

Rehabilitation of Patients with Hip Joint Arthroplasty (Late Post-surgery Period – Hospital Rehabilitation)

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Received: 08 Dec 2015

Accepted: 12 Dec 2016

Published Online: 16 Jan 2017

Published: 27 June 2017

Key words: total hip arthroplasty, hip joint, rehabilitation

Citation: Krastanova MS, Ilieva EM, Valcheva DE. Rehabilitation of patients with hip joint arthroplasty.

Folia Medica 2017;59(2):217-221.
doi: 10.1515/folmed-2017-0016

Background: Hip joint replacement (endoprosthesis, alloplasty) has become one of the most frequent surgery interventions of the 20th century.

Aim: To conduct rehabilitation therapy in the late post-surgery period of hospital rehabilitation (45 days after surgery), to track patients' progress and measure the results.

Materials and methods: One hundred and fifty-two patients with hip joint endoprosthesis were included in the study. All underwent surgery and rehabilitation at the Department of Clinical Rehabilitation of the Physical and Rehabilitation Medicine Clinic at Doctor G. Stranski University Hospital, Pleven. Kinesitherapy included therapeutic massage, isometric exercises for gluteal and hip muscles, isotonic exercises for the hip and the knee joint, breathing exercises, analytical gymnastics, exercises for balance and posture stability; gait control, exercises with gym equipment; occupational exercises included all activities of daily living (ADL) that were practiced at home; treatment with performed physical factors included applying magnetic field, interferential current therapy, electrostimulation of the *m. quadriceps femoris* and the gluteal muscles.

Results: The scores from the pain visual analog scale (VAS), the muscle strength test and the test for the movement volume of the hip joint were obtained at the beginning and at the end of the rehabilitation process and stored in an individual file for each patient.

Conclusion: The results of the present study suggest that the complex rehabilitation program (kinesitherapy, performed physical factors and occupational therapy) can result in a considerably faster recovery and ensures that patients reach optimal functional results.

BACKGROUND

Total joint replacement, or arthroplasty, represents a significant advance in the treatment of painful and disabling joint pathologies. Hip joint replacement has become one of the most successful modern surgical interventions in orthopedics and traumatology. Improvement of surgical methods and introduction of new surgical techniques and prosthesis materials have turned joint replacement into one of the most successful contemporary treatment methods.^{1,2} Postoperative rehabilitation is of the utmost importance following total joint replacement in order to ensure pain-free function of the joint and improve the patient's quality of life. Adequate and timely rehabilitation is very important for accelerating

the recovery process and for prevention of complications.^{3,4}

AIM

The aim of this study was to assess the effect of a complex rehabilitation program (CRP) consisting of kinesitherapy (KT), ergotherapy (ET) and physical agent modalities, applied 45 days post-surgery on inpatients at Hospital Rehabilitation Department (HRD).

MATERIALS AND METHODS

The present study included 152 patients (107 female and 45 male, age range 22 to 84 years) with hip joint arthroplasty due to osteoarthritis or femoral

neck fracture. All patients received surgery at the Department of Orthopedics and Rehabilitation at the Rehabilitation Department of Doctor G. Stranski University Hospital, Pleven, between 2010 and 2014.

For functional assessment of the results we used the following methods: the manual muscle test, goniometry for flexion and abduction of the hip joint and a VAS test for pain (the patient chooses the points based on self-appraisal – 0 points mean strong pain and 20 points mean no pain at all) at the admission and discharge from the hospital.^{5,6} The measurements and test results are entered into a file for each patient, then these data are analyzed statistically using PAS, Statgraphics v.5.0, SPSS for Windows v.7.0 and the Mann-Whitney (Wilcoxon) W-test.⁷

The rehabilitation aims at improving the patient's locomotion (how to use walking aids) in performing the activities of daily living (ADL). Kinesitherapy includes therapeutic massage of the lower limb for several reasons: to improve microcirculation and manage the venous and lymphatic swelling, to revitalize the weak gluteal and hip muscles (abductors, extensors and external rotators of the hip joint and *m. quadriceps femoris*), and to relax the flexors and abductors of the hip joint.

