The background is a dark blue gradient with abstract white and light blue geometric patterns. On the left side, there is a large, semi-circular scale with tick marks and numbers ranging from 140 to 260. Several concentric circles and arcs are scattered across the slide, some with arrows indicating a clockwise or counter-clockwise direction. The overall aesthetic is technical and modern.

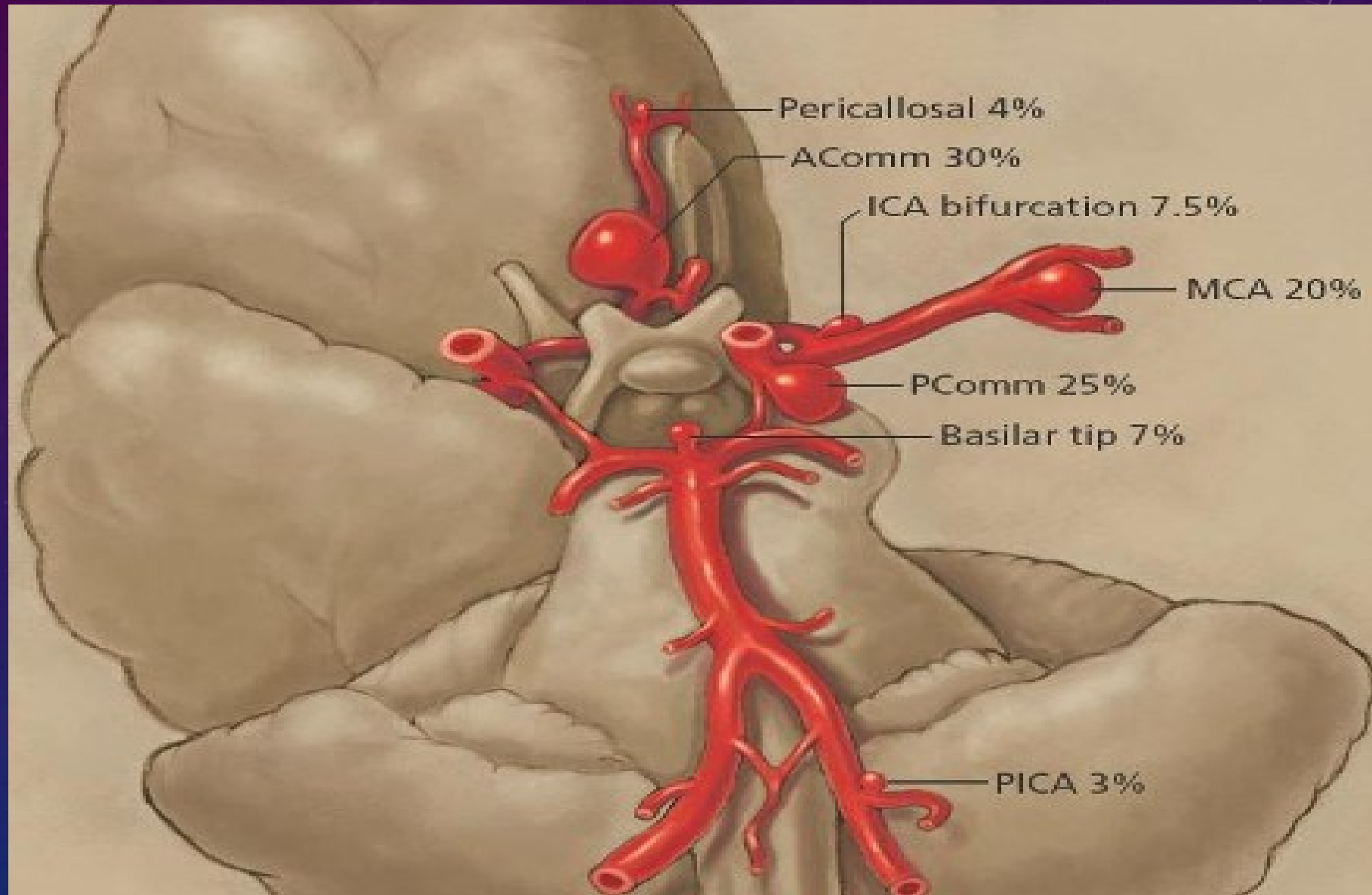
CRITICAL CARE NURSING MANAGEMENT OF ENDOVASCULAR VASOSPASM PATIENTS

LORA CHEEK RN CNRN

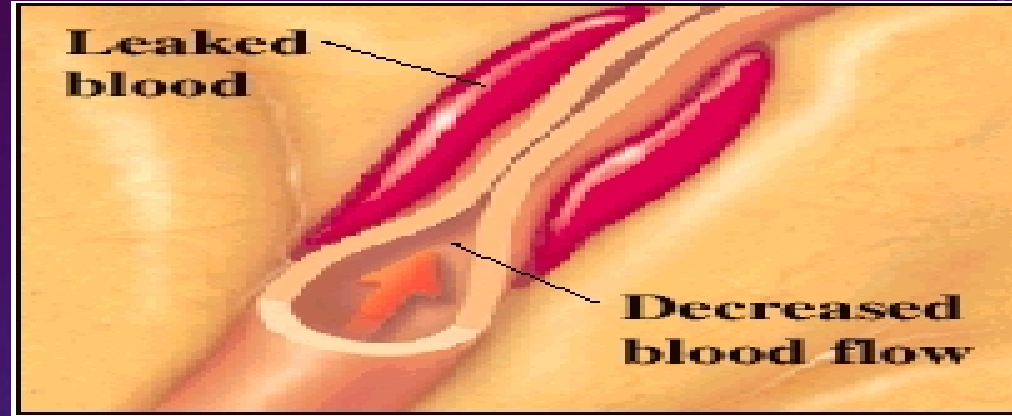
ACKNOWLEDGEMENTS : DHEERAJ GANDHI (MD), TIM MILLER (MD),
GARAUV JINDAL (MD) ANASTASIA WHITE RT (R)(VI)

CEREBRAL ANEURYSMS

- Relatively small incidence < 6% of the population
- SAH approx. 30,000 per year
- Risk of rupture increases with age
- Average age, 55 years
- 10%-15% of persons have multiple aneurysms
- Usually develops in the walls of major cerebral arteries at branching points

