Symposium I. Hemodynamic Studies

(Chairman) Masahiro Iio, Univ. of Tokyo

Effective Cerebral Blood Flow in A-V Malformation

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According to the papers of Schenkin, Evien, and others, gas analysis by the nitrous oxide technique has proved that there is a circulatory increase up to three to four times the normal blood flow in A-V malformation. However, the value of such gas analysis may be subject to criticism. The blood passing the mlaformation, that is, the shunt, loses no N_2O to cerebral tissue; consequently N_2O concentration in the jugular vein may be calculated higher than the real value perfusing in the brain tissue. The difference in arteriovernous N_2O is therefore decreased. Although the resultant decrease in A-V difference is inversely proprotional to the increase of blood flow on calculation, greater value determined by this method does not always mean rise in the effective blood flow which perfused in the brain tissue. Since there is no vascular resistance in A-V malformation, more rapid circulation results in the malformation, and the intracranial blood pool is enlarged without increase in circulation within the brain itself. The relative ischemia thus produced often leads to neural malfunction characterized by epileptic seizures. For the purpose of studying the hemodynamics in A-V malformation, two different methods were employed to determine the cerebral blood flow in ten patients with A-V malformation; one is the krypton 85 clearance method, indicating the effective blood flow perfused in the brain tissue and contributing to the brain metabolism; the other is the RI cerebrogram using ^{131}I Hippurate which reveals the circulation time and the volume of the intracranial blood pool.

The cerebrogram on the side of the lesion showed acute upslope and downslope, and higher baseline activity, indicating a shortening in the circulation time and increase in the intracranial blood volume respectively. On the contrary, the effective blood flow determined by means of the krypton method was markedly decreased. In the beginning of the clearance curve, the typical peak followed by a slower phase of clearance was seen which on calculation showed a low blood flow for cerebral tissue. This initial high peak of clearance might show the flow in the anomaly and be helpful in a quantitation of A-V shunt. In seven cases of ten A-V malformations, the effective blood flow on the side of the lesion decreased in proportion to the size of the anomaly. Removal of the anomaly resulted in disappearance of the initial peak and rise in the effective blood flow.

Relative Shunt Flow in Cerebral Arteriovenous Malformations

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Recent advance in neurosurgical treatment of cerebral arteriovenous malformations requires more information about the abnormal hemodynamics of the shunt flow. Although some information can be obtained by a conventional cerebral angiographic technique, the