Needle-Catheter Aortography and Selective Angiography

Technical Note

JOSEPH T. MCFADDEN, M.D., F.A.C.S.
Medical Center, Norfolk, Virginia

ALTHOUGH angiography has now become the foremost diagnostic method in neurosurgery for tumors and vascular lesions, the needle techniques evolved from Egas Moniz' original contribution (1927) are too limited in scope for adequate study of the patient with arterial insufficiency. Furthermore, the percutaneous needle approach, while almost never failing in the cranial and partial extracranial evaluation of carotid arteries, cannot produce satisfactory total vertebrobasilar artery pictures in some patients. Only catheter angiography overcomes these limitations.

The percutaneous introduction of a catheter into an artery for the purpose of making selective or regional angiograms distant and circuitous to the point of entry requires the use of either the Seldinger or the needle-catheter technique. The alternative, catheter introduction through a cannula, makes an arterial hole larger than the catheter, causing bleeding problems during and after the procedure. Seldinger's method, reported in 1953, entails a multi-step procedure employing a needle (cannula), a guide wire, and a catheter. The needle-catheter technique requires one step only, the assembled instrument acting as a needle (cannula) for arterial entry, then becoming a catheter on removal of the puncturing core (Figs. 1 and 2). While the Seldinger method was developed under the aegis of neuroradiology, the needle-catheter evolved during the past 4 years for use primarily as a neurosurgical instrument. It was introduced in 1965 (published in 1967) specifically for retrograde common carotid catheterization to perform arch aortography and four-vessel cranial angiography.

The needle-catheter has been adapted subsequently to selective arterial catheterization and angiography by several modifications:

1. The metal tip shortened to 2.5 mm allows tip deflection (Fig. 1).
2. Two mural holes proximal to the metal tip, each equal in diameter to the catheter lumen, permit maximum fluid outflow with minimum tip retropulsion (Fig. 1).
3. A metal mesh incorporated in the catheter wall prevents lumen collapse under torque.

Directed by the Muller Guide system, the catheter tip curves 180°, and rotates completely clockwise or vice versa, so that it goes to any chosen point either vertically or horizontally (Fig. 3). Additionally, the deflected tip, on advancement, moves ahead of the deflection curvature, and thus progresses down the lumen of a selected vessel circui-