Preliminary Experience with use of Qureshi-5 Catheters for Diagnostic Cerebral Angiography

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Abstract

BACKGROUND—A catheter technique was developed to overcome current challenges in the stabilization and manipulation of catheter in tortuous arteries such as right subclavian artery and left common carotid artery.

METHODS—The new catheter has the following two lumens: first lumen can accommodate a 0.035-inch guide wire (lumen A) and a curved shape at the distal end; the second lumen can accommodate a 0.018-inch guide wire and terminates at the beginning of the distal curve of the first lumen (lumen B). The catheter is withdrawn or advanced over the 0.018-inch guide wire and the curved free end of catheter manipulated until the end engages the origin of the target artery. Subsequently, either contrast can be injected or a 0.035-inch guide wire advanced into the target artery.

RESULTS—The catheters were used in two patients to perform diagnostic cerebral angiography through a 6F introducer sheath placed in the right common femoral artery. The left and right common carotid arteries and left and right vertebral arteries were catheterized in first patient (contrast used 50 ml; fluoroscopy time 20:09 min). The left and right internal carotid arteries, left and right subclavian arteries, and left external carotid artery were catheterized in second patient (contrast used 40 ml; fluoroscopy time 13:56 min). No complications were observed in either of the two patients.

CONCLUSIONS—The performance of the new catheter for catheterization of multiple arteries in two patients was considered adequate with high-quality angiographic image acquisitions.

Keywords
Supra-aortic artery; cerebral angiography; catheter; Qureshi catheter; double lumen
Catheter, Rogers, Minnesota. The catheter has two lumens: one of which can accommodate a 0.035-inch guide wire (lumen A) and a curved shape at the distal end; the second lumen can accommodate a 0.018-inch wire and terminates at the beginning of the distal curve of the first lumen (lumen B) (Fig. 1). The lumen A entry is through a central port and the lumen B entry is via a side port (Fig. 1) at the proximal end of the catheter. The principle of the catheter is that a 0.018-inch wire is advanced into the parent artery and used as a stabilizing wire. The catheter is withdrawn or advanced over the 0.018-inch wire and the curved free end of catheter manipulated until the end engages the origin of the target artery or branch. The 0.018-inch wire provides stabilization against catheter retropulsion and inadvertent catheter engagement into tortuosity sidewall or origin of nontarget arteries. The relative straightening of the parent artery by the stiff 0.018-inch wire achieves the stabilization goals as mentioned previously (Fig. 2A). A 0.035-inch guide wire is advanced through the terminal opening of the curved tip into the branch and once enough length of the wire is advanced, the 0.018-inch wire is retracted within the second lumen and catheter advanced over the 0.035-inch guide wire into the target arterial branch (Fig. 2B).

INITIAL ASSESSMENT

The Qureshi 5 catheters were used in two patients to perform diagnostic cerebral angiography. The characteristics of the patients are summarized in Table 1. A 6F introducer sheath was placed in the right common femoral artery using modified Seldinger’s technique. The Qureshi 5 catheter was advanced over a 0.035-inch glide...
wire (placed in lumen A) through the iliac artery, abdominal aorta, descending aorta, and arch of aorta in a retrograde manner. A 0.018-inch wire (V-18 Control Wire, 0.018 inch, 180 cm, Boston Scientific, Marlborough, MA) was concurrently placed in the lumen B throughout the above-mentioned advancement of the catheter, but the distal end of the 0.018-inch wire was contained inside the distal end of the lumen B.

All the target supra-aortic arteries were successfully catheterized using the Qureshi 5 catheter. Once the catheter was advanced past the origin of the right innominate artery in the aortic arch, the 0.035-inch wire was retracted within the distal end of the lumen A. The distal end of the catheter was manipulated to orient in cephalad direction and retracted to engage the origin of the supra-aortic arteries. The catheter was advanced over the 0.035-inch wire into the supra-aortic arteries (Figs. 3 and 4). For subclavian arteries, the catheter was advanced into the distal segment past the origin of the vertebral artery. The 0.018-inch wire was advanced into the distal subclavian artery, and the 0.035-inch wire was retracted within the distal end of the lumen A. The catheter was withdrawn and manipulated over a stable 0.018-inch wire until the desire location and orientation for the distal end was achieved as identified on fluoroscopic imaging. The 0.035-inch wire was advanced into the vertebral artery or the right common carotid artery. The 0.018-inch wire was retracted within lumen B and catheter advanced into the vertebral or right common carotid artery. For left common carotid artery, the 0.018-inch wire was advanced into the right distal common carotid artery and the 0.035-inch wire was retracted within the distal end of the lumen A. The catheter was withdrawn and manipulated over a stable 0.018-inch wire until the origin of the left common carotid artery was engaged as identified on fluoroscopic imaging. The catheter was advanced into the left common carotid

Table 1. Patients’ and procedural characteristics of the diagnostic angiography procedure performed using Qureshi 5 catheter.

<table>
<thead>
<tr>
<th>Patient 1</th>
<th>Patient 2</th>
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</thead>
<tbody>
<tr>
<td>Age (years)/gender</td>
<td>65/M</td>
</tr>
<tr>
<td>Presenting symptoms</td>
<td>Suspected vertebrobasilar ischemia</td>
</tr>
<tr>
<td>Cardiovascular risk factors</td>
<td>None</td>
</tr>
<tr>
<td>Vessels catheterized</td>
<td>Left and right common carotid arteries and left and right vertebral arteries</td>
</tr>
<tr>
<td>Contrast used</td>
<td>50 ml</td>
</tr>
<tr>
<td>Fluoroscopy time</td>
<td>20:09 min</td>
</tr>
<tr>
<td>Radiation dose (mGy)</td>
<td>765</td>
</tr>
<tr>
<td>Record DAP (mGy·cm²)</td>
<td>5139</td>
</tr>
</tbody>
</table>

mGy, milligray; DAP, dose area product.
artery after retraction of the 0.018-inch wire as described previously. For selective catheterization of the internal carotid arteries, the catheter was advanced over the 0.035-inch guide wire with 0.018-inch wire retained in the lumen B. The intravascular contrast agent Xenetix 300, Lobitridol injection was used in both procedures. The quality of the contrast injection and subsequent opacification and visualization of cervical and intracranial arteries was considered adequate in each image acquired. The femoral sheaths were removed followed...
by manual compression to achieve hemostasis. A neurological assessment performed at the conclusion of the procedure did not demonstrate any new neurological deficits.

**DISCUSSION**

The performance of the catheter for catheterization of multiple arteries in two patients was considered adequate with high-quality angiographic image acquisitions. Three areas were identified for improvement in the first-generation Qureshi 5 catheters. Firstly, the radio-opacity of the distal end of the catheter needs to be increased to allow better visualization of the manipulation and rotation of the distal end under fluoroscopy. Secondly, the exit point of the lumen B appeared to have a step off which created an irregularity with potential impediment to smooth advancement in narrow arteries. Thirdly, a
rotational device at the proximal end of the catheter needs to be included to facilitate external rotation at the complex double-entry point system. It is anticipated that larger diameter catheters can be used for the delivery of devices including angioplasty balloons and/or stents in highly angulated locations such as vertebral artery origin. The design of the catheter also makes it a useful device for the catheterization of branches of the aorta and coronary arteries with highly angulated origins that require high degree of stability of the distal end of the catheter. The distal end of the catheter can be conformed to lengths and configurations that may be best suited for particular applications. The new catheter is expected to reduce the complexity and associated complications of selective catheterization necessary for cerebral angiography in patients with tortuous arterial anatomy.

REFERENCES