Some of the problems are not new. Spastic diplegia was depicted in drawings in ancient Egypt (Charcot and Richer); and in a painting 'of a palsied man' by Rafael (Richer). An early anatomical exposition of the gross cerebral pathology was given by Cruveilhier in 1829.

One problem is finding the cases. Clinical vigilance is necessary and thus some variation in figures occurs. In U.S.A. it is reported to involve one person below 18 years per 1,000 in New York, and Perlstein gives an incidence of 5.9 per 1,000 live births. In England an average figure is about one per 1,000 children of school age, but where very careful clinical screening has occurred an incidence, of all grades including the minimal, of one in 750 has been noted.

Prevention. This is of paramount importance. Genetic factors are undoubtedly present in certain pre-natal or hereditary types of spastic disorder, but it is always necessary to remember Little's fundamental observations (1861) 'on the influence of abnormal parturition, difficult labour, premature birth, and asphyxia neonatorum, on the mental and physical condition of the child especially in relation to deformities.' A large proportion of cases are acquired in the peri-natal period, thus attention to every possibility of favourable obstetric performance is ever necessary. Major disasters to the foetus or the newborn are usually clinically self-evident; the less obvious intracranial birth injury, vascular or anoxic, may appear to be minimal and fugitive, but sequelae in spastic disorder may ensue. The newborn has peculiar and sometimes remarkable resilience to shock, anoxia, commotio cerebri, or a 'cerebral state,' but to avoid consequences, skilled resuscitation measures and neonatal care and management must be at hand. Early recognition and appropriate treatment of haemolytic disease of the newborn, with potential icterus gravis, has already prevented many cases of kernicterus and subsequent athetoid quadriplegia.

Ante-natal and para-natal factors. Foetal life must be nurtured as safe and sound as is possible. Maternal health, and thus placental health, needs no emphasis. Foetal anoxia, even episodic, is dangerous. Placental disease and inefficient oxygen exchange function may be critically aggravated by a host of obstetrical factors, ante-partum haemorrhage, maternal toxæmia or anaæmia, general anaesthetics, prolapsed cord, breech delivery, precipitate labour, prematurity, immaturity or post-maturity. A concatenation of circumstances may be more injurious to the foetus or the newborn than any single and separate incident. It is essential to have awareness of the possible types of intracranial pathology and of the clinical signs of the vascular damage or extravasation. Treatment of the various cerebral states in birth injury carries a great responsibility for the clinician and, moreover, continued meticulous day-to-day care and supervision of the affected newborn for several weeks is time well invested. Such cerebral damage may be very much lessened in its cerebral palsy effects later, if any infection or continued and troublesome cerebral irritation can be avoided during the early weeks, and good nutrition maintained. Post-natal disease, such as subdural haematoma, meningitis, encephalitis, cerebral tumour or abscess, a vascular abnormality including cortical venous thrombosis or venous sinus thrombosis, post-convulsive effects, cerebral embolism, cerebral disturbance in pertussis, congenital angioma of the brain, cephalic trauma, may be implicated. In each instance special care in diagnosis and treatment may minimize the degree of complicating cerebral palsy. Developmental disease of the nervous system may be revealed as post-natal growth proceeds and thus microcephaly with degrees of spastic diplegia or cerebellar dysfunction unfold; or the degenerative atrophies variously affecting the cerebro-spinal systems make their appearance. It is in the self-limiting or non-progressive cerebral pathologies that special attention is paid. Treatment leading to a progressive improvement by bringing into increasing function the undamaged parts of the brain is the aim, and, of course, the earlier this is done, and while the brain is growing at its phenomenal speed during infancy and early childhood, the better. Compensating mechanisms and adaptive pathways can thus evolve in the
damaged central nervous system of the young person if every care and attention is given at the right time. Even gross brain damage, e.g. giving rise to a hemiplegia, may thus eventually lead to minimal disabling physical handicap.

Clinical types of spastic disease have wide detailed variations as between quadriplegia, hemiplegia, paraplegia, or monoplegia. Motor complexes may involve in some degree cortical, basal-ganglion or cerebellar disorder, and in the order of the motor symptoms spasticity or hypertonia, athetosis, ataxia, tremor, hypotonia or flaccidity, and last but by no means least, convulsive. No two cases are quite the same and more usually the bizarre clinical states are each an individual diagnostic problem. Diagnosis and assessment must be as early as possible and regular reviews of the clinical state carried out. Each problem will involve a clear perception of the neurological, the intellectual, the physical disability and its handicap effects, the emotional status, hearing, speech and vision. A simple motor or single handicap creates a vastly easier educational problem than in those cases where two or more abnormal features create a multiple handicap and a complex system of adaptive treatment is found to be necessary. Early diagnosis is the aim, but is not always easy. Hemiplegic disability may be clearly seen at a few months of age, but the fact that some sensory impairment is also present in the affected limbs may not be recognizable until later; yet the presence of normal sensation will act very favourably in the development of movement and co-ordination in the hemiparetic state of the growing child. Sometimes special investigations as air-encephalography to reveal the cerebral anatomy and the state of the ventricular system is of great help. Electro-encephalography is certainly of particular value in the detection and follow-up of spastic conditions which may be associated with potential or actual focal or general epileptiform seizures.

