Surgical Treatment of Hypertensive Intracerebral Hemorrhage*

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Diseases affecting the cerebral blood vessels are the most common cause of death in Japan. Approximately 160,000 persons die of these diseases and their complications each year. In recent years, neurosurgeons have displayed an increasing interest in cerebrovascular problems. Much has been written on the surgical treatment of intracranial aneurysms and vascular malformations as well as on endarterectomy and other vascular surgical techniques designed to restore circulation in the carotid and vertebral arterial systems. In contrast, little has been published concerning the surgical treatment of hypertensive intracerebral hemorrhage. We are therefore taking this opportunity to report our encouraging experiences in the diagnosis and surgical treatment of 43 hypertensive patients with spontaneous intracerebral hematomas treated on our service since 1960.

In 1908, Cushing⁵ reported his experiences in the management of patients with acute cerebral compression due to intracerebral hemorrhage. Subsequently, there were sporadic reports by other surgeons⁷,¹¹,¹⁷,¹⁹ but the results were discouraging. Since 1950, the number has increased to slightly more than 300 reported cases. However, no remarkable progress has been made. This is understandable, inasmuch as hypertensive cerebrovascular disease is usually complicated by such problems as senility, generalized arteriosclerosis, myocardial ischemia or infarction, impaired renal function and pulmonary congestion. The surgical attitude toward the hypertensive intracerebral hemorrhage problem has been summed up by Mckissock and his associates¹⁴ who state, “craniotomy and evacuation of the hematoma as soon as the site and accessibility of the lesion has been confirmed” produced no better results than those obtained by conservative treatment.

Diagnosis and Surgical Treatment

Purpose of Surgical Treatment. The primary objective in the surgical evacuation of the hematoma is to effect an immediate reduction of the intracranial hypertension as well as to alleviate the focal ischemia due to compression by the clot. This relief of generalized and local pressure leads to improvement in blood flow and recovery of function in hypoxic neurones. Furthermore, some of the systemic disturbances such as impaired cardiac, renal and pulmonary function are improved.

The satisfactory healing at the site of a surgically treated hematoma is illustrated in Fig. 1. This patient, a 63-year-old man, with a 40 ml. hematoma in the region of the left basal ganglia, died 2 months postoperatively. Immediately following surgical evacuation of the clot there was a prompt disappearance of his neurological signs and symptoms. Microscopic examination disclosed minimal gliosis and fibrosis at the site of hemorrhage.

Diagnostic Measures. Spontaneous intracerebral hemorrhage should always be suspected in the acute stroke patient, particularly if there is a disturbance of consciousness and a history of known hypertensive cardiovascular disease. General physical examination will confirm the existence of hypertension. The state of consciousness, signs of increased intracranial pressure, and neurological deficits are noted. Roentgenograms of the skull are occasionally helpful in diagnosis. Lumbar puncture is performed routinely. This procedure will usually disclose an elevation of cerebrospinal fluid pres-
Hypertensive Intracerebral Hemorrhage

Fig. 1. Healing at site (left basal ganglia) of a 40 ml. hematoma removed 2 months prior to death.

sure as well as cytological and chemical changes consistent with intracranial bleeding.

In our experience, the most reliable preoperative diagnostic measures are carotid angiography and echoencephalography.

The characteristic findings in the carotid angiograms are displacement of the anterior cerebral artery to the opposite side and either lateral or, less frequently, mesial displacement of the middle cerebral vessels in the anteroposterior projections. In the lateral views, arching of the anterior cerebral artery and superior displacement of the middle cerebral vessels are commonly noted. The anteroposterior roentgenograms are usually more reliable from the diagnostic standpoint.

Angiography was performed on 40 patients with intracerebral hemorrhage verified either at surgery or at autopsy. Thirty-seven of the 40 patients (92.5 per cent) had demonstrable displacement of the anterior or middle cerebral arteries. Obviously, this shifting of vessels is not conclusively diagnostic of a hematoma and must be differentiated from shifting due to cerebral edema, neoplasma and other space-taking lesions.

Frequently, echoencephalography has been of greater value than angiography in the localization of a hematoma. A midline shift was found in 37 (92.5 per cent) of the 40 patients examined by this method. Taylor et al.22 reported that the midline shift was accurately determined in 216 (87.2 per cent) of 248 cases of intracranial hematoma which they evaluated. But more important was the hematoma echo reflected by the cavity. This echo is a multiple spike wave picked up at 2-3 Mc./sec. (Fig. 2). The "hematoma echo" was found in 38 (95.0 per cent) of our patients (Table 1). To our knowledge, it has not been described previously and will be the subject of another report from our neurosurgical department.

Time of Operation. Surgery should be car-

Fig. 2. Multiple spike pattern of a hematoma echo, and displacement of the midline echo in a patient with cerebral hemorrhage (left). Echogram of a patient with cerebral infarction due to occlusion of anterior cerebral artery (right).