

# PHYSIOTHERAPY IN THE CEREBRAL PALSY TEAM

## AT THE FOREST TOWN SCHOOL, JOHANNESBURG.

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**PHYSIOTHERAPY** is one of the cogs in the great wheel of rehabilitation which is turning with increasing momentum at the Forest Town School for Cerebral Palsy. It is often said that physiotherapy is actually the axle round which this wheel rotates. Physiotherapy educates physical movement, and it is through physical movement that the developing child learns and acquires self-help, locomotion and experience of his environment. I always maintain, however, that the physical stimulus alone is inadequate, and correlated stimuli from the mental, emotional and social aspects is needed as well. This is available in the integrated habilitation programme carried out at the Forest Town School.

### Cerebral Palsy

This is defined by M. Perlstein as a condition characterized by paralysis, weakness, inco-ordination or any other aberration of motor function, due to pathology in the motor control centres of the brain. It must be differentiated from spinal palsy, peripheral nerve palsy and mental deficiency.

### Approach to Case

One often hears how difficult and complex it is to treat cerebral palsy cases, and as a result many therapists are discouraged from work in this field. We realise however, that any problem can be complex if one does not approach it scientifically and analyse exactly what the basic difficulties are before trying to overcome them. The complexity diminishes if one applies the following questions ;

(1) *What is the normal ?*

The physiotherapist applies her knowledge of kinesiology (body mechanics and muscle work) and a study of neuro-motor development as investigated by Dr. Arnold Gesell and others.

(2) *How is the pathological movement different ?*

This is analysed by examination.

(3) *Why is there a difference ?*

Basically the neuropathology and mechanical distortions are responsible. An example of the latter is an equinovarus foot, secondary to spasticity of the internal rotators at the hip with deformity, or it may be due to a tight Tendo-Achilles only.

### Examination

We have compiled an annual examination form, to record the abilities and disabilities, and the progress of each case. The main headings include ;-

(1) Posture and performance (ability) of basic positions e.g. lying, prone-lying, sitting, kneeling, standing.

(2) (a) Mode of locomotion of patient.

(b) Developmental motor skills in the broad sequence—rolling, crawling, walking, running and jumping.

(3) Examination of Individual Movements and the musculature under the sub-headings passive and active. The range, spasticity and strength of movement is recorded as applicable to each case. Unlike other workers in this field, we do not make an examination of individual muscles. I base this on neuro-physiological experiments which suggest

that representation in the motor cortex is that of foci of movement, and not of individual muscles.

(4) Tests for balance and co-ordination.

(5) Photographs and summary.

Having completed this evaluation, the obvious question is—What can be done ?

### Therapy

We are trying to build up motor patterns which the normal child develops automatically—probably beginning with its foetal kicks. The cerebral palsied child also instinctively tries to make contact with its environment, but, with abnormal motor patterns. Thus the older the child, the more difficult it is to break down incorrect motor habits, or alleviate the inevitable contractures, before we can begin building up the desirable movements. Thus therapy should be commenced as soon as the deviation from the normal is diagnosed.

Therapy is planned according to the above evaluation form. Besides therapy of the individual disabilities, all children receive training of basic postures and motor skills in the developmental sequence as outlined. Techniques are adapted to each individual and type.

### The Spastic

In this case the cortical motor area 4S, situated in front of premotor area 4, has a lesion. It does not convey its inhibitory impulses through the corticobulbar reticulospinal tract to control over-action of the spinal reflexes and their related muscle contractions and tone. Therefore Sherrington's law of reciprocal innervation is upset, e.g. when the spastic attempts elbow flexion he encounters a simultaneous contraction of the stretched extensors. This is antagonistic to the movement and tension, blocking or the stretch reflex occurs. With involvement of area 4 as well, paralysis is also present, which may be flaccid if 4S is still intact.

The spastic is taught voluntary relaxation, followed by relaxed rhythmic passive movement, given with care not to elicit the stretch reflex. The simple fundamentals of motion are passively demonstrated to the child. This stimulates kinaesthetic images of the correct movements, which the child will attempt through assisted active and active movement. Then simple movements are built up to the complex. For example, when Willie learns to walk, he will begin from the back-lying position and combine the simple movements for reciprocal hip and knee flexion and extension. He progresses this reciprocal leg motion in crawling, knee-walking, tricycling to marking time assisted, unassisted and finally education of walking itself.

Obviously much balance and postural training is important. The latter includes specific and general strengthening and mobilising exercises. Resisted exercise is often used for the weak antagonists to the more spastic groups. Passive stretchings and the use of night splints form a large part of our treatment of the spastic muscle groups. Manipulations of the feet and arches are constantly used as well.

