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THE BOBATH CONCEPT IN THE TREATMENT OF CEREBRAL PALSY*

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Dr. Bobath has defined cerebral palsy as "the result of a lesion or maldevelopment of the brain, nonprogressive in character and existing from earliest childhood. The motor deficit finds expression in abnormal patterns of posture and movement, in association with an abnormal postural tone. The lesion, which is present in the brain when it is still immature, interferes with the normal motor development of the child."[1] That is, he considers that the essential deficit is in the derangement of "the normal postural reflex mechanism", and he regards this "postural reflex mechanism" as comprising the integrated activity of automatic reactions, which are said to include equilibrium, righting and other protective reactions. These develop in sequence in the child and are related to normal tone. This postural reflex mechanism enables us to perform antigravity function and gives us postural fixation to enable us to perform skilled activities.

The Bobaths have determined a concept of the neuromuscular dysfunction which results from injury to the brain, and they have based their treatment upon this concept. Their contribution in the field of cerebral palsy is therefore, not only in the *treatment* of these patients, but, more important, in the *understanding* of the condition itself.

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I propose here to discuss this concept of the Bobaths, giving consideration to the problems involved in cerebral palsy, and to the treatment rationale; I will not go into details about actual treatment. An understanding of their treatment of neuromuscular dysfunction involves, I think, an understanding of their philosophy of normal movement, as well as their concept of what can go wrong with movement when control from the brain is defective.

We must ask ourselves what it is about these patients we are trying to alter, and before we can answer this question, that is, before we can find out what *is* abnormal about these patients, we must understand what is involved in normal movement. And to understand this we must know how movement develops from the neonate to the adult. We must also ask ourselves *why* we want to make these changes in the patient, *i.e.* why will these changes lead to more normal function. In other words, we must understand the relationship between movement and function.

In cerebral palsy, according to the Bobaths, the derangement of the postural reflex mechanism results in abnormal postural tone of varying types and degrees, which may take the form of spasticity, flaccidity, or intermittent tonic spasms. Together with this abnormal tone, there are abnormal patterns of posture and movement. That is to say, the

abnormal tone does not occur in single muscles, it is not a local phenomenon, but occurs always in well-defined patterns. When the patient moves he does so in these stereotyped and abnormal patterns. Consider, for example, the spastic quadriplegic child with predominantly extensor hypertonus in his lower limbs, and flexor hypertonus in his upper limbs. When he tries to sit up from supine, his trunk extensor hypertonus, more pronounced in supine because of abnormal tonic labyrinthine activity, keeps him in the extended position. His arms flex more through associated reactions brought on partly by the great effort he expends in his attempt, and therefore he cannot support himself on his hands, and his legs go into further extension, adduction and internal rotation. The harder the child tries to get up the more his spasticity prevents him, and he is rendered immobile.

The relative abnormality of these patterns can only be understood by a detailed consideration of normal movement patterns, and there are a multitude of such patterns, and of the importance of automatic postural adjustment. Consider, for example, the importance of automatic head control in movement, the way in which the head initiates trunk movement in such movements as coming up to sitting from supine, standing up from prone, standing up from a chair. Try to make the pattern go wrong in some way. Try to sit up from supine with your head extended; try to stand up from a chair with your head extended. Consider also the many automatic postural adjustments one makes in trying to remain comfortable in a seat during a lecture. Even in quite a small movement your whole body has to make astonishingly complex compensatory adjustments. One of my students having just had a lecture on movement, was so impressed with the wonder of automatic movements that she came all the way to the hospital by bus one morning, palpating her sternomastoid, in order to test the postural adjustments necessary during the complexities of a bus ride. Tonight, try to get into your nightdress with one arm flexed and your hand tightly fisted. Your postural patterns, the normal pattern of your movement, will be upset. You will have to make adjustments and you will feel strange making them. You will have to perform the function at a more conscious level than you otherwise would do.

These postural adjustments, the patterns our movements fall into, are to a large extent automatic. One may *voluntarily* reach out and touch some object, but the *manner* of reaching out, the pattern of movement, the postural adjustments made, these are all automatic, and their basis was laid down in infancy. Kinnier Wilson is quoted by the Bobaths[2] as describing motor activity as ranging at various levels from most automatic to least automatic, which suggests that reflex and voluntary movements are fundamentally the same.

