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Single Catheter for Aortic Arch and Selective Cerebral Angiography

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Over the past several years angiographers have been obtaining arch angiograms more frequently before selective femorocerebral catheterization, especially since smaller catheters have become available capable of delivering contrast material at higher flow rates. With the head-hunting technique [1], the technology has advanced to the point where a pigtail catheter is no longer needed for preliminary arch angiography so long as one has digital equipment at his disposal, since the latter makes it possible to obtain a good arch angiogram with much smaller volumes of contrast agent.

Materials and Methods

We have obtained over 80 aortic arch angiograms using 100 cm, 5.0 French braided Torcon (Cook, Bloomington, IN) catheters without side ports, having an H1 head-hunting curve. The catheter should be

advanced across the arch until its tip is in the ascending aorta about 4 cm proximal to the innominate orifice and should be so positioned that the convexity of the H1 curve matches the convexity of the ascending aorta (fig. 1). Conray 60 is used for both arch and selective injections so that the mechanical injector can be loaded with a single solution for the entire examination. The total volume for arch angiography is 20–30 ml injected at rates of 10–15 ml/sec depending on estimates of patient size and cardiac output. Digital angiography is performed using a General Electric DF 3000. The right posterior oblique arch of the average adult requires an exposure of about 800 mA for 0.5 sec at 75 kVp.

Results

There were no complications and catheter "whipping" has not been a problem. Within the described range of injection rates the catheter has behaved with predictability; specifically,



Fig. 1.—Diagram of recommended placement of H1 (black catheter) in ascending aorta with tip 4 cm below innominate orifice and convexity of terminal curve matching convexity of aorta. Typical displacement at peak of injection (white catheter) also shown.

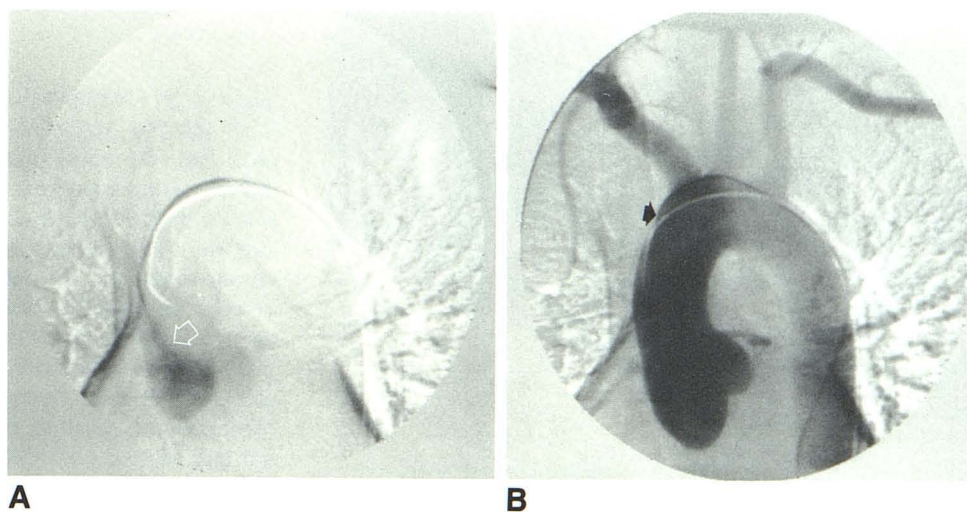


Fig. 2.—Digital aortographic sequence. White catheter (subtracted) indicates resting position. **A**, Early phase of injection and partial catheter displacement. Jet of contrast material (arrow). **B**, Peak of injection and maximal displacement. Position of catheter tip (arrow).

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when the contrast material jets from the catheter's end port, it causes the catheter to recoil, and, having no place to go, the catheter simply backs into the embrace of the aorta's outer curve and remains there nearly motionless (except for the motion induced by aortic pulsations) until the injection is completed. It then returns to resting position (fig. 2). Angiographic contrast of the arch and its brachiocephalic branches has been consistently good.

Discussion

In 80 patients, using our technique, the arch and its brachiocephalic branches were sufficiently well demonstrated to provide a good "vascular map" for subsequent selective cerebral catheterizations. This may be significant when examining subjects older than middle age, because gross lesions, be they vascular anomalies, atherosclerotic stenoses

or obstructions, arteriovenous fistulas, etc., will likely be revealed if they are in the vicinity of the arch. Smaller lesions and the structural detail of the common carotid bifurcations, however, may not be seen precisely. As a result of our experience, we recommend that when digital arterial angiography is planned, a 5.0 French end-hole catheter with an H1 configuration be used initially to image the aortic arch and its branches before using the same catheter for selective carotid or vertebral artery catheterization. This technique will eliminate the cost of a pigtail catheter if demonstration of the arch before selective catheterization has been planned and will save the time necessary for a catheter exchange.

REFERENCES

1. Hinck VC, Judkins MP, Paxton HD. Simplified selective femoro-cerebral angiography. *Radiology* **1967**;89:1048-1052