### The Athetoid

The lesion here is thought to be extra-pyramidal and within the basal ganglia. Thus the body receives too many

impulses to move, owing to the lack of the filtering action of the basal ganglia. These unpatterned, involuntary movements distort the voluntary action and there is an upset in balance, lack of co-ordination and muscular weakness. There are tension athetoids and more commonly non-tension athetoids.

Therapy emphasizes relaxation progressed through all basic body positions—increasing the length of the required period of relaxation. The methods of building motor patterns for the spastic and the athetoid show similarities. The athetoid is first taught passively the direction, range and uninterrupted movement which he later performs as voluntary controlled action. Balance and co-ordination are trained with particular attention to the control of the disrupting influence of the athetotic head and neck movements. Resisted movements are often used for focussing attention, educating directional sense and diminishing athetosis.

#### The Ataxic

The balance co-ordination and muscle tone are abnormal, due to a cerebellar lesion. Proprioception is stimulated by passive movements which are soon followed by simple directional movements. Balance is trained in all fundamental starting positions and advanced to derived positions, such as four-foot kneeling, half-kneeling, step-standing and eventually to balance in walking forward, backward, sideways, on foot-prints and on a line. Co-ordination exercises of arms, legs, both combined and further with head and trunk are practised in the progressive positions of medical gymnastics. Fraenkel's exercises and the introduction of Klapp's Crawls have proved useful. Remedial exercises incorporating strengthening and co-ordination are used in a postural training table.

#### The Tremor and Rigid Types

These are rare and we have neither at the School. The rigid type is similar to the spastic in therapy, but more severe in pathology. The tremor resembles the athetoid in these respects.

There are 10 spastic quadriplegias, 5 paraplegias, 9 hemiplegias, 16 athetoids, 4 ataxics and two with a combination of spasticity and ataxia undergoing physiotherapy at the school.

For all types we employ varied apparatus to counteract the deficiencies of balance, co-ordination, reciprocal movement, strength and spastic deformities. Parallel bars with an abduction board, foot placement ladder, reciprocal walking skis, inclined plane for walking heel first, stairs, wallbars and mirrors are all used a great deal. Nevertheless in therapy it is careful observation and intelligent use of exercises that matter rather than impressive apparatus.

#### Attitudes to Therapy

The everyday actions of the normal child are acquired as skills to the cerebral palsied. The cerebral palsied child learns to walk in the same way as the normal child learns to play the piano, and needs constant practice and special training. Continued activity is essential to maintain the power, endurance, and co-ordination of the neuro-muscular mechanism. Therefore it is important that they have pleasant associations with therapy, and move confidently and with enjoyment. As a result we have to use our ingenuity and imagination continually to develop motivations. Early head control is encouraged by following a moving toy with the eyes. Singing rhymes are used with the exercises as well as finger plays, action songs and interesting apparatus. Group work supplements the individual treatments of the less excitable children. The group situation provides motivation and the inspiration of confidence.

We are trying "daring" corrective exercises which promote the thrill of achievement and confidence. These exercises include assisted somersaults, climbing wallbars, hanging, horizontal bar-work, baby gymnastics and swinging by the arms or upside-down by the legs. A freedom of movement is enjoyed that has never really been known. However we are still sceptical of the relaxing effect of swinging by the limbs, which is perhaps more effective for the normal child.

#### Correlation within the Cerebral Palsy Programme

For an efficient campaign against cerebral palsy, it is essential that a co-ordinated programme of habilitation be carried out by skilled personnel working as a team. The team includes the different therapists and educationalists as well as an advisory panel of specialists in pediatrics, orthopaedics, neurology, psychology and otolaryngology.

The integration of physio-therapy with the other therapies and education is described below.

#### (1) Speech Therapy

The same underlying principles, progression from gross movement and basic function to finer, more complex movements exist. In other words as we teach reciprocal kicking before walking, the speech therapist teaches basic tongue and lip exercises before sounds and speech. Relaxation and breathing present joint problems for physiotherapy and speech therapy. We have also to provide incentives to encourage the children to speak, sing and count. This superimposes speech on a large moving mechanism. The focus of treatment on the affected arm of a hemiplegia may result in speech and behavioural difficulties, and thus we have close association with the speech therapist in dealing with these cases.

#### (2) Occupational Therapy

Co-operation is obviously necessary in this field, for together we must build up the movements of functional activities and skills of everyday life for the independence of the cerebral palsied child.

