NORMAL AND ABNORMAL DEVELOPMENT

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The Influence of Primitive Reflexes on Motor Development

Fourth Printing

By

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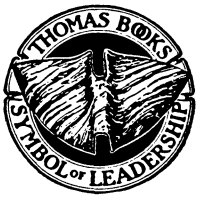

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To my Mother and Sister
Carolina and Ella Fiorentino

FOREWORD

The treatment of the cerebral palsied child has in the recent decade progressed to the point where a deeper understanding of normal reflex development and persistent primitive reflexes is a necessity for the proper treatment of these children.

This book by Miss Fiorentino now provides both physicians and therapists with a graphic representation of these reflexes. It is invaluable in the early diagnosis of the cerebral palsied child under one year of age. This book will also be a useful guide in the evaluation of newer techniques in therapy since much of this evaluation will depend upon the persistence or absence of primitive reflexes.

The information in this book has for many years been used in evaluating and treating the cerebral palsied child at Newington Children's Hospital and has been completed as a result of the demand for Miss Fiorentino to put into writing the result of her work and teaching carried on both at Newington Children's Hospital and worldwide.

MYRON E. SCHAFER

PREFACE

The developmental milestones of the normal child demonstrate the integration of the central nervous system with the lower, primitive patterns to the higher, more selective behavior necessary to the performance of everyday living.

Development of the cerebral palsied child is not normal due to the lack of integration within the central nervous system. As a result, one sees abnormal postural positioning influenced by abnormal primitive reflexes and abnormal tone. Such children, therefore, have delayed development and a lack of higher developmental function.

ACKNOWLEDGMENTS

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M.R.F.

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INTRODUCTION

As we know it today, cerebral palsy is the result of brain damage or maldevelopment which occurs prenatally, natally, or postnatally. This means that the lesion acts on an immature brain, interfering with its normal process of maturation and with its normal orderly development. This is evidenced by an insufficiently developed postural reflex mechanism, such as poor head control; by a lack of inhibition, demonstrated by prolonged retention of the primitive total patterns of earliest childhood, and by abnormal tone; therefore, there are impaired patterns of movement and delayed motor development.

To understand and interpret correctly the nature of the motor deficit of children with cerebral palsy, one must have a good working knowledge of normal child development. One must be able to interpret a child's functional behavior in the development of normal postural reflex mechanisms and total patterns of motor coordination. Conversely, one must study the various abnormal postural reflexes, their specific patterns of incoordination, the way in which they differ from normal primitive patterns, and the manner in which they interfere with normal motor activity.

PURPOSE

The purpose of this book is to orient physicians and therapists to the importance of knowing the developmental motor milestones as they relate to the normal child so that recognition of the lack of development as seen in the cerebral palsied child is noted at an early stage of development. The book also gives an understanding of the analysis of factors contributing to this lack of development through the persistent influence of primitive reflexes resulting in abnormal postural patterns.

PROCEDURE

The following pages present basic concepts in the maturation of normal motor development; normal motor development at certain heirarchal stages with photographs of children from the ages of six days through fourteen months, illustrating the integration and modification of primitive reflexes and postural movements to the higher, more complex functions.

The last section illustrates the effect of persistent primitive reflexes on motor development. The resultant delay is specific to the level of motor development at which the child is performing.

Chapter I

BASIC CONCEPTS IN THE MATURATION OF NORMAL MOTOR DEVELOPMENT

MOTOR DEVELOPMENT

Normal motor development proceeds in an orderly sequence of events; from the apedal, to the quadrupedal, to the bipedal level of maturation. The central nervous system acts as a coordinating organ for the many incoming sensory stimuli, producing integrated motor responses adequate to the requirements of the environment. As the nervous system develops, more centers are established, resulting in greater possibilities of interpretation and, therefore, greater combinations of muscular actions.

Muscles are grouped in coordinated action patterns. In the performance of our everyday movements we are not conscious of the function of the individual muscles concerned with the movements, nor can we follow up or direct voluntarily every part of a movement at every stage of it, a large part of such movements being automatic, especially those of postural adjustment.

