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Research Article

REHABILITATION OF PATIENTS AFTER SURGERY WITH POST-COVID ASEPTIC NECROSIS OF THE FEMORAL HEAD

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ABSTRACT

We carried out rehabilitation of patients after surgery with post-COVID aseptic necrosis of the femoral head according to the method developed by us in 49 patients. The patients were divided into 2 groups: the main group of 25 and the control group of 24 patients. The main group underwent rehabilitation developed by us, the control group by the traditional method. The results of rehabilitation were checked by the Coordination-speed test, the test parameters before the operation to the main group of the operated leg and after the operation, the difference in the number of movements in 10 seconds was estimated. when performing the test with an operated and non-operated leg, at the same time, the hip abduction index increased to the greatest extent after the operation. The data of the coordination test showed that the control group before the operation on the operated leg (retraction, step forward, backward) was within 9.0 m. These indicators after the operation on the 3rd- 5th day became 8.5 m, on the 14th day they were

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noted within 9.4 m . The data of the coordination test were noted before the operation to the main group on the operated leg (retraction, step forward, backward) was within 9.4 m. These indicators after the operation on the 3rd-5th day became 9.8 m, on the 14th day they were noted within 12.4 m. The data obtained shows that the result in all parameters is better in the main group than in the control group, and the difference in the dynamics of indicators is clearly visible. Conducting better postoperative rehabilitation shows the performance of the gluteal muscles, as it is most important in terms of prevention of dislocations of endoprostheses. Thus, the method of stage-by-stage rehabilitation developed by us, post-COVID femoral head aseptic necrosis, contributes to improving the results of treatment. A differentiated approach to the rehabilitation of patients with post-COVID femoral head aseptic necrosis has reduced the duration of rehabilitation and disability.

KEYWORDS

Kidney-shaped aseptic necrosis of the femoral head, rehabilitation period, results, Coordination-speed test, physical therapy.

INTRODUCTION

Post-COVID aseptic necrosis of the femoral head is one of the common problems of modern orthopedics. According to the World Health Organization, aseptic necrosis of the femoral head occurs in 25% of cases, and disability - in 60%. [1,3, 19, 43.]. There are isolated reports in the available literature concerning the development of femoral head aseptic necrosis after COVID-19. These papers discuss the role of corticosteroids widely used in COVID-19 in the development of the disease. According to Aldridge J.M., Urbaniak J.R. (2020), this complication against the background of COVID is 1.9 per 10,000 population. [2, 5]. In a subsequent study, 23.1% (18 out of 78) Chinese patients with atypical pneumonia developed steroid-induced Post-COVID femoral head aseptic necrosis, mainly due to taking high doses of glucocorticoid during treatment of atypical pneumonia. [4, 10, 18] In our region, since the end of 2021, due to the Covid-19 pandemic, the incidence of femoral head aseptic necrosis has sharply increased. As many clinicians note, femoral head aseptic necrosis in patients who have undergone COVID-19 develops in a shorter time compared to patients without coronavirus infection. To understand the features of the development of femoral head aseptic necrosis after COVID-19, further accumulation of factual data is necessary. Probably, the development of the disease is synergistically influenced by many factors, including steroid and ischemic. The blood supply to the femoral head is carried out through the vessels located in the femoral neck, in 45-50% of cases pathology , causal factors that fail. That is why the process is often called idiopathic. [7,9,24,46]. Idiopathic osteonecrosis of the femoral head is a severe degenerative-dystrophic lesion of hip joint observed at the most able-bodied age.11,12) In our region, surgical treatment of femoral head aseptic necrosis mainly consisted of hip replacement, which was useful in the last stages of the disease. However, scientific studies devoted to early diagnosis, complex conservative and minimally invasive and, depending on the stage of the disease, surgical treatment, study and implementation of research results after Covid-19 have not been conducted.