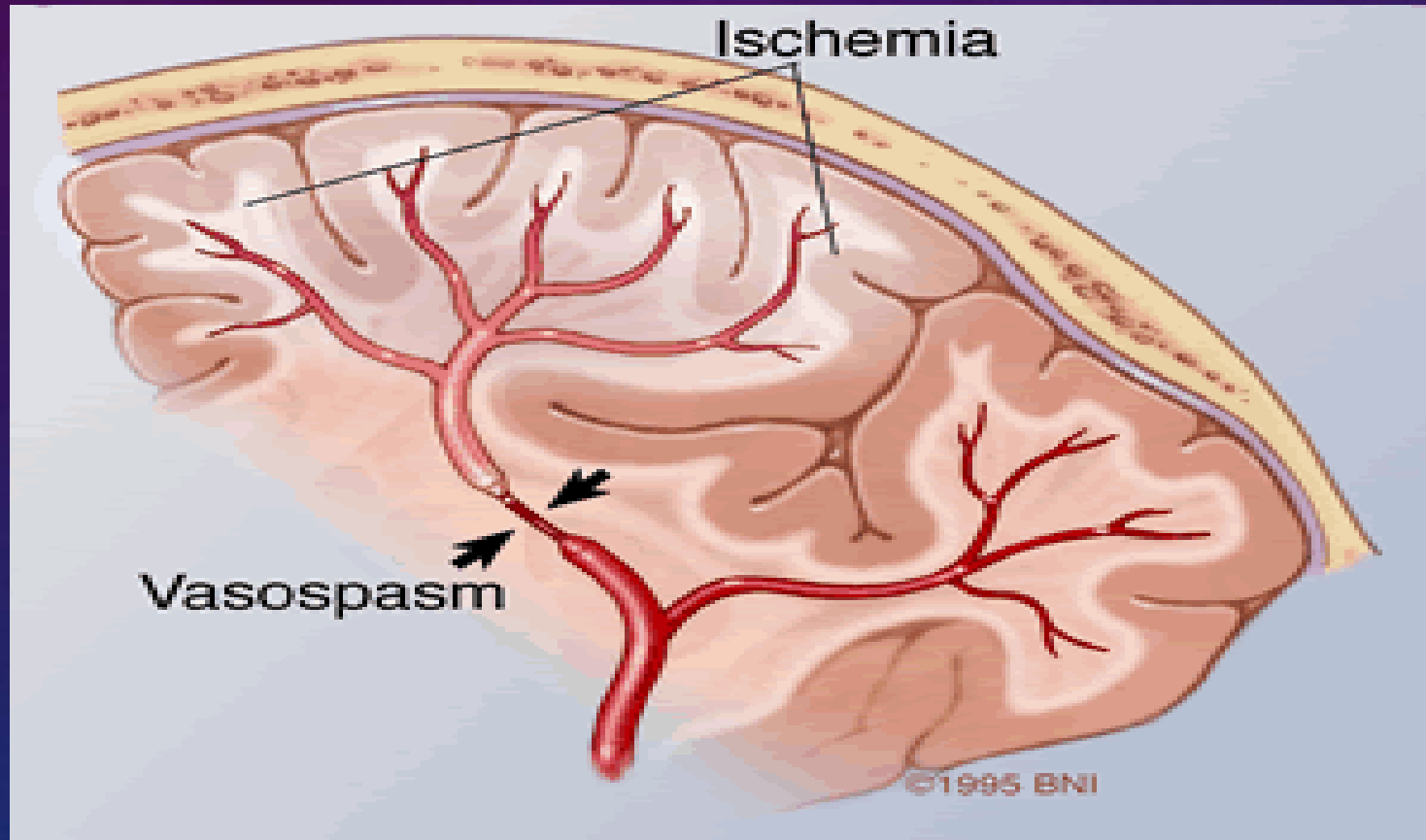


VASOSPASM



- A focal or diffuse narrowing of intracranial arteries
- Usually most severe in arteries adjacent to the ruptured aneurysm
- Results from the presence of blood products in subarachnoid space
- Predicted by amount of blood in subarachnoid space detected by CT

VASOSPASM



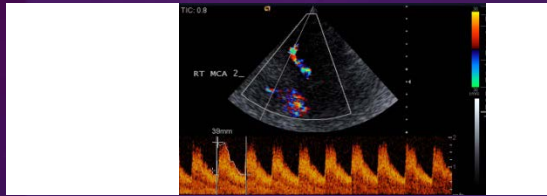
VASOSPASM

- Usually more severe in older persons and women
- Usually not present within first 2-3 days after ictus, peaks at 7-14 days, then resolves
- Causes brain ischemia secondary to decreased cerebral blood flow
- TDC or CTA

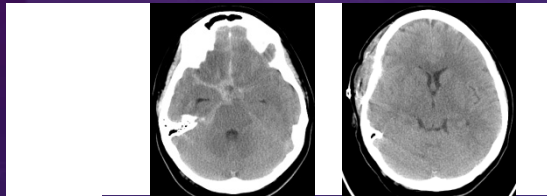
CLINICAL ASSESSMENT

- Frequent neurologic exams are critically important during the high-risk time window (3-14 days)
 - Any of the following should raise concern:
 - Confusion
 - Delirium
 - Decreased consciousness
 - New focal neurologic deficits

DIAGNOSTIC IMAGING



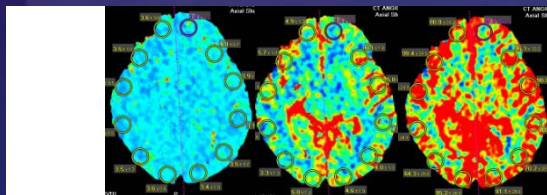
Bedside evaluation:
Transcranial doppler ultrasonography (TCD)



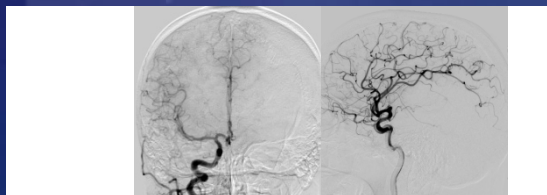
Rule out rehemorrhage or hydrocephalus:
Non-contrast head CT



Initial angiographic evaluation:
Computed tomography angiography (CTA)



Perfusion evaluation:
Computed tomography perfusion (CTP)

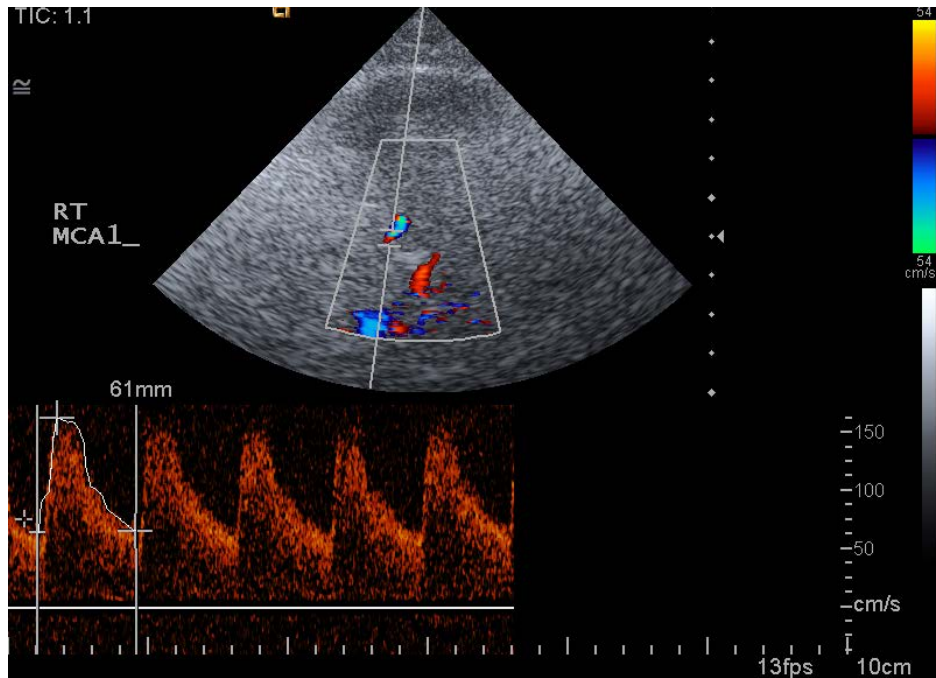


Definitive angiographic evaluation:
Digital subtraction angiography (DSA)

62 YO WOMAN WITH RUPTURED ACOM ANEURYSM, DEVELOPS CONFUSION AND SLEEPINESS 6 DAYS AFTER CLIPPING

Transcranial Doppler Ultrasound (TCD)

MCA



TCD reveals markedly elevated MCA peak systolic velocities (163 cm/s) suggesting vasospasm

CT Angiogram (CTA)



