

CLINICAL TRIALS

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Role of magnetotherapy in rehabilitational complex of shoulder habitual dislocation treatment.

Shoulder dislocations come to 31 - 75 percents of the general number of large joints dislocations. Shoulder habitual dislocation (SHD) is a serious disease of a shoulder joint - complication of an initial dislocation. According to various authors data 20 to 60 percent of initial traumatic dislocations turn into habitual ones. If to group kinds of sports according to character of locomotor activity SHD more often can be met among the representatives of single combats - 33.03 %, game type sport - 22.11 %, cyclic type sport - 16,96 %, technical type sport - 11,22 %, power-speed type sport - 3,53 %, multiathlon - 1,52 %.

Sportsmen` SHD treatment is one of actual problems. Currently it is generally acknowledged, that most effective method of SHDs treatment is surgical operation . At the same time the operation itself does not solve all problems.

The important place has quality of rehabilitation postoperative actions. Sportsmen postoperational aftertreatment for whom it is extremely important to achieve shoulder joint stable active stabilization due to shoulder joint muscles strengthening, normal locomotor amplitude in joints of the upper extremity and regeneration of its muscle force has the special value. Other peculiar feature of sportsmen postoperative aftertreatment is the desire to support in possible short period of time and then to restore their general capacity for work. The last aftertreatment stage includes the recovery means for sportsman specific locomotor abilities meeting individual sport specific features. Nevertheless the terms of sports disability are long enough taking 6-10 months after surgical operation.

The purpose of our clinical trial was the reduction of sports disability period due to the application of the most effective rehabilitation means among all suggested by various authors and the introduction of the new methods, as «ALMAG-01» device "travelling magnetic field" magnetotherapy in particularly.

20 sportsmen have been divided into two groups - the basic and control one. Among the patients there were mainly wrestlers of various styles and sports and games athletes at middle age about 21 years, all of them were men.

In the basic group in post-immobilization period there were applied: therapeutic physical training, massage, thermotherapy, hydrotherapy; in control group - therapeutic physical training,

massage, thermotherapy, hydrotherapy and magnetotherapy by «ALMAG-01» device "travelling magnetic field". Device emitters were imposed on a sick joint area. Magnetic field induction amplitude - 20 ± 6 mTl, frequency - 6 Hz, procedure duration time - 20 minutes. Treatment rehabilitational course included 20 daily procedures.

Trials methods

1. 1. Dynamometry of operated arm various muscular groups (shoulder flexor –and- extensor muscular group, forearms flexor, outside and inside rotators).
2. Goniometry - operated shoulder joint motions range volume measurement (arm bending, moving aside, unbending, inside and outside rotation).
3. Measurement of shoulder girth in sm.
4. Shoulder muscles strength endurance loco-motor trials:
 - pull- up test (the number of pull-ups)
 - press-up test on parallel bars (number of press-ups),
 - shoulder joint passive flexibility test (the capture of fingers behind a back.)
5. Measurement results static processing. During sportsmen rehabilitation period medical examination was carried out every 1,0-1,5 months.

In both groups rehabilitation was carried out according to three periods: immobilization (1 month), post-immobilization (from 1 to 3-4 months after operation, training-regenerative (more than 3-4 months after operation). Within the first period there were carried 10 magnetotherapy procedures, in the second with one month interval - 10 magnetotherapy procedures, and in the third (1,5 months later after the second one) - 10 magnetotherapy procedures.

In both groups rehabilitation was carried out as follows: immobilization period (1 month), immobilization period (from 1 up to 3 4 months after surgical operation, training- recovery (more than 3-4 months after surgical operation). In the first period there were carried out 10 magnetotherapy procedures, in the second one (with one month interval -10 magnetotherapy procedures, in the third period (in 1,5 month after the second) - 10 magnetotherapy procedures.

In both groups there was applied rehabilitation complex methodic as follows. Immobilization period - massage, general complex of physical exercises for an able- arm, legs, body cases, special exercises for operated hand, isometric muscle tension of the same arm, bicycle-ergometer training to keep body general working capacity (30 minutes, pulse 150-160 beats/minutes). General duration of rehabilitational measures (actions) within a day was 2-2,5 hours;

In the second period there was applied : massage of different types, thermotherapy, hydrotherapy, arm isometric muscle tension and further on arm dynamic muscle tension. At first physical exercises for shoulder girdle muscles were carried out in the benign conditions, and then various special gym apparatuses were used to load shoulder muscles certain groups. Power exercises for shoulder girdle muscles have been started with small 0,5-1 kg load. And then applying power training equipment there was used the principle of repeated maximum. At

the initial stage muscle endurance development weight was chosen according to sportsman personal capability to lift it 25-35 times. Beginning with the first days of the second period there were carried out medical and health-improving procedures as: magnetotherapy, massage, physical exercises and swimming in the swimming pool. General duration of physical procedures - 4-5 hours a day.

In the third period the basic aftertreatment means were : physical exercises carried out in training gym, in swimming pool and in the park, massage, magnetotherapy. All physical exercises can be divided into three groups: local and power exercises of submaximal intensity for shoulder girdle muscles, imitating and specially - prepared exercises in accordance with sport type, general physical development exercises and exercises rising sportsmen work capacity. Physical exercises total duration in training -regenerative period came to 5 -5,5 hours.

