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Host Society: The Canadian Neurosurgical Society
Société Hoté: La Société Canadienne de Neurochirurgie

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CEREBRAL CYSTICERCOSIS IN CANADA: A REPORT ON THREE CASES FROM MONTREAL

PAUL A. HWANG, Z. ALI-KHAN, E.J. ARPIN, M. AUBE, G. CHONG
Montreal, P.Q.

Porcine cysticerci affecting the brain, extradural and subdural space were identified in two cases of coccidiodomycosis. In the third case, an intracranial cysticercus was discovered on routine examination at necropsy. The patients were a 30-year-old man, a 45-year-old man, and a 60-year-old woman. The presenting symptoms were headache, seizures, and altered mental status. The diagnosis was confirmed by computed tomography (CT) and magnetic resonance imaging (MRI). The patients were treated with corticosteroids and anti-parasitic medication. The outcome was good in all cases, with complete resolution of symptoms.

There were 10 patients with orbital tumors and all presented with proptosis rather than any specific neurological manifestation.

The importance of early clinical diagnosis of this highly malignant tumor will be stressed and the rapid neurological progression illustrated by the case material.

INTRACRANIAL PRESSURE MONITORING

D.L. MORRISON AND F.B. MAROUN
Health Sciences Complex, St. John’s, Nfld.

I.C.P. monitoring has been in clinical use for over 20 years and is now advocated for management of serious head trauma and diffuse encephalopathies such as Reye’s Syndrome. This display outlines the pathophysiology of raised I.C.P., the principal monitoring devices, and the methods used to measure I.C.P. The technique, as used at Memorial University of Newfoundland is demonstrated along with some interesting features of I.C.P. monitoring.
EEG ACTIVITY DURING BARBITURATE ADMINISTRATION OF HYPOXIC BRAIN INJURIES IN ADULTS

SHERILL J. PURVES, W. MARTIN, R. EVELYN AND W. GODдарLFF
Vancouver, B.C.

This report describes the results of EEG monitoring during the administration of high doses of barbiturate (Thiopental) in seven patients (ages 17-71 years) who had suffered severe hypoxic brain damage as a result of cardiac arrest. The patients survived, one died a cardiac death on day three, and three appeared to proceed on to “brain death.” Thiopental was administered in a total dose ranging from 20 to 94 mg/kg. The EEG was recorded from electrodes placed at C3, C4, and Fz, and was monitored for the duration of the treatment, and for up to 72 hours after completion, with daily or weekly EEGs carried out for the duration of the patient’s hospital stay. In some patients due to technical difficulties data were not complete.

From this experience there are some interesting findings which appear to be important for the interpretation of the EEG in these difficult clinical situations. In the patients who survived for more than a few days, including the two who returned to very nearly normal neurological function, the EEG depression (which usually only attained a burst suppression pattern, rather than an iso-electric trace) was only maintained during the initial phase of the barbiturate administration. After approximately 12-14 hours, despite constant blood levels, the EEG gradually became continuous and showed some activity in the Alpha frequency range, or in the patients who died the most in the Beta frequency range. Failure of this return of activity within 24 hours (even in the presence of continued intravenous barbiturate and maintained blood levels) was uniformly associated with a bad outcome. The EEG pattern was associated with the blood glucose levels in the individual patients will be considered.

The EEG appears to have an important role for monitoring brain function during barbiturate administration, but it is suggested that in any future studies, the patient should have both the EEG and serum thiopental levels monitored, as these two parameters appear to have different implications for assessment of cerebral function.

ANTICOAGULANT ASSOCIATED INTRACRANIAL HEMORRHAGE

DAVID R. MACDONALD AND CHARLES F. BOLTON
London, Ontario

The contribution of anticoagulation was assessed in a retrospective study of 369 patients who suffered non-traumatic intracranial hemorrhage during a 5 1/2 year period. Twenty-six patients were associated with anticoagulant induced intracranial hemorrhage. Seventeen had intracerebral hemorrhage. Eight had subdural hematomata, and two subarachnoid hemorrhages. There was an intra- cerebral hemorrhage two months after a subdural hematoma. The patients received warfarin, heparin, and 3,9. Indications for anticoagulation included pulmonary embolus in 11 patients, deep vein thrombosis in 2, tension pneumothorax in 2, and other thrombotic disturbances in 3. The duration of anticoagulation ranged from 1 day to 13 years. Nineteen patients had hypertension (BP > 160/90), diabetes (PTT > 2 1/2 control), and 6 had previous cerebrovascular infarction. Seventeen had two or more risk factors. The prognosis was poor: intracerebral hemorrhage - 19/17 died, 3/17 lived with major neurological deficit; subdural hematoma - 2/8 died, 1/8 major deficit; subarachnoid hemorrhage - 3/15 died.

An important consideration in the management of intracranial hemorrhage is the risk of hemorrhage is greater if the patient is hypertensive, has had a cerebral infarct, or is receiving excessive anticoagulant therapy, and intracranial hemorrhage in our series is greater than in previous reports. Probably due to improved detection by computerized tomography brain scans.

INTRAVENOUS BARBITURATES IN COMATOSE HEAD INJURIES: LATE FAILURE TO CONTROL ELEVATED INTRACRANIAL PRESSURE

DAVID W. ROWED, MAHADEV K. SOURI
Toronto, Ontario

Intravenous barbiturates have been shown to effectively decrease raised intracranial pressure when conventional therapy has failed in comatose patients with head injuries. Continuous intracranial pressure monitoring was performed on twenty-six patients with major closed head injuries at Sunnybrook Medical Centre. The last year, utilizing either an intraventricular catheter or a subarachnoid screw. All patients received conventional management which included controlled hyperventilation, a PaCO2 of 25-30 torr, and intravenous dexamethasone and mannitol.

In fifty percent, the intracranial pressure remained elevated at greater than 20 mm Hg. After receiving intravenous barbiturate to orbital portal to maintain barbiturate serum levels of 2.5-4.5 mg%. Ninety-two percent showed an initial stable reduction of intracranial pressure, but effective control of elevated intracranial pressure was maintained in only twenty-four percent of the whole group. In the majority of late failures, the reasons for loss of control were unexpected. In fifteen patients, PaCO2, coincided with loss of control and in one instance, premature reduction of barbiturate dosage may have been causative. Despite the apparent precipitating abnormality, subsequent control intracranial pressure elevation was achieved in only one patient.

CEREBRAL EDEMA IN ACETAMINOPHEN OVERDOSE

W.J. BECKER, R. SUTHERLAND, P.J. MULLER
Calgary, Alberta

A 15 year old girl was admittted after taking 30 grams of Acetaminophen. Her PaCO2 was 15 mm Hg at 8 hours after ingestion. Acetaminophen levels were 165 mg/dl 48 hours after admission she became delirious. 60 hours after admission she was comatose with deep reflexes. Head C.T. scan was normal. Total bilirubin was 5.4 mg/dl, SGPT was 2631 (N<33).

72 hours after admission she was hyperventilating, and her right pupil became fixed and dilated. There had been no hypotension. A right temporal craniectomy was done. On opening the dura, edematous brain under pressure issued forth. Her pupils again became equal and reactive. 12 hours later both pupils became fixed and dilated, with death 24 hours post surgery.

At autopsy, cerebral edema was present, with giall fation and tentorial herniation.

In our patient, severe cerebral edema and increased intracranial pressure were present as proven at craniotomy, and appeared to be the immediate cause of death. Intracranial pressure monitoring would appear indicated in patients with coma from severe acetaminophen overdose. Further studies are needed to determine if barbiturate therapy and possibly surgical decompression can increase survival in acetaminophen overdose when intracranial pressure cannot be controlled by conventional methods, as the liver may be able to regenerate if the patient does not die from CNS causes.

THE RELATIONSHIP OF A FOCAL MOTOR NEUROLOGICAL DEFICIT TO INTELLECTUAL FUNCTION IN EXTERNAL HEAD TRAUMA

B.A. RIDGLEY, BARBARA DIBKIN, M. SCHWARTZ, C.H. TATOR AND D.W. ROWED
Toronto, Ontario

The relationship between external head trauma and cerebral function is of considerable concern to the clinician. In addition, the presence or absence of a neurological deficit and its relationship to severity of intellectual impairment following head injury has been extensively studied. The present study examined the relationship between hemiparesis following head trauma and intellectual function on a standardized test, the Wechsler Adult Intelligence Scale. Three groups of patients, similar in age and education were compared on measures of overall abilities (WAIS Full Scale IQ), verbal (Verbal IQ), visual spatial abilities (Block Design scores), and hemiparesis. Group One consisted of patients with external cerebral trauma and hemiparesis as sequelae; Group Two consisted of patients with external cerebral trauma and no hemiparesis; Group Three consisted of psychotic patients, serving as a control.

The results of the study showed that a group of patients, with head injury obtained significantly lower scores than the control subjects on the Full Scale IQ (p<0.001) Verbal IQ (p<0.02) and Performance IQ (p<0.001). Subjects with hemiparesis (Group One) obtained significantly lower scores than control subjects on both language and visual spatial tasks and significantly lower scores than Group Two on six subtests. Patients without focal motor deficits (Group Two) obtained significantly lower scores than the control group on selected visual spatial subscales.

The implications of this preliminary study are discussed with respect to patient adjustment and therapeutic management. The presence of motor sequelae in patients with head injury should alert the clinician to the increased likelihood of intellectual impairment; however the absence of focal motor signs does not preclude the presence of intellectual deficits.

SPECTRAL ANALYSIS OF THE ELECTROENCEPHALOGRAPHIC RESPONSE TO EXPERIMENTAL CONCLUSION IN THE NON-ANESTHETIZED RAT

M. WEST, D. PARKINSON AND V. HAVLICEK
Winnipeg, Manitoba

This investigation studied the pathophysiology of concussion by recording the electroencephalographic (EEG) response of a conscious rat to a concussive blow administered to 27 Sprague-Dawley rats, previously innomated with chronic epidural EEG electrodes. The blow was administered to the head by a blunt dart, shot from a spring-loaded pistol. The rats were conscious during the blow and acutely anesthetized using one-way analyses of variance and Duncan’s multiple range test. Fifteen rats were concussed to Stage 1-2 that is, transient loss of consciousness without associated autonomic disturbances. Their EEGs were characterized by a decrease in the power spectra of the alpha, beta, and theta frequencies by 25%, 37%, and 10% respectively. The delta spectrum alone was increased, by 15%. These EEG changes were similar in pattern, but less profound than those observed in Stage 3-4 concussion. The EEG power spectra returned to control values within 2 hours of the concussion. These observations support the theory that concussion represents a reversible alteration in cerebral cortical activity, rather than a transient dysfunction of the reticular activating system alone. In fact, previous authors have demonstrated EEG hypersynchrony in response to a lesion in the reticular activating system — a finding directly opposite to the above results. (Supported by the M.R.C.)

NEUROSURGICAL APPLICATIONS OF DOPPLER

M.I. VILAGHY, D.W. ROWED, V.C. HACHIKIAN AND D.W. ROWED
Sunnybrook Medical Centre, Toronto

Two hundred and eight neurosurgical patients were referred for continuous wave cerebrovascular Doppler assessment. The clinical diagnoses were transient ischemic attack, TIAs, recovering ischemic neurological deficit (RIND) or cerebral infarction in 134 patients (64.4%), amaurosis fugax in 33 (15.9%), asymptomatic bruit in 25 (12%) and other in 16 (7.1%). One hundred and six (51%) of the cases were in connection with endarterectomy, 26 (12.5%) with extracranial-intracranial (EC-IC) anastomoses. Cerebral angiography was also performed on 89 patients proving the Doppler examination 59% accurate in the assessment of the cerebral carotid system. On the other hand, 11 (3.5%) of the surgical (or autopsy) specimens were compared with Doppler and angiographic results. The Doppler proved useful in the pre- and post-operative assessment of EC-IC anastomoses to detect existing stenosis function until up to 11 months post-operative in 2 patients. Eleven of 14 patients (78.6%) referred because of incidence of asymptomatic bruits had other cerebral stenotic lesions depicted by Doppler. On the other hand, 11 of patients with postoperative bruits, only 2 (18.2%) demonstrated recurrent stenosis.

Doppler proved useful in the pre- and post-operative evaluation of carotid endarterectomy patients, in assessing patency of EC-IC anastomoses and for following asymptomatic bruits.
INTRACRANIAL VENOUS THROMBOSIS OCCURRING IN EARLY PREGNANCY

A. GUBERMAN, D.A. GUZMAN AND V. MONTPETIT
Ottawa General Hospital

Intracranial venous thrombosis in pregnancy classically occurs in the post-partum period and only rarely in early pregnancy. We wish to report two patients with extensive intracranial venous thrombosis at 6 weeks and 4 months gestation.

A 32-year-old, unaware of her pregnancy, presented with severe headache and vomiting (without dehydration or electrolyte imbalance) followed by Weil-March's aphasis. Ten days later she developed generalized seizures, a right hemiplegia, left leg weakness and coma. Computerized cranial tomography initially showed a left tempoparietal hemorrhagic lesion surrounded by edema and later extensive edema with focal hemmoraghic areas bilaterally, especially parasagittally. Angiography showed the disappearance of previously seen venous structures. Death occurred after 17 days and extensive venous thrombosis with widespread cerebral infarction and edema were found at autopsy.

The second case was a 29-year-old who presented with status epilepticus in the fourth month of gestation. She remained in coma up to and following delivery. The diagnosis was made angiographically.

