

MOTOR PROGNOSIS AND CURRENT PERSPECTIVES IN CEREBRAL PALSY

PROGNÓSTICO MOTOR E PERSPECTIVAS ATUAIS NA PARALISIA CEREBRAL

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Abstract:

Cerebral palsy it is a consequence characterized by non-progressive motor disturbance referring to his lesion. According to the lesion area, can promote different outcomes that result in functional disabilities. **Objective:** to review by non-systematic way the theme cerebral palsy focusing motor prognosis, including life expectancy and functionality. **Methods:** using the Medline and LILACS, data bases searching for the last fifteen years with the terms cerebral palsy, quadriplegia, diplegia, hemiplegia, prognosis. **Results:** a total of 474 scientific papers were listed and 34 select based on: title, abstract, subject, original article and access through CAPES homepage. Were identified variables that could affect motor prognosis in children with cerebral palsy. The motor impairment from children is directly related to cerebral palsy severity level, therapeutic assistance and cerebral palsy type presented in children. The patients with hemiplegic cerebral palsy showed most favorable motor outcomes compared to diplegic and quadriplegic ones.

Key words: cerebral palsy; quadriplegia; spastic diplegia; hemiplegia; prognosis.

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Resumo:

A paralisia cerebral é uma seqüela de agressão encefálica caracterizada por transtorno motor não evolutivo quanto à sua lesão. De acordo com o local da lesão pode provocar diferentes seqüelas que resultam em incapacidade funcional. **Objetivo:** revisar de forma não sistemática sobre o tema paralisia cerebral, enfocando o seu prognóstico motor, incluindo expectativa de vida e funcionalidade. **Método:** utilização das bases de dados Medline e LILACS, dos últimos quinze anos, com os unitermos paralisia cerebral, quadriplegia, diplegia, hemiplegia, prognóstico. **Resultados:** foram listados 474 artigos científicos, sendo selecionados para esta revisão 34 artigos com base em: título, resumo, assunto, originalidade e disponibilidade de acesso pelo portal da CAPES. Foram identificadas as variáveis que podem influenciar o prognóstico motor nas crianças com paralisia cerebral. O prejuízo motor das crianças com paralisia cerebral está diretamente relacionado com o nível de gravidade da paralisia cerebral, assistência terapêutica e o tipo apresentado pelas crianças. Os pacientes com hemiplegia resultante de paralisia cerebral apresentam um prognóstico motor mais favorável comparado aos diplégicos e quadriplégicos.

Palavras-chave: paralisia cerebral; quadriplegia; diplegia espástica; hemiplegia; prognóstico.

INTRODUCTION

The Cerebral Palsy (CP) was first described in 1843, with the denomination Little syndrome, is also known by the term Chronic Infantile Encephalopathy. The most accepted definition nowadays date back to the Oxford symposium (1959): "Cerebral palsy is the sequelae characterized, mostly, by a persistent disturbance- but not invariable – of the muscle tone, posture and movement, which appears in the infancy and that is not directed secondary to this not evolutionary lesion of the brain, if not also due to the influence that such lesion exerts to the neurological maturity"¹⁻⁷. This definition is according to the one described by Hernandez *et al.*⁸, which describes the CP as a set of motor manifestations resulting from an encephalic lesion occurred during the mature period of the Central Nervous System (CNS), having as feature not progressive disturbances of the posture and movement. Not only the cerebral lesion is not progressive, the CP causes variable debility in the coordination of muscle action, resulting incapacity of the child in maintaining postures and normal movements⁹.

It is understood by the above exposed that the CP is not an evolutionary disease, that is, the anatomical and pathological aspects do not progress with the passing of age, however physical alterations and psychological can be observed during the whole course of the disease¹⁰.

The CP is one of the most common infantile disorders, even though in Brazil there are not specific scientific researches regarding the incidence of people with physical, sensorial or mental disabilities. However, there is the estimative of 20.000 new cases a year of CP in Brazil and, thus, it is established the challenge of taking care of a child with CP considering the necessity of resources, including time and money¹¹.

It was very scarce, in the researched literature, studies related to the physical-functional prognosis of children with CP. For this reason, the question that arose by the authors of this review was: which are the possible compelling variables in the motor prognosis of CP?

This way, the authors consider important the scientific wide spread about the motor prognosis in children with CP to stimulate the filling of studies in this gap knowledge of physical rehabilitation.

