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Transbrachial Artery Approach for Selective Cerebral Angiography in Outpatients

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Transaxillary or transbrachial approaches to the cerebral vessels have been reported [1–4], but selective angiography of all four vessels has not been possible through one route. In this report, we describe our technique for outpatient transbrachial cerebral angiography in which all four cerebral vessels are examined.

Subjects and Methods

We examined 36 outpatients and one inpatient via the transbrachial approach (20 patients via the right brachial, 16 patients via the left). Patients' ages ranged from 18 to 86 years, with the majority in their seventh or eighth decade. Diagnoses among the outpatients included old cerebral infarction, transient ischemia attack, and seizure. The diagnosis for the inpatient was an intracranial arachnoid cyst. The femoral approach could not be used in this patient because of bilateral arteriosclerosis obliterans.

Materials included a DSA system,* a 4-French tight J-curved Simmons 80-cm catheter, a 19-gauge extra-thin-wall Seldinger needle, and a J/Straight floppy 125-cm guidewire.

Generally, the volume of the contrast agent (300 mgI/ml iopamidol) used in the common carotid artery angiogram was 6 ml, while that used in the vertebral artery angiogram was 4 ml. If catheterization of the vertebral artery or right common carotid artery was unsuccessful, we injected the subclavian or branchiocephalic artery, using a total of 8 ml of contrast material.

The patient lay in a supine position with the upper extremity extended laterally. The brachial artery at the inner side of the elbow was punctured with 19-gauge thin-walled needle and the Teflon-coated guidewire was inserted. Next, the 4-French modified Simmons catheter was advanced over the wire into the aortic arch (Fig. 1A). The catheter and the guidewire were then inserted into the left ventricle, and the catheter was reformed (Fig. 1B). The reformed catheter was then withdrawn to the ascending arch of the aorta (Fig. 1C). The right transbrachial approach is shown in Figure 2. When catheterization of the left vertebral artery was not possible, we injected the left subclavian artery (Fig. 2D). The left transbrachial approach is shown in Figure 3. As catheterization of the right vertebral artery was not possible with this type of catheter, we injected the brachiocephalic artery to obtain the right vertebral angiogram (Fig. 3C). The catheter was rotated either clockwise or counterclockwise according to circumstances.

Results

With the right transbrachial approach, catheterization of both carotid arteries was successful in all patients. Catheterization of the right vertebral artery was successful in 17 (85%) of the 20 patients examined in this manner, and the left vertebral angiogram was obtained in all patients who were injected in the left subclavian artery.

With the left transbrachial approach, catheterization of the left carotid and vertebral arteries was successful in all patients. Catheterization of the right carotid artery was successful in 10 (59%) of the patients examined in this manner, while the right carotid and vertebral arteries were clearly visualized in patients who were injected in the branchiocephalic trunk. There were no complications. The time required for the four-vessel study was less than 60 min.

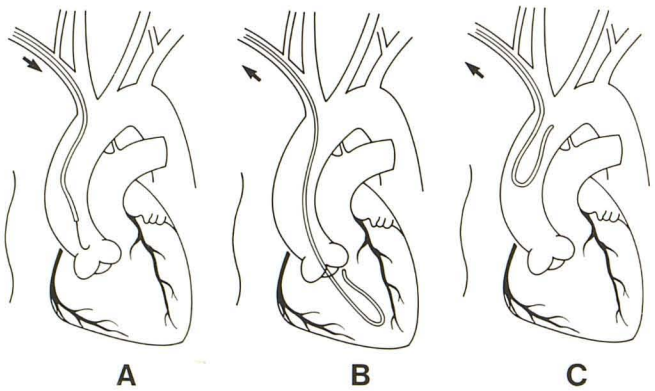

Fig. 1.—Diagrams of catheter being advanced into aortic arch.
***A*, Guidewire is advanced into arch of aorta and catheter is advanced over the wire.**
***B*, After wire removal, the curve of catheter is reformed in left ventricle.**
***C*, Withdrawal of reformed catheter allows entry into aortic arch.**

* Digital Fluorikon 5000; General Electric Co., Milwaukee, WI.

