PROCEEDINGS OF THE SOCIETY OF BRITISH NEUROLOGICAL SURGEONS: 56th MEETING

The 56th meeting of the Society of British Neurological Surgeons was held in London on November 15 and 16, 1957. The Society met at the London Hospital on November 15, with the President, W. R. Henderson (Leeds), in the chair and held a combined meeting with the Association of British Neurologists on November 16 at the National Hospital, the two Presidents, W. R. Henderson (Leeds) and Sir Charles Symonds (London), occupying the chair in rotation.

On Certain Tumours of the Third Ventricle

D. W. C. Northfield (London) discussed certain aspects of a group of intrinsic tumours invading the anterior part, or the whole, of the third ventricle. Rathke pouch tumours, pituitary tumours, colloid cysts, basal ganglia tumours, and those restricted to the posterior part of the third ventricle were excluded.

Amongst 17 such cases a group emerged in which emaciation had been pronounced. It comprised six infants aged (when first seen) 1 year 4 months to 3 years 6 months. In two older patients (16 years and 21 years) loss of weight was commented upon, but in one child of 3 years and two of 8 years with tumours in this situation wasting was not found.

Skeletal growth had not been affected and some of the six infants were above average in length. Appetite at times had been voracious. In due course other neighbourhood symptoms (diabetes insipidus, loss of vision) and symptoms of raised intracranial pressure developed with enlargement of the head. Examination usually revealed optic atrophy with or without papilloedema and often little else abnormal in the central nervous system.

Skull radiographs in some showed separation of the sutures and enlargement of the sella turcica. Investigations might reveal depression of adrenal function. Ventriculography and craniotomy had confirmed the site and nature of the tumours which in the infants had been astrocytomas. Where palliative treatment had prolonged life for several years, the emaciation was gradually replaced by obesity but the child remained blind and mentally defective with varying degrees of other neurological deficit.

Case Report.—N.S. (Case No. 6906) was referred by Dr. Alex Russell for a diencephalic syndrome of wasting. The child was normal until the age of 2½ years when he began to waste away though growing normally; he had occasional headache and vomiting. At the age of 3 years height was 39½ in. and weight 28 lb. There was slight excess of hirsutes; vision and skull radiographs were normal. An air encephalogram was normal except for imperfect filling of the anterior extremity of the third ventricle. In the next two years he grew nearly 2 in. but gained only 4 lb. in weight; thereafter he became obese. At the age of 8½ years, after minor trauma to the head, there was rapid failure of vision and a return of the headache and vomiting. Readmitted to hospital, height was 49½ in., weight 61½ lb. He was obese, the trunk hairless, and the genitalia diminutive. There was bilateral papilloedema and optic atrophy; he was nearly blind. Radiographs showed evidence of raised intracranial pressure and a large sella. Ventriculography showed dilated ventricles and an obliterated third ventricle. This was followed by an exploratory craniotomy. The child died later and necropsy showed a massive piloid astrocytoma filling the third ventricle.

Growth Hormone: New Prospects

A. Stuart Mason (London) discussed new prospects with regard to growth hormones. It was noted that growth hormone, prepared from cattle pituitaries, had never produced significant protein anabolism or growth in humans. Even pure bovine growth hormone, first isolated by Li and Evans in 1944, had proved very potent in rats but not in man. This led to the suggestion that primate pituitary growth hormone was a different substance to the bovine hormone. Knobil and Greep (1956) demonstrated that growth hormone prepared from monkey pituitaries caused protein anabolism in the monkey, whereas bovine growth hormone was ineffective. Li and Pankoff (1956) obtained a pure preparation of monkey and human growth hormone and found that they were different substances to the bovine hormone. Both monkey and human growth hormones were polypeptides with a molecular weight of about 26,000 compared with 46,000 for bovine growth hormone. Raben (1957) prepared growth hormone from human and monkey pituitaries, getting a rather high yield from the former. Using these preparations on a dwarf, with a craniopharyngioma, Beck, McGarry, Dyrenfurth, and Venning (1957) obtained marked protein anabolism with concomitant calcium retention.

