

AN IMPROVED METHOD FOR VISUALIZING CAROTID BLOOD FLOW IN THE NECK

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During the course of evaluating cerebral scintangiography using the anticubital venous injection of ^{99m}Tc -pertechnetate and the gamma scintillation camera, we have devised a method for better visualization of the carotid arteries in the neck.

In the usual anterior cerebral flow position, the patient's head is resting against the detector face in order to best visualize the blood flow through both cerebral hemispheres. The forehead in this position prevents apposition of the neck to the detector, and the resolution of the great vessels in this region is degraded. This paper describes a method for optimal visualization of blood flow in the large arteries of the neck using ^{99m}Tc -pertechnetate and the Anger scintillation camera.

METHOD

The patient is placed supine with bolsters under his shoulders and the head extended as far as possible. The detector is centered on the thyroid cartilage, (Fig. 1), and 15 mCi of ^{99m}Tc -pertechnetate is injected into an anticubital vein below a blood pressure cuff, after the method described by Olden-

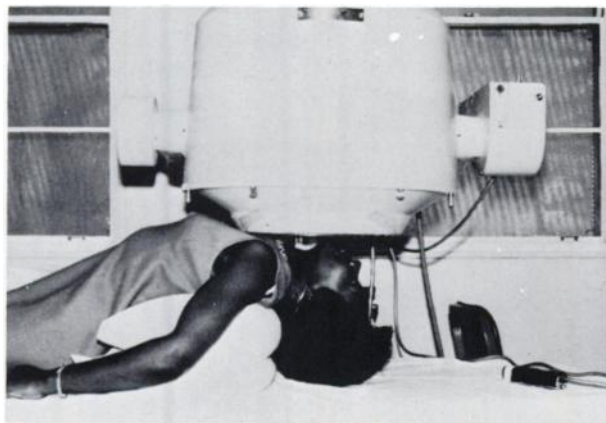


FIG. 1. Extended position for optimal visualization of blood flow in large arteries of neck.

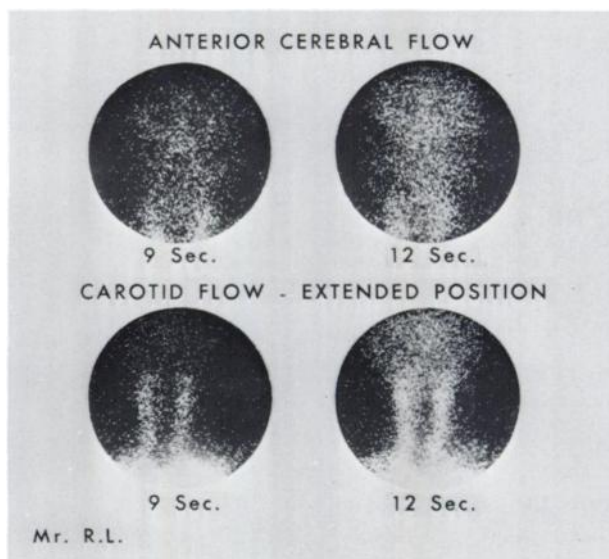


FIG. 2. Standard anterior flow study (top), and carotid flow in extended position (bottom) in normal subject.

dorf (1). Timing is started from the instant of release of the blood pressure cuff. Polaroid films are taken every 1.5–2 sec, beginning at the first appearance of activity in the arteries seen on a persistence scope. The flow pattern is also recorded on a 35-mm camera with 1-sec exposures begun at the time of injection and on 8-mm movie film from a persistence scope also started at the time of injection. The flow pattern is followed to the end of the venous phase, or for about 30–40 sec altogether.

RESULTS

The standard normal anterior cerebral flow study is seen in Fig. 2 (top). The normal pattern has been described by Powell and Anger (2) and Rosenthal (3). Figure 2 (bottom) is the same patient showing carotid flow in the extended position taken at the

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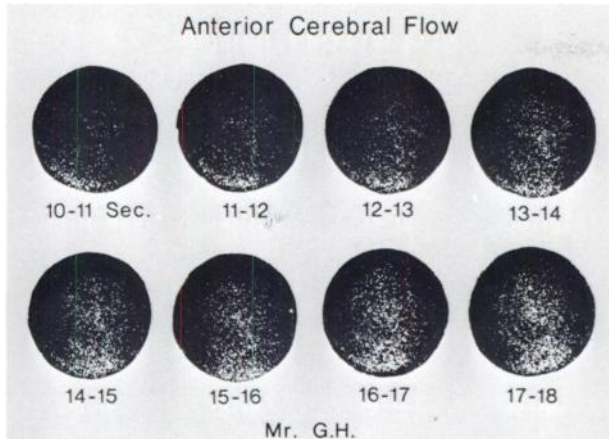


FIG. 3. Obstruction of right internal carotid artery. Standard anterior view; decreased flow on right.

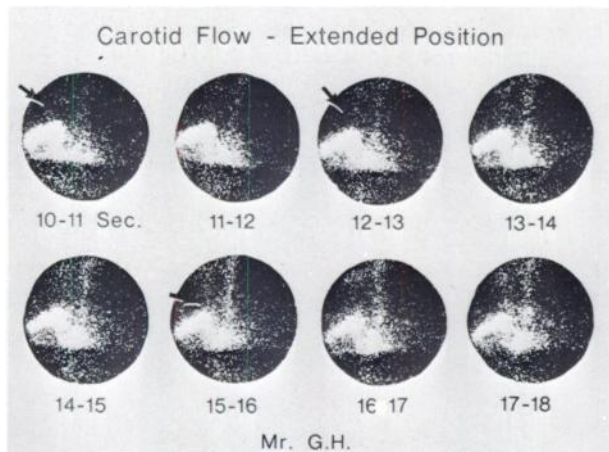


FIG. 4. Obstruction of right internal carotid artery. Extended position; decreased flow right carotid indicates site of obstruction is in this large vessel.

same time intervals. These vessels are much more clearly visualized in the extended position, and their symmetry is more easily assessed.

