Traumatic Epidural Arterio-Venous Aneurysm

Report of 2 Cases

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It is well known that simultaneous injury to an adjacent artery and vein may produce an arterio-venous fistula. Extensive reviews of traumatic carotid cavernous fistula have been made.\textsuperscript{1,4} Arterio-venous or cirsoid aneurysms of the scalp have been proved to be of traumatic origin in some cases.

When temporal or parietal bones are fractured, injury to the middle meningeal artery and its branches may result in epidural hemorrhage. In 1964, Kuhn and Kugler\textsuperscript{5} reported the occurrence of a false aneurysm of the middle meningeal artery following temporal fracture. Jackson and du Boulay\textsuperscript{6} in 1964, reported a case of arteriovenous fistula between the middle meningeal artery and the diploic vein, in association with a linear fracture of left parietal bone.

The present communication is a report of 2 cases of traumatic arterio-venous fistula between the middle meningeal artery and dural veins draining into the superior sagittal sinus.

Case Reports

Case 1. A 38-year-old Thai man was admitted to the Chulalongkorn Hospital, Bangkok on March 16, 1964, complaining of headache. Ten days previously he had been hit on the head with an axe and was unconscious for approximately 1 hour. When he awoke, he was confused and complained of headache. He was treated at a local hospital where 2 small scalp wounds were sutured. The wounds healed well but the mental confusion and headache persisted.

Examination. On admission the patient was ambulatory but markedly disoriented. Vital signs were normal. There was moderate stiffness of the neck and a positive Kernig's sign. No other abnormal neurological signs were present. The eye-grounds were normal.

Roentgenograms of the skull (Fig. 1) showed stellate fractures of right frontal and parietal bones with upward extension into the diastatic sphenoidal suture and downward to the temporal region.

Right carotid arteriography was performed; the external carotid artery was inadvertently punctured and there was little filling of the internal carotid artery. In the lateral projection, the first film showed filling of the branches of the external carotid artery. The middle meningeal artery was seen as far as the proximal intracranial portion and was much enlarged. An abnormal pool of contrast media was seen around this intracranial part of the middle meningeal artery. The abnormality was better seen in the film taken half a second later (Fig. 2). Irregularly shaped channels were seen extend-

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FIG. 1. Case 1. Roentgenogram of the skull showing stellate fracture of right frontal and parietal bones.
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Fig. 2. Case 1. External carotid arteriography showing abnormal vascular channels extending from the sphenoparietal ridge to vertex, and simultaneous filling of the middle meningeal artery and its concomitant veins.

Case 2. A 24-year-old Thai bank clerk was admitted on July 10, 1963, because of mental confusion. Twelve days previously he had fallen from a motorcycle and had hit the left side of his head on the ground. He was unconscious for a few minutes and remained markedly confused. In the left fronto-parietal region there was a swelling on the scalp, which gradually increased in size (Fig. 6).

Examination. On admission he was ambulatory, but agitated and disoriented. Over the left fronto-parietal region there was a purplish swelling of about 2 to 3 cm. in diameter without pulsation or bruit. The knee jerk was brisker on the left. The rest of the physical and neurological findings were normal.

Roentgenograms of the skull (Fig. 7) showed a linear fracture in the region of left coronal suture. Carotid arteriography by percutaneous puncture of the left common carotid artery (Fig. 8) revealed marked enlargement of the superficial temporal and middle meningeal arteries. There was an arterio-venous aneurysm in the scalp in the fronto-parietal region which was fed by the large tortuous superficial temporal artery. There was also a collection of contrast medium typical of an aneurysm in the fronto-temporal region which showed in the anteroposterior projection (Fig. 9) just under the skull. The cortical vessels were seen separating from the inner table of the skull, leaving an avascular slit about 3 mm. thick in the fronto-temporal region. In a later phase an abnormal collection of contrast medium was seen about the region of the linear fracture. It appeared as a channel 5 or 6 mm. wide with many outpouchings, from the sphenoparietal ridge upward and posteriorly in the lateral view (Fig. 10). In the antero-posterior projection (Fig. 11) the dilated channel was situated along the medial aspect of the avascular slit.

The angiographic needle was advanced into the internal carotid artery for a selective internal carotid arteriography which revealed no filling of either scalp or epidural arterio-venous aneurysms.

Operation. On July 22, 1964, an operation was done. The arterio-venous aneurysm of the scalp was totally removed after ligation of the superficial temporal artery. Cranietomy revealed a thin epidural hematoma and thin-walled vascular channels containing arterial blood and bleeding easily. The craniectomy was extended towards the sphenoparietal ridge and the middle menin-

Fig. 3. Case 1. Venous phase of external carotid arteriography showing contrast media in the vascular channels draining into the superior sagittal sinus.

Fig. 4. Case 1. Anteroposterior projection of Fig. 2 showing abnormal filling close to the inner table of skull (arrow).