We know that from birth onward we are activated by powerful afferents. These come from the outside world through the exteroceptors such as eyes, ears, skin; internally, from the interoceptors and proprioceptors. The normal central nervous system can absorb this afferent inflow and respond according to the changing demands of the environment. The central nervous system of the cerebral palsied cannot cope as well with the demands upon it. Though the nervous system has retained its ability to respond, the afferent inflow is short-circuited into the synaptic chains of the few typical, widespread, abnormal sensorimotor patterns of movement. Thus, motor dysfunction in movement seen in the cerebral palsied child is not a result of paralysis of muscles, but to abnormal coordination, to abnormal patterning of muscle throughout the affected parts.

LEARNING OF MOVEMENTS

The learning of movements is entirely dependent upon sensory experience; sensory input which not only initiates but also guides motor output. We know from animal and human studies that sensory deprivation does alter behavior, that it does affect the central nervous system, and that we must have sensory input to have motor output. This has always been known but has not been given sufficient thought.

The normal child changes and modifies the sensorimotor patterns of early primitive movements and adapts them gradually to more complex functions as prehension and walking. The child can use only what he knows, e.g. what he has felt, what he has experienced, and what he can remember.

In cerebral palsy the sensorimotor experience has been abnormal from the beginning. This child can make use of his abnormal sensorimotor patterns only to the degree he may be involved.

PATTERN OF MATURATION

Human behavior follows a pattern of maturation. The normal child develops in a well-ordered sequence of events. As an infant, the nervous system receives information consisting mainly of hunger, wetness and cold, which are interpreted as harmful or unpleasant. The resultant action is crying and the mother caters to his needs. This dependency continues so that for the first eight months of his life he can do little for himself. Gradually he begins to develop basic patterns of movement and postural control by adjusting to changes of position. This continues for the first three years during which period the child learns the basic motor patterns of many skills. Later, he will use the same patterns in an increasing number of combinations, changing and adapting them to more intricate and complex functional activities.

During this process, similar modifications are seen in the primitive reflex behavior with the gradual appearance of certain automatic, postural, and adaptive reactions which make the higher activities possible.

The cerebral palsied child has immature postural reflex mechanisms plus a lack of inhibition to integrate the early patterns of movement; therefore, he has impaired patterns of movement and delayed motor development.

Chapter II

NORMAL DEVELOPMENTAL MOTOR MILESTONES

Following is a review of some of the important developmental milestones as seen in the normal child. There are two points to emphasize: (1) Development is variable even with the normal child; (2) each new activity is built upon previous patterns which are integrated and elaborated on to make possible the varied, complex, and refined movements of function.

SIX-DAY-OLD

Motor activity in the newborn, to a great extent, is a continuation of the movement of the fetus, such as the sucking reflex. Following birth, the innate aptitudes are fulfilled in the course of his anatomical and physiological development under the influence of the external environment, heredity, etc.

Rooting Reflex

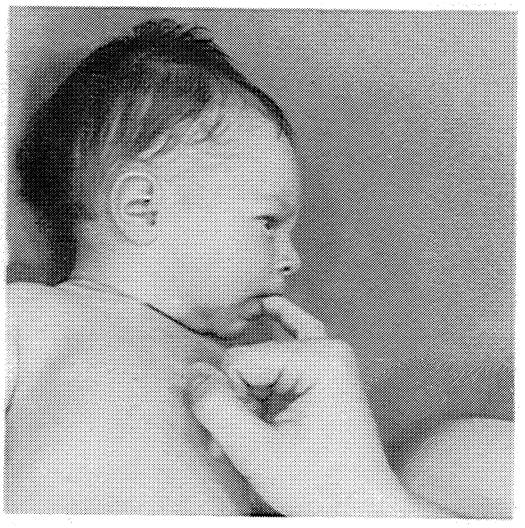
Corner of mouth lightly stroked outwards.

Result

Lower lip drops at that corner. On continuation of this contact to cheek, tongue moves towards stimulus and head turns to follow it.

Persists approximately 3–4 months, and 7 months while asleep.

Sucking Reflex



Finger placed on lips.

Result

Immediate sucking motion of lips; jaw drops and lifts rhythmically.

Persists approximately 3–4 months.