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БИОМЕДИЦИНА ВА АМАЛИЁТ ЖУРНАЛИ


ЖУРНАЛ БИОМЕДИЦИНЫ И ПРАКТИКИ | JOURNAL OF BIOMEDICINE AND PRACTICE

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RESULTS OF COMPREHENSIVE REHABILITATION OF CHILDREN WITH DISEASES OF THE PERIPHERAL NERVOUS SYSTEM

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ABSTRACT

Objective: The study was carried out with the aim of improving the condition of patients after treatment and normalizing their usual life activities. Complex rehabilitation measures with the use of medications, including the drug Ipigrix, lead to the preservation of treatment results and the prevention of recurrence of the disease. Of particular importance is the correct choice of diagnostic tactics, treatment and comprehensive rehabilitation of children with diseases of the peripheral nervous system. **Methods:** To improve the diagnostic algorithm, we examined 100 children with various mononeuropathies aged 3 to 18 years. Out of 100 studied children, 80 are children with neuropathy after the use of non-steroidal anti-inflammatory drugs (injections), 10 are healthy children caused by excessive use of orthopedic bandages, 10 are patients with neuropathy of various etiologies. Collection of anamnesis allowed us to determine the duration of the disease, the effectiveness of the treatment and the accompanying pathology. Clinical and neurological examinations aimed at identifying sensory, motor, reflex and trophic disorders of patients were carried out. The complex rehabilitation period was 45 days. It used restitution, regeneration, compensation methods of rehabilitation.

Results: The data obtained during the study confirmed the therapeutic significance of the practical application of complex rehabilitation measures developed by us for diseases of the peripheral nervous system in children. **Conclusion:** The use of the complex rehabilitation method we have developed in applied medicine (45 days) allows to significantly improve the clinical course of diseases of the peripheral system, including post-injection mononeuropathy, as well as restore the physical activity of the child, which leads to an improvement in the quality of life.

Key words: peripheral nervous system, ultrasound, diagnostics, rehabilitation, massage, mononeuropathy, children, muscles, skeleton

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РЕЗУЛЬТАТЫ КОМПЛЕКСНОЙ РЕАБИЛИТАЦИИ ДЕТЕЙ С ЗАБОЛЕВАНИЯМИ ПЕРИФЕРИЧЕСКОЙ НЕРВНОЙ СИСТЕМЫ

АННОТАЦИЯ

Цель исследования: Исследование было проведено с целью улучшения состояния пациентов после лечения и нормализации их обычной жизнедеятельности. Комплексные реабилитационные мероприятия с применением медикаментозных средств, включая препарат Ипигрикс, способствуют сохранению результатов лечения и предотвращению рецидивов заболевания. Особое значение имеет правильный выбор диагностической тактики, лечения и комплексной реабилитации детей с заболеваниями периферической нервной системы.

Методы: С целью совершенствования алгоритма диагностики нами было обследовано 100 детей с различными мононейропатиями в возрасте от 3 до 18 лет. Из 100 обследованных детей 80 составили дети с нейропатией после применения нестероидных противовоспалительных препаратов (инъекций), 10 – здоровые дети с нарушениями, вызванными чрезмерным использованием ортопедических бандажей, 10 – пациенты с нейропатией различной этиологии. Сбор анамнеза позволил определить длительность заболевания, эффективность проводимого лечения и сопутствующую патологию. Проводились клиничко-неврологические обследования, направленные на выявление нарушений чувствительности, движений, рефлексов и трофических расстройств у пациентов. Период комплексной реабилитации составил 45 дней. Использовались реституционные, регенерационные и компенсаторные методы реабилитации. **Результаты:** Полученные в ходе исследования данные подтвердили терапевтическую значимость практического применения разработанных нами комплексных реабилитационных мероприятий при заболеваниях периферической нервной системы у детей.

