

Results of using professional motor test in the program of physical rehabilitation of football players after injuries of the ankle joint

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Purpose: improving the results of physical rehabilitation of football players aged 18–24 with intra-articular injuries of the ankle joint at the outpatient stage by optimizing and increasing the effectiveness of the differentiated use of rehabilitation measures that were integrated into the training process.

Material & Methods: this work was based on the results of observation of 36 athletes who play football in the clinic of the "MirMajidErslan" Medical Center in Beirut (Lebanon) based on the physical therapy room. Victims of the control group received a set of rehabilitation measures according to the traditional program of physical rehabilitation adopted in this clinic. The victims of the main group were offered a set of rehabilitation measures of the program developed by us, which included the use of therapeutic gymnastics integrated into the training process, the use of modified ethnic Arabic bath procedures and the consistent use of procedures with elements of ethnic Arabic massage.

Results: analysis of the results of physical rehabilitation showed that with a positive dynamics of changes in the functional status of the victims of both clinical groups, more pronounced and significantly better results were obtained from the victims of the main group, who underwent physical rehabilitation according to our proposed program.

Conclusions: the proposed program of physical rehabilitation of injured athletes after internal articular injuries of the ankle at the outpatient stage, which is included in the training process, is effective and can be recommended for general use.

Keywords: ankle joint, physical rehabilitation, oriental massage, Hammam, outpatient stage.

Introduction

Among the priority problems of modern sports medicine and physical rehabilitation of athletes is the question of the most effective rehabilitation of athletes of team sports in injuries and diseases of the ankle joint, the quick and full return to them of sports performance. An ankle joint is a complex joint that bears a significant load, especially in sports, and therefore is often prone to traumatic injuries. The complexity of the anatomical structure and the weak security of soft tissues with systematic high loads and frequent traumatic actions lead to the fact that the mechanical strength of its elements is insufficient. Ankle injuries account for up to 15% of all joint injuries, while the main contingent of people with this pathology is people of working age, including athletes [4; 10; 14].

Dislocations and fractures prevail among injuries, the frequency of which reaches 30–50% of all injuries of the ankle joint, and up to 12% among all pathologies of the musculoskeletal system. Damage to the ligamentous-capsular apparatus of the ankle joint is the second most common disease after meniscus pathology and is up to 15% among all injuries of the joints. Internal articular ankle fractures account for 1,5–4,0% of all skeletal bone fractures and 5–7% of all internally articular fractures. Most victims with such injuries need long-term treatment [7; 11; 19].

A significant percentage of disability with open injuries of the ankle joint, which ranges from 9,3% to 17,4%, indicates a number of unresolved issues in the treatment of such injuries [11; 12].

For these reasons, it is advisable to further improve, search for and incorporate into the process of rehabilitation after internal articular injuries of the ankle joint the most progressive and scientifically based technologies. Their use should be complex and provide a differentiated approach to the choice of forms and means depending on the nature of the injuries of both the bone and cartilage structures of the joint and the soft tissues surrounding it [2; 12].

A positive solution to the identified problem can be found only if new rehabilitation technologies are added to the existing traditional methods and approaches, which are promising in terms of optimizing or stimulating reparative processes. The need to return qualified athletes to active training and competitive activities sets high requirements not only for their medical support, but also for the subsequent restoration of their health. At the same time, it is necessary to take into account possible material costs and to have a goal of reducing them, including by improving the complex of rehabilitation measures at all stages, and especially at the outpatient level [10].

The main goal of physical rehabilitation, as an integral part of the medical rehabilitation process, is a complex process of restoring the health, physical condition and working capacity of victims with the use of, for therapeutic and prophylactic purposes, exercise and natural factors [1; 13].

The leading role in such programs is given to modern methods of non-drug therapy, while traditional methods of physical rehabilitation, taking into account the ethnic, historical and cultural characteristics of the lives of victims, are currently not being sufficiently applied.

Purpose of the study: to improve the results of physical rehabilitation of athletes of game sports (by the example of football) with internal articular injuries of the ankle joint at the outpatient stage by optimizing and increasing the effectiveness of the differentiated use of rehabilitation measures integrated into the training process.

