mal. Localization to the affected lobe was based mainly upon the preoperative EEG findings, often supplemented by electrocorticography.

The histological findings were reminiscent of tuberous sclerosis, but this diagnosis was not entirely acceptable because (a) no evidence of adenoma sebaceum or any of the other stigmata could be found either in the patients or in their families, (b) the incidence of mental subnormality and of epilepsy in the families was very low, (c) in most patients the onset of epilepsy was during puberty or later, and (d) there was a trend towards a normal or even raised IQ in the patients. Finally, the histological appearances were far from typical, consisting essentially of a neuronal over-population in the cortex rather than a paucity. Other distinguishing features included a total lack of calcification and of subpial glial 'wheatsheaving', both of which are often found in the tubers of tuberous sclerosis.

The uncovering of these lesions in the main resulted from a policy of resecting as much as possible of the affected lobe in one block, rather than by suction removal which would have precluded a detailed histological examination. Most of the patients were benefited as regards their epilepsy.

The cases therefore appeared to be an unusual type of cortical dysplasia in which circumscribed areas of anomalous neurones and often glia, visible only under the microscope, underlie the clinical and electrical manifestations of a focal form of epilepsy.

APPLICATION OF CRYOTHERAPY IN CEREBROVASCULAR ANOMALIES: AN EXPERIMENTAL AND CLINICAL STUDY

H. A. D. WALDER (Nijmegen) studied the effects of freezing of large vessels (common carotid artery and jugular vein) in the dog. There were no macroscopic changes after the application of the probe at -150°C for five to 10 minutes and, after thawing, normal blood flow was resumed. Significant degenerative changes were apparent microscopically, however, affecting the cellular components of the intima and muscularis after 24 to 48 hours when muscle nuclei were completely resorbed with no subsequent regeneration. In contrast the fibres in the muscularis (reticulum, elastic, and collagen) were intact but straightened, particularly the elastic fibres. The intima became detached from the internal elastic layer and at the transitional area joining normal intima a marked proliferation of endothelial cells was seen. This process, which was delayed four to six weeks after freezing, resulted in an asymmetrical stenosis of the lumen to about a third of its original diameter, often with thrombosis. These findings were confirmed by angiography.

Fusiform aneurysmal dilatation of the dog's carotid artery appeared three to six weeks after the injection of nitrogen mustard. The application of the cryogenic probe to these damaged arterial segments did not cause haemorrhage or other macroscopic change but angiography six weeks later showed partial thrombosis of the vessel or reduction of the dilatation to about normal diameter. Histological examination revealed thrombosis or endothelial proliferation as described above.

Eleven patients with cerebral arteriovenous malformations had been treated by this technique at open oper-

ation, although the author intended eventually to employ stereotaxis. Selection of patients had been influenced by the situation of the anomaly and by the view that age or general condition precluded surgical resection. Illustrative cases were described. One patient came to necropsy three weeks after operation after a pulmonary embolism from a femoral venous thrombosis. The malformation was completely thrombosed. Postoperative angiographic studies of the remaining 10 patients showed total disappearance of the shunt in five cases and considerable reduction in the others.

CRANIOPHARYNGIOMA—A RADIOLOGICAL TECHNIQUE FOR OUTLINING THE ANATOMY OF LARGE CYSTS

J. C. TAYLOR (Derby) presented details of a technique to demonstrate the radiological anatomy of a cystic craniopharyngioma more directly and completely than was achieved by the usual procedures of ventriculography and cerebral angiography. The method was derived from that used to outline cerebral abscess with the fine barium suspension known as Steripaque. The cysts were aspirated through an appropriately situated burr hole and 1 ml. Steripaque was injected. This was repeated as often as necessary, the barium becoming incorporated into the capsule as it is in the capsule of an abscess. Serial cystograms would subsequently demonstrate the size and position of the cyst and its extensions.

Four cases were described and their cystograms were shown. In one series a cyst was clearly outlined which extended through the foramen magnum, although other contrast studies had failed to suggest this. The treatment in these four cases was by radiotherapy after aspiration.

TEN-YEAR EXPERIENCE WITH A NEW METHOD IN THE TREATMENT OF CRANIOSYNOSTOSIS

A. J. M. VAN DER WERF (Amsterdam) had employed two methods to prevent bony regrowth and secondary closure of craniectomy channels in the treatment of craniosynostosis. In six cases dural strips were replaced by fascia lata, and in 23 cases the outer layer of the dura was dissected from the deeper layer and was sutured to the periosteum. The surgically produced 'sutures' remained patent in all cases, in some for as long as 10 years. Appositional bone formation occurred at a later date in those cases in which fascia lata was employed but it was thought that the dural layer method resulted in a better cosmetic result. Dissection of the outer layer of dura was not regarded as presenting difficulty and was the recommended procedure.