Заключение: Применение разработанного нами метода комплексной реабилитации в прикладной медицине (45 дней) позволяет значительно улучшить клиническое течение заболеваний периферической нервной системы, включая постинъекционную мононейропатию, а также восстановить физическую активность ребенка, что приводит к улучшению качества жизни.

Ключевые слова: периферическая нервная система, ультразвуковое исследование, диагностика, реабилитация, массаж, мононейропатия, дети, мышцы, скелет

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ПЕРИФЕРИК НЕРВ ТИЗИМИ КАСАЛЛИКЛАРИ БИЛАН ОҒРИГАН БОЛАЛАРНИ КОМПЛЕКС РЕАБИЛИТАЦИЯ ҚИЛИШ НАТИЖАЛАРИ

АННОТАЦИЯ

Тадқиқот мақсади: Тадқиқот беморларнинг даволашдан кейинги ҳолатини яхшилаш ва уларнинг одатий ҳаётий фаолиятини меъёрлаштириш мақсадида амалга оширилди. Ипигрикс препаратини ўз ичига олган дори воситалари билан комплекс реабилитация тадбирлари даволаш натижаларини сақлаб қолишга ва касалликнинг қайталанишининг олдини олишга ёрдам беради. Периферик нерв тизими касалликлари билан оғриган болаларни ташхислаш тактикаси, даволаш ва комплекс реабилитация қилишни тўғри танлаш алоҳида аҳамиятга эга. **Усуллар:** Ташхислаш алгоритмининг такомиллаштириш мақсадида биз 3 ёшдан 18 ёшгача бўлган турли хил мононейропатияли 100 та болани текширдик. Текширилган 100 та болалардан 80 таси нестероид яллиғланишга қарши дори воситалари (инъекциялар) қўлланилгандан кейин нейропатияси бўлган болалар, 10 таси ортопедик бандажларнинг хаддан ташқари ишлатилиши натижасида бузилишлар юзага келган соғлом болалар, 10 таси турли этиологияли нейропатия билан оғриган беморлар ташкил этди. Анамнез йиғиш касаллик

давомийлиги, ўтказилаётган даволашнинг самарадорлиги ва ҳамроҳ патологияни аниқлашга имкон берди. Беморларда сезувчанлик, ҳаракат, рефлекс ва трофик бузилишларни аниқлашга қаратилган клиник-неврологик текширувлар ўтказилди. Комплекс реабилитация даври 45 кунни ташкил этди. Реституцион, регенерацион ва компенсатор реабилитация усуллари қўлланилди. **Натижалар:** Тадқиқот давомида олинган маълумотлар биз ишлаб чиққан комплекс реабилитация тадбирларини болаларда периферик нерв тизими касалликларида амалий қўллашнинг терапевтик аҳамиятини тасдиқлади. **Хулоса:** Биз ишлаб чиққан комплекс реабилитация усулини амалий тиббиётда қўллаш (45 кун) периферик нерв тизими касалликларининг, шу жумладан инъекциядан кейинги мононейропатиянинг клиник кечишини сезиларли даражада яхшилашга, шунингдек боланинг жисмоний фаоллигини тиклашга имкон беради, бу эса ҳаёт сифатини яхшилашга олиб келади.

Калит сўзлар: периферик нерв тизими, ультратовуш текшируви, ташхислаш, реабилитация, массаж, мононейропатия, болалар, мушаклар, скелет

1. Introduction

In the case of neuropathy, movement disorders are manifested in the development of paresis or paralysis. Neuropathy is accompanied by muscle atrophy, loss of pay reflexes, decreased muscle tone, trophic changes, impaired skin sensation, pain during muscle contraction [1, 2]. Exercise, massage and physiotherapy play an important role in the complex treatment of patients in this group. The purpose of complex rehabilitation treatment for peripheral paralysis is as follows:

- stimulating the renewal and re-excitation of nervous fields in the state of tension;
- prevention of injuries and improvement of vascular condition and trophic processes for this purpose;
- strengthening paretic muscles and buttocks;
- prevent contractures and prevent joint immobility;
- restoration of the labor force through the normalization of movement functions and the development of compensation tools [3]

Exercise therapy is used to relieve pain and relieve the patient's condition. The method and nature of rehabilitation measures are determined by movement disorders, their location and stage of the disease.

