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Rehabilitation Outcome in 305 Turkish Patients With Cerebral Palsy

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Abstract: The aim of this study was to evaluate the etiology, clinical distribution, complications, progress and hospitalization time of the cerebral palsy patients treated at Ankara Rehabilitation Center during the last 2.5 years.

Clinical grouping was done according to the John F. Kennedy Institute system of classification. Degrees of head control, sitting balance, ability to crawl, balance on hands and knees, standing balance, gait and ambulation on admission and discharge were compared.

The study group consisted of 305 patients (ages 2-14, mean 5.8; 129 girls and 176 boys). Perinatal factors were the most common etiologic factors in cerebral palsy. The clinical distributions of the patients were as follows: 221 patients had spastic CP, 30

had extrapyramidal CP and 54 had mixed forms. 149 patients had deformities of the lower extremities.

Physiotherapy programs consisting of therapeutic exercise and neurodevelopmental techniques were performed. The duration of the stay of patients at the center was 69.8 days. Twenty-five of the patients were ambulatory at admission, while 187 were ambulatory with the aid of orthosis and assistive devices.

Many studies report physiotherapy results with development in posture and gait, range of motion in the joint and activities of daily living. Our results are in agreement with such studies.

Key Words: Cerebral palsy, rehabilitation.

Ankara Rehabilitation Center, Ankara-Turkey

Introduction

Cerebral palsy (CP) is a group of permanent but variable clinical disorders of movement, tonus and posture which begins early human life, resulting from nonprogressive damage to the immature brain with incomplete anatomical and physiological development (1-3). Disorders of specific cognitive functions as well as mental and emotional disorders, sensory loss and language disorders may accompany the situation (1, 2). Clearly, CP is not a specific disease, but rather a collection of disorders with some common features. The incidence is reported to be between 1-5 in 1000 live births (4).

Three basic groups are defined according to the etiological factors causing CP: prenatal, perinatal and postnatal CP (1-3). Prenatal causes include any source of intrauterine anoxia or decreased blood flow to the fetus, including placental insufficiency, maternal hypotension, respiratory compromise or maternal infections. Problems in the labor and birth process, including placenta previa, prolonged umbilical cord compression, or abruption of

the placenta, may contribute to perinatal asphyxia. Postnatal causes of CP include head trauma, cerebrovascular accidents, meningitis, encephalitis, poisoning and toxins.

CP can be divided into three clinical groups, according to the John F. Kennedy Institute Classification of CP: A- Spastic, B- Extrapyramidal, C- Mixed (1).

The aim of treatment in cerebral palsy should be to reach the best functional level and maximum independence in activities of daily living (ADL). Therapeutic intervention with the CP patients usually involves a large multidisciplinary team. The patient and his family must be included in the team. The physiatrist or the pediatrician may coordinate the effort, which involves parents, physical therapists, occupational therapists, social workers, special educators, psychologists, ortopedists and later vocational counselors. The goal of intervention is maximization of the patient's ultimate functional ability. Aspects include parental education and support, environmental enrichment for the child, and

	Admission		Discharge	
	n	%	n	%
Head control	299	98	304	99
Sitting balance	240	79	290	95
Balance on hands and knees	198	65	263	86
Balance on knees	144	47	241	79
Standing balance	57	19	204	67
Walking balance	25	8	187	61

Table 1. The Distribution of patients according to their motor development between admission and discharge

Table 2. The ambulation levels of the patients at discharge

	n	%
Independent ambulation	20	7
Ambulation with assistive devices	50	16
Ambulation with assistive devices+orthosis	117	38
No ambulation	118	39

Table 3. The levels of independence in activities of daily living at discharge

	n	%
Independent	27	9
Partially dependent	157	51
Fully dependent	121	40

medical and therapeutic treatment.

The aim of this study was to evaluate the etiology, clinical distribution, complications, progress and hospitalization time of CP patients treated at Ankara Rehabilitation Center during the last 2.5 years. The importance of risk factors and the effect of rehabilitative approach to functional development are discussed.

Materials and Methods

Ankara Rehabilitation Center includes a Children’s Rehabilitation Unit consisting of 50 beds. A rehabilitation team is made up of physiatrists, pediatricists, neurologists, special educators, psychologists, social workers and physiotherapists. Children under 14 years of age who are believed to have a potential benefit from the active rehabilitation program are admitted to the hospital. As our rehabilitation unit is one of the primary centers in

Turkey, almost all our patients are referred from rural parts of the country. Thus these children are treated as in-patients having their primary care-givers with them during their hospital stay. Out-patients were excluded from this study. Treatment programs consist of neurodevelopmental techniques, therapeutic exercise, the Bobath technique – usually modified according to the needs of each patient, stressing either motor improvement, balance, coordination or gait—and ambulation exercises. Other conventional modalities are also used for this aspect.

Functional rehabilitation, which consists of training in ADL and speech therapy is performed by occupational and physical therapists.

This paper presents the results of the rehabilitation of 305 patients which were treated at our center throughout the last two years. The patients were evaluated according to age, sex, etiologic factors and clinical distribution. The clinical grouping was made according to the John F. Kennedy Institute Classification. Degrees of head control, sitting balance, ability to crawl, balance on hands and knees, standing balance, gait and ambulation on admission and at discharge were compared. Ambulation was graded on a 4 point scale: 1- No ambulation, 2- Ambulation with the aids of assistive devices and orthotics, 3- Ambulation with assistive devices but without orthotics, 4- Independent ambulation.

