VERTEBRAL ANGIOGRAPHY BY RETROGRADE INJECTION OF THE BRACHIAL ARTERY

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VERTEBRAL angiography has become of sufficient value in the diagnosis of lesions of the posterior fossa to warrant exploring new methods to accomplish the procedure. The technique of filling the vertebral system has been described by many authors (Moniz, Shimizu, Sjöqvist, Takahashi, Sugar et al., Lindgren, Radner, Sergent, and Hauge), and there are many excellent descriptions of the vascular anatomy and pathology available. At present there are three methods in general use: vertebral arterial catheterization (Radner); percutaneous puncture of the artery in the neck (Sugar); and percutaneous puncture of the artery at the base of the cranium (Sergent). These techniques are designed primarily for use in adults and are difficult to perform in children. The catheterization technique, while described by Radner in a child aged 2 years, requires considerable experience and equipment that ordinarily is not available in a radiological department. Hence there remains a need for a more adaptable method of obtaining filling of the vertebral-basilar system in infants and children.

The purpose of this report is to present our experience in a series of 16 cases in which an attempt was made to fill the intracranial vascular tree by retrograde brachial artery injection. Since 1952 this procedure has been carried out upon 9 adults and 7 children, ranging in age from 7 months to 65 years. Successful filling of the posterior fossa circulation was obtained in 5 of the 9 adults and in all of the children. In the 4 adult cases classified as unsuccessful there was some degree of contrast medium in the vessels but it was considered insufficient for diagnostic purposes.

TECHNIQUE AND ANATOMY

General anesthesia with intravenous pentothal-curare solution and endotracheal nitrous-oxide and oxygen was used on all of the children and 4 of the 9 adults. In the remaining 5 adults the anesthesia was limited to local infiltration with 1 per cent procaine.

An incision 3–4 cm. long was made over the bicipital groove at the junction of the middle and distal thirds of the arm. The segment of the brachial artery exposed at this level is distal to the origin of the profunda brachii and the superior ulnar collateral arteries. The brachial fascia was incised and the neurovascular bundle identified. The median and ulnar nerves were retracted to expose the deeper lying brachial artery. A 2–3 cm. segment of the artery was mobilized and isolated by
placing behind it a small rubber dam drain. A needle with stylet was selected according to the size of the artery. An 18-gauge spinal needle was used in the child 7 months old, while a 15-gauge needle was easily introduced in the older patients. The needle was inserted in a proximal direction for 1–2 cm. The stylet was left in place throughout the procedure except during the actual injection. A small bulldog clamp was placed on the artery distal to the entrance of the needle to prevent peripheral flow of the contrast medium. The clamp was removed between injections. The amount of the contrast medium (35 per cent Diodrast) used varied according to the size and age of the patient. A volume of 8 cc. was sufficient for adequate filling in the 7-month-old child, and 15 to 18 cc. was used in the older children. In the adults, as much as 30 cc. was injected but the average was approximately 20 cc. The dye was injected as rapidly as possible to produce a “bolus” of Diodrast travelling refluxly through the brachial into the subclavian artery. When it reached the origin of the vertebral artery the “bolus” was carried with the normal blood flow into the vertebral-basilar distribution.

Three radiographic exposures were made with each injection. The first exposure was made just as the injection was completed: the others, at 1-sec. intervals thereafter. The anteroposterior exposure was made with the x-ray tube inclined 35° above a horizontal plane through the skull.

The needle puncture defect in the artery in children was closed with a single arterial suture of 5–0 silk; in adults the arterial suture was not necessary because pressure for a few minutes with a sponge resulted in adequate closure of the needle hole. The incision was closed with interrupted silk sutures and the arm was wrapped with an elastic bandage to prevent later formation of a hematoma.

With this technique both the vertebral and carotid systems are usually filled.

CASE EXAMPLES

Case 1 (#849327). D.H. was a 65-year-old male who had a sudden onset of a left hemiplegia 5 months before admission to hospital. Persistent vomiting began 1 month before admission. There was a spastic left hemiplegia and paresis of the right