It is the ability to vary patterns, to move in many different ways, that differentiates the neurologically normal person from the neurologically abnormal cerebral palsied person. Always it is the stereotyped nature of the spastic patient's motor responses that singles him out from the normal person who has a variety of motor responses available to him.

As well as understanding normal movement, both automatic and voluntary, we must understand the gradual development of these movement and postural patterns, from earliest infancy to fully developed adult life. "Normal motor development precedes in an orderly sequence of events",[3] and is characterized, say the Bobaths, by the development of normal postural reflexes which are not present at birth and which will eventually become very complex and varied. For this development is required normal postural tone which allows the performance of these movements. Normal motor development is also characterized by the inhibition of some of the primitive responses of the neonate. It is said that "the baby is a victim of his general muscular activity",[4] and he remains victim of responses such as the Moro or startle reaction and the grasp reaction, until some degree of cortical inhibition takes place. If this does not occur, or if inhibition is incomplete, these primitive responses make functional movement even more difficult for the cerebral palsied child. A child with a positive Moro reaction, for example, may be incapable of maintaining a sitting position because of his tendency to

extend suddenly with abducted arms, upon any sudden noise, or if he is even momentarily put off balance.

The breaking up of the total responses of the neonate makes possible the putting together again of patterns in many varied ways, and allows, together with the development of a normal postural reflex mechanism, the performance of skills such as walking and manipulation. When I was in London last year attending the Bobath's Course, I saw a good example of the difficulties which may arise when inhibition is still incomplete in certain functions. I was sitting in a park one lunchtime when a small boy, probably less than two years old, came up to a nearby waste-paper bin. He held in his index finger and thumb the wrapping of a bar of chocolate, and gripped between the other fingers and his palm was the chocolate itself. He wanted to throw the paper away, but he lacked, I think, the necessary inhibition, and when he opened his index finger and thumb to drop the paper, his whole hand opened and he dropped the lot. His howl of frustration echoed around the park. . . . The boy, I thought, had not yet gained control over his primitive and total motor patterns, and he must learn to modify them if he is to be able to learn more skilled performances than the one I witnessed.

Now "posture and movement interact to such an extent that they cannot be separated. Movements are only changes of posture."[5] This is the Bobath's concept of "dynamic posture". Walking has been described as a constant losing and regaining of balance. Sherrington said, "Posture follows movement like a shadow". So automatic postural reactions underlie all functional behaviour. They form the background of posture and movement, and the child has to learn to adapt these to all skills as he grows older. Unless these postural reactions are fully developed, normal activities are impossible. We need, for example, to learn to balance in such a way that our hands are left free for manipulative activities.

The lesion in cerebral palsy, says Dr. Bobath, "has led to the release of certain pathological reflexes, including increased tone, which dominate the child's behaviour. They interfere with the development of higher postural reactions which are the prerequisites for willed movement and skills."[6]

The motor handicap in these patients may be said to be characterized by abnormal postural tone, and abnormal patterns of posture and movement. The abnormal co-ordination of posture and movement is due to the release of abnormal postural reflexes, the tonic neck and labyrinthine reflexes of Magnus. These produce in the spastic child a typical distribution of spasticity throughout the body which changes predictably with changes of head or body position in space. The child becomes, therefore, more or less fixed in certain abnormal postures, and if he can move away from these postures he can only do so with a great deal of effort and in a limited and abnormal way. In the athetoid child, the fluctuating muscle tone and the intermittent effect of these abnormal reflexes prevent the child from building up normal movement patterns.

Of the spastic child, Dr. Bobath has said, "there seems to be on the one hand, a deviation of reciprocal innervation towards an excess of co-contraction, in which spastic agonists are opposed by equally or more spastic antagonists". This may prevent any movement at the joint, and may be seen in the scissor posture of the severely spastic diplegic or quadriplegic, where both flexion and extension are impossible. "On the other hand, there may also be a deviation towards an excess of reciprocal inhibition. The severe tonic inhibition of certain muscles by their very spastic antagonists will cancel out any attempt at movement. These muscles will appear 'weak' though they are not necessarily weak at all."[7] This may be seen in the hemiplegic patient who holds his arm flexed and who appears unable to straighten it. The extensors appear "weak" until the hypertonus is modified, when the patient is found to be able to extend his arm quite well. This patient may also be seen to extend his arm actively in certain positions and not in others. These extensors then, are not weak but rather, inhibited.

