

Hemorrhagic Stroke

Nov 6, 2020

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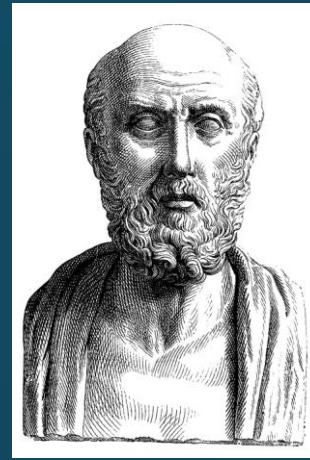
Associate Director of Cerebrovascular Neurosurgery
St. Luke's Marion Bloch Neuroscience Institute



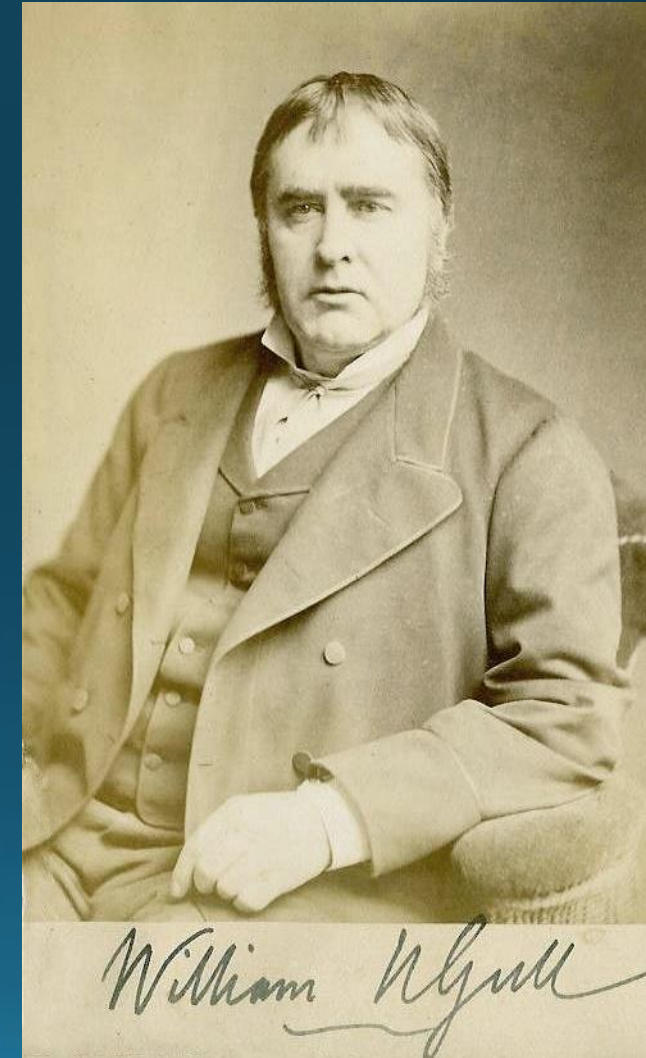
Conflicts of interest

- Nothing to disclose
- I will be discussing off-label use of devices in the context of clinical care situations which have no FDA-approved or medically standardized treatment modality

Beginnings



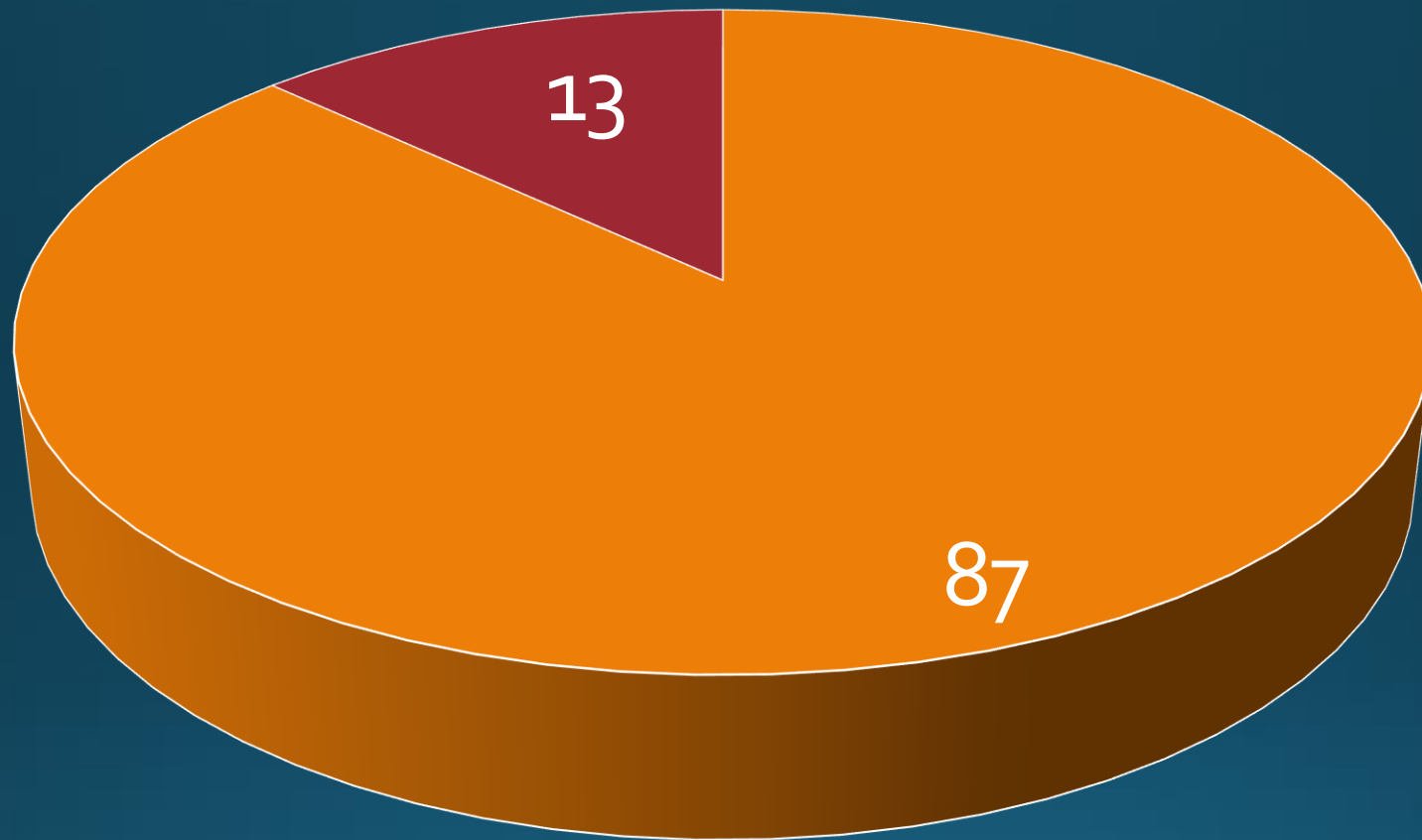
- Hippocrates, *Aphorisms*, 400 B.C.E
- “When persons in good health are suddenly seized with pains in the head, and straightway are laid down speechless, and breathe with stertor, they die in seven days.”
- Sir William Gull, 1859
 - 30yo woman with headache, AMS, and right sided paralysis
 - Recovered somewhat, more interactive, only to abruptly worsen and die on day 5
 - Demonstrated two MCA aneurysms on autopsy, one with signs of rupture



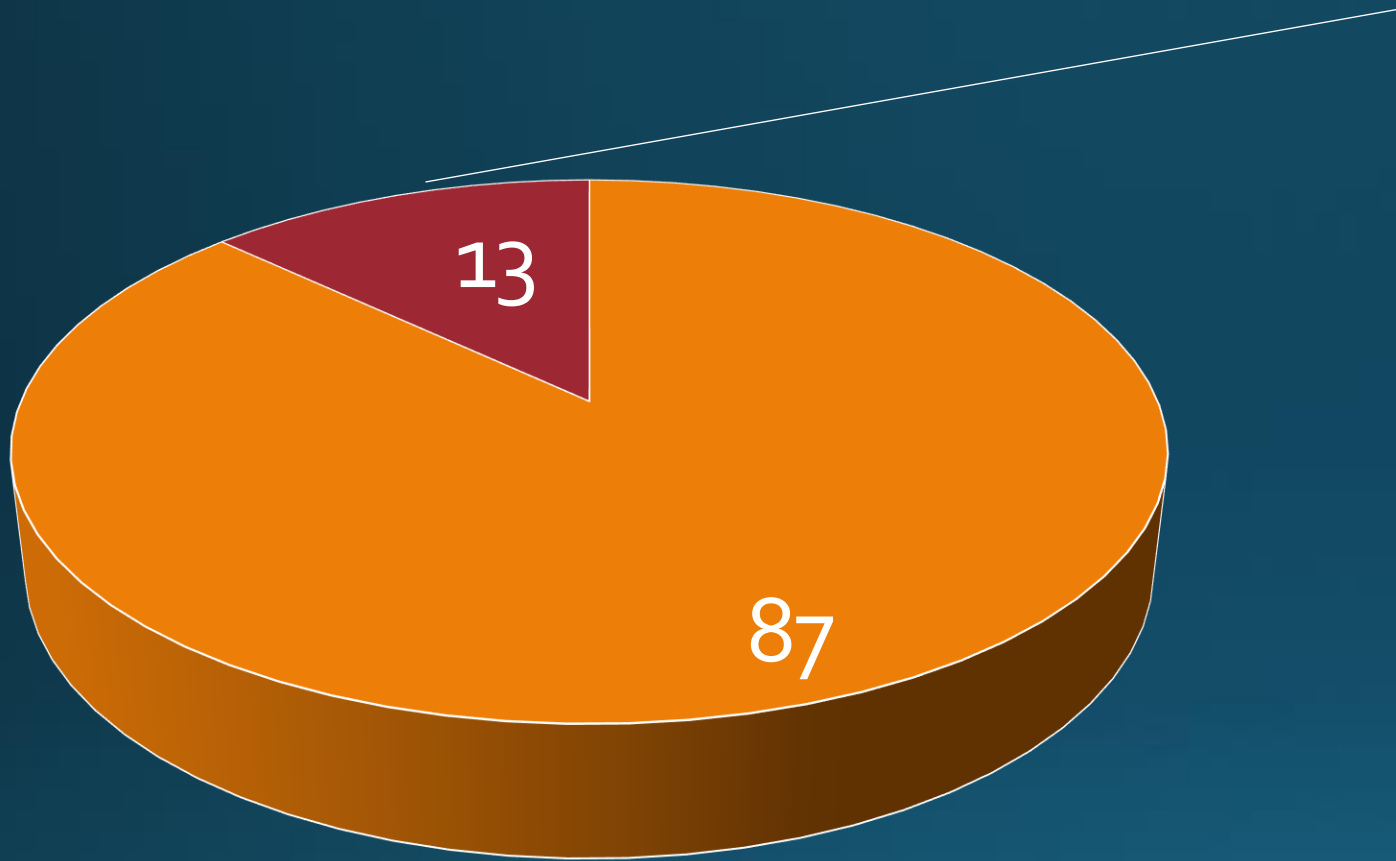
Guiding principle:

Preservation of quality of life by
prevention of neurologic injury

Types of stroke

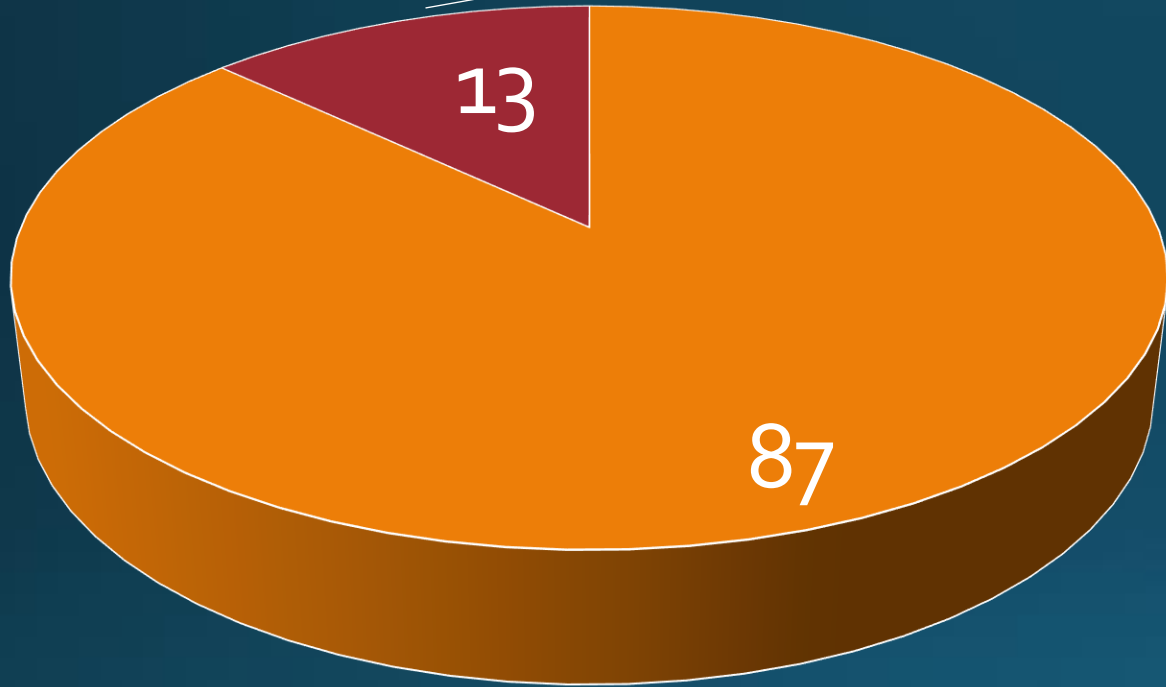


■ Ischemic stroke (%) ■ Hemorrhagic stroke (%)



■ Ischemic stroke (%)

■ Hemorrhagic stroke (%)



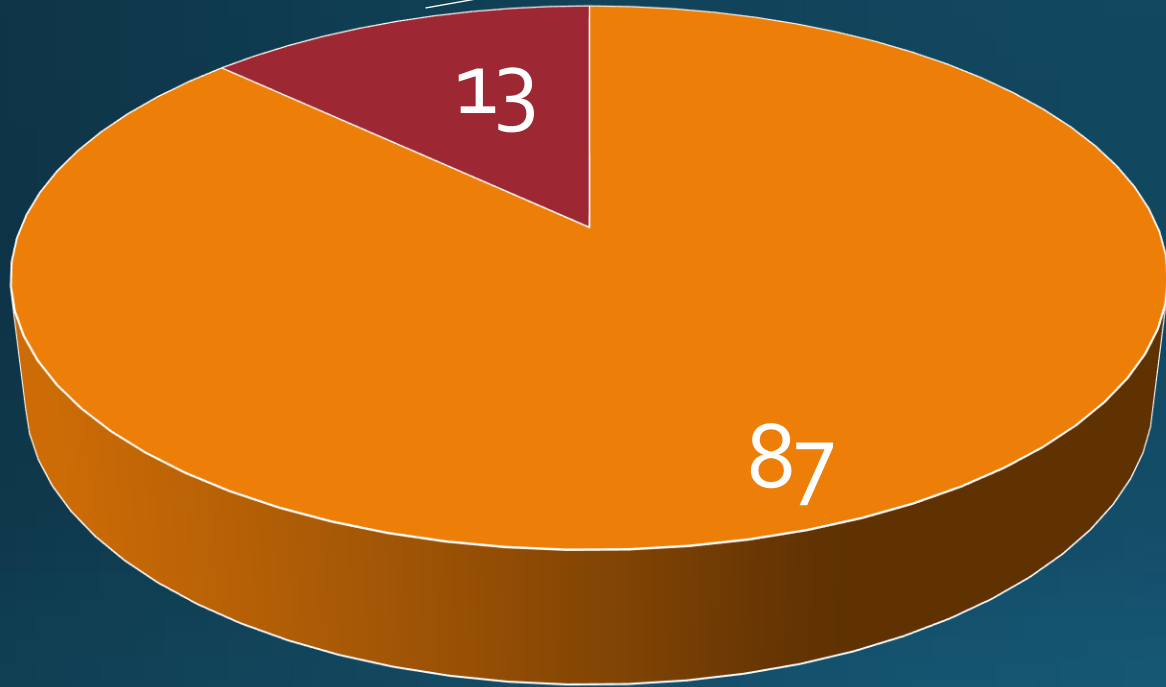
Subtypes:

Intracerebral (intraparenchymal)

Subarachnoid

■ Ischemic stroke (%)

■ Hemorrhagic stroke (%)



- Ischemic stroke (%)
- Hemorrhagic stroke (%)

Subtypes:

- Intracerebral (intraparenchymal)
- Subarachnoid

Causes:

- Hypertension
- Cerebral aneurysm
- Arteriovenous malformation
- Dural arteriovenous fistula
- Venous sinus thrombosis

Treatment

Arteriovenous malformations

Observation

Stereotactic radiosurgery

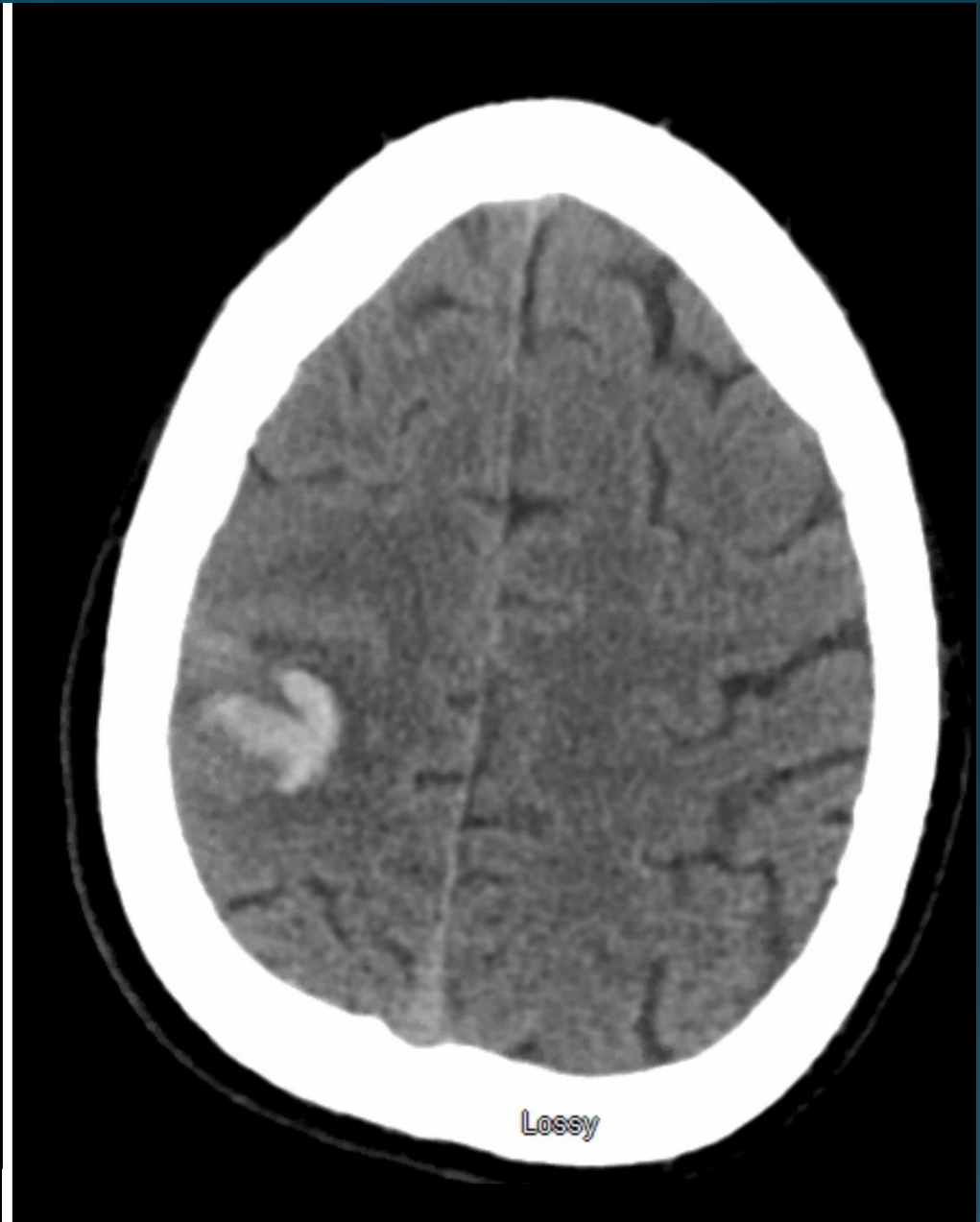
Open surgical resection

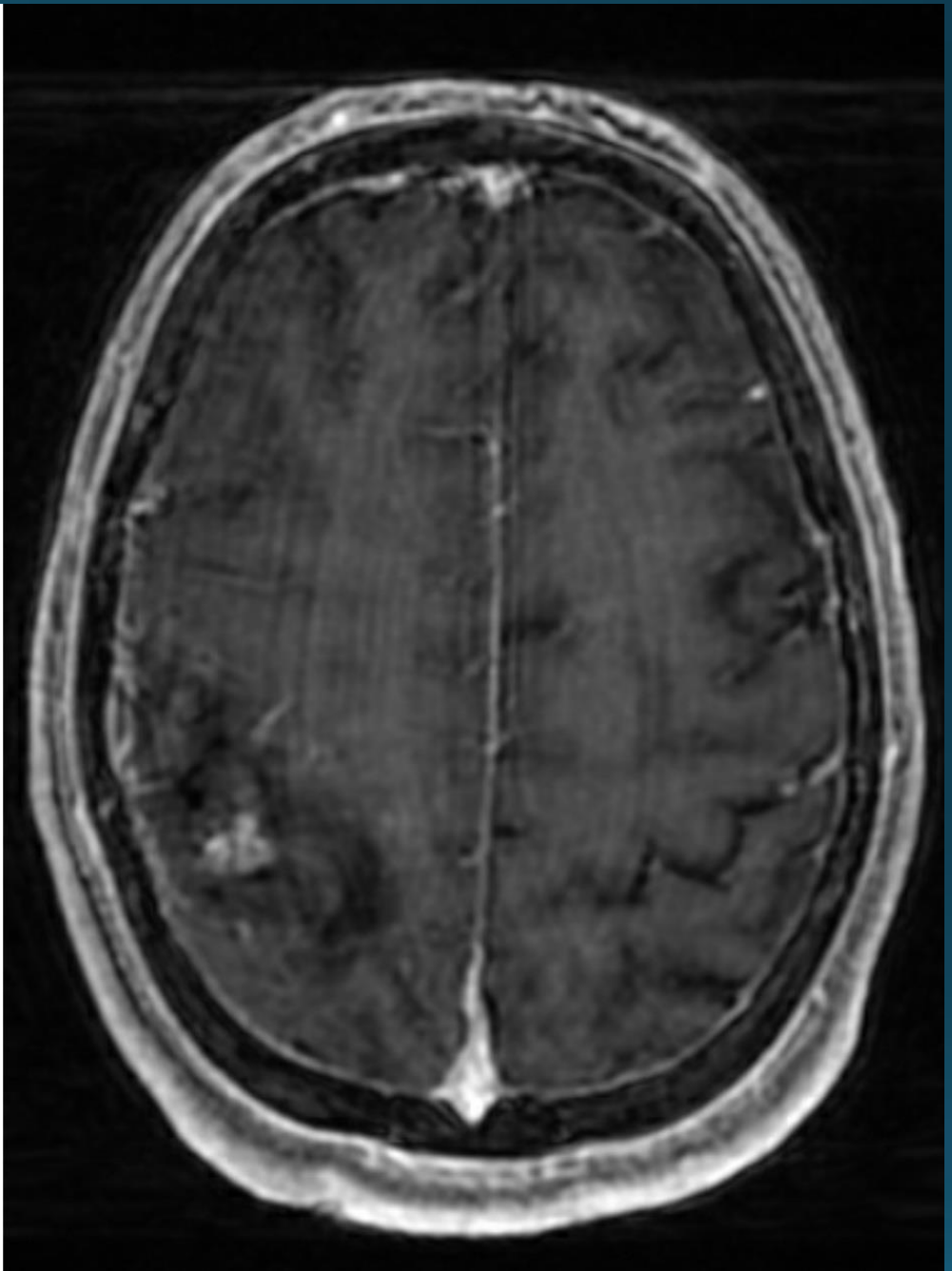
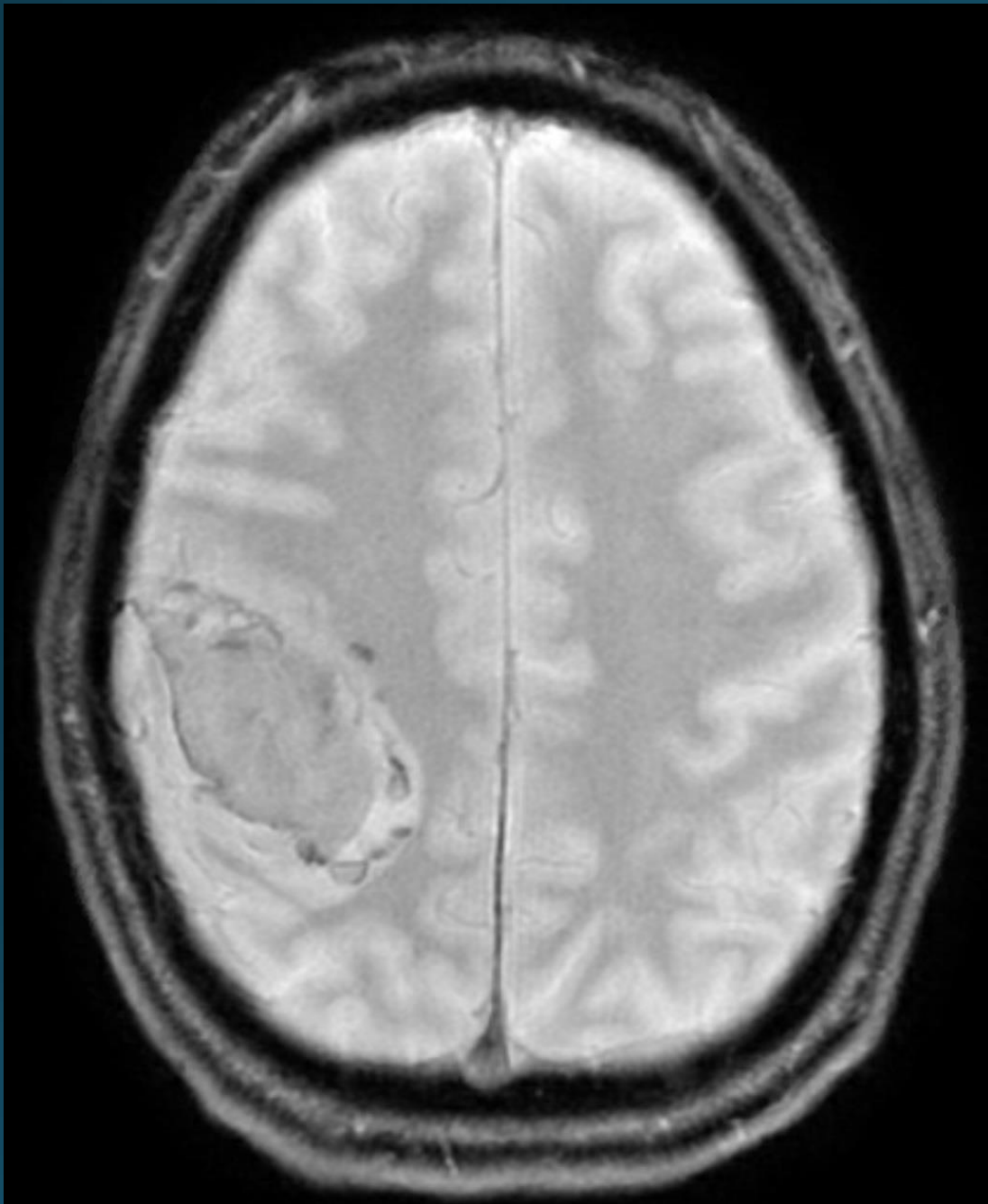
Endovascular embolization