Material and Methods of the research

The study was conducted in the clinic of the Medical Center "Mir Majid Erslan" in Beirut (Lebanon) at the base of the physical rehabilitation office during 2016–2018. The basis of this work was based on the results of observation of 36 athletes involved in football. All injured athletes were male, aged 18 to 24 years.

When conducting complex biological surveys with the participation of athletes, they adhered to the Helsinki Declaration of the World Medical Association on the ethical principles of medical research with human participation as the object of study. The content of maximum test loads and physiological parameters measurement procedures complied with the International Rules and requirements for biomedical research involving human subjects. The persons who were tested were acquainted with the content of tests, measurement procedures and agreed to conduct them.

The injured athletes were divided into two equivalent clinical groups – the main and the control group (18 injured athletes each). In terms of age, manifestations of functional disorders and localization of injuries received, the main and control groups were identical.

The study involved victims with closed injuries of the ankle joint of types A1, A2, C1 and C2 according to the classification AO/ASIF [19].

The duration of injury ranged from 4 to 6 months, while athletes from both clinical groups underwent rehabilitation treatment for the first time. The injured athletes of the main clinical group underwent a course of rehabilitation treatment in parallel with the restoration of the training process.

Victims of the I (control) group received a set of rehabilitation measures according to the traditional program of physical rehabilitation adopted at the clinic of the Medical Center "Mir Majid Erslan".

The victim of the II (main) group was offered a set of rehabilitation measures in accordance with the program developed by us.

The victims of both groups immediately before the rehabilitation treatment and at its completion underwent a primary and repeated examination - 30 days after it began, which made it possible to assess the dynamics of changes in the indicators of the state of the body systems.

To assess the effectiveness of vocational rehabilitation of injured athletes using the traditional and proposed programs, we used a standard motor test from the elements of professional technical and physical training of football players. This test is traditional for the training process of football players of different ages and qualifications, is regularly used in sports teams "Hoops", "Champs", "Adab w Riada", which are part of

the sports club "Sporting high" in Beirut.

The digital material obtained during the study was processed using the Statistica for Windows version 6.0 general-purpose data processing software. The significance of differences between groups (comparison of the average values of the indicator for each group) was determined using Student's criterion (t). The confidence level was adopted 95%.

For the victims of both clinical groups, physio-functional measures were performed for all clinical cases. Each phase corresponds to the weekly protocol of rehabilitation activities according to the schedule (Table 1)

The injured athletes of group I were assigned 3 sessions of magnetic therapy for a week with magnetic induction up to 30 mT. Laser therapy in this phase was used 3 times for all patients, taking into account the type of monochrome radiation to the ankle and reflexogenic zones, but, as a rule, in continuous mode with a power of up to 25 mW for 15–30 seconds each, the total time of the procedure was 3 minutes. Magnetotherapy was intended for all suffered athletes of group I – 3 sessions (with preliminary characteristics), laser therapy – 3 sessions with identical power. The criteria for the

Table 1
Schedule of rehabilitation activities for victims of the control group

Weekday	Procedure	
	morning	day
Monday	TE	magnetic therapy, laser therapy
Tuesday	TE	therapeutic limb massage
Wednesday	TE	laser therapy, magnetic therapy
Thursday	TE	therapeutic limb massage
Friday	TE	magnetic therapy, laser therapy
Saturday	TE	therapeutic limb massage
Sunday		rest

effectiveness of the rehabilitation measures carried out were: full axial load, correct posture, standing, full active flexion and extension in the ankle joint without resistance, restoration of muscle strength to 80% of the strength of the retro-lateral limb, absence of pain syndrome and edema of the limbs.

The group II victims of the complex of rehabilitation measures were designed according to the program we proposed. It also consisted of a protocol that was implemented on schedule for all phases (Table 2). The program of differentiated use of physical rehabilitation facilities for injured athletes developed by us included the use of therapeutic gymnastics, which was integrated into the training process of athletes, and massage with elements of ethnic Arabic massage using modified ethnic Arabic bath procedures.

