

Transluminal Stent-Assisted Angioplasty of the Vertebrobasilar System

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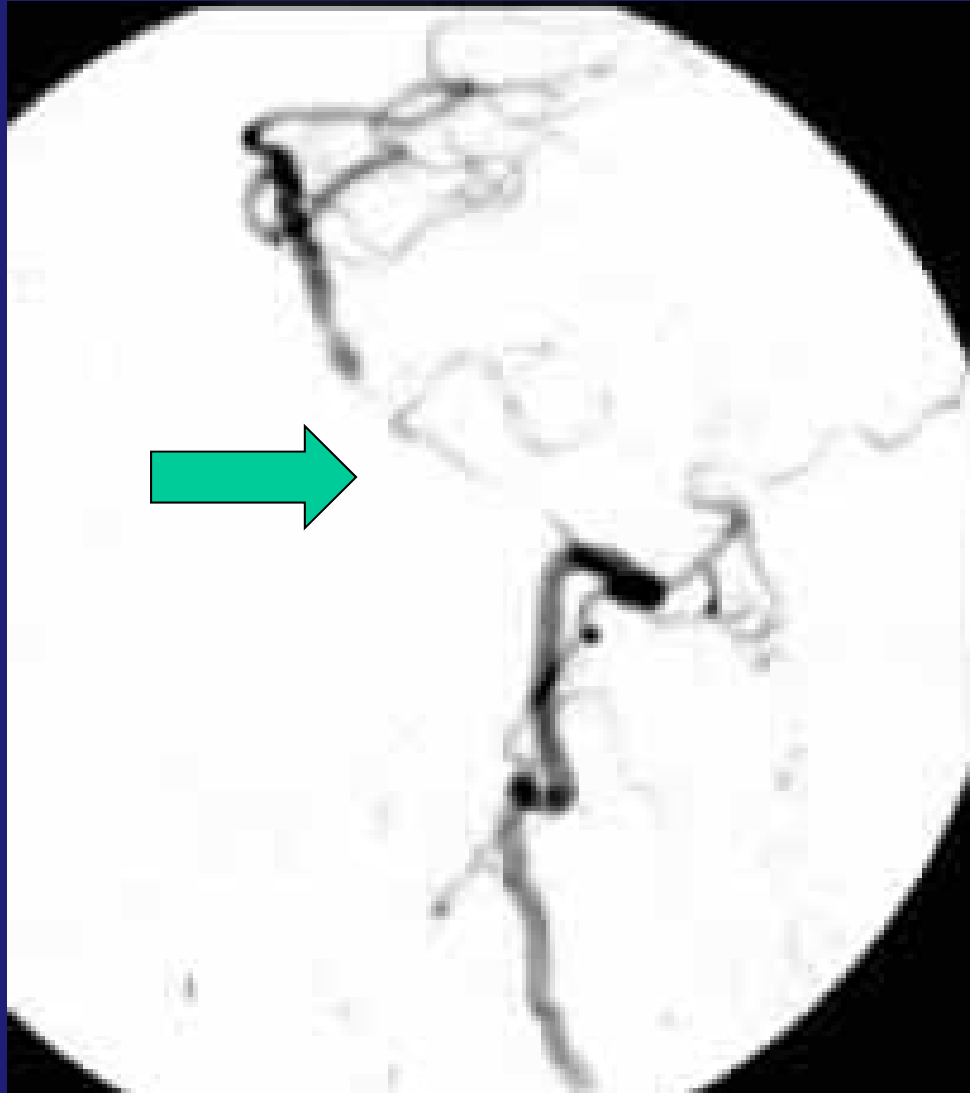
Case #1

- 64 y.o male
- VB TIA on maximal medical therapy(will define later)
- PMH: HTN, PVD, CAD, COPD, GERD
- Angio: left VA occlusion, right distal VA stenosis
- Intervention: surgery vs. stent vs. angioplasty alone vs. observation