Early recovery (2-20 days), late recovery (20-60 days) and residual period (more than 2 months) are distinguished. With surgical intervention on the nerves, the duration of all periods is prolonged and Residual: the period of early recovery can last up to 30-40 days, 3-4 months in the evening and up to 2-3 years in the residential [4, 5].

With the development of paralysis of the wound, optimal conditions are created for the restoration of its functions, treatment with massage and physiotherapy. A distinctive feature of massage for peripheral paralysis is its effect on the muscles, strict dosage, segmental-reflex nature of its effect. (neck area, lumbosacral area massage). Massage has a positive effect on the use of droplet and spiral underwater massage, which combines the massage (vibration) of the apparatus performed at the "action points" and along the paretic muscles, the positive temperature effect of hot water and its mechanical effect on tissues. In the absence of motor functions, electrophoresis with calcium ions is used to increase the permeability of the nerves [6]. After physiotherapeutic methods, therapeutic exercises are performed, which consist of passive and idiomotor exercises for complete paralysis. It is recommended to combine passive exercises with active movements on the same pieces of the symmetrical joint. Special attention should be paid to observing the appearance of voluntary movements during training times, choosing optimal starting positions and supporting the development of active movements [7].

During the evening recovery period, treatment is carried out according to the condition of the patient, massage, healing physical education and physiotherapy are used. The nature of the treatment is determined by the dosage and the depth of the paresis. The deeper the lesion, the longer the treatment lasts (except for active action). During the evening recovery period, treatment is carried out according to the condition of the patient, massage, healing physical education and physiotherapy are

used. The nature of the treatment is determined by the dosage and the depth of the paresis. The deeper the lesion, the longer the treatment lasts (except for active action) [8, 9, 10]. Hyperactive gymnastics affects the pattern of exercises: the bending of the participant is symmetrical in the absence of movements, damaged during passive gymnastics, muscles are weakened with general participation. The following scheme of hyperactive Gymnastics has a positive effect: active movements in the symmetrical joints with a healthy limb, passive movements of the affected limb, General active light exercises with the participation of weakened muscles.

During the period of residual complications, medical gymnastics training continues, a significant increase in the number of practical classes for training in home and professional skills, the introduction of entertainment and sports-practical elements, the formation of optimal compensation adaptations is carried out. 15-20 different massage methods are prescribed, repeating the course of treatment for 2-3 months. According to the condition, treatment is determined by orthopedic tasks (foot, hand, foot tasks, etc.) and is orthopedic, at the same time with the help of prosthetic joists (apparatus, special shoes) [11].

Currently, the presence of contracture and joint immobility is a challenge in treatment. The alternation of passive movements with active movements with massages of alternating types and undamaged areas, light thermal methods help us to restore the desired amplitude of movement. Mechanotherapy is used as secondary changes in tissues persist. Mechanical treatment is effectively used in water.

when weak paralysis or paresis develops rehabilitation measures include:

- * improving the function of the peripheral neuron;
- * prevention of muscle tissue hypotrophy;
- * prevention of contractures.

Improving nerve tissue function is achieved through the use of neurotrophic and vasoactive drugs.

To prevent severe pain and muscle hypotrophy, the following rehabilitation tools are used:

- * massage through the stimulation method (curative, dotted, linear);
- * passive and active movements in the affected organs;
- * active exercises related to muscle contraction in training (in mild conditions);
- * monitoring the process after therapeutic gymnastics;
- * electrostimulation of affected muscles.