The ADL were graded on a 3 point scale: 1- Dependent, 2- Requires assistance, 3- Independent.

The treatment period of each patient was taken into consideration.

Results

The study group consisted of 305 patients (ages: 2-14), mean 5.8±2.8, 129 girls (42%) and 176 boys (58%).

The distribution of the patients according to etiological factors were as follows: perinatal factors were the most common etiological factors in CP (56%), among which prematurity was the leading cause, at 17%, and vacuum extraction and forceps application followed with 13% in the perinatal CP group. Postnatal factors comprised 27% of the etiological factors and infections of the newborn were the most common factor (22%) in this group. Among prenatal factors, which comprised 17% of the etiological distribution, marriage of close relatives in rural parts of the country was the leading cause.

The clinical and topographical distribution of the patients were made. 72% were spastic, 10% were extrapyramidal and 18% had mixed forms of clinical involvement. In the spastic group, 57% were diplegic, 30% quadriplegic, 9% double hemiplegic and 4% hemiplegic. Spastic diplegic patients comprised the largest group. In the extrapyramidal group, 68% were athetoid, 18% had tremors and 14% had ataxia.

149(49%) had deformities of the lower extremities and 24(16%) had had surgery related to their deformities before admission to our center. The most common deformities were flexion, adduction and internal rotation in the hip joints; flexion in the knee; and pes equinus in the foot.

The duration of the stay of patients at the center was 69.8 ± 42.5 (min-max: 11-157) days. The admission and outcome motor evaluation results of the patients are shown in Table 1. Sixty-one percent of the patients were ambulatory at discharge while only 8% were ambulatory at admission. The levels of ambulation at discharge are given Table 2. One hundred seventeen (38%) patients were ambulatory with the aid of orthosis and assistive devices (13 with AFOs, 19 with KAFOs, 28 with knee splints, 57 with walking splints). The levels of independence in ADL are given in Table 3. Only 9% of the patients were fully independent in ADL.

Discussion

CP is a lifelong, non-progressive disorder which benefits from appropriate rehabilitation of optimum duration. The aim of treatment is to minimize the dependence of the child in ADL and help him become an active member of society. CP rehabilitation requires hard work, financial support, qualified workers, time and patience. The best way to manage CP is to prevention through education of families. The knowledge of etiologic and risk factors, and the education of the population and the medical staff on the subject are important for

prevention (5).

The etiologic factors in CP have changed in the last 20 years. Erythroblastosis fetalis and encephalitis were the leading causes before 1950, while prematurity is the leading cause today (4). Of 873 low-birth weight children, 238 died in the first month, and 4% of the remaining 512 developed CP (6). Torfs et al (7), reported 41 (0.3%) of the 19,044 live births to develop CP. In 8 (14%) the cause was infection or trauma during the postnatal period.

In our study, prematurity, vacuum extraction and trauma were the leading causative factors during the perinatal period and infections in the postnatal period. Prenatal factors were in the third place among which marriage of close relatives, commonly seen in the Turkish population was the leading cause.

The occurrence of cerebral palsy of congenital origin is 0.6% among boys and 0.4% among girls (6). Male patients were dominant in our group also. Spastic CP is the most common clinical form. Torfs (7) reported 80% of his patients to have spastic CP, 5% to have athetoid CP, and 15% to have other forms of CP. Perin (6) reported that among 202 spastic children, 32% demonstrated the diplegic form. In a former study in our country, 86% of the patients had spastic cerebral palsy and 82% of these patients were diplegic (8). Our study confirmed these results, spastic diplegic group being the most common clinical form.

The most common deformities in the lower extremities of the patients were flexion and adduction deformity of the hip, flexion deformity of the knee and equinus deformity of the ankle. These deformities are the most common reported deformities in CP patients and 15-20% of them require surgical intervention (5). Orthosis for support and stabilization are also used in CP. Sixteen percent of our patients underwent surgery for their deformities and 117 of them (38%) used walking splints.

The neurodevelopmental approach is very popular for the treatment of CP(4). Wright and Nicholson (9) reported that the time involved for physical therapy interventions could sometimes be tedious and distressing for the child and the family. They claimed in one study that physiotherapy adds very little to the functional development of CP patients. The evaluation of the effects and results of therapeutic approaches in CP is very limiting because of the differences in patient age, the clinical form, the former surgical and therapeutical interventions and the inability to see the patients at regular intervals. Bobath states that the

neurodevelopmental therapy is not a rigid and standardized method of therapy and can be modified according to the needs of each patient.

Many studies report that physiotherapy results in development in posture and gait, range of motion in the joints and activities of daily living. Our results confirm this. In the motor development of our patients between the period of admission and discharge (Table 1) there was a dramatic difference between the number of children

performing each task. The greatest developments were observed in standing balance and walking. Sixty-seven percent of the patients had standing balance at discharge, while only 19% were able to perform this task at admission. Also, the percentage of patients who were able to walk at discharge was 61%, whereas it was only 8% at admission.

Successful therapy in CP requires the multidisciplinary coordination of physiatrists, pediatricians, orthopedic

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