It must be constantly understood that with the cerebral palsies we are dealing with infants and young children who are, or should be, 'growing and moving' and keeping as near a normal way of life as is possible in the home, the family, the school or the hospital. Special attention will, therefore, be given to any and every opportunity to learn more about the child's abilities, and every advantage in clinical care, and motor action and educational advance carefully taken up, so that no newly emerged physical advantage, which the child may well have discovered for himself, is lost again through lack of opportunity for further expression and progression. Thus over-rigid or biased considerations in assessing the total clinical picture are wisely avoided. Team work is essential.

It is highly convenient to have in each area an assessment centre for clinical examination where good records are kept and where the medical team together with the psychological and educational experts can jointly agree. General paediatrics, neurological, orthopaedic and possibly neurosurgical matters are thus worked out. The School Health Service must be linked with the hospital schemes. The leader of the team must be very interested and well informed on the more recent advances in comprehensive diagnosis in cerebral palsy. The minimal disorders are very important and may be overlooked in the absence of clinical skills to detect, in a perhaps not very co-operative child, a minor asymmetrical spasticity, or dysmetria, or other motor incapacity. Juvenile frustrations and difficult behaviour patterns may somewhat override and mask the picture.

Moreover, it is important in elucidating the whole aspect of the problem to take note of the home environment, parental attitudes and sibling relationships and by all means to regard the family doctor as the likely source of valuable general knowledge on the child, and, of course, the family doctor should be kept informed of any decisions and recommendations of the assessment team. The care and guidance in the home may well be the dominant note, and a misunderstanding might severely impair or abolish good progress in the child.

Prognostic factors. Comprehensive diagnostic accuracy is the only way to determine the real and appropriate needs. Mind and body relationships in terms of the child's thoughts, actions and orientations must be appreciated. The derangement of function in the one or several parts of the highly complex cerebrospinal system will improve in no small degree by the child's own will to improve, provided a strong humanitarian outlook colours the whole spectrum of treatment and education of the physical and any associated mental handicap. Partial deafness, acting always adversely, may lend itself to early auditory training from about one year of age; eye disease, especially retinal forms with some probable permanent visual defect, needs very accurate assessment so that early educational treatment can add to the general betterment. Unexpected abilities sometimes emerge, which may confound even the experts and put the child on to some quickly advancing line of action.

Thus, generally, free enterprise in movement should be given to the child, bearing in mind the subtle understandings of the child of himself, and the ease whereby the over-anxious doctor, parent or teacher might engender fear and insecurity and thus a worsening of the movements and co-ordination of the child. Ideas of self-pity among
relations and friends concerning the disabled child should be avoided. Things of this sort might insidiously undermine careful medical and teaching skill. Adaptation to physical handicap is enormously eased by a sense of well-being and confidence, and sound mental health. Prognostic considerations will be related to such factors as effective sight, effective hearing, educational ability—or subnormality, adjustment and maladjustment, the enormous importance of speech ability or defect, or the presence or absence of cerebral dysrhythmia. 'Language is one of the highest manifestations of human intelligence; remove it and the intellectual powers are greatly impoverished.' Intricate situations in the particular child may be baffling because combinations and permutations of physical and mental handicap in cerebral palsy are unlimited: also the physical handicap and environmental adversity and retardation may run together in shocking array.

**Factors in treatment.** A child will, up to a point, treat himself if well nurtured and nourished, and especially so if, in the spastic type of disorder, time and convenience are allowed for his natural tempo and the proper order of evolution of movements and powers as is, of course, only too obvious in the observed cycles of a normal child. Growth and development will lend many opportunities to a child to advance with his handicap or to leave it more or less gradually behind. Any auditory visual, perceptual or sensory defects will call for special medical and educational care. Obviously, all available in-going impressions of common sensation, sense of position, sense of movement and of muscle contraction and relaxation, thermal sense, discriminative and tactile sensations, will be of the utmost value to improving reflex co-ordination of movement and limb power. Matters of regular physiotherapy and speech therapy demand a careful understanding of the child's special needs. Ritual and slavish repetition of manoeuvre are only likely to bore and discourage the child. Intelligence tests should be given by a psychologist who will give a sensible general report in a severely handicapped child and give more guidance in the educational side of treatment. As a contribution a social worker might help the parents to find adjustments with the child and the siblings. Thus many aspects and problems come up for consideration and a wide perspective needs to be kept.

