

Univ. Klinik for Neurologie Innsbruck,

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VORSTAND: PROF. DR. F. GERSTENBRAND

A-6020 Innsbruck, am Anichstraße 35. Telefon28711

Organization of a rehabilitation center for patients in coma after serious cranial cerebral traumata

F. Gerstenbrand, L. Saltuari, E. Rumpl, A. Schmölz

Due to the advance in the emergency medicine the survival rate of patients with serious head injuries are increasing. The early exploration of complications and the initial therapy improves the outcome of a patient and the therapeutic results. Especially secondary and tertiary damages following brain injuries may be avoided by immediate support of the vital functions and by new methods of the acute diagnosis and the therapy.

For the staging and screening of patients with brain injury a standardized terminology is necessary. The terms coma, serious coma, prolonged coma, as well as coma vigile, are insufficient for the topical diagnosis and the grading of a cerebral damage. The terms midbrain and bulbar brain syndrome permit a better clinical classification of the symptomatology after a cerebral trauma and a topical correlation of the disturbed brain function as well as a prognostic estimation.

The splitting up into various phases and the diagnosis of a lateralization of the midbrain syndrome allow the observation of the course and additionally make a prognostic statement possible. The assessment of the substantial defect and the functional disturbances is possible by use of CAT, EEG and last but not least by the NMR method by means of special rating-scales, whereby the clinical course can be observed.

The Glasgow-rating scale seems less useful because the items are simplified. Comprising syndromes of the different phases of the midbrain syndrome and bulbar brain syndrome the Innsbruck Rating Scale permits better correlation with the clinical picture and is of better prognostic value.

It is absolutely necessary to transfer patients with a brain injury to special centers to have all the possibilities of diagnosis, treatment and observation. In this connection the availability of helicopters seems to be of big importance. The balance will be positive after a few years comparing the costs for a helicopter system and the costs for a long rehabilitation and especially in case of the invalidity of some patient.

An intensive care unit should be equipped with all means of monitoring, technical equipment for diagnosis, such as EEG, EV and should be closely connected to a neurological diagnostic street. Apparatus for measurement of brain pressure, EEG and evoked potentials have to be included, as well as a complete laboratory equipment. An intensive care unit for brain damages has to be run by neurologists and anesthesiologists. A good cooperation with surgical intensive care is important.

After 7-8 day brain damaged patient has to be considered a neurological case, offering all problems of neurological rehabilitation. The program for rehabilitation should start at the beginning of the acute stage. The treatment of the patient has to be carried out in close cooperation with other specialists, like neurosurgeons, traumatic surgeons and others. The course of a patient with an acute midbrain or bulbarbrain syndrome can show a direct remission, passing the different phases or may develop an apallic syndrome. In some cases a prolonged midbrain syndrome with transitory syndromes of an apallic syndrome can be observed.

Already on the 2-3 day of a midbrain syndrome, there occurs an enormous increase of noradrenalin in the serum, parallel with a significant raising of the basis metabolism, which clinically correlates to the symptoms of a disinhibition of a vegetative system.

The use of beta-blockers and alpha-neuron-blockers together with a high nutrition rate is accepted as an essential therapeutic program. The tertiary lesions like encephalopathy, pontine myelinolyse, myelopathy and polyneuropathy can be reduced or even avoided. Programs for positioning and and all clinical procedures of the intensive care are completing the therapeutic program in this early therapeutic stage.

After 6-8 days in severe cases without direct remission a traumatic apallic syndrome is developing and after 10-20 days the complete Sympto-

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matology of the traumatic apallic syndrome occurs. At this stage the patient has to be treated at a special neurological center.

The rehabilitation program has to be divided into 8 stages: preparation phase, phase of first communication, activation phase, mobilization phase, stabilisation phase, resocialization phase and after care phase.

After the preparation phase, in the phase of first communication the active rehabilitation gets more importance. A special physiotherapy using the tonus regulating reflexes represents an essential part of therapy.

