



# TOP RESOURCES OF 2019

— FOR —

CEREBROVASCULAR SURGEONS

# Table of Contents

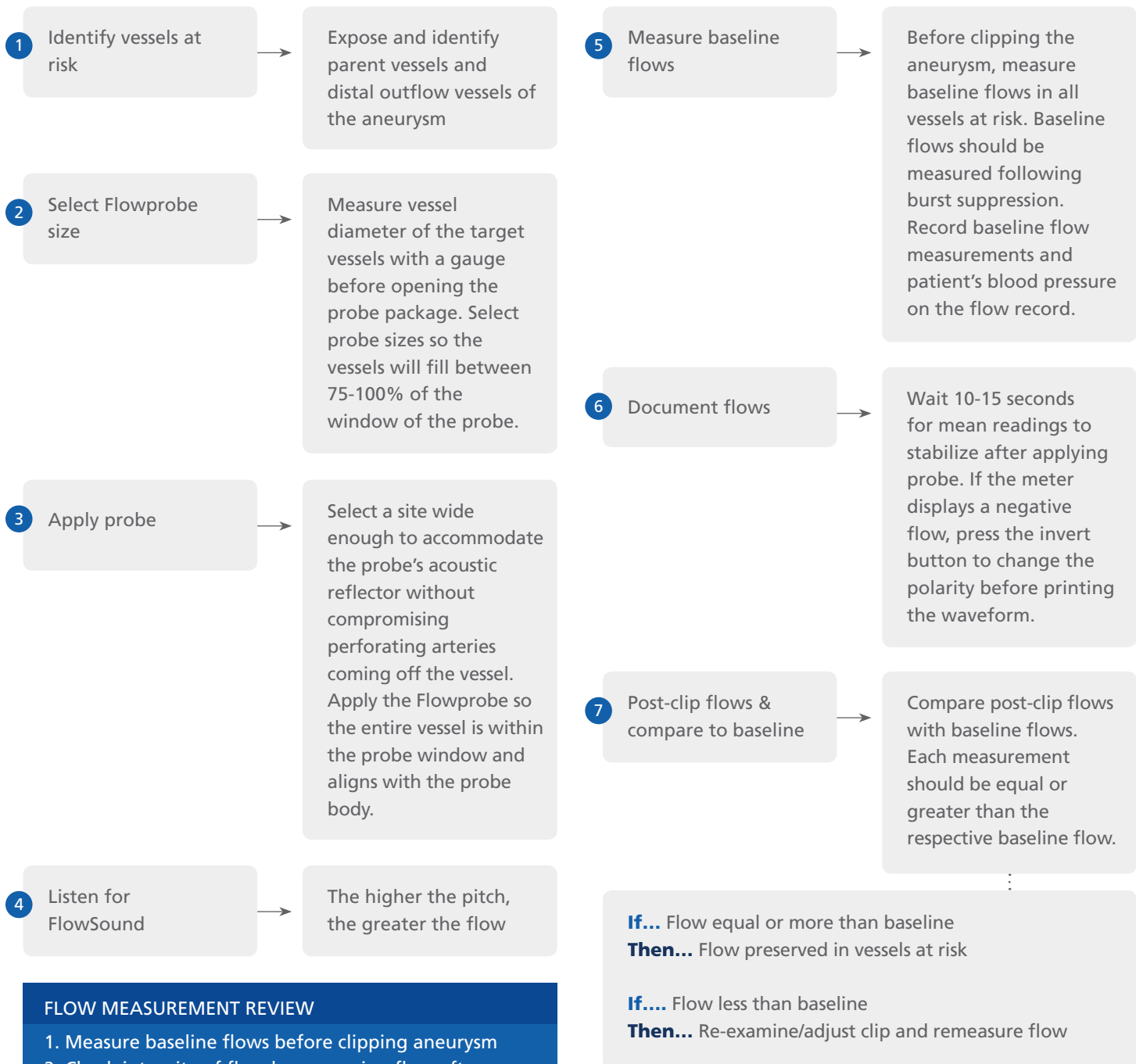
## Flow-assisted Surgical Techniques:

Aneurysm Clipping Surgery .....	1
Arterial EC-IC Bypass Surgery .....	2
STA-MCA Bypass for Moyamoya .....	4
Venous EC-IC Bypass Surgery .....	5
Arteriovenous Malformation (AVM) Resection.....	6
Spinal Dural Arteriovenous Fistula Occlusion.....	8
Cerebrovascular Neurosurgery Flowprobe Video .....	9

## TECHNIQUE NO. 1

# Aneurysm Clipping Surgery

During aneurysm surgery, using a non-constrictive Charbel Micro-Flowprobe to measure blood flow in major cerebral vessels helps achieve optimal clip placement to obliterate aneurysm without compromising flow that could cause an intraoperative stroke.



## FLOW MEASUREMENT REVIEW

1. Measure baseline flows before clipping aneurysm
2. Check integrity of flow by measuring flow after temporary clipping of aneurysm
3. Compare post-clipping and baseline flows to confirm flow restoration after permanent clipping

Information courtesy of F. Charbel, MD, FACS;  
To view full protocol, see: [www.transonic.com/applications/surgical/cerebrovascular](http://www.transonic.com/applications/surgical/cerebrovascular)

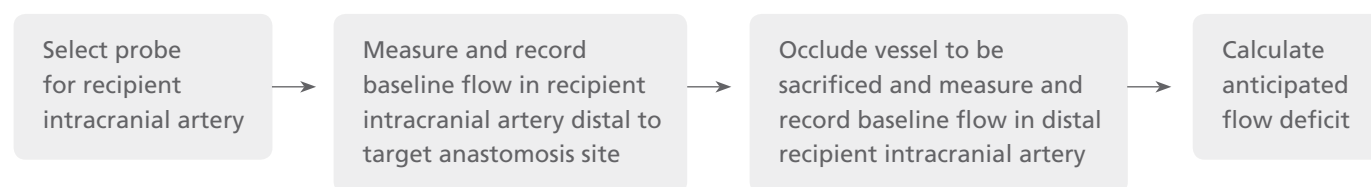
## TECHNIQUE NO. 2

# Arterial EC-IC Bypass Surgery

When you select an arterial extracranial-intracranial (EC-IC) bypass to preserve flow during aneurysm clipping or trapping surgery, Charbel Micro-Flowprobes assess the adequacy of flow during and after construction of the bypass.

## Flow Measurement Steps:

### INTRACRANIAL



### EXTRACRANIAL



Continued on next page

## Calculate Flow Deficit:

$$\text{Flow deficit} = \text{baseline flow} - \text{flow with vessel occluded}$$

Compare the anticipated flow deficit with cut flow

### IF...

Cut flow is less than the flow deficit → Consider another operative strategy

### IF...

Cut flow is greater than the anticipated flow deficit → Proceed to construct bypass, trap aneurysm and sacrifice vessel → Measure and record donor artery post-bypass flow → Calculate Cut Flow Index (CFI)  

$$\text{CFI} = \frac{\text{Post bypass flow}}{\text{Cut free flow}}$$

### IF...

The CFI is less than 0.5 → Examine bypass for kinks and analyze recipient bed

### IF...

The CFI is greater than 0.5 → The bypass is patent → Measure proximal, distal recipient artery post-bypass flows to document surgical success