An oriental massage was intended for the muscles of the affected limb with an emphasis on activating the blood and lymph flow. Physiotherapeutic procedures were replaced by the appointment of three sessions of an Arabic bath of a mixed type, namely, an oriental bath based on an Arabic with a fixed methodical (technological) sequence.

We used the traditional for the state of Lebanon and the Arabic bath of the mixed type spread on its territory. In contrast to the stereotypical and unconventional for most other countries,

Table 2
Schedule of rehabilitation activities for victims of the main group

Weekday	Procedure
Monday	bath + oriental massage
Tuesday	workouts with integrated therapeutic exercises
Wednesday	bath + oriental massage
Thursday	workouts with integrated therapeutic exercises
Friday	bath + oriental massage
Saturday	workouts with integrated therapeutic exercises
Sunday	relaxation

the use of a Hamam type of bath, with a high content of water vapor in the air and humidity up to 90%, we used the classical Arabic bath according to the eastern type with a "dry" warming room for soaring and humidity not higher by 40%. This made it possible to significantly reduce the load on the cardiovascular and respiratory systems of the victims and made it possible to use this bath procedure more frequently and rhythmically in the course of physical rehabilitation. The criteria for the transition to the next phase of rehabilitation were the same as in the affected athletes of group I.

Results of the research

Under the terms of the standard motor test, the athletes regularly and repeatedly used special technical pedagogical exercises during their sporting careers from the elements of professional technical and physical training of football, so the coaching archives kept data on test results, including shortly before injury to the players, made it possible to compare the objective data to the injury and after the rehabilitation and find out the extent to which the athlete returns to the level of professional technical and power conditions (coordination and physical abilities).

According to the conditions of the motor test, the ball should hit the goal area after a stroke, must be performed in different ways and with different parts of the foot, namely:

- tinner surface of the foot (in the position of pronation of the foot), the kick is performed with the ball lifting into the air, and the ball must fly over the goal line;
- outer surface of the foot (in the supine position of the foot) kick is performed with the ball lifting into the air, and the ball must fly over the goal line;
- by bridge of the foot (in the position of bending of the foot) the kick is performed with the ball rolling on the lawn, while the ball should roll over the goal line.

The athlete was given 12 attempts to hit the ball. It was considered the number of hits in the goal area with the observance of the conditions for striking the ball from the center of the penalty line (16 m distance).

An excellent result was considered to hit from 11 to 12 times; good result was hit from 8 to 10 times satisfactory – hit from 5 to 7 times, and unsatisfactory – number of hits, less than 5 (Table 3).

Analysis of the archival test data from the impact on the inner surface of the foot in I (control) group showed that 83% of the athletes had excellent marks, 11% had good marks and only

5% had a satisfactory mark. After the measures of physical rehabilitation in the same test, excellent, satisfactory and unsatisfactory results were equally divided by 33%. That is, the number of excellent results decreased almost 2,5 times, and the number of good and satisfactory increased 3 and 6 times, respectively. There were no unsatisfactory results both before and after the injury.

The obtained data from the test results with the impact of the foot's outer surface in I (control) group found the following. Before injury, 77% had a great result, 11% were good and 16% had a satisfactory score. There were no unsatisfactory results.

According to the results of the data obtained after the physical rehabilitation measures in the same test, 22% had an excellent estimate (the number was reduced by 3,5 times), 33% had a good and satisfactory score (an increase of 3 and 2 times respectively) and 11% were unsatisfactory evaluation.

The analysis of the test results from the impact of lifting the foot showed that according to the results of archival data in this test, 72% had excellent marks, 16% each had good and satisfactory ratings.

After the physical rehabilitation measures taken in this test, the number of excellent marks decreased 6,5 times, while the number of good and satisfactory marks significantly and evenly increased 1,3 and 1,6 times, respectively. In addition, there were unsatisfactory marks for this test (16%), which were absent to the injury.

Analysis of the test with the impact of the inner surface of the foot in group II (main) showed that, according to the results of archival data, there were 77% excellent marks, 11% good and as many satisfactory results.

After carrying out the proposed measures of physical rehabilitation in this test, 55% of excellent results were found (a decrease of 1,4 times) and 44% of good results, which is 4 times more than the archived data.

