or stenosis. Either result should be beneficial to the aneurysm patient. Procedures designed to restore the expansibility of the proximal arterial wall are referred to as the 'A' principle.

LATE MORTALITY AND MORBIDITY OF COMMON CAROTID LIGATION FOR POSTERIOR COMMUNICATING ARTERY ANEURYSMS: A COMPARISON WITH CONSERVATIVE TREATMENT

H. RICHARD WINN, ALAN RICHARDSON, and JOHN A. JANE (London and Charlottesville) had performed a follow-up study on an initial group of 78 patients of whom 41 had been assigned randomly to non-surgical management and 37 allotted common carotid ligation. None of the patients had been in coma. Treatment was given between 1958 and 1959. The results at six months had previously been published by McKissock *et al.* (1960). This study had followed the fate of the 26 patients surviving non-surgical treatment and the 34 patients surviving for at least six months after surgery. The longest period of follow-up was 14 years and the average period eight years. Fourteen patients were lost to follow-up. Late bleeding episodes were strictly defined according to the data available, and were related only to events after the six months follow-up period. Three groups of absolute, probable, or possible haemorrhage were considered. There was no demonstrable difference in the rebleeding rate over a 10 year period between the two groups of survivors, allowing for the various degrees of proof and the interdigitation of natural death and loss to follow-up. The morbidity of the surgical survivors continued to remain less than those untreated over the ensuing years of follow-up, but the morbidity in both groups changed little with the passage of time. Larger series would require study.

STUDY OF ANTERIOR COMMUNICATING ANEURYSMS

V. CHARLEZ and B. H. DAWSON (Salford) noted that even after small initial bleeds severe and repeated recurrent haemorrhages were apt to take place from anterior communicating aneurysms. Without surgical treatment the primary mortality of haemorrhage from anterior communicating aneurysms had been set as high as 40%. The results of surgery for these aneurysms could be judged properly only in the light of clear knowledge of the form and method of case selection and the form and method used to evaluate long term postoperative results. The authors presented a series of 115 patients, 107 of whom underwent angiography. Operation was performed in 79. The operability rate was 69%. There was considerable variation in the operability rate and in the operative mortality rate over the 17 years of survey. Seventy per cent of the patients had undergone

angiography within two weeks of the first haemorrhage and most patients were operated on within a week after angiography. Using a variation of the pre-operative grading system of Botterell and Hunt, and a grading system for postoperative results, the authors were able to show that most grade 1 cases did well with surgery and returned to full work. The overall mortality in 115 cases was 25% and the surgical mortality in 79 cases was 14%. The surgical morbidity in the 68 survivors after surgery was 26%. The authors concluded that reviews of the results of surgery for anterior communicating aneurysms must include careful pre- and postoperative gradings and details of operability rates.

DIRECT SURGERY OF ANTERIOR COMMUNICATING ANEURYSMS AND ITS EFFECT ON INTELLECT AND PERSONALITY

R. P. SENGUPTA (Newcastle upon Tyne) had analysed the quality of survival in 26 patients whose anterior communicating aneurysms had been clipped. Aneurysm obliteration had been carried out under controlled hypotension without the use of a microscope. At follow-up the patients were examined on the Wechsler adult intelligence scale and the Wechsler memory scale. A questionnaire was completed by the relatives of the patients. Mean test scores showed that the results were very close to those in a normal population with a mean IQ and memory quotient of 100 plus or minus 15. There was nothing to suggest that the group as a whole exhibited specific memory impairment. Relatives assessed only three cases as being of less good intelligence after the operation. It seemed that psychometric studies did not show any evidence of postoperative intellectual deficiencies in this group of patients but personality changes indirectly affected intellectual performance. There was a significant correlation between clinical grading before operation and loss of interest and initiative observed postoperatively. Early surgery in clinically satisfactory patients was compatible with a good outcome. It was concluded that the successful treatment of a ruptured anterior communicating aneurysm depended, firstly, on accurate dissection and isolation of the aneurysm neck without premature rupture or damage to perforating vessels, and, secondly, on the avoidance of vasospasm after surgery. The clinical condition of the patient remained the prime factor in determining the outcome of surgery.