Of the athetoid child, Dr. Bobath says "the deviation of reciprocal innervation seems to be towards an excess of unmodified reciprocal inhibition. Any attempts at a movement will

lead to an immediate and excessive relaxation of the antagonists. The lengthening group of muscles are unable to hold and guide the movement. There is a lack of co-contraction and properly graded reciprocal innervation, therefore movements are characterized by poor control, extreme range, and poor co-ordination."[8]

As well as the motor defect with its resultant mental and physical retardation, the child may actually suffer from primary mental subnormality, that is, he may suffer actual intellectual impairment. However, impairment may result as much from lack of experience of himself and his relationship to the world around him, as to cortical damage. The child will be prevented from experiencing certain sensations, from touching his own body, from experiencing the sensation of normal movements.

To summarize. The problems of the cerebral palsied are:—

1. Abnormal postural tone and abnormal patterns of movement, combined with the release of tonic reflexes and the failure of development of normal reactions such as equilibrium and righting.
2. Associated reactions made apparent on increased effort.
3. Retardation, both motor and intellectual, which may be superimposed upon actual mental subnormality.
4. Perceptual disability and sensory impairment; a distorted body image results from "feedback" of abnormal postural and movement patterns.

With regard to treatment, the Bobaths do not aim to strengthen and relax individual muscles, but rather to improve co-ordination of posture and movement, and to obtain more normal muscle tone.

The main aims of treatment will therefore involve the inhibition of the abnormal postural and movement patterns plus the facilitation of more normal patterns, including automatic reactions, such as those involved in balance and equilibrium. This means that we set out to *change* the tone. To lower it in the spastic, to increase it in the flaccid, to regulate it in the athetoid. Once tone is regulated, more normal movement is possible with less effort. "The child must be made to *feel* a normal posture, a normal movement."[9] Remember that we feel "normal" even if we are not. The person with, for example, a postural kyphosis probably feels "normal" and when he tries to correct his defect he feels strange, not himself. The cerebral palsied child feels normal, too, because he experiences only the sensation of his abnormal postures and his abnormal tone, and the few incorrect movement patterns that he has. Repetition of abnormal movements and maintenance of abnormal postures in the infant and young child strengthen these abnormalities, until they feel normal to the child. Secondary contractures will eventually develop.

It has been said that "We do not learn a movement but the sensation of a movement".[10] All learning is through sensation. The cerebral palsied child experiences only excessive effort when he moves and this also he gradually understands as being, for him, "normal". For this reason it is important to regard cerebral palsy as a sensori-motor disorder.

In this neurodevelopmental treatment, we aim also to fill in gaps in the child's otherwise patchy development. With the cerebral palsied child there are missing links in the sequence of normal development. Gesell has said that each new activity is based on the activity preceding it. But though in treatment we try to follow normal sequences of development, this, Mrs. Bobath stresses, "should not mean that the child must first learn to perfect one stage before going on to another. In fact, the perfecting of one activity may only be reached by trying the next."[11] Treatment should not stress, for example, sitting or standing, until the child has passed through earlier stages necessary to prepare him for these functions. He must have head control in prone before he can sit properly. This does not mean that the child is not treated in sitting, but rather the emphasis in treatment is on head control in prone, or whatever developmental gap is present. The Bobaths' reason for this emphasis is based upon their experience that a child will not become proficient in a more complex activity such as walking, until he has mastered the earlier parts of the sequence.