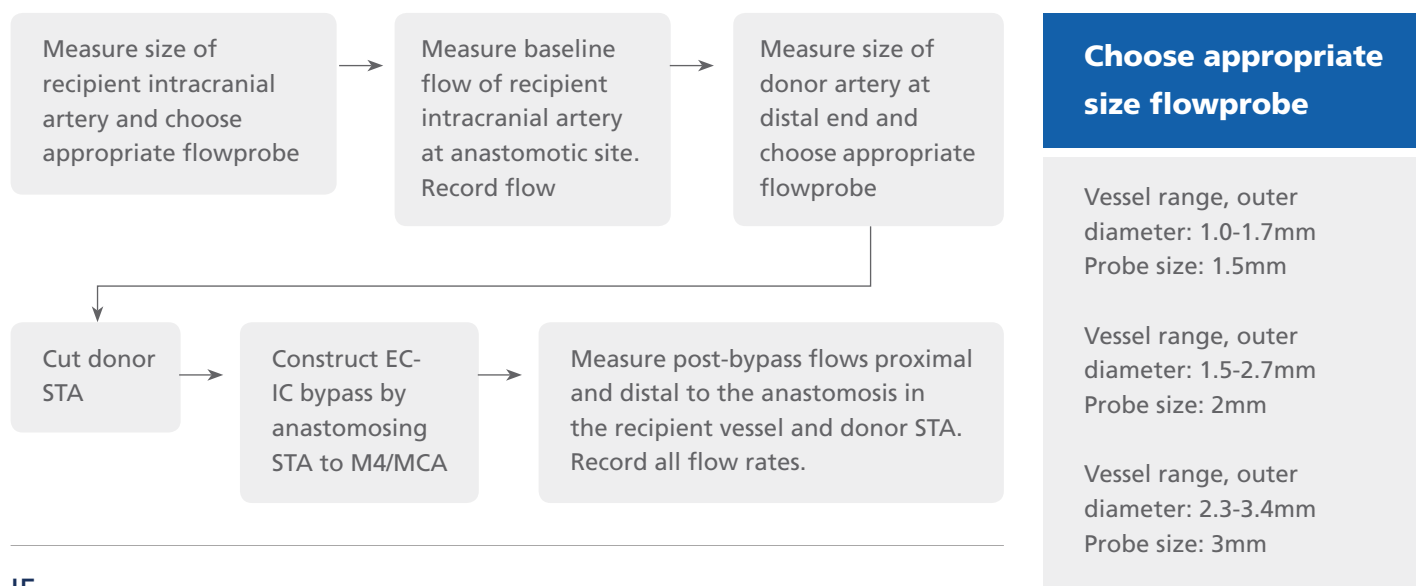
## TECHNIQUE NO. 3

# STA-MCA Bypass for Moyamoya

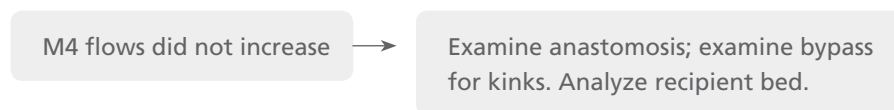
One strategy you may elect to use to alleviate the symptoms of Moyamoya syndrome is the surgical creation of an arterial extracranial to intracranial (EC-IC) bypass from the superficial temporal artery (STA) to the M4 middle cerebral artery branch.

During surgery, the Charbel Micro-Flowprobe® is used to measure direct volume blood flow in the STA bypass and small target M4/MCA vessels. Intraoperative blood flow measurements confirm the quality of the anastomosis and assure that the target area is receiving sufficient blood from the bypass. Measurements also prompt revision if a technical error is suspected.

## Flow Measurement Steps: Intracranial Recipient Artery and Extracranial Donor Artery



### IF...



### IF...



### IF...



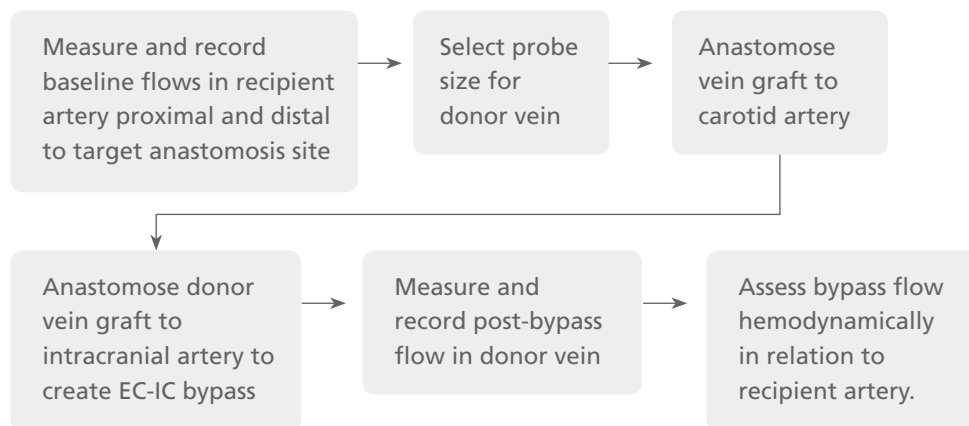
Information courtesy of  
G. Steinberg, MD, FACS;  
To view full protocol, see:  
[www.transonic.com/applications/surgical/cerebrovascular](http://www.transonic.com/applications/surgical/cerebrovascular)

