% of observations/leading to handicap in 10 to 21% of cases .

The treatment of patients suffering from deforming knee osteoarthritis is a challenge for doctors who deal with this disease. The main reasons bringing the patient to visit a doctor are pain and decreased joint function.

The complex approach of osteoarthritis patients' treatment implies the wide use of physiotherapeutic methods. Their application promotes the microcirculation improvement in subchondral bone, synovial membrane and periarthritic tissues, the improvement of metabolism and suppression of destructive processes [5,16].

Nevertheless, the remaining high occurrence of the disease and long rehabilitation process of patients make the search of new effective methods and recovery facilities actual. A promising method of conservative therapy of arthrosis patients is the application of extracorporeal shockwave therapy (ESWT), a new method of treatment which represents a promising alternative surgery treatment of deforming knee osteoarthritis.

In medicine shockwaves have been applied for the first time in 1980 for lithotripsy of renal stones [8], and in 1985 for lithotripsy of the gall stones [9]. The first publications describing application of shockwave therapy for orthopedic pathology and consequences of traumas appeared in the beginning of 1990s [10]. Application of the shockwaves in orthopedy by means of devices for lithotripsy has shown that they do not meet the requirements for treatment pathologies of the musculoskeletal system. During the last decade special devices using various ways of shockwaves generation were developed. All of them are aimed on generation of the pressure impulse transferred to tissues with the minimum loss of energy for which purpose the various connective environments [11] are used. Shockwaves start the cascade of effects which begins with application of the physical energy in the form of acoustic waves and finally results in restoration of vessels and metabolic activity improvement by means of various physiological mechanisms.

The shockwave (acoustic wave) bearing high energy to painful spots and tendons or musculoskeletal tissues with subacute, subchronic and chronic conditions activates healing, regeneration and reparation of tendons and soft tissues [12].

The international studies show an average ESWT efficiency of 77% (for separate nosologies up to 92%).

Given the above, an objective of this research was the investigation of the results of shockwave therapy application for gonarthrosis.

We observed 30 patients with gonarthrosis showing joint function decrease of I-II grade. The average age of patients was 40+5.6 years. The disease started between 1-3 years before the study started. Clinical history showed the prevalence of the painful syndrome with restriction of flexion and extension in the affected extremity up to 40° and decrease in muscular force. The palpation revealed painful spots on the back of the leg, in the joint



area. Pain was significantly increasing at movements.

Patients received ESWT with the device BTL 6000 SWT TOPLINE.

There were 3 to 6 sessions performed with an interval of 3-6 days between them. The session included 2000-3000 shocks with various frequency (10-15 Hz) and pressure from 1.5 to 3.5 bars. If the patients experienced pain during the ESWT procedure, the level of the energy applied was decreased.

Procedure was performed with the patient in lying position. The knee joint, the front area of the hip (quadriceps), and painful points were treated. Treatment area localization was defined using the method of biofeedback, i.e. the patient informed the doctor about the location of the painful spot when pressing with a finger or applicator tip during the procedure. The treatment duration was 15-20 minutes. Procedures were performed daily, outpatiently. For minimization of power losses the contact gel was used. Any forced physical activities were prohibited after the procedure, since the immediate analgesic effect can provoke new damage.

ESWT was performed as monotherapy. According to the data of experimental studies, local methods of therapy (injections, physiotherapy, NSAID) can change or block the action of shockwaves [13,14,15]. There were no complications of ESWT procedure revealed. To estimate the efficiency of treatment the main symptoms of the disease were registered before the beginning of therapy, after the first procedure and after the last treatment on a 0-3 scale – i.e. from 0 to 3 depending on the intensity. we took into account the joint pain, exudative phenomena in joints, hyperthermia of the joints, morning stiffness, joint function restriction, articular crepitus at movements, ESR rate. The sum of all listed values in points allowed to define the process intensity in the beginning of therapy and in the end of it and to estimate its efficacy. The decrease of a total index in the end of treatment by 50% and more was regarded as considerable improvement, by 50-25% - as moderate improvement, and the decrease in number of points less than 25% was regarded as an absence of dynamics.

Objectification of the painful sensations in the areas with the highest pain level was performed by means of the VAS questionnaire (10 cm, a ruler). The criterion of treatment efficiency was the decrease in level of pain estimation on VAS with not less than 2.5 points, high efficiency – more than 5 points. If the estimation on VAS decreased less than 2.5 points the treatment was admitted inefficient.

Results

After the treatment course 85% of patients showed considerable improvement. The morning stiffness rate was reduced by 44%, joint index reduced by 39%, and functional index reduced by 18% compared to the initial data.

After the first ESWT procedure pain have decreased by 26%, after 3 procedures — by 8.5% and after 4-6 procedures — by 67 and 85%, respectively. Analgesic effect on a painful spot was observed approximately after 300-500 impulses.

After the treatment course for patients with severity 1 arthrosis where VAS was 4.5 ± 0.7 before the shockwave therapy, at the moment of the last examination it was 0.5 ± 0.3 . In patients with severity 2 arthrosis, 42% showed a considerable decrease of the painful sensations by the time of the last examination. Before the treatment VAS was 6.8 ± 0.8 , and at the end it was 1.8 ± 0.9 ($p < 0.05$). General condition of 1 patient has not improved substantially. No worsening of the condition was registered. In our opinion, this is due to the changes in the joint, long-term course of disease and previous intra-articular hormonal therapy.



Conclusion

Shockwave therapy with the device BTL 6000 SWT TOPLINE is an effective treatment of deforming knee osteoarthritis. In 95% cases shockwave therapy decreases the painful syndrome and also improves the function of knee joints. The advantages of shockwave therapy for the treatment of gonarthrosis are its noninvasiveness, the possibility to perform the procedure outpatiently without interrupting the professional activity, the convenient schedule of procedures — 1-2 times a week.

For the pain management and treatment of microcirculatory disorders the most effective treatment course is five ESWT procedures with the gradual increasing of energy density.

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