The diagnosis of intracranial venous thrombosis is facilitated by computerized cranial tomography. The outcome of cases in early pregnancy is less favourable than those presenting post-partum and treatment remains symptomatic.

"ASSESSMENT OF EXPERIMENTAL MICROVASCULAR SURGERY BY SCANNING ELECTRON MICROSCOPY"

G.E. OUAKNINE, G. MOHR AND J. HARDY
Notre-Dame Hospital and University of Montreal

This poster presents the surgical evaluation by scanning electron microscopy (S.E.M.) of various microvascular operations performed in 60 rabbits and 40 rats (9 longitudinal sutures, 11 venous patches, 40 end-to-end anastomoses and 40 end-to-side anastomoses). Vessels were irrigated with heparin solution and various temporary microclips were used. Different needles and threads were compared, among which 10.0, 11.0 and 12.0 nylon threads mounted on various needles (140. 100, 70 and 50 in diameter). The animals were kept alive for varying lengths of time (from 2 hours to 6 weeks). The patency rate of our experiments was slightly above 90%.

The S.E.M. permitted to demonstrate that all varieties of microclips showed alterations of the normal endothelial folds and resulted in an increased apoptosis-like expression of the endothelial cell. The HEPETZ clip showed complete disruption of the endothelial surface, the SCOVILLE clip showed alterations of the normal endothelial folds after mechanical vascular trauma. The best results were obtained with the SCOVILLE clip. The devices tested showed a strong improvement over the interrupted technique.

When facilities for arteriography and invasive vascular surgical procedures are some distance away, the decision to send a patient many miles from home for potentially dangerous investigative and therapy is fraught with uncertainty. The ideal imaging system, "Echflow", is a non-invasive ultrasound technique allowing the practicing physician to distinguish between those patients with obstructive disease of the carotid arteries amenable to surgical intervention and those patients for whom surgery is not indicated.

Our experience over the past 12 months includes over 400 evaluations. We have verified various reports regarding clinical signs in vascular disease, controversies in the interpretation of the results of non-invasive imaging system in patients with cerebral infarction and the subsequent effect on the management of such patients.

CLINICAL APPLICATIONS OF INHALATIONAL XENON 133 FOR THE STUDY OF REGIONAL CEREBRAL BLOOD FLOW

B. WEIR AND D. MENON
Edmonton, Alberta

Our experience with aneurysms, aneurysmata or arteriovenous malformations and carotid occlusive disease as studied by the above method will be presented with pictorial presentations of illustrative cases and tabular summaries of our overall experience. We believe that CBF measurements add a new dimension to the assessment of patients with subarachnoid hemorrhage which may be helpful in the management of such cases.

MICHAEL BOYD, A.R. WATTS, M.W. BOWERING
London, Ontario

We have previously documented an increase incidence of cardiac arrhythmias, elevated serum cardiac enzymes and ischaemic ECG changes in acute stroke patients as compared to controls. We have also noted a rise in plasma catecholamines in acute stroke patients which may be related to the occasional findings of local myocardial lesions in these patients who die acutely.

We have systematically studied cardiac sections in 70 consecutive autopsies, using histochemical methods sensitive to mitochondrial damage. No damage was seen in 5 cases who died instantaneously from violent deaths. However, in 13 of 34 hearts from patients with cerebral lesions, myocardial damage was seen throughout the whole thickness of the left ventricle. These cases included intracerebral hemorrhage and infarction, brain tumors and hemorrhages. Cardiac analyses in 36 patients dying of systemic illnesses only 8 showed similar transmural enzymatic changes.

However, some evidence suggests that elevated plasma catecholamines may be related to the areas of focal myocardial damage seen in patients.

COMPUTED MAPPING OF ELECTROENCEPHALOGRAM (CME) IN CEREBRAL INFARCTION: COMPARATIVE STUDY WITH CT AND REGIONAL CEREBRAL BLOOD FLOW

K. NAGATA, G. ARAKI, M. MIIZUKAMI AND T. KAWASE
Mihara Memorial Hospital, Japan

Computed mapping of electroencephalogram (EEG) is a newly developed microcomputer system to display equipotential maps of the head in real-time. The system is capable of giving topographic EEG map over each frequency band on color television. This new device was employed for the first time in comparing clinical symptoms and EEG findings of focal myocardial lesions in these patients who die acutely.

We have previously documented an increase incidence of cardiac arrhythmias, elevated serum cardiac enzymes and ischaemic ECG changes in acute stroke patients as compared to controls. We have also noted a rise in plasma catecholamines in acute stroke patients which may be related to the occasional findings of local myocardial lesions in these patients who die acutely.

MONITORING REQUIREMENTS DURING CAROTID ENDARTERECTOMY

MICHAEL BOYD, A.R. WATTS, M.W. BOWERING
Regina, Saskatchewan

Concern for the possibility of shunts causing emboli or ischaemia led to a progression of intra-operative monitoring proce-
improved platelet function during Sorbiclear hemodialysis, no clearance of middle molecule plasma fractions, platelet function contains a two layered membrane of cellulose and activated dialyzer, or hemodialysis by a Sorbiclear dialyzer. The latter crossover design, we tested this hypothesis on 12 patients, 9 abnormalities in proximal nerve function in patients with arteriovenous malformation and other abnormalities in cerebral blood flow. The seven patients who were clinically abnormal, the distal motor nerve conduction was abnormal in six, and the proximal conduction was abnormal in four. These had greater proximal than distal slowing. One patient out of sixteen had normal conduction in spite of a severe sensory ataxia.

These results confirm the diffuse distribution of the lesions in idiopathic chronic relapsing polyneuropathy, often with a greater proximal involvement. F wave determinations show definite abnormalities in proximal nerve function in patients with idiopathic chronic relapsing polyneuropathy who are clinically normal and have normal, or borderline distal nerve function.

MIDDLE MOLECULE CLEARANCE IN UREMIA: EFFECTS ON PERIPHERAL NERVE CONDUCTION AND PLATELET FUNCTION

C.F. BOLTON, K.M. CARTER, R.M. LINDSAY W.F. CLARK, A.L. LINTON

Several investigators have suggested that toxins of "mold" as opposed to smaller, molecular size may be responsible for polyneuropathy and other complications of uremia. Using a crossover design, we tested this hypothesis on 12 patients, 9 having polyneuropathy. A baseline period of observation established that the control values were similar. At two-monthly intervals for six months, each group was alternated between either conventional hemodialysis or a Homocline dialyzer, or hemodialysis by a Sorbiclear dialyzer. The latter contains a two layered membrane of cellulose and activated charcoal designed to clean middle molecules. At the beginning and end of each two-month period the patients were tested for clearance of middle molecule plasma fractions, platelet function (bleeding time, platelet count and platelet aggregation), and nerve conduction. A single 0.5 mm segment of peripheral nerve (in a 200 microlitre wet culture) induces a neurite outgrowth response from sensory neurons that is greater than the response seen with concentrations of NGF that promote neurite outgrowth. This response can be inhibited by approximately 10% upon cocultivation with antibody to purified NGF at concentrations that produce 100% of the response seen with NGF-induced neurite outgrowth. Ligation of the nerve in vivo results in a rapid decrease of neurite outgrowth promoting activity proximal to the ligature. Spinal neurons from 7 day embryos have been established in culture in a defined serum-free medium. In this setting, adult mouse peripheral nerve segments cause a quantitative enhancement of neurite outgrowth.

PERIPHERAL NERVE SEGMENTS PROMOTE NEURITE OUTGROWTH FROM EMBRYONIC SENSORY AND SPINAL CORD NEURONS IN VITRO

R.J. RIOPELLE, R.J. BOEGMAN, D.A. CAMERON

Kingston, Ontario

Single cell cultures of neurons from 7 and 8 day chick embryo dorsal root ganglia and spinal cord have been established and used to detect the presence of factors from peripheral nerve segments of adult mice that promote neurite outgrowth. In the absence of NGF, 8 day sensory neurons show little or no neurite outgrowth, while those cultured in the presence of NGF that are transported to sensory and spinal cord neuronal cell bodies from the periphery and act to maintain the functional integrity of these nerves.

* supported by Natural Sciences and Engineering Research Council of Canada
** supported by Muscular Dystrophy Foundation
*** supported by Medical Research Council of Canada Summer Studentship

EVALUATION OF RADICULOPATHIES AND PLEXOPATHIES USING SEGMENTAL SENSORY STIMULATION

ANDREW EISEN, GEORGE ELEKLER

Montreal, P.Q.

Available electrophysiological methods have been diagnostically disappointing for evaluating radiculopathies and plexopathies. Poor specificity of segmental stimulation and difficulty in recording from proximal structures being the main problems. Recording somatosensory responses (SEP's) should be potentially useful in these cases. Although segmental evoked, multisegmental stimulation is utilized. In this study, we evoked SEP's by stimulation of different sensory nerves each subserving one or at most two segmental levels. The following sites were stimulated: thumb (median, C9); index digit (ulnar, C9); ventral lateral forearm (musculocutaneous, C8); and the following sensory nerves at the ankle - saphenous (L5-S1); superficial peroneal (L4); sural (S). Sensory nerve action potentials (SNAP's) were simultaneously recorded at the elbow and knee following stimulation of upper and lower extremity nerves respectively. This allowed assessment of more distal parts of the peripheral nervous system. The first, the initial cortical event of SEP's evoked by upper limb stimulation measured (msec) 22.2 ± 1.2 (N = 33), 22.5 ± 1.1 (N = 32), and 17.4 ± 1.2 (N = 24) for each stimulation site respectively. "P2", the equivalent peak evoked by upper limb stimulation measured (msec) 43.4 ± 2.2 (N = 20); 39.8 ± 1.6 (N = 20) and 42.1 ± 1.4 (N = 20) for each nerve stimulated. Twelve patients were studied with myelographically proven radiculopathies due to disc disease, six of whom had operative confirmation of their lesion. In each case, the SEP's evoked by stimulation of an appropriate segmental level(s) showed evidence of slowed conduction and/or block in conduction. In 5 other patients with brachial radiculopatia, the presence of identical vacuoles in each instance, in order to test the specificity of this observation, we have further studied 7 biopsies from a variety of pathological conditions and an equal.
number of “normal” biopsies where no structural changes were present at either the light or electron microscopic levels to indicate a pathological basis.

We conclude that this vacuolar change is not specific for Creutzfeldt-Jakob disease. Idiopathic changes are also present in Alzheimer’s disease, though much less frequently, and in Creutzfeld-Jakob disease. Identical changes are also present in Huntington’s disease and in patients with a variety of diffuse neurodegenerative diseases.

Failure of the SEPs to return to normal in the presence of abnormalities in cortical and subcortical potentials suggests that the abnormalities are central. The cortical somatosensory evoked potential (SEP) is used predominantly as a useful adjunct in the diagnosis of acute spinal cord injuries. The SEP is absent in patients with complete motor and sensory loss below the level of spinal cord injury. With partial spinal cord injuries in potential, a positive peak at about 28 msec discriminates well between patients who ultimately show neurologic recovery and those who do not.

Having observed the SEPs in well over 100 spinal cord injured patients we conclude that this technique has prognostic utility because recovery of the SEP can precede major clinical improvements.

CEREBROSPINAL FLUID (CSF) CATALASE IN MULTIPLE SCLEROSIS

W. SHEREMATA, A. SAZANT AND E. PARRIS
University of Miami

Phagocytes are common present in central nervous system (CNS) lesions in many diseases; thus implicating free radical production in the pathology. Tissue damage by these cells may be produced by the toxic free radical superoxide, a molecular form of oxygen and superoxide. The enzy- mase superoxide dismutase (SOD) removes superoxide, but its toxic reaction product — H2O2 must be removed by catalase. Low levels of catalase could lead to increased tissue damage or increased levels might follow induction by high SOD activity. As SOD would probably reflect such activity, therefore we examined fluid from 25 multiple sclerosis and 25 other patients with CNS disease. The timed disc floculation technique developed by Gagnon was used with bovine liver catalase (Pharmacia) standards. Fresh 3% H2O2 (Pharmacia) was stabilized with EDTA. All test specimens were examined con- currantly with standard dilutions. Multiple Sclerosis CSF gave a mean of 18 ± 4 U/dl, while normals gave a mean of 11 ± 2 U/dl. Chronic degenerative CNS disease gave a mean of 9 ± 2 U/dl. In patients with exacerbation gave values significantly greater than those with chronic progressive or stable disease. Multiple sclerosis does not appear to be due to abnormally small amounts of catalase.

Lissencephaly: Three Cases Diagnosed by CT Scan

S. HOROWITZ, B. ROSENBLATT AND G. O’GORMAN
Montreal Children’s Hospital
A. LABRISSEAU
St. Justin’s Hospital

Lissencephaly is a rare congenital malformation of the brain whereby it never develops convolutional markings, remaining smooth as in a twenty week fetus.

Up until 1978 about thirty cases were reported in the litera- ture, all diagnosed at autopsy with retrospective clinical analy- sis. Pathologic findings included various degrees of pachygyria or agyria, with associated cerebral anomalies. Microscopically, heterotopic nests of grey matter were found in the submen- dyma which gave rise to the theory that the basic defect was an abnormal migration of neuroblasts in fetal life. Several studies show convincing evidence for a genetic origin of this defect, while others present isolated examples.