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Akhtamov I.R. and co-authors (2012) suggest the femoral head aseptic necrosis of the fifth stage of the development of the disease, which allows you to navigate the stage of the disease when choosing a treatment method. Thus, the division of the stage of the disease is relative, because the process develops dynamically has no clear boundaries and one stage passes into another. Such a division of the stage of the disease is necessary to determine the degree and depth of the pathological process. These indicators solve the question of the choice and tactics of the treatment method. To date, no radical treatment has been developed for pathology. However, adequate drug therapy slows down the destructive progression of bone tissue. In the absence of treatment, bone femoral head aseptic necrosis leads to disability of the patient. Patients are recommended to urgently consult a doctor at an early stage while the disease worsens, the diseases develop rapidly. At stage 1, complex conservative treatment and physiotherapy, stage 2 shows minimally invasive decompensating, revasculizing operations with bioceramics or bioscruze, stage 3-4 shows surgical treatment in the form of hip joint endoprosthetics.[17,28,42, 45] After surgery for post-aseptic necrosis of the femoral head, the main role is played by the rehabilitation of patients, at the same time. the main points are the return of patients to work and the improvement of the quality of life of patients, as well as the prevention and prevention of complications.for their active participation in the life of society, the creation of optimal conditions.[15, 21, 29]

The purpose of our work: To improve the results of surgical treatment for postcovoid femoral head aseptic necrosis by developing rehabilitation methods.

MATERIAL AND METHODS OF RESEARCH

We have carried out rehabilitation of patients after surgery with Post-COVID aseptic necrosis of the femoral head, a technique developed by us in 49 patients. The patients were divided into 2 groups: the main group of 25 and the control group of 24 patients. The main group underwent rehabilitation developed by us, the control group by the traditional method. At the age of 35-45 years – in 32 patients;. from 46 – 55 years in 12 patients and from 56 – 65 years in 5 patients. Of these, 42 men and 7 women. These data show that the disease occurs in men at a young working age,

After surgery with post-covid femoral head aseptic necrosis, in order to improve the results of surgical treatment, we divided medical rehabilitation into the following stages: inpatient, outpatient, sanatorium-resort. During inpatient rehabilitation, preoperative preparation of patients was carried out. assessment of pain intensity on the Oberg scale.and clinical signs according to the computer program (DGU No. 20223723) developed by us. At the stage of instrumental diagnostics, we used: X-ray diagnostics (RD), magnetic resonance imaging (MRI), Dopplerography (DG) of NK blood vessels, laboratory studies. Inpatient rehabilitation included surgical treatment. After surgery, the hip joint area was divided into two stages: The early stage up to 4 days from the moment of surgery and the late stage up to 3 weeks. At a late stage , patients independently perform tasks and exercises for rehabilitation after surgery with post - cortical aseptic necrosis of the femoral head hip joint . At the sanatorium-resort stage, patients received physical therapy and physiotherapy every year during the year in sanatorium-resort conditions.

It is especially important to carry out a preoperative assessment of the condition of patients with hip joint movement, shortening, concomitant diseases, as they are the starting point for comparing and taking into

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account the results of surgical treatment. Before the operation , patients should be familiarized with the operation and their possible complications . how to conduct physical therapy hip joint after surgery. The preoperative period lasts 3-4 days. The period of the operation. After the operation, the patient is in the intensive care unit for 24 hours and receives: antibacterial medications (antibiotics), in order to prevent the development of infection; from venous thrombosis of anticoagulation drugs. Also against pain prevention of inflammation of nonsteroidal anti-inflammatory drugs; to accelerate the regeneration of bone and muscle structures of protein and calcium supplements.

After surgery, the treatment and recovery period began for both groups of patients, which lasts for 2-3 weeks

In the main group, special Therapeutic exercises were used for the rehabilitation of patients developed by us and carried out in a gentle mode. In the control group, physical therapy classes were conducted in a group or patients independently performed exercises recommended by a physical therapy doctor.

