Transbrachial Approach with Turn Over Technique for Selective Cerebral Angiography
—Technical Note—

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Abstract

A new technique to obtain selective internal carotid, external carotid and vertebral artery angiograms through the transbrachial route using a special 4-Fr long catheter and long guidewire positioned by a turn over technique is described. The technique was used in 25 geriatric patients to obtain angiograms without persistent complications.

Key words: selective angiography, transbrachial approach, turn over technique

Introduction

Cerebral angiography is usually performed using a transfemoral route even in geriatric patients. Selective catheterization may be impossible in patients with severe aortic atherosclerosis or tortuosity of the brachiocephalic vessels. A transaxillary or transbrachial approach allows catheterization of the cerebral vessels. Selective angiography of all four vessels is possible through one route using a modified Simmons catheter. However, obtaining selective angiograms of the internal carotid and/or external carotid arteries was impossible because of the short tip of the catheter. Here, we describe a new catheter and our technique for obtaining these selective angiograms via the brachial artery.

Clinical Materials and Methods

Cerebral angiography was performed in 25 geriatric patients using the right transbrachial approach. The patients' ages ranged from 67 to 90 years, with the majority in their 70s or 80s. Ten were outpatients and the other 15 were hospitalized. Examination of these patients revealed 19 old infarctions, three intracerebral hemorrhages, one ruptured intracranial aneurysm, one acute cerebral infarction and one left transverse sinus thrombosis with dural arteriovenous fistulas.

Angiography was performed with a digital subtraction angiography system (Digital Fluorikon 5000; General Electric Co., Milwaukee, Wis., U.S.A.), and a special 4-Fr 120-cm long catheter, with the tip having a simple primary curve at an angle of approximately 80 degrees to the tertiary curve of 1-cm length (BTOHO-120S; Cathex Co., Inc., Tokyo)

Fig. 1 Photograph, showing the special 4-Fr 120-cm long catheter.
Fig. 2  Diagrams of the turn over technique.  A: The catheter is advanced into the ascending aorta just above the aortic valves. Guidewire is turned over above the valves and introduced into each brachiocephalic vessel.  B: The catheter is turned over just above aortic valves for selective catheterization of the left carotid and vertebral arteries. Guidewire can easily be inserted into the arteries.  C: Another technique for selective catheterization of the right vertebral artery. Guidewire and catheter are advanced directly into the artery.

Fig. 3  A–D: Selective angiograms of the right vertebral (A), right internal carotid (B), left internal carotid (C) and left vertebral arteries (D). Angiogram of the left internal carotid artery demonstrates a ruptured anterior communicating artery aneurysm.  E: Selective angiogram of the right vertebral artery, showing an unruptured basilar artery-superior cerebellar artery aneurysm. Selective catheterization was achieved by the technique introducing the catheter and guidewire directly into the vessel.

(Fig. 1), and a 150-cm long guidewire (Terumo Inc., Tokyo).

The catheter was introduced using a turn over technique. The patient lay in the supine position with
the right upper extremity extended laterally. The brachial artery at the elbow was punctured with a 21-gauge thin-walled needle and the 150-cm long guidewire was inserted. The 120-cm long catheter was advanced over the wire into the aortic arch. The guidewire and the catheter were then advanced and turned over just above the aortic valves, and finally the guidewire was introduced into the brachiocephalic vessels. The catheter was then flushed into those vessels (Fig. 2A). Whenever advancing the guidewire into the left carotid and/or the ipsilateral subclavian artery appeared difficult, the tip of the catheter was turned over above the aortic valves before introducing the guidewire into the arteries, enabling the guidewire to advance easily into the vessels (Fig. 2B). Selective catheterization into the right vertebral artery could also be achieved by advancing the guidewire directly into the right vertebral artery (Fig. 2C). Selective angiography was performed after these procedures.

Results

Selective catheterization was achieved and the four-vessel angiography was completed using the turn over technique in all patients. Figure 3 shows the four-vessel angiograms, and another technique for selective catheterization of the right vertebral artery.

Turning over the catheter and the guidewire just above the aortic valves and flushing the catheter into the brachiocephalic vessels was very easy because advancing the guidewire and pressing the catheter into these vessels against the valves presented no difficulty (Fig. 2A).

The procedure was complicated by the appearance of premature ventricular beats if the catheter and/or the guidewire was erroneously inserted into the left cardiac ventricle, but the arrhythmia spontaneously disappeared just after the catheter or guidewire was removed from the ventricle.

Discussion

This transbrachial approach can provide selective cerebral angiography using a 4-Fr 120-cm long catheter, and enables four-vessel studies to be carried out through one route. Complications of premature ventricular beats caused by accidental insertion of the catheter and/or the guidewire into the left cardiac ventricle spontaneously ceased on removal of the catheter or guidewire.

A definite diagnosis and decision on proper treatment of patients, especially of geriatric patients, can easily be obtained through the transbrachial approach using our long catheter and the turn over technique.

References


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