We recently observed three patients with the lissencephaly syndrome. However, through the use of the CT scanning we were able to make the diagnosis in life, and thus have the oppor­ tunity of monitoring the course as it evolves. We wish to discuss these children in detail with reference to the pathological and clinical features that have been described in the literature, and to show the CT scans. These patients illustrate the spectrum of the syndrome of pachygyria-agyria providing fuel for speculation as to the etiology of this aberration of development.

Hereditary Demyelinating Infantile Neuropathy with Unusual Clinical and Pathological Findings

A.F.G. HAHN, J.J. GILBERT, G. HINTON
London, Ontario

A disease expressed as a primary Schwann cell abnormally akin to but different from Dejerine-Sottas neuropathy is presen­ ted.

S.B., age 12, showed nystagmus, slow motor development and progressive gait and limb ataxia since early infancy. He de­ veloped pes cavus and a progressive distal lower limb weakness. Reflexes became absent. Vibration sense was de­ creased distally and pseudoatrophy movements were ob-
served. Peripheral nerves were not enlarged. Progressive partial external ophthalmoplegia was noted and mild sensory neural hearing loss was documented. No evoked motor or sensory action potentials were recordable with surface electrodes at age 3.

Needle electrode study showed no active denervation. Recorded action potentials were small and dispersed, estimated MNCV 3.5 m/second SF protein 77 mg/ml.

Father, age 42, had slowed motor development, pes cavus and slowly progressive distal atrophy and weakness. MNCV was 15 m/second in the upper limbs and unrecordable in the lower limbs; sensory potentials were absent.

Sural nerve biopsy showed teased fibers to be totally or partially demyelinated along 80% of their lengths. Oligodendroglial myelin lamellae were noted in every fiber scattered at random. Onion bulbs were formed by concentrically arranged double layered basement membranes. Axonal loss was minimal.

An abnormality of axon-Schwann cell interaction and a failure of myelination appears to form the basis of this disorder.

**SPINAL CORD SWELLING IN MULTIPLE SCLEROSIS**

THOMAS E. FEASBY, GEORGE C. EBERS

In subacutely progressive spinal paraparesis, myelography is commonly used to differentiate inflammatory myelitis from external cord compression and intrinsic cord neoplasms. In 3 women, aged 35, 37, and 48, subacute spinal cord syndromes with paraparesis and a sensory level evolved over 10 to 40 days.

Myelography was performed because of the clinical suspicion of spinal-cord widening. Widening of the cord, similar to that seen in intramedullary tumour, was seen in the upper thoracic cord in two patients and in the mid-cervical cord in one. However, CSF protein electrophoresis showed oligoclonal IgG banding in each case. This suggests that the subsequent clinical course confirmed a diagnosis of multiple sclerosis (MS) in all three patients. Repeat myelography after 21 days in one case showed a reduction in cord swelling.

Two of our patients had myelography with water-soluble contrast medium which may facilitate demonstration of minor cord swelling associated with MS which might otherwise be missed on myelography. These results demonstrate that spinal-cord enlargement may be seen in MS. This observation is of special importance in evaluating myelographic findings in subacute spinal cord swelling. It underlines the importance of alternate diagnostic techniques, particularly the CSF protein electrophoresis, for a correct diagnosis and avoidance of surgical intervention in demyelinating myopathies.

**SPINAL CORD INJURED PATIENTS**

W.J. BECKER, T.P. SELAND, G.R. WEST, K.M. HOYTE

Calgary, Alberta

Pattern visual evoked responses (VERs) and auditory brainstem responses (ABRs) were studied in 26 patients aged 18 to 63 with a clinical diagnosis of spinal cord demyelination. All patients had symptoms and signs suggestive of disease above the foramen magnum. Almost all had had myelography. Duration of symptoms ranged from 1 month to 13 years. 5 patients had had symptoms for less than 1 year.

For VERs, positive peak latency and inter-eye latency differences were measured. For ABRs, wave I, III, V, and I-V intervals were measured, as well as inter-ear differences for these intervals. All values were compared to our normal control group (N = 35).

Using 3 standard deviations (SD) above the normal mean as the upper limit of normal, VERs were abnormal in 17 patients, and ABRs in 13. ABRs were abnormal in 3 patients with normal VERs. Only 6 patients were normal on both tests.

Using 2 SD above the normal mean, VERs were abnormal in 20, and ABRs in 18. Only two patients were normal on both tests.

These results are compared with a second group of 20 patients with predominantly spinal cord demyelination but with some clinical features suggestive of disease above the foramen magnum. VER and ABR testing is a useful investigation in patients with demyelinating disease affecting predominantly the spinal cord.

**FAVOURABLE RESULTS WITH THE SYRINGO-SUBARACHNOID SHUNT FOR THE TREATMENT OF SYRINGOMYELIA**

KOTO MEGURU, C.H. TATOR, D.W. RÖDE

Toronto, Ontario

There is still considerable controversy about the indications for surgery and the method of surgical treatment of syringomyelia. During the past six years, 18 patients with syringomyelia were treated by a syringo-subarachnoid shunt. The principal indications for this procedure were significant and continuing neurological deterioration during the preceding six months and absent or minimal evidence of tonsillar ectopia. There were 14 patients with diaphragmatic syringomyelia, three with post-traumatic syringomyelia, one with spinal arachnoiditis and one with a spinal arachnoidal cyst. The operations were performed in the sitting and prone positions and a fascial flap was directed to protect the arachnoidal membrane to ensure proper placement of the distal end of the shunt in an intact subarachnoidal space. Another, more uncommon, approach was into the syrinx through a posterior medullary myelotomy in most instances.

The average follow-up was four years. A favourable result was obtained in 14 of 19 patients (73%), including an excellent result with improvement of neurological deficit in 11 patients and a good result in three patients. One patient had an initial good result.

There was a poor result with further progression in five patients. A short duration of preoperative symptoms was usually a good prognostic sign. Four patients with a history of less than six months all had excellent results. Eleven patients had only the shunt procedure, and all had good or excellent results. Eight patients had other surgical procedures, before, accompanying, or after the shunt, and three had favourable results.

Thus, syringo-subarachnoid shunt is an effective modality of treatment for syringomyelia particularly if no major tonsillar herniation is present.

**THE RELATIONSHIP BETWEEN CORD INJURY, SPINAL COLUMN INJURY AND RECOVERY IN 358 SPINAL CORD INJURED PATIENTS**

CHARLES H. TATOR, VIRGINIA E. EDMONDS, DAVID F. ANDREWS

Toronto, Ontario

The management of acute spinal cord injured patients is made difficult because of the multitude of possible combinations of types of spinal cord injury and types of spinal column injury. There have been, in the past few years, which have attempted to determine if there are any consistent patterns of relationship between the cord and the vertebral injuries and recovery. Diagnosis of the injuries in the acute stage might be improved by a knowledge of the frequencies with which certain types of neurological and vertebral injuries might also be facilitated. This study is based on a computerized analysis of the records of 358 patients managed between 1948 and 1973.

It was noted that patients who had produced more complete cord injuries and a higher incidence of death than other types of injuries, while those with compression fractures had a lower incidence of death and lower complete cord injuries. There was an effect of level of injury on completeness with thoracic injuries tending to be more complete. Level of injury had no effect on recovery. The presence and severity of distraction also affected the degree of neurological deficit on admission. The absence of failures at all, the type and level of bony injury were not related to the cause of the injury. Failure at home produced more compression fractures and more thoraco-lumbar injuries than traffic, sports-recreational or work-related causes of cord injury.

**AN EVALUATION OF SILASTIC SHEATHING IN NEUROLYSIS OF THE ULNAR NERVE**

B.G. BENOFI, D.N. PRESTON and V. DA SILVA

Ottawa Civic Hospital

The variety of procedures designed to relieve entrapment of the ulnar nerve at the elbow, attest to their obviousness. This study was designed to evaluate the influence of silastic sheathing of the ulnar nerve with silastic, following a means of modifying the effects of recurrent scar formation.

A total of 43 procedures were performed on 39 patients, four of which were re-explorations. All cases were graded according to a weighted scoring system utilizing the clinical evaluation of sensory and motor function, but with a major emphasis on electrophysiological testing. The patients were then re-assessed using the same parameters, from one to five years after surgery.

Thirty-four (79%) were improved, 6 (14%) remained unchanged and 3 (7%) had deteriorated. Two of the latter were re-explored and new adhesions were found at the ends of the silastic sheath. Most of those who remained unchanged, suffered from an advanced neuropathy or had a metabolic predisposition towards entrapment.

It is concluded that simple nerve grafts, without transposition, combined with silastic sheathing of the nerve, compares favourably with other techniques for primary entrapment.

**256 HZ VIBRATION IN THE CARPAL TUNNEL SYNDROME**

J. DALTON and D.N. PRESTON

Ottawa Civic Hospital

To investigate the observation that testing of 256 Hz vibration sense is valuable in assessment of peripheral nerve dysfunc­tion, we analyzed 120 consecutive patients referred to an electrophysiological laboratory with carpal tunnel syndrome. The clinical signs were evaluated and compared with distal sensory and motor latencies of the median and ulnar nerves. Vibration sense was tested with a 256 Hz tuning fork and considered abnormal if vibration, sensed by the examiner through the patient’s fingers, was not sensed by the patient in patients under age 65. In patients over 65, a selective impairment of vibration in the first three digits of an involved hand was considered abnormal.

Impaired vibration in the first three digits was present in 75% of the whole group. Impairment of vibration was the most common sensory defect noted clinically and exceeded impairments of touch, pain, and 2-point discrimination. No patient had motor signs without sensory findings. Only 16% were normal on clinical examination. The impaired vibration group had a mean distal sensory latency in the involved median nerve 5.5 - 1.7 mseconds, compared to 4.6 - 0.9 mseconds for the others (P < 0.005).

It is concluded that contemporary concepts, careful 256 Hz vibration testing is useful in the evaluation of a suspected carpal tunnel syndrome.

**THE RELATIONSHIP BETWEEN LOCAL PENCILIN SPIKES AND SPINDLES IN CERVEAU ISOLE CATS**

R.S. MCCLACHLAN, M. KAIBARA AND J.P. GRVIN

University Hospital, London, Ontario

Gloor and others have suggested that generalized spike dis­charges induced by Pencilcin are closely related to spindles. They studied the relationship between focal cortical spikes induced by topical Pencilcin and spontaneous spindles of the Caraveau Isole preparation in cats. A significant association between spikes and spindles occurred in 23 out of 27 foci. Immediately after es­tablishment of the focus, spikes were independent of or poorly associated with spindles, but the relationship between the two wave forms gradually increased with time. In 11 foci, after a lat­ent period of 1 to 40 minutes, spikes occurred only during a spindle, i.e. 100% association, and the relationship between the two waves occurred after establishment of the epileptic focus.

The morphologic relationship of the focal spike discharge to the spontaneous spindle was associated with a 100% association and will be presented. These findings will be discussed with respect to the thalamicocortical interaction in the production of local Pencilcin spikes.
PERIPHERAL NEUROPATHIES IN CHILDHOOD

H.G. DUNN
University of British Columbia

In children, electrodiagnostic studies are required more often to aid in the diagnosis of polymyopathies than in the investigation of isolated nerve lesions. The author has tested 126 children with polymyopathies as compared to only 35 with mononeuropathies due to trauma or entrapment (excluding facial palsies). The former may be grouped as follows -

Genetic
- hypotrophic type of Charcot-Marie-Tooth disease 20
- Friedreich's ataxia 15
- Krabbe's leukodystrophy 6
- metachromatic leukodystrophy 4
- ataxia-telangiectasia 9
- hereditary sensory neuropathies 3
- others, e.g. mucopolysaccharidoses 7

Metabolic
- hypothyroidism 6
- diabetes mellitus 3
- chronic renal failure 2

Inflammatory
- Guillain-Barré syndrome 16
- others, e.g. diphtheria, post-measles 4

Nutritional
- coeliac disease 1

Toxic
- vincristine 11
- diphenhydantion 7

Cryptogenic
- chronic sensor-motor neuropathy 9
- others, e.g. dystyremyelination 5

These polymyopathies may now be divided into axonal (e.g. in Friedreich's ataxia) and demyelinating (e.g. in leukodystrophies, diphtheria). Electrical studies may assist in the diagnosis and management of the underlying disease. Even in some seemingly more localized lesions like neuralgic amyotrophy (paralytic brachial neuritis) conduction studies and electromyography may demonstrate more widespread affection of peripheral nerves. Some practical aspects of conduction studies will be discussed.

DERMATOLYPHIC ALTERATIONS ARE A SUBTLE INDICATOR OF ANTICONVULSANT EFFECT ON THE FETUS

E. ANDERMANN, A. SHERWIN, F. ANDERMANN AND L. DANSKY
Montreal Neurological Hospital

P. LOUGHAHAN
Royal Children's Hospital, Melbourne

Gestational exposure to anticonvulsant medication has been associated with an increased risk of major congenital anomalies, dysmorphic craniofacial features, and digital defects. A clinical investigation of children of epileptic women was designed to assess the risk of minor congenital abnormalities in relation to the presence of major congenital malformations and maternal use of anticonvulsant medication during pregnancy.

To date, 72 children ascertainment retrospectively and prospectively have been examined. Phenobarbital was the first anticonvulsant medication used in two of these children, but the association was based on cross-sectional studies. In all other instances, phenobarbital was used in combination with valproic acid, carbamazepine or phenytoin. These women had a history of epilepsy since childbearing age and all had a history of recurrent seizures for at least 5 years, or earlier in the case of earlier histories of epilepsy.

