REFRESHER COURSE FOR GENERAL PRACTITIONERS

HEAD INJURIES—II. TREATMENT AND SEQUELAE

BY

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After a head injury shock may be present, but it usually resolves spontaneously with simple methods of resuscitation—for example, warmth, rest, raising the foot of the bed, and tap-water per rectum. If it is severe and persisting, as shown by a low blood pressure (persistently below 100 mm. Hg systolic), rapid pulse, and cold and sweaty extremities, more energetic methods should be employed, including blood transfusion and a pressor drug such as methylamphetamine hydrochloride, 15 to 30 mg. intramuscularly.

While unconscious the patient should be nursed in the lateral position, and turned regularly from side to side every four hours; the skin over pressure areas should receive careful attention. The head should rest on a low pillow, and the body should be horizontal (see illustration). In this position the midline of the head will

lie in the same axis as that of the trunk, and the airway will be clear; respiratory secretions will flow from the uppermost lung along the trachea and pool with saliva in the lower cheek. The mouth and pharynx should be regularly cleaned out at intervals of, say, half an hour with a piece of moistened gauze held on forceps, or by suction from a motor pump through a large soft rubber catheter. When the patient is turned over on to his other side the lower lung takes the upper position and is then drained of secretions. In the event of there being excessive secretions (as may happen after a brain injury) the foot of the bed must be raised so as to take greater advantage of the action of gravity in emptying the respiratory pathways.

It is wrong to elevate the head and shoulders of an unconscious patient, in whom the coughing mechanism is usually defective, for this will increase hypostasis and embarrass respiration still further. It is also wrong to nurse the patient supine, for the tongue will fall back and obstruct the airway. Oxygen should be administered if there is any cyanosis; anoxia will aggravate cerebral damage. Pyrexia should be countered by removing bed-clothes; if the temperature rises above 103° F. (39.4° C.) energetic measures must be employed—for example, covering the patient with only a damp sheet, playing an electric fan on him, administering ice-cold water per rectum. If unconsciousness lasts more than a few hours it is wise to give penicillin, 250,000 units twice daily, as a prophylactic against respiratory infection; if infection becomes established larger doses will be necessary, 1,000,000 units twice daily. The sputum should be cultivated and micro-

organisms tested for sensitivity to other antibiotics and the sulphonamides. Pulmonary collapse may occur as a result of the plugging of a bronchus with viscid mucus and bronchoscopic aspiration may be necessary.

During the first few hours of unconsciousness special attention to fluid intake is unnecessary, apart from the treatment of shock. At the end of that time tap-water may be given per rectum. If consciousness has not returned within 12 hours food and nourishment must be given by means of a soft rubber tube (Jacques's oesophagus tube No. 9 English gauge) passed through the nose into the stomach. Great care must be taken to ascertain that the end of the tube is within the stomach and not in the trachea, for it can easily be passed into the trachea in a deeply unconscious patient. The safest test is to inject (or blow) air briskly down the tube while listening with a stethoscope placed over the stomach; unmistakable loud borborygmi will be heard as the air bubbles into the stomach. The tube may be removed once weekly for cleaning. As consciousness returns the swallowing mechanism must be carefully tested; a swab soaked in water is held between the lips and squeezed and the throat watched. If sucking and swallowing are satisfactory, teaspoonfuls of water may be given, and later a feeding-cup may be employed. If the fluid is not swallowed properly, or coughing occurs, the tests should be repeated daily until the nasal tube can be withdrawn. These details have been given, as proper nursing during the period of unconsciousness is life-saving.

When the patient is fully conscious he may take up whatever position in bed is found to benefit his headache; he may be propped up on pillows, lie flat, or the foot of the bed may be raised. There is no hard-and-fast rule about posture. He should be kept in bed, in a subdued light, free from distractions and noise until headache, dizziness, and nausea abate. As these symptoms subside he may be given increasing liberty to sit up in bed for meals, read, smoke, and receive visitors.

How long should he remain in bed? The best criterion is freedom from headache. When headache has been absent for a few days he may be allowed up for increasing periods of time. This graduated convalescence is continued, each few days bringing extra activity; if symptoms recur a previous stage should be resumed. When physically active, increasing exercise should be prescribed with a view to imitating as closely as possible the conditions of employment. Massage and exercises, and perhaps orthopaedic advice, will be necessary for residual limb parestheses, and disabilities such as diplopia and dysphasia will need specialist advice.

