Proceedings of the Society of British Neurological Surgeons

The 70th Meeting of the Society was held in conjunction with the Neurosurgical Section of the Societas Medicorum Bohemoslovenica J.E. Purkyne. Meetings were held on 22 and 25 September 1964 in Prague and Smolenice under the Chairmanship of Professor Z. Kunc, Professor R. Petr, and Mr. George Alexander.

TOTAL CIRCULATORY ARREST IN THE TREATMENT OF INTRACRANIAL VASCULAR ANOMALIES

J. M. SMALL (Birmingham) reviewed the surgical indications in intracranial vascular anomalies and said that proximal ligation in carotid aneurysms was unsatisfactory and direct approach the only answer. In 17 patients treated by proximal ligation four had had recurrent bleeding and two had died. In a series of 189 cases of intracranial haemorrhage, 100 had been operated on, 66 aneurysms and 34 angiomas. The mortality had been 12% and the results were especially bad in cases of anterior cerebral and middle cerebral aneurysms. The bad results of surgery in otherwise satisfactory candidates was due to operating in dangerous areas in the face of, at times, severe haemorrhage and the search for a dry field was essential. Occlusion of the carotid and vertebral arteries in the neck had proved dangerous because of thrombosis, and totally inadequate for haemostasis. Similarly, small vessel occlusion intracranially had proved dangerous and inadequate for the same reasons and, in addition, the necessary exposure endangered vital perforating vessels.

The Drew method had been adopted with brain temperatures of 15°C, which would give a total circulatory arrest of 45 to 50 minutes. Eight patients had been treated but the results had been so bad that he considered this was not a method applicable to intracranial surgery.

It seemed clear that only a few minutes were required for dealing with the vascular anomaly in a dry field and this could be achieved with moderate cooling to 30°C. Whilst the craniotomy was in progress the chest was opened, and at the moment that ischaemia was required the great vessels from the aorta were clamped. This did not achieve ischaemia because of anastomotic circulation and induced hypertension. It was decided to clamp the vena cavae and then the aorta and this method had produced excellent ischaemia in the operation field. With aneurysms of major vessels low molecular weight dextran had been given to prevent sludging and possible thrombosis in parent vessels. When the anomaly had been treated and the circulation re-established blood pressure immediately rose to normal levels or higher and so proved the efficacy of control. He said that they were now experimenting with a modification of this method whereby a conducting catheter was passed into the right ventricle via the brachial vein and the heart could be put into ventricular fibrillation and controlled from then on, thus obviating any major thoracic surgery.

POSSIBILITY OF SURGERY IN ARTERIOVENOUS MALFORMATIONS IN THE ANATOMICALLY IMPORTANT AND DANGEROUS REGIONS OF THE BRAIN

ZDENĚK KUNC (Prague) said that about half the vascular malformations had been considered inoperable because of technical difficulties or their location in important anatomical regions of the brain where their removal might lead to severe neurological deficit. Recent advances in technique, especially controlled hypotension, hypothermia and circulatory arrest, demanded a reassessment of the operative possibilities. He stressed that often no normal brain tissue was present in the angioma and much adjacent brain had already been damaged by repeated bleeding. It should be possible, therefore, to remove even large angiomas without neurological damage if the removal was confined to the angioma itself and blood supply of the surrounding brain was preserved. Operation should, therefore, be carried out as close to the lesion as possible after vessels supplying the angioma had separated from those supplying surrounding brain. This was a difficult procedure and could only be carried out under hypothermia and sometimes circulatory arrest.

During the period 1953-64, 59 patients with angiomas had been under observation and 41 had been operated on. He then presented case histories of four patients in whom large angiomas had been removed from the dominant hemisphere without any serious neurological deficit resulting.

He concluded that the operability of cerebral angiomas depended more on their type than their location. In the cavernous variety normal cerebral tissue was not present in the angioma and these could be safely removed provided the line of resection was close to the angioma. Operation should be undertaken before repeated bleeding and chronic anaemia of the brain had produced serious secondary changes. Caution was required in treating small racemose angiomas in which normal brain tissue might be found and in large malformations with considerable brain degeneration and mental deterioration.
STEREOTAXIC EVACUATION OF THE TYPICAL INTRACEREBRAL HAEMORRHAGE

Presented by V. BENES, V. VLADYKA, and E. ZVERINA.