According to archival data, athletes of the II (main) group for injury in the test from hitting the outer surface of the foot revealed 77% excellent results, 16% good and 11% satisfactory.

The activities of physical rehabilitation allowed to get 50% excellent marks (1,5 times less), 44% good (2,6 times more) and only 5% satisfactory results, half the archival data.

The results of the archival test data with a kick of the foot include 66% excellent results, 11% good and 22% satisfactory results.

The results obtained after the physical rehabilitation measures taken in this test showed that the number of excellent marks decreased by half, but the number of good marks increased 3,5 times and the number of satisfactory ones slightly increased (1,2 times). Unsatisfactory ratings were not found at all.

Conclusions / Discussion

It is undeniable that one of the topical problems of modern

Table 3

The results of the pedagogical motor test of affected athletes of both clinical groups

Kick the ball in the Gate area with parts of the foot		Control group								Main group							
		Excellent		Good		Satisfactory		Unsatisfactorily		Excellent		Good		Satisfactory		Unsatisfactorily	
		abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
Inner surface of the foot	Before injury	15	83	2	11	1	5	-	-	14	77	2	11	2	11	-	-
	After rehabilit.	6	33	6	33	6	33	-	-	10	55	8	44	-	-	-	-
Outer surface of the foot	Before injury	14	77	2	11	3	16	-	-	14	77	3	16	2	11	-	-
	After rehabilit.	4	22	6	33	6	33	2	11	9	50	8	44	1	5	-	-
Bridge of the foot	Before injury	13	72	3	16	3	16	-	-	12	66	2	11	4	22	-	-
	After rehabilit.	2	11	4	22	5	27	3	16	6	33	7	39	5	27	-	-
Total		18				100%				18				100%			

sports medicine and physical rehabilitation of athletes is as much as possible and, at the same time, as soon as possible and full-fledged return of their sports performance.

There is no doubt that the ankle joint carries a significant amount of exercise in sports and is therefore often prone to traumatic injury. As is known, damage to the ankle joint capsule is prevalent in second place after the meniscus pathology and accounts for up to 15% among all injuries to the joints, and for the majority of victims with such injuries, long-term treatment is required.

In this case, it is advisable to argue only on the choice of treatment tactics depending on the nature of the injuries of both the bone and cartilage structures of the joint, and the soft tissues surrounding it.

This problem can find a positive solution only if new treatment technologies that are promising in terms of optimization or stimulation of reparative processes are added to existing traditional methods and approaches.

The need to return qualified athletes to active training and competitive activities sets high demands not only on their medical support, but also on the early restoration of their professional conditions. To solve this problem, the author of the article developed and put into practice the program of physical rehabilitation, which, due to the improvement of the complex of rehabilitation measures, was logistically included in the training process.

The analysis of the results of the study suggests that with a positive dynamics of changes in the functional state of the victims of both clinical groups are more pronounced and signifi-

cantly better results were obtained in victims of the II (main) group who received physical rehabilitation according to our proposed program using the integrated training process of therapeutic gymnastics, procedures of a modified ethnic Arabic bath and consistent use procedures with elements of ethnic Arabic massage.

Also in the affected II (main) group, indicators of the applied methods and scales for evaluating the results in the same observation period were found to be significantly better than the control group, indicating not only the effect obtained, but also a pronounced positive trend in the condition of the affected athletes after the program of complex application physical rehabilitation.

Using the course of physical rehabilitation according to the traditional program in the control group, according to the standard motor test of the elements of professional technical and physical training of football players, allowed to objectively reduce the number of unsatisfactory and satisfactory results and increase the number of good ones.

Using the course of physical rehabilitation according to the traditional program, according to the standard motor test from the elements of professional technical and physical training of football players, allowed the athletes of the main group to receive reliably more good and satisfactory results in the absence of unsatisfactory, which convincingly shows the benefits of the proposed program of physical rehabilitation.

The proposed program of physical rehabilitation of injured athletes after internally articular injuries of the ankle at the outpatient stage, which is included in the training process, is effective and can be recommended for general use.

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