TECHNICAL NOTE

Balloon-Assisted Coiling through a Single 6F Guiding Catheter

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SUMMARY: The new version of the 6F Envoy guiding catheter, with its enlarged inner diameter of 0.070 inch, is capable of simultaneously accommodating both a 0.014-inch microcatheter and a balloon microcatheter for balloon-assisted coiling (BAC). We report our experience using this guiding catheter for access in BAC in 48 patients. The guiding catheter allowed for easy manipulations of 2 microcatheters, while providing sufficient quality of control angiograms during the procedure. In cases in which BAC is indicated, a larger guiding catheter (7F) or the commonly used bifemoral approach is no longer necessary, making the procedure technically simpler for the operator and less traumatic to the vessel wall.

Balloon-assisted coiling (BAC) has become widely accepted an adjunctive technique for endovascular treatment of cerebral aneurysms.[1-3] Until recently, the simultaneous use of a balloon microcatheter and a regular microcatheter required a 7F guiding catheter or 2 separate arterial punctures and 2 smaller guiding catheters to achieve access to cerebral circulation. Although manipulation of 2 guiding catheters with a size of 5F or 6F is not necessarily difficult or risky, they at least theoretically increase the risk of injury to the upstream vasculature and thromboembolism. In small, stenotic, or tortuous angioarchitecture, the use of BAC is limited. Furthermore, bilateral puncture of the femoral arteries may also increase the risk for postprocedural groin hematoma. We have found currently available 6F guiding catheters with a larger inner diameter (ID) of 0.070 inch large enough to accept simultaneously both the balloon and the standard microcatheter necessary to perform BAC. The purpose of this short communication is to describe our experience in a series of 48 patients treated with BAC by using a single 0.070-inch ID, 6F Envoy guiding catheter (Cordis Neurovascular, Miami Lakes, Fla).

Table 1: Distribution by location

Parent Vessel	No.
Aneurysms	
Internal carotid artery	
Ophthalmic artery	5
Posterior communicating artery	19
Carotid terminus	3
Anterior cerebral artery	1
Anterior communicating artery	7
MCA	1
Posterior circulation	
Vertebral artery	1
Superior cerebellar artery	1
Posterior inferior cerebellar artery	2
Basilar tip	4
Vessel occlusions/fistulae	
Dysplastic P-2 segment	1
ICA sacrifice for fusiform dilation	1
Parenchymal AV fistula MCA territory	1
Cavernous-Carotid fistula	2

Note:—P-2, posterior cerebral artery segment 2; AV, arteriovenous; MCA, middle cerebral artery.

Technique

The new generation of 6F Envoy guiding catheters have an ID of 0.070 inch (compared with the previous 0.067 inch ID) and can be introduced by using standard 6F vascular access sheaths.

We employed this new Envoy 6F guiding catheter in an unselected series of neuroendovascular patients requiring BAC. Forty-four procedures involved saccular cerebral aneurysms; one patient had 2 aneurysms, both treated in the same session. The series also included one patient with a fusiform dilation of the internal carotid artery (ICA) as a source of bleeding and 3 patients who had high-flow fistulas, requiring balloon-assisted flow arrest during vessel or fistula occlusion. Aneurysm location is tabulated in Table 1. Thirty-one patients had aneurysmal subarachnoid hemorrhage, of which 29 were treated in the acute phase. Bare platinum coils were used exclusively, in all aneurysm patients, with the exception of 4 patients who underwent embolization with liquid embolic agent (Onyx; Microtherapeutics, Inc, Irvine, Calif), one of whom also received a stent.

Our standard procedure included single femoral puncture access with a 6F sheath, diagnostic angiogram when indicated (by using a 5F diagnostic catheter), and then navigation of the 6F Envoy guiding catheter into the cervical segment of the ICA or the vertebral artery for the intervention. During the procedure, intermittent angiographic runs were performed to document vessel patency and aneurysm packing and to identify complicating events such as clot formation. Heparinization, with an activated clotting time of at least twice the baseline, was employed in all cases. The balloon catheter was usually positioned first, followed by the microcatheter. In cases of parent vessel occlusion ($n = 3$), a preliminary balloon test occlusion was performed.