The kinesitherapy consists of *isometric exercises* in hypertrophic mode; *isotonic concentrated exercises* for maintaining and increasing the range of motion of the hip joint and the knee joint, and improving the strength of the gluteal muscles both isometrically and against minimal resistance; *bilateral exercises* for the lower limbs; *analytical gymnastics* for the paravertebral, stomach, upper limb and shoulder muscles; *breathing exercises* – conducted in a correlational dependence with the type of the performed exercise (isotonic, isometric or isokinetic); *active exercise* of the hip joint with flexion of the knee and ankle joints (flexion of the hip joint with an extended knee should be avoided due to the strong forces applied on the joint); special techniques for *proprioceptive neuromuscular facilitation* (PNMF); *exercises with gym equipment and with a treadmill* for improving the range of motion of the hip and the knee joints; analytical exercises for the main movements and the combined movements of the ankle joint – with equipment; *post-isometric relaxation* (PIR) for *m. triceps surae et m. soleus*; assisted stretching until reaching Thomas' neutral test position to avoid flexion contractions and adhesions in the hip joint

from occipital position; *exercises for balance and posture stability; gait control* and, when necessary, *gait correction* using means and aids according to the stage of recovery.^{8,14}

The maximum movement volume of the hip joint is flexion until 90° and abduction 10°-15°, while abduction and rotation of the hip joint is not allowed.⁹

At baseline, each exercise is repeated 4-5 times. If the patient's adaptive capabilities are good, the repetitions gradually increase to 10-15 times. The kinesitherapeutic exercises are done once per day during the first several days, and if there is good functional capacity they are performed twice a day.

The treatment with performed physical factors includes applying NIMP – 20 min, 16000 A/m; IFT – 5 min., 90-100 Hz, 10 min., 1-100 Hz (quadripole isoplanar interference), electrostimulation (of the quadriceps femoris and the gluteal muscles) - 50Hz, perpendicular impulse with impulse length of 1ms/19 ms pause; group modulation with group continuation of 100 ms, periods from 1000 to 2000 ms.^{10,14}

Occupational therapy includes all ADL that are practiced at home, which are reinforced and improved further.^{8,11}

In our practice, we prefer prolonged periods for using *walking aids*, although most literature recommends shorter ones. For cemented prostheses we recommend that early partial weight bearing should begin around the second month, and full weight bearing - after the end of the second month, adjusted individually to each patient, these patients being mostly of advanced age. For uncemented prostheses, we recommend partial weight bearing after 3-4 weeks, and full efforts – after 4-6 weeks.¹² After reaching full capacity with walking aids, if there are no subjective complaints and objective reasons against that, the patient should begin walking with a single crutch on the opposite side of the affected leg. Extra focus should be placed on proper gait avoiding wrong movement stereotypes. If walking with a crutch causes no pain, the patient should gradually start using a cane. Using a cane is mandatory until the patient has overcome the gait called “gluteus medius”. For patients who already are able to climb stairs up and down, the number of stairs without a break during exercise is increased, and for patients unable yet to climb stairs, the kinesitherapy exercises must include training for stair climbing.^{8,13}

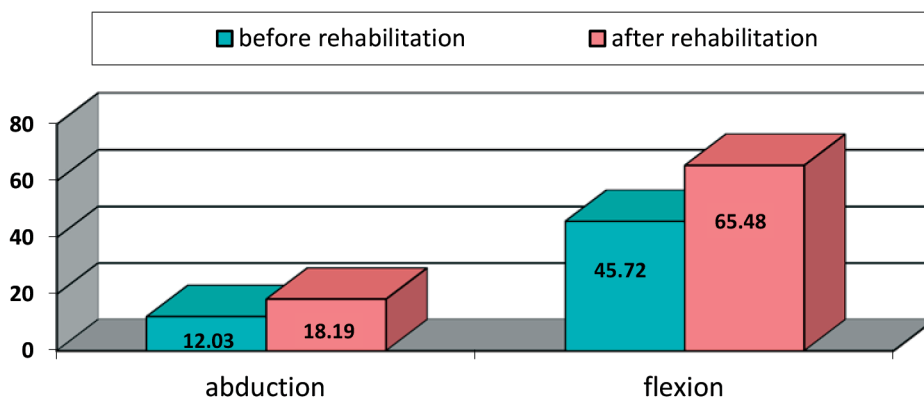


Figure 1. Results from goniometry for flexion and abduction in the hip joint at the beginning and end of the observed period.

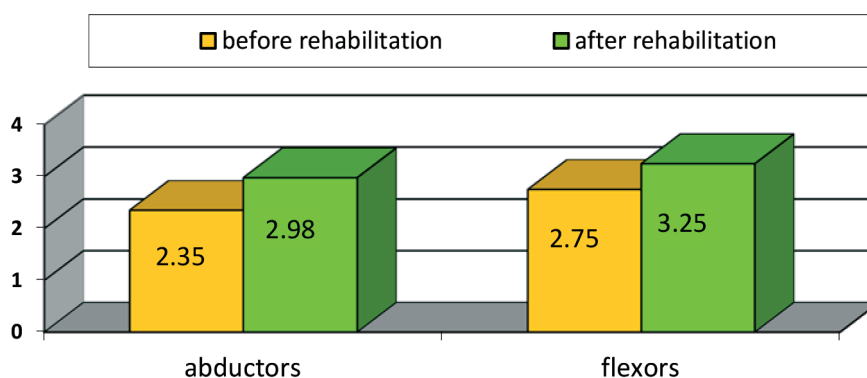


Figure 2. Results from MMT for flexor and abductor in the hip joint at the beginning and end of the observed period.

