PREVENTION, MANAGEMENT AND REHABILITATION OF PATIENTS WITH CEREBRAL PALSY

Poposka A¹, Georgieva D¹, Dzoleva-Tolevska R¹, Georgiev A²

¹ PHI University Orthopaedic Diseases Clinic, Medical Faculty, Ss. Cyril and Methodius University, Skopje, R. Macedonia
² PHI University Heart Diseases Clinic, Medical Faculty, Ss. Cyril and Methodius University, Skopje, R. Macedonia

Abstract: The aim of this paper is to present the importance of orthopaedics in the prevention, treatment and rehabilitation of persons with cerebral palsy.

Material and methods: The paper is based on a study realized at the University Orthopaedic Clinic, Medical School, Ss. Cyril and Methodius University in Skopje, with application of documentary analysis, observation and clinical analysis of 76 patients with cerebral palsy, aged between 1 and 15 years.

Results: Orthopaedics is a surgical field of medicine, in which context there have been, are and will be, as a challenge, many questions for the present and future generations. Data analysis pointed out that surgical treatment in combination with conservative treatment give a hope that a definite or prolonged cure is possible, with maximal and possibly preserved function of the loco-motor system or, in the most serious cases, abatement of the impaired locomotor system symptoms.

Summary: Early diagnosis and appropriate application of surgical treatment enable better functioning of persons with cerebral palsy by maximal exploitation of their remaining abilities.

Key words: cerebral palsy, orthopaedics, early diagnosis, treatment, rehabilitation, multidisciplinary approach.
Cerebral palsy, in short, or pediatric cerebral paralysis, denotes a condition of brain dysfunction. It is a chronic neurological condition characterized by non-progressive motor function disorder of tone, position, coordination, sense of balance. The type of cerebral palsy differs according to the location of the injured region. The injury can appear before, during, or after birth, even up to pre-school age. The patients may have a history of prenatal complications. However, its etiology cannot be established in 20% to 30% of cases. The key to making a diagnosis is establishing that the motor symptoms do not progress. Regression of motor abilities points to a varied group of diagnostic possibilities including brain and spine injuries, which can be treated conservatively or surgically [1, 2].

The diagnosis of cerebral palsy and determination of its subtype can be made by medical examination. Medical findings within the first year of life are changeable and non-specific. The first signs may include impaired passive tone in association with vivid deep tendon reflexes without associated weakness. Early problems with suckling and swallowing can proceed to verified motor delay. Because findings can change, a final diagnosis of cerebral palsy should not be made until the infant is at least 1 year old (for an infant born on time) and 15 to 18 months old (for preterm born infants). The diagnosis is based on abnormal findings in four to six great motor regions: growth, oro-motor functioning, vasomotor functioning, tone, development of primitive reflexes and muscle stretching [1, 3, 4].

Because the injury to the central nervous system disables the inhibition and balance of its own muscle tone, the tone abnormalities have been especially important for the diagnosis of cerebral palsy. After initial hypotonia, the child may develop increased tone at the age of 12 or 18 months, respectively, that shows a clear rigidity or spastic hypertonia at the age of 2 years [5, 6].

Damage to the central nervous system disables the upper levels from control, eliminating or inhibiting the influence of the primitive reflexes. Accordingly, persistent primitive reflexes are signs of cerebral palsy [5, 6].

When the treatment of cerebral palsy is in question, one should be aware of the fact that its complete cure is not possible, and patients and parents should pay attention to this fact. Functional disorders can be impaired with treatment, but the handicapped person will never be fully cured. Treatment is focused toward the use and improvement of the patient’s remaining abilities and alleviation of the disorders that have occurred. It is striving according to all abilities to help in emotional maturation, physical independence, speech and the possibility of communication, social and economic independence, the feeling of self-validity is stimulated, but also development of the awareness of objective assessment of the condition [2, 3, 5].
Treatment of patients with cerebral palsy is very complex and requires a team approach consisting of an orthopaedist, physiatrist, physiotherapist, neurologist, neurosurgeon, pediatrician, psychologist, teacher of the handicapped, speech pathology, social worker. The orthopaedic surgeon is a very important member of the therapy team but the other participants have an important role, and their joint work gives the best results. [3, 5, 6].

The purposes of non-surgical treatment are focused towards the development of speech and communication, self-help, prevention and correction of deformities, enabling the patient’s mobility and gait, enabling the patient for the activities of daily living and acquiring various levels of education. The most important types of non-surgical treatment are: treatment with physical therapy, treatment with plaster cast immobilization, and treatment with appliances – orthosis and drug therapy (vitamin therapy, antiepileptic therapy, muscle relaxants, sedatives, analgesics, etc.) [7–10].