## TECHNIQUE NO. 4

# Venous EC-IC Bypass Surgery

When construction of an arterial extracranial to intracranial (EC-IC) bypass graft is contraindicated due to atherosclerosis, twisting or a poor section of the superficial temporal artery, you may elect to harvest a vein and construct a venous EC-IC Bypass graft to preserve or augment intracranial flow. Intraoperative flow measurements provide on-the-spot feedback as the surgeon identifies and defines the specific hemodynamic requirements for each case.

## Flow Measurement Steps



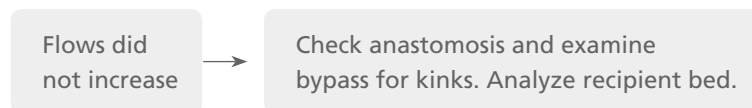
### Choose appropriate size flowprobe

Vessel range, outer diameter: 2.5-3.3mm  
Probe size: 3mm

Vessel range, outer diameter: 3.3-4.9mm  
Probe size: 4mm

Vessel range, outer diameter: 4.4-6.9mm  
Probe size: 6mm

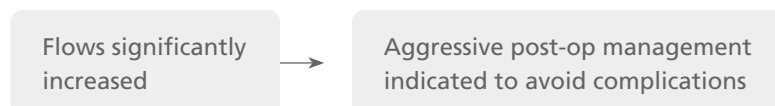
### IF...



### IF...



### IF...



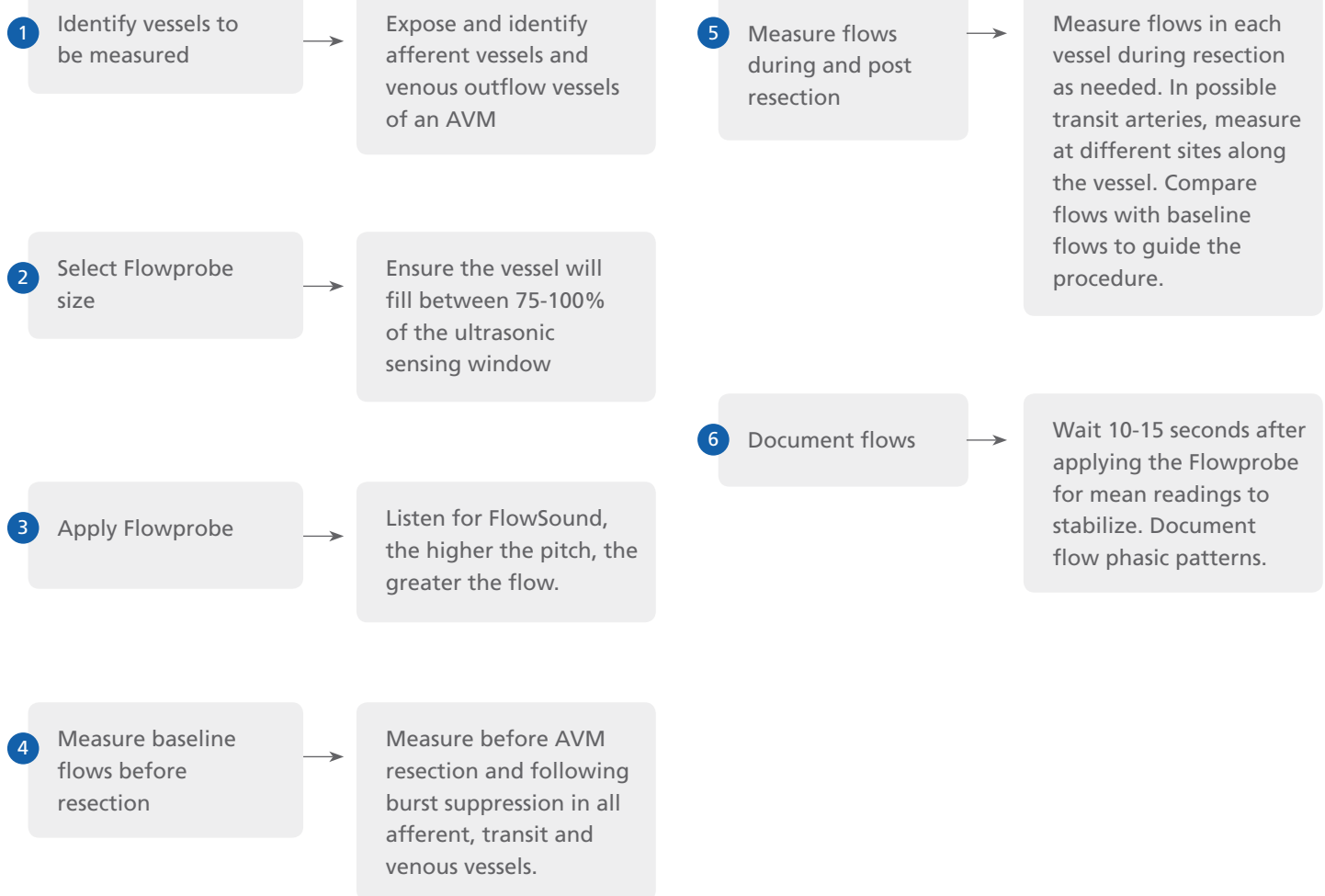
Information courtesy of  
F. Charbel, MD, FACS;  
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## TECHNIQUE NO. 5

