Computerized tomographic definition of mesencephalic hematoma with evacuation through pedunculotomy

Case report

ROBIN P. HUMPHREYS, M.D., F.R.C.S.(C)
Division of Neurological Surgery, Hospital for Sick Children and University of Toronto, Toronto, Canada

A 10-year-old boy, who presented with symptoms of a progressive hemorrhagic stroke, had suffered a spontaneous midbrain hematoma. The extent of the clot was detailed by computerized tomography and the lesion was surgically removed through pedunculotomy.

KEY WORDS • brain stem • cerebral hemorrhage • computerized tomography

The principles of operative neurosurgical care have become more precise because of the resolution and anatomic exactness of computerized tomography (CT). Occasionally, CT defines a lesion in a totally unexpected site, and as a consequence treatment decisions are altered, as illustrated by the following case report.

Case Report

This 10-year-old boy presented on May 7, 1977, with a 6-day history of headache and fever, progressing to listlessness, vomiting, incoherence, restlessness, and finally inability to stand and walk.

Examination. He showed confusion, aphasia, chewing movements, spastic right hemiparesis with central facial involvement, and bilateral extensor planter responses. In view of a minor head injury which allegedly initiated these symptoms and signs, the clinical diagnosis was that of a left supratentorial hematoma.

Within the first few hours following hospital admission, his confused state progressed to stupor, and then coma, with intermittent right-sided decerebrate posturing. Computerized tomography (Fig. 1) outlined a blood clot, lying within the upper brain stem and extending from the interpeduncular fossa above down through the midbrain to the midpons. There was no associated hydrocephalus, and the surrounding neural tissues appeared intact. Immediate vertebral arteriography showed evidence of a large peduncular and pontine mass with no abnormal vessels. The mass lay entirely within the brain stem.

First Operation. The clot was thought to have arisen as the result of rupture of a cryptic vascular malformation which had now destroyed itself, or, less likely, from...
hemorrhage into a pre-existent brain-stem tumor. Furthermore, it appeared from the neuroradiological studies that the clot could be evacuated through the floor of the fourth ventricle via a suboccipital approach. This procedure was performed immediately following arteriography, but all the features of the fourth ventricular examination were normal. The brain stem was not needled.

Following the first operation, the child's vital signs remained stable. His right arm and leg, and at times the left extremities as well, were held in decerebrate posturing. Yet, the child could occasionally follow commands of a simple nature.

Second Operation. As the clinical condition was unchanged 9 days following admission, the midbrain was explored through a left temporal craniotomy at a second operation on May 16, 1977. The midportion of the temporal lobe was elevated, and the edge of the tentorium incised. A tiny blue “blister” representing dissected blood clot was noted beneath the pia of the left basis pedunculi, just dorsal to the superior cerebellar artery (Fig. 2). The midbrain was entered through a 5-mm incision at this site, and liquified and sticky clot gently removed with microcurettes and suction. Tissue submitted for histological examination showed hemorrhage in every fragment with peripheral necrotic tissue containing occasional necrotic astrocytes and dilated thin-walled vessels. Portions of small vessels and meninges were present. No tumor was seen.

Postoperative Course. The child remained decerebrate and in coma for the next 10 weeks, but then awoke, engaged in a rehabilitation program, and within 5 months of the second operation was back to a full, normal daily program. His only lingering disability is a mild right superior oblique muscle paresis. His academic record is unblemished, as his current performance exactly matches that prior to ictus. Seven months following operation, CT examination outlined mild ventricular dilatation with low-density changes close to the suboccipital bone defect (Fig. 3).
Mesencephalic hematoma

Discussion

Primary and isolated brain-stem hemorrhage challenges diagnostic acumen, pathological explanation, and therapeutic options. Sixteen patients with this condition have previously been studied, operated on, and reported in the literature.\(^1\)\(^{-14}\) Despite these limited numbers, Arseni and Stanciu\(^2\) outlined a clinical profile for patients with primary hematomas of the brain stem which they distinguished from brain-stem "hemorrhage." The diagnosis of a primary hematoma is characterized by "a recent ictal onset, with a rapidly progressive or two-stage evolution in a young patient."\(^2\) However, the clinical features outlined in that and other reports are basically those of pontine and medullary compromise. It is not surprising that, with one exception, all of these patients have had hematoma within the pontomedullary parenchyma evacuated through the fourth ventricular floor via the suboccipital route.

The problem of isolated mesencephalic hematoma, however, has been documented in only one previous report. Scoville and Poppen's experience,\(^14\) related in 1949, is remarkable as the diagnosis of intrapeduncular hemorrhage was made almost exclusively by clinical examination, and the operation performed subsequently had not been attempted previously.\(^14\) Intermittent symptoms occurred in their 44-year-old patient over an 18-month period, before the diagnosis of a left cerebral peduncular hematoma was established. Without the assistance of modern neuroradiological facilities (a ventriculogram outlined diffuse dilatation of the ventricular system and poor filling of the third ventricle), and without sophisticated operative aids, Poppen operated on the woman in September, 1940. He approached the left cerebral peduncle beneath the occipital lobe, split the tentorium, and visualized the pineal body, corpora quadrigemina, peduncle, and pons. As the peduncle was "at least twice its normal caliber and was fusiform," it was incised and the "chocolate-colored mass" and "syrupy black blood" removed. At the time of report, the patient's improvement had been sustained over a 7-year period.

Brain-stem hematoma has been previously documented in children, although none suffered mesencephalic involvement. Koos, et al.,\(^4\) Matson,\(^6\) Obrador, et al.,\(^10\) and Scott, et al.,\(^12\) have each documented a singular experience with pontine hematomas in children. In each instance, the hematoma was explored and drained through posterior fossa exploration. This was also the first method attempted in our child because of the suggestion on CT that the hematoma extended caudally as far as the level of the open fourth ventricle. Two earlier personal experiences with evacuation of pontomedullary hematomas in children (one in an 8-year-old boy with cutaneous hemangiolymphoma and the other in a 6½-year-old girl who bled into a Grade III astrocytoma of the brain stem) strengthened our belief that the hematoma in the present case could be evacuated through the fourth ventricular floor. But during operation there was no doubt that this structure and the lower aqueduct were normal. As CT had already confirmed the presence, nature, and location of the upper brain-stem lesion, and as the child's condition remained unchanged during the first 9 days in hospital, an alternative entry into the clot was chosen. The success of the subtemporal mesencephalic exploration depended upon the presence of a surface hallmark of the clot, that is, the bluish distention of local tissues of the clinically appropriate left basis pedunculi through which the clot was evacuated. While there is aptness in Scoville's comment, "if the hemorrhage (in the midbrain) is large, death is immediate,"\(^14\) the midbrain can, in select instances, be explored and the hematoma removed, with excellence of patient recovery similar to that occurring in individuals with pontine and medullary hematoma evacuated through the floor of the fourth ventricle.\(^5\)\(^{-8}\)\(^{10}\)

Computerized tomography has in so many instances readily confirmed the clinical diagnosis of the neurosurgical patient. On occasion, however, CT outlines more than one anticipated lesion, or, as in the case reported here, a lesion of recognizable type in an unexpected site. As a consequence, treatment decisions and operative methods are altered.

References


Address reprint requests to: Robin P. Humphreys, M.D., Division of Neurosurgery, The Hospital for Sick Children, 555 University Avenue, Toronto, Ontario M5G 1X8, Canada.