Proceedings of the Society of British Neurological Surgeons

The 74th Meeting of the Society of British Neurological Surgeons was held jointly with the British Neuropathological Society in the Anatomy Department, Trinity College, Dublin, on 29-30 September 1966. The Presidents, Mr. Wylie McKissock (London) and Professor W. Blackwood (London), occupied the chair in rotation.

**THE MANAGEMENT OF THE EARLY PITUITARY TUMOUR**

ALAN MOONEY (Dublin) discussed the management of the early chromophobe adenoma of the pituitary. He said that when there was enlargement of the sella, endocrine changes, and headache but normal visual acuity and discs, normal visual fields or only contraction to 5/2000 red, normal angiograms and air studies, then observation with repeat perimetry at three-monthly intervals was advisable. He thought that at this stage the patient's symptoms would not be improved by surgery or irradiation and as many of such cases remained stationary for a considerable time treatment should be delayed so long as one was certain that irreversible changes in the visual pathways had not developed. When it became clear from early bitemporal involvement of the field periphery, scotomatous changes, or disc pallor that the tumour was expanding then the selected form of treatment should be carried out. He favoured conservative surgical treatment with biopsy and partial removal of the tumour. He did not favour the use of radiation therapy as he had experienced considerable morbidity, including blindness and failure of visual improvement.

He reviewed the results of a questionnaire on this problem addressed to several centres throughout the world.

**THE INCIDENCE AND PROGNOSIS OF GLIOMAS IN CHILDREN**

P. O. YATES (Manchester) presented a study of gliomas in children derived from material in the Manchester Children's Tumour Registry. He estimated that the area population of five million included one million under the age of 15 and that this group produced 100 tumours per year, 20 within the central nervous system. He had analysed 10 years' material ending in 1963.

Of 43 patients with medulloblastoma, only six had survived beyond three years. Of 37 patients with juvenile astrocytoma, 22 who survived the initial diagnostic and therapeutic period were still alive. Adults with astrocytomas and glioblastomas had not done well and only 14 of 40 had survived five years. Ependymomas carried a poor prognosis, only five of 30 patients remaining alive. In the miscellaneous group of 41 the largest group was that of brain-stem tumours diagnosed clinically.

Here there was obviously two types of pathology, one group of six patients dying within a year and the remaining eight surviving beyond seven years.

He concluded that radiotherapy of medulloblastomas, whilst having considerable short-term benefit, could not be thought of as a cure and that patients with juvenile astrocytoma, particularly in the cerebellum, did equally well with conservative therapy and with more radical measures.

**KINETIC PARAMETERS OF CEREBRAL TUMOUR GROWTH**

ROBERT TYM (Glasgow) said that in order to influence the radiation sensitivity of gliomas by the introduction of an iodine-containing analogue of thymidine one must know the doubling time of the cells and the times of separate growth phases. For glioblastoma cells in vivo, using tritiated thymidine, vincristine, and autoradiography, he had estimated the synthesis phase as 12 hours and the second growth phase as 4-5 hours. Estimate of the first growth phase required a knowledge of the percentage of cells in a tumour playing an active part in its growth. Assuming all cells to be dividing the first phase in the tumour investigated would have been 520 hours.

A mathematical model incorporating a constant growth factor, a stem cell model, had been applied to an oligodendroglionioma using some real and some supposed growth parameters. Computer simulation gave a cell doubling time of 80 hours for a tumour taking 10 years to reach 100 cc. He noted that all results were only relevant to the stated hypothesis of growth but might form a basis for future experiments.

**METASTASIZING GLIOBLASTOMA OF THE SPINAL CORD**

H. URICH (London) presented four cases of gliomata of the spinal cord in young people (F11, F22, F21, M18). He said that the three older patients presented with a variety of spinal cord symptoms rapidly progressing to a complete paraplegia. This was followed within months by symptoms and signs of raised intracranial pressure. In the younger child signs of increased pressure preceded the onset of cord symptoms. The total duration of illness ranged from six to 10 months.

