powered devices. The IPOT was completely implantable so that no tubes or wires were required to penetrate the skin. It had a sensitivity of 2 mm water, and zero drift, which had been a substantial problem with most other transducers, had been eliminated by hermetic sealing of the transducing element. Evaluation of the IPOT was carried out by implantation in 11 dogs, and both epidural and ventricular pressures were measured simultaneously varying from hours to 12 weeks. The optimal parameters for insertion were determined. Epidural pressure was found to be a linear function of intraventricular pressure with a correlation of 0.998 in both acute and chronic implants. Epidural pressure was found to be higher than intraventricular pressure in the chronic implants because of fibrosis of the dura mater beneath the transducer. The dural stress force thus produced created a fictitiously high epidural pressure. Dural fibrosis not only caused absolute pressure differences but also decreased the measured epidural pressure response to changes in intraventricular pressure due to stiffness of the transducing membrane. An accurate correlation of epidural pressure with intraventricular pressure in chronic implants would depend on the use of special materials to minimize dural fibrosis. Despite the problems created by dural fibrosis, the IPOT performed well and provided reliable and sensitive measurements of epidural pressure in chronic implants.

TRAUMATIC EXTERNAL HYDROCEPHALUS

WALPOLE LEWIN (Cambridge) read a paper on external hydrocephalus after trauma.

BENIGN INTRACRANIAL HYPERTENSION: RESULTS OF TREATMENT BY DEHYDRATING AGENTS

A. A. JEFFERSON (Sheffield) had treated 26 patients with papilloedema but no intracranial tumour during the past 18 years. Twenty-one of these were treated by non-surgical means, and all were female and overweight. Although most of the patients were aged less than 26 years, older patients were also affected by this disease. A sequence of dehydrating agents had been used over the years. These were: oral urea 1.0 g/kg/d, oral glycerol 1.0–1.5 g/kg/d, hydroflumethiazide 100 mg every other day, chlorthalidone 200 mg every other day.

With the newer diuretics potassium supplements had been prescribed. While on dehydration therapy the patient's total daily fluid intake had been limited to 900 ml. The patients had also been encouraged to lose weight. The success of the therapy had been controlled by serial measurements of the blind spot, and these had been obtained on a Bjerrum screen at 2 m using a 16 mm white object. Eight points had

been plotted to give an octagonal figure, the area of which was derived from the formula

$$\sqrt{\frac{(a+b)(c+d)}{2}}$$

where a = half the vertical height of the blind spot, b = half its width, and c and d = half of each of the two diagonals. It had been shown that this formula provided a useful approximation to the blind spot area and gave consistent results. The success of dehydration therapy had been shown not only by a reduction of blind spot size but also by the fact that no serious loss of visual acuity occurred in any of the patients treated. Confirmation of the validity of the blind spot measurements had been obtained by fluorescein angiography and colour photographs.

In future, fluorescein angiography was likely to be mainly of value in assisting diagnosis in cases of doubtful papilloedema. Some patients developed mild optic atrophy which was not accompanied by functional loss of vision.

It was concluded that neither surgery nor steroid therapy were necessary for the management of papilloedema in the overweight female and that Chlorthalidone appeared to be the most efficient of the dehydrating agents which had been studied.

AVOIDANCE OF SHUNT DEPENDENCY

JOSEPH RANSOHOFF AND FRED EPSTEIN (New York) observed that total shunt dependency with all its sequelae is a frequent complication of shunting procedures used in the treatment of hydrocephalus. Most authors with extensive experience of the treatment of hydrocephalic children had reported only a 25–30% success rate over a 10–15 year follow-up period. To eliminate or minimize shunt dependency the authors had attempted to avoid implanting shunting systems and had attempted to arrest hydrocephalus by cranial compression with resultant increase in spinal fluid absorption. If this form of therapy were contraindicated or unsuccessful, an 'on-off' shunt was inserted to drain CSF electively, and attempts were made over extended periods to discontinue use of shunting systems. The aim of this procedure was to achieve a state of compensated hydrocephalus. If this aim were not realized and it was clear that a child needed to remain dependent on a shunt, an effort was made to maintain the ventricles at a larger size than normal while preserving a minimum of 3 cm of frontal cortical mantle.

The authors believed that this regime would make future obstructions of the ventricular ends of shunts less common and would facilitate revisions of shunts. Should a child with small ventricles become shunt dependent despite all these measures, subtemporal craniectomy was advocated to allow the lateral

ventricle on the side of operation to increase in size and make catheter obstruction less likely.

CSF 'PULSE PRESSURES' IN HYDROCEPHALUS

ELDON L. FOLTZ and SCOTT LEDERHAUS (Irvine, California) had recorded ventricular CSF pressures and subdural pressures in 16 normal dogs, two hydrocephalic dogs, and 10 hydrocephalic humans. The aim of this study had been to record the characteristics of the transcerebral pressure of the pulse wave generated in the ventricle by the choroid plexus, and to record CSF 'pulse pressure' relationship to mean CSF pressure relative to peak-to-peak pressure ranges, characteristic waveform and duration, and latency of appearance of the pulse pressure as related to the cardiac QRS complex.

It was concluded from this study that the intracranial CSF compartment acted normally as a dampening and absorbing system modifying the 'water hammer' action of the pulse pressure which presumably originated from the choroid plexus in the ventricles. This effect was apparently the result of expansion of the limiting membranes of the CSF compartment. This might represent part of the so-called 'ventricular compliance' which was an early compensatory factor in hydrocephalus. The venous volume of the brain also acted in a similar manner to reduce the impact of the pulse pressure on the brain. Further indirect evidence to support the concept that the amount of pulse pressure was a critical factor in progressive ventricular enlargement in hydrocephalus was provided by the observation that head compression in the expansile heads of infants with hydrocephalus produced an increased mean pressure but a reduced pulse pressure.

TUMOURS OF THE CLIVUS OF BLUMENBACH

EDWARD S. CONNOLLY and JAMES DOMINGUE (New Orleans) discussed their experience of clivus tumours and reviewed the world literature. Differential diagnosis, clinical course, pathology, and therapy were discussed.

RESULTS AND COMPLICATIONS OF TRANSLABYRINTHINE AND TRANSTENTORIAL APPROACHES TO 60 ACOUSTIC NERVE TUMOURS

T. T. KING (London) had totally removed 60 acoustic nerve tumours by a translabyrinthine or a translabyrinthine-transtentorial approach. The translabyrinthine surgery had been carried out by the otologist and the tumours had been removed by the neurosurgeon. Twenty-nine tumours were large (exceeding 3 cm in diameter), and the remainder were medium sized (1.5–2.5 cm in diameter), or small (intracanalicular). There had been one death. No patient was totally disabled after operation. Of

those with intracanalicular tumours five had returned either to work or to normal activities and one was independent subject to some limitations. All of the patients with medium sized tumours had returned to work. Twenty-six of the patients with large tumours had resumed work, and two patients with large tumours were independent with some limitation of activity. The facial nerve was preserved in all patients with small tumours, in 21 of the 25 with medium sized tumours, and in two of the 29 with large tumours. Facial nerve function was normal in one of the patients with small tumours, in 13 of those with medium sized tumours, but in none of those with large tumours. Slight facial weakness and asymmetry were present in four of the patients with medium sized tumours and in one of those with large tumours. Five of those with small tumours had well-marked facial weakness associated with mass movements. Four of those with medium tumours and one of those with large tumours also had facial weakness and mass movement. The principal complications of these procedures had been 11 cerebrospinal fluid leaks from the ear requiring further operation, temporal lobe epilepsy in 18% of those operated on by a transtentorial approach, and dysphasia in four of 17 patients undergoing transtentorial operations on the left side.

ACADEMY AWARD PAPER

RICHARD L. RAPPORT (Seattle) described the use of phenytoin (Dilantin) in the control of experimental epileptogenic foci in cats.

EFFECT OF TRAUMA ON SPINAL CORD BLOOD FLOW IN MONKEYS

W. GEORGE BINGHAM, JR (Columbus) had used indicator fractionation techniques utilizing [^{14}C] and antipyrine to measure spinal cord blood flow in normal and in bluntly traumatized spinal cords of adult male Rhesus monkeys. The injuries had been inflicted by dropping 20 g weights from a height of 15 cm on to the exposed T6 segments of the cords. The dura mater had been left intact in each case. Control tissue had been obtained from the T2 segments which had not been injured. After injury the animals had been allowed to survive for periods varying from five minutes to four hours. Arterial pressure, blood gases, and end-expiratory CO_2 were monitored throughout the experiment. During each experiment 25 μCi of [^{14}C] antipyrine were injected intravenously. Each animal was killed by being injected with a 5 ml bolus of saturated KCl. Four animals underwent laminectomy without cord trauma and served as laminectomy controls. Eight animals were not submitted to surgery and were used for the study of normal flow rates in several cord segments. In both the experi-