Throughout, the patient should be encouraged in the belief that he will make a good recovery. Moral support and a cheerful outlook play a big part in the successful return to employment, and the doctor should never show any anxiety. On the other hand, a careful assessment of the patient's prognosis and honesty towards the patient are also necessary. In severe brain injury residual intellectual deficit or a physical disability may quite clearly prevent a patient from returning to his original type of employment. Expert help will be needed to make a proper assessment, and the patient should be told as soon as it is certain what the future holds for him. It is as important that he should not return to work for which the injury has rendered him quite unfitted as it is to avoid a neurosis, the result of introspection or of anxiety, that he cannot work when in fact

he is well able to. The experience of head injuries during the war has led to a lessening of the period during which patients are kept in bed. Too long in bed is apt to foster the patient's belief in the seriousness of his injury and to breed neurosis. Some cases need little or no rest in bed. Thus a patient who has been concussed and recovers consciousness in a minute or so may feel quite free from any ill effects, and, provided none appear, he need not be kept from his work. Or his headache may last but a day or so, and he might be allowed to resume work a few days later. Moreover, during the period of rest in bed enough activity must be allowed to prevent boredom.

Symptomatic Treatment

Restlessness may have an ascertainable cause—for example, a full bladder or thirst. In the early stages of compression a patient may exhibit much motor activity, perhaps the external evidence of headache, and this possibility should be borne in mind before prescribing drugs. Simple drugs such as potassium bromide and chloral hydrate (30 gr. (2 g.) of each per rectum, or 20 gr. (1.3 g.) of each by nasal tube) should first be tried. If an injection is essential soluble phenobarbitone, 3 gr. (0.2 g.) intramuscularly, or the more powerful drug paraldehyde, 2 to 5 ml. intramuscularly, are both safe.

Headache if severe may be the earliest symptom of compression, and the possibility of this complication must always receive attention before prescribing. Simple analgesics such as aspirin, 10 to 15 gr. (0.65 to 1 g.), or codeine (as tab. codein. co.), one or two tablets, usually suffice. Magnesium sulphate as a rectal infusion (6 oz. (170 ml.) of 50% solution retained for half an hour) and attention to the most comfortable position are helpful. The use of morphine should be avoided if possible, because of the risk in the early stages of masking the clinical evidence of brain compression. If it must be used, only a small dose (1/12 to 1/8 gr. (5.4 to 11 mg.) by subcutaneous injection) should be given, and it may be repeated in half an hour if it is inadequate.

Insomnia may be controlled by the sedatives already recommended or by other preparations in common use.

Giddiness tends to subside spontaneously, particularly with graduated exercise, and rarely needs special drugs, though phenobarbitone in small regular doses, 1/2 gr. (32 mg.) thrice daily, may be given if necessary.

Radiography and Lumbar Puncture

An x-ray examination of the skull is unnecessary in the early stages of the care of closed head injuries: radiographs do not influence treatment, the manipulations of the head may interfere with the airway, and good definition cannot usually be obtained owing to the patient's restlessness. But if operation is to be performed for a fracture, depressed or open, good films are essential in order to provide the surgeon with precise information about the site and size of the fracture and the presence of driven-in fragments.

Lumbar puncture may be of value in several ways, but it is potentially dangerous during the first day or so; it is in this period that compression of the brain most commonly occurs, and a lumbar puncture may well aggravate that condition and precipitate the patient's death. For that reason it should be carried out only on the recommendation of the surgeon who will be called upon to operate. But if the diagnosis of compression does not arise the removal of small quantities of bloody cerebrospinal fluid may relieve headache and diminish physical excitement and delirium. If pyrexia is excessive or persistent lumbar puncture is advisable in order to detect the presence of meningitis, which may otherwise easily elude diagnosis.

Surgical Treatment

It would be inappropriate in this article to describe the various operations which may be necessary in cases of head

injury. They are for the most part highly specialized procedures, and patients in need of these should be immediately transferred to the nearest centre where such facilities are available. In this category will be cases of brain compression (suspected or actual), of compound and of depressed fracture, and of extensive scalp laceration. Small scalp wounds, after carefully shaving the scalp over an area of at least 3 in. (7.6 cm.) from the edges of the injury, should be excised, removing all devitalized tissue but only the narrowest margin of skin edge, and exploring any subcutaneous pockets which may hide debris. The wound is then powdered with penicillin and a sulphonamide and closed with stitches.

Cerebrospinal rhinorrhoea resulting from fractures of the anterior cranial fossa often ceases spontaneously in a few days, and this may be hastened by keeping the head and shoulders raised, but this posture may be adopted only if the patient is conscious. If the leak of fluid persists or is severe operation may be advisable in order to close the dural tear with a fascial graft. If the fracture is extensive operation may be advisable in order to insure against intracranial infection at a later date. During the period of rhinorrhoea, and for several days afterwards, it is advisable to give a prophylactic course of penicillin, 250,000 units twice daily, and of sulphadiazine, 2 g. four-hourly for 24 hours and then 1 g. four-hourly.