Early stage - After hip arthroplasty, patients are in the intensive care unit and within 24 hours. The department monitors the main functionally significant indicators of the state of the body: blood pressure, heart rate, breathing, etc. If necessary, blood and blood substitutes are transfused. In order to prevent congestion in the lungs, respiratory gymnastics is performed. Immediately after the operation , he uses compression cuffs .Carrying out rehabilitation measures strengthens the outcome of surgical intervention. Surgeons and all the authors do not recommend during the performance of physical exercises bringing the limb with internal rotation of the hip, in order to prevent dislocation of the head of the endoprosthesis. Both groups are the main and control group after surgery/

The list of special physical therapy exercises after surgery for post–COVID femoral head aseptic necrosis (starting position - lying on your back)

The content of the exercise	Dosage	Days	Tempo	Execution conditions
Flexion and extension in the toes and ankle joints with tension of the lower leg muscles	5-10 times	1-2 days	Slow	Breathing is free
Flexion and extension in the toes and ankle joints with tension of the muscles of the lower legs. Flexion and extension, retraction and reduction for the fingers of the hand. Toning massage of the palm surfaces of the hands for 1 minute .Exercises of the Niche "closing the palms"	10 – 15 times	3-4 days	Slow	Breathing is free
Alternately lifting straight legs, sock on yourself. Facilitated flexion in the knee	10 -15 times	5-6 days	middle	Lifting – exhale, lowering - inhale

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joint of the operated limb. Retraction of a straight leg . Gymnastics for the fingers of the hand. Exercises of the Niche "closing the palms"				
Simultaneous lifting of straight legs, toe-to-toe retraction of a straight leg, flexion and extension in the knee joint of the operated limb. Gymnastics for the fingers of the hand. Exercises of the Niche "closing of palms" exercises with visual control, tricycle walking.	12 -15 times	8-9 days	Slow	Breathing is free
Lifting the operated straight leg, the sock on itself. Active flexion, extension in the knee joint and retention of the operated limb. Lifting a straight leg in a prone position. Walking with a high knee lift of the operated limb. Gymnastics for the fingers of the hand. Exercises of the Niche "closing of palms".	10 – 15 times	10-12 days	middle	Breathing is free
Lifting the operated straight leg, the sock on itself. Retraction of the straight leg, flexion and extension in the knee joint of the operated limb. Gymnastics for the fingers of the hand. Exercises of the Niche "closing the palms" Exercises of the Niche "closing the palms"	12 – 15 times	14-15 days	middle	Breathing is free

After the operation, the operated limb was diverted by 20 degrees using a roller between the legs. In order to prevent thrombosis of the vessels of the lower extremity after surgery, both legs are immediately bandaged with an elastic bandage. On the 2nd day, taking into account the severity of concomitant pathology, the volume of intraoperative blood loss, patients were allowed to be transplanted from the bed with the maximum raised bed head end 1-2 times for 10-15 minutes, the position is determined by the patient's well-being,. The main position of the patient is lying on his back with the removal of the operated limb by 20 degrees.The patient was allowed to lie on his healthy side with a pillow or a roller between his legs .On the 3rd- 4th day after the permanent elastic bandaged legs, they were allowed to sit down in bed with outside help. turns on the side with a roller between the legs. And also allowed to lie with a support frame or crutches at the bedside with limited support or without support on the operated limb. On day 4-5, patients began to move with the help of a physical therapy instructor on crutches or a support frame around the ward with limited support or without support on the operated limb. On day 6-7, independent movement was allowed with

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the help of crutches or a support frame without load or with limited load on the operated limb. On the 8th- 9th day, patients began to walk with a support frame or crutches along a corridor up to 150m with a 50% insignificant load. On the 8th- 13th day, they were allowed to climb one flight of stairs. On the 14th- 15th day, the stitches were removed after the surgical wound. The patients were trained in walking with a support device, self-service skills.