Treatment is directed at the child's particular problems by means of techniques of inhibition of the abnormal tone and abnormal patterns of movement, and by facilitation of more normal automatic and voluntary movements. Treatment is directed not to one limb, but to the whole child, otherwise it has been found that the desired response may be gained, say, in the upper limbs at the expense of greater spasticity in the lower limbs. Abnormal postural reflex activity originates from the head and neck and more proximal parts of the body, the shoulder girdle, the pelvic girdle, and the spine. Therefore, in treatment these parts of the body are used as key points of control from which we may influence or modify the strength and distribution of abnormal tone here and in the extremities. In practice, while the therapist controls the key points, the child is encouraged to move his limbs actively, with the therapist able to prevent any deterioration in the movement. "The key points have to be chosen carefully and changed as necessary in order to obtain sequences of active automatic movements at the desired places."[12]

Mrs. Bobath now uses the phrase "reflex inhibiting patterns" rather than the earlier "reflex inhibiting postures", in order to stress that inhibition is not a matter of placing the child passively in a series of inhibiting postures until he relaxes. Relexation is not required, and the postures are not fixed. It is important that once the therapist, by her inhibitory techniques, has made the tone more normal, that is, made it possible for the child to move more easily and normally, that control should be handed over to the child. He will need guidance at first, but it is hoped that he will eventually learn to do the movement alone. He is not just helped to move within a particular position, but also to move from this position to another, this movement being a sequence of changes of posture. He therefore learns to use his muscles in new and at first, to him, strange patterns of co-ordination. Inhibition is gained by changing the relationship of parts of the body to other parts. Sherrington noted that a reflex could be changed by changing the body position, and the Bobaths have found that by handling the patient in certain ways, abnormal reflex activity can be changed. Handling attempts to prevent abnormal patterns from occurring, and by changing the patterns the abnormal tone is also changed.

Mrs. Bobath defines "facilitation" as "techniques of obtaining inherent normal automatic movements in response to handling, in contrast to movements performed at request".[13] Rather than teach the child all the complex functional abilities of a certain stage of development, the Bobaths try to facilitate the basic motor patterns (such as symmetrical postural behaviour and balance reactions) which the child can then use in other, new, activities.

I do not want to give the impression of techniques of inhibition always followed by facilitation. In fact the techniques are used in conjunction. Mrs. Bobath has said that "reflex inhibiting patterns create the precondition for the use of facilitation techniques, and are of limited and temporary value".[14] The main point remains, that whether inhibition or facilitation are used alternately or simultaneously, the child must be given a chance to move actively. He must learn to adjust himself to changes in his centre of gravity.

With the spastic child it is important to avoid static postures. His problem is that he finds difficulty in initiating movement—he is too static. Likewise, passive movements and stretching of individual muscles will not do anything to help his overall problem. Sensory stimulation must be given, but carefully graded so as to avoid abnormal reactions. The athetoid child is different. He is too mobile. He appears weightless. "He lacks sustained postural control and cannot give fixation to moving parts."[15] He needs inhibition of his abnormal reflex activity plus techniques of stimulation. His treatment will tend to be more static than that of the spastic. Perhaps the situation can best be summed up by saying that the spastic child is too organized, though in an abnormal way, while the athetoid child is disorganized.

During treatment the child should be helped to perform movements without effort and in as normal a way as possible. Therefore, we must make sure that we have reduced hypertonus before asking the child to try a movement. He should be guided in this movement and not allowed to struggle by himself.

I have said earlier that knowledge of techniques of treatment alone is not enough. It is necessary first to understand the problems involved, that is, to consider what it is that we want to change, and why we want these changes. Some problems are obvious as soon as the child is examined, but constant reappraisal is necessary in order to recognise as such the problems which may arise during treatment; to recognize what it is that prevents a child from doing a particular movement normally.

Mrs. Bobath uses the word "handling" to describe her method of treatment. I think we should consider what this term means. I sometimes find it difficult to describe what I am actually *doing* when I am treating a patient. Similarly, it is impossible, I consider, to talk about the particular, detailed, methods of treatment to be used for a particular problem, say for a hemiplegic's flexed arm. There are, as Mrs. Bobath stresses, no "recipes" for treatment, nor are there "short cuts" to learning how to treat these patients. One has to be able to *feel* by handling the patient, what his response is, and what needs to be done next. By handling a patient I mean I am guiding him, regulating his motor output. There is a delicate interplay between my handling of the patient and his response to this handling. It is important that the handling produce the desired result, therefore it is important that the therapist understand how a normal person responds to such movement and handling. The therapist is responsible for the quality of the patient's performance. When she feels that the patient's response will be abnormal, she must try to stop it. If she interferes early enough she can probably either stop it, or at least prevent the response from becoming more severely abnormal. Treatment must be adjusted therefore, not only to the individual child, but to the responses elicited in this individual child.