Thus, the objective of this study is to present some discussion topics concerning to the CP, especially to the motor prognosis of these children, which will be able to serve as a theoretical landmark to make the future exploit researches in this area easier and more encouraging.

METHOD

The authors carried out searches for scientific articles in the electronic database Medline and LILACS, between the years of 1995 to 2009, using the following key words: cerebral palsy, quadriplegia, diplegia, hemiplegia, prognosis and the equivalent in Portuguese and Spanish. It was found 474 articles, being selected for this review 34 articles, considering the following variables: title, summary, subject, originality and availability of access by CAPES. The search for articles primed published studies about the motor prognosis in the CP. Besides, the following criteria of inclusion were used: (1) research applied in human beings; (2) participants must have the CP diagnosis; (3) studies approaching the motor aspect of CP; (4) publication of articles in the following languages: Portuguese, Spanish, and/or English. This study is characterized by a non-systematic literature review and, thus, the statistical analysis is not required.

CP diagnosis

The CP diagnosis is clinical and generally does not offer difficulties. However, while the motor capacities are in development yet like in the new-born babies and suckling babies, the detection of motor disturbances demands a bigger attention. In this age group a neuropsychological-motor development delay can be observed, in greater or minor degree, generally associated to the changing of the muscle tone and to the persistence of the primitive reflexes, besides the expected age. In these ca-

ses, the etiological investigation and essential stimulation must be started until the diagnosis can be defined¹².

Up to twelve months old 2,5 to 1,000 children are diagnosed with CP, while the prevalence of this in seven-year-old children is related in 2 per 1000 live born¹³. Nevertheless, the investigation must be oriented to an early diagnosis, before the clinical condition be completely established by abnormal movement patterns, shortening and/or deformities¹⁴.

The developing neurological evaluation and the functional evaluation provide important to the doctors¹⁵. The anamneses will provide data in relation to the etiology (dystocia, anoxia, prematurity, previous placenta, gestation) and clinical (palsies, convulsions), the physical examination will indicate the motor delay (maintain the head, sit, walk, grasp objects, talk, laugh), the face observation, the mimic, the voluntary movement, hands attitude, the posture and body attitude, the muscle tone, the state of reflexes. These information will make it easier to reach a correct and early CP diagnosis¹⁶.

The persistence of primitive reflexes and the delay or failure in acquiring postural reactions are early indicators of the dysfunction in the CNS. The primitive reflexes are mediated in the cerebral brainstem. The development of cortical connections gradually overlaps these primitive answers during the first 6 to 8 months of life. While the primitive reflexes are being integrated, the straightening reactions, protection and postural balance are emerging. This transition can be delayed or never happen in children with cerebral abnormalities¹⁵.

The physical examination will also determine the extension of these motor problems and its quality making it possible to classify such onset, according to one of the three following definitions:

A The Nomenclature committee and classification of the American Academy of

Cerebral Palsy, in 1956, classified 17 children in three physiological groups, to be known:

(1) Pyramidal (characterized by the spasticity). It is characterized by the increase of resistance of extremities to the passive movement and with fast speed.

(2) Extra- pyramidal (choreoathetosis, athetosis, dystonia and ataxia). This group is characterized by the variation of the tone during rest and in situations of stress.

(3) Topographical: diplegia (commitment of lower extremities), hemiplegia (involvement of lower and upper extremities from the same side of palsy), triplegia (involvement of lower extremities and one of the upper extremities), double hemiplegia (involvement of the lower and upper extremities, however **with** higher spasticity present in upper extremities), quadriplegia (serious involvement in the lower and upper extremities).

(B) The 1957 Little Club classification is done by the following way: (1) spasticity (hemiplegia, double hemiplegia and diplegia); (2) dystonia; (3) choreoathetosis; (4) mixed; (5) ataxia and (6) CP atonia.

(C) Rosenbaum, leader of the American Academy of Cerebral Palsy and development of Medicine proposed a classification 18 based in several work components of an international group that in 2005 included the following aspects:

(1) Nature and typology of the disorder: spasticity (pyramidal), the muscle tone is speed- dependent; dyskinesia (extra-pyramidal), it can be dystonia (it includes hypertonia and activity reduction) or choreoathetosis (involuntary muscle movements of extremities); and ataxia (extra-pyramidal), that concerns the loss of muscle coordination, generally caused by a brain deficit.

