Value of Subtraction in Brachiocephalic Angiography

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Hoffman and Rein1 have demonstrated the value of routine subtraction in "four vessel studies" when the area of interest is primarily the brachiocephalic vessels. The following example further illustrates the value of this technique.

Case Report. A 51-year-old white man was admitted to the Oklahoma University Hospital on Jan 20, 1974, complaining of transient blurred vision and dizziness, followed by vague pain in the left chest and left arm. These symptoms cleared spontaneously. Two of these attacks occurred on the evening before admission. His past medical history included severe peripheral arteriosclerotic vascular occlusive disease, and since 1969 he had had multiple vascular surgical procedures of the lower extremities. He had a below-the-knee amputation on the left in 1971. In November 1973, after a series of transient episodes of blurred vision and dizziness, he sustained a stroke, with left arm paralysis and aphasia. Some residual weakness of the left arm and residual speech difficulty persisted.

On physical examination, pertinent neurologic findings were limited to left interossei and thenar atrophy, as well as weakness of muscles of the left forearm.

Aortography of the brachiocephalic vessels was done via the left axillary route (Fig 1). Notice that the carotid bifurcations are very well preserved bilaterally, but that, in Figure 1, A, the proximal portion of the left vertebral artery is not seen. Subtraction is of immense value here in defining the pathologic process (Fig 2). There is narrowing at the origin of the left vertebral artery by an atheromatous plaque. Also, a filling defect is seen in the vessel lumen extending downstream (ie, cranial) a distance of approximately 4 cm. The constellation of findings is diagnostic of an atheromatous plaque with an attached thrombus at the origin of the left vertebral artery.

Discussion

In addition to the less frequent subclavian or vertebral "steal" phenomena, two additional mechanisms are frequently invoked as productive of brain ischemia in arteriosclerotic disease involving the brachiocephalic vessels.2 First, the vessel itself may be narrowed to the point where flow is impeded. Generally, this requires a stenosis greater than 50% of the diameter or 75% of the area of the lumen, a situation which probably does not apply in this case. Secondly, thromboembolic phenomena may result from the so-called ulcerated plaque or from any intimal irregularity tending to promote aggregation of platelets. Such emboli may be the platelets themselves, complete clots, or granous material from the base of an ulcerated plaque.4 This latter mechanism is well defined in this case as a clot trailing downstream from an atheromatous plaque. Roberson et al5 have described such phenomena in the carotid vessels, but this is the first case we have seen with involvement of the vertebral artery.

As noted above, this case is yet another example of the value of subtraction, since without it, the pathologic process is not identified and one could say only that the proximal portion of the left vertebral artery is poorly seen.

References


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FIG 1

Left posterior oblique view of brachiocephalic vessels after injection into the ascending aorta, arterial phase. (A) Plain angiogram. (B) Same film after subtraction.

FIG 2

Enlargement of boxed area in Figure 1. A. Closed arrows define stenotic plaque. Open arrow defines intraluminal thrombus.