A Simplified Technique for ICA Back Pressures

To the Editor:

The measurement of internal carotid artery back pressure ("stump pressure") prior to carotid endarterectomy is a valuable indicator to assess the need for an intraluminal shunt. Commonly described methods of obtaining stump pressures are by needle puncture of the common and/or internal carotid arteries. Vascular clamps, tapes, or vessel loops are then applied in the sequence depicted in figure 1.

To minimize vessel trauma and save time we describe a simplified technique for measuring internal carotid artery back pressure. The importance of the external carotid artery as an intracerebral collateral vessel can also be assessed.

All operations are performed under general anesthesia with continuous 12 lead EEG monitoring before, during, and after carotid occlusion. The internal carotid artery is dissected first for as great a length as necessary, and encircled with a #2 silk ligature above the diseased segment. The common and external carotid arteries may next be dissected safely. Dissection is minimal and the plane is kept close to the arterial wall to prevent injury to the vagus nerve and its branches. Traction may be placed on the internal carotid artery, temporarily occluding the vessel, while dissection is carried out around the bifurcation to avoid embolization. If intraluminal fragments are dislodged, they are more apt to wash into the external carotid artery. A No. 21 gauge needle attached to a strain gauge pressure catheter is inserted in the internal carotid artery above the area of palpable disease to obtain the internal carotid pressure. A Heifetz clip is then applied proximal to the needle catheter yielding the stump pressure (fig. 2). The EEG is carefully observed for suppression of burst activity, general or lateralized slow wave activity, any of which may signify cerebral ischemia and the need for a shunt. The authors utilize sequential occlusion of the external carotid artery to obliterate leptomeningeal collateral circulation to the middle cerebral artery, which can significantly alter EEG tracings during internal carotid occlusion. The stump pressure is rarely altered by sequential occlusion of the external carotid artery. When occlusion diminishes the stump pressure, the external carotid should be considered an important collateral source of intra-

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**Figure 1.** Conventional "two clamp—two needle" technique. Step 1: needle pressure catheter is inserted in common carotid artery to obtain common carotid pressure. Step 2: needle pressure catheter is inserted into internal carotid artery above area of palpable disease, obtaining internal carotid artery pressure gradient across bifurcation. Step 3: common carotid artery and external carotid artery are cross clamped, obtaining the internal carotid artery stump pressure.

**Figure 2.** Simplified "clip" technique: Step 1: needle pressure catheter is inserted into internal carotid artery, above area of palpable disease, to obtain internal carotid pressure. When there is no significant proximal occlusive disease the pressure gradient across the bifurcation is also obtained. Step 2: Heifetz clip is applied proximal to the needle-catheter to obtain the stump pressure.
cerebral blood flow and the surgeon should carry out a careful and complete endarterectomy of both the internal and external carotid arteries.

All patients undergoing carotid endarterectomy should have a preoperative four vessel arch arteriogram to visualize the extra and intracerebral circulation. When there is no arteriographic evidence of significant occlusive disease in the innominate or proximal left common carotid arteries, systemic and common carotid pressures have been equal in all patients in our series. Common carotid puncture and pressure measurement are therefore unnecessary.

A single puncture technique is described for measurement of the pressure gradient across the carotid bifurcation as well as the internal carotid artery stump pressure. This technique avoids the cumbersome use of two sets of needles and clamps in a small operative field. Potential dangers caused by needle puncture to small arteries, including embolization, intramural hematoma, and elevation of the intima are reduced. The possibility of trauma to the vagus, superior laryngeal, and anomalous recurrent laryngeal nerves is minimized by this technique.

The technique of Heifetz clip occlusion for obtaining stump pressures is not only safe and less traumatic but more expedient. The average time for obtaining stump pressure in our hands has decreased from 6 minutes with the "two clamp — two needle technique" to 2 minutes with the Heifetz clip occlusion.

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