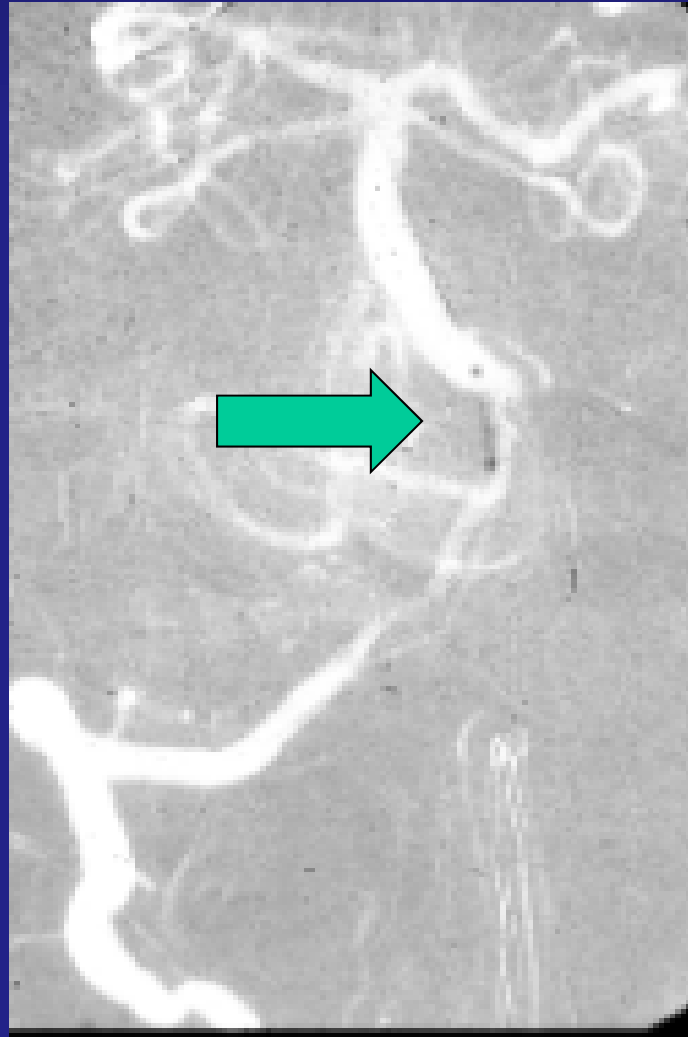
Case #1 cont.

- Procedure: stent-assisted angioplasty of distal VA
- Clinical Outcome: death
- Cause: VA rupture from stent
- Questions: **What went wrong? Was it avoidable?**