A patient with a proven obstruction of the right internal carotid artery was studied in both the standard anterior (Fig. 3) and the extended positions (Fig. 4). Decreased flow to the right hemisphere is seen in the standard views, but the origin of the obstructive lesion is not visualized. The extended view of the neck shows a marked decrease in flow in the right carotid area suggesting that the site of obstruction is in the large vessels of the neck. Angiography showed a complete obstruction at the origin of the right internal carotid artery (Fig. 5).

DISCUSSION

We believe, as do Rosenthal (4), Fish (5), and Surprenant (6) that scintiangiography is an integral part of brain scanning. The standard anterior cerebral flow is the best screening procedure, but if

there is clinical indication for vascular disease posteriorly, a posterior cerebral flow may be more helpful. If an asymmetry of flow is noted on the screening procedure or if there is clinical evidence of cerebrovascular insufficiency, the patient is then restudied in the extended neck flow position described above. The intracranial circulation is not well delineated in the extended position, however, because of the overlying facial and neck structures and because of poor object-detector geometry (Fig. 6). In occlusive vascular disease it is of special importance to assess flow in the carotid arteries because much of the surgically correctible occlusive disease occurs here, often close to the carotid bifurcation (7). While there is some variation in the level of the carotid bifurcation, it is always within the field of view when a study is performed in the extended position. The bifurcation is well below the superior-most level of the column of activity in the neck seen in the extended view at which point the internal carotid artery turns posteriorly to enter the base of the skull. We have not been able to resolve

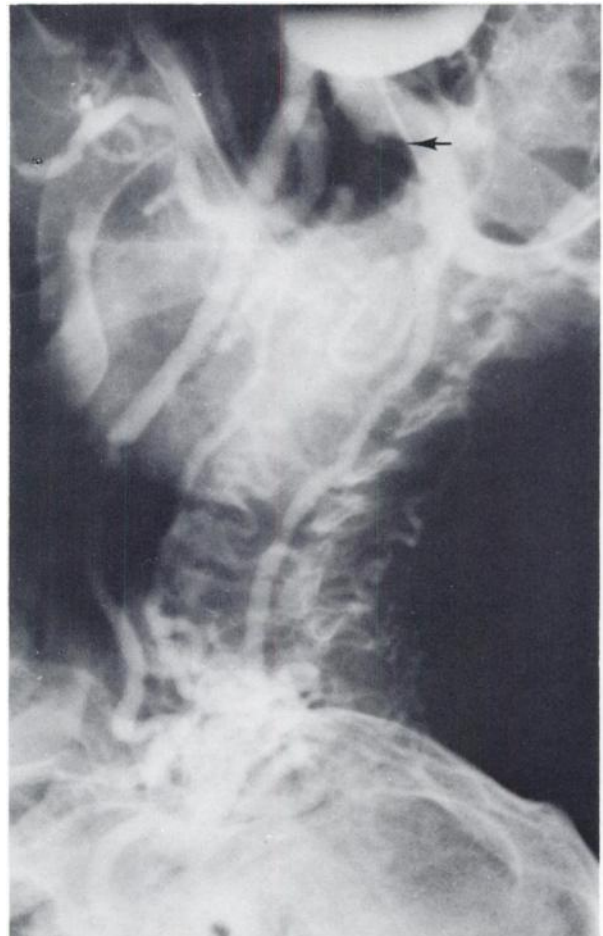


FIG. 5. Angiography reveals complete obstruction at origin of right internal carotid artery in patient shown in Fig. 3.

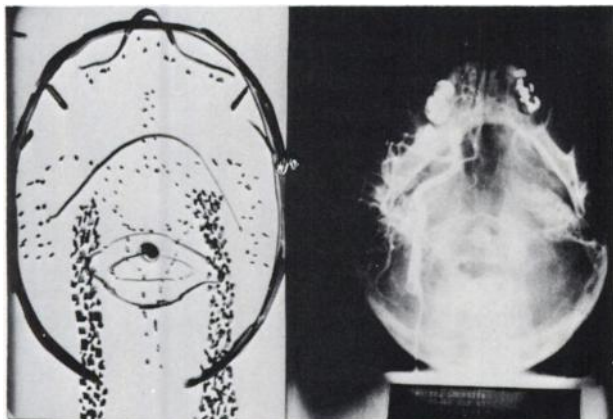


FIG. 6. Relationship of large vessels to detector in extended neck position. Left, schematic; right, arteriogram with catheter tip in internal carotid. Intracranial flow is not visualized well, but carotids are thrown into close apposition to detector.

the activity into either external or internal carotid in the neck artery; the majority of activity is from the carotid system, whether or not an anterior or posterior view is obtained.

SUMMARY

A position is described which will give better definition of the cervical portion of the carotid vessels. This view will include the region of these vessels where correctible occlusive lesions are found.

This view has special and limited application outlined above and is not meant to replace the standard anterior or posterior cerebral scintiangiography in wide use today.

ACKNOWLEDGMENTS

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