# Arteriovenous Malformation (AVM) Resection

A Charbel Micro-Flowprobe can be used as a quantitative tool during a microsurgical resection/obliteration of an arteriovenous malformation (AVM). The Micro-Flowprobe directly measures blood volume flow in cerebral vessels to guide surgical strategies.

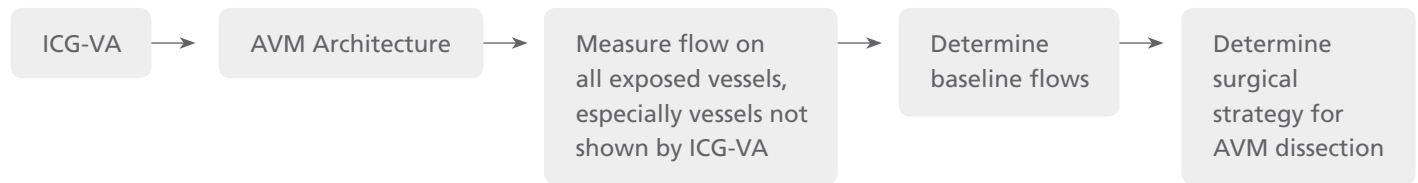


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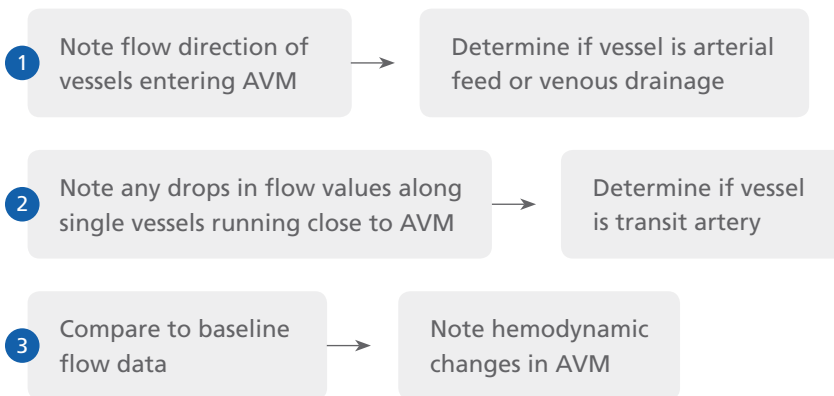


