

OPTIMIZATION OF PHYSICAL REHABILITATION IN CONGENITAL CLUBFOOT

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Annotation. The aim of the study was to improve the results of treatment of children with typical form of congenital clubfoot by optimizing of physical rehabilitation. The study included the following objectives: to make the algorithm work with the child, to justify the basis of physical rehabilitation, to study its effects, to develop a framework of implementation and optimization of the physical rehabilitation of children with congenital clubfoot. In the course of the study were 62 children involved with the typical form of congenital clubfoot: the main group (n = 42) and control group (n = 42). Age children from 4 years to 7 years. Physical rehabilitation was a logical continuation of treatment. Optimization analysis was performed by clinical examination, radiometric data and indicators of functional methods of research. Comparative analysis of the results of the physical rehabilitation of children with congenital clubfoot in both groups showed a trend more pronounced positive changes in children the main group in all respects.

Key words: clubfoot, physical rehabilitation, optimization, children.

Introduction

Congenital bow legging takes one of leading positions in structure of supporting motor system's defects and is 35.8% or 0.6 – 3 cases per 1000 of new born children [5,8]. Up to the present time there have not been developed any single approach to treatment of congenital bow legging of early child age patients. There exist a great number of pathogenetically grounded methods of surgical correction of this defect. Variety of surgical operations witnesses about absence of single opinion of children orthopedists about bow legging's treatment. Great number and traumatic character of such surgical operations are very painful for growing organism. Frequency of post-operational relapses of bow legging can reach 60% [6,9,11]. The reasons of it can be incomplete elimination of foot deformation elements, scar-commissure process, which progresses after extensive foot surgical operations with extracting of ligaments of significant length, absence of full fledged rehabilitation treatment and inobservance of orthopedic regime [7].

Analysis of scientific-research, special and medical literature showed that now there exists already developed and scientifically grounded new method of treatment for prevention from relapses for forefoot at the account of anatomical interactions in forefoot [1]; it has been established that morphological changes of flexor-supinator muscles, which are connected with character of neuro-physiological abnormalities and heaviness of foot deformation, are pathogenetically significant mechanism of clubfoot [3]; There were offered interesting algorithms of fulfillment of clinical researches and diagnostic methods for verification and adequate choice of treatment method and, for the first time, there was scientifically grounded tactic of complex treatment of patients with congenital bow legging in combination with other kinds of orthopedic pathologies [4]; there has been developed and tested new device for limbs' massaging with club footing that supplements the scope of medical means in post-operation period, trains motion in ankle, normalize imbalance of shin muscles, facilitates formation of biomechanically correct gait, increase effectiveness of rehabilitating treatment [2].

Purpose, tasks of the work, material and methods

The purpose of the research is improvement of treatment of children with typical form of congenital bow legging with the help of physical rehabilitation's optimization.

The tasks of the research: formation of algorithm of child's treatment, foundation of physical rehabilitation's principles, studying of its influence, development of principles of implementation and optimization of physical rehabilitation for children with congenital bow legging.

In the basis of results' analysis there were clinical examinations, X-ray data and indicators of functional examinations. This system of congenital bow legging treatment results' estimation is a combination of commonly known clinical, X-ray and functional methods of diagnostics [2].

Results of the research

Our research covered 62 children with typical form of congenital bow legging. First (main group) consisted of 42 children with congenital bow legging, with whom the offered physical rehabilitation was carried out. The second group (control) consisted of 20 children, with whom traditionally, twice a year TPC, massage and physio-therapeutic procedures were carried out. The age of patients varied from 4 to 7 years old. Results were appraised as good, satisfactory and unsatisfactory (see table 1).

The purpose of physical rehabilitation's optimization is development of motion functions (skills), correction of their abnormalities with further progressing up to normal state. Physical exercises (trainings, procedures) are main specific physical mean for achievement of targeted influence oh child's motion; stimulators are auxiliary means. Ontogenetic successive stimulation of motion development (motogenesis), considering qualitative specific abnormalities, characteristic for different clinical forms of disease is in the basis of physical rehabilitation's optimization. Intensive stretching of muscles is carried out with the help of ontogenetically oriented kinesio-therapy.

Formation of motion stereotype was carried out in stage-by-stage manner, in the course of special exercises, considering formation level of main motion functions (skills). The task of physical rehabilitation's optimization implies orientation on using of natural, ecologically pure means, which stimulate quick restoration of child's organism; teaching of ability to apply appropriate complexes of physical exercises (with the help of parents), conditioning to the cold, thermal procedures and other means.