His present investigations recorded the effects of growth hormone, prepared from human pituitaries by Professor F. G. Young. Five milligrams were injected on two successive days into a dwarf aged 19 years, height 4 ft. 2 in. with panhypopituitarism due to a craniopharyngioma. Average daily nitrogen retention over five days from the first injection was 2 g. Sulphur and phosphorous retention was in the same proportion to nitrogen as found in protoplasm. There was a short period of increased urinary calcium loss. Salt and water retention occurred for five days, followed by a diuresis. Potassium
was retained for two days. Storage of sodium and potassium was not consistent with an A.C.T.H.-like effect. Serial radio-iodine uptakes showed no change, indicating the absence of T.S.H. from the preparation. A slight drop in urinary chloride concentration and no rise in urinary specific gravity indicated no contamination by posterior lobe hormones.

References

Follow-up of Cerebellar Astrocytomas in Relation to their Pathology
J. V. Crawford, L. J. Rubinstein, and D. S. Russell (London) presented a follow-up study of cerebellar astrocytomas in relation to their pathology. The post-operative fate of 60 cases when correlated with the microscopical structure of the tumour indicated that these tumours were divisible into two groups.

The first, which could conveniently be called "juvenile", accounted for about 80% of their pathological material of 70 cases and arose in early life. The mean age of the group was 9 years. Long survival, up to 20 years or longer, was the rule even when only part of the tumour had been removed (seven cases). Microscopically this juvenile form was of the kind frequently labelled as "polar spongioblastoma"; it was, however, composed of stellate astrocytes as well as piloid cells and should be regarded as a form of astrocytoma. Occasionally, recurrence of growth demanded further operation and, in one such example, evidence of anaplasia was noted in the recurrence. Vascular endothelial proliferation and invasion by the tumour of leptomeninges had been observed in several instances when only part of the tumour had been removed; nevertheless, these patients still survived after long periods.

The second type was of "diffuse" character, comparable to the cerebral astrocytomas and was uncommon (12 cases). These mostly arose in adults, the mean age being 24. Of the eight examples followed up, five died soon after operation. Like the cerebral astrocytomas they were prone to undergo anaplasia (six cases). In two further patients who died shortly after operation the appearances were indistinguishable from those of glioblastoma multiforme.

"Recurrent" Medulloblastoma
Campbell Connolly (Birmingham) discussed the problem of recurrent medulloblastomas. A review of the literature indicated that a few cases of cerebellar medulloblastoma (Bailey, 1930; Lampe and MacIntyre, 1954; Penfield and Feindel, 1947) after being treated in the first instance by operation and deep x-ray therapy, developed obstructive hydrocephalus without the recurrence of a large growth. Three such cases were described. In these, there was a small amount of viable tumour tissue in the cerebellar vermis and this showed evidence of degeneration due to the irradiation. However, in each case the obstruction at the outlet of the fourth ventricle was due to the formation of fibrous and glial tissue rather than to tumour. It was considered more likely that this collagen and glia formed as a result of the irradiation than as a reaction to the tumour.

It was therefore suggested that ventriculography should be performed in patients with previously treated cerebellar medulloblastoma if they should show evidence of recurring symptoms and signs suggestive of a lesion of this type. If this investigation confirmed the presence of obstructive hydrocephalus without obvious recurrence of tumour, operation to relieve the obstruction was indicated in the first instance as opposed to further deep x-ray therapy.

References

Cold Agglutinins as a Complication of Hypothermia
S. D. K. Stride (London) gave a preliminary communication concerning this problem.

Pituitary Destruction by Hypophysectomy and Radioactive Implant for Hormone-dependent Cancer
G. A. Gleadhill (Belfast) discussed the apparent difficulty of obtaining total ablation of pituitary activity in the treatment of hormone-dependent cancer and described a technique of subtotal removal reinforced by filling the surgically cleared fossa with a mixture of 10 millicuries of yttrium-90 in 0.8 ml. dental impression wax. The radioactive wax was received as a sterile pellet from Harwell on the day of operation and after being rolled into a thin cylinder was forced into the pituitary fossa by means of a simple syringe designed for the purpose.

Ocular radioactive complications had occurred, two cases having homonymous hemianopia, but no chiasmal damage since a thick piece of muscle had been interposed between wax and chiasma. Four cases of left-sided third nerve paralysis had occurred, due to some wax having been forced into the cavernous sinus through a tear made during curettage. This complication had been avoided by more careful manipulation of the wax when a tear was suspected.