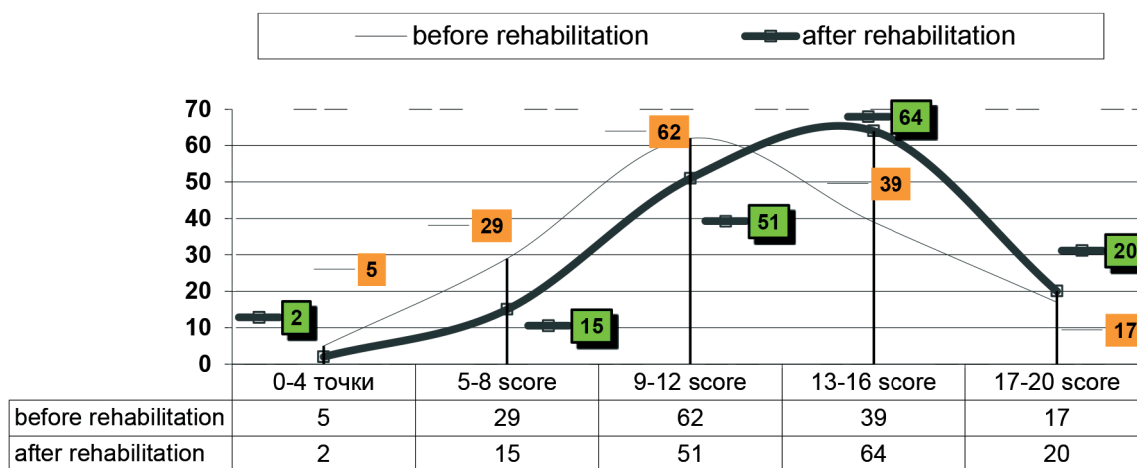


Figure 3. The Wilcoxon curve results from a modified VAS for pain at the beginning and end of the observed period.

RESULTS

Fig. 1 presents the results of the median arithmetic values for flexion and abduction of the hip joint before and after conducting hospital rehabilitation. Increased movement volumes of the hip joint demonstrate a significant improvement at the end of this rehabilitation period ($P < 0.05$).

Fig. 2 shows the data for the median arithmetic values for MMT for flexion and abduction of the hip joint at the beginning of the rehabilitation process and upon discharge from the hospital. The increase of the strength of the flexor and abductor muscles ($P < 0.05$) helps patients stabilize their gait and perform DAL.

Fig. 3 presents the Wilcoxon curve for the median arithmetic values of the modified VAS test for pain at the beginning and at the end of the rehabilitation period. The curve shifts to the right, indicating a significant pain reduction ($P < 0.05$).

The applied complex rehabilitation program has a high level of effectiveness for the functional recovery of patients after hip joint arthroplasty. It is perceived well by patients, does not cause risky situations, incidents, complications and side effects.

The inclusion of isoplanar interference treatment helps to reduce considerably the pain and restore the functionality of the hip joint, which is confirmed by the Wilcoxon curve for the pain VAS test.

Applying electro stimulations with low frequency currents for the extensors and abductors of the hip joint drastically improves the strength of these muscle groups, restores locomotion and helps patients perform their DAL.

DISCUSSION

In the available literature there is currently no systematized rehabilitation programme for patients after total hip replacement that includes not only a wide variety of kinesitherapeutic methods and physical agent modalities, but also plans the patient treatment in terms of periods and stages. Most authors focus mainly on a specific aspect of the kinesitherapy and not on the entire process.^{9,13,14} In this report, we presented one of the periods of the applied long-term kinesitherapy program for treating patients with hip replacement, which includes various means and methods of the natural and performed physical factors. It is adjusted and adapted to the conditions and specifications of the health care program in our country. We found that including electrostimulations, LFMF and isoplanar interference in the treatment process of patients with hip joint endoprosthesis shortens their recovery period. We found no information in the available literature regarding the application of these procedures during patients' rehabilitation after hip replacement.

CONCLUSION

Based on the results of the study we can conclude that applying a complex rehabilitation program consisting of KT, ET and physical agent modalities, significantly improves and shortens the recovery of patients with hip arthroplasty and ensures reaching optimal functional results. Patients report improved satisfaction from the achieved results compared to their highest pre-surgery expectations. A positive

impact is observed on patients autonomy in activities of daily living, as well as decreased depression state.