At necropsy all patients showed a malignant intramedullary glioma metastasizing extensively through the
cerebrospinal fluid pathway. Tumour filled the spinal subarachnoid space and the basal cisterns and seeded into other parts of the cerebral surface and into the ventricles. In one case distant metastases were found in bones.

CHEMOTHERAPY OF CEREBRAL TUMOURS: PRELIMINARY CLINICAL AND PATHOLOGICAL OBSERVATIONS

R. MYLES GIBSON, D. F. HARRIMAN, AND A. E. WALL (Leeds) reported the pathological findings in 10 cases of cerebral glioma treated with Epodyl. In five cases a single dose had been given and in five cases up to five doses at weekly intervals. Doses of 5 or 10 ml., suitably diluted, were given via the appropriate internal carotid artery. One case was of an astrocytoma with a 32-month history, the others were of glioblastomas with histories of from three to nine months.

In one patient who died after 18 hours, there was considerable haemorrhage and oedema in the tumour which appeared to have been induced by the drug.

In seven patients, dying from five days to 12 weeks after the last dose, there was extensive necrosis with foci of tumour growth, especially at the margins but no unusual cytological features. The findings were in no way different from those common in many untreated gliomas.

In two cases there was a possible reduction in tumour volume due to cell lysis and cavity formation.

In none of the brains was there any evidence of a toxic effect on the cerebral cortex, white matter, basal ganglia, or cerebellum.

They concluded that more frequent doses or administration via alternative routes, such as the cerebrospinal fluid, might prove more effective.

DIRECT RADIATION OF CEREBRAL GLIOMAS

T. F. BUCKLEY (Oxford) reported on a method of direct radiation of cerebral gliomas by means of a radium bomb. This was a perspex sphere containing radium calculated to give a surface dose of 4,000 rads per week. The tissue dose beyond 5 cm. was negligible. The bomb was placed in the tumour bed or a cyst at the time of operation and was removed by further operation a week later. This was followed by a course of external irradiation. Thirty patients had been treated in a uniform manner. There were four early post-operative deaths from causes probably unconnected with this form of treatment. In the survivors the average survival time was 19-5 months. This result compared favourably with 16 patients treated by surgery alone who survived 2-5 months and 42 patients treated by surgery and external irradiation who survived an average of nine to 12 months. They concluded that the short-term survival had been improved by six to seven months but that the long-term survival was not affected by this treatment.

Methods of direct radiation used previously, such as radium, isotopes of phosphorus, sodium, Yttrium, and radioactive colloidal gold had not improved survival periods.

EFFECT OF TRANSECTION OF THE PITUITARY STALK ON THE PITUITARY GLAND IN MAN

J. HUME ADAMS (Glasgow), PETER M. DANIEL, AND MARJORIE M. L. PRICHARD (London) described the changes observed in the pituitary glands of 21 patients who had survived for from 30 hours to 11 months after surgical transection of the pituitary stalk. The operations had been undertaken to produce a profound reduction of anterior pituitary function. In every case there was evidence of infarction in the anterior pituitary and in three cases of short survival the infarct involved more than 75% of the lobe. In cases of longer survival the original infarct was represented by a shrunken fibrous scar. Volumetric studies indicated, however, that stalk section in man did not invariably cause massive necrosis in the anterior pituitary.

PUBERTAS PRAECOX DUE TO HYPOTHALAMIC HAMARTOMA

D. W. C. NORTHFIELD and D. S. RUSSELL (London) reported two cases of hypothalamic hamartoma with pubertas praecox which had survived surgical removal. They said that the association of pubertas praecox with tumours of the third ventricle had long been recognized. The tumour was sometimes a hamartoma comprising a haphazard assembly of neurones, bundles of nerve fibres and neuronal cells, forming a mass of about 1 or 2 cm. in diameter at the base of the brain in the region of the tuberculum. They described two cases, both male patients approximately three-and-a-half years old, in which such a hypothalamic hamartoma was removed. Both patients were alive eight and four years respectively after the operation. The appearances in air encephalograms and the operative approach were described. The mechanisms which may excite pubertas praecox in these and similar cases were discussed.