In 1:11 gestations with a one month history of a rapidly evolving polyneuropathy. This was supported by evidence of an increased CSF protein (97%), nerve conduction studies and a sensory-motor disturbance of the upper and lower limbs.

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AN UNUSUAL CASE OF ACUTE INFLAMMATORY POLYNEUROPATHY — THE ROLE OF PREGNANCY, RHESUS IMMUNE GLOBULIN, AND PLASMAFERESIS

H. ABDOULLAH, D.C.N. HOWSE, A.R. GILES AND R.J. RIOPPELLE
Kingston, Ontario

A 27-year-old G4P3 female presented at 38 weeks of gestation with a one month history of a rapidly evolving sensory-motor disturbance of the upper and lower limbs consistent with a diagnosis of acute inflammatory polyneuropathy. This was supported by evidence of an increased CSF protein (57%), nerve conduction studies and a sural nerve biopsy.

Four weeks prior to the development of the neuropathy, the patient had received 300 mg of rhessus immune globulin (PhoD Immune Globulin — Connaught). A small group of patients is known to develop this disorder in association with recent vaccinations. The patient reported no history of recent vaccinations.

The association following the administration of anti-D globulin has not been previously reported.

The association with pregnancy is believed to be coincidental and in a few previously reported cases, delivery has appeared to have a beneficial effect on the course of the disease. However, in our patient, within 48 hours of delivery (7 weeks following onset) a rapid deterioration in neuromotor function occurred with the development of bilateral leg weakness, facial weakness, dysphagia, and bulbar palsy. The CSF protein became 226 mg/L.

The patient was treated with steroids (prednisone 80 mg per day). Ten days following the acute deterioration, she was treated with four units of plasma exchange. This latter treatment was associated with subjective and objective improvement. Following the fourth exchange she had recovered close to her pre-delivery status. Her subsequent course has been that of continuing recovery.

DERMATOLYPHIC ALTERATIONS ARE A SUBTLE INDICATOR OF ANTICONVULSANT EFFECT ON THE FETUS

E. ANDERMANN, A. SHERWIN, F. ANDERMANN AND L. DANSKY
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INFLAMMATORY POLYNEUROPATHY — THE ROLE OF PREGNANCY, RHESUS IMMUNE GLOBULIN, AND PLASMAFERESIS

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SURGICAL AND ELECTRONIC INSTRUMENTATION FOR THE FUNCTIONAL EXPLORATION OF EPILEPSY

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Hôpital Notre-Dame, Montreal

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Université Laval, Québec

In the clinical use of BAEP, one is commonly faced with abnormal waveforms which change character on repeating the test. Since many artifacts ("noise") can distort BAEP morphology, it is important to guard against making a false positive diagnosis on this basis. This requires knowledge of the noise content.

A simple method is described which allows on-line statistical estimation of the "noise", and objective classification of the scalp or from the depth with chronic deep electrodes has al-

lowed for a better definition of the epileptogenic zone. The suc-
cess of surgery depends directly on the precise localisation of this zone.

In order to achieve this goal, a new stereoelectrode frame was developed to introduce precisely and safely many small flexible electrodes having from 5 to 15 contacts. An attachment for this frame was also built to introduce electrodes in direction not nec-

essarily in the AP or lateral projections. It is desirable to pick up all the available data (up to 130 separa-
test signals) and to shorten the duration of monitoring. A 32 channel prototype was designed and built recording the electrical signals on the videotape which also record the behav-

or of the patient.

The availability of the SEEG signals on a videotape will allow repeated analysis using different strategies. We will be demonstrating surgical instruments and techniques and the equipment electronically.
ABERRANT WAVE FORMS TO PATTERNS REVERSAL STIMULATION: ELECTROPHYSIOLOGICAL SIGNIFICANCE AND ELECTROGRAPHIC “SOLUTIONS”

D.C. JONES, W.T. BLUME
London, Ontario

Although a delay in appearance of the major electrophysiological abnormalities by patient stimulation correlates reliably with anterior visual system lesions such as optic neuritis, the test becomes clinically valueless when more than one potential can be plausibly identified as (P2). This phenomenon, which we have termed an aberrant wave form (AWF), occurred in 20% of our patient population.

The AWFs occur in 34 normal controls, 40% of patients with AWFS and for at least one eye had definite MS, an additional 28% had questionable MS, while the remaining had chronic myelopathy or other central nervous system disease. These findings did not depend on whether the possible (P2) peaks were delayed or not. Similar percentages occurred among pa­

patients in whom the (P2) peak for at least one eye was clearly de­

fined but delayed. In contrast, among patients with a normal PVER response in each eye, MS occurred in 10% and question­

able MS in an additional 33%.

We conclude that an aberrant wave form as above defined car­

ries a similar clinical significance as a normally formed but delayed (P2) peak. Herit-field stimulation is the best method of dis­

cving which of several peaks evoked by full-field stimuli is the “true” (P2).
in 105 consecutive cases. An internal shunt was used only three times. Three of the 105 patients had a new deficit post-operatively. In every instance the deficit was transient.

In 64 cases continuous EEG intra-operative EEG recordings were available. An internal shunt was not used in any of these patients. One (third (23 64) showed significant EEG changes during cross-clamping. In two patients a minor post-operative deficit occurred; in neither of whom there was an EEG change. In 18 patients measurements of cerebral blood flow (CBF) and indexes of cerebrovascular reserves were made. In six patients with a significant EEG change, CBF fell an average of 39% during clamping; while in 12 patients without a significant EEG change, the fall was 17%. In general, changes in stump pressures paralleled the changes in CBF.

Our results demonstrate that major EEG changes, and profound reductions in flow as low as 14 ml 100 gmin in one case) may occur during carotid endarterectomy without any new post-operative deficit occurring. These observations support our view that an internal shunt is rarely, if ever, necessary during carotid endarterectomy.

THE INFLUENCE OF THE HISTOCHEMICAL PROFILE OF MUSCLE ON THE IN VITRO CAFFEINE CONTRACTURE TEST

A.W. BROWNELL, M. SZABO
Calgary, Alta.

In vitro contracture tests on skeletal muscle are recognized as the most sensitive method of detecting the presence of individual axons for malignant hyperthermia (MH). Several factors are known to influence the outcome of these tests. These include the temperature at which the test was carried out and the concentration of any drug which might influence the contracture test. The present study describes the effect of the histochromic profile of the biopsy specimen on the results of in vitro caffeine contracture tests in patients at risk for MH.

RETRINAL NERVE FIBRE ATROPHY IN COMPRESSION OF THE CHIASM
A PROGNOSTIC SIGN

OWEN B. WHITE AND JAMES A. SHARPE
Toronto, Ontario

Recovery of vision after chiasmal decompression cannot be predicted reliably from the nature of the lesion or the duration or pattern of visual loss. Atrophy of the retinal nerve fibre layer (NFL) can be detected by direct ophthalmoscopy using red-free illumination when the optic disc appears normal. We describe the correlation of visual fields loss and characteristic histochemical signs of diffuse or hemiopic retinal NFL atrophy before and after treatment of compressive lesions of the optic chiasm.

Discrete areas of NFL atrophy were performed in ten patients who presented with visual field defects documented by kinetic perimetry and tangent screen examination. Serial visual fields and follow-up periods of one to five years (mean 2.2 years) after surgery.

THE DESIGN AND EVALUATION OF A PROBLEM BASED LEARNING APPROACH IN UNDERGRADUATE NEUROLOGY
H. BARRROWS
Hamilton, Ontario

Problem based learning requires the student to learn while attempting to evaluate and understand neurological disease problems. The student is taught to apply the hypothetico-deductive logic of the clinician to determine the anatomical, physiological, biochemical, psychological, pathological processes responsible. Guided by faculty in this process the student develops the concepts in basic neuroscience and clinical neurology that must be learned through self-study to understand neurological disease and the nervous system in general. Following self-study from a wide variety of resources, the knowledge and skills acquired are applied back to each problem undertaken. Advantages of this approach include: 1) acquisition of problem solving (clinical reasoning) skills, 2) integration of learning through reuse in subsequent problems. 5) reinforcement of learning through re-use in subsequent problems, 5) perceived relevance of learning, 6) high motivation for learning through active participation in the problem-solving process.

This paper will describe 1) criteria for problem selection, 2) design of problem formats, 3) structure of problem based learning and, 4) faculty skills required.

AN EVALUATION OF: 1) student acceptance, 2) teacher acceptance and, 3) student learning relevant to the advantages described in a recurrent six week block in neuroscience, a subfield of Phase III McMaster’s curriculum will be presented.

CLINICAL VALUE OF THE CORNEOMANDIBULAR REFLEX
A. GUBERMAN
Ottawa General Hospital

Although the corneomandibular reflex has been recognized since 1902, its significance remains unknown. The reflex, consisting of a corneal stimulus (concurrent or contralateral) following a brisk corneal stimulation, was found in 40 cases out of several hundred representative neurological patients examined over several years.

The reflex was unilateral in 14/40, bilateral but asymmetrical in 14/40 and bilaterally symmetrical in 15/40. Twenty-nine of 40 patients were stuporous or comatose.

The reflex was seen in 3 patients without evidence of neurological disease: in 1 patient with motor neuron disease in 16 patients with unilateral hemispheric lesions where it was usually contralateral to the lesion and often associated with elevated intracranial pressure (13 16); in 2 patients with acute bilateral hemispheric lesions; in 7 patients with intrinsic upper brainstem lesions and in 11 cases with diffuse (usually encephalitic) metabolic disturbances.

In the comatose or stuporous patient the corneomandibular reflex tended to suggest an intrinsic brainstem lesion or a hemispheric lesion with extracranial distortion and secondary brainstem distortion. It was also useful for following the evolution of the depth of coma. In the alert patient the reflex correlated best with reflex or rapid interruption of supranuclear pathways to the trigeminal nerve nucleus.

POST-OPERATIVE SYMPTOMS IN UNRECOGNIZED MALIGNANT HYPERTERMIA (M.H.) REACTIONS
A.S. GORDON AND B. BRITT
Toronto, Ontario

Patients who survived documented intra-operative M.H. reactions often complain of muscle cramps or cramps of the muscles of mastication which are the result of the period of muscular rigidity and acidosis that occurs during the peri-operative period. Twenty-eight of 40 patients were stuporous or comatose. Careful anesthetic histories of probands were obtained and, in 26 patients from carotid stumps. Data is totally lacking about prognosis in these patients. In some from carotid stumps. Data is totally lacking about prognosis in these patients. The natural history in patients with these conditions and evidence of TIA or partial stroke is not known in more than a fragmentary way. From the evidence available, two to ten percent of occluded carotid arteries will have stroke each year after the occlusion, mostly embolic from alternate carotid channels, some from carotid stumps. Data is totally lacking about prognosis for inaccessible carotid artery stenosis and middle cerebral occlusion. Middle cerebral stenosis by best available evidence has a 2% per year risk of stroke. These imperfect figures cannot be used to predict any evolution of the bypass.
The challenge and responsibility of Medical Education is one of which we are all a product and in which many of us are active participants. Medical Education in the developing world is even a much greater challenge. Many simple or complicated solutions to the problems of medical education in this developing world have been tried but have resulted in an incredible "Brain Drain" towards the developed world with adverse effects on the sending country. North American man power saturation and government awareness of this has resulted in immigration policies which will make it difficult or prohibitive for perspective candidates in medical education. Consequently, we needed to take a fresh look at involvement in International Education and development.

The theory of Gardner relates to the development of synomygia-cerebro spinal fluid pressure transmission between the fourth ventricle and the central canal of the spinal cord. This explanation is not adequate for all categories of synomygia especially the non-communicating varieties (e.g. spinal arachnoids and post-traumatic). Alternative theories include abnormal CSF passage through the cord substance via Virchow-Robins spaces or a result of depiction of CSF by glial cells lining the cavities. While most neuroradiological assessment has been anatomic, i.e. evaluation of cord entailment and confirmation of the presence of cysts, the advent of water soluble contrast media and CT allows a more dynamic study of CSF pathways in synomygia. Five cases of synomygia, four of which were post-traumatic, are presented showing metrizamide taken up in the cord by five or six hours following metrizamide myelography. Three of these, on myelography, showed small cords, that would otherwise be called atrophic. This appears to confirm the theory of subarachnoid fluid passage through the spinal cord between a syrinx and the surrounding subarachnoid space. This also may be the most definitive way of confirming the presence and extent of the syrinx.

**DIAGNOSIS IN FAMILIES WITH ALZHEIMER'S DISEASE**

S.J. Rothman, A. Heyman, B. Hurwitz, M. Rozear
Durham, N.C.

Neuropathologic changes identical to those seen in Alzheimer's Disease develop in almost all patients with Down's Syndrome after the third decade of age. Clinical manifestations of Alzheimer's Disease develop in almost all patients with Down's Syndrome. Thus, within three generations of one sibship, one affected case was found in the index case. In family one, the index case was a 57 year old woman with Alzheimer's Disease, the seventh of eight children. That sibship included two sisters with Down's Syndrome. This sibship was selected for study as the index case had Down's Syndrome and 51 years of age, a much greater challenge.