#### (3) Education

It has been noticed that rapid improvement in muscle control occurs when a cerebral palsied child goes to school, even if there has been no definite emphasis on muscle training itself, and also vice-versa. Education increases the child's limited experiences and therefore checks the fear factors. Education also helps him compensate for his disabilities and adjust to his handicap.

Many of the special teaching methods adapt equipment and incorporate training in co-ordination, proprioception and concentration.

The Nursery School activities become largely therapeutic, apart from their psychological and socialising influences. Manual dexterity and sensory education of shape, size and texture are developed through the use of special apparatus, such as the peg-board, threading large beads of various shapes, as well as crafts such as finger-painting, clay modelling, project work, egg-shell work and other interests as created by the teacher's ingenuity.

Furniture in the classroom must be supervised by the medical officer and physiotherapists. We have special tables and chairs, built to the measurements and disabilities of each child in order to prevent contractures, promote sitting balance, and a good relaxed posture. Standing tables are recommended according to the needs of the case.

Owing to the inter-relationship between movement and learning, physiotherapy helps the child acquire knowledge in a broad sense, besides the simple necessity for the use of hands to write or turn pages of a book.



AIDS TO WALKING.

(1) Athetoid in Reciprocal Skis. (2) Spastic Paraplegia in knee corsets, using tripod crutches.

#### Play Therapy

This is invaluable in our treatment. Chair swings, jungle gym, bean bag and ball games, pedal-cars, push carts, tricycles, hobby horses are used under supervision to encourage balance, co-ordination, strengthening and rhythmic sense. This is supplemented by musical and rhythmic activities which appeal to the personality of the child as a whole. Percussion band, eurhythmics and modified dancing are being developed. We are at present also observing the effects of swimming instruction and working on a pian for developing hydrotherapy.

#### Parent Education

The progression or retrogression of the child's habilitation depends greatly on the parents. We help them acquire constructive attitudes and carry out home exercises, passive stretchings, and if indicated the application of appliances. They are advised on any problems and encouraged to allow their children to develop their potentialities as normal individuals, within the limits of their conditions.

#### Experiments and Research

The school is the first of its kind in South Africa, and has been running for four years. The neuromuscular techniques have been learnt from our own experience and knowledge adapted from overseas personnel and all available literature.

Experiments are small and consist of:—

(1) *Bracing*: We are fortunate in having the technical advice of Mr. J. D. Ball and Mr. W. D. Robertson. A "Forest Town" night splint has been developed and proved itself useful for spastics. It has also received favourable comment from various orthopaedic specialists.

Day knee corsets from thigh to calf have been introduced for the older child with knee contractures, and weight bearing on flexed knees.

Duck-boots with wide base and pull on the plantar-flexors are being used at the moment. Shoes with raised soles and dropped heels for stretching tight Tendo-Achilles have so far proved themselves worthwhile.



TEAMWORK IN THE ORTHOPAEDIC DEPARTMENT.

Note: Doctor is holding night-splint developed at the Forest Town School for Spastics.

We hope to work out a "lively" type of splintage during the day, which resists undesirable movement patterns but assists the child's voluntary correction of movement.

(2) *Pulleys*: I am adapting a system of pulleys for resistance, assistance, co-ordination and interest of these children.

(3) *Sandbags*: filled with lead shot or metal dust are being made up in the shape of dolls and animals for weighting limbs in relaxation or in graduated resistive exercises. These are more attractive sandbags and provoke enjoyment of the exercise.

(4) *Breathing*: It is being recognised that many of the cerebral palsied have "difficulties in breathing." There seems to be little investigation into this, however. The mechanics of breathing, air flow, pulmonary function and correlation with the neurological features of the cerebral palsied interest me. At present I am in the preliminary stages of a research investigation into the respiration, knowledge of which is invaluable for speech therapy, physical performance and concentration at school.

#### SUMMARY

The physiotherapy of the different types of cerebral palsy as described, is carried out at the Forest Town School for Cerebral Palsy (Spastics). It is shown how the physiotherapist guides the child's development and promotes a positive attitude to the enjoyment of movement. The teamwork of therapists and educationalists is stressed and described, and also the progressive and constructive outlook of the school.

In conclusion may I acknowledge how much I appreciate being a member of a team of such excellent workers, led by Mrs. F. M. Tragott Vorweg, and Dr. M. Medalie. Physiotherapy at the Forest Town School is indeed a challenge worth accepting. It is rewarding and pioneering work, demanding application of one's specific and general knowledge, experience and personality. I personally feel privileged to play a small part in helping these children help themselves avoid the shadow of a handicap and live the fullest life possible. For indeed we do not believe in the philosophy that only the fit should survive.