(2) Motor functional ability: Gross Motor Function Classification Scale (GMFCS) based in the disability and functional limitation.

(3) Anatomical: quadriplegia (upper and lower extremities and brainstem are involved,

being the upper extremities more damaged than the lower extremities, characterizing this is the most serious of CP), diplegia (lower extremities are more damaged than the upper ones) and hemiplegia (involvement of lower and upper extremities from the same side of palsy). Monoplegia and triplegia are uncommon. Although these known classifications, there are authors who prefer to classify the CP by the nature and typology of the lesion (spasticity, dystonia, ataxia and athetosis), however regarding the anatomical classification, the terms diplegia and quadriplegia are very usual in the research and clinical areas. But these terms must be avoided as a classification mechanism, due to the inaccurate use of these terms in the general practice¹⁹.

CP prognosis

Life expectation

The level of survival to CP patients has been calculated using information from recording of the population data picked since 1952 20. About 87% of the people suffering from CP survive up to the 30 years old 21 and almost 85% of the ones who overpass 20 years old survive until 50 years old.²² Several factors influence the survival, such as the kind of CP (for example, the spastic quadriplegia has the worst prognosis), presence or not of epilepsy and serious mental deficiency²¹.

The survival patterns of people with CP has been described lately considering the effects upon the seriousness of physical, cognitive and sensitive disorders. The literature reports show individuals with CP in a mild level of dysfunctions, even some with serious dysfunctions, can live in satisfactory conditions, without great complications, up to the adulthood 22. The level of motor dysfunction is related to the range of activities, to the resources of daily life assistance²³.

Patients with the most serious type of CP have a worse prognosis and many of them will die before reaching the adulthood. Deaths

caused by respiratory system diseases are much more prevalent in the general population, especially for those who die before 40 years old, while the deaths by accidents or bruises happen in much smaller level than the expected for this age group²².

A great proportion of death in adults who are older than 30 years old results from cancer and circulatory system diseases. Deaths caused by digestive and nervous system are also prevalent than the general population²².

Regarding the motor prognosis it is verified that the functional independency in children with CP is conversely proportional to the level of involvement of the brain structures. The gait prognosis can be researched during the child development. Some authors relate only the capacity of sitting with the possible deambulation. 24,25. However, it is known that it is necessary that the child reach all the marks of development to start the gait effectively. The major of children that reach this gait makes it at the age of 6, though others walk only between 10 to 14 years old. 24. Among the children that use a wheelchair to move, the prognosis is significantly better to the ones who can operate it than to the ones that depend totally of help to it. When analyzed individually, the locomotion, manual and visual abilities that have a greater seriousness probably have worse prognosis than the ones who suffer from serious levels of cognitive dysfunctions²⁵.

It is frequently associated to the worst prognosis the effects of coexistent epilepsy, the necessity of feeding via gastrostomy and even a possible effect of the economic and social circumstances²⁵.

Functionality

The development of gross motricity is delayed in the children with CP. This way, the acquisition of motor basic tasks can be extended much in the childhood; whereas the development of a healthy child, the gross motricity

plateau happens around 5,6 years old, while the age average of children with CP is 10,1 years old²⁶.

Yet, concerning to the motor condition, according to the motor evaluation protocol GMFCS widely used for patients with CP, children with hemiplegia and finally, the children with quadriplegia. In relation to the cognitive and behavior tasks accomplishment, the children with hemiplegia also presented the best results in the Scheffe and Posthoc analysis²⁷.

Children classified in the level 1 of the GMFCS are completely independent; they do not use orthosis and normally have mild hemiplegia with spasticity. On the other hand, children in level 5 of the protocol do not have independent mobility and usually have serious dyskinesia with spasticity in a quadriplegia. It must be noted, as well that children with spastic hemiplegia will be equally in level 1 and 2; children with spastic diplegia will be in levels 2,3, and 4 and those with quadriplegia will be in levels 3, 4 and 5 (the bigger the level, the bigger is the degree of motor dysfunction).²⁸