In the basic group as it was said there was applied " AIMAG-01 " device " travelling " magnetic field magnetotherapy on a joint area for 20 minutes once a day, the course of treatment - 10 daily procedures. Besides in post-immobilization period to make action on injured upper extremity muscles there was used both drum-type vibrator to influence all muscles of operated upper extremity (2-3 exercises a day) and hand -operated stimulator.

During an aftertreatment process the regeneration rate and final results of active movements in shoulder joint and the strength of muscular groups were obviously higher in the experimental group (see table 1).

Muscular strength endurance motorial tests (both 10 time pulling up and pressing- up on parallel bars without rest) have been done by the patients of the basic group on the average in 4,2 months after taken surgical operation, and by the patients of the control one in 5,4 months. Operated upper extremity shoulder joint passive flexibility (finger capture behind a back) motorial test has been done by the patients of the basic group on the average in 4,8 months after surgical operation, and by the patients of control one in 5,9 months.

Table 1. Functional parameters of operated shoulder joint in the basic and control group by the end of the third rehabilitation period.

Group of sportsmen	Operated joint locomotor amplitude (in angular degree)						Various groups strength (in kg.)					Shoulder girth (in sm.)
	Bending	Frontal moving	Transverse moving	Unbending	Shoulder external rotation	Shoulder internal rotation	Shoulder bending	Forearm bending	External rotators	Internal rotators		
Basic group	181 ± 3,1	180 ± 2,3	105 ± 5,5	58 ± 3,5	80,5 ± 6,9	56,5 ± 3,4	44,4 ± 3,3	45,2 ± 3,1	22,1 ± 2,1	26,6 ± 3,4	32,4 ± 1,1	
Control	179,5	179,5	95	53,5	56,5	38	42	39,3	16,9	18	29,9	

group	± 2,8	± 1,6	± 10,0	± 1,8	± 6,7	± 7,1	± 2,2	± 1.7	± 2,9	± 2,0	± 0,9
Significance rate (t)	1,15	1,2	2,8	3,69	7,75	7,49	1,33	5,39	4,6	7,06	5,7
Student's test (p)	>0,05	>0,05	<0,05	<0,01	<0,001	0	>0,05	0,001	0,001	$\frac{<0,001}{1}$	<0,001

On the basis of both shoulder joint locomotor amplitude in various direction, various muscular groups joints strength and endurance functional and motorial trials results there was taken an expert decision on sportsman transition to the training initial stage. Taking into consideration the trials results sportsmen of both groups (the basic and control) took decision to start training in the following period of time (see tab. 2).

Table 2. Terms of sports training resumption initial stage in the sports basic and control groups.

Terms after surgical operation (in months)	Basic group	Control group
3-3,5	3 (a hockey player, a skier, a racing cyclist)	1 (a football player)
4-4,5	1 (mountain skier)	-
5-5,5	6 (5 wrestlers, 1 decathlon competitor)	2 (wrestler)
6-6,5	-	3 (2 wrestlers, 2 rugby players, 1 mountain climber)
7 and more	-	2 (wrestlers)

As it is shown, according to an expert assessment, all sportsmen of the basic group were allowed to start training initial stage not later than 5 - 5,5 months after surgical operation.

In the control group only three of the sportsmen (a football player, 2 wrestlers) were allowed to start to the training initial stage at the same terms (5 - 5,5 month after surgical operation) Five sportsmen of control group were allowed to start trainings in 6-6,5 months, and two - in 7 and more months.

Conclusions

1. Sportsman physical rehabilitation after shoulder dislocations surgical operation is one of the most complicated, not sufficiently investigated actual issues.
2. Sportsmen successful physical rehabilitation after shoulder dislocations surgical operation is possible provided meeting all medical rehabilitation requirements, as follows :
 - early beginning, complexity, continuity and succession, an individual approach and others.
 - medicinal agent and physical exercises timely application, dose progressive increase, physical activity complexification.
 - in immobilizing period duration of all rehabilitation actions should be 2 - 2,5 hours per day, in post immobilizing period - 4-5 hours, in training- recovery period - 5 - 5,5 hours.
- 3 The developed physical rehabilitation complex technique with "travelling " magnetic field magneto-therapy involvement proved to be more effective one as final results of both joint mobility, muscles strength and special locomotor tests turned out to be authentically the best in the basic group where this technique have been applied
4. On the basis of expert assessment sportsmen of the basic group taken " ALMAG-01 " device " travelling " magnetic field magnetotherapy (8 of 10 sportsmen were engaged in sport demanding humeral joint maximal involvement) started training initial stage on average in 4,5 months after surgical operation, while control group sportsmen being engaged in the same kinds of sport started training on the average in 6 months.
5. On the basis of taken clinical trials results it is necessary to recommend the application of developed rehabilitation complex including " ALMAG-01 " device " travelling " magnetic field magnetotherapy in clinic traumatology departments, sport prophylactic centers, polyclinics for sportsmen after surgical operation treatment.

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