In order to ensure the effectiveness of the rehabilitation methodology developed by us, we tested the Coordination-speed test, which serves to determine the coordination-speed capabilities of patients to determine the severity of asymmetries between operated and non-operated limbs. Methodology: Coordination-speed test, conducted before surgery, on 3-5 days and

before discharge (13-14 days of the postoperative period).At the same time, it is necessary to perform as many movements as possible in a fixed time – 10 seconds (leg retraction, step forward and backward). The test allows you to judge the degree of readiness of various muscle groups to move, which is most significant in the postoperative period.(table 1.)

Test results. The distance covered by patients in 10 seconds. before the operation

Table 1.

Main group 15 people	Control group 15 people
2,1 m	2,8 m
2,5, m	3,5 m
4,8 m	3,30 m
4,0 m	3,83 m
3,5, m	3,2 m
3,2, m	4,5 m
2,7 m	3,6 m
3,5 m	2,5 m
2,80 m	3,35 m
3,70 m	3,1 m
2,75 m	3,2 m
3,1. m	3,8
3,2	2,9
2,5	2,8
2,6	3,0
Average M =3,13 m±0,18	Average M =3,29 m±0,13

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T	**10,946**
p	**<0,001**

Test results. The distance covered by patients in 10 seconds. after the operation

Table 2.

Main group 15 people	Control group 15 people
5,01 m	4,85 m
5,0 m	3,5 m
5,2 m	4,36 m
4,9 m	4,83 m
4,2 m	4,2 m
5,1 m	3,5 m
4,7 m	4,6 m
4,95 m	4,5 m
4,83 m	4,35 m
5,75 m	3,8 m
4,76 m	4,9 m
4,9 m	3,5
5,2	4,0
5,0	3,8
5,5	3,2
Average M = 5,0 м± 0,1	Average M =4,13 м±0,11
T	**5,9**
p<0,001	

This test shows the state of the muscular system, also allows you to judge the operability of the periarticular muscles, makes it possible to control the determination of the severity of asymmetries between the operated and non-operated limbs and is safe.

The results of the test are presented in (Table 3).

Table 3

Coordination-speed test data (number of movements in 10 seconds)

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Group	Stages of the study	Not operated leg			Operated leg		
		Withdrawal	step forward	step back	Withdrawal	step forward	step back
Control	Before the operation	8.5±0,13	9.5±0,15	8.5±0,13	9.2±0,21	8.8±0,12	9.1±0,17
		8.83±0,3***			9.03±0,13*		
	3-5 days	9.2±0,17	9.0±0,14	8.5±0,13	8.2±0,12	9.5±0,08	8.1±0,09
		8.9±0,23***			8,6±0,43*		
	14 days	9.2±0,17	9,4±0,21	9,8±0,11	9,9±0,21	9,2±0,19	9,3±0,2
		9,46±0,4**			9,47±0,23***		
Main	Before the operation	9,2±0,12	10.5±0,09	9,8±0,2	9,5±0,09	9,2±0,12	9,6±0,21
		9,83±0,4			9,43±0,13		
	3-5 days	10,0±0,2	10,2±0,16	10,6±0,13	9,0±0,17	10,2±0,22	9,2±0,16
		10,4±0,2			9,47±0,4		
	14 days	10,9±0,27	10,6±0,15	11,0±0,28	12,3±0,12	12.5±0,28	12.0±0,25
		10,83±0,13			12,26±0,17		

Note: * - *- p<0,05; **-p <0,01; *-p <0,001 with respect to basic group to control one.**

The table shows that before the operation after the operation, the difference in the number of movements in 10 seconds was estimated. when performing the test with an operated and non-operated leg, at the same time, the hip abduction index increased to the greatest extent after the operation. The data of the coordination test showed that before the operation, the control group before the operation on the operated leg (retraction, step forward, backward) was within 9.0 m.These indicators after the operation on the 3rd- 5th day became 8.5 m, on the 14th day they were noted within 9.4 m . The data of the coordination test were noted before the operation to the main group on the operated leg (retraction, step forward, backward) was within 9.4 m.These indicators after the operation on the 3rd- 5th day became 9.8 m , on the 14th day they were noted within 12.4 m . The data obtained shows that the result in all parameters is better in the main group than in the control group, and the difference in the dynamics of indicators is clearly visible. Conducting better postoperative rehabilitation shows the performance of the gluteal muscles, as it is most important in terms of prevention of dislocations of endoprostheses. Thus, the data of the coordination test showed that on the 14th day after the operation, this indicator on the operated leg in the main group