All cases included the use of the 6F Envoy guiding catheter, a 10 or 14 microcatheter, and a balloon microcatheter, either the Hyperform, Hyperglide (Micro Therapeutics, Inc), or Sentry (Target Therapeutics, Inc, Fremont, Calif). The microcatheter/balloon microcatheter combinations are listed in Table 2.

All treatments were considered successful in that the planned treatments were completed. There were no groin puncture site problems.

It was our impression that the quality of the follow-up angiograms performed by using the 6F Envoy guiding catheter,

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Table 2: Microcatheter/balloon catheter combination

Microcatheters/Balloon Catheters	No.
Rebar 14/Hyperglide	8
Echelon 10 or 14/Hyperglide, Hyperform, Sentry	13
Prowler 10 or 14/Hyperglide, Hyperform	13
Prowler Select LP/Hyperglide, Hyperform, Sentry	5
Tracker 10/Sentry, Hyperglide, Hyperform	8
Surf 11/Sentry	1

Note:—Manufacturers are as follows: Rebar, Echelon, Hyperglide, Hyperform: Micro Therapeutics, Inc (Irvine, Calif); Prowler: Cordis Neurovascular (Miami Lakes, Fla); Tracker, Sentry: Target Therapeutics Inc (Fremont, Calif); Surf: Cook, Inc (Bloomington, Ind).

with the balloon and standard microcatheters in place, was comparable to those obtained through a 7F guiding catheter. There was more resistance to contrast injection through the smaller guiding catheter, so the rate of injection was not equivalent. The images obtained, however, were adequate, and no significant anatomic details, such as intraluminal clots, were thought to have been missed during the procedures. In some cases, a slight increase in friction between the microcatheters and the guiding catheter was perceptible, though this did not interfere with the execution of any procedure. No technical complications attributable to the use of the combination of these catheters were noted.

Discussion

Small upstream vessels and difficult anatomy, in the situation of lesions with anticipated necessity for BAC, were the context for the development of this combination of guiding catheter and microcatheters. In October 2003, one of us (G.G.) treated a patient who presented with an ICA–posterior communicating artery aneurysm with a wide neck. There was moderate stenosis of the cervical ICA, upstream from the aneurysm. An attempt to treat the aneurysm without balloon assistance was unsuccessful, and there were concerns that the ICA would not accommodate a 7F guiding catheter, or 2 smaller ones, needed for BAC. To solve the problem, G.G. bench-tested the newly available 6F Envoy XB catheter, with a 0.070-inch ID and found it to be large enough to accommodate an Echelon 14 microcatheter and a Hyperglide balloon microcatheter. The guiding catheter was then introduced through the groin and navigated into the ICA, after which the aneurysm was successfully coiled with BAC. The second 6F BAC case involved a patient with difficult access to the brachiocephalic artery. G.G. found that the 6F Envoy XB, which has a stiffer shaft than the regular Envoy, was able to navigate the arch and provide access for BAC, whereas a 7F guiding catheter had not been able to. During our subsequent clinical experience, "non-XB" models of the 6F Envoy catheter were "upgraded" by the manufacturer to the 0.070-inch ID and we began to employ the "non-XB" model.

We have not experienced difficulties with these larger ID 6F guiding catheters. Indeed they are more navigable than the 7F, fit well into smaller vessels, and are intuitively safer. Instead of using the 6F Envoy as a last resort, we now routinely use this guiding catheter for most cases requiring BAC. We now reserve the use of the stiffer Envoy XB for some of the more difficult navigations, though it does provide excellent support and can be used in most situations. Because we can use this technique through a smaller, less-traumatic guiding catheter, we now feel that the risk of BAC has been decreased and are increasing our use of this technique.

References

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