## Flow-Guided AVM Resection

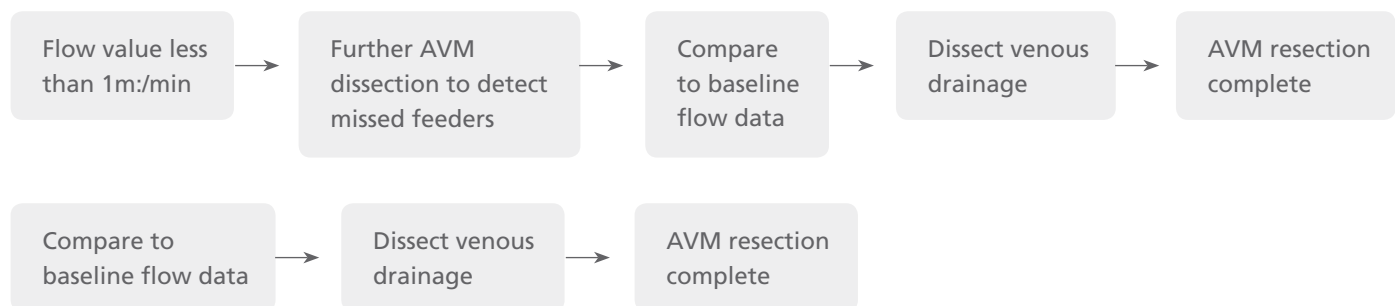
### PRE-DISSECTION



### MEASURE FLOW AS NEEDED



### MEASURE FLOW ON VENOUS DRAINAGE BEFORE SECTION/CLOSURE



Information courtesy of A Della Puppa, MD;  
To view full protocol, see: [www.transonic.com/applications/surgical/cerebrovascular](http://www.transonic.com/applications/surgical/cerebrovascular)

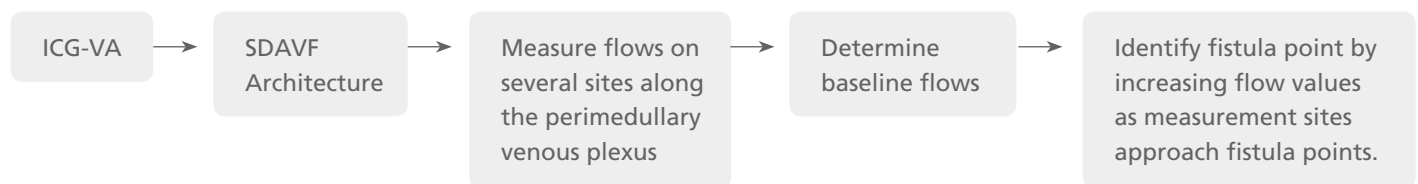
## TECHNIQUE NO. 6

# Spinal Dural Arteriovenous Fistula Occlusion

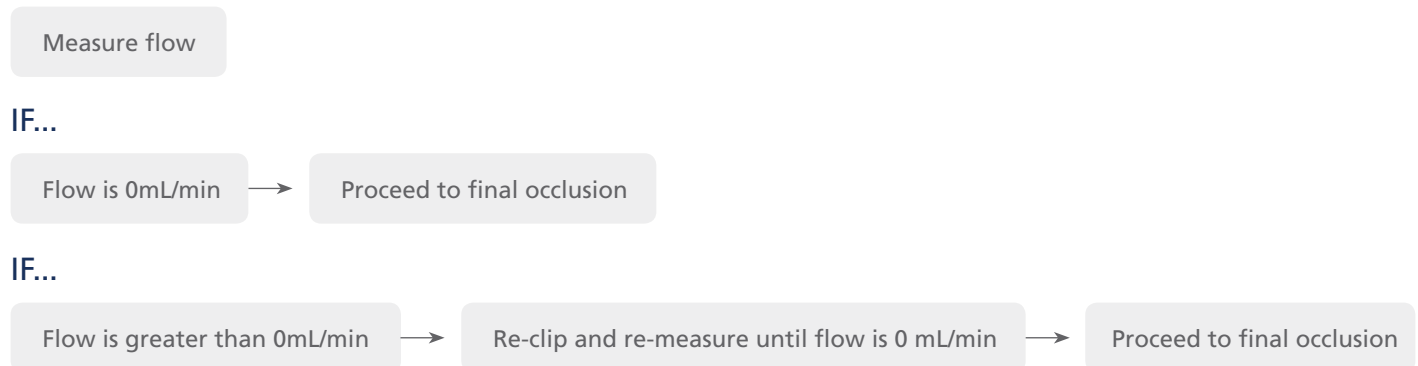
Charbel Micro-Flowprobes® are designed to measure blood flow in cerebral vessels. However, you can use the bayonet-style Flowprobes during other surgeries that are performed under a microscope. One such surgery is disconnection of a spinal dural arteriovenous fistula (SDAVF). The long bayonetstyle Flowprobes, available in 1.5, 2, and 3 mm sizes, use ultrasonic transit-time principles to directly measure volume blood flow. In the case of SDAVF occlusion surgery, flow measurements guide the surgical strategy by helping to identify the point of the fistula and confirm its disconnection.