Fractures of the facial skeleton may occur in conjunction with a head injury, and it is important that these should be recognized quickly, so that treatment may be initiated as promptly as possible. Either the upper or the lower jaw may be fractured, and a fracture particularly apt to escape detection on account of bruising and swelling of the eyelids is one involving the margin of the orbit. The eyeball may be displaced, and if unreduced this fracture may be the cause of permanent diplopia, quite apart from the disfigurement. Appropriate specialist treatment will be necessary.

Fractures of the middle cranial fossa involving the ear rarely need operation. The pinna and meatus are cleansed daily with 70% alcohol, insufflated with penicillin and sulphadiazine powder, and then covered with a sterile pad in order to diminish the risk of infection entering the middle ear from the exterior. The meatus should not be packed, but prophylactic penicillin and sulphadiazine should be given. If the ear is already the seat of a chronic otitis media, or if an acute infection develops, mastoidectomy may be necessary.

The Sequelae of Head Injury

The post-contusional syndrome embraces the minor symptoms which may persist for some time after a head injury—namely, headache, dizziness, and mild mental symptoms such as impairment of memory, inability to concentrate, apprehension, and emotional instability. To what degree these symptoms are due to organic damage or are psychogenic it is often impossible to determine, and so interwoven are the possible causative factors that the attitude now is to avoid any attempt at labelling. Obvious causes of psychological stress, such as the patient's natural anxiety for the care of his family, or about his symptoms or his future return to work, should be dealt with in an understanding and common-sense manner. Impending litigation may be a troublesome factor and often delays recovery by the anxiety it breeds.

As previously mentioned, proper assessment of the ability to work and of the appropriate work for the man are most important, and in serious cases may need psychiatric aid. A simple explanation of symptoms and disabilities is often of great help in fostering the patient's self-confidence. Intolerance of noise and of family activities usually subside with sympathetic understanding. A doctor's letter recommending employers to allow shortened hours for the first week helps to bridge the period of readjustment. Headache of a mild degree may need simple analgesics, and reassurance is necessary in order to prevent the

patient from believing his brain is seriously damaged. Provided a proper period of initial rest and graduated convalescence has been carried out, the patient should be encouraged to ignore headache and persevere. Occasionally severe headache persists, and takes on all the characters of a migraine. It is best treated by those drugs which sometimes help in migraine. The following remarks of Cairns are pertinent: "Almost every patient who makes a full recovery from concussion suffers at a certain stage of his recovery from headache. . . . It is one thing to have a headache; it is another thing to complain about it."

If considerable structural damage of brain tissue has been sustained the residual sequelae may be severe according to the areas involved. Widespread contusion with much haemorrhage may lead to substantial loss of white and grey matter, demonstrable by encephalography as an enlargement of the ventricles and of the subarachnoid spaces over the cortex. Or the damage may be restricted to the frontal lobes as a bilateral polar contusion, often associated with bilateral anosmia. In these patients there is usually a quite obvious intellectual deficit, which may improve somewhat with re-education, but which is permanent to a greater or less degree. Return to employment will depend upon the size of the deficit and the nature of the available work. Hemiparesis will continue to improve, with lessening speed, over several months, but severe degrees of weakness and spasticity may be a permanent disability. Disturbances of speech, of reading, and of writing may improve with special training, but a permanent residuum is likely.

Recovery from cranial nerve damage varies according to the individual nerves affected. Anosmia, whether partial or complete, is usually permanent from the time of injury. Similarly, damage to the optic nerves and chiasma rarely shows any improvement. In paralysis of the extrinsic muscles of the eyeballs there is a strong tendency to recovery, although final recovery may be slow and orthoptic exercises or corrective operations may be necessary. Damage to the branches of the trigeminal nerve is rarely permanent. Facial paralysis usually clears up; it may be advisable to seek the advice of an aural surgeon about the feasibility of exploring the canalis facialis, in order to relieve pressure on the nerve or to graft it. Hearing may be recovered, although if the auditory nerve is damaged deafness is likely to be permanent.

Epilepsy is a serious sequela which may develop early or late after a brain injury; the incidence reaches its highest at about the end of the first year. The fits may be localized (Jacksonian) or generalized, the former usually occurring in the case in which there has been a localized injury to the brain, as happens in a penetrating injury. Epilepsy is more common after severe injuries, and much more common after open than after closed injuries. Its incidence after open injuries, in which extensive scarring may develop in the brain, has been variously estimated as 30 to 50%. Electroencephalography unfortunately does not give reliable information about which individual will and which will not develop epilepsy. In order to diminish this risk it is advisable to prescribe an anticonvulsant to any patient who sustains a head injury in which there has been penetration of the dura mater. Only a small dose (phenobarbitone, $\frac{1}{2}$ gr. (32 mg.) twice daily) need be taken, but it should be taken for five years without remission. If fits have not occurred at the end of that time it can be discontinued, but withdrawal should be by graduated doses over several weeks. Sudden withdrawal may be promptly followed by a fit.