Special attention is paid to the strengthening of proprioception in the implementation of all the important steps in the rehabilitation process. Such strengthening is mainly carried out in two ways:

- the method of resistance to dosage of the performed movement (Kabat H method - "proprioceptive neuromotor facilitation", PNF);
- use of reflexes caused by peripheral receptors.

Patients and methods

1.1. Patients

100 children aged 3 to 18 with damage to the peripheral nervous system who were being treated in the neurological rehabilitation department of the Republican Center for Rehabilitation of Children's Musculoskeletal System Diseases were taken. All children were divided into 2 groups: the main group and the control group. 26 children in the main group aged 3-7 years, 20 children under 7-11 years old, 18 children aged 11-18 years old, 15 children in the control group of children under 3-7 years old, 13 children under 7-11 years old, 11 - 8 children under 18 years of age (table 1).

Age	Hypesthesia, %		Pain caused by improper injection (antibiotic, non-steroidal anti-inflammatory drugs), %	
	Boys	Girls	Boys	Girls

3-7 years	3.1	17.6	9.2	23.5
7-11 years	29.0	16.1	29.5	32.3
11-17 years	39.8	28.6	36.8	44.2
Average	29.5	30.9	31.3	40.9

1.2. Treatment Methods

Patients were treated with traditional medicines taking into account the dosage of the medicine depending on their age. Metabolic treatment was carried out to restore and stimulate the regeneration of nerve axons, for which neurotrophic drugs - cerebrolysin, cortexin, piracetam in an age-appropriate dose, the drug Actovegin were used, this drug also has the effect of improving reparative and venous blood circulation [12]. To improve myelination, were used group B vitamins - thiamine hydrochloride and cyanocobalamin in an age-dependent dose, as well as the oral form of the drug Nucleo CMP. To improve intersynaptic and neuro-muscular transmission, were used anticholinesterase drugs - proserin, galantamine hydrobromide, ipidacrine. Physiotherapeutic procedures include therapeutic gymnastics exercises aimed at increasing the volume of active movements, preventing the development of contractures in the joints, improving blood circulation and trophic processes in the injured limbs, eliminating trophic disorders, strengthening the regeneration of damaged nerves, and developing adaptive movements. For this purpose, passive movements were performed on the paretic limb, and the goal was to use resistance exercises to increase muscle strength. In this case, the physical loads are limited, because excessive physical activity often leads to an increase in muscle weakness in the de-activated muscles. Massage is widely used to improve blood supply and muscle trophism in cases of slow paresis [13]. We have used a general toning massage as well as a trigger point massage.

In order to prevent joint contractures, movement stiffness and deformations, overextension of paretic muscles, patients were treated by positioning them in the desired position - using plaster casts and bandages. Corsets were used in scoliosis. Neuromuscular electrostimulation was performed, stimulating electrodes were placed on the muscles taking into account the movement points. In this case, triangular electrodes were placed perpendicular to the direction of the muscle fibers, where the ends of the movement were located, the distance between the electrodes was 2-3 cm, which ensured the same excitation of all motor fibers of the stimulated muscle. Single pulses with a duration of 100-300 ms were used for marked deasabation, pulses with a duration of 1-10 ms for moderate paresis, and pulses with a duration of 0.01-0.05 ms for mild deasabation.

In order to improve neuromuscular permeability, local metabolism, to treat contractures and muscle atrophy, proserin and iodine electrophoresis are applied longitudinally to the area of damaged limbs. Current density 0.03-0.05 mA/cm², duration of effect 15-20 minutes, 10-15 treatments. Ozokerite (46-48°C) and paraffin (48-50°C) applications were applied to paretic limbs. The duration of effect is 15-25 minutes, one course includes 10-15 procedures per day.

All patients underwent reflexotherapy - electroacupuncture of biologically active points, the effect of which is aimed at improving blood circulation and muscle trophicity, increasing muscle tone and relieving pain.