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was equal to 12.4 m and in the control group - 9.4 m of movement, which is 30.5% worse, in comparison, than in the main group. With this disease after surgery, the main points in the rehabilitation of patients is to improve the results of treatment, return patients to work and improve the quality of life of patients, as well as prevention and prevention of complications. For their active participation in the life of society, the creation of optimal conditions and the reduction of disability.

DISCUSSION

After total hip arthroplasty, post-COVID femoral head aseptic necrosis is of great importance for the rehabilitation of patients in assessing the results of treatment. After total arthroplasty of hip joint, some patients with non-compliance with the orthopedic regimen experience a dislocation of the femoral head for the purpose of prevention, various splints are used.

Known abduction tire for the treatment of congenital dislocation of the hip, made in the form of a metal telescopic strut. At the ends of the strut with the help of hinges, cuffs are fixed for fastening the tire in the lower third of the lower leg (V.Ya. Vilensky. Diagnosis and functional treatment of congenital dislocation of the hip. Moscow: Medicine, 1971, p. 107).

However, the tire of Vilensky V.Ya. has a rigid fixation, excludes movement in the hip joints in the frontal plane in the form of adduction, does not have the possibility of gradual dosing of hip abduction.

A device for the treatment of children with pathology of the hip joint, containing a sliding metal spacer made of two bars, and fixators of the lower extremities, characterized in that the bars of the spacer have holes 1 cm apart, and the fixators of the lower extremities are made in the form of a bracket with rings at the ends in which the belts are installed, while at one end of the belts there is a Velcro fastener, and a screw is installed in the holes of the slats (RUz, patent FAP No. 00609, A 61 V 5/04, 12/23/2009).

However, the device is not intended for use in adults, it has a rigid fixation in the hip joint area, limits active and passive movements in the hip joint, excludes movement in the hip joints in the frontal plane in the form of hip adduction, and creates inconvenience during hygienic self-service.

Known splint for the treatment of congenital dislocation of the hip, containing abductor arches and a spacer connecting them, made of two parts, while at least one connection of the abductor arch with the spacer is made movably with the possibility of changing and fixing the angle between them, characterized in that the parts the struts are connected by a ball joint with a position lock, providing the possibility of changing the angle between the parts of the strut (RU, patent No. 2407488, A61F5/01).

The disadvantage of the above tire is the inability to use in the development of the operated hip joint (the impossibility of performing rotational movements of the thigh). The tire is intended only for walking the patient, but walking is difficult, since the device is attached to the lower third of the lower leg. The design of the device is inconvenient to use - a ball joint with a position lock provides a change in the angle between the parts of the spacer, subject to constant adjustment by a specialist. In addition, the device is not intended for use by adults.

Known functional tire for the treatment of congenital dislocation of the hip in children, containing a telescopic sliding tube, cuffs for fastening the tire, characterized in that the telescopic tube is equipped

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with a screw rod and a spring (KZ, patent No. 22142, A61F5/04, 15.01.2010).

The disadvantages of a functional bus are: its complex mechanism, which includes many constituent elements that make the mass of the mechanism heavier; inconvenience in use - the development of the hip joint is carried out only lying down and in one plane; inability to use in adults; lack of deep study of muscles in various planes.