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The names of the following members of the medical profession were included in the New Year Honours List published in the *London Gazette* on January 1.

Order of Merit

WILDER GRAVES PENFIELD, C.M.G., M.D., D.Sc., Hon.F.R.C.S., F.R.S. Director of the Neurological Institute and Professor of Neurology and Neurosurgery in McGill University, Montreal. Formerly President of the Royal College of Physicians and Surgeons of Canada.

K.C.M.G.

ERIC DENHOLM PRIDIE, C.M.G., D.S.O., O.B.E., M.B., B.S. Chief Medical Officer, Colonial Office.

K.B.E. (Military Division)

FREDERICK HARRIS, C.B., C.B.E., M.C., M.B., B.Ch., D.P.H. Honorary Surgeon to the Queen. Lieutenant-General, late R.A.M.C. Director-General, Army Medical Services.

KENNETH ALEXANDER INGLEBY MACKENZIE, C.B., B.M., B.Ch. Surgeon Vice-Admiral. Medical Director-General of the Navy.

Knighthood

VINCENT ZACHARY COPE, M.D., M.S., F.R.C.S. Consulting Surgeon, St. Mary's Hospital, London.

ARTHUR WILLIAM MICKLE ELLIS, O.B.E., D.M., F.R.C.P. Emeritus Regius Professor of Medicine in the University of Oxford. Consulting Physician, London Hospital.

NORMAN MCALISTER GREGG, M.C., M.B., Ch.M., F.R.A.C.S., D.O.M.S. Honorary Ophthalmic Surgeon to Prince Alfred Hospital and to Royal Alexandra Hospital for Children, Sydney, New South Wales. For services to medical science.

EDMUND BRITTON JONES, M.B., B.S., F.R.C.P. Honorary Physician, Adelaide Children's Hospital. A leading physician in the State of South Australia. For public services.

PETER MACCALLUM, M.C., M.D., M.Sc., M.R.C.P.Ed., D.P.H. A member of the Medical Board, State of Victoria, and formerly Dean of the Faculty of Medicine and Professor of Pathology in the University of Melbourne.

FRANK PERCIVALE MONTGOMERY, M.C., M.B., B.Ch., F.F.R. Honorary Consulting Radiologist, Down County Infirmary and Down County Mental Hospital. Consulting Radiologist, Ulster Hospital for Children and Women, Belfast. For public services in Northern Ireland.

C.B. (Military Division)

ARTHUR JOSEPH BEVERIDGE, O.B.E., M.C., M.B., B.Ch., M.Sc., D.P.H. Honorary Physician to the Queen. Major-General, late R.A.M.C.

THOMAS NORMAN D'ARCY, C.B.E., L.R.C.P.&S.I., D.O.M.S. Surgeon Rear-Admiral.

EDWARD DEMETRIUS DALZIEL DICKSON, C.B.E., M.D., F.R.C.S.Ed., D.L.O. Honorary Surgeon to the Queen. Air Vice-Marshal, R.A.F.

FRANK KINGSLEY NORRIS, C.B.E., D.S.O., E.D., M.D. Director-General of Medical Services, Australian Military Forces.

C.M.G.

ALFRED EDWARD ROWDEN WHITE, M.D., F.R.A.C.P. A prominent physician in the State of Victoria. For public and philanthropic services.

Hon. C.M.G.

SAMUEL LAYINKA AYODEJI MANUWA, O.B.E., M.D., F.R.C.S.Ed., D.T.M., D.T.H. Inspector-General of Medical Services, Nigeria.

C.B.E. (Civil Division)

IVOR JONES DAVIES, M.D., F.R.C.P. Consulting Physician to the Ministry of Pensions Hospital, Rookwood, Cardiff.

JOHN LOWE, M.D. Senior Specialist (Leprologist), Nigeria.

ROBERT ALEXANDER McCANCE, M.D., Ph.D., F.R.C.P., F.R.S. Professor of Experimental Medicine in the University of Cambridge. Director, Department of Experimental Medicine of the Medical Research Council at the University of Cambridge.

LOUIS BOYD NEEL, M.R.C.S., L.R.C.P. Conductor of Music. CHARLES LINDSAY SUTHERLAND, O.B.E., M.D., D.P.H., D.I.H. Senior Medical Officer, Ministry of National Insurance.

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