Twenty-one cases had been treated by this method, with three deaths ascribable to operation. Four cases were too recent for hormonal assessment. One case died from an unrelated cause two weeks after operation, in clinical remission but without hormone assay. Of the remaining 13 hormonally-assayed cases, one, which had an unsatisfactory implant, was a failure hormonally and clinically. The other 12 showed absent hormone activity post-operatively. Two of these were, however, clinical failures; they were two cases of local breast disease only, with normal pre-operative radioactive iodine utilization figures of 50%. The other 10 cases are all in clinical remission; they all had blood-borne metastases with pre-operative radioactive iodine uptake figures of 30%.
Some Interesting Tumours Causing Destruction of the Skull Vault

G. K. Tutton (Preston) presented three cases of extensive destruction of the vault of the skull caused by tumour. Two of these cases turned out to be meningiomas and the third a form of meningeal sarcoma. In all three cases, the history, presentation, and subsequent history showed interesting points. Surgical removal was attempted in two of the cases, one of which ended fatally. In the third case, which had been thought to be a secondary tumour from a mule spinner’s cancer of the scrotum, no operation on the head was carried out, the patient dying from the effects of prostatic obstruction.

Case 1.—71-year-old man with a history for two-and-a-half years of a pulsating swelling on the vertex, whose presence had been preceded by a transient attack of left paresis about a year before. When first seen, he had a small swelling just to the right of the midline in the mid-parietal region. His visual acuity was greatly diminished and he had a left hemiparesis. Radiographs of the skull showed an erosion in this area. In view of his age, the poor vision, and the paresis, operation was not advised. Fourteen months later he was seen in a chronic bed. The tumour on the head had increased enormously but his neurological condition had even improved slightly, although he was confined to bed and had a severe left hemiparesis. Under pressure from the patient, his relatives, and being impressed by his comparative well-being, investigations were undertaken. The radiographs and angiograms revealed a grotesque degree of destruction and vascularity. Despite the size of the tumour, the function of the right-sided limbs was normal. He was kept in a continuation hospital for two months and given physiotherapy, encouragement, and good food, so that he could walk around with help. A urea clearance test was 40% normal. After full explanation of the risks involved and under pressure from the patient and relatives to remove the lump from the top of the head, operation was undertaken. Under hypothermia and clamps on both carotids in the neck and the help of hypotension, 780 g. of meningo-meningioma were removed. The dura was not opened. The patient died 12 hours later. Necropsy showed extensive bilateral involvement of the falx and longitudinal sinus. Complete removal was probably a technical impossibility.

Case 2.—A 74-year-old man, a mule spinner for 60 years, presented with a painless, non-pulsating lump on the back of the head, the size of a large orange. Neurological examination revealed an attention defect in the left homonymous field, no evidence of raised intracranial pressure but very mild weakness of the left arm. On the scrotum there was a typical mule spinner’s cancer without regional nodes. A radiograph of the skull showed gross destruction in the posterior parietal area. No angiogram was performed because needle biopsy of the tumour suggested that it was of the same type as the scrotal cancer, which had been excised. The patient died three months later from the effects of a transurethral resection of the prostate. At necropsy the tumour on the skull was found to be a typical meningo-meningioma involving both sides of the falx, almost certainly inoperable.

Case 3.—A woman of 57, in October, 1956, after a fall in the garden developed headache and difficulty in finding the right word. By December, 1956, she had weakness of the right arm and was becoming drowsy and she had evidence of dysphasia. She was admitted to hospital where a tense swelling in the left posterior parietal region was found which on radiology showed a destructive lesion of the bone in this situation. Her condition deteriorated and she became very unresponsive with a right hemiparesis. Needle biopsy secured blood and some pieces of tumour which were reported as being malignant cells, showing mitotic figures. In view of the rapid onset, no operation was advised. The patient was transferred to another hospital and no more heard until six months later when she walked into the Out-patient Clinic. Apparently she had recovered consciousness two weeks after transfer and had then taken her own discharge from hospital and three months later returned to her job as a music teacher. On examination in June, 1957, there was no lump in the parietal region but a bony defect could be palpated. Radiographs of the skull, however, showed an extension of the destructive process. The patient declined further treatment for another two months when she was admitted for an angiogram in August, 1957. At this time the lump had reappeared in the parietal region and also a second lump under the skin had appeared near the external occipital protuberance. Pre-operatively, the tumour was thought to be a meningioma, despite the original biopsy. At operation, the larger of the two tumours was removed, together with a ring of surrounding bone and dura. The tumour was soft, red, and extremely haemorrhagic, and was entirely outside but involving the dura mater. The histological report stated that it was a sarcoma? of meningeal type but resembling Ewing sarcoma. The causes of the peculiar behaviour of this tumour were discussed.