In compiling the acupuncture prescription, we followed the themes of damage to the nervous system and channels related to this area from the perspective of classical acupuncture. In the presence of pain syndromes, the area of the projection of pain sensations was first influenced by the methods of inhibition, and only after that the excitatory effect was shown on the area of movement disorders. The prescription included paravertebral points and points of the posterior median canal, which have a common innervation with the damaged nerves. In the presence of serious vegetative disorders, an inhibitory effect was shown on the points of the back middle channel [14].

Complex rehabilitation work was carried out after the treatment, including general massage, increasing muscle mobility, and improving limb function. Ipigrix drug was used during complex rehabilitation.

2. Results

Of the 100 children included in the study, 64 made up the main group and 36 made up the control group (Table 2). Among patients with leg mononeuropathy, there were 30 (37.5%) cases of fibular nerve neuropathy, 13 (16.25%) cases of large calf nerve neuropathy, and 37 (46.25%) cases of small calf nerve neuropathy. The majority of patients suffering from injection (iatrogenic): 65 children (81.25%) from non-steroidal anti-inflammatory drugs, after antibiotics - 15 (18.75%) children (diagram 1).

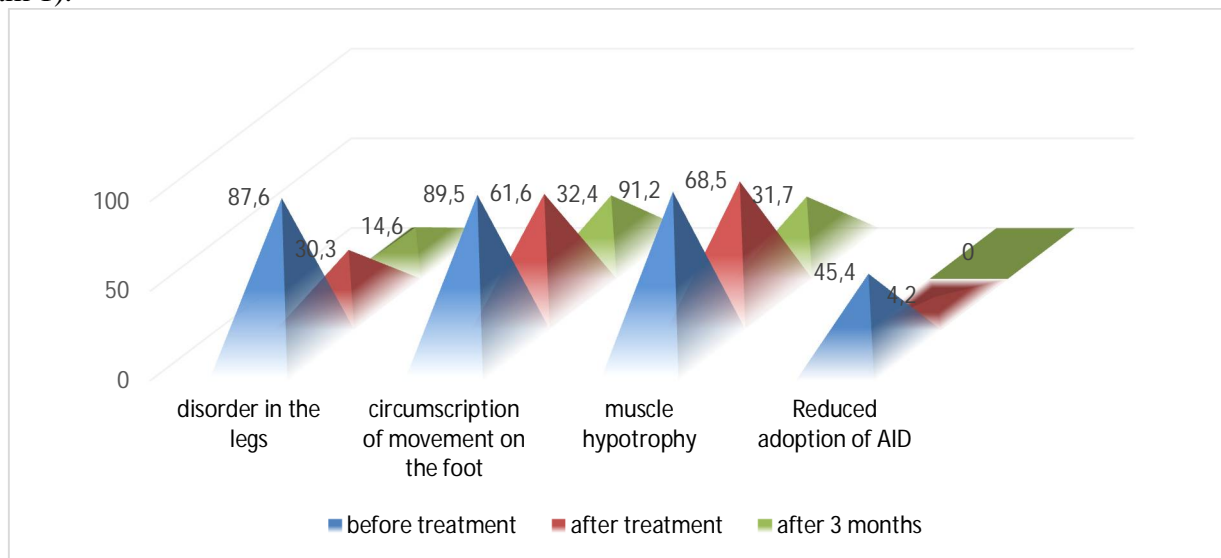


Diagram 1

In the main group, reflex functions in the neurological examination before and after the treatment changed noticeably (diagram 2).