**CEREBRAL PHOSPHOLIPIDOSIS EXPERIMENTALLY-INDUCED WITH CHLORPHENTERMINE**

J.R. Wherrett
S. Huterer, M. Khan and N.B. Newcastle
University of Toronto

An increasing number of neuroleptic drugs have been found to cause a systemic lipidosis in animals morphologically similar to the Niemann-Pick syndromes. These experimental phospholipidoses could provide conversion models in which to analyze pathophysiological disturbances in cerebral storage disorders. Here we describe morphological and lipid changes in brain and other tissues of rats that had received the anesthetic drug chlorphentermine (chlorphentermine), 25, 50 and 100 mg/kg intraperitoneally, 5 times weekly for 3 weeks. Electron microscopy confirmed the formation of intracellular lipid cytoplasm in lung and liver and in cerebral neurons after exposure to the drug. Glucose analysis of lung, liver, spleen and brain revealed variable alterations in organ weight, lipid and phospholipid content. In all tissues there was an increase in the lysosomal-specific phospholipid, bis-(mono-acylglycerol)-phosphate ranging from 4-fold in brain to 4-fold in lung. This phospholipid is thought to play an important role in the lysosomal metabolism of fatty acids and is known to accumulate in human Niemann-Pick syndromes. In this study we have shown that neuronal lipidosis may be induced readily in vivo by a neuroleptic drug and is accompanied by a disturbance in glycolipid phospholipid metabolism.

**POST-OPERATIVE TENSION PNEUMOCŒPHALUS**

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Recent reports suggest the association of surgery performed in the sitting position using nitrous oxide amnesia with the accumulation of subdural air under tension causing a deterioration in level of consciousness. An recent report such patients who worsened in the early post-operative period. The presence of air was demonstrated using computerized tomography and air films. Aspiration of the air resulted in marked sustained improvement in their conditions. We believe that tension pneumoencephalus should be considered in the differential diagnosis of any patient whose conscious level fails to improve post-operatively.

**PLASMA AMINO ACIDS IN EPILEPSY**

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McGill University

We have previously reported plasma amino acids in patients with 30% spike-wave arrest. The present study of plasma amino acid investigations were made in a heterogeneous group 11 epileptic patients whose electroencephalograms exhibited cerebral dysrhythmia other than the classical 3/sec spike-wave abnormality. 11 first degree relatives of these epileptic patients were also investigated. Plasma levels of 14 amino acids were determined and ratios of certain structurally related amino acids calculated in the epileptic probands when compared with...
22 control probands the mean plasma levels of ASP, THR, SER, ILE, LEU and TYR were significantly decreased along with a significant decrease of TAU, GLN, GLU, GLU, THRCVR, THR/GLY and SER/GLY. When the relatives of epileptic probands were compared with the control probands, they showed a significant decrease in TAU, ASP, GLN, GLU, THR, TAU/GLU and GLN/GLU, and a significant increase in VL. This group of epileptic patients was also found to be significantly different from their controls in the physiology, somewhat showing a significant decrease of THR, THR, GLY, ALA, MET, ILE, LEU, THR, THRCV/G and SER/GLY. Discriminant Analysis it was possible to distinguish epileptics from controls with 100% accuracy and from 3sec spike-wave epileptics with 90.5% accuracy.

The results of this indicate: 1) the plasma probands whose electroencephalographic patterns are normal, abnormal or diffuse forms show plasma amino acid patterns which are significantly different from non-epileptic control probands, 2) that these altered plasma amino acid patterns appear to be genetically controlled at least in part and 3) that the plasma amino acid patterns of these epileptic probands are also significantly different from those of probands with 3/sec spike-wave epilepsy.

PLASMA AND ERYTHROCYTE FLOW IN ACUTE FOCAL CEREBRAL ISCHEMIA

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The object of the investigation was to study plasma and erythrocyte flow and morphological changes in an area of acute focal cerebral ischemia. The right middle cerebral artery (MCA) of 18 ketamine-anesthetized cats was occluded microsurgically. Plasma and erythrocyte flow in the area of the right MCA was determined by measuring the transit of Tc-albumin and Tc-labelled erythrocytes injected into the ipsilateral carotid artery. The right MCA was occluded and the flow studies were repeated. Groups of 6 cats each had flow studies after 1 hour, 3 hours, or 6 hours of occlusion. The cats were then killed by the intra-arterial perfusion of a colchicine-carbon-buffered fixative solution. Sodium fluoride (50 mg) and Evans blue (50 mg) were given intravenously 20 minutes before death. Mean transit times before occlusion were 4.0 ± 0.5 sec for Tc-albumin and 11.5 ± 0.5 sec for Tc-erythrocytes. They increased slightly after occlusion to 9.5 ± 1.0 sec for Tc-albumin and 15.3 ± 1.0 sec for Tc-erythrocytes. Progressive delay in mean transit time was seen with longer periods of ischemia. At 6 hours, mean transit time was 23 ± 3.5 sec for Tc-albumin and 24.0 ± 4.0 sec for Tc-erythrocytes. Prolongation of transit times correlated with the development of cortical edema and microvascular narrowing. Three cats with evidence of edema and narrowing had only limited changes in their flow patterns. The findings of this study suggest that plasma and erythrocyte flow changes are similar and that a state of plasmapheresis does not develop.

THE VALUE OF SCANNING ELECTRON MICROSCOPY IN EXPERIMENTAL MICROVASCULAR SURGERY

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Notre-Dame Hospital and University of Montreal

Experimental microvascular surgery has proven to play an important role in clinical research for neurosurgery: firstly, for teaching purposes in performing micro-anastomoses on vessels; the incision was passed into the lumen and extended. The intima from the outer layers of the lower external carotid artery. Also possible to carry out a similar separation of the diseased intima in the outer layer of the external carotid artery. The microscope was then removed. Three vessels were clamped; the incision was passed into the lumen and extended. The plaque was then removed in one or two pieces in the routine way.

The major advantages are: (1) the shortening of dissection times (and particularly in the setting where pressor agents are used in cardiac patients) (2) facilitation of removal of intact plaques. Intraoperative EEG monitoring and post-operative clinical evaluations gave no evidence of embolization.

STABILIZATION OF THE CERVICAL SPINE USING THE ANTERIOR APPROACH

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In the past twenty years the anterior approach to the cervical spinal canal pioneered by Cloward has gained wide acceptance in the surgical treatment of spondylosis resulting in medullary or radicular compression. Surgical experience gained in using the Cloward technique has led to the development of a series of modifications suited to the specific needs of the individual cervical spine following trauma. Thirty cases of post-traumatic cervical spine instability are reviewed in which stabilization was accomplished using an anterior approach. Modifications of the classic Cloward technique: interbody fusion utilized include vertical pegs, transpedicular fusion, autogenous bone struts and interbody body replacements using acrylic implants. Follow-up clinical and radiological assessments demonstrate that, when the anterior vertebral elements are the pivot of instability, patients presenting with complete quadriplegia are best treated with acrylic implants. For those with incomplete neurological insults and patients without neurological deficit, stabilization using autogenous bone struts or pegs in one or several stages produces the most acceptable outcome.

EXTRALUMINAL DISSECTIONS WITH CAROTID ENDARTERECTOMIES

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The media was dissected from the plaque in 40 cases prior to vessel clamping with the aid of the operation microscope and microinstrumentation. A small (mm.) longitudinal incision was made over the plaque and the carotid arteries. The media and the elastic lamina were separated from the calcified plaque with a small, curved instrument. Circumferential dissection was completed at the plaque. It was also possible to carry out a similar separation of the diseased intima from the outer layer of the lower external carotid artery. The microscope was then removed. Three vessels were clamped; the incision was passed into the lumen and extended. The plaque was then removed in one or two pieces in the routine way.

NEUROPSYCHOLOGICAL ASSESSMENT OF THE EFFECTS OF CAROTID ENDARTERECTOMY

R. BORMSTEIN, B.G. BENIOFF AND R.L. TRITES

University of Alberta Hospital, Edmonton and Ottawa, Ontario

Carotid endarterectomy has demonstrated prophylactic value in reducing the risk of cerebral vascular accidents. The operation is most effective in patients who have completed strokes with the presence of one or more risk factors, such as hypertension. Surgical experience gained in using the xenon 133 intra-arterial injection technique and the initial slope index method.

In the first group (11 patients) regional cerebral blood flow (rCBF) values were compared between ipsilateral internal carotid arteriography and common carotid arteriography. In a second group (14 patients) selective extra-arterial (ECA) rCBF values were performed and the rCBF values were compared in rest and during hypertension. In the third group (13 patients) rCBF pattern changes were studied following extracranial intracranial (EC-IC) anastomosis surgery by injecting the tracer via the shunt.

Our results suggest that the extra-cerebral circulation 1) is not homogeneous 2) responds paradoxically (as compared with artery to artery) to carotid occlusion and 3) EC-IC anastomosis surgery results in marked and unpredictable changes in both the regional pattern and paradoxical pCO2 rection of the extra-cerebral tissues.

INTERNAL FIXATION OF CERVICAL SPINE DISLOCATIONS WITH AN INTERCLAMPER

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Victoria General Hospital, Halifax

For many years we have utilized a locally made clamp device, originally designed by Dr. H.H. Tucker, for fixation of cervical fracture dislocations or unilateral subluxations. This method has evolved to be our procedure of choice in injuries where posterior cervical instability is the main defect. Thirty-two patients were treated between 1972 and 1978 and all were initially placed in cervical traction and most reduced prior to operative treatment. Fifteen had fractures through the posterior elements of the cervical spine, 12 nevus rod defect, 4 mild spinal cord contusions and 3 severe cervical cord injuries.

The clamp is applied to the adjaçant laminae of the involved levels by placing it on the spine, the fusion is performed. In 2 patients bilateral clamps were applied because of severe instability. Two were re-explored in the immediate postoperative period for replacement of slipped clamps. Postoperatively a cervical collar and in some cases, a Minerva cast was used. The major morbidity left within 3 weeks postoperatively was the loss of motion due to the presence of the clamp. The advantages of this method will be discussed.

BLOOD FLOW CHARACTERISTICS OF THE EXTRA-CEREBRAL CIRCULATION

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Sunnybrook Medical Centre, Toronto

The extra-cerebral circulation is an important factor in cerebral blood flow measurements by non-invasive techniques and in certain diseases like migraine. Still, it has been generally assumed that it is a still, non-invasively and not measurable. In order to re-examine this question, we have studied three groups of patients using the xenon 133 intra-arterial injection technique and the initial slope index method.

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Early surgery within 48 hrs. of a bleed, 2/15 (13%), resembled following surgery within 48 hrs. of a bleed, 2/15 (13%), resembled actual surgery (7).forwards operations evoked twitching in muscles not innervated by stimulation of roots prior to lesion making at the second operations evoked twitching in muscles not innervated by those roots, a finding never seen at the initial procedure. Indica­
sions for the operation will be discussed in the light of our experience.

Early Versus Delayed Repair of Ruptured Intracranial Aneurysm

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100 consecutive stable (Gr. III) Botterle patients with ruptured berry aneurysms were analysed to compare the results of early and delayed operative repair.

Results: Following admission occurred in 28 patients, re­
sulting in 8 deaths, deterioration precluding further surgical con­
sideration (4), and persistent cerebral deterioration prior to even­
tual recovery (7).

Therefore, only 88 patients came to surgery, with only 64 having maintained their admission grade or better. In this group, 31 were repaired within 7 days of their most recent hemorrhage and 33 thereafter.

The outcome following surgery is shown in Table I.

Early repair of ruptured intracranial aneurysms with 48 hrs. of a bleed in clinically stable Gr. I–III patients, appears to be a reasonable alternative to a policy of delayed intervention, and merits further experience.

HERPES SIMPLEX VIRUS ENCEPHALITIS ISOLATES ANALYZED BY RESTRICTION ENDONUCLEASES.

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University of Alberta

J. SUBAK-SHARPE
Glasgow, Scotland

B. YOUNG AND A. ZBITNEAU
Saskatoon

D.W. PATY AND G.D. KETTLYS
Chapel Hill, North Carolina

The DNA of Herpes Simplex Virus can be purified and digested into fragments with restriction endonucleases. The DNA fragments, which radioactively labelled with P32, can then be subjected to agarose gel electrophoresis and autoradiography. The DNA restriction endonuclease profiles obtained readily differentiates Herpes Simplex Virus type I from type II.

We previously reported that 21 spontaneous isolates of herpes simplex virus type I from children with seizures, hyperactivity, topographic, superior cerebral, and vagus ganglia from 17 individuals could be classified as 15 different virus strains by analysis of DNA restriction profiles. Virus isolates from different individuals could be differentiated from one another, whereas multiple virus isolates from the same individual are indistinguishable.

We report here the restriction endonuclease profiles of eight strains of herpes simplex virus which cause encephalitis of humans. The isolates were obtained from London, Ontario, Saskatchewan, Edmonton, Alberta, and Vancouver, British Columbia. Virus DNA was digested with the restriction endonucleases Bam HI and Kpn I. All eight isolates exhibited restriction enzyme profiles characteristic of Herpes Simplex Virus type I, and they could all be differentiated from one another. It is concluded that encephalitis may be caused by many strains of Herpes Simplex Virus type I, and as yet no subgroup of strains is associated with that disease.