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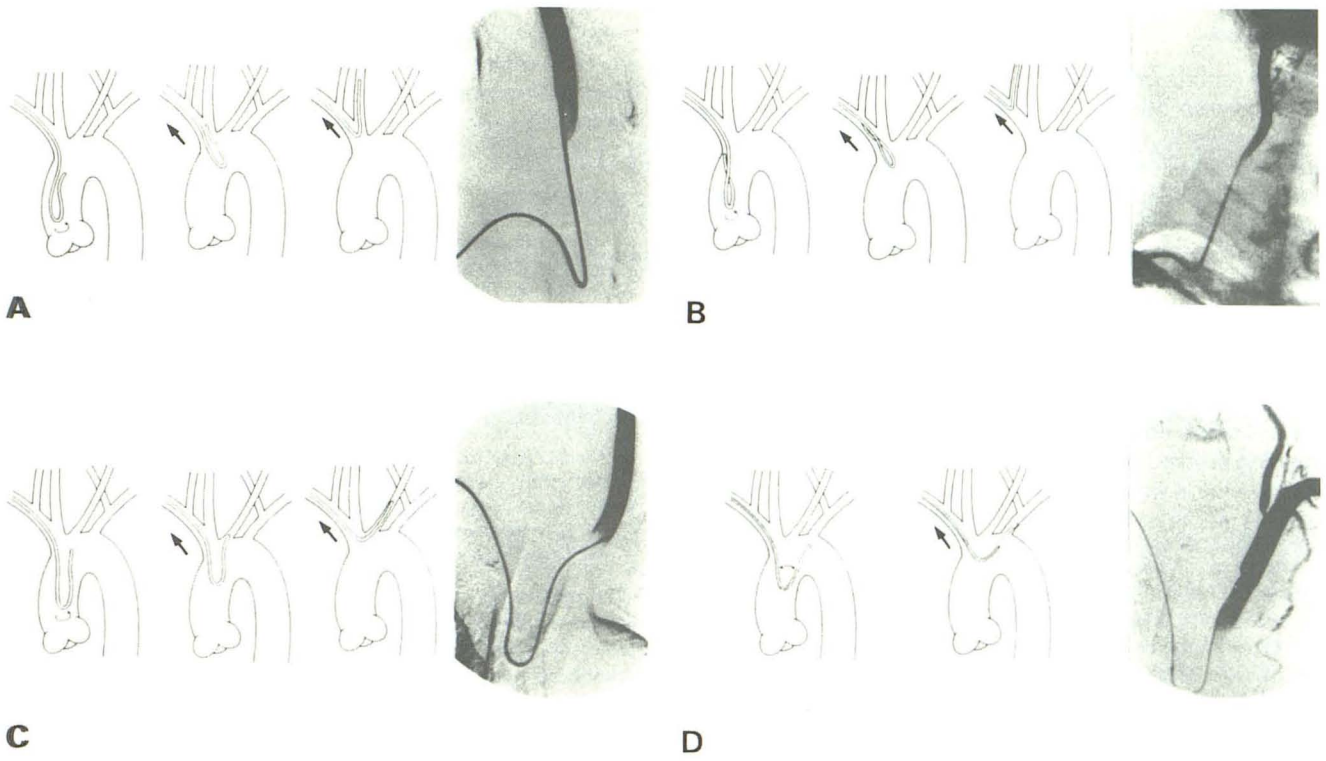

Fig. 2.—Diagrams show the technique of right transbrachial approach. *A*, Approach to right common carotid artery. *B*, Approach to right vertebral artery. *C*, Approach to left common carotid artery. *D*, Approach to left vertebral artery.