Table 1

Evaluation criteria of physical rehabilitation results with congenital bow legging

Evaluation of results	Examination data
Good	All components of bow legging are absent; dorsal flexion – not less than 15%, total motion amplitude – not less than 45%, no limping; muscles' strength – 4-5 points; data of X-raying, photo-plantography, electric myography podography, stability metering met standards or were close to standards.
Satisfactory	Significant reduction of anatomical and functional components of deformation; there is still insignificant camber of forefoot, reduced to 15% ; volume of movements in ankle is not less than 30%, decreasing of dorsal bending scope is insignificant – less than 15%; moderate hypotrophy of shin muscles (up to 20% from standard), no limping; deviation of X raying indicators – up to 15% from standard; indicators of photo-plantography (videlicet coefficient of forefoot – 1.3 – 1.5; angle of heel bone setting in subtalar join is up to +10°; angle of Shoparov's joint – from 180° to 170°, angle of toe deviation – up to 10°; data of electric myography, podography, stability metering were lower than standard maximum by 20%.
Unsatisfactory	Relapse of deformation or variant of hyper-correction; complaints for pains, distortions of gait; expressed hypotrophy of shin muscles (more than 20% from standard); distortions of all X ray parameters more than by 20% from standard; forefoot coefficient is more than 1.5; angle of heel bone setting in subtalar join is more than +10°; показники фотоплантаграфії, а саме коефіцієнт переднього відділу стопи становив більше 1,5; кут установки п'яркової кістки в підтаранному суглобі більше +10°; angle of Shoparov's joint is less than 170°; angle of toe deviation is more than 10°; data of electric myography, podography, stability metering were lower than standard more than by 20%.

The purpose of physical rehabilitation is maximally complete restoration of motion functions. This is a great, heavy work, that requires from a child patience and persistence and from rehabilitation specialist, who supervises rehabilitation process, - special knowledge, skills, availability of required rehabilitation equipment, stimulators, devices. Development and correction of personal program is fulfilled by rehabilitation specialist, besides, his task is methodological maintenance of rehabilitation process. Restoration of absent motion abilities, delay (or insufficient level) of physical condition shall be based on standards of natural physical (biological) development.

At the beginning of our research we developed algorithm of working with child (see fig.1).