PSUEDO-TUMOUR OF THE ORBIT

J. TREVOR HUGHES (Oxford) reported four cases of pseudo-tumour of the orbit. Two of these were due to a pyogenic orbital cellulitis, one was of unknown aetiology. The fourth case was a woman of 70 whose condition had started three years previously with an orbital tumour syndrome. Exploration had shown gross thickening of the orbital periorbitum. Later the condition spread intracranially and a further operation disclosed leathery thickening of the dura in the region of the sphenoid wing. There was gradual deterioration and death.

Necropsy showed that the granulomatous process in the orbit was only one part of a widespread disorder of vascular and connective tissue in which the histological findings were very similar to such diseases as polyarteritis nodosa, hypersensitivity angiitis, and Wegener's granulomatosis. He thought that the probable aetiology was some form of auto-immune reaction to connective tissue.

ELECTRON MICROSCOPY OF CEREBRAL OEDEMA

W. G. P. MAIR (London) said that cerebral white matter
in relation to menigiomata was oedematous. The myelin sheaths in normal white matter were fairly densely packed together and little extracellular space was seen. In oedematous white matter the myelinated fibres were widely separated by swollen astrocytes and their processes. In some regions the plasma membranes of astrocytes appeared to have broken down leaving vesicles, mitochondria, and fluid extracellularly between the myelin sheaths. The cytoplasm of the oligodendrocytes contained larger and more numerous vesicles than normal. The capillary endothelial cells and pericytes contained large numbers of vesicles and many rounded spaces occurred in the basement membrane, indicating very active micropinocytosis. This process transferred fluid across the capillary wall into the astrocytes.

SOME OBSERVATIONS ON INTRACEREBRAL SKIN GRAFTS

W. THOMAS SMITH (Birmingham) reported on a series of experiments in which Thiersh-type grafts from mouse tail skin were implanted in the brain. Auto-grafts usually developed into small dermoid cysts which underwent progressive epithelial atrophy in four to six months. By eight months most of such grafts were replaced by fibrous and glial scar. In the few cysts that persisted there was always some connexion with the meninges or ventricle.

Auto-grafts pre-treated with a minute dose of 20-methylcholanthrene, not carcinogenic when the skin was left in situ, grew progressively in the brain and often developed into infiltrating squamous carcinomas or were replaced by astrocytic gliomas or undifferentiated malignant tumours.

He suggested that human implantation epidermoids grew because of the favourable environment and might not survive if implanted wholly within neural tissue. Also, that the usual connexion of dermoids and epidermoids with bone, meninges, or ventricle enabled them to survive. Progressive growth in a tumour not so connected might imply malignant change.

He thought that the auto-grafts probably degenerated because of some immunological reaction.

VASCULAR TRIANGLE OF THE INSULA: A CONTRIBUTION TO THE ANGIOGRAPHIC LOCALIZATION OF HEMISPHERE TUMOURS

A. A. FERNANDEZ-SERRATS (Salford) described a method of identifying the usual position of the insular arteries in lateral angiograms so that displacements from the normal position could be recognized in tumour cases. After a study of 100 normal angiograms he had found that one could construct a triangular figure which encompassed the superior Sylvian branches of the middle cerebral artery in the region of the insula. The superior border was formed by the line of the loops of the superior insular arteries, the inferior border by a line from the origin of the fronto-orbital artery to the curve of the middle cerebral artery at the parieto-temporal operculum, and the anterior border by a line joining the origin of the fronto-orbital artery to the point where the highest loop of the artery crosses the anterior operculum.

This triangle bore a constant relationship to certain planes, such as the Frankfort plane, an intermeatal plane perpendicular to this through the external meatus, and various other proportions. From such data the 'normal' insular triangle could be constructed on an angiogram and deformities characteristic of tumours in various positions in the hemisphere recognized. He concluded that the vascular triangle of the insula was a figure easily identified in a lateral angiogram and of known position and shape. From a consideration of the direction and type of deformation the position of a hemisphere tumour could easily be deduced.