The aim of surgical treatment of the upper limbs is to improve the function, to create the possibility of better voluntary control, respectively, of the movements in the region of the shoulder, elbow, wrist and fingers, a better acceptance of the things of various sizes, but also for hygienic and aesthetic reasons. Surgery of the lower limbs has as its aim to improve the gait function and aesthetics, to enable better sitting, transfer, maintenance of the care and hygiene of the patient, and sometimes to remove pain [7, 9].

When a decision for surgical treatment is taken, the following significant elements should be taken into account: the type of cerebral palsy; the extent of the damage of the CNS; the expression and progression of deformity; associated disorders; age; motivation and mental capacity (intelligence quotient – IQ) of the patient [7, 8, 10].

**Aim**

The aim of this article is to demonstrate the importance of orthopaedics as one of the significant specialties in the prevention, management and rehabilitation of patients with cerebral palsy.

**Material and Methods**

This article was written at the Sts. Cyril and Methodius University Orthopaedic Clinic, Medical School, in Skopje. As material, 76 patients with cerebral palsy, of different gender, aged from 1 to 15 years were used and analysed. Patients were divided into two groups (Group 1 and Group 2):
1. Patients treated conservatively (redressing with plaster-cast immobilization for foot deformity correction; coxo-femoral plaster cast for non-blood reposition of hip dislocation; orthosis; physical therapy).

2. Patients treated surgically (surgical methods after Vulpius, Bayer and Ponseti for correction of foot deformities; tenotomies of the adductor tendons in the hip region with aponeurectomy; release of hamstrings, bloody reposition of dislocated hip).

Results

One way of determining therapy and treatment for people with cerebral palsy is an analysis of the patient's gait. In clinical analysis of 76 patients with cerebral palsy, 36 (group 2) underwent surgical treatment, while 40 were treated only with conservative treatment (group 1), (Figure 1).

From documentary analysis of the patients and clinical analysis and observation of the patients, we found that of 40 persons with cerebral palsy, in total, treated conservatively, 14 patients were liable for plaster-cast immobilization, of whom 4 patients were treated with plaster-cast immobilization for foot deformity correction, and 10 children were treated with a coxo-femoral plaster cast after bloody repositioning of dislocated hip. Although physical therapy and application of orthosis were included in all 40 patients treated conservatively, in 3 children the base of the treatment was the application of orthosis, and in 23 patients, the key point was providing long-term physical therapy of the musculo-skeletal system (Figure 2). Excellent results were obtained in this group of patients, after which it was not necessary to indicate surgical treatment.
Plaster-cast immobilization, the application of orthosis or physical therapy do not always enable improvement of the patient’s situation. In children at the age of 3 years, there are excellent results from applying physical therapy and orthosis, but in older children and patients it is necessary to combine the physical therapy with surgery. Often, there is a need of complementation of the conservative treatment with surgical treatment. In our example, in 7 children, foot deformities could not be corrected by plaster-cast immobilization and orthosis, therefore it was necessary to make surgical correction of the foot deformities. The condition and the clinical picture in 8 patients initiated the providing of two-sided tenotomy of the adductor tendons in the hip region with aponeurectomia, and in 4 patients making a release of the hamstrings, while in 4, bloody reposition of a dislocated hip (Figure 3).

Despite the sophistication of modern orthopaedics and modern technology, however, some patients undergo multiple surgeries in order to achieve the desired correction and to obtain the required movement. 13 patients in our study had to undergo more than one of the previously mentioned operational interventions.
In assessing and determining the necessity of implementing surgery, it is necessary to do more analysis of patients, and a comparison between most analyses, including analyses of the patient’s gait, often leads to a change in the recommendation for the type of surgical treatment for 50% more patients. Increasing the percentage of surgeries of the *musculus gastrocnemius* and *rectus femoris*, while decreasing the surgeries on the hamstrings, *musculus psoas*, hip adductors etc, often occurs.

When the clinical picture requires surgery, it is important to pay attention to the age at which the intervention will be realized, because the results are directly related to patient age. Surgery of the upper extremity is recommended to be done between 6 and 8 years, while that of the lower limbs at 4 to 6 years. Preschool age children often suffer from a recurrence of contractures as a result of continuous growth. Children aged 4 or 5 years develop a mature gait pattern, and cooperate better in the realization of a postoperative physiotherapeutic programme.

Patients from Group 2 were primarily treated conservatively, which brought some success but not sufficient, after which the surgical interventions continued, and were followed by conservative treatment.