HEAD INJURY AND HAEMOPHILIA

JOHN M. POTTER (Oxford) reported the results of treating seven patients with head injury and haemophilia or Christmas disease. The past results of treating such patients had not been encouraging, as the only methods available had been whole blood transfusion or of fresh-frozen plasma, the latter being more effective in haemophilia than Christmas disease. The advantage of plasma over concentrates of anti-haemophilic globulin (A.H.G.) prepared from pig or ox plasma was that it was non-antigenic, but large quantities might be required and there was risk of overloading the circulation. The activity of animal A.H.G. and Christmas factor concentrates was equivalent to about 16 times, and that of human A.H.G. to about four times the volume of plasma.

The patients in this series all received intravenous concentrates of A.H.G. prepared from pig or human plasma, or of human Christmas factor, during the stage of actual or threatened bleeding. This enabled investigations such as lumbar puncture or carotid angiography and cranial operations to be carried out with greater safety. Four patients were haemophilics and three had Christmas disease. Six were children under the age of 7 years, the age when they were particularly prone to disasters from minor injuries. There was one case of extradural haemorrhage, two of subdural, one of intracerebral haemorrhage, and one large sub-aponeurotic haematoma of the scalp. All were operated on and one case of subdural haematoma died. The two other patients recovered without operation. Detailed case histories in these seven patients were recounted.

It was stressed that surgery of this type could not be undertaken unless there was a properly-equipped and staffed haematological laboratory available. Not only must the type of disease be quickly diagnosed and the appropriate concentrates be available but reliable assay of the degree of activity of the deficient factor was necessary for rational and accurate replacement therapy. Appropriate therapy, usually fresh-frozen plasma, should be given as soon after injury as possible and thereby operation might be avoided. Carotid angiograms and other operations should be avoided unless really necessary but lumbar puncture seemed safe especially if plasma had been already given. Operative treatment should be reduced to a minimum.

VASCULAR FACTOR IN THE PATHOPHYSIOLOGY OF BRAIN INJURIES

Presented by A. FANTIS.

SOME HAEMODYNAMICS OF INTERNAL CAROTID ARTERY STENOSIS


CRYOGENIC LESIONS IN STEREOTACTIC SURGERY

JOHN HANKINSON (Newcastle) said that the search still continued for a method of making brain lesions of predictable shape and size and it had become increasingly realized that some clinical or physiological test should be carried out before a permanent lesion was inflicted. He reviewed briefly previous attempts to use cooling for these purposes. During the last 15 months he had used the cryogenic probe devised by Irving S. Cooper and manufactured by the Linde company, a subsidiary of the Union Carbide Corporation of America.

The instrument was a vacuum insulated probe of 2.5 mm. diameter. Liquid nitrogen contained in a Dewar flask and pressurized to 30 lb./sq. in. was delivered to the probe tip via a flexible tube, and there vapourized, the gas escaping via the casing, feeding tube, and outlet. The flow of nitrogen, and therefore tip temperature, was controlled by valves servo-operated from two thermocouples at the probe tip. The instrument could be set for any given temperature within its range and this provided a range of 5° around this temperature at the tip. This instrument had been used for producing temporary cessation of nerve function by cooling tissue to 0°C. and the production of permanent lesions by cooling tissue to temperatures below −15 to −20°C. Cooling to 0 to −10°C. could produce cessation of tremor in Parkinson patients if the probe were correctly located and this served as an indicator for the positioning of the probe. Furthermore, in making a permanent lesion the advancing edge of the lesion was always reversible for the temperature there was 0°C. although the tip temperature might be −80°C. or lower. If any undesirable change occurred, such as sensory disturbance or the appearance of an extensor plantar response, the cooling could be stopped at that point with the immediate shrinkage of the ice sphere. Thus the probe provided a safety factor both initially and during the production of the final lesion. The lesions were made in a graduated manner so that haemorrhage associated with sudden cooling to a low temperature did not occur. The spherical shape and diameter of the lesions had been remarkably constant and for a lesion 6—8 mm. diameter a temperature of −80°C. for three minutes was used.