CEREBRAL BLOOD FLOW MEASUREMENTS DURING CAROTID LIGATION

W. BRYAN JENNITT and A. MURRAY HARPER (Glasgow) reported a method of measuring regional blood flow at capillary level in the brain. The rate of clearance from the brain of a radio-active insert gas (Xenon133) after internal carotid injection was used. Gamma emissions were measured through the intact skull and blood flow in the anterior part of the hemisphere measured before and after trial clamping of the common or internal carotid arteries. All four patients in whom regional flow was reduced more than 25% during internal carotid occlusion developed a hemiparesis, and none of six who maintained 75% control flow had complications. A carotid steal was detected in four patients during common carotid clamping and two developed immediate hemiparesis. All four withstood subsequent internal carotid ligation without event. This had confirmed the previous suggestion that sometimes common carotid ligation might prove less safe than internal because of 'carotid steal'.

THE VERTEBRAL STEAL

P. CAREY (Dublin) discussed vertebro-basilar insufficiency due to vertebral steal and described four cases. The demonstrable lesions predominantly affected the vertebro-basilar system but the clinical presentation mainly suggested carotid involvement.

The two cases presented with hemiplegia, one with minor hemiparesis and vertigo and one with paraesthesiae and visual loss. Symptoms were generally long-standing, ten years in one case. The obstructive lesion was in the innominate artery in two cases, the subclavian in one, and subclavian and vertebral arteries in one. All showed delayed filling of the subclavian artery by retrograde flow from the vertebral artery. Endarterectomy was performed in three cases with excellent results but the fourth case treated conservatively had also done well over a period of six months.

CONGENITAL TUMOURS CAUSING SPINAL CORD COMPRESSION

J. P. LAGUSAN (Dublin) discussed congenital tumours causing cord and root compression in children. He noted that these were relatively common in children and might be teratomas, dermoids, or epidermoids. He described two cases, in a girl of 13 and a boy of 16. Both had marked widening of the spinal canal with erosion of
pedicles and scalloping of the posterior margins of the vertebral bodies, this was seen in plain radiographs and was a common finding in these tumours. One patient also had other congenital anomalies, spina bifida, absent D.11 spine and skin naevus. In both cases the tumour was situated in the low dorsal-upper lumbar area and presented very similar operative appearances with an intramedullary mass of fat above a cystic tumour. Partial removal was carried out. In one case the tumour was considered to be a dermoid and in the other a teratoma. One patient had a severe paraplegia before operation and showed partial recovery with later deterioration, the other complained of pain which was relieved by operation.

**FURTHER OBSERVATIONS ON THE STURGE-WEBER SYNDROME**

G. L. ALEXANDER (Bristol) reported observations made on seven further cases of this condition seen since 1960. It was found that availability of oxygen in cortex adjacent to affected areas but macroscopically and histologically normal showed no evidence of the vasodilator response to inhaled CO$_2$. He presumed that as the arterioles in this region were behaving abnormally then during an epileptic attack, when there was increased production and retention of CO$_2$, the affected neurones were unable to benefit from vasodilatation and increased oxygen supply. The implications of this in connexion with the fall-out of nerve cells were mentioned. Pre-operative venograms in the recent cases had shown abnormally large and tortuous veins in the Galenic region and in the hemisphere of the unaffected side and one out of three cases recalled for review had shown a similar feature.

Reference was made to two chromosomal abnormalities reported in the literature in this condition but in a review of his cases none had so far been found abnormal.

**INTRADURAL SPINAL ANGLIOMAS**

A film was shown on behalf of R. H. SHEPHERD (Derby) illustrating the operative removal of two spinal angiomas. One was from a man of 49 with severe spastic paraparesis and operation was followed by complete recovery in nine months: the other in a woman of 70 with paraplegia and 80% loss of function. There had been no change in her condition post-operatively. Slides of a third case were shown, a man of 43 with severe spastic paraparesis who had shown moderate and continuing recovery following operation.