CTA confirms right M1 segment vasospasm

Courtesy Of D. Gandhi MD

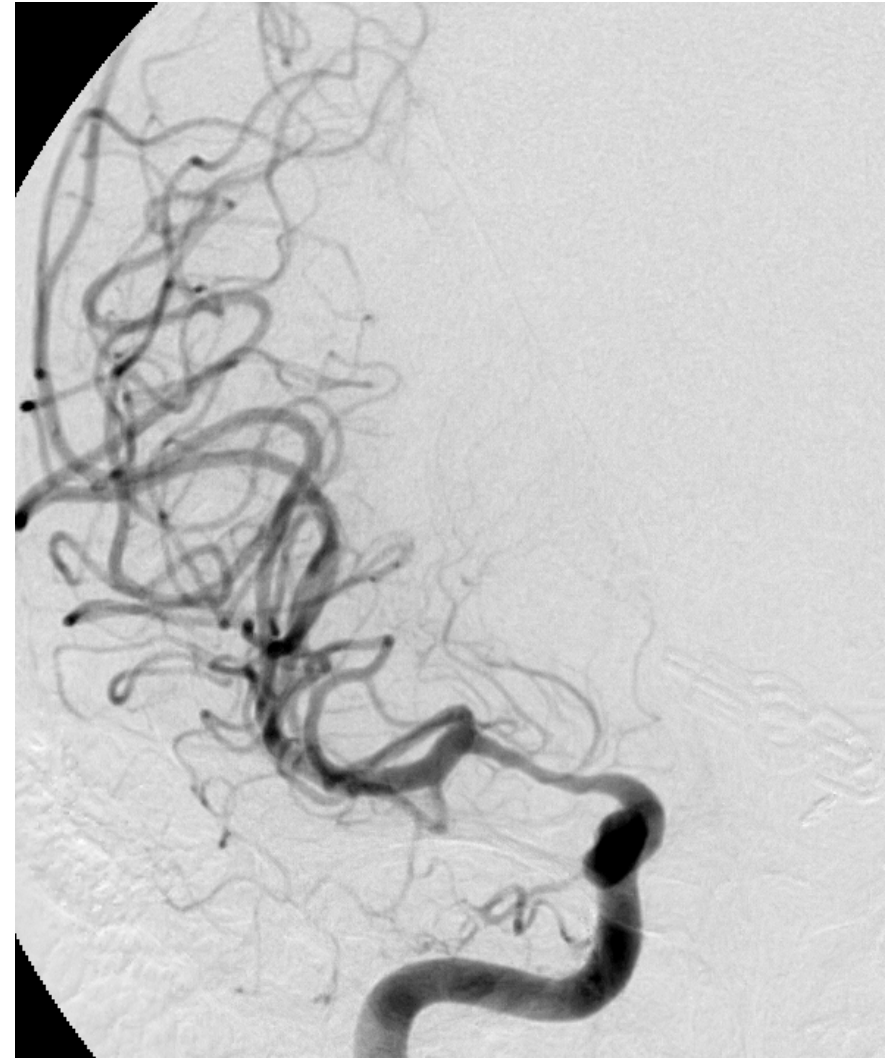
AP view: right ICA injection



6 days
later



AP view: right ICA injection



**Patient with symptomatic
vasospasm**



Established infarct



**Contraindication to aggressive
therapy**

Regions of established infarct have minimal chance of functional recovery and have a high risk of reperfusion hemorrhage

Patient with symptomatic vasospasm



Salvageable parenchyma

1st line for most patients



Medical Therapy

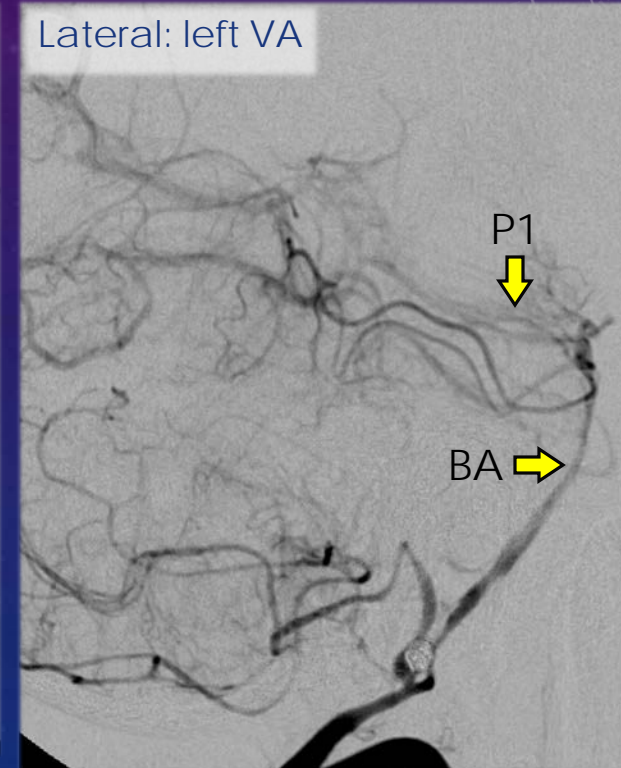
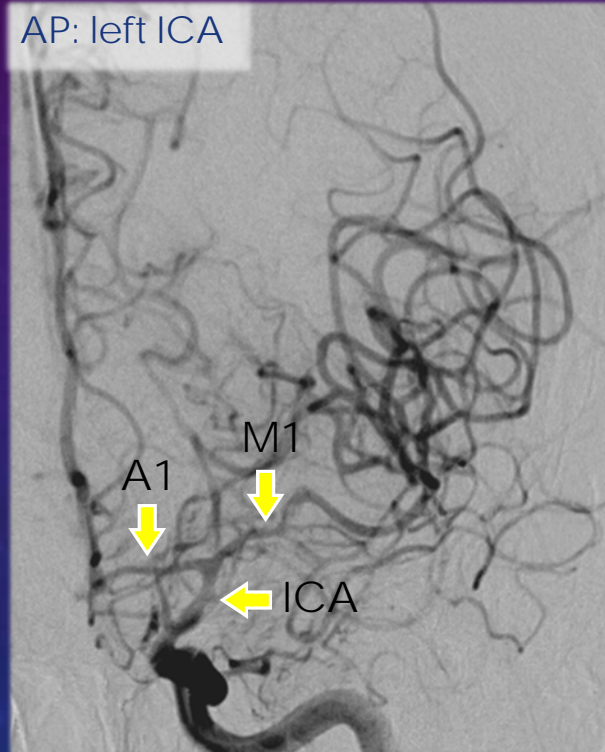
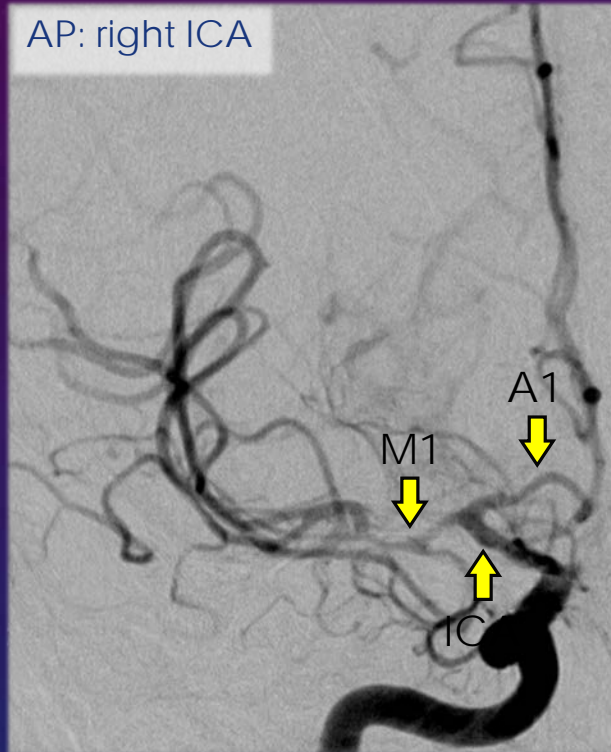
hypertension, hemodilution



*Patient cannot
tolerate
hemodynamic
therapy*

Endovascular Therapy

- Intra-Arterial (IA) Vasodilator Infusion
- Transluminal Balloon Angioplasty (tBA)
- Combination