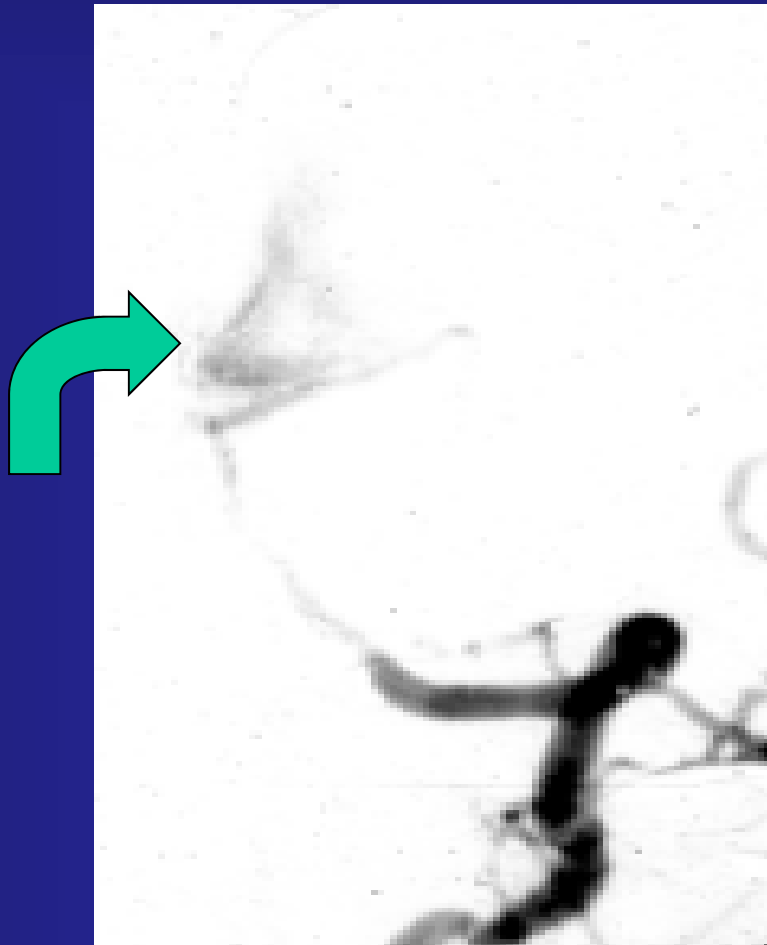
LVA: Long-segment stenosis



Long-segment stenosis: AP



LVA: Contrast extravasation



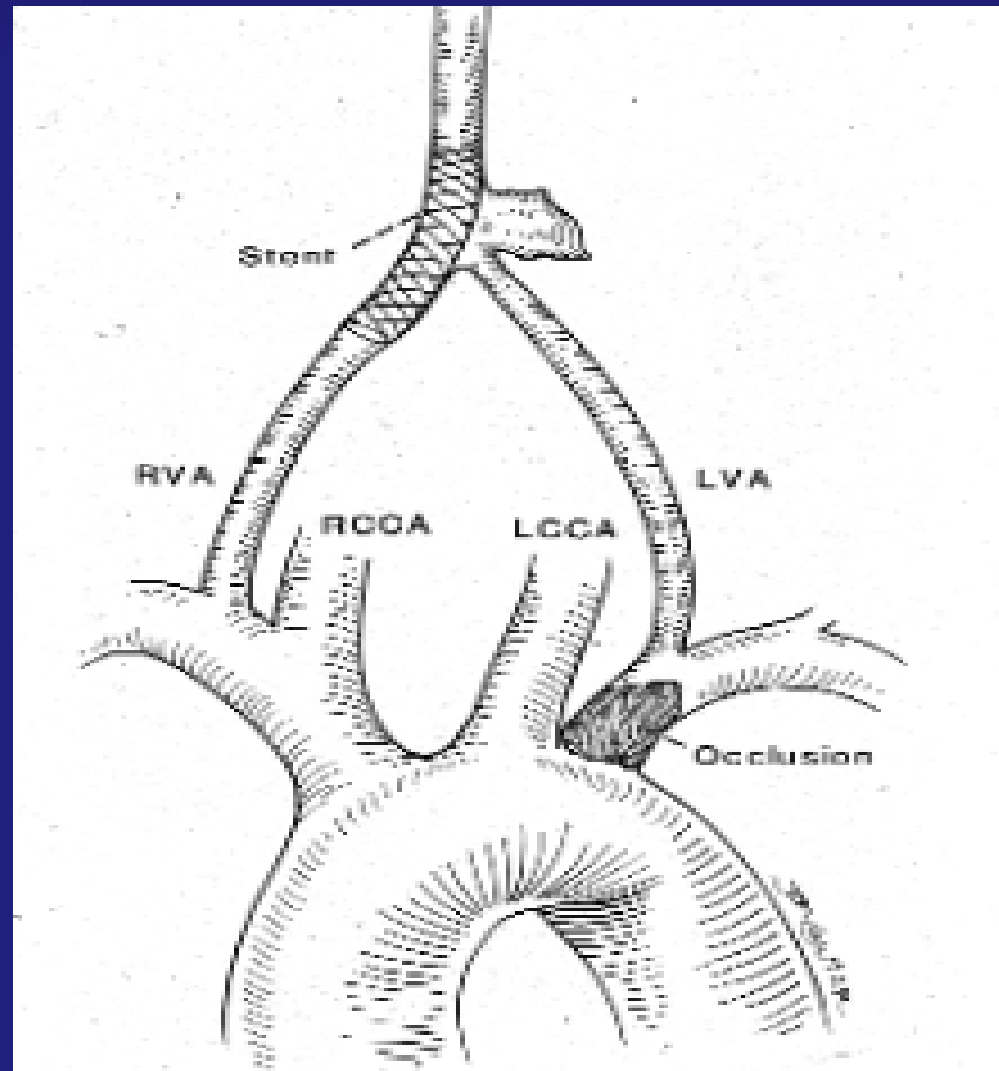
Case #2

- 61 y.o female
- HH III, Fisher III
- PMH: Subclavian-steal, sinusitis
- Angio: vert-confluence aneurysm, focal stenosis
- Intervention: surgery vs. stent vs. angioplasty alone vs. observation
- Procedure: SAA and SAC
- Outcome: mild diplopia