## Flow Measurement Steps:

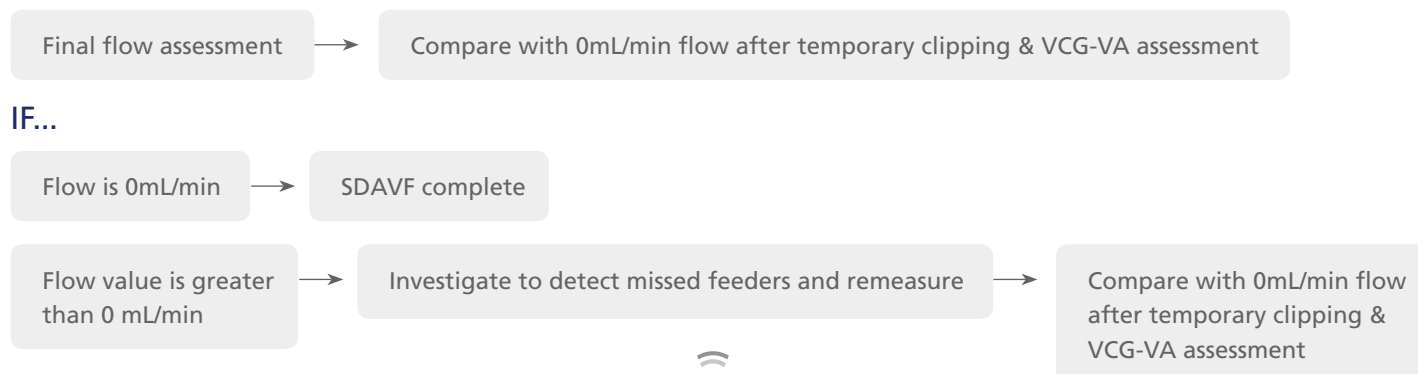
### PRE-OCCLUSION



### AFTER TEMPORARY CLIPPING



### AFTER FINAL OCCLUSION



# Cerebrovascular Neurosurgery Flowprobe Video

Many cerebrovascular neurosurgeons use a Doppler flow probe to measure flow velocity during a procedure.

Dr. Sophia Shakur, a cerebrovascular neurosurgeon practicing at Peninsula Regional Medical Center in Maryland, uses a Transit-time ultrasound Micro-flowprobe to obtain more objective volume flow measurements during her cases.

See why Dr. Shakur prefers volume flow measurement to Doppler velocity and how it helps her achieve better outcomes in the video below.

You'll also learn:

- Why the Transonic Micro-flowprobe plays a crucial role in Dr. Shakur's surgeries.
- How the Transonic Micro-flowprobe greatly lowers the risk of stroke during aneurysm clipping surgery.
- Why flow measurement is important during bypass surgeries.





Transonic Systems Inc. is a global manufacturer of innovative biomedical measurement equipment. Founded in 1983, Transonic sells “gold standard” transit-time ultrasound Flowmeters and Monitors for surgical, hemodialysis, pediatric critical care, perfusion, interventional radiology and research applications. Transonic® also provides pressure and pressure volume systems, laser Doppler Flowmeters and telemetry systems.

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