Whilst no general conclusions could be drawn from these few cases, another case of meningo-meningioma was mentioned, which had been present for 18 months in the posterior parietal region and was involving both sides of the falx and actually coming through the bone and underneath the scalp. It was completely removed. If operation is to be at all successful in this type of tumour, then it must be early. Involvement of the longitudinal sinus, the actual size of the tumour, and the technical difficulty of dealing with such a large mass constitute the main surgical difficulties.

Experiments on the Phrenic Nerve of the Seal

R. J. Harrison (London) discussed the results of various experiments on the phrenic nerve of the seal. He stated that it was known that the common seal (Phoca vitulina) exhibited a reflex bradycardia on diving from about 130 beats to 10 beats per minute. It was also known that seals possess certain curious adaptations in their venous system, namely, a caval sphincter rostral to the diaphragm, an hepatic venous sinus and a large extra-dural intravertebral vein connecting cranial venous sinuses to the renal veins and having many anastomoses with other venous lines (Harrison and Tomlinson, 1956). The striated muscle of the sphincter was supplied by a branch of the right phrenic nerve; the sphincter did not contract when the diaphragm contracted during respiration. It could be shown experimentally that the sphincter was capable of occluding venous return from the abdomen at least in a surfaced animal. Recordings were played to indicate variation in the bradycardia in seals dived to different depths for varying times. It appeared
that the animal exhaled forcibly at the start of a dive. Section of the right phrenic nerve slowed the rate of development of the bradycardia, section of one vagus caused irregular slowing, section of both vagi obliterated the bradycardia. The anatomy of the right phrenic nerve was described, including the number of fibres, their size and distribution and the connexions with the recurrent laryngeal nerve and the sympathetic chain.

Reference

The Surgical Approach to Thoracic Intervertebral Disc Protrusions
A. Hulme (Bristol) discussed the operative surgery of thoracic intervertebral disc protrusions. He noted that the results of attempts to remove thoracic intervertebral disc protrusions, using a standard laminectomy approach, were often disappointing. The hardness and anterior situation of the lesion necessitated harmful manipulation of the cord, which was often already in jeopardy from vascular changes. The operation of simple decompression and division of denticulate ligaments left the primary lesion untreated.

An alternative approach was suggested by the operations of anterolateral decompression and lateral rachotomy in Pott's disease.

Three cases operated on by the anterolateral approach were described. In each, a hard protrusion was removed with little difficulty and minimal manipulation of the cord. The first case was already paraplegic following a standard laminectomy, and remained so. Both subsequent cases, showing moderate motor and sensory deficit pre-operatively, made virtually complete recoveries.

The operation was conducted with the patient prone. After resection of the medial portions of a rib (including the head and neck) on each side of the affected disc space and enlargement of the intervertebral foramen, the disc protrusion was undercut, using a high-speed surgical burr. The protrusion was depressed into the hollow and withdrawn, with little disturbance to the cord.

An accurate pre-operative diagnosis was essential. Characteristic radiological changes in the spine, especially calcification in the disc spaces or posterior osteophytes, were often helpful. Careful myelography was essential to determine the exact level of the lesion and to confirm its anterior situation.

