

AN UNUSUAL VARIANT IN CEREBRAL CIRCULATION STUDIES

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Early filling of intracranial venous channels during cerebral circulation studies was attributed to jugular vein reflex of the injected material, perhaps related to the patient's breath holding.

We have recently observed a patient in whom early filling of intracranial venous structure was seen following injection of $^{99m}\text{TcO}_4^-$ into an antecubital vein for a dynamic cerebral blood flow study. Such studies are used extensively to demonstrate alterations of regional cerebral perfusion. In some cases they are used routinely and normal variations in flow pattern have been widely reported. These include particularly asymmetry in venous structures. This case serves to illustrate another normal variant not previously reported.

CASE REPORT

A 56-year-old black woman was admitted to the Johns Hopkins Hospital because of sudden onset of chest pain followed by weakness in her right upper and lower extremities.

The patient had had a nasal biopsy performed 4 days before admission for an indolent ulcer of the inferior surface of the right nasal vestibule. Two days later nasal packing was removed and she began to complain of mild, generalized headache. The following evening the patient was awakened by a severe headache and sharp pain over the left side of her chest radiating into her shoulder and arm. This was accompanied by sweating and dizziness. Over the next several hours she improved but on attempting to arise she found her right side to be weak, and she fell, sustaining no injury.

On physical examination in the Emergency Room, the patient was in no acute distress with a regular pulse of 48/min. The blood pressure was 140/80. Cardiac enlargement was noted to percussion and a Grade II/VI apical systolic murmur radiating into

the axilla was present. Strength was reduced in both the right upper and lower extremities. Reflexes were increased on the right side. She also had a right-sided Horner's syndrome which had been present since 1970. The remainder of the physical examination was negative.

The patient had a long history of cardiac disease dating back to her first admission to Johns Hopkins in early 1964 for congestive heart failure. In mid-1970, she was admitted for a cerebrovascular accident. Her only residual neurological disability at discharge was a right Horner's syndrome.

In 1972, an adenocarcinoma of the sigmoid colon was resected with an end-to-end anastomosis. Following a myocardial infarction in February 1973, she had remained well until the present symptoms. She had been taking digoxin, methyl dopa, hydrochlorothiazide, and 10% KCl solution.

The patient was admitted with the provisional diagnosis of myocardial infarction, digoxin toxicity, and cerebrovascular accident or metastasis. On admission, electrocardiogram showed first-degree heart block and sinus bradycardia but no evidence of recent myocardial damage or ischemia.

In order to evaluate the possibility of an intracerebral neoplasm or major vascular occlusion, a brain scan and cerebral circulation study were performed on July 18, 1973.

The patient was placed in the supine position for a vertex study with the head hyperextended and the gamma camera detector placed parallel to the nasalmantal line. A sphygmomanometer cuff inflated to 130 mmHg was placed proximal to the left elbow and followed by the injection of 20 mCi of ^{99m}Tc -pertechnetate into a left antecubital vein (1). Serial 2-sec count accumulations were made using a 35-mm camera with a motor drive film transport (Fig. 1).

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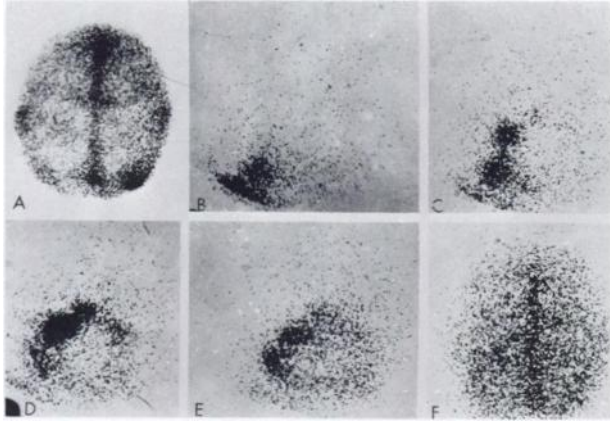


FIG. 1. Serial 2-sec count accumulations following i.v. injection of ^{99m}Tc -pertechnetate starting with frame B at 4 sec, C at 6 sec, D at 8 sec, E at 12 sec, and F at 24 sec. Frame A is accumulation of initial 300,000 counts.

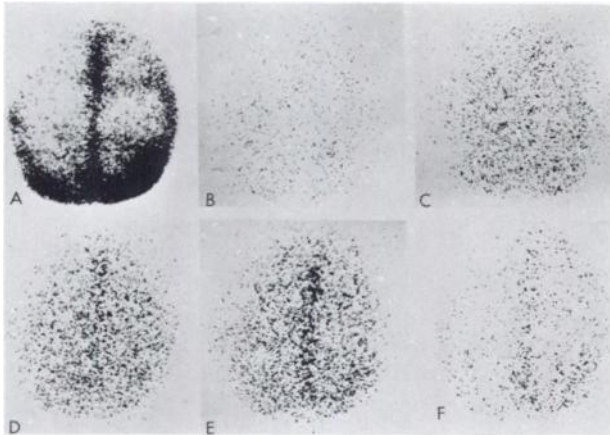


FIG. 2. Repeat study 2 days later with no evidence of abnormality seen. Frame A again represents initial 300,000 count accumulation image; followed by 2-sec count accumulation image starting with frame B at 8 sec, C at 10 sec, D at 12 sec, E at 14 sec, and F at 24 sec postinjection.

On the initial film obtained 2 sec after injection (Fig. 1A), an area of radionuclide concentration was seen extending into the field of view posteriorly from the left. No other activity was seen. In later views, the activity moved anteriorly and curved towards and across the midline (Fig. 1B, C, D, E). A small area of prominent uptake persisted in the left posterior region during the venous phase (Fig.

1F) but the remainder of the activity was no longer present. One hour after the flow study a normal, five-view static brain scan was obtained.

In view of the unusual appearances of the first circulation study, a repeat study was performed on July 20, 1973, 2 days after the first. The second study was performed in an identical manner. At this time a completely normal result was obtained (Fig. 2).

There had been no change in the patient's clinical condition between the two studies.

DISCUSSION

Cerebral circulation studies are often a useful addition to the routine static views. Usually the tracer is not seen in the arterial phase of the cerebral circulation until 8–10 sec after injection. In persons with a normal cerebral circulation, arterial filling is symmetrical, followed by a characteristic venous phase.

In the presence of an arterial-venous malformation, we observe early filling of vessels beginning 8–10 sec after injection. In Fig. 1D, the distribution of activity seems to correspond to the sigmoid and transverse cerebral sinuses on the left, the side of injection.

We postulate in the first study that the tracer refluxed up the jugular vein into the cerebral sinuses. The normal, second study proves that the phenomenon was transient. It is possible but not proved that the patient held her breath after inspiration or performed a Valsalva maneuver at the time of the first injection.

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REFERENCE

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