PROSPECTIVE STUDY OF EFFICACY AND TOXICITY OF CARBAMAZEPINE AND PHENYTOIN AS PRIMARY ANTIEPILEPTIC DRUGS

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A prospective double blind study evaluating carbamazepine and phenytoin was performed using newly diagnosed epileptics with generalized tonic-clonic and partial seizures. Twenty-five patients randomly received carbamazepine or phenytoin and have now completed 6 months. The patients receiving phenytoin did not differ significantly from the carbamazepine-treated patients with regards to seizure type and frequency, age and sex, and duration of the seizure disorder. Doses were adjusted according to response, toxicity, and plasma levels. Of 11 carbamazepine-treated patients, 2 were discontinued because of non-compliance and two patients were discontinued because of an allergic skin rash. Seven of 9 patients who completed the study all had excellent seizure control (5 were seizure free). Plasma carbamazepine concentrations ranged from 3 to 10 microgram/ml. Of 12 phenytoin-treated patients, 5 patients had to be terminated because of lack of efficacy, 2 patients were discontinued because of an allergic skin rash and only 5 achieved excellent seizure control in the absence of toxicity. Plasma phenytoin concentrations ranged from 5 to 17.9 microgram/ml. Side effects were similar in severity and frequency in both groups of patients, however, only patients in the phenytoin-treated group showed a lack of response (5 patients). Carbamazepine was a more useful drug in the treatment of these patients.

EEG ABNORMALITIES AND CONVULSIONS IN JUVENILE DIABETES MELLITUS - A FOLLOW-UP STUDY

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Every diabetic child is exposed to the risk of hypoglycemic convulsions, now with a tighter diabetic control being advocated. The occurrence of hypoglycemic episodes and convulsions is going to increase.

The Montreal Children's Hospital diabetic clinic has routinely ordered a baseline EEG on all new diabetics at the time of initial admission. In an attempt to correlate the initial EEG with future convulsions associated with hypoglycemia, the hypothesis tested was that EEG's and in some sphenoidal EEG's, psychometric tests and specialized radiography. Some had an hysterical attack during another. It is concluded that encephalitis may be caused by multiple virus isolates from the same individual are indistinguishable.

Hearing, smell, and taste are the most common sensory symptoms of headache. We reviewed the records of patients seen from 1976 to 1978 for coma, intracranial infarction (n = 94) and convulsions (n = 187). The majority of the compound of EEG's seen in the patients with diabetes and seizures (26%) was 10.4% of a control group (P < 0.001). The differences in the initial epileptic EEG were not as significant (P > 0.001) in the patients with diabetes and seizures (26%) compared to diabetic patients without seizures (16%). However, the initial epileptiform activity was higher in patients with diabetes and seizures, with recurrent seizures from the diabetics who had only a single clinical episode.

It was concluded that diabetes with an epileptiform abnor-
seizures occurred in 152 children (66%) and were more frequent in those aged between 1 to 3 years than in the other age groups. Sixty children died. Occular and motor findings correlated significantly with mortality. Metabolic acidosis and a variety of other systemic disturbances, usually multiple, occurred in nearly half the children at discharge. 102 of the remaining 165 children were normal and the remainder had some degree of handicap (mild to severe). The importance of detecting and correcting accompanying systemic disturbances is discussed.

THE RESULTS OF SURGICAL TREATMENT OF TEMPORAL LOBE EPILEPSY.
A PERSONAL EXPERIENCE WITH THE FIRST 100 CONSECUTIVE CASES
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Montreal Neurological Institute

From 1971 to 1979 inclusive, the author has carried out 124 temporal lobectomies including the amygdala and the pes of the hippocampus in 124 patients, of which 100 had a minimum follow-up of one year. For the purpose of analyzing the results, the patients have been classified in three main groups.

GROUP A (seizures-free or maximum of 3 seizures per year) 55%
1) totally seizure-free since discharge 34%
2) patients who have become seizure-free (minimum one/year) 13%
3) patients still having a maximum of 3 seizures per year 8%

GROUP B (patients having less than 50% of the original number of attacks) 27%
SUCCESS GROUP (Groups A and B) 82%

GROUP C (patients improved or only slightly improved) 11%
Follow-up incomplete 7%

The results do not seem to differ when operations are performed on the left (57%) or on the right (43%). 10 patients (10%) in this series have had pre-operative stereotaxic depth electrode studies. There were no death and no permanent hemiparesis or dysphasia in this series.

The results will be discussed on the background of the total number of temporal epilepsy cases treated surgically at the Montreal Neurological Institute with emphasis on the preoperative investigation.

NEUROLOGICAL INVOLVEMENT IN CHILDREN WITH MORPhea (LOCALIZED SCLERODERMA)
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Montreal Neurological Hospital and Montreal Children’s Hospital

In a retrospective study of 25 children with morphea (mean age at presentation 6.3 years), neurological abnormalities were found in 65% including psychomotor retardation, partial or generalized seizures, hemiataxia, as well as dysarthria, proximal and distal muscular atrophy, anacœmia and optic atrophy. Electroencephalographic (EEG) abnormalities were found in 75% of the patients, including paroxysmal or focal abnormalities while a few had epileptic discharges sporadically or with photic stimulation. The type and localization of the EEG abnormality did not seem to correlate well with the site of the skin lesion.

Associated abnormalities included hemiparetic atrophy, eosi-nophils, increased sedimentation rate and hyperglycmapydri-a. Radiological studies done and in progress including CT-Scans showed cranial and cerebral asymmetry appropriate for the side of the face involved only in some cases.

The incidence of neurologic abnormalities in these patients is high indicating primary or secondary involvement of the nervous system plays a role in the expression of this disorder.

EXTRAPYRAMIDAL COMPLICATIONS OF METOCLOPRAMIDE THERAPY
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Ottawa Civic Hospital

Metoclopramide is now a widely prescribed drug. Despite being a spinal dopaminergic receptor (DA 2) antagonist the drug was considered safe to use in Parkinson’s Disease. Apart from acute dystonic reactions (1%), extrapyramidal complications have been rare.

Over a 15 month period 11 patients with metoclopra-mide-induced extrapyramidal disorders were assessed in a Parkinson’s Disease Clinic. Two patients (average age 54) had developed acute tran-sient dystonic reactions. Eight patients (average age 71) de veloped parkinsonism (average 1.7 years metoclopramide treat ment). Six of these were referred as classical Parkinson’s Disease and 4 were already receiving L-Dopa (average 1 yr). Metoclopramide withdrawal resulted in complete clearing of parkinsonism within 2 weeks in 5 patients. The other 3 patients remained with some residual signs and may have had pre-existing undiagnosed Parkinson’s Disease.

Six patients (5 of the parkinsonism group and 1 other) developed tardive dyskinesia on discontinuing metoclopramide (average 2.6 yrs. treatment). This was transient in 3 but on continued follow-up movements persisted in 2 and 1. Chronic metoclopramide therapy can induce transient or permanent extrapyramidal disorders in older patients. Its chronic use seems contraindicated in Parkinson’s Disease and the drug should be placed in the same extrapyramidal risk category as the neuroleptics.

CEREBRAL TUMOURS IN CHILDHOOD PRESENTING AS CHRONIC FOCAL EPILEPSY
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That a longstanding uncontrolled focal seizure disorder may represent a supratentorial cerebral neoplasm in childhood is uncommonly appreciated. We found tumours in 14 of 29 patients less than 20 years old operated on for intractable epilepsy from 1974 to 1979. This contrasted markedly with the 9% tumour incidence of the MNI series covering the same age group (Mathiesen, 1975).

In our series, the manifestation of seizure disorder prior to surgery was 7.3 years. 11 of these 14 patients (79%) had normal neurological examinations; 4 of 15 patients (27%) without tumours had abnormal neurological examinations. Intelligence was normal in 85% of the tumour patients and 43% of the non-tumour patients.

EEGs showed multiple independent spikes in both hemispheres in 12 of 14 tumour patients. (86%) and in 11 of 15 pa-tients (73%) without tumours. However, persistent delta activity on most sequential EEGs appeared in 71% of tumour patients and only 27% of non-tumour patients.

Initial CTT scans failed to diagnose the tumour in 9 of 14 patients.

CONCLUSIONS: (1) a longstanding therapy resistant focal seizure disorder may be the only clinical manifestation of a childhood tumour; (2) possibility of tumour increases when intelligence and CNS examination are normal; (3) persistent focal EEG delta activity has greater differentiating value than spikes, and (4) initial contrast radiography may be non-diagnostic for tumour.

CAROTID-OPHTHALMIC ANEURYSMS: 19 CASES PRESENTING WITH COMPRESSION OF THE VISUAL APPARATUS ALONE
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London, Ontario

A recent review of our experience with 72 cases of carotid-ophthalmic aneurysms reveals that visual involvement is a more important and frequent finding at the time of presentation of these aneurysms than previously thought, Abtsgeller, 25 pa-tients were noted to have visual signs. In six of 30 patients present ing with subarachnoid hemorrhage, visual involvement was a secondary finding. In the other 19 patients, however, the aneu­rysms were intact and visual deterioration simulating the more common causes of optic nerve and chiasmal compression was the presenting feature in each case.

These 19 cases were distinctive. All were women. Eighteen of the 19 aneurysms were of “palm” site. Nine patients had more than one aneurysm. In five, there were bilateral carotid-ophthalmic aneurysms. Visual acuity was impaired in ev­ery case, and with the exception of one case, was the symptom bringing the patient to medical attention. In 12 cases, there was bilateral loss, always greatest on the side of a single aneurysm or on the side of the largest of bilateral aneurysms. Visual loss was usually slowly progressive over many months or a few years. Abnormalities of the visual fields were found in all 19 patients. They were typically diverse. The most common were bilateral temporal sector defects or hemianopsias; but na­dal defects, afferent hemianopsias, and central scotomas were also seen.

A wide variety of surgical techniques were required to treat these aneurysms. The overall neurological and visual results of direct treatment (13 cases) was better than the results of indirect treatment. The visual results with direct treatment are somewhat unpredictable. Factors associated with a favourable outcome in­clude: a short history, sparing of the visual apparatus, and a good decompression of the optic apparatus at the time of the initial operation.
Intra-uterine hydrocephalus

GUIDELINES FOR MANAGEMENT OF INTRA-UTERINE HYDROCEPHALUS

D. COCHRANE, T. MYLES
Calgary, Alberta

The aggressive treatment of intrauterine hydrocephalus has been of benefit to many children.

Sonomodified 2-dimensional ultrasound techniques (gray scale, color flow and pulsed wave or continuous wave Doppler) have facilitated the diagnosis of hydrocepha-
lus more reliably than previous methods.

Medical decisions regarding the management of hydrocepha-
lus in intrauterine life are difficult because the potential morbidities of obstructive hydrocepha-
lus remains a focus of controversy.

Medical management has included the use of amnioinfusion and the placement of percutaneous or transcranianal shunts in an attempt to correct the obstruction.

The most common complications of the treatment of intrauterine hydrocephalus are hydrocephalus,

leukocyte glutamate dehydrogenase (LDH) in various forms of ataxia

A. BARBEAU, M. CHARBONNEAU AND T. CLOUTIER
Clinical Research Institute of Montreal

Many studies from our group have indicated that pyruvate metabolism may be impaired in certain spinocerebellar depen-
nation syndromes (CNSJ 3: 389-397, 1976). In other studies we have demonstrated a marked decrease in cerebellar glutamic acid and occasional decreases in GABA and/or glutamic acid.
biopsy differs from that of other forms of centronuclear myopa­thies, thereby showing large clusters of central nuclei, and be­cause of the copious central accumulation of glycogen and lipofuscin. The pathophysiology of these changes is presently unknown.

FACIO SCAPULO HUMERAL DYSTROPHY: THE INFANTILE VARIANT (FSH)
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Sherbrooke University

FSH muscular dystrophy is generally considered a restricted disorder with onset in the second decade; running a relatively benign course. An infantile FSH disease has been described by Duchenne, a century ago, forgotten and rediscovered in rare contemporary reports. It is not a widely recognised entity. We describe a 13 year old male patient showing facial diplegia in the neonatal period with a progressive muscle weakness leading to loss of ambulation at age 7 years. Outstand­ing are the peculiar shoulder and lumbar lordosis. He is intellectually normal. Se­rum enzymes are markedly elevated and EMG studies show myopathic motor units. The biopsy taken at 5 and 13 years of age show evidence of a recent and a long standing process with no evident tissue infiltration. The patient’s mother showed mild facial, neck and shoulder weakness in line with a low penetrance of the FSH phenotype in her muscle biopsy. This is type I fibre atrophy. This is more typical of myotonic dystrophy (MD) with which this family has little in common clinically. However like in congenital myo­tonic dystrophy most reported cases of FSH had an early disabling myopathy most likely inherited through an autosomal dominant gene from a very mildly affected parent. A major differ­ence seems to be the presence of an intermuscular dis­ability between the two ends of the FSH spectrum unlike (MD). A movie will show the patient at the near end of his ambulatory pe­riod and literature will be reviewed on the subject.

END-PLATE ACTIVITY IN MAN
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University Hospital, London, Ontario

Two types of electrical activity are evident at the End-Plate zone with concentric needle electrodes. These include (1) low voltage negative potentials which correspond to miniature End-Plate potentials and (2) other larger voltage negative potentials which frequently have pre-potentials evident in the rising phase of the initial negative voltage deflection. The origin of the latter is uncertain but most authors have claimed that the latter discharges represent nerve fibre activity. Theoretically, this explanation is not particularly attractive. For this reason the phrenic nerve diaphragm preparation was investigated by means of intra-cellular electrode techniques, and parallel needle electrode investigations were carried out with the conventional concentric needle electrodes used in human electromyography. The spontaneous larger voltage negative potentials were rarely detected with the intra-cellular electrode, even though the miniature End-Plate Potentials were readily detected by both electrode techniques. The negative positive potentials were clearly triggered by contact of the panonomic needle electrode and its fibres. They were abolished by curare. The latter evidence led to the conclusion that these positive negative discharges at the End-Plate zone represent, not nerve fibre activity, but muscles fibre action potentials, probably pre-synaptically activated by mechanical irritation of the motor axon terminal and pre-terminal branches. The latter has been uncertain but most authors have claimed that the latter discharges represent nerve fibre activity. Theoretically, this explanation is not particularly attractive.

PREDICTION OF RESPONSE OF HYPERACTIVE CHILDREN TO METHYLPHENIDATE
R.L. TRITES, A. BLOUN AND T. BRANTS
Royal Ottawa Hospital

Follow up studies of hyperactive children have demonstrated persistent, academic, social and/or behavioural difficulties in spite of longterm treatment with stimulant medication. Hyperactivity in children seems to be the final common pathway for a number of different conditions and it is possible that a favourable academic and social outcome of certain subgroups of hyperactive children treated with methylphenidate is masked if the subgroups are not differentiated. This study reports a long-term investigation of 96 boys aged 8-11, the aim of which was to develop a rationale for treatment of hyperactivity. Each child received detailed neuropsychologic, neuropsychological, psychiatric and electrophysiological studies with the aim of delineating specific subgroups. Different treatments including behavioural, diet manipulation and stimulant drugs were systematically tried with each subgroup and the most effective treatment for each subgroup was determined. A neuropsychological test series was predictive of response to stimulant drug treatment. In contrast the presence of learning disability, personality adjustment problems and/or family pathol­ogy were not predictive of a favourable drug response. The neuropsychologic profile of the typical "favourable responder" will be presented.

PREDICTION OF OUTCOME IN NONTRAUMATIC COMA IN CHILDHOOD
S.S. SESHIA, B. JOHNSTON and G. KASIAN
Children’s Hospital and University of Manitoba, Winnipeg

The data in 102 comatose children (seen Feb, 26-12 Dec, 78) were analysed. The median age was 30 months (range 1-17 yrs) and the median duration of coma, 30 hrs. (range 3 hrs-35 days). 33 children died, 51 were normal and 18 had mild, moderate or severe handicap (follow-up 8-1 observation periods: 24 tumors, 9 patients with acute unilateral cerebral ischemia and 20 controls. These cases were studied in detail by Van Huffelen (thesis, 1980).

These cases were studied in detail by Van Huffelen (thesis, 1980).

SPECTRAL ANALYSIS OF THE BASIC ACTIVITY FOR CLINICAL APPLICATION OF THE EEG APPLIED IN PATIENTS WITH SPACE OCCUPYING LESIONS
O. MAGNUS, D.C.J. POORTVLIET
C.J.M. VAN DER WULP AND A.C. VAN HUFFELEN
The Hague, Netherlands

This method has been applied to 49 EEGs recorded in 37 pa­tients with intracranial space occupying lesions (24 tumors, 9 intracerebral hematomas, 3 extracerebral hematoma and 1 large aneurysm). It will show the general distribution of the groups the method served to detect. localizate and quantify EEG abnor­malities. In the majority of cases this also led to a correct localization of the lesion, but there were exceptions, which, however, corre­sponded usually with those found on visual interpretation and revealed functional disturbances at a distance from the lesion. A comparison will be made by the findings in a series of 40 pa­tients with acute unilateral cerebral ischemia and 20 controls. These cases were studied in detail by Van Hulsteijn (thesis, 1980).

PRIMARY CNS LYMHPHOMAS: CLINICAL FEATURES AND PATHOLOGICAL ASPECTS
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In the past 12 months, five cases of primary brain lymphomas with clinical manifestations resembling multiple sclerosis. Parkinson’s disease and encephalitis respectively (three cases), were treated in this hospital. The histology of this group of cases will be presented. Different treatments were used in each of these cases with both surgical and radiation therapy. Treatment was most effective if the lesion was radiosensitive. This was confirmed by two nec​tions which showed that the lesion was completely removed or destroyed. All cases were reviewed and the results discussed.
Lymphoma was diagnosed by brain biopsy in four cases and autopsy in one. Extracerebral primaries were excluded by clinical investigations or autopsy. CT scan was positive in four but negative in one patient with temporal lobe involvement; multifocal tumor was present in one case. CSF showed pleocytosis, increased total protein and gamma globulins, and positive cytology in two. Pathological examination in all cases included light and electron microscopy, and immunoperoxidase technique for gamma globulins and lysozyme. The tumors were diagnosed as poorly differentiated - PD (two), neuroendocrine-like (one) and lymphoplasmocytoid (two). Light microscopy and immunocytochemistry were diagnostic in three cases but both PD were salvaged for anaplastic markers and required EM for unequivocal diagnosis. None of the tumors was clearly monoclonal.

Eleven cases received cranial irradiation and chemotherapy and were followed for up to 12 months. Because of the potential good therapeutic response of brain lymphoma, importance of early biopsy with the aid of electron microscopy and immunocytochemistry is stressed in cases with obscure diffuse or multifocal CNS disease which may represent lymphomatosive disorder.

CLINICAL APPLICATIONS OF SUBCORTICAL SOMATOSENSORY EVOKED RESPONSES

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Clinical application of subcortical somatosensory evoked responses has been limited by difficulties in the evaluation of the origin of individual components. We have had the opportunity to correlate the result of depth electrode (DBS) recording with those obtained simultaneously from surface electrodes (EC, C, or temporal) in 21 electrodes in 16 patients after stimulation of the median nerves at the wrists and after peroneal nerve stimulation at the knees. After wrist stimulation the "thalamic" component can be recorded at latencies of 13 to 18 msec. With surface electrodes, peak positive components are seen at peak positive latencies of 9.6 ± 0.6, 12.2 ± 0.8, 14.6 ± 0.9 and 18.6 ± 0.6 msec in 30 normal volunteers. The "thalamic" component is often hard to identify in patients with multiple sclerosis. The responses have been delayed in patients with spinal cord tumors, pediatric focal tumors, Miller Fisher variant of the Guillain Barre syndrome, multiple sclerosis, brainstem cerebrovascular lesions, brainstem trauma, Reyes syndrome, and toxic encephalopathy or coma in patients with dystone musculorum deformans, torticollis and Parkinson's disease.

Greatest clinical and diagnostic value of these subcortical somatosensory evoked responses is achieved by correlation with subcortical auditory, cortical somatosensory and visual evoked responses. Subcortical somatosensory evoked responses can provide an atraumatic and practical method of assessing function of somatosensory pathways in a wide range of medical and surgical conditions.

PLASMA EXCHANGE AND MYASTHENIA GRAVIS

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Plasma exchange was used to treat thirty-seven patients (age 16 to 74 years) with moderate to severe myasthenia gravis. Thirty-eight of patients were studied: 18 immediately pre- or post-thymectomy, 13 with relapses of myasthenic weakness, and 6 with chronic weakness. All patients were assessed clinically before and after plasma exchange. Serum anti-bodies to acetylcholine receptor were measured in all patients before plasma exchange. During each 2 to 2.5 L of plasma were removed and replaced with a combination of Na-saline, stored and fresh frozen plasma.

Seventeen of the 18 patients undergoing thymectomy had normal or only minimal increases in their plasma exchange: 14 had been stable 2 months after thymectomy and 16 have remained in remission (on immunosuppressive drugs) for 2 to 20 months. One of these patients relapsed with bulbar and respiratory failure following discharge after thymectomy. Nine of the 13 patients in myasthenic relapse following thymectomy on Prednison improved following plasma exchange and with adjustment and continuation of immunosuppression have remained improved or in remission for 4 to 18 months.

Five of the 6 patients with chronic weakness had immediate improvement with plasma exchange and 4 remain improved following multiple course of plasma exchange and immunosuppression.

The complications of plasma exchange in these 37 patients included urticaria; celiac toxicity and transient hypotension but serious problems were not encountered. Plasma exchange has a role in preventing significant bulbar and respiratory weakness and allowing uneventful introduction of Prednison therapy in myasthenic patients undergoing thymectomy. Plasma exchange may be useful in preventing respiratory failure and prolonged hospitalization among myasthenic patients in relapse with chronic weakness and continued improvement depends on adequate immunosuppression.

FAILURE OF PLASMAPHERESIS IN POST-THYMECTOMY MYASTHENIA GRAVIS

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Five patients are presented with myasthenia confirmed by clinical, electrical and serological criteria. All were taken to early thymectomy with no other anti-myasthenic therapy being employed. These patients experienced persistent ocular myasthenic features (diplopia and ptosis) following thymectomy, despite resolution of clinical muscle and bulbar weakness. When ocular symptoms failed to resolve during the ensuing 12 months, plasmapheresis was performed. These patients were consecutively studied Tension positive and on no other medications. All five patients failed to show any improvement in the ocular features of myasthenia gravis, immediately after plasmapheresis or during the ensuing two months. Acetylcholine receptor antibody titers were elevated in each patient initially and came down with plasmapheresis without corresponding clinical benefit. All patients were then treated with Prednison and showed dramatic improvement.

Clinical improvement in myasthenia gravis with plasmapheresis has been postulated to be the result of the removal of a circulating humoral factor. The acetylcholine receptor antibody has been implicated. The failure of these post-thymectomy symptoms to respond to plasmapheresis despite normalization of the antibody titer suggests that another mechanism may be operational. The striking response to steroids in preference to plasmapheresis suggests that these agents may operate by different mechanisms.

THE HEMODYNAMIC DYNAMICS OF ALBUMIN AND WATER FLUX AFTER INTRACAROTIC INJECTION OF HYPEROSMOLAR SOLUTIONS

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This study was carried out to determine the influence of infusion solution osmolarity on the flux of Evans Blue-albumin complex, isotope labeled serum albumin and H2O into rabbit brain and CSF. The experimental model used was the ipsilateral osmotic demarcation of a column of solutions from 0.28 Osm to 2.5 Osm. No alteration in albumin permeability either into specific brain regions or CSF was found after infusion of iso-osmolar NaCl. Increasing the solution osmolarity to 0.5 Osm increased albumin penetration into CSF but not into cerebral regions. Progressive qualitative and quantitative increases in albumin flux were seen after infusion of 0.83 Osm, 1.6 Osm and 2.5 Osm solutions. Following the changes in albumin flux and H2O content after infusion of 0.83 Osm solutions demonstrated a marked decrease in albumin penetration into both brain and CSF 5 to 15 minutes after infusion with normalization of many brain regions 1 hour after infusion. A significant increase in specific ipialateral regional cerebral blood flow and cerebral blood volume was seen after 29 and 59 Osm albumin infusions. A marked decrease in albumin and H2O into brain regions which reaches a maximum in the first 5 - 15 minutes after hyperosmolar infusion and then shows progressive normalization over 1 h.

“REDUCED ANESTHESIA REQUIREMENT IN PATIENTS AFTER PERIQUADULAR GRAY STIMULATION”

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Electrical stimulation of the periaqueductal gray region of patients with intractable pain has produced relief concomitant with evidence of a reduction in the anesthetic requirement. The mechanism of nonopinehcrine occurs in the same periaqueductal area in the rat during hyalourone or corynaneza anetaphora. It is hypothe­ sized that the anesthetic receptor is a different receptor that selective stimulation or inhibition of specific brain regions.

To determine whether stimulation of the periaqueductal gray area decreases the anesthetic requirement, we determined the alveolar concentration (MAC) of halothane and 60% nitrogen oxide (amand of anesthetic needed to prevent movement in re­ sponse to stimulation and anesthesia was maintained with N2O5 O2 and enflurane. Artificial ventilation produced moderate hypocarbia. A transalional internal carotid catheter monitored arterial blood pressure, enabled blood gas and hematology sampling and served as an injection site for xenon133. A Swan Ganz thermolaether catheter was advanced into the pulmonary artery for determination of central venous pressure, cardiac output, pulmonary artery pressure and pulmonary capillary wedge pressure. All cerebral, cardiac and pulmonary parameters were measured pre-, during and post-manipulation at an infusion of 1.3 to 1.3 Gms/kg body weight. The significant features of this study were the large increases in cardiac output and cerebral blood flow; the maintenance of the 70% increase in the adjacent changes in cerebral and peripheral vascular resistance due to vascular dilation.

MECHANISMS OF GROWTH OF CHRONIC SUBDURAL HEMATOMAS — IS A FLUID SHIFT INVOLVED?

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It has been hypothesized for some time that chronic subdural hematomas grow in volume by a differential osmotic or oncotic pressure between the blood and the adjacent vascular or CSF compartment. Oncotic pressure is that which results across a membrane whose pores are sufficiently large that they are impermeable to only large molecules such as albumin but allow many smaller molecules in addition to water to pass freely. With the recent development of membrane oncometers with fast response times it has become feasible to measure oncotic pressures of biological samples. It was felt that the direct simultaneous measurement of oncotic pressure in hematomas and in blood would provide an opportunity to test the oncotic hypothesis of hemotoma growth. The oncotic pressure in the blood of 14 patients with chronic subdural hematomas was 25.9 ± 1.7 mm Hg, the hemotoma fluid had a pressure of 27.5 ± 1.9 mm Hg. There was therefore no significant difference. On the other hand in six cases of subdural hygromas there was a significant difference with blood having a pressure of 20.3 ± 2.2 and hygroma fluid being 7.2 ± 3.2. This finding fails to support the theory that chronic subdural hematomas grow and produce symptoms by a fluid shift because they attract fluid from the blood via dural vessels.

THE EFFECTS OF MANNITOL ON THE CEREBRAL, CARDIAC AND PULMONARY CIRCULATIONS IN NEUROSURGICAL PATIENTS

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Neurosurgical patients undergoing craniotomies were specifically selected for this study by their need for intravenous mannitol. Informed consent was obtained from all patient for the placement of intraarterial catheters for xenon133 injection and cerebral blood flow measurement. Anesthesia was induced with thiopental, the trachea intubated, muscle relaxa­ tion produced by atracurium and anesthesia was maintained with N2O5 O2 and enflurane. Artificial ventilation produced moderate hypocarbia. A transfemoral internal carotid catheter monitored internal blood pressure, enabled blood gas and hematology sampling and served as an injection site for xenon133. A Swan Ganz thermolaether catheter was advanced into the pulmonary artery for determination of central venous pressure, cardiac output, pulmonary artery pressure and pulmonary capillary wedge pressure. All cerebral, cardiac and pulmonary parameters were measured pre-, during and post-manipulation at an infusion of 1.3 to 1.3 Gms/kg body weight. The significant features of this study were the large increases in cardiac output and cerebral blood flow; the maintenance of the 70% increase in the adjacent changes in cerebral and peripheral vascular resistance due to vascular dilation.
BLOOD-BRAIN BARRIER (BBB) DYSFUNCTION FOLLOWING EXPERIMENTAL SUBARACHNOID HEMORRHAGE (SAH)

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The pathophysiology of clinical deterioration in some cases of SAH is poorly understood. One mechanism that was postulated to be a possible mechanism involved in the clinical deterioration was the breakdown of the BBB. To test this hypothesis, experiments were performed with 35 cats. Metaraminol (5 x 10-6 M) or 6.0 x 10-5 M solution of mercaptoethanol (HgCl2) were used to cause BBB breakdown. The SAH was simulated by cisternal injection of autogenous blood. The BBB breakdown was detected by the extravasation of Evans blue into the extra-vascular space leading to staining of the brain. Animals studied were further examined under the fluorescent microscope. The animals were divided into the following groups: (1) controls, (2) arterial hypertension, (3) HgCl2, (4) SAH, (5) SAH followed by arterial hypertension, and (6) SAH followed by HgCl2 perfusion. Animals in which arterial hypertension had been induced and those treated with HgCl2 showed well defined areas of BBB breakdown. Animals submitted to SAH failed to display BBB leakage. BBB breakdown was neither seen in animals made hypertensive nor in animals injected with HgCl2 following SAH. Therefore, SAH did not cause BBB breakdown by itself. On the contrary, it prevented the BBB breakdown induced by the damaging agents. The mechanism of action of these agents has yet to be investigated in order to involve increased pinocytosis by the capillary endothelium. Our results suggest that SAH interferes with this active pinocytotic process. Pinocytosis inhibition has been reported by others during the acute stage following cerebral ischemia.

THE ROLE OF THE BLOOD-NERVE BARRIER (BNB) IN NORMAL AND INJURED PERIPHERAL NERVE

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Nerve fibres in a peripheral nerve function in a unique environment created and maintained by special barrier mechanisms (blood-nerve barrier), analogous to the blood-brain barrier in the central nervous system. The present experimental study was designed to examine the role of the blood-nerve barrier in both the normal rat sciatic nerve and in nerves under various pathological conditions. Alterations in the BNB were assessed by two fluorescent tracing of intravenously-injected bovine serum albumin labeled with Evans' blue and by electronmicroscopic tracing of I.V. injected horseradish peroxidase. The sciatic nerves of 4 groups of 25 animals were subjected to either: 1) nerve injection, with a variety of acidic, steroid and local anaesthetic agents, 2) nerve transection following epineural suture, 3) nerve transection with neuroma formation, or 4) crush injury. The left sciatic nerve was used as the control throughout. The nerves were studied at varying periods from 1 hour to 8 weeks following injury. Results revealed that in the normal nerve the intraneurally-injected bovine serum albumin was not found in the nerves under various pathological conditions. Alterations in the BNB were assessed by two fluorescent tracing of intravenously-injected bovine serum albumin labeled with Evans' blue and by electronmicroscopic tracing of I.V. injected horseradish peroxidase. The sciatic nerves of 4 groups of 25 animals were subjected to either: 1) nerve injection, with a variety of acidic, steroid and local anaesthetic agents, 2) nerve transection following epineural suture, 3) nerve transection with neuroma formation, or 4) crush injury. The left sciatic nerve was used as the control throughout. The nerves were studied at varying periods from 1 hour to 8 weeks following injury. Results revealed that in the normal nerve the intraneurally-injected bovine serum albumin was not found in the neural segments and that the lumen of the endoneurial microvessels and ependymon with no passage into the endoneurium. The anatomic sites of the BNB appeared to be the anatomic sites of the endoneurial capillary endothelium and perineural cells. There is controversy concerning the role of internal neurons in nerve surgery. Many workers consider the procedure valuable in treatment of a variety of nerve lesions associated with fibrosis. It is also a fundamental component of newer techniques of nerve repair which employ fascicular suture and interfascicular nerve grafting. Others view internal neurons as a potentially dangerous factor, capable of producing some degree of injury to nerve and of damage to the microcirculation, resulting in intra- fascicular and perineural scarring. Paucity of laboratory work on the subject prompted the present study designed to examine morphological and physiological alternations in nerve fibres following internal neurons.

MANAGEMENT OF SEVERE HEAD INJURIES WITH BARBITURATE PROTOCOL

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The University of Vermont protocol for the management of head injuries is presented. In this protocol is the mandatory administration of high dose intravenous barbiturates in all severe head injuries (Grade 3, 4, 5) beginning immediately after neurological assessment and following the receipt of the x-ray. These agents are used to attempt to maintain intracranial pressure within normal limits and hopefully influence quality of neurologic recovery. Our observations, based on a detailed analysis of 25 cases treated to date, do not support the contention that barbiturates favorably influence the intracranial hypertension or the quality of the patient's outcome.

ROYAL COLLEGE LECTURE: "MALIGNANT" BRAIN EDEMA IN CHILDREN

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Sixty-one of 215 children who had early CT scans following head trauma exhibited a pattern which we have described as diffuse cerebral swelling. This is marked narrowing of the ventricular system, compression of the perimesencephalic cistern and a general loss of CSF spaces. Three quarters of these children had Glasgow Coma scores of 6 or less and 24 had Glasgow Coma scores of 5 or less. The patients were divided into two groups: Those with a lucid period and the onset of secondary deteriorations and those who were immediately rendered unconscious. In the former group, the acute deterioration is suspected to be due to acute brain swelling produced not by the loss of content of the brain but by acute congestion of the brain, vasodilatation and hyperaemia. Studies of cerebral blood flow, cerebral blood volume and cerebral metabolism are required to substantiate this concept. In the second group of children with immediate onset of unconsciousness, 90% developed evidence of extracerebral collections, progressive ventricular dilatation, and a pattern which looked like atrophy. Their time to recovery was much longer than the group with a lucid interval and their residual neurological deficits much worse. It is concluded that acute diffuse brain swelling attributable to increased blood volume and hyperaemia is a common accompaniment of acceleration-deceleration head injury in children. In those with a lucid interval, their time to recovery was much longer than the group with a lucid period and their residual neurological deficits much worse. In those patients with an acute onset of unconsciousness and evidence of diffuse brain injury, recovery will be slow, delayed intracranial hypertension can be expected and the majority of these children will take many months to recover. We believe that the term "malignant" cerebral edema is a misnomer.

CEREBROVASCULAR PERMEABILITY IN MECHANICALLY INDUCED HYPERTENSION

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Our present studies of cerebrovascular permeability in angiotensin-induced acute hypertension have demonstrated that the cerebrovascular permeability in angiotensin-induced acute hypertension is enhanced pinocytosis. In order to exclude the possibility that the enhanced pinocytosis was a direct effect of angiotensin, cerebrovascular permeability alterations were investigated in rats with nonpharmacologically induced hypertension.

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Rats received horseradish peroxidase (HRP) intravenously, following which hypertension was induced by clamping the abdominal aorta. Animals were sacrificed 2 3/4 minutes after the onset of the hypertensive episode. The results show the same pattern of permeability alterations as observed in angioten-
sin-induced acute hypertension. In hypertensive animals local segments of penetrating arterioles in the temporal and parietal cortex showed increased permeability to HRP. Permeable ves-
sicles increased numbers of pericytic vessels as comp-
pared with controls. The interendothelial junctions revealed no alterations. A few vessels demonstrated HRP diffusely in endo-
thelial cytoplasm but this was not associated with extravasation of tracer into the endothelial basement membranes. Enhanced pinocytosis appears to be the principal mechanism resulting in increased cerebrovascular permeability in this model as well. (Supported by Grant MRC MA-7191).

**QUANTITATIVE HISTOTOPOGRAPHY IN DOWN’S SYNDROME: COMPARISONS WITH NORMAL AGING AND ALZHEIMER’S DEMENTIA**

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An XY pen recorder linked potentiometrically to a sampling stage microscope permitted the plotting of topographic “scatter-
grids” to determine the precise cytoarchitectonic localization of neurofibrillary tangles and granulovacuolar degeneration in hip-
pocampal neurons of adult mongol’s brains. The area (and hence volume) of six cortical “zones” surveyed was measured with a digitizer and programmable calculator.

In decreasing magnitude of affliction, the rank order for neu-
rofibrillary tangles was: entorhinal > subiculum > H1 > endplate > H2 > presubiculum. That for granulovacu-
olar change was: subiculum > H1 > H2 > endplate > entorhinal > presubiculum.

These striking regional predispositions suggest that a com-
mmon neurotransmitter deficit may underlie the local selectivity of such lesions in mongoloid brains; and the predictions’ marked similarities to ranking orders already noted both in normal aged subjects and especially in senile dementias of the Alzheimer type (Ball, M.J., Acta Neuropath. 42: 73-80, 1978) enhance the importance of the Down’s syndrome neuraxis as a key to the puzzle of Alzheimer’s dementia.

**AKINETIC MUTISM: CONTRIBUTING DYNAMIC FACTORS**

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6 cases presenting a state of akinetic mutism are reviewed. They presented a normal or low pressure hydrocephalus of various etiology, aqueductal stenosis, previous posterior fossa surgery for cerebellar hemangioblastoma and atresia of the foramen of Magendie, subarachnoid haemorrhage and eptic tumor of the third ventricle.

Surgical treatment consisting in aspiration, partial excision and radiotherapy for the cystic tumor of the third ventricle and CSF shunting procedures in the other cases was successful with clinical recovery.

The authors emphasize the role of mechanical factors as a cause of the state of akinetic mutism in their patients. The importance of recognizing hydrocephalus, even if mild and of the low-normal pressure type is discussed.

There seem to be a common denominator in these cases which is the enlargement of the 3rd ventricle associated with hydrocephalus or intraventricular cystic tumor. It is postulated that this interferes with the function of periventricular structures through direct pressure, oedema or reduction in blood flow to cause this syndrome.

**NEUROFIBROMATOSIS AND MACROCRANIA - MEGALENCEPHALY**

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Macrocrania as a feature of neurofibromatosis has not been much emphasized in the past. Sixty-one children with neurofibro-
matosis, half of whom were familial cases were assessed regarding head size. All had measurements of the occipital frontal circumferences (O.F.C.) and standard skull x-rays. Six children had pneumo-encephalograms and 25 had CT-Scans to investigate macrocrania or confirm the presence in nine patients of optic nerve or chiasm gliomas. Head size by O.F.C. was skewed toward upper percentiles for age (15 of 61 at or greater than the 98%ile) while stature (height) was skewed towards the lower percentiles for age.

There was a low order correlation between macrocrania and other features including intellectual deficit, motor deficits, and EEG abnormalities.

From plain skull radiographs, the cranial capacity was esti-
mated and found to be above the 95%ile in 60% of the patients. The volume of the sella turcica was likewise measured and found to be above the maximum normal volume in only 20%.

From CT examination ventricular enlargement was found in 20% and ventricular asymmetry in 48%.

**DISCREET LOCALIZATION OF HUMAN ENTRAPMENT NEUROPATHIES**

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In human entrapment neuropathies, it is sometimes impor-
tant to learn as precisely as possible the actual level of the nerve injury. Errors in localization may lead to occasional failure in the surgical decompression; for example, in the median nerve en-
trapment at the level of the carpal tunnel. It has been estab-
lished by direct intra-operative stimulation of the involved nerves at short intervals that the functional abnormalities may be restricted to quite short segments of the nerve. This latter techni-
que led us 4 years ago to attempts to better localize nerve inju-
ries by combinations of stimulation or recording at short intervals (20 mm. or less) both proximal and distal to the level of the nerve injury by means of surface electrodes. The method was utilized primarily to investigate ulnar or peroneal nerve entrapments, but has been extended to the median nerve in the last 6 months following the publication of Kimura’s observations with this technique in the median nerve (Braun, 102, 619-635).

The surface electrode methods have had two important advantages:

1) It has been possible to identify abnormalities in nerve function, particularly in the median nerve at the level of the carpal tunnel segment not clearly identifiable by conven-
tional EMG techniques.

2) The methods have made it possible to more precisely localize the level of the nerve injury, and hence establish the cause of failures in prior surgical decompression at-
ttempts.

The methods have therefore helped not only to extend our knowledge about the patho-physiology of human nerve entrap-
ments, but represent a significant improvement with which nerve entrapments can be identified and precisely characterized in clinical laboratories.