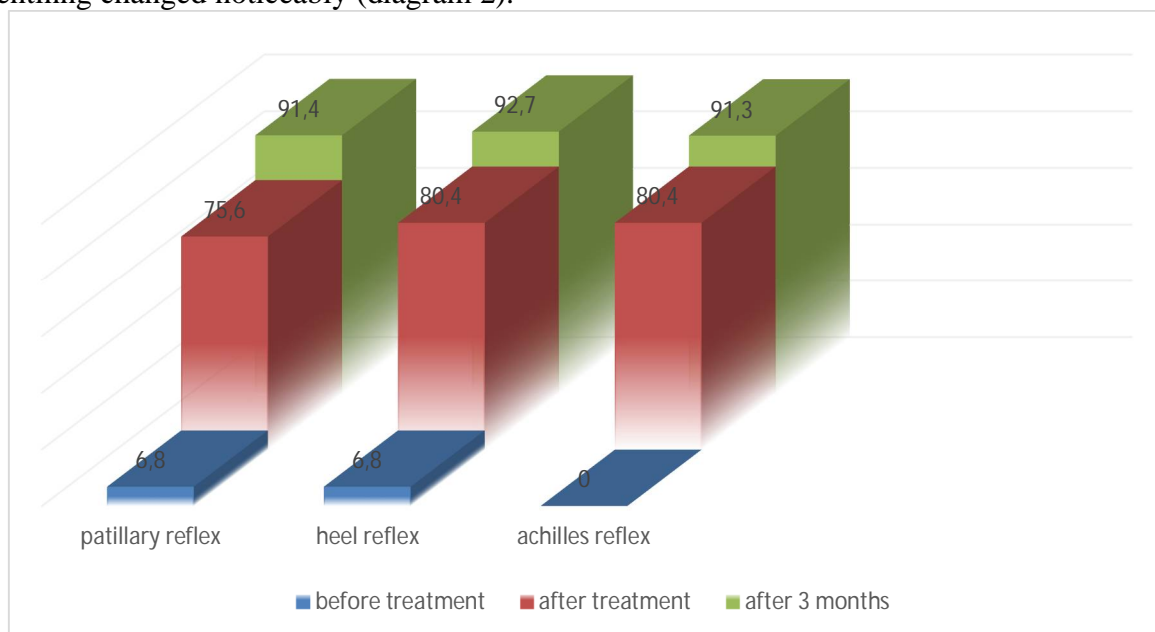


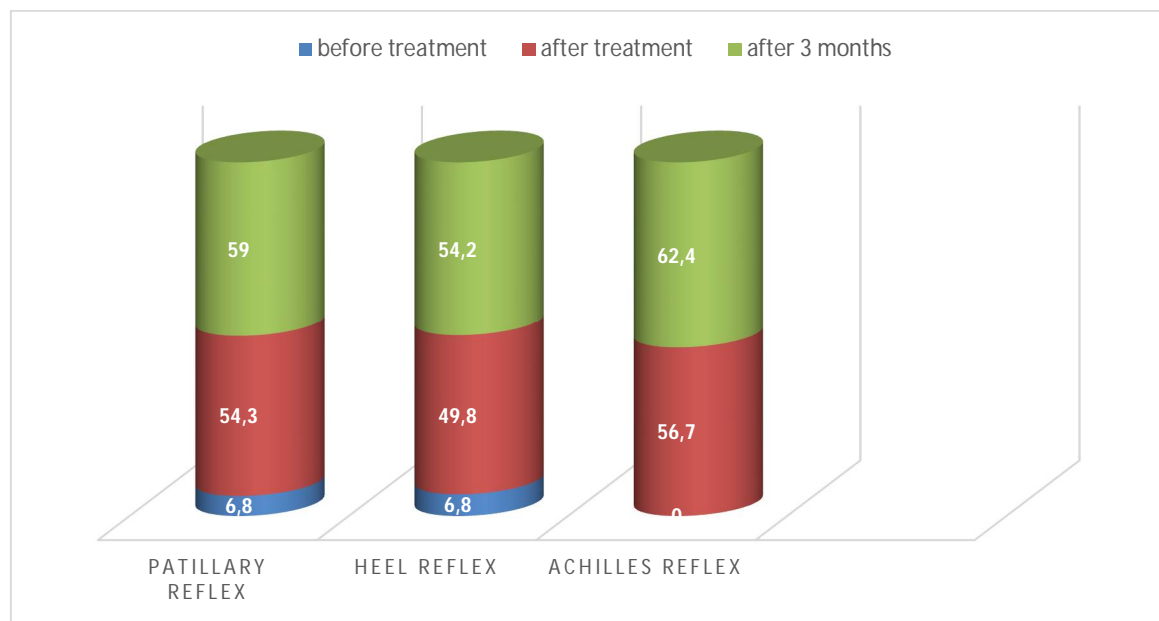
Diagram 2

A treatment method was developed at the Republican Children's Rehabilitation Center, instead of the traditional 10 days in the usual hospitals, it was extended to 45 days at the Republican Children's Musculoskeletal System Rehabilitation Center. This medical approach in children's neurorehabilitation allowed to attract highly qualified specialists in order to improve the full scope of

rehabilitation activities in the shortest possible time for children, and the level of children's disability was reduced.

2.1. Improvement of treatment group after 45 day complex rehabilitation

Achilles reflex ranged from 0.0% to $80.4 \pm 8.2\%$ in the main group and $56.7\% \pm 5.1\%$ in the control group ($r \leq 0.05$). Joint-muscle tenderness in the main group increased by $57.8 \pm 7.1\%$, compared to $24.5 \pm 3.7\%$ in the control group. These indicators are explained by the complete or partial restoration of afferent pathways under the influence of physical rehabilitation. As a result, the degree of dependence on the walking level from the groups leading children decreased from $23.5 \pm 4.6\%$ in the main group to $4.2 \pm 1.7\%$, and in the comparison group to $6.7 \pm 2.1\%$ ($r \leq 0.05$) (diagram 3).



After rehabilitation measures in the main group, the rate of symptoms of neuropathy due to incorrect injections was $46.8 \pm 7.4\%$, compared to $23.5 \pm 2.6\%$ in the control group, neuropathy of the feet was $37.8\% \pm 3.0$. 