The E.E.G. Investigation of a Case of Epilepsy
S. L. Last (London) discussed one case and showed extracts of the electroencephalograms and electrocorticograms obtained and demonstrated the type of intracranial electrodes used. The case was one of a man, aged 37, who for 10 years had attacks of psychomotor epilepsy. These had become very frequent and at times occurred every 10 minutes and he usually had at least four a day. Lately the attacks were preceded by joyless laughter. Eleven records were taken before the operation. These included activation by over-breathing, " seconal ", and chlorpromazine. Five of the records were derived from implanted electrodes; some of these were lying on the surface of the brain, others were inserted in the substance. The findings were variable and showed abnormality to predominate sometimes on the right and sometimes on the left side. However, the most constant finding was of a high-voltage spike originating near the orbital surface of the frontal lobe. This was further confirmed by electrocorticography during a right-sided frontal craniotomy. An area containing the spike focus was excised. A fortnight later the E.E.G. still contained much abnormality on the right side.

A month after the operation the patient returned to work. Six-and-a-half months after the operation he had remained at work. He had had no more attacks and his record had become almost completely normal.

Radioactive Isotopes in Neurology
H. J. Crow (London) presented his views on the use and the value of radioactive isotopes in neurology. He considered that some confusion had resulted from the misinterpretation of results in experiments with radioactive isotopes. He agreed with Dr. R. Silverstone who had argued that much of the current confusion in thought about cerebrospinal fluid production and absorption arose from the failure to appreciate the differences between the flow of fluid and the exchange of ions across a semi-permeable membrane.

From his observations he concluded that at present the only practical use of a radioactive isotope in hydrocephalus was to give an index of cerebrospinal fluid movement, which might enable the effect of operation to be tested. The patient must be used as his own control. A simple technique was described for testing the patency of tubes in subarachno-peritoneostomy, subarachno-ureterostomy, and ventriculo-cisternostomy.

An experiment, performed on dogs, was described which was claimed to demonstrate the following points:
1. There was a blood-brain barrier to sodium, 20 hours being required for complete equilibrium.
2. In respect of sodium at least, cerebrospinal fluid behaved like an integral part of the extracellular fluid of adjacent nervous tissue.
3. The rate of uptake of sodium from the plasma into the central nervous system varied from region to region.

The explanation, which it was claimed had been demonstrated, was as follows. All regions of the central nervous system received sodium through their capillaries at the same rate. Cerebrospinal fluid flowing from the ventricles delivered extra sodium to the central nervous system, the proximal regions receiving their cerebrospinal fluid moiety of sodium before the distal regions.

The Surgical Treatment of Aneurysms in the Posterior Fossa
Valentine Logue (London) discussed the surgical treatment of posterior fossa aneurysms and presented the clinical and operative features of six personal cases. Consideration was restricted to aneurysms lying below the level of the tentorium on the vertebral and basilar arteries and their branches up to the bifurcation of the basilar artery. All the cases were examples of ruptured
saccular aneurysms with subarachnoid haemorrhage. Previous reports on these aneurysms had suggested that they were untreatable and had influenced neurosurgeons against making further investigations after negative carotid angiograms in cases of subarachnoid haemorrhage. Certain features, however, made their treatment somewhat easier than that of supratentorial aneurysms. They lay free in the subarachnoid space so that little brain retraction was needed to expose them, both vertebral arteries were easily visible in a posterior fossa approach, and the whole length of the basilar artery could be exposed through a transtentorial approach, and finally, the dual vertebral supply made occlusion of one artery a possibility. Clinical features were not considered in detail but experience had shown that some cases evidenced symptoms and signs pointing to a posterior fossa location whilst others could only be diagnosed by vertebral angiography, usually after a negative carotid angiogram.

Case 1 (Superior Cerebellar Artery).—A woman of 56 had suffered from migraine all her life and had had two attacks of suboccipital and right aural pain associated with transient unconsciousness. Signs: reduced corneal reflex on the right and bilateral extensor plantar responses. Carotid angiography was normal. Two further concomitantly occurring haemorrhages occurred leaving her with fifth sensory impairment, a sixth nerve paresis, and hearing loss on the right side. Vertebral angiography showed an aneurysm on the right superior cerebellar artery. Operation: transtentorial approach and removal of aneurysm after clipping the artery on either side; section of the fifth nerve was necessary. Six years later leading a normal life and fifth nerve anaesthesia and slight facial contracture the only residual signs.