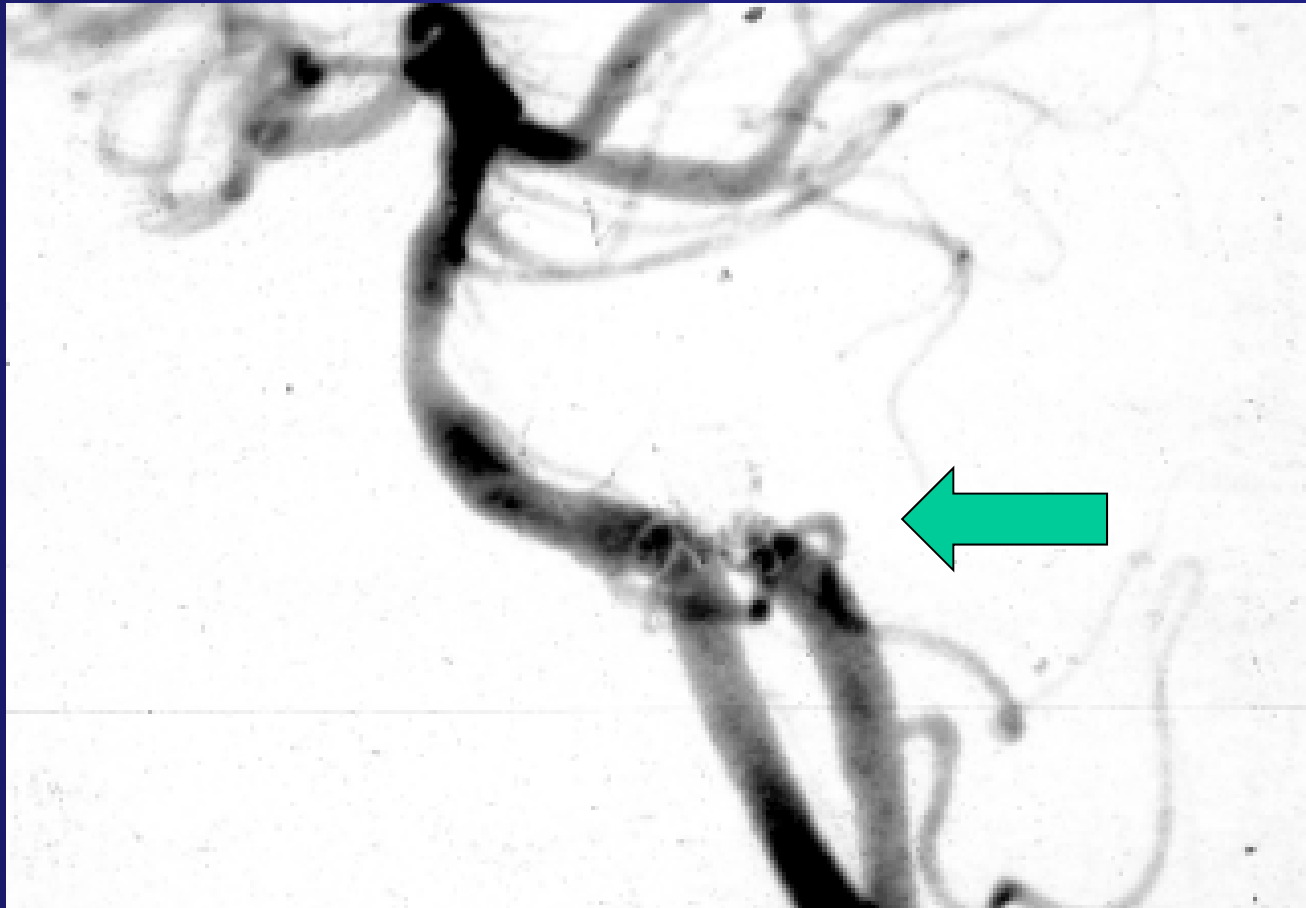
Vertebral Confluence Aneurysm



Illustration of Intervention



Post Stent-assisted Coiling



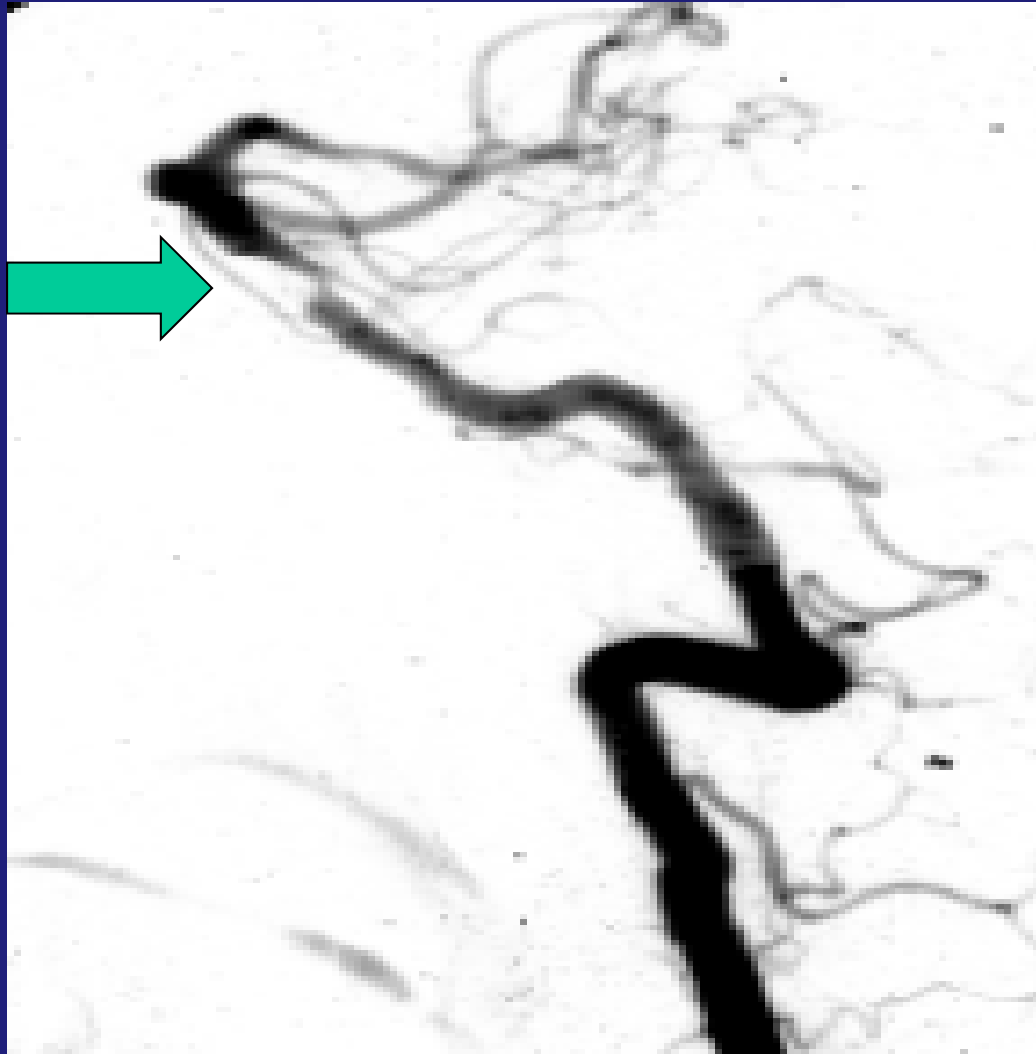
Case #3

- 56 y.o male
- VB TIA on maximal medical therapy(will define later)
- PMH: HTN, PVD, Hyperlipidemia
- Angio:mid-BA stenosis
- Intervention: surgery vs. stent vs. angioplasty alone vs. observation
- Outcome: relief of symptoms