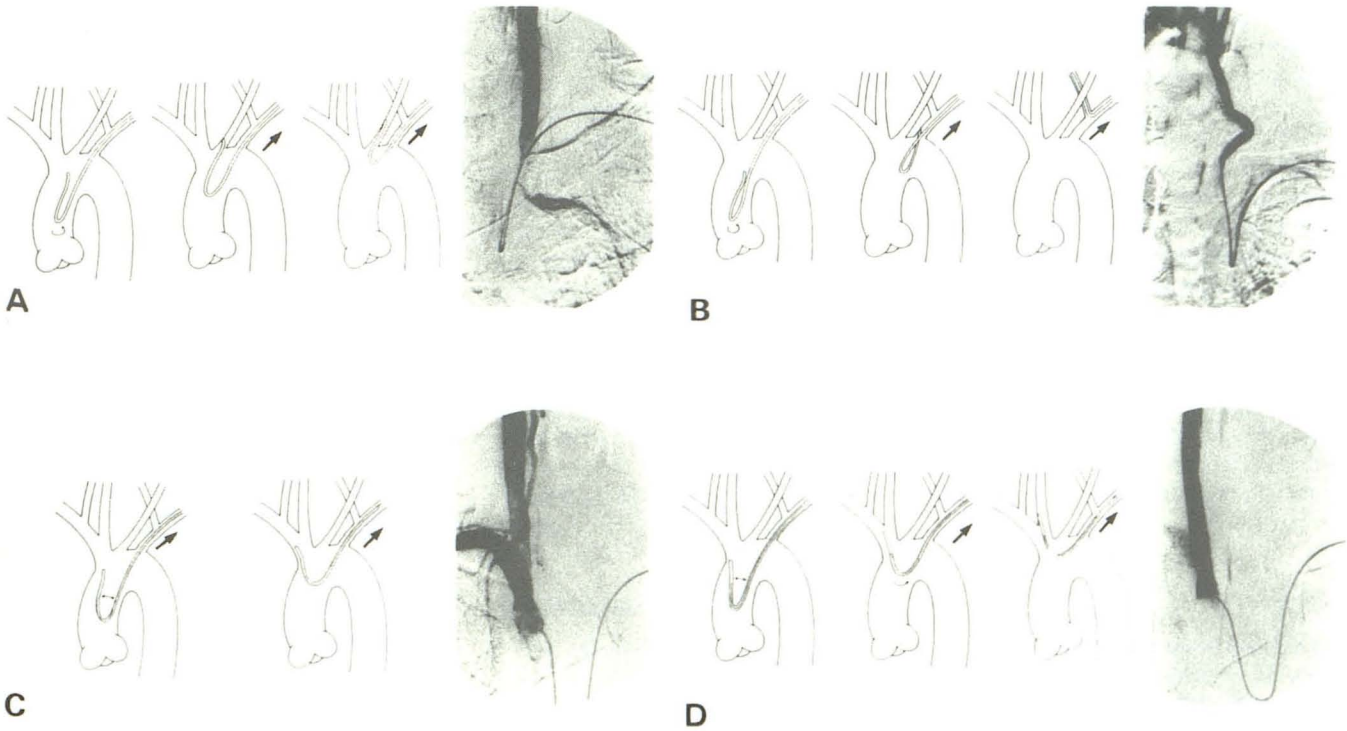

Fig. 3.—Diagrams show the technique of left transbrachial approach. *A*, Approach to left common carotid artery. *B*, Approach to left vertebral artery. *C*, Approach to brachiocephalic trunk. *D*, Approach to right common carotid artery.

Discussion

In the reports on outpatient angiography, a selective four-cerebral-vessel study could not be performed via the transbrachial route [5, 6]. Hanafee [1] reported a 2% complication rate with the axillary approach, including hemiparesis, large local hematoma, transient pain in the fingers due to pressure injury of the brachial plexus, and total occlusion of the subclavian artery upon removal of the catheter from the aortic arch. Moreover, the transaxillary approach was unable to yield information on all four of the cerebral arteries through the one route.

In this study, the transbrachial approach with catheterization was used for 36 outpatients and for one inpatient with arteriosclerosis obliterans for definitive diagnosis and decision regarding proper management. Advance of the catheter into the left ventricle was usually necessary to reform the catheter, since the length of the tip of the modified Simmons catheter was about 4.5 cm.

We believe that definitive diagnosis and a decision on proper treatment of outpatients can be easily obtained through a transbrachial approach using the DSA system and the technique described in this paper.

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