56% of three year old children ($r < 0.05$) had foot measurements of 57.6 ± 1.5 cm (hypotrophy) and 51.8 ± 1.6 cm (atrophy) in 44% of children, before rehabilitation in children under 5 years of age The length of the legs of 63% of children was 65.4 ± 1.7 cm, ($r < 0.05$) (hypotrophy and 37% of children were found to be 61.3 ± 1.4 cm (atrophy). Before rehabilitation, 58% of 7 year old children had a leg length of 70.5 ± 1.6 cm (hypotrophy), and 42% of children had a leg length of 68.4 ± 1.4 cm (atrophy). Almost all children (96%) observed improvements after a set of rehabilitation processes in the main group. Thus, in 3-year-old children, the average age of the legs increased by 2.4 ± 0.2 cm, and in 90% of children of this age, the leg length was 59.8 ± 1.2 cm, while in 10% of children, the leg length decreased and the leg length was 58, It was 6 ± 1.1 cm ($r < 0.05$). It was found that only 71% of children improved in the comparison group where the traditional rehabilitation method was used. Therefore, in the comparison group, the leg length increased slightly and in 3-year-old children it was 58.2 ± 0.8 cm, and in the 5-year-old children in the main group, the leg length increased by an average of 3.7 ± 0.1 cm ($r < 0.05$). In 8% of children, the leg length increased slightly and was 67.8 ± 1.3 cm, among children under 5 years of age, 68% of children in the control group improved their condition. The length of the legs partially increased to 66.5 ± 1.5 cm, while 32% did not change the length of the legs, which indicates the presence of hypotrophy or atrophy in the legs. In 7 year old children in the main group, the leg length increased by an average of 2.8 ± 0.2 cm ($r < 0.05$). There was little change in the comparison group. Thus, among the examined 7 year old children, the leg length increased by 71.6 ± 0.4 cm in 64% ($r < 0.05$). Positive changes were not detected in 36% of children in the comparison group. Leg length indicators before treatment and after treatment in the main group of children aged 3-7 years were noticeably (diagram 4).