In comparison with the major kinds of CP, the hemiplegia is usually characterized by a natural history not complicated and the affected child has a reasonable perspective of having a "full" adult life. Children with hemiplegia evolve with the worsen of manual function²⁹ and their main difficulty will be to accomplish tasks that demand bilateral manipulation^{30,31}. The biggest changes in the function of grip happen during the first years of life²⁹. After 11 years old this worsen is attributed to the member growth and to the retraction of the wrist tendons³⁰. With the passing of years, the neuromotor dysfunction of children with congenital hemiplegia get better up to a determined level and keep itself the same.²⁹ According to the development of these children, they tend to acquire a greater skill with the non-affected hand and increasingly to neglect the damaged hand. This can be due to the presence of neuropsychological disorders related to

the damage in the cortical and sub cortical sensory-motor areas, to the reflected movements or simply to the best ability of the non-affected hand to learn motor tasks³⁰. Studies about the strengths of grip during the manipulation of an object have been showing that children with hemiplegia have an unbalance in the strength coordination to the grip and lifting of an object. They present long delays between the level of movement and generation of sequelae grip of load. Most of children with CP are able to adjust their strengths of grip to the weight and texture of the object using sensorial mechanisms; they typically present a decreased ability in graduating the strength expended from an advanced way without the extensive practice³². Children with hemiplegia have a better quality of life compared to children with quadriplegia³³. According to the Child Health Questionary (CHQ), the average scores for children with hemiplegia were bigger than the children with diplegia and quadriplegia in the physical basic areas³⁴.

Lesion location

The child cognitive is affected according to the place and extension of the brain lesion, it can be in the pyramidal tracts or brain cortex, analyzed according to examinations such as computerized tomography or electroencephalogram³⁵. The hemispheric dominance is controlled by the language centers that, in most of people it is located in the left hemisphere. Nowadays an important role in the perception of the body scheme, graphic space and construction is attributed to the right hemisphere. Despite the fact that the left hemisphere predominate in relation to the language, the right one is more important in the melody perception. It can be also noted the differences between both hemispheres in relation to the memory; the left one is related to the verbal memory and the right one with the space locations, physiognomies and melodi-

es. Therefore depending on the local and extension of the lesion, the children can course with disorders related to the praxis, gnosis and language (dyslexia, dysgraphia, dyscalculia)³⁶ and this way these dysfunctions can exert influence in the motor performance in the aspects related to rhythmicity and body interaction in the space.

Therapeutic approach

The CP children prognosis can be beneficially changed while getting proper treatment from the rehabilitation team, including treatment by physiotherapist. A study showed that children who received intensive physiotherapy sessions (four times a week) interchanged with bigger periods of resting had the motor performance enhanced³⁷. The traditional methods of treatment and the objectives tend to be oriented to the independent gait reach or semi-independent, most of times, without considering the necessary time to reach such objective and how long it will be kept.

In the functional training aspect to acquisition and/or maintenance of gait, the wheelchair, though it seems an antagonistic mean of locomotion, it must be seen as a useful strategy to the maintenance of the independent gait for the bigger time as possible. The integrated use of the wheelchair with the independent continuous gait, though limited, could possibility to a great number of people who lost the gait due to joints pain, a bigger probability of autonomy, allowing, this way, a longer period of independent gait accomplishment. The therapists can direct their techniques to real objectives, for instance, developing the ability of making the patient more independent in the daily activities or favor that the patient participates more actively with the caregivers in these activities. Finally, the basic principle of any therapeutic plan must be more concentrated in an approach that is more oriented to independency and less worried with the symbolic importance of the independent gait³⁷.

CONCLUSION

For a motor prognosis definition, firstly a specific evaluation must be conducted to the functional physical aspects. Besides the direct relation between the motor injury and the level of seriousness of CP, it also must be considered the following variables: cognitive influence upon the motor performance; presence or not of epilepsy; social-economic condition of the family; realization or not of treatment with rehabilitation team and the necessities of assistance in the daily life that influence the functional independency.

It must be of the knowledge of health professionals, especially of occupational therapists and physiotherapists, the several ways of classification of CP for the aim of determining the motor prognosis. Patients

with hemiplegia resulting from CP present a more favorable motor prognosis comparing to the children with diplegia and quadriplegia, however the motor prognosis of patients with diplegia is better when compared to children with quadriplegia. Nonetheless, the presence or not of other variables that can influence the motor performance must be analyzed.

Concerning the gait prognosis, it is important to highlight that the use of wheelchair in an intermittent way to the independent gait possibilities the deambulation for a longer period of time.

Continuous efforts must be done to find ways to increase the independent activities and to promote the participation of children with dysfunction, as well as to approach the secondary dysfunctions that can emerge.

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