REFERENCE

1. Tivchev P, Kinov P, et al. Arthroplasty of the hip joint. Sofia: BG Kniga; 2014, pp 37-57, 68-72, 148-88. [Bulgarian].
2. Dreinhöfer KE, et al. (eds.). EUROHIP: Health Technology Assessment of Hip Arthroplasty in Europe, EFORT Appropriateness of Total Hip Replacement K. Dreinhöfer Department of Orthopedics, Ulm, 2011;55-63:145-6.
3. Jotov A, Rusimov V. [Current aspects in hip and knee joint replacement.] Physical medicine, Rehabilitation, Health 2013;2:3-14. [Bulgarian].
4. Fuentes CJ, Armijo-Olivo S, Magee DJ, et al. A preliminary investigation into the effects of active interferential current therapy and placebo on pressure pain sensitivity: a random crossover placebo controlled study. Physiotherapy 2011;97(4):291-301.
5. Bankov S. [Manual muscle testing.] Medicine and Sports 1991;81-91:130-5. [Bulgarian].
6. Donatelli R, Wooden MJ. Orthopaedic physical therapy. 4th edition, St. Louis: Churchill & Livingstone; 2010:400-80.
7. Velkova D. Health and social problems of elderly people living alone in villages [dissertation]. Pleven, 2000 [Bulgarian].
8. Ilieva E. [Features of rehabilitation and occupational therapy after hip arthroplasty.] Physical medicine, Rehabilitation, Health 2007;6(4):14-8 [Bulgarian].
9. Avery PP, Baker RP, Walton MJ, et al. Total hip replacement and hemiarthroplasty in mobile, independent patients with a displaced intracapsular fracture of the femoral neck: a seven- to ten-year follow-up report of a prospective randomised controlled trial. J Bone Joint Surg Br 2011;93(8):1045-8.
10. Milanova H, Troev T. [Current strategies for physical therapy and rehabilitation after fracture of the distal radius (magnetic therapy, interference current, laser therapy) (overview).] Prevention and Rehabilitation 2011;2:17-24 [Bulgarian].
11. Troev T, Milanova H, Mavrova R. [Our experience in kinesitherapy after knee endoprosthesis.] Medicine and sports 2011;4:16-9 [Bulgarian].
12. Cook C, Hegedus E. Orthopedic physical examination tests: an evidence-based approach. Upper Saddle River NY: Pearson Prentice Hall; 2008:93-9.
13. Bodén H, Adolphson P. No adverse effects of early weight bearing after uncemented total hip arthroplasty. Acta Orthop Scand 2004;75(1):21-9.
14. Kisner C, et al. Therapeutic Exercise 1915 Philadelphia, PA: FA Davis Company; 2007; pp 191-203;643-86.

Реабилитация пациентов после артропластики тазобедренного сустава (поздний послеоперационный период – больничная реабилитация)

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Дата получения: 08 декабря 2015

Дата приемки: 12 декабря 2016

Дата онлайн публикации: 16 января 2017

Дата публикации: 27 июня 2017

Ключевые слова: тотальная артропластика тазобедренного сустава, тазобедренный сустав, реабилитация

Образец цитирования: Krastanova MS, Ilieva EM, Valcheva DE. Rehabilitation of patients with hip joint arthroplasty.

Folia Medica 2017;59(2):217-221. doi: 10.1515/folmed-2017-0016

Введение: Замена тазобедренного сустава (эндопротезирование, аллопластика) является одним из наиболее частых хирургических вмешательств в 20-ом веке.

Цель: Целью настоящего исследования является проведение реабилитационной терапии на позднем послеоперационном периоде больничной реабилитации (через 45 дней после операции), отслеживание улучшения состояния пациентов и представление результатов.

Методы и материалы: Пациенты с эндопротезированием тазобедренного сустава в количестве 152 человек приняли участие в исследовании. Все подверглись операции и прошли реабилитацию в отделении клинической реабилитации клиники физикальной и реабилитационной медицины при Университетской больнице «Д-р Г. Странски» в Плевене. Кинезитерапия включала в себя лечебный массаж, изометрические упражнения для ягодичных и тазобедренных мышц, изотонические упражнения для тазобедренных и коленных суставов, дыхательные упражнения, аналитическую гимнастику, упражнения для баланса и стабильности позы, контролирование походки, упражнения на тренажорном оборудовании; эрготерапия включала в себя все виды повседневной деятельности, имеющих место в домашних условиях; лечение физическими факторами включало в себя применение магнитного поля, интерферентного тока, электростимуляцию м. Quadriceps femoris и ягодичных мышц.

Результаты и измерения: После проведения теста по визуально-аналоговой шкале (ВАШ) для оценки интенсивности боли, теста на прочность мышц и теста на объём движений тазобедренного сустава были установлены в начале и по завершении реабилитационного процесса и внесены в индивидуальное медицинское досье каждого пациента.

Заключение: На основе результатов исследования, можем сделать заключение, что проведение комплексной реабилитационной программы, включающей в себя кинезитерапию, проведённые физические факторы и эрготерапию приводит к значительному ускорению восстановления и обеспечивает достижение оптимальных функциональных результатов для пациентов.