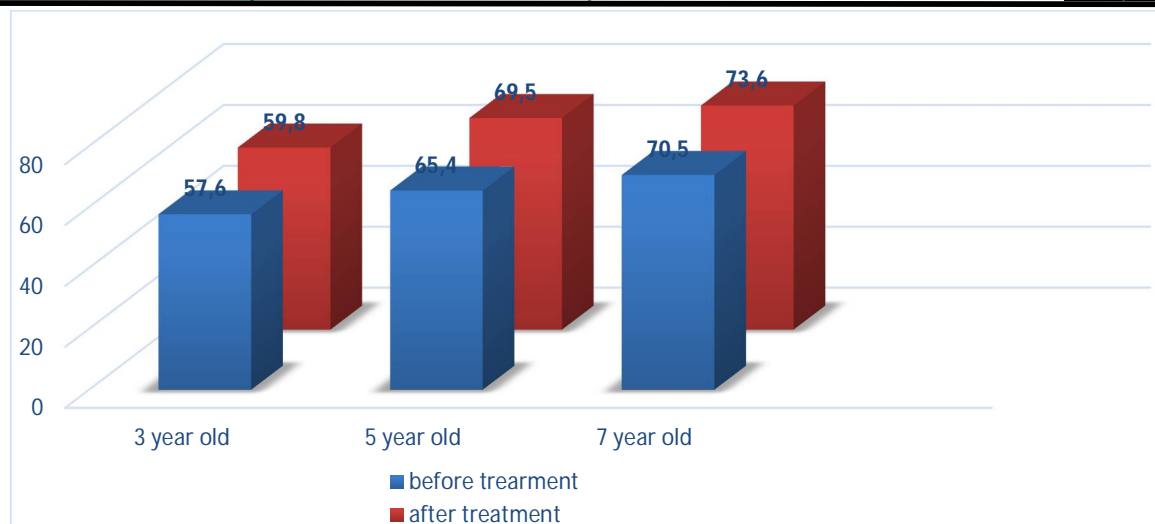


Diagram 4

3. Discussion

After complete rehabilitation of patients in the main group, a complete decrease in acute pain syndrome was noted, average pain decreased by 78.9%, constant by 92.6%, periodic by 75%.

In addition, there are different approaches to the examination and interpretation of the obtained clinical data among different specialists who are faced with this problem: among pediatricians, neuropathologists, rehabilitologists, surgeons, etc. The impact of harmful factors is important in the concept of formation of postinjection neuropathies. Quantitative risk indicators were used to assess health and the basis of preventive measures, as well as epidemiological analysis of the relationship of the disease with the age of the child [15].

Determining the cause and effect relationships of disease development, creating prognostic models is an urgent task of pediatric neurology. Despite the improvement of existing risk assessment methods, there is no unified methodology in our country.

At the same time the modern principles of medical rehabilitation of children with neuromotor system damage should include comprehensive, continuous, step-by-step, individual implementation, therapeutic physical exercises, physiotherapy, pharmacotherapy, orthopedic procedures, orthopedic care, timely provision of orthopedic equipment [16]. In order to improve the quality indicators, increase the quality of life, and reduce the expenses of the patients' relatives during the implementation of complex rehabilitation measures, the Ipiatrix drug was used, and its most effective results were reflected in the recovery of the patient's movements and the increase in muscle strength.

4. Conclusion

5. The data obtained during the study confirmed the therapeutic value of the practical application of the rehabilitation treatment developed by us for postinjection mononeuropathy of the legs in children. The use of the rehabilitation method developed by us in practical medicine (45 days), the use of the drug Ipiatrix in this process allows to significantly improve the clinical course of post-injection mononeuropathy, as well as to restore the child's physical activity, which leads to an improvement in the quality of life.

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