The authors have developed an abducting rotational system for the treatment of hip joint pathology in children, characterized by the fact that it contains two beams connected in series connected from adjacent ends with the possibility of changing the mutual angular position in one plane and fixing the achieved position, the free end of each beam is equipped with a mounting element movably connected to the beam, each fastener is made of two component parts connected with the possibility of changing the mutual angular position in one plane and fixing the achieved position, the first part of the fastener is connected to the beam through a single-plane axial hinge, the second part is equipped with a connecting element designed for attachment to an orthosis. 2. The outlet rotary system according to claim 1, characterized in that the beams are made in the form of oblong plates. 3. The outlet rotary system according to claim 1, characterized in that the first part of the fastener is made in the form of the first corner, the second part of the fastener is made in the form of the second corner, the first shelf of the first corner is connected to the beam through a cylindrical axis, the second shelf of the first corner is in contact with the first shelf of the second corner and connected to it through the axis, while in the first shelf of the second corner there is a groove in the form of an arc sector, and in the second shelf of the first corner there are threaded holes, in one of which a locking screw is installed. 4. The diverting rotary system according to claim 1, characterized in that the beams are connected at adjacent ends by a discretely fixed axial hinge. 5. The diverting rotary system according to claim 4, characterized in that the discretely fixed axial hinge contains a toothed disk fixed at the end of the first beam, in contact with the reciprocal toothed hole at the end of the second beam, and an axis connecting the beams, made in the form of a screw (RU, patent No. 175524, A61F5/0127, March 12, 2018).

However, the device creates inconvenience for patients when worn, since the location of the outlet rotational system in the inguinal region is not convenient, and can lead to injury to the organs of the reproductive system if used improperly. Due to the direction of the abducting rotational system in the groin area, the splint is inconvenient when working out muscles while walking. It is not intended for use in adults or for strengthening hip arthroplasty musculature as it cannot provide varying levels of exercise to increase or decrease stiffness. Due to the accumulation of fixation elements, the tire design is inconvenient and technically complex.

According to Akramov V.R. (2021), after arthroplasty, the rehabilitation of patients with aseptic necrosis of the femoral head provides for the following main points: The return of patients to work is one of the main points in the rehabilitation of patients after total arthroplastywith ankylosed hip joint. The second point is the creation of optimal conditions for its active participation in society, as well as to improve the quality of life of patients.

Authors Shorin (2018) Medical rehabilitation of patients with a hip joint after arthroplasty included the following stages: inpatient, outpatient, sanatorium and resort. The researchers wrote that the stage of

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inpatient rehabilitation included preoperative preparation of patients and surgical treatment. After hip arthroplasty was divided into two stages: Of these, the early stage was from the moment of surgery to 4 weeks. From 4 weeks to 12 weeks - there was a late stage. In the late stage, patients performed tasks and exercises for rehabilitation after hip arthroplasty by a surgeon and a rehabilitation specialist. The authors wrote that at the sanatorium-resort stage, patients spent 3 years in sanatorium-resort conditions, and also received exercise therapy and physiotherapy every year.

Researchers Khamraev Sh.Sh., Karimov M.Yu. (2013 C 18 -20) wrote that after the operation period of total arthroplastyHJ, patients should actively perform general strengthening exercises. and normalization of the neuromuscular apparatus of the operated limb,

In order to restore the operated joint and prepare for full load, the authors indicate that patients should gradually maximally mobilize the tendons, muscles, bursal-ligamentous apparatus, which contribute to stability and balance, adaptation to life..

In conclusion, we can say that the analysis of scientific literature femoral head aseptic necrosis indicates at present a large number of scientific papers on postoperative rehabilitation of patients with this disease. Despite most of the accumulated experience of total arthroplastyHJ, post-operative rehabilitation of patients has not been sufficiently studied. No postoperative phased rehabilitation of patients.

CONCLUSIONS

1. The method of stage-by-stage rehabilitation treatment developed by us, post-COVID femoral head aseptic necrosis, improves the results of treatment.

2. A differentiated approach to rehabilitation of patients with post-COVID femoral head aseptic necrosis has reduced the duration of rehabilitation and disability.

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