Case 2 (Basilar Artery).—A woman of 49 had one subarachnoid haemorrhage. A carotid angiogram was normal. A vertebral angiogram showed an aneurysm at the upper end of the basilar artery, its apex giving rise to both posterior cerebral and superior cerebellar arteries. Operation: by a subtemporal route confirmed this situation and the aneurysm was packed around with muscle. The patient is now leading a normal life without residual signs.

Case 3 (Posterior Inferior Cerebellar Artery).—A man of 25 had four subarachnoid haemorrhages. Normal carotid angiogram. Right vertebral angiography showed a normal right vertebral but poor filling of the basilar artery. A left vertebral angiogram showed the aneurysm on the left posterior inferior cerebellar. Operation: posterior fossa approach and a large aneurysm clipped at its base, leaving the derivate vessel intact and sac removed. Recovery complicated by a tentorial block and hydrocephalus requiring anterior third ventriculostomy. A year later had returned to light work and the only residual signs were nystagmoid jerks and difficulty in balancing on one leg.

Case 4 (Vertebral Artery).—A woman of 50 had one subarachnoid haemorrhage. Carotid angiogram was normal. Vertebral angiography showed a saccular aneurysm of the left vertebral arising by a neck. Operation: base of aneurysm occluded by a clip. Two and a half months later was doing normal housework and her only residual sign was a spinal accessory weakness.

Case 5 (Vertebral Artery).—A woman of 47 had three attacks of subarachnoid haemorrhage with greatly reduced vision from retinal haemorrhages. Normal carotid angiogram, but a vertebral angiogram showed an aneurysm of the right vertebral artery. At operation the aneurysm was found to be a saccular dilatation of the vertebral artery. The vertebral artery was occluded proximally with a clip. She developed ischaemic signs and recovered slowly from these. Nine months after operation she was doing housework, vision remained very poor, there was a right Horner's syndrome, and considerable ataxy of gait.

Case 6 (Vertebral Artery).—A man of 55 had two subarachnoid haemorrhages. Carotid angiograms were normal. A vertebral angiogram showed an aneurysm on the left vertebral artery and spasm of the basilar. The aneurysm was found at operation to be a saccular dilatation of the vertebral artery and a proximal clip was applied. He developed mild ischaemic signs but made a good recovery. Fourteen months after operation he was doing light work and the residual signs were nystagmus and some sensory reduction in the right lower leg.

It was stressed that contrary to reported views proximal clipping of a vertebral artery reversed the blood flow in the vessel and profoundly reduced the pressure in it. The immediate decrease in the size of the sac and pulsation and the later development of ischaemic signs was sufficient proof of this. The freedom from bleeds following operation was further clinical proof of its value. It was further emphasized that a careful search for evidence of a posterior fossa location would avoid the necessity for carotid angiography and that vertebral angiography would be carried out as a routine when carotid angiograms were normal in cases of subarachnoid bleeding.

Footballer's Amnesia

John Potter (Manchester) discussed the question of a particular type of amnesia encountered in football injuries. Cases of mild head injury where the blow was remembered and yet post-traumatic amnesia (P.T.A.) followed were unusual. Russell and Nathan (1946) suggested that delayed P.T.A. indicated "vascular complications"; in accidental head injuries its incidence was 2-5% but in gunshot wounds 14%.

In one year at the Radcliffe Infirmary, Oxford, almost all of 522 patients with head injuries were questioned about their amnesia. Ten had no retrograde amnesia (R.A.) but P.T.A. started about a second to 15 minutes after the injury and lasted from a few minutes to about two hours. This general incidence of about 2% compared with Russell and Nathan's 2-5%. Almost all the remaining cases had amnesia and this was of the conventional pattern of R.A. and P.T.A.

Of the 522 cases, 19 were football injuries and six of these showed P.T.A. only, a remarkable incidence of 30%.

None of the cases with P.T.A. only appeared to have had a fit, but syncope may have occurred in three. Subarachnoid and subdural bleeding was present in another. Only two cases showed any resemblance to Denny Brown's (1941) cases of "delayed collapse".