Courtesy Of D. Gandhi MD

ENDOVASCULAR IA PHARMACOLOGICAL THERAPY

Verapamil (A)

- Calcium Channel Blocker
- Acts on smooth muscle cells
- Produces vasodilation
- Quick onset

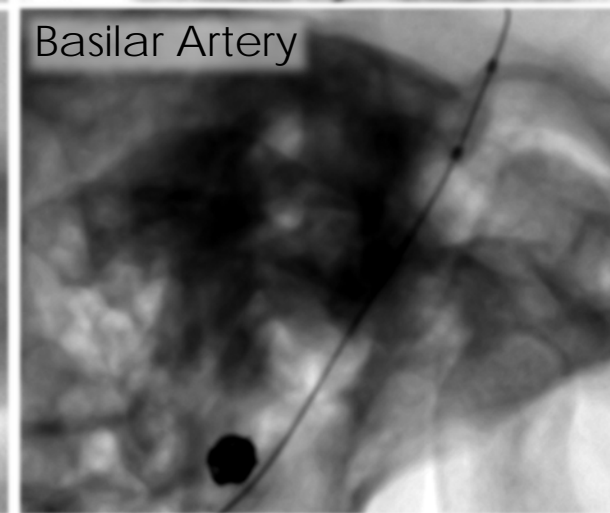
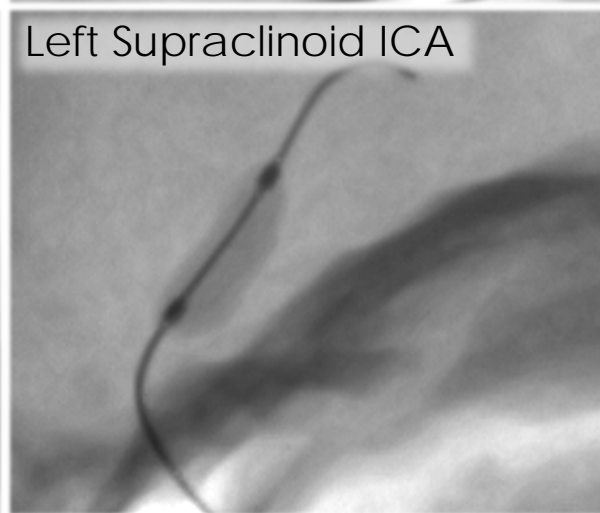
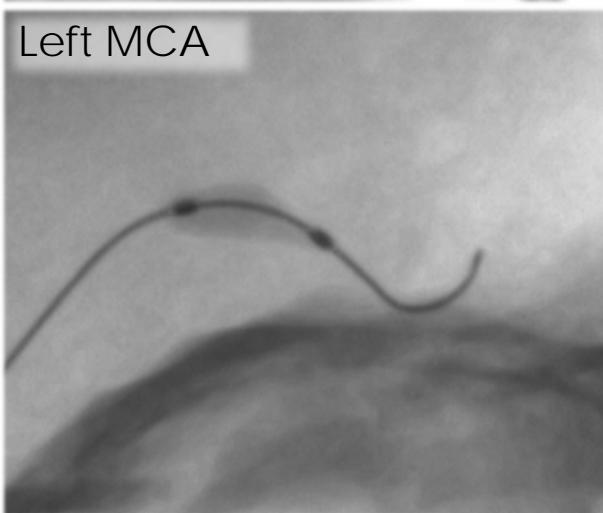
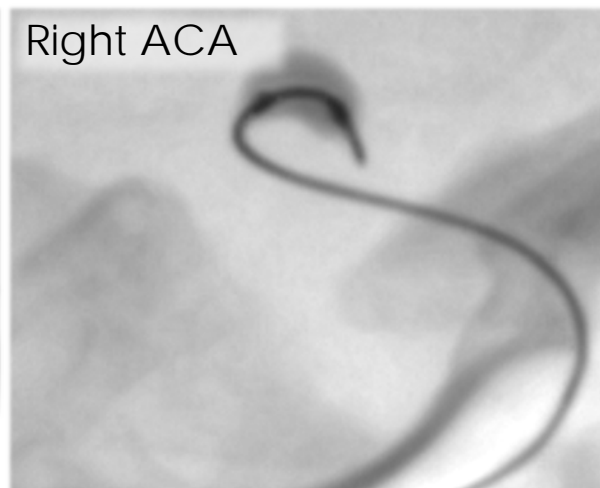
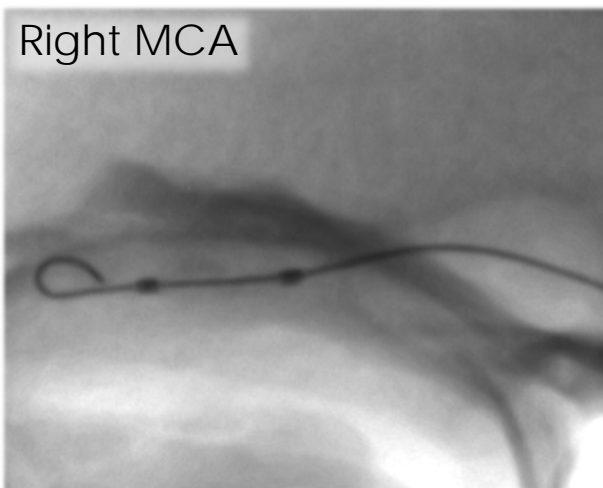
Nicardipine (A/V)

- Calcium Channel Blocker
- More selectivity for vascular smooth muscle cells
- Systemic Vasodilatation resulting in DECREASE BP
- Onset within minutes

TRANSLUMINAL BALLOON ANGIOPLASTY

CONSIDERATIONS FOR PROCEDURAL PLANNING

- Locations that are amenable for angioplasty include:
 - Proximal vessels of Circle of Willis
 - Vertebral arteries
 - Basilar artery
 - Supraclinoid internal carotid artery
 - M1 segment
 - Immediate distal branches
 - A1
 - Proximal A2
 - M2
 - P1, P2