The method had been used in 180 cases, mostly of Parkinson's disease. The clinical results had not shown any appreciable difference from a previous series of 300 cases using heat lesions, but in the cryogenic lesions the striking difference had been the almost completely undisturbed immediate post-operative state. This had lead to a widening of the indications for operation to include many patients who would have been previously rejected. The only disadvantage had been an increased incidence of recurrent tremor during the first few days or weeks. This was thought to be due to too small a lesion; −60°C. for three minutes had been used initially, but using −80°C. for the same time had decreased this complication.

EXPERIENCES WITH NIGROTOMY IN THE EXTRAPYRAMIDAL DISEASES

Presented by B. ZAPLETAL.
EXPERIENCES WITH MALIGNANT BRAIN TUMOURS IN TISSUE CULTURE

G. MUNGYEROVE, K. JACZ, I. KUZMA, O. BABUAIKOVA, and F. KALAFUT described their experiences with the tissue culture of human gliomas. Using modern roller tube techniques utilizing Hintzsche's method, a good growth could be achieved in almost all gliomas. The rapidly growing astrocytoma had a growth zone consisting of radially arranged spindle cells, but the structure of an astrocytoma was not often found in the culture. In the gemistocytic astrocytoma typical swollen glial cells were found in the growth zone. In the neurinomas a population of long spindle cells was characteristic and in ependymomas rosettes were common.

In glioblastomas many different structures could develop in the cultures. The growth zone usually consisted of spindle cells, not unlike those of the neurinoma or rapidly growing astrocytoma but shorter and with marked polymorphism of the nuclei. A reticular arrangement of the growth was common and pleomorphism very variable. Nests of cells with or without processes were common. The features seen in the tissue culture could also be identified in sections of the tumour removed. They had observed that glioblastomas growing rapidly in vitro had a shorter case history and worse prognosis than the slowly growing ones.

In further investigations the radio-sensitivity of gliomas in tissue culture was tested, using conventional x-ray and telecobalt irradiation with doses from 2,000 to 8,000 r. Astrocytomas, spongioblastomas, and neurinomas, which were clinically resistant to treatment, reacted little to irradiation in tissue culture and only a slowing of growth was achieved. In glioblastomas, however, partial or almost complete degeneration of the growth zone occurred. Nearly always, however, some cells survived, even with high dosages, and clinically such surviving cells might be the cause of recurrence. X-ray radiation and Cobalt 60 produced the same effects in vitro but the better penetration of Cobalt 60 irradiation produced a better result. The effect in medulloblastomas was the same.

The influence of cytostatic agents on glioma tissue cultures was tested. Myleran and Degranol had effects only at doses higher than would be safe clinically. Good results were obtained with 6-azauracil riboside in 0.04% concentration and Mannit myleran in 2 mg. % concentration. After two to three days there was a massive degeneration of all cells in the growth zone.

A very convincing effect was obtained with 0.04% Trenimon. There was fragmentation of the cell processes, pyknosis of the nuclei, and a complete destruction of the culture. This drug was now given in the post-operative treatment of glioblastomas but the follow-up period had been too short to assess the results.

A MODERN VIEW OF THE MANAGEMENT OF SPINA BIFIDA CYSTICA

A. N. GUTHKELCH (Manchester) reviewed the present-day attitude to spina bifida cystica and its treatment. He noted that even 10 years ago most of these cases were considered to be hopeless and not likely to improve with surgery, but the present position was quite different. He divided his cases into simple meningoceles, probably less than 20%, and myelo-meningoceles which could be open or closed. The degree of paralysis was much greater in the open cases but in 14% there was only partial paralysis. In the past, treatment of the spinal condition had been overshadowed by the presence of fear of hydrocephalus. This complication was rare in simple meningocele but an Arnold-Chiari deformity was almost constantly present in the other varieties. He felt that the most important factor in progression of hydrocephalus was the presence of infection.

He preferred to operate on simple meningoceles at about two months and hydrocephalus if it had developed was dealt with first. The closed myelomeningocele should always be operated on so that other deformities, often unsuspected, could be dealt with. He now felt that immediate closure of the open myelomeningocele, within the first 48 hours, was worth an extended trial. The cord rudiment was detached from surrounding tissues and replaced within the spinal canal preserving all nervous tissue which was encountered. The dura was mobilized and closed and the skin closed with rotation flaps if necessary. If infection was already established or other conditions precluded early operation, then natural epithelialization should be allowed to take place before operation. In 19 such cases of immediate closure the mortality had been 21%.