Early diagnosis and detailed and accurate assessment are two important points in this approach to cerebral palsy. The Bobaths consider that early diagnosis, and treatment begun as soon as possible, preferably in the young infant, will forestall the development of the full picture of the abnormality. They consider early treatment can prevent secondary retardation in an otherwise intelligent child, or in a mentally subnormal child. Higher centres have not yet reached maturity and neural patterns can be influenced more easily.[16] "The first eighteen months of a normal child's life is a period of great and fast development," say the Bobaths. "At no other stage does a child learn and develop so quickly. It is not only a stage with the highest potential for learning, but also for adjustment to cerebral damage."[17]

With assessment one asks the question, "Why can he do some things but not others?" One must assess "to what extent the perfection of the postural reflex mechanism is interfered with by abnormal postural reflex activity in association with abnormal postural tone".[18] We try to assess the *quality* of the performance; whether the child can move away from the abnormal posture; what part of a particular movement is abnormal. We try to assess the distribution of abnormal tone. For example, in prone, the distribution of spasticity favours the flexors. This may prevent the child from raising his head, from getting his arms out from under his body, from rolling over. The same child may, in supine, have spasticity of his extensors, and in this position he will still be unable to raise his head or roll over. In assessment we have to note the effect of movement of one part of the body on the rest of the body. That is, we must look for associated reactions.

Reassessment helps to determine the effect of treatment. If a child progresses in standing but not in prone, treatment has probably been in the wrong direction. The gaps in development have not been filled in. The assessment, then, is qualitative.

Extensive bracing is incompatible with this treatment concept. It interferes with the mobility of the weight-bearing joints, thereby preventing the delicate interplay of postural adjustment. Also it will not change spasticity, merely shift it elsewhere. However, bracing for children for whom this type of treatment is not available may be necessary in order to obtain as much function as possible for the child, and to prevent deformities.

Home treatment and team work are other factors the Bobaths stress. It is not enough that the child receive treatment and be handled

correctly by his therapists. His mother and other members of his family must carry on with the same concept of treatment at home. They must handle the baby in such a way "that he can acquire the necessary sensori-motor patterns of postural adjustment".[19] The parents should understand the problems involved as thoroughly as possible, and be capable of taking over treatment from the therapist. Similarly, it is thought that all the therapists involved in the treatment of the child, whether they be speech, occupational or physical therapists, should be basically "cerebral palsy therapists", preferably trained in this concept together. They should be capable of understanding all the problems involved, whether they be problems of speech, of movement, or of function, for after all, the three are closely interwoven, and the concept, the approach to the problems, should be basically the same, and care should be taken that everyone treating the child is heading in the same direction.

There is always, however, the proviso that any approach to treatment must necessarily be limited by the child's potentialities, by how far the capacity of his damaged brain can be used and reorganized in the most normal way.

In conclusion, I consider this concept has much wider application than in the understanding of cerebral palsy, involving as it does, the study of movement from the neurodevelopmental aspect. I think movement is now no longer regarded by physiotherapists as a largely anatomical function, but perhaps we still tend to give too much emphasis to the anatomy of movement, that is to say, to the framework of movement, to joints, bones and muscles, than to the astonishing manner in which the framework moves, the way the brain manipulates and co-ordinates the anatomical structures. It seems that physiotherapy is on the threshold of new developments in treatment, with more emphasis being placed on movement of the body rather than on individual muscle function. This latter seems to me a rather over-simplified way of looking at what is, in fact, unbelievably complex and as yet little understood. Advances in electromyographic studies of movement are pointing out these new complexities, and I think that unless we stop thinking of movement as the contraction and relaxation of muscles around one or two joints, or of muscles in one limb, we will never treat our patients really effectively. Not until we grasp the principles involved in movement, the total body involvement, and the development of movement, will we progress, I believe. It is in this field of the study of movement that I think the Bobaths are making such an important contribution, and it is in their findings on the observation and treatment of patients with cerebral palsy that one can see an illustration of their concept.

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