FRACTURE-DISLOCATION OF THE PETROUS TEMPORAL BONE

In the course of an investigation of traumatic paralysis of the 5th nerve by J. C. DE VILLIERS (Cape Town) some aspects of the mechanics of crush fractures of the skull were re-examined. He first described, with photographs of specimens, the anatomy of the petrous temporal bone and its relationship to surrounding structures. Horizontal and oblique crush fractures had been produced in eight fixed cadaver heads employing a type of vice used by

bookbinders. A further series of photographs was then shown of dissections of the upper brain-stem showing the 5th nerves and the structures in the vicinity of the apex of the petrous bone. Serial photographs and radiographs had been taken while the crushing was in progress and again at the end of each procedure when the crushing force had been released. An attempt was then made to correlate the findings in these experiments with the clinical features of six patients with clinical and radiological evidence of petrous dislocation. It was concluded that, because of certain types of deformation of the base of the skull, the petrous bone might be dislodged in a postero-medial direction from its normal position due to opening of the petrosphenoid and petrosquamous sutures. As a result of this bony displacement, the 5th and 6th nerves might be damaged by stretching or by involvement in the fracture line. Extension of the fractures laterally into the middle ear produced deafness and facial weakness and the function of the temporomandibular joint might be disturbed by disruption of the petrosquamous fissure in the glenoid fossa. Medially the displaced petrous apex might damage the carotid artery and cause a carotid cavernous fistula. It was suggested that this syndrome and its variants might occur more frequently than had been hitherto suspected.

SURVEY AND FOLLOW-UP OF 225 CONSECUTIVE PATIENTS WITH A DEPRESSED SKULL FRACTURE

R. BRAAKMAN (Rotterdam) had undertaken a retrospective study of cases of depressed fracture of the skull who had been admitted to his department during the past 10 years. He included only those patients admitted within 48 hours of the accident and assessed their present condition in relation to the injury. The 225 cases under review were also compared with the 400 Glasgow cases reported by Miller and Jennett in 1968.

As in the Glasgow series 85% of the cases were male and of the 196 survivors information was available about 177; 44% were under 16 years of age. Only 14% of fractures were classified as closed, whereas Lewin had found closed and compound fractures in equal numbers. In this, and also regarding dural penetration, the Rotterdam and Glasgow figures were similar.

The incidence of epilepsy, both early and late, was less than in the Glasgow series, although the mortality rate was significantly higher. In relation to practical management, as a result of this study, they felt that bone fragments should usually be replaced. There were five infections in 109 cases with replacement and the same number in 56 cases where the fragments had been completely removed. Antibiotics were administered to some cases but not to others without any apparent plan or, as far as could be seen, any influence on the incidence of infection in the two groups.

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HEMICRANIECTOMY IN THE TREATMENT OF ACUTE SUBDURAL HAEMATOMA

J. RANSOHOFF and V. BENJAMIN (New York) gave an account of their experiences of a regime of treatment for patients with acute subdural haematoma demanding surgery for the preservation of life within the first 24 hours after injury. They referred to the very high mortality reported in this type of head injury, which, in their own department, previously amounted to 75% with very few patients restored to normal life. Death had resulted from brain-stem compression, torsion, and secondary haemorrhage, but, at necropsy, few had shown what had been regarded as primary brain-stem lesions. General factors over which the surgeon had no control were:

1. The severity of the initial brain injury.
2. The rapidity of haematoma expansion.
3. The age and poor general condition of the patient.

Factors which the surgeon should be able to influence were:

1. Delay in diagnosis and treatment.
2. Inadequate removal of clot and pulped brain.
3. Failure to control haemorrhage.
4. No provision for the accommodation of secondary cerebral oedema.

Diagnostic evaluation, including emergency cerebral angiography, proceeded simultaneously with general resuscitation, intubation, and respiratory assistance when necessary and the use of intravenous dehydrating agents (mannitol, 2 g/kg, intravenously). Operation was undertaken immediately on patients shown by angiography to have large, unilateral subdural haematomas. Essentially, this consisted of the removal, using the air drill, of a very large fronto-temporo-occipital bone flap through a skin incision from the glabella to theinion and thence laterally. The squamous temporal bone was removed to the base of the skull. An equally large dural flap was hinged medially. Clot and pulped brain (only) were removed and haemorrhage from bridging veins and lacerated brain controlled. Subsequently electrolytes and blood gases were controlled and tracheostomy performed in 48 hours if necessary. Corticosteroids and anticonvulsants were administered.

Twenty patients had been so treated during a two-year period. On admission 10 showed bilateral and five unilateral decerebration, and five made no response to stimulation. There were eight deaths, one coma vigil, and one hemiplegia. Eight patients (40%) returned to their pre-accident employment and two made a partial recovery. There were no survivors over the age of 65, with a haematoma larger than 500 ml., when treatment had been delayed or when in the immediate preoperative period both apnoea and bilaterally dilated and fixed pupils were present.

STEREOTAXIC TREATMENT OF PAIN

M. P. A. M. DE GROOD (Tilburg) outlined current views on the three main afferent pathways for pain.

1. The classical spinothalamic tract terminating in the posteroventral thalamic nuclei. Lesions in this group of