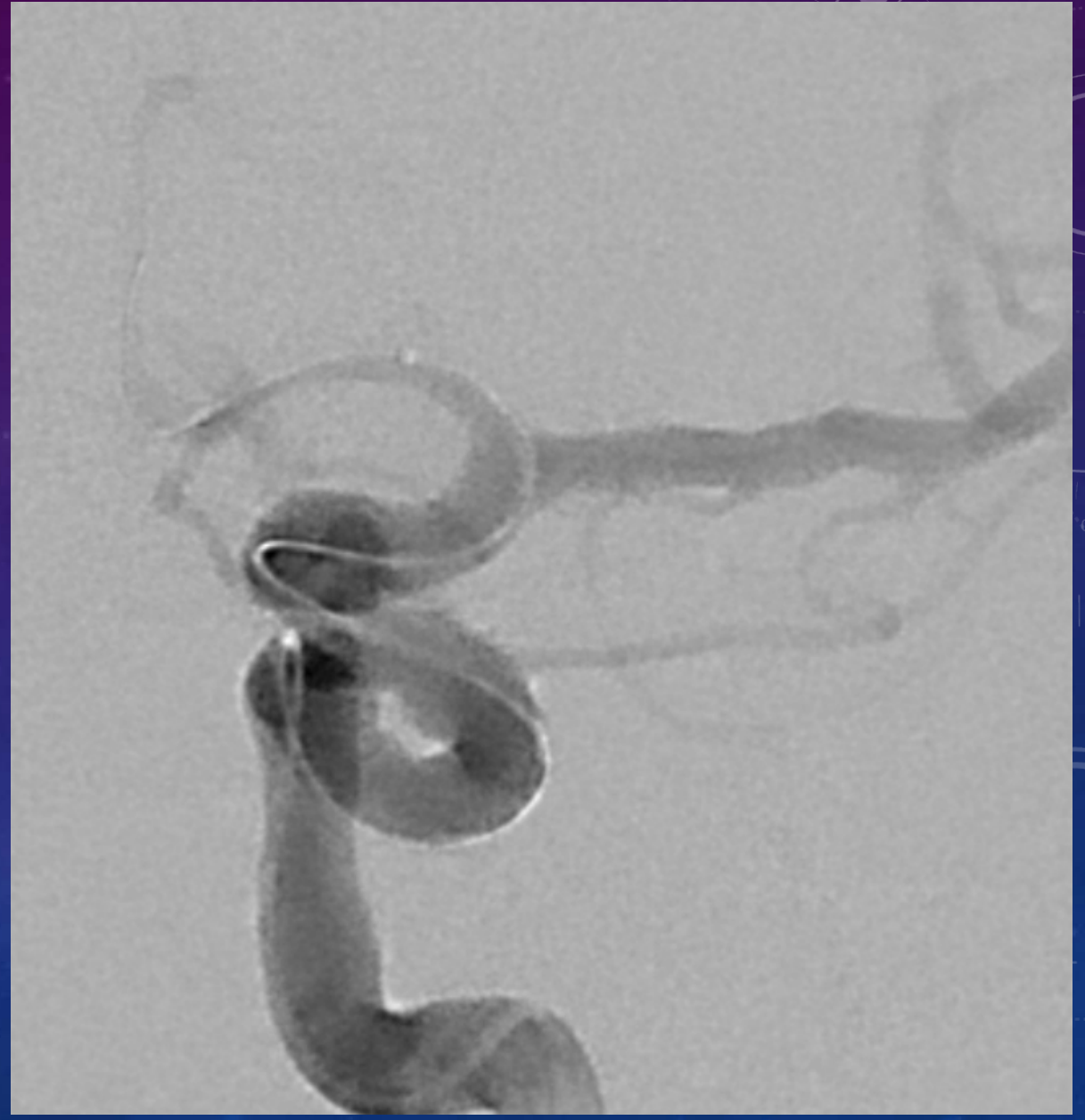


Courtesy Of D. Gandhi MD

CASE STUDY VASOSPASM

- 55 yo Female
- Past medical hx of 2 cardiac stents
- WHOL at work : 911
- CT = SAH
- GCS 11, EVD placed ICP's 10-16
- Ruptured ACOM
- Post Bleed, day 6 exam worsened, Neuro IR steps in

LEFT ACA VASOSPASM

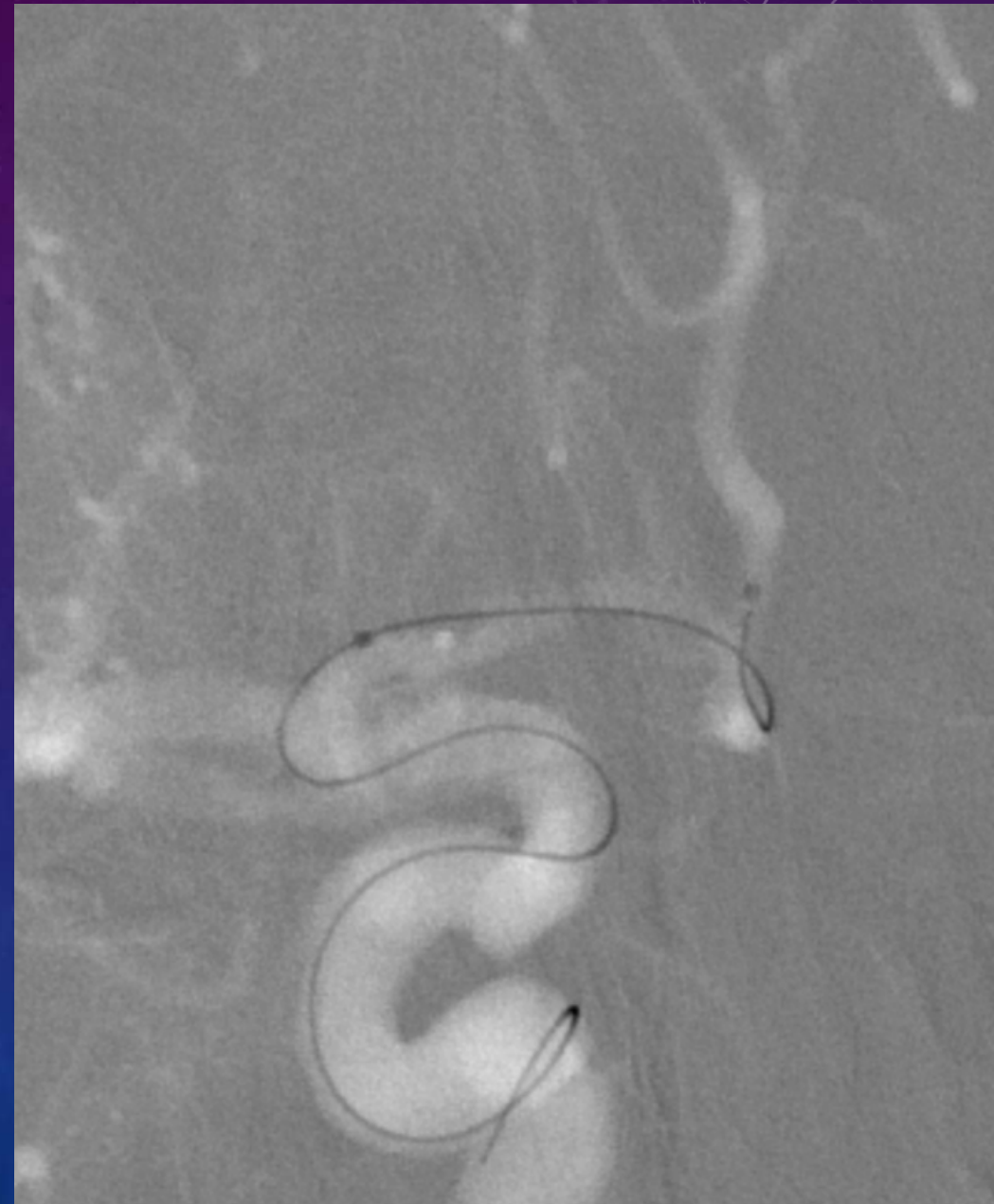
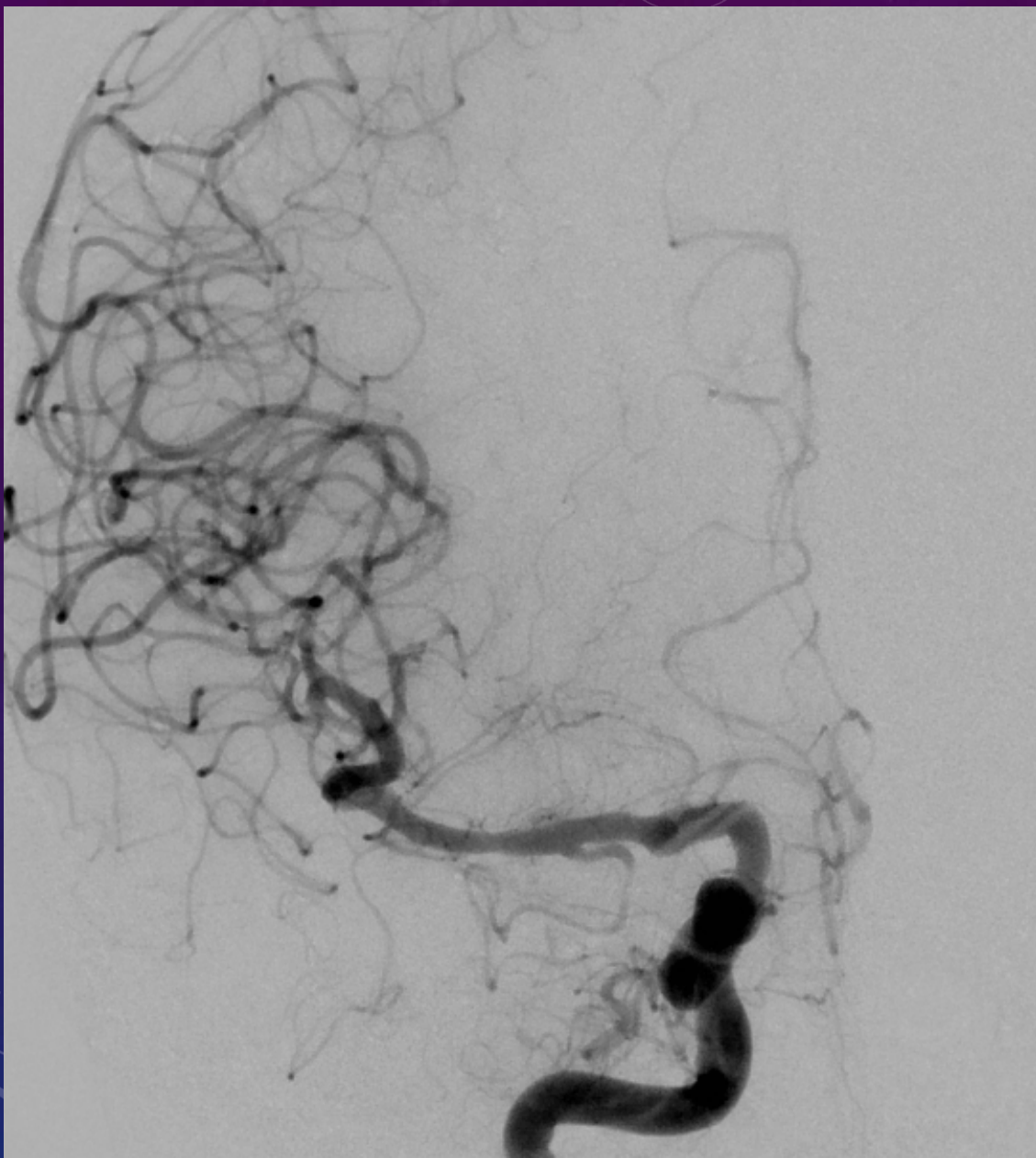