INTRACRANIAL ARTERIOVENOUS MALFORMATIONS: A 26 YEAR EXPERIENCE

EDWIN B. BOLDREY and BYRON C. PEVEHOUSE (San Francisco) had been involved in the care of 150

arteriovenous malformations over a period of 26 years. One hundred and thirty-two of these were supratentorial and 18 infratentorial. Patients seen in the earlier years were referred because of haemorrhage and had in general larger lesions than those seen more recently. This fact was related to the increasing use of angioencephalography, especially with respect to patients with convulsive seizures. Fifty-four patients were operated on by the authors and 17 underwent operation by surgeons with whom the patients had been seen in consultation. Surgical intervention was contraindicated in 40 patients and was declined, though advised, in the remainder. On three occasions radiotherapy was administered by a 1 000 kV source and on two occasions by the Synchrotron (70 000 kV) without benefit.

In nine patients with supratentorial lesions there were coexisting saccular aneurysms. Haemangioblastomas were found in three patients.

EMBOLIZATION IN THE PREPARATION FOR SURGERY OF LARGE CEREBRAL ARTERIOVENOUS MALFORMATIONS

B. M. STEIN, R. A. R. FRASER, and S. WOLPERT (Boston) considered that controversy existed regarding the best method of treating intracranial arteriovenous malformations. The operative mortality was probably 10% and in conservatively managed series the long term mortality was 15–20% with a morbidity rate of about 30%. The authors had used silastic emboli varying in size from 0.5 to 2.0 mm and introduced by femoral arterial catheters as a preoperative treatment. During a nine month period seven patients had been treated in this fashion. The objects of the procedure were to produce better preoperative status of the patient, to cut down the blood supply of the malformations, and to promote better perfusion of normal brain by reducing the steal phenomenon through the malformation. Indications for terminating the procedure were appearance of neurological deficit, lodging of emboli in normal vessels, significant reduction of perfusion to the malformation, and improvement in normal circulation. There was one operative death in a patient in whom embolization of a large malformation in the right Sylvian region had been unsuccessful. It was concluded that embolization was an important adjunct to surgery but was not in itself a cure, that occlusion of normal cerebral arteries during embolization was associated with transient neurological deficits and rapid development of collateral circulations and normal flow patterns, that arteries near to the malformation could compensate for vessels occluded by embolization, and that changes in the arteries feeding the malformations were slow to resolve.

ANALGESIA DOLOROSA AFTER DIFFERENTIAL RETRO-GASSERIAN THERMAL OR MECHANICAL RHIZOTOMY: TACTICS EMPLOYED TO DECREASE ITS INFLUENCE

W. H. SWEET (Boston) noted that after differential thermal retrogasserian rhizotomy with sparing of some touch fibres there might be a state of continuing pain described in the same terms as those used by patients with the anaesthesia dolorosa found after total division of rootlets. This had occurred in patients with idiopathic trigeminal neuralgia sufficiently frequently for the author to halt the procedure after producing a smaller lesion than customary in any patient in whom concern was caused by subjective numbness. Analgesia dolorosa has been more common after treatment of facial pain other than that caused by trigeminal neuralgia. For the past 18 months he had included in the preoperative appraisal a temporary differential lidocaine block of the retrogasserian rootlets so that the patient might be given a trial period of hypalgesia or analgesia without loss of touch sensation. The clinical results were described in the treatment of (1) idiopathic trigeminal neuralgia, (2) symptomatic trigeminal neuralgia, (3) periodic migrainous neuralgia, (4) pain after trauma, (5) pain due to neoplasm, (6) post-herpetic pain, (7) pain due to no demonstrable cause.

The results were correlated with the various grades and types of sensory loss in each variety of case.

MEDICAL MODIFICATION OF SENSORY LOSS OPERATIVE DENERVATION

CHARLES J. HODGE, JR, and ROBERT B. KING (Syracuse, New York) pointed out that denervation of the head and neck by sectioning the descending tract of the trigeminal nerve, the nervus intermedius, the ninth cranial nerve, the upper parts of the tenth cranial nerve, and the upper cervical dorsal roots would be expected to provide adequate relief of craniocervical pain. They felt, however, that the results of this type of surgery were often poor. Detailed sensory examination of two patients after such surgical procedures and after having received L-dopa, alphamethyldopa, and nitrous oxide revealed that the sensory loss from extensive denervation was variable in a predictable fashion. The return of preoperative pain associated with administration of L-dopa had been correlated with return of sensation to areas presumed to be completely denervated. The subjective and objective decrease in sensory loss could be reversed by alphamethyldopa and nitrous oxide. They concluded that sensory overlap by way of neighbouring dorsal roots was more extensive than previously described in man and further that the pathways involved in the return of sensation and subjective pain did not develop as a result of the denervation but were always present.