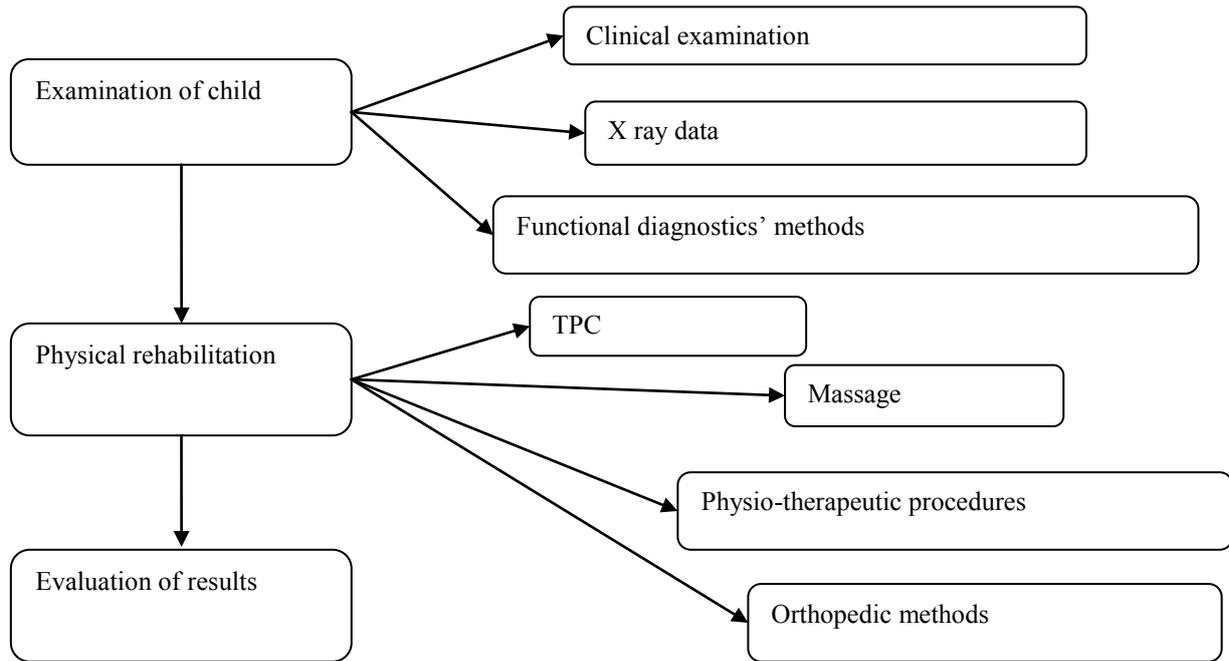


Fig. 1. Algorithm of working with child

Physical rehabilitation is a logical continuation of treatment. Methods of physical rehabilitation, which were used by us in the course of the research, admitted bio mechanical influences, were always oriented on absence of age counter indications and could be applied as prevention means, as auxiliary, which potentiate and optimize main therapy as well as in cases is effective schemas of treatment are absent, being able to be independent methods of treatment.

Rehabilitation program is a succession of actions, which shall be realized in order to restore motion functions. Main tool of rehabilitation is an exercise. Every exercise was correctly selected (considering specificity of child's organism), correctly organized (with the help of technical means, devices, special rehabilitation equipment) and correctly fulfilled. Imperative character of organization – is main principle of exercises' execution. It means that child is given all parameters of exercise's execution as necessary external conditions: trajectory and amplitude of movement, power characteristics, frequency and quantity of repetitions, intensity and so on. Such form of rehabilitation process's organization ensures methodic, planned, many hours work for obtaining of positive results. When developing experimental program of physical rehabilitation, we based on analysis of already formed in modern traumatology ideas about rehabilitation treatment of congenital bow legging, application of stimulators of new generation and choosing of available means of dynamics' estimation in the process of restoration of lower limbs' functions. General methodic of physical rehabilitation included such main procedures: TPC exercises, complex of physical exercises; different kinds of walking; physio-therapy, massage and hydro-massage; orthopedic methods.

After finishing of rehabilitation course, there were noticed positive results shown by children of main group. As a result of conducted complex estimation of physical rehabilitation's optimization results, for main children group we obtained 69.05% (29 children) good and 19,05% (8 children) satisfactory marks. Unsatisfactory marks belonged only to 11.90% (5 children). In control group good marks belonged to 25.00% (5 children) satisfactory – to 35.00% (7 children) and unsatisfactory – to 33.3% (8 children) (see table 2).

Table 2

Results of physical rehabilitation's optimizations of children with congenital bow legging

Results	Stages of research	Groups	
		main	control
Good	At the beginning	16.67% (7 children)	20.00% (4 children)
	At the end	69.05% (29 children)*	25.00 (5 children)
Satisfactory	At the beginning	40. 48% (17 children)	35.00% (7 children)
	At the end	19.05 (8 children)*	35.00% (7 children)
Unsatisfactory	At the beginning	42.86% (18 children)	45.00% (9 children)
	At the end	11.90% (5 children)	33.3% (8 children)

Notes:* - indicators of confidentiality of differences $p < 0.05$ between indicators at the beginning and at the end of research.

Comparative analysis of results of both groups' patients' with congenital bow legging rehabilitation showed in ($p < 0.05$) a trend to more expressed positive changes of main group children as per all parameters. The sum of good

and satisfactory results was regarded by us as favorable result of physical rehabilitation's applying; unsatisfactory results were appraised as unfavorable ones.

Conclusions:

Optimization of physical rehabilitation was oriented on normalization of motion functions, mastering of motion skills. Development and correction of personal program was carried out by rehabilitation specialist, besides, his tasks included methodological maintenance of rehabilitation process. Normalization of motion abilities, physical development were based on standards of natural (biological) development. As a result of fulfilled by us work main target, which we determined, was achieved, the following tasks were solved: algorithm of working with child was constructed, influence of physical rehabilitation's optimization on ankle joint was studied; physical rehabilitation methodic was developed and tested. Comparative analysis of physical rehabilitation of patients with congenital bow legging in both groups showed the trend to more expressed positive changes of main group children by all parameters.

The prospects of further researches. Our researches will be oriented on optimization of physical loads of children with congenital bow legging in the course of physical rehabilitation.

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