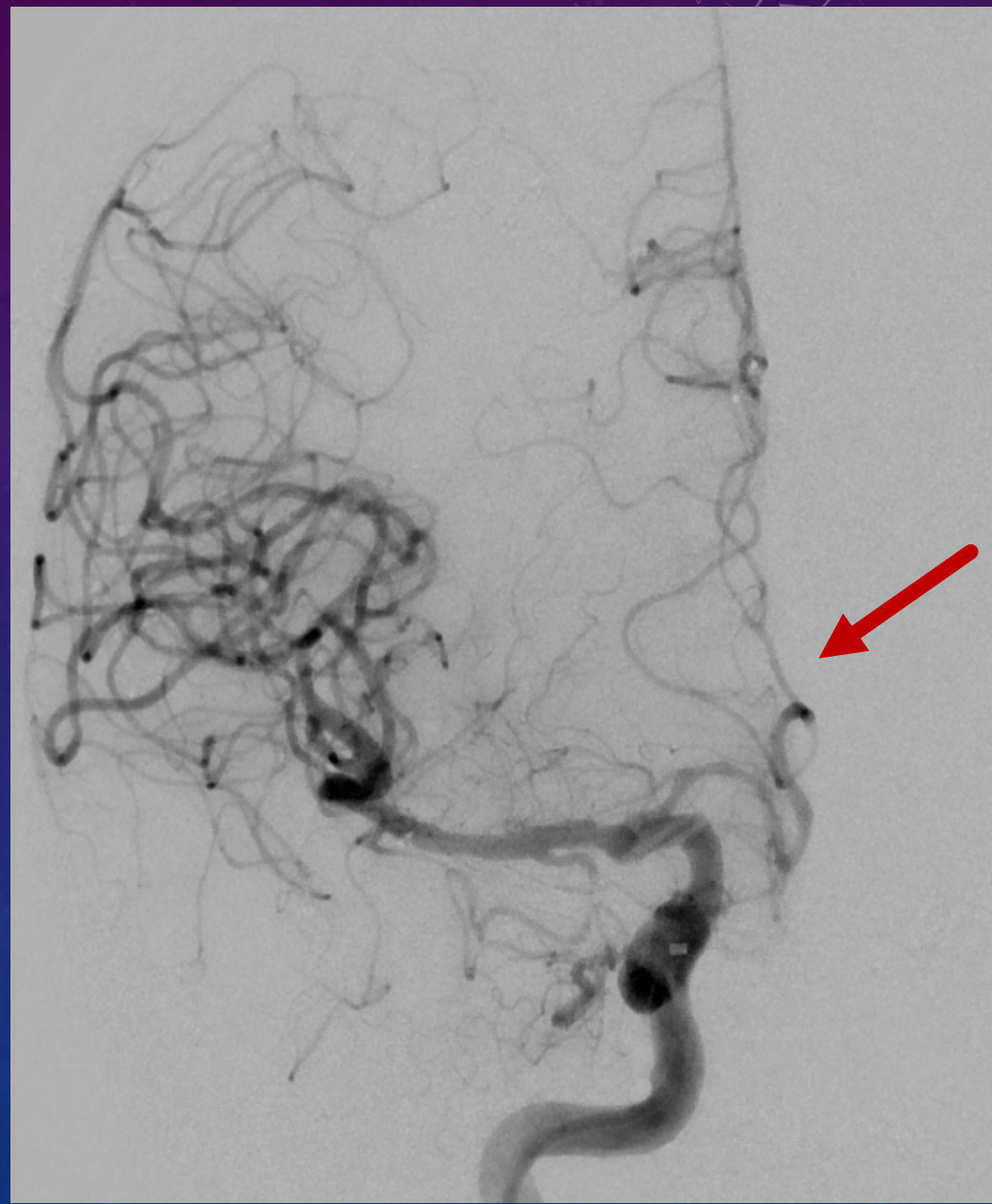
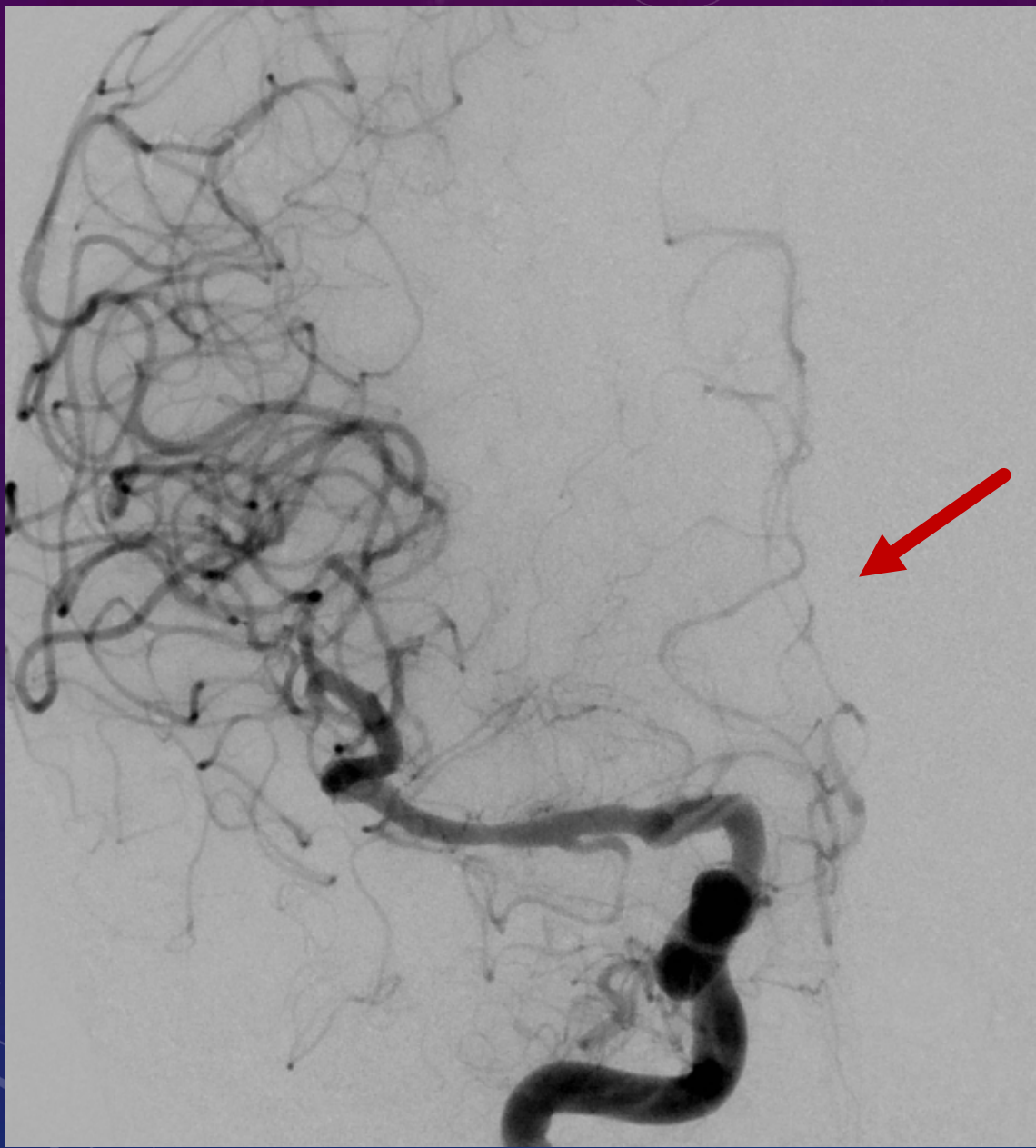
PHENYLEPHRINE NEO-SYNEPHRINE

- Alpha-1 adrenergic stimulant
- Beta-1 effect – sometimes bradycardia
- Vasoconstriction – increase BP and Systemic Vascular Resistance
- Dosing by MD: 100 – 200 mcg IV bolus; may repeat every 10-15 min
- Dosing: IV gtt 40 – 60 mcg/min and Titrate to goal SBP
- BP > at least 140 systolic or per MD parameters to maintain adequate cerebral flow



RIGHT ACA VASOSPASM





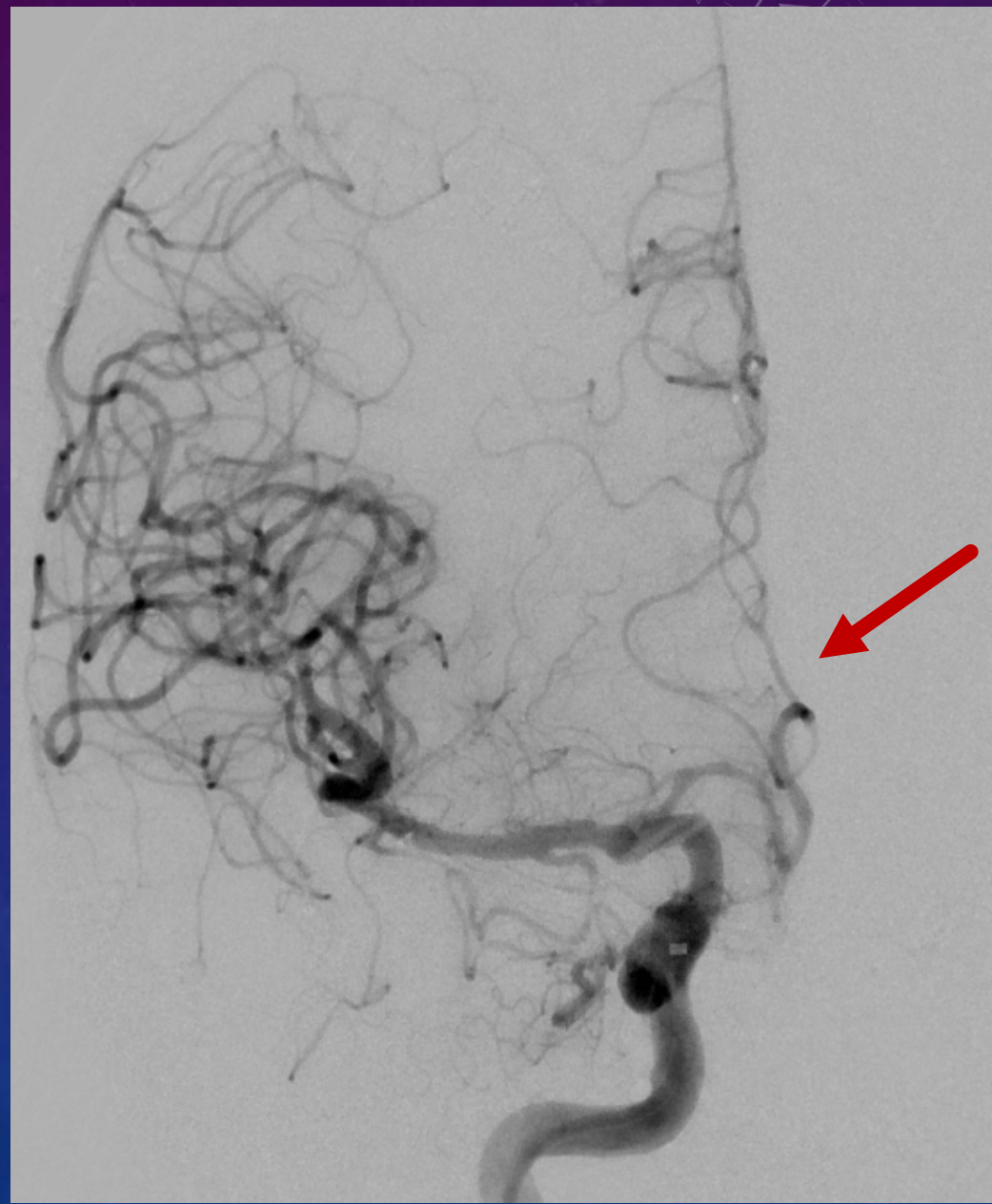
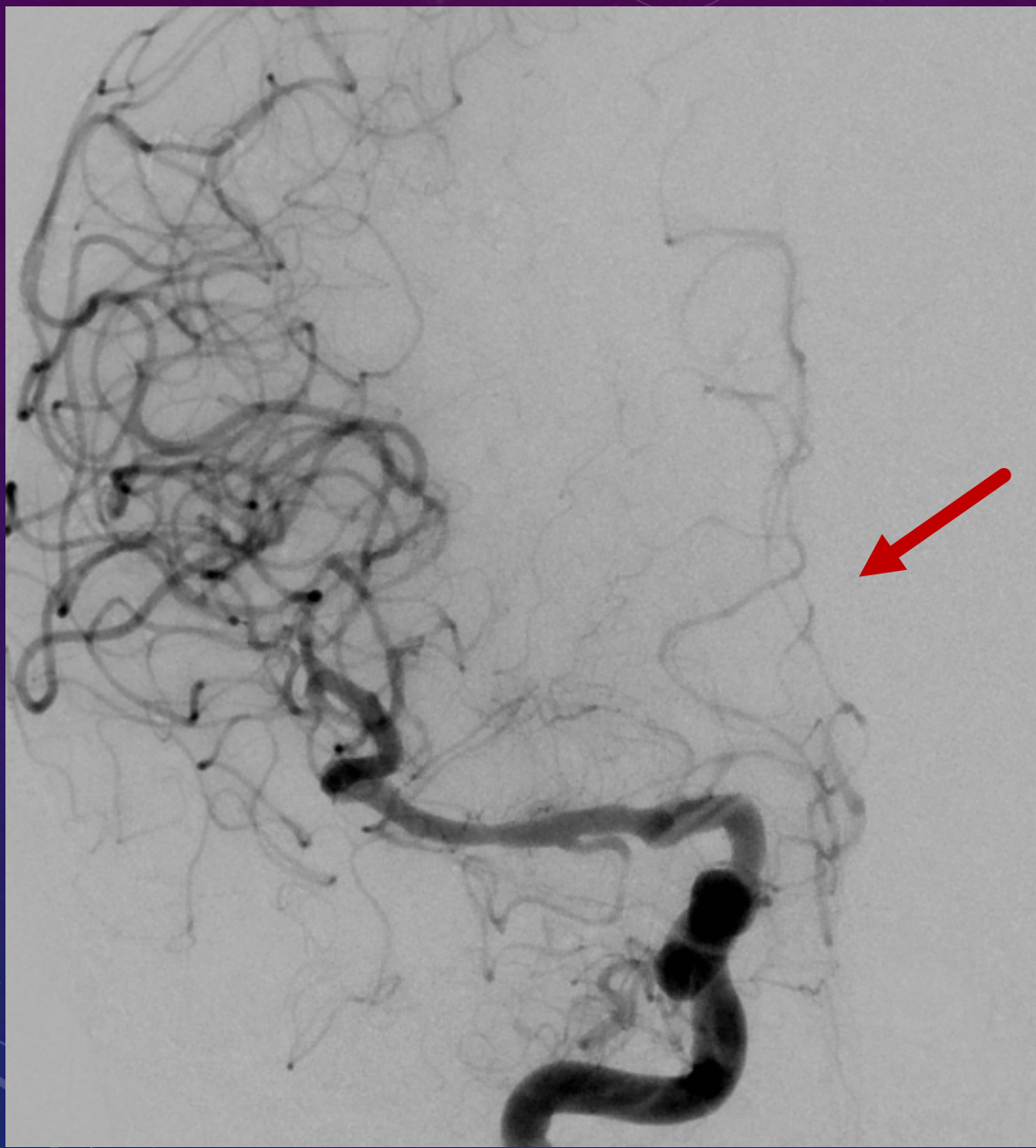
LEVOPHED (NOREPINEPHRINE)

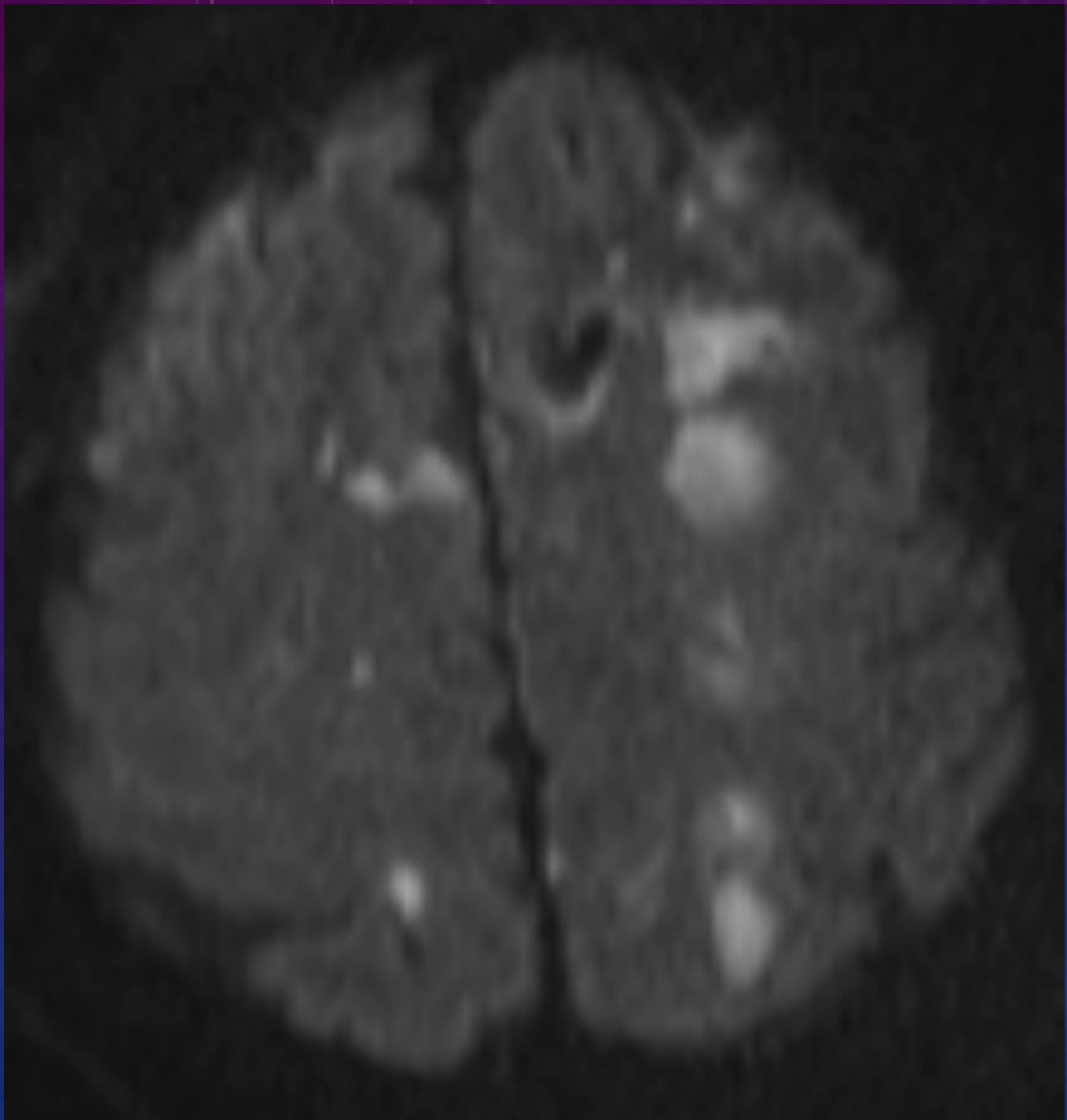
- Alpha-/Beta adrenergic agonist; constrict peripheral arterial system
- Increase BP by Increase afterload
- Dosing for severe Hypotension start at 8-12 mcg/min titrate to goal SBP
- BP > at least 140 systolic or MD parameters to maintain adequate cerebral blood flow

VASOPRESSIN

- Antidiuretic hormone
- Increases BP by peripheral vascular resistance (vasoconstriction)
- Dosing 0.04 units/min







VASOSPASM PATIENT

- **IDEAL**
 - Vented
 - Central line
 - Foley
 - IVC
 - A-line
- **Minimal Recommendations**
 - 2 Large bore PIV
 - Foley
 - Maintain Sats > 95 % flat

PLAN OF ACTION

- IR Nurses
- Neuro IR Attending's and Team
- Neuro ICU critical care team
- Neurosurgery
- Anesthesia
- CCRU critical care team

VASOSPASM CODE





Medfusion Syringe Pump

Equipment for IA treatments:

- Syringe pump (Medfusion 3500)
- 60 ml or 30 ml syringe (luer lock tip ONLY)
- High pressure tubing x 2 (Arterial line tubing)- dropped **STERILE** on field
- Drug of choice (made up to concentration per MD)
- 0.9 NSS IV to mix with drug for MD chosen concentration
- **NO AIR IN TUBING!!**



THANK YOU FOR YOUR TIME AND ATTENTION