**A REVIEW OF ACOUSTIC NERVE TUMOURS**

PAUL AHLUWALIA and P. BUXTON (Liverpool) reviewed 102 cases of acoustic nerve tumour collected over a 24-year period with special reference to the results of extracapsular and intracapsular operations. They suggested that plain radiographs, together with vertebral angiography, were usually sufficient for diagnosis but that in doubt positive contrast ventriculography or air encephalography, where there was no papilloedema, might be used. They stressed that in the intracapsular operation there should be no removal of cerebellar tissue, limited capsular removal and no catheter drainage. Mortality figures had improved with increasing experience and new techniques but that of the intracapsular operation, now less than 11%, was still falling whilst the extracapsular had remained stationary in recent years. With the intracapsular operation, hospital stay was shorter, walking more quickly established, and disability at three months and one year follow-up much less. Recurrences had only occurred in one intracapsular operation and they felt that this limited and safer type of operation was probably adequate with such a slowly growing tumour.

Histology had been carried out in 77 cases. The appearances were very similar in all cases and they were unable to relate recurrence, morbidity, or mortality to the tumour cell type.

**SOME PROGNOSTIC STUDIES IN SUPRATENTORIAL GLIOMATA**

A. G. L. CORKHILL and W. BLACKWOOD (London) presented some results from their analysis of the life history of supratentorial gliomas. They had a series of 741 case histories with death follow-up in 529. These patients had all had biopsies and various forms of treatment during life. They had concentrated on the 50% dead time in evaluating various factors. Kernohan's histological grading had been used: results in grades 3 and 4 were so similar that they could be considered together. Prognosis was worst in grades 3 and 4 and best in grade 1. In view of the numbers in these groups, 2 and 3 had been used to assess various factors.

Increase of age carried an increasingly poor prognosis when one lobe only was involved, worse when more than one lobe or in bilateral tumours. Frontal lobe alone carried the best prognosis, but frontal lobe spreading to others the worst. This probably only reflected the large size of this lobe. The effect of radiotherapy was estimated, eliminating those patients who had died within a month of biopsy. Results showed that such therapy prolonged life to some degree.

In grade 3 there was no difference in the 50% dead time in cystic and non-cystic tumours, which was three months from biopsy. In grade 2 patients, however, those with cystic tumours lived about six months longer than with solid ones, who died at 12 months.

They were proposing to subject their figures to multiple regression analysis to make a retrospective prognosis study and, later, might be able to make a prospective study of these cases.

**MIXED GLIAL AND MESODERMAL TUMOURS: A CLINICAL AND PATHOLOGICAL SURVEY**

J. R. W. GLEAVE (Cambridge), D. R. OPPENHEIMER (London), and C. S. TREIP (Cambridge) described a series of cerebral tumours from the Neurosurgical and Neuro-pathological Departments in Oxford and Cambridge. The common pathological features were that the tumour was well-circumscribed and tended to 'shell out' of the brain; it was firmly attached to the dura, usually in the middle fossa, and histologically consisted of two ele-
ments, glioma and sarcoma, more or less intimately mixed.

The tumour occurred in middle-aged or elderly patients, and presented with a short, rapidly progressive history. Initial recovery was good but the prognosis, even after complete macroscopic removal, was poor, death usually occurring within a year. In one case, after removal of the tumour, there was a symptom-free period of a few months, followed by the appearance of multiple fibrosarcomatous deposits in bones. Cerebral symptoms recurred, and at necropsy, 11 months after the operation, there was a large glioblastoma in the temporal lobe, apparently spreading from the operation site. This appeared to be a rare instance of a mixed tumour in which the two elements, after operation, pursued independent malignant courses.

Various theories had been suggested as to how they arose. In some a malignant glioma might induce neoplasia in nearby vessels and meninges, in others, a meningeal sarcoma induced malignant change in the glia.