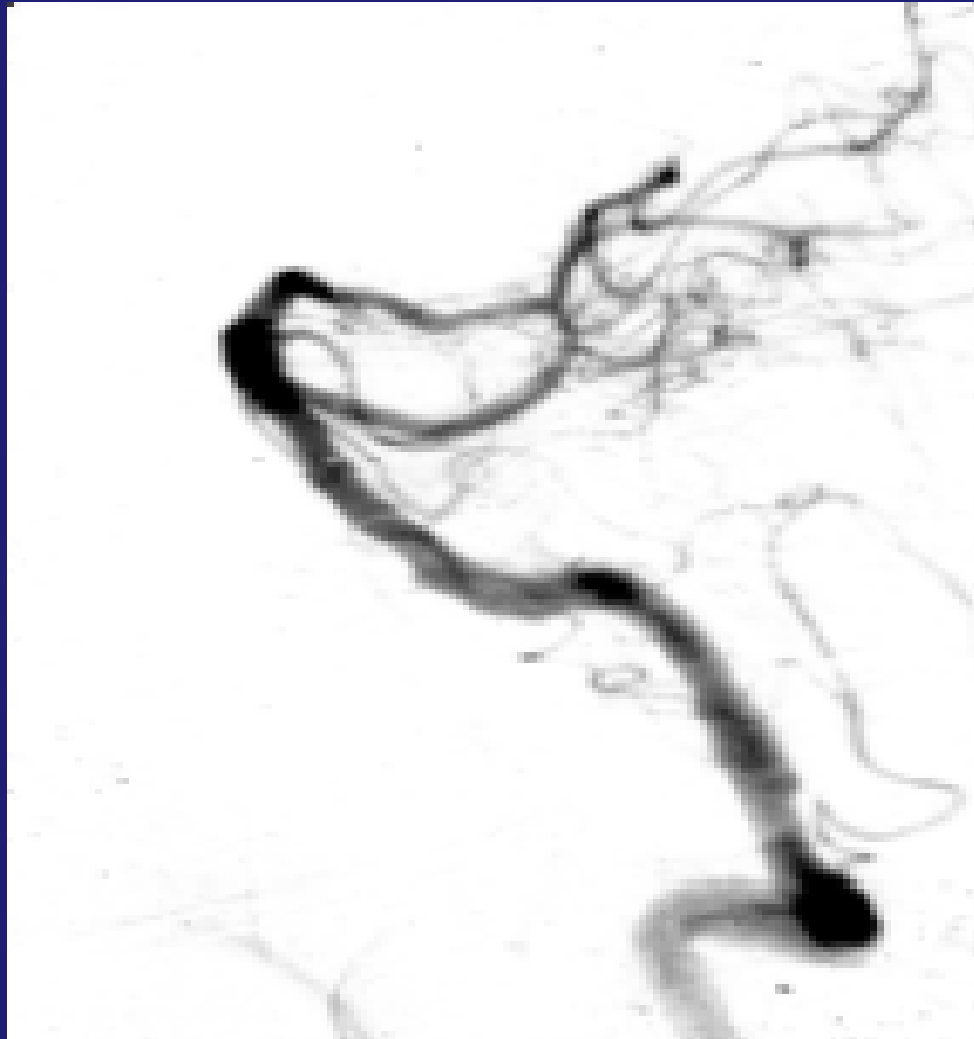
Case #3 cont.

- Procedure: stent-assisted angioplasty of the BA
- Clinical Outcome: lateral gaze diplopia (resolving)
- Angio outcome: resolution of stenotic segment
- Questions: **Why was this successful?**

BA Short-segment Stenosis



Post Stent-assisted Angioplasty



Introduction

- Symptomatic medically refractory VBAS portends a poor prognosis:
 - 11% stroke if untreated (10.7/100 patient-years)
- If lesions thrombose or occlude rates are:
 - 80-100% mortality
- Observation is not an acceptable option for these patients

VB TIA

- Defined as:
 - ataxia
 - facial drooping
 - headaches
 - diplopia
 - incoordination
 - dysmetria
 - depressed mental status

Surgical Bypass

- Spetzler, Ausman, Hopkins have reported series
 - significant morbidity approximately 34%
- Many other patients can not tolerate surgery
- What do we do with these people?

Angioplasty Alone

- Most data is from the coronary literature
- Abrupt closure following angioplasty alone:
 - 5% abrupt closure or narrowing
 - 28% especially when thrombus is present
- Nakatsuka described rates in the cerebral circulation:
 - 50-60% restenosis rate (not all significant)
- McKenzie describes
 - 35% moderate to severe restenosis

Angioplasty Alone cont.

- Takis studied periprocedural stroke rate
 - 40% following PTA alone
- Terada found:
 - 30% procedural complication rate
- **BEST PAPER:** Mori et al who found
 - restenosis highly dependent on lesion morphology

Angioplasty Alone cont.

- Mori et al:
 - type A: <5mm, concentric
 - type B: < 5-10mm, eccentric or occlusive
 - type C: >10mm, tortuous, occlusive
- Stroke risk 8%, 26%, 87% respectively
- Restenosis: 0, 33%, 100% respectively

Stent-Assisted Angioplasty

- Recent advances in stent technology
 - can navigate through proximal tortuosity of posterior circulation
 - new options for symptomatic, poor surgical candidates
 - also for assistance in coiling difficult aneurysms

Stents

- 1997 Higashida et. Al
 - stent-assisted coiling of fusiform BA aneurysm
- Sekhon described a similar technique for a wide-necked VA aneurysm
- We described stent-assisted coiling for vertebral confluence aneurysm (in review)