Attention has to be paid to the patient's desire to rest. In periods of awareness acoustical and visual stimulation as well as bio-feedback procedures should be applied carefully. Of special importance are the feeding procedures.

Contact to close relatives and friends are of great importance. Generous handling of visiting times has to be practiced and special clothes for the visitors are necessary. In the following remission phase the supporting activities of the relatives should be intensified. Motor activities have to be trained, including primitive motor patterns and its higher developed complex movement in form of stereotypes like the primitive Klüver-Bucy-syndrome patterns.

The alternative use of a wheel-chair and bed should be practiced. The wheel-chair helps the patient to leave his room and to change the surrounding.

The apallic syndrome with its 8 remission phases shows in the first phase a primitive emotional reaction with optic fixation, the optic following movements with global emotional interaction is passing to the Klüver-Bucy phase with 3 different stages. When the patient has passed the Klüver-Bucy phase a transfer from the intensive care unit to the special rehabilitation center has to be achieved. In some cases the transfer could be organized in the remission phase 2.

The first act in the special rehabilitation center has to be the performance of an evaluation of the recent state of the patient to organize an individual rehabilitation program considering the functional lesions and the damages of the central and peripheral nervous system. A teamwork of physiotherapist, occupational therapist, speech therapist, neurologist and psychologist is necessary. Based on the neurological examination using the current coma rating scale additive examinations like CAT, EEG, evoked potentials, EMG-NLG, examinations of the cerebral circulation with Xenon-clearance and SPECT and if possible NMP has to be used. With a special test battery including some parameters of the neurological status like motor abilities or aphasia the individual achievement profile is fixed. According to this achievement profile the individual program has to be worked out. So patients after apallic syndrome as well as others with severe cerebral trauma without a following apallic syndrome can be classified according to their disturbed functions.

In the individual program of the preparation phase, beginning in the initial stage, following details have to be included: 9 points have to be sub grouped according experiences of the Innsbruck rehabilitation center.

Care and nutrition are the basis of the first activities of the rehabilitation. The pharmacological therapy is listed in the following first table, the other tables are listing physiotherapy stimulation methods, ergo therapy, logopedic treatment, resocialization and psychological support. The individual treatment program has to be controlled permanently according to the balance scale.

The achievement profit helps to monitor the development of the recovery of higher brain functions as well as of the motor system. Pharmacologically the regression tendency has to be adapted. In the meantime psychopharmaca as well as anti-epileptic drugs may be used, when there is a clinical indication for it.

Complications like a tertiary lesion of the peripheral nervous system should be avoided by correct physiotherapy or with special methods, eg. electrotherapy. Other complications such as ossifications, shortening of tendon or ankylosis have to be corrected surgically as well as decubital ulcer.

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All these activities have to be continued during the mobilization and stabilization phase. An important phase in rehabilitation is the resocialization. The way back to former life must be opened up with training, reintegration in the profession or, if necessary, retraining.

The rehabilitation of severe brain injured patients is based on the therapeutic community including relatives as well as other patients, who already have achieved a more advanced remission phase. Later on friends and colleagues of the patient may be integrated in this therapeutic community.

Summarizing it has to be stated, that an early diagnosis of the primary traumatic lesion as well as the developing complications is essential with all the therapeutical consequences like operation of a subdural hematoma. Severe brain damaged patients must be treated in a special center. Rehabilitation should start in the first period. An individual program in accordance with the damage and the dysfunctions is essential for the rehabilitation. The fixed program has to be controlled continuously. The therapeutic community is of positive influence on rehabilitation. The aim of rehabilitation is the full resocialization.

According to the experiences of the Neurological Clinic Innsbruck a resocialization can be achieved in about 55% of patients with an apallic syndrome. Moreover it is necessary to continue the rehabilitation during a period of about two years. The aftercare phase has to be continued over some years.

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VIA COPERNICO 5 Tel. 0267078143 20125 - MILANO (MI)

Tel. 0267078143