Concerning movements, it is as well to allow a spastic child to have as much freedom as possible. If they can crawl let them. Ingenuity exists in such things as climbing frames, adaptable chairs and walking aid apparatus. Individual needs should be carefully anticipated. Spontaneous emergence of an ability should be seized upon and encouraged. Experience shows that water exercises and guided activity in a shallow, but large, bath has very much to be recommended. This may give the child a real sense of achievement in mobility and action. In hemiparesis an orderly scheme to try to make use of the defective hand as the assisting hand is indicated. Large drawings and paintings and big writing with large curves will suggest themselves to encourage some bilateral action and improving hand-eye cooperation: special chairs may be essential. Learning difficulties may come and go in bizarre fashion, but in lack of concentration much ingenuity will be needed to decide the right way to deal with each individual child.

Behaviour difficulties and lack of control may be a concomitant of brain injury. There may be inability to recognize shapes or to execute shapes. Mirror writing and other aberrant forms of writing is sometimes put into the picture. Extra-special care with learning to read will call for particular persuasion and help. It is important not to stick to any one method of teaching in cerebral palsy. For instance, the athetoid palsy may find the 'look-say' method an advantage, and the spastics the phonetic method. In many of these procedures early nursery training, between 2-5 years, will have great advantages in hand and eye training, especially concerning shapes and manipulations.

Social and emotional training by freedom for play between children is gently encouraged. Our experience is that many spastic children can go to ordinary school. A fair number of spastic children are certified under the Mental Deficiency Acts. In some areas day centres for care are being established by voluntary societies. Only a small number need attend or reside in a special spastic school. Children with perceptual handicap can lag seriously behind unless given special help.

It would certainly be wise to give the child satisfying alternatives to ordinary physical education or games which he cannot do. Thus, a swimming bath is an exciting diversion with, at the same time, inherent physiological advantages. Some occupational therapy, to include basket making and weaving, may give considerable satisfaction.

All this should be linked with the awareness that, in the cerebral palsies and often in the athetoid type, the love affection is highly developed, fear is not apparent, but anger and rage is easily provoked; in the spastic type there is more fear, a strong protective affection pattern and anger is short-lived, if aroused. The ataxic child is more or less normal in these respects.

Special lines of treatment may need consideration. If an epileptic problem is associated with
the cerebral palsy, every effort must be made to control the fits. If these fits are focal or arising in a particular part of the cerebral cortex, e.g. motor area or in the temporal lobe, local excision of the irritable area may be quite seriously considered. A problem which has presented itself with some force is the bad effect which old scarred cerebral tissue in one hemisphere (with varying degree of contra-lateral hemiparesis and hemi-anæsthesia) may disturb and cause deterioration in motor function and intellectual capacity of the opposite, and structurally normal, cerebral hemisphere. In some carefully selected cases excision (hemispherectomy) of the diseased brain material will very favourably affect improvement in behaviour and possibly eliminate convulsions.

Schooling. A number of cerebral palsy cases will be ineducable and become a responsibility under the Mental Health Acts. But most careful ascertainment must be made and no masking of intelligence through physical incapacity overlooked. 'Those palsied children with subnormal intellectual development should by no means be neglected: each should receive such schooling as is indicated by an investigation and measurement of his particular faculties. It will often be found that abilities along certain lines will exceed the general stream of accomplishment, and special training along such lines is certainly to be advised. A background of general education will not only aid in the vocational habilitation, but will open avenues of pleasure and recreation which would otherwise be closed' (Courville).

A few cerebral palsy cases can obtain great help in treatment combined with special educational procedures at a 'spastic school.' Many of the children can therefrom pass on to ordinary school at a suitable age and physical improvement. But far the greatest number, including the groups of more minor disability, can and should attend an ordinary school and mix up with other children and 'move and grow' in the ordinary stream of juvenile life, thus building up adaptive qualities and skills to meet vocational needs later. Aptitudes and skills and social adjustments are thus encouraged. School teachers are usually very co-operative and helpful, especially where there is a reasonable liaison with the medical advisers.

Denhoff puts it thus: 'Cerebral palsy, in addition to being an important medical problem, has various non-medical aspects, such as vocational guidance, education and employment. The aim of treatment of cerebral palsy is to integrate as many as possible of these patients into society and to help them to live within their limitations.'

The most pressing problems may be stated briefly: Continued meticulous attention in antenatal, obstetrical and neonatal care; special measures calculated to minimize the risks to the foetus and newborn in prematurity; speedy diagnosis and urgent efficient treatment in purulent meningitis; early recognition that some form of cerebral palsy is present and its full assessment by an expert team. With preventive aspects in mind, and a keen sense of the clinical possibilities in cause and effect in cerebral palsy, problems in treatment will suggest ways and means of dealing with each particular case on the merits. Knowledge on these affairs has certainly advanced in recent years and all doctors should appreciate that the public conscience has been aroused, which no doubt partly inspired the Ministry of Health to issue its Circular 26/53 concerning the welfare of handicapped persons and the special needs of those affected with cerebral palsy.

**BIBLIOGRAPHY**


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