Stent-Assisted Angioplasty

- Mori et al in a follow-up paper:
 - VB stenosis in six patients (eight lesions)
 - 2 aborted due to tortuosity
 - 6 successful w/o morbidity

Our Study

- Objective:
 - Examine outcomes for medically refractory symptomatic VBA stenosis treated with SAA
- Methods:
 - 11 patients
 - retrospective
 - angio and clinical f/u (immediate and short-term)

Table 1: Patient Demographics

<u>Patient No.</u>	<u>Age</u>	<u>Sex</u>	<u>Comorbidities</u>	<u>Symptoms</u>
1	62	M	HTN, CAD, MI, Tobacco	VB TIA, hemiparesis
2	66	M	CAD, MI, DM, hyperlipidemia	VB TIA, thalamic stroke, BA thrombosis on admission
3	61	M	HTN, CAD, PVD, Tobacco	VB TIA
4	65	M	HTN, CAD, AAA, Tobacco	VB TIA, visual decline
5	77	M	HTN	syncope
6	43	M	Tobacco	VB TIA, BA thrombosis on admission
7	56	M	HTN, PVD, hyperlipidemia	VB TIA
8	65	M	Tobacco	VB TIA
9	68	M	HTN, PVD	2 strokes vertigo
10	65	M	PVD, HTN	VB TIA
11	64	M	HTN, PVD, CAD, COPD, hyperlipidemia reflux	VB TIA

Table 2: Lesion Location, Stent Size, and Complications

Patient No.	Lesion Location	Lesion Morphology (Mori Classification)	Stent Size (mm)	Complication
1	proximal BA	A	4 x 9	VA rupture
2	distal BA stenosis, thrombosis on admission	C	3 x 13	pontine stroke
3	mid-BA stenosis	A	3 x 8	none
4	mid-BA stenosis	A	3 x 9	none
5	mid-BA stenosis	B	3 x 8	none
6	proximal BA, thrombosed on admission	A	3 x 8	none
7	mid-BA stenosis	A	4 x 12	none
8	mid-BA stenosis	B	2.5 x 12	brain death
9	distal right VA stenosis (left VA occlusion)	A	3.5 x 18	none
10	distal left VA stenosis (right VA occlusion)	A	3 x 12	none
11	distal right VA stenosis (left VA occlusion)	C	2.5 x 12	VA rupture, death

<u>Patient No.</u>	<u>Clinical Outcome: Rankin Score</u>	<u>Angiographic F/U</u>	<u>F/U Duration (mo.)</u>
1	6	n/a	<1
2	6	n/a	3
3	0	good patency	8
4	0	minimal intimal hyperplasia	4
5	0	good patency	6
6	0	40% narrowing, intimal hyperplasia	5
7	2	good patency	5
8	6	n/a	<1
9	0	good patency	5
10	0	good patency	3
11	0	n/a	<1

Results

- 11 patients treated
- 3 perioperative deaths
- 1 delayed death from pontine stroke
- 7 (64%) resumed pre-procedural activity or better
- Angio: 71% good patency at last f/u
 - 1-minimal hyperplasia
 - new stenosis proximal to the stent
 - pseudoaneurysm within stented portion

Post-Procedure Management

- Heparin discontinued
- Abciximab continued for 12 hours
- sheath removed the following day
- discharged on ASA 325mg po qd
and Clopidogrel 75 mg po qd x 1 month

Conclusion

- Effective for reducing or eliminating symptoms
- Morbidity similar to surgery in patients who are poor surgical candidates
- need long-term f/u
- As technology improves and experience grows, morbidity may continue to decrease
- **DO NOT KNOW IF THIS IS BETTER THAN THE NATURAL HISTORY!!**



**Operating Theater:
19th century,
London, England**

**Dr. Lunsford's
“pick list” for
the OR**

TREPANNING SET

BOX CONTAINED 8 TREPANNING
INSTRUMENTS:

TREPHINE

SPARE INNER PIECE

KEY

BRUSH

TWEEZERS

ELEVATOR (INSERTED THROUGH
HOLE TO RAISE INDENTED/SP

SKULL SAW (DOUBLE SIDED B
SMALL CUTS TO T
OF T

ONE MISSING
LATE 18TH CENTURY



**Trephine Craniectomy
Set: old operating theater
in an abandoned church**



**Trephine Craniectomy
Set: old operating theater
in an abandoned church**