**Discussion**

According to many authors and researches it is considered that the number of children with cerebral palsy worldwide ranges between 0.5–61/1000 children born. When the frequency of this disorder is in question, we should always take into account the classical Phelps formula, according to which 7 children/100,000 population are born with cerebral palsy. Of these 7 children, 1 died during the first year of life, and of the other 6, 2 children are in a severe condition for which no treatment can be applied, and need permanent care and admission to a corresponding institution, respectively. Of the other 4, one child is in a condition to have home care or daily care in one of the centres. Two children were medially severely affected and later on they were suitable for all types of treatment, while the other 1 child had a modest type of this disease, which practically did not require any treatment [2, 4, 9].

*In vitro* fertilization, a contemporary cure for sterility with the appearance of a more fertile pregnancy, increases the risk of developing cerebral palsy. The development of neonatology enables a great deal of premature newborns to compensate for the lost weight, but some of them are left with permanent brain damage. By improving the postnatal treatment and the increase of survival of premature newborns, the number of children with cerebral palsy increases considerably. At present, it is considered that there is no tendency for
a decrease in intensity of the occurrence of this condition compared to the advance of prevention and treatment, especially Rh incompatibility or the significant improvement of obstetric care [11, 4–6].

Diagnosis of cerebral palsy has been based almost wholly on anamnestic data and a good clinical examination by a neurologist, pediatrician, orthopaedist and physiatrist. Early diagnosis within the first 12–24 months has been of special significance because it enables a quick start to treatment which gives significantly better chances of success. When an early diagnosis is made, which, by the way, is not simple and requires observation of the baby in its activities of daily living over a longer period, special significance must be given to social cooperation (attention), sensitivity (sight, hearing, speech), mobility (spontaneous mobility, tone, reflexes, postural reflexes) and the eventual existence of convulsions. The other examinations most commonly are applied for the exclusion of progressive neurological diseases and conditions, as well as for location of the spot and determination of the extent of brain lesion [2, 3, 5, 9].

**Conclusion**

Orthopaedics with a high professional staff and rapid development of medical technology make a great contribution to the prevention, management and rehabilitation of patients with cerebral palsy. Timely made diagnosis and early conservative and surgical treatment enable alleviation of development and training of these patients for further more qualitative life.

In cerebral palsy there is no total cure, and the treatment’s results are unpredictable and vary from patient to patient. The assessment of the treatment’s results depends on many variables, but most important in every treatment, in order to achieve best results, is precise control of all the factors that impact on deformity appearance.

**REFERENCES**

Резиме

ПРЕВЕНЦИЈА, ЛЕКУВАЊЕ И РЕХАБИЛИТАЦИЈА НА ЗАБОЛЕНИТЕ ОД ЦЕРЕБРАЛНА ПАРАЛИЗА

Попоска А.1, Георгиева Д.1, Џолева-Толевска Р.1, Георгиев А.2

1 ЈЗУ Универзитетска клиника за ортопедски болести, Медицински факултет, „Св. Кирил и Методиј“, Скопје, Р. Македонија
2 ЈЗУ Универзитетска клиника за кардиологија, Медицински факултет, „Св. Кирил и Методиј“, Скопје, Р. Македонија

Вовед: Основна цел на овој труд е да се прикаже важноста на ортопедијата во превенцијата, лекувањето и рехабилитацијата на лицата заболени од церебрална паразила.

Материјал и методи: Трудот е напишан врз основа на студија направена при Универзитетската клиника за ортопедски болести, Медицински факултет, „Св. Кирил и Методиј“ во Скопје, со примена на анализи на документација, опсервација и клинична анализа на 76 пациенти со церебрална паразила, на возраст од 1–15 години.

Резултати: Ортопедијата е хируршко подрачје на медицината во чиј контекст биле, сè и ѝ останат како предизвик бројни прашања на сегашните и идните генерации. Анализата на резултатите посочува дека оперативните зафати во комбинација со консернативното лекување даваат надеж дека е можно дефинитивно или продолжено излекување со максимално можно зачувана функција на локомоторниот систем или во најтежок случај ублажување на симптоматологијата на оштетениот локомоторен систем.
Заклучок: Раната дијагноза и соодветната примена на оперативните зафати, овозможуваат подобро функционирање на лицата со церебрална парализа преку максимално искористување на нивните преостанати способности.

Ключни зборови: церебрална парализа, ортопедија, рана дијагноза, лекување, рехабилитација, мултидисциплинарен пристап.

Corresponding Author:

Anastasika Poposka
PHI University Orthopaedic Diseases Clinic
Medical Faculty, Ss. Cyril and Methodius University
Skopje, R. Macedonia
St. Vodnjanska No. 17, 1000 Skopje
Tel: 023147006

E-mail: ninomiki@t-home.mk