He would estimate the survival rate as 50-60% and this would mean that in the British Isles the incidence in the population surviving would be 20 per 10,000 of whom 15 would be disabled and only five capable of attending a normal school. The incidence of hydrocephalus was 65%. Many cases showed spontaneous arrest and when treatment was necessary the level of preservation of intellect was encouraging.

OPERATIVE TREATMENT OF KYPHOSCOLIOSIS WITH PARAPLEGIA

R. PETR (Hradec Kralove) said that paraplegia was an uncommon complication of kyphoscoliosis and reviewed his experiences in 10 cases. He said that there were many factors which might damage the spinal cord and especially during the growth period. The cord was usually unable to adjust itself to the rapid growth of the spinal column and the increasing curvature. In scoliosis the cord was gradually compressed by the deformed pedicles which projected into the lumen of the canal. Compression by stretched inelastic dura was an important factor in kyphosis but its effect had probably been overestimated in scoliosis. Torsion of the cord was also an important factor for the cord must follow passively the motion of the spine. The cord was, therefore, affected by the combined action of pressure, torsion and stretch and, in addition, there might be local ischaemia from disturbances of blood and cerebrospinal fluid circulation. Lowered blood pressure, as might occur during operation, could also contribute to local ischaemic changes.

Operative treatment consisted essentially of removal of the areas of bone compressing the cord. This usually comprised an extensive laminectomy, removal of pedicles.
comparing the cord and, where kyphosis was marked, removal of bone anteriorly. This latter was a difficult part of the operation and must be performed from the side. It might be necessary to remove ends of several deformed ribs as well. This procedure often allowed the cord to return to a more normal position and freed it from pressure. In some cases wide opening of the dura to remove pressure on the cord was necessary. Transposition of the cord was unnecessary and division of roots to facilitate this might be harmful, for the blood supply to the cord was dependent on radicular arteries which might have to be divided in this process.

In eight cases operated on for kyphoscoliosis motor power was markedly improved in seven, and in four cases the neurological findings three years after operation were now normal. In two cases of kyphosis, marked improvement was noted in one, the other was unchanged. In a follow-up of all cases of one to three years no late neurological deterioration had been found.

STUDY OF THE USE OF ISOTOPES IN HYDROCEPHALUS

R. SEARS, R. WILKES, and W. J. ATKINSON (London) described the results of a study on the absorption of tracers from the ventricular cerebrospinal fluid in patients with hydrocephalus. It was designed to test the efficacy of operations for hydrocephalus, assess its severity, and throw some light on the mechanism of absorption of cerebrospinal fluid. Tracers were placed in the lateral ventricle and a scintillation counter placed on the forehead which in effect counted the whole head. At first Na\(^{24}\) was used (3 \(\mu\)C.), later radio-iodated (I\(^{131}\)) human serum albumin (R.I.S.A.) in a dose of 5 microcuries was used and in other cases a combination of both. Counting was continued until specific activity had dropped below usefully recordable limits. Thirty-six cases had been investigated and the results had fallen into four groups. In group I the Na\(^{24}\) clearance had been more than 30 hours and in group II less than 10 hours. In group III the times lay between these values. In group IV, eight cases in which R.I.S.A. was used, the results showed a wide variation. Most of the cases were children and in these there was a good correlation between the severity of symptoms of hydrocephalus and long times for half-life clearance and between low values and successful operations. In the adult group there was no clear correlation between clearance times and the severity of symptoms. They felt that before this test could be used in difficult clinical cases, much more must be known about the effect of the different pathways of absorption of cerebrospinal fluid, the ventricular wall, choroid plexus and the leptomeninges outside the brain. When the latter pathway was virtually absent, as in congenital hydrocephalus, the test was valuable in deciding on operation and in assessing the results of operation and possible subsequent blockage of the drainage system. In adult cases, however, where the lepto-meningeal route was partially available, the clearance half-times gave at present no indication of the severity of the pathological state.

PATHOLOGICAL CAVITIES COMMUNICATING WITH CEREBRAL VENTRICLES

Presented by Z. FISER and P. DRABEK.