Optimum wide neck bifurcation aneurysm angle change (BSW index) promotes better coiling of the aneurysm

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Introduction:

• Wide-necked cerebral aneurysms that occur at a bifurcation can be difficult to treat with endovascular techniques despite many advances.

• We describe a new technique of micro-scaffold remodeling of the aneurysm neck of wide-necked bifurcation aneurysms which involves placement of one or more microcatheters and/or wires in the efferent vessels.

• We hypothesize that catheters can be used to change the branch angulation, allowing for an improved configuration to stably deploy coils.

• We used this technique on 17 aneurysms and most had more than 5 years follow up with complete occlusion. We present a retrospective case series to illustrate this technique.
Methods

• 17 wide-necked bifurcation aneurysms in 17 patients were coil embolized using this technique during a 5 year study period.

• Branch-vessel microcatheters and/or microwires were used to remodel the aneurysm neck and to support the coil mass.
Results

Representative data

Patient A

During microcatheter insertion vessel angle changed

During embolization with microcatheters and coils, vessel angle remain changed
After completion of embolization and removal of devices, angle normalized.

Follow-up angiography 27 months later showed near normal angle.
Vessel Angle Normalized After Intervention

**Conditions**

- Angle Before
- Angle During (Microcatheter)
- Angle During (Coils)
- Angle Immediately After
- Follow-Up Angio

**Note:** *= P<0.05
Results

- Eleven patients had complete occlusion of their aneurysm (Raymond-Roy class I). Six patients had Raymond-Roy class 2 immediately after treatment.

- Complete occlusion was documented for all 8 subjects with long-term follow-up.

- Involved placement of one or more microcatheters and/or wires in the efferent vessels, which change the branch angulation, temporally allowing for an improved configuration to deploy coils. Aneurysm neck sizes were measured before, during and after. It was found that neck sizes do not change.
Existing temporary devices as microwires, microcatheters can be used to remodel and reconstruct the local vascular anatomy and enable endosurgical repair of wide necked bifurcation aneurysms.

Use of these devices will buttress the aneurysm neck, induce local vascular conformational change, and provide a stable scaffold to form an intra-aneurysmal coil mass. Proper packing will allow the coil mass to be held tightly within the aneurysm.

Technical challenges associated with existing alternatives also can be avoided. This method allows aneurysm occlusion, while preserving the vessel patency. Patients do not need dual-antiplatelet therapy and have a low rate of recanalization.

We are developing a computational model to ascertain the optimum angle or “BSW Index” that accommodates the largest frame coil safely and/or inserting more soft coils to pack tightly will give the best possible outcome.
Summary Points

• The micro-scaffold endosurgical remodeling technique is a useful adjunct in treating wide-necked bifurcation aneurysm.

• By elevating branch vessels away from the aneurysm neck, this technique allows for dense coil packing while decreasing the need for balloon, device or stent-assistance.

• Choosing the optimum angle or “BSW Index” that accommodates the largest frame coil safely and/or inserting more soft coils to pack tightly will give the best possible outcome to the patient.

• A computational model will be used pre operatively to choose the best possible methods and devices.