Vascular or vasomotor complications were the most satisfactory explanation of such a delayed phenomenon and it was interesting to recall the experimental findings of Denny Brown and Russell (1941) concerning stimulation of the vaso-glossopharyngeal system which was...
observed to occur even in sub-concussive injuries. In the cases under consideration it was possible that we were observing vascular effects which in more ordinary concussion were concealed by overlapping of the primary neuronal disintegration.

Why should football injuries provide such a disproportional number of these atypical cases? Trauma as focal and with as low a velocity as a kick should occur in a general run of some 500 other accidents to the head. Many injuries at football were received during a spell of marked physical exertion and it might be that these delayed effects were the result of a sub-concussive blow on the brain during a physiological state of the body that was not operative when most head injuries were sustained.

REFERENCES

Arterial Spasm in Subarachnoid Haemorrhage: Mechanical Considerations

R. J. Johnson, J. M. Potter, and R. G. Reid (Manchester) mentioned briefly the various factors which had been shown to influence the caliber of the cerebral arteries in experimental animals. Most important were (a) changes in systemic blood pressure, temperature, and CO₂ tension, (b) accumulation of metabolites, and (c) vasoconstrictor and vasodilator nerves. The changes in caliber produced were for the most part of minor degree, the gross vasoconstriction of spasm being produced solely by local trauma to the vessel wall.

There were, however, three pitfalls in the arteriographic diagnosis of spasm: first the vessels might be narrowed congenitally or by reason of arteriosclerosis; secondly, even if the diagnosis of spasm was only accepted (as should be the case) if the vessel was demonstrated both in its normal and constricted state, temporary narrowing might be produced by stretch of a vessel round an intracerebral clot or a large aneurysm; and thirdly, the appearance of narrowing might be produced by variations in blood flow. This was encountered in (i) non-filling of the anterior cerebral artery, often attributed to spasm as a result of needling the carotid, or as a result of spontaneous dissection of an atheromatous plaque but which might be produced by restricting the blood flow through the injected carotid, when both anterior cerebals filled from the opposite side, and (ii) streaming of the contrast medium which closely simulated spasm and which might be demonstrated by trickle angiograms.

True spasm of the cerebral arteries had been produced during neurosurgical operations so one need have no worry about the propriety of applying to the human brain this finding in experimental animals. It was probably seen best and in its purest form in the subarachnoid loops of the posterior inferior cerebellar artery which in some instances might be driven into spasm by merely twanging one of the supporting arachnoid bands. The vessel narrowed and also shortened and within a minute or less returned to normal. It was doubtful if this change produced any serious reduction in blood flow under physiological conditions: the trauma required was slight and certainly no more than might occur as a result of a head injury or the outpouring of blood into the subarachnoid space as a result of leakage from an aneurysm or angioma. It might also be observed at operation that vessels of the calibre of the middle and anterior cerebral arteries became smaller as the blood pressure was lowered by hypotensive drugs and a little manipulation at this stage encouraged the vessel wall to contract down, although it was difficult to be sure what degree of narrowing under such conditions constituted spasm.

Spasm was a major problem in the management of intracranial bleeding, for it might be a concomitant of pure subarachnoid haemorrhage (unassociated with any intracerebral clot) from a small aneurysm or angioma, and yet cause severe morbidity and not infrequently death. It only occurred when there had been bleeding and usually only in the presence of severe bleeding and it had several features: 1. It was confined to the intradural vessels. 2. It might be proximal or distal to the aneurysm and might be on the opposite side. 3. It was patchy and irregular and the length of involved segments varied considerably. 4. It was essentially proximal, always near the circle of Willis, frequently involved the carotid syphon and yet distal vessels were normal. 5. It caused slowing of the cerebral circulation. 6. The narrowing might persist for weeks, a feature which suggested structural changes in the vessel wall.

They observed that "spasm" was produced and maintained by the mechanical effects of the subarachnoid haemorrhage. Blood poured out from a "subarachnoid" aneurysm would fill the basal cisterns and travel along the subarachnoid spaces surrounding the main branches of the circle of Willis. Susceptible arteries would be thrown into spasm by physical stretch or by pull on attached arachnoid bands. Rapid return to normal failed to take place either because of intrinsic damage to the vessel wall or because of the surrounding blood clot. An added factor was the distortion and rotation that might occur at the carotid bifurcation by twist of the aneurysm as it bled; this lowered the local blood pressure and reduced the flow, accentuating the effect of the narrowing.

Recovery occurred at an interval which varied with the pathology, i.e. (1) the nature and extent of damage to the vessel wall, (2) the rate of dispersal of surrounding blood clot, (3) return to normal of a kinked main vessel, and (4) the final dissolution of arachnoidal adhesions formed around the vessel in response to the clot.

Carotid kinking and arterial "spasm" due to subarachnoid blood clot were demonstrated at operation and at necropsy, the "spasm" remaining unchanged in the post-mortem angiogram.

They suggested finally that a comparatively small amount of subarachnoid blood clot could maintain narrowing of main vessels and cause serious ischaemia and that this might be an indication for early surgery in an attempt to free the main vessels, quite apart from treatment of the aneurysm itself.

Intrathecal Phenol for Intractable Pain: Safety and Dangers of the Method

P. Nathan (London).
Intrathecal Phenol for Intractable Pain: Histological Findings

M. C. SMITH (London).

The Effects of Anterior Choroidal Artery Division

P. R. R. CLARKE and B. E. TOMLISON (Newcastle-upon-Tyne) discussed the effects of anterior choroidal artery occlusion. The importance of the functional anatomy of the anterior choroidal artery in neurosurgery was mentioned in relation to the surgery of Parkinsonism and of aneurysms of the circle of Willis. The discrepancy between the older views regarding its distribution (Abbie, 1934), and that of Cooper (1956), who had stated that the globus pallidus was the only area irrigated by the artery to have virtually no other constant source of blood, was discussed.

A case was described of a young man of 24, who underwent division of the left anterior choroidal artery in an attempt to improve his torsion spasm. In the immediate post-operative period there was a right spastic hemiplegia with weakness of the left superior oblique and inferior rectus muscles and right hemi-anaesthesia to light touch. Death from an unrelated cause took place seven weeks after operation and a detailed examination was made of the brain. An extensive area of infarction was found involving the upper portion of the middle third and some of the posterior third of the posterior limb of the internal capsule, the medial part of the globus pallidus and the neighbouring portion of the internal capsule, the ansa lenticularis, much of the amygdaloid nucleus, and some of the tail of the caudate nucleus and of the uncus.

It was stressed that the vascular system in this patient appeared entirely normal and that the anterior choroidal artery was the only one to have been divided.

REFERENCES


Diagnostic Cortical Biopsy: A Histological and Chemical Study

W. BLACKWOOD and J. N. CUMINGS (London)

The Significance of Lead Poisoning in Neurological Surgery

W. J. ATKINSON (London) described a case of lead encephalitis which had presented as a difficult diagnostic problem in the Neurosurgical Department of the London Hospital. The patient was a three-year-old child who had had 24 hours of malaise and projectile vomiting which was followed by rapid loss of consciousness. Anaemia had been diagnosed and investigated a year previously at a local hospital.

On admission he was unresponsive to painful stimuli, had Cheyne-Stokes respiration, inactive dilated pupils, and equivocal plantar responses. There was a recent perforation of the right tympanum but no evidence of chronic ear disease. Bifrontal and right temporal burr-holes revealed no collection of fluid; the lateral ventricles could not be tapped. By the following day he had improved considerably and had recovered completely in four days. Ventriculography revealed lateral ventricles which were of maximum size for a normal child. The E.E.G. records resembled superficially those of subacute vascular encephalopathy and virus encephalitis but returned to normal within a week. Erythrocytes showed punctate basophilia, the long bone radiographs showed lead lines, and the urine contained coproporphyrin and excessive concentrations of lead. He continued to remain well and received courses of calcium vasenate.

In America, lead poisoning usually presented in children with vomiting, convulsions, and papilloedema. Bucy and Buchanan (1935) and others had advocated and practised cranial decompression for their cases. In the acute case entering a neurosurgical ward the appearance of lead lines in the long bones radiographically was the quickest way to a diagnosis which could be confirmed later by finding coproporphyrins and excessive lead in the urine.

REFERENCE

Bucy, P. C., and Buchanan, D. N. (1935). J. Amer. med. Ass., 105, 244.

Symptoms of Cerebral Abscess since the Introduction of Antibiotics

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