

THE REHABILITATION OF A CHILD AFTER SEVERE HEAD INJURY — A CASE REPORT

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SYNOPSIS

The rehabilitation of a 12 year old boy following a severe head injury is described. He had a haemorrhage in the posterior thalamus, and remained in coma for 19 days. A ventriculo-peritoneal shunt was inserted for hydrocephalus.

After 11 weeks of comprehensive therapy at the Department of Rehabilitation Medicine, Tan Tock Seng Hospital, Singapore, he was discharged, fully independent in ambulation and self-care. He had regained spontaneous speech, and was able to return to normal school.

INTRODUCTION

The number of head injuries admitted to the Department of Rehabilitation Medicine, Tan Tock Seng Hospital, has increased significantly from 17 in 1977 to 35 in 1982. (1). Road traffic accidents are the commonest cause of these injuries, and the majority involve young people.

After a head injury, rehabilitation must include the coordinated efforts of a physiotherapist, occupational therapist, speech therapist and a psychologist. It must aid recovery, and aim at returning the patient to a normal a life as possible, physically, mentally, economically and socially.

The rehabilitation programme of a 12 year old boy, following a severe head injury is described. The importance of combined therapy and family support is emphasised.

CASE REPORT

A 12 year old Chinese male was admitted with a history of being knocked down by a car on 20.2.82. He was admitted in Coma 3 and remained in coma until 10.3.82. A CT Scan showed haemorrhage in the posterior thalamus. A ventriculo-peritoneal shunt was inserted for Hydrocephalus.

The patient was transferred to the Department of Rehabilitation Medicine, Tan Tock Seng Hospital on 25.3.82., and initial assessments were carried out. He was restless, had a blank expression, and eye contact could not be established. Nystagmus was present, and a Marcus-Gunn pupillary reflex was present in the left eye. Vision was impaired and he had a very poor concentration span.

Tactile defensiveness was present and he did not respond to any verbal stimulation. He was unable to indicate any needs, and was fed through a Ryles tube. There was poor head and trunk control, and no sitting balance. A weak swallowing reflex was present, and he could not imitate lip, or tongue movements. Vocalisation was not present.

A dense spastic hemiplegia was present on the left side. Passive shoulder movements were restricted by pain, and there was a fixed flexion contracture of 60° at the left elbow. Full passive range of movements was possible at the wrist, fingers and thumb, but there was marked wasting of the intrinsic. In the left leg passive movements were full except for ankle dorsiflexion which was restricted to 80° by a tight tendo-achilles.

Although active movements were present on the right side, they were aimless and marked flexor spasticity was present. Active shoulder movements were half range, and passive movements were full. The elbow had a fixed flexion contracture of 10° and the hand was in tight palmar flexion, with fingers and thumb tightly clenched. Only 20° of passive dorsiflexion was present at the wrist. At the ankle passive dorsiflexion was restricted to 90° by a tight tendo-achilles.

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TREATMENT PROGRAMME

Initially, therapy was carried out by the physiotherapist, occupational therapist and speech therapist together. As the patient's tolerance and concentration span improved, the three areas were separated so that emphasis could be placed on each special problem. Outlined briefly are the actual treatment programmes used in his rehabilitation.

PHYSIOTHERAPY

Aims of treatment and methods used included the following:-

1. Maintaining and increasing range of movement of all joints through passive movements in the initial stages, progressing to active assisted and then active movements. Passive movements and prolonged stretchings were especially important in reducing the elbow contractures and lengthening the tight tendo-achilles
2. Mental stimulation through conversation and music.
3. Encouraging eye contact.
4. Reduction of spasticity through
 - a) Stimulating and maintaining balance, head, trunk and hip control,
 - b) Coordination and weight bearing of the four limbs through matwork, and activities in standing.
5. Matwork — Stimulating head control in different postures. Facilitating rolling. Pushing up to sitting from side lying. Maintaining static and dynamic balance in different postures and changing from one posture to another eg. side sitting, cross legged sitting, four foot kneeling, high kneeling and half kneeling. Techniques used included rhythmic alternation, rhythmic stabilisation and tapping. Ambulation on a mat via four foot crawling and kneel walking.
6. Tilt-table — Stretching of the tight tendo-achilles and giving a sensation of weight bearing.
7. Stimulating static and dynamic sitting balance on a stool and in standing.
8. Ambulation was achieved through facilitated walking, progressing to walking with aids and different degrees of manual support and finally independent walking.
9. Improving gross coordination, speed and accuracy of movements through activities and games, eg. throwing and kicking of different sized balls, quoits, and games which encouraged quick changes of posture.
10. Improving eye-hand coordination, fine hand function and sensory-motor integration through piano playing.

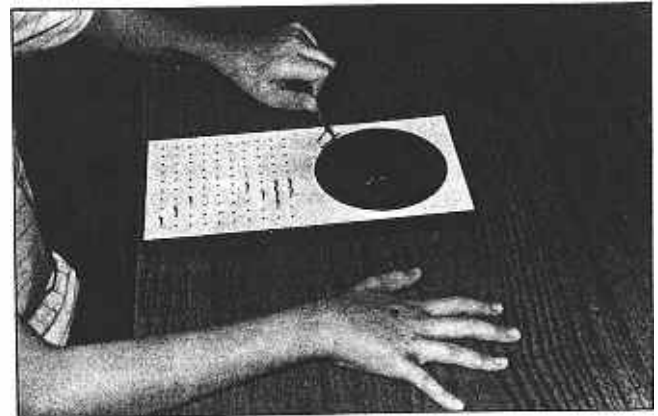
OCCUPATIONAL THERAPY

Aims and treatment procedures were as follows:-

1. Improving physical condition, using activities with various postures and at different levels, eg. lying down supine and prone, sitting on the floor, kneeling, sitting on a chair with a back, sitting on a stool and standing.
2. Improving hand function, coordination, gross and fine movements, and bilateral function with the use of exercises and activities. Special splints were made for the right hand, and the left elbow and hand. Serial splinting was carried out to the left elbow.
3. Improving cerebation, orientation, memory and immediate recall, concentration span and intellectual function by the use of mental and sensory stimulation. As he improved he was given reading exercises and simple mathematical problems.
4. Perceptual retraining was carried out as the patient had disturbances in body image, spatial relationships and right left discrimination. He also had constructional apraxia, poor eye-hand coordination and hemianopia. He was unable to distinguish shapes, sizes and colours.
5. Retraining in activities of daily living, eg. feeding, dressing, bathing, toileting and grooming.



BILATERAL MANIPULATIVE SKILLS TRAINING.



O'CONNOR'S TWEEZERS DEXTERITY BOARD.



PIANO PLAYING WITH ORTHOPLAST COCK-UP SPLINT.

SPEECH THERAPY

1. Swallowing. The swallowing reflex was stimulated by stroking the throat, at the base of the tongue, and around the lips and cheeks. Tongue movements were encouraged eg. protrusion of tongue, and licking the upper and lower lips. The patient's lips were moulded for 'o,'e' or 'u' movements, and these sounds were uttered simultaneously by the therapist or mother. A multisensory approach was used for stimulation, such as auditory, tactile and visual senses.
2. Feeding. When the swallowing reflex was stronger, the Ryle's tube was removed, and the patient fed with a spoon. He kept his mouth open, leading to drooling, and had to be constantly reminded to close his mouth. Gentle mandibular massage was given to encourage chewing before swallowing.
3. Speech and Language. Initially the speech therapist spoke to him slowly, and in short sentences, always facing the patient so that he could watch her lips and face. The mother was advised to do the same. Familiar songs were

played to him. Although he was able to understand simple instructions and pick out numbers, letters, and common words, he was not able to vocalise until 2 weeks after admission.

As he improved, he was encouraged to answer in sentences rather than in monosyllables. Soon he was able to read without prompting. Articulation drill and exercises were taught.

The patient spent 9 weeks at the department, and continued as an out-patient for another 2 weeks. At discharge, he had achieved the following:

Mobility — Independent ambulation on flat ground, slopes and uneven terrain. He could climb stairs without rails. There was no spasticity in all 4 limbs. He had good static and dynamic balance in all postures. Full active range of movements was present in both ankles.

Activities of Daily Living — Independent in all areas.

Hand Function — Right hand function was normal, and there was full active range of movements in both elbows and wrists. There was minimal clawing of fingers of the left hand, but gross grip and fine manipulative skills were good. Bilateral activities however were not fully spontaneous.

Intellectual Function — The patient was orientated in time and place. Concentration span varied according to his mood and interest, but maximum span was 15 minutes. There was still some amount of restlessness and irritability, but his memory had improved. Psychological testing showed an IQ of 72. He was immature and lacked confidence especially in new activities.

There was no difficulty in understanding and speed, in working out mathematical problems, but he had difficulty with English comprehension. He had disjointed ideas in composition, but had no difficulty in reading.

Speech — Articulation was good, and he had no difficulty with speech and language. Swallowing was normal.

The patient was reviewed again 1 year after injury. He showed further improvement. He had returned to school, and had no difficulty with his schoolwork. He had been promoted in spite of his long period of hospitalisation.

DISCUSSION

Rehabilitation should begin as soon as the injury has occurred. In the acute stages care must be taken to prevent complications of the chest and minimise spasticity and contractures of the limbs. When the neurosurgical status is stable, a careful assessment must be carried out, and an appropriate programme outlined.

The programme should be formulated according to the physical and mental condition of the patient, taking into consideration his premorbid educational, occupational and social background.(2). To be useful, the therapeutic programme must be rational and the goals realistic.(3). Rehabilitation must aid the process of recovery and maximum use must be made of spontaneous recovery. Thus it should be started early.(4,5,6). Improvement can continue over a variable period of time, in some cases, as long as 3 years after discharge.(7,8,9). It has been suggested that the length of treatment is vital, and that 6-8 weeks is inadequate for the severely disabled patient.(10,11).

Good family support plays an important part in the rehabilitation of a head injured patient.(4,5,10). Jennet (12) suggests that in the stages of recovering consciousness, one should talk to the child, give him something to do or to look at, such as television. Parents and relatives are encouraged to stay around the patient as much as possible. The patient's mother in this case, spent a great deal of time with the patient talking to him, reading to him and playing music to him. She reminded him of childhood events and of his school friends and relatives. She also reinforced all that was taught during his therapy sessions.

Parents and their children require reassurance and supportive follow-up, if post-traumatic psychiatric sequelae are to be

minimised.(13). Physical recovery was faster than the intellectual abilities, and personality changes were thought to be due to stress on impaired perceptual and cognitive abilities.(14). In the paediatric group, personality change, behaviour abnormalities, and memory and cognitive defects, are common.(15).

Piano playing was used as form of therapy for the first time with our brain damaged patients. The patient had learnt to play the piano from an early age, and enjoyed it. This earlier experience was useful not only in sustaining interest, but also in the application of this form of therapy. Piano playing involves functional use of the individual finger flexor and extensor muscles, and by synergistic action, encourages stability and control of the shoulder girdle, elbow and wrist, as well as the trunk, thus improving sitting balance and righting reactions. Eye-hand coordination including interpretation of visual cues from written musical notes into active movements of the various fingers to play the notes on the piano, and unilateral and bilateral hand function, are involved in this activity. The dexterity of the patient's hands improved, not only in piano playing, but also in other activities which involved upper limb function.

In summary, the rehabilitation programme of a child with head injury should begin early, and must be comprehensive. The parents must participate in the programme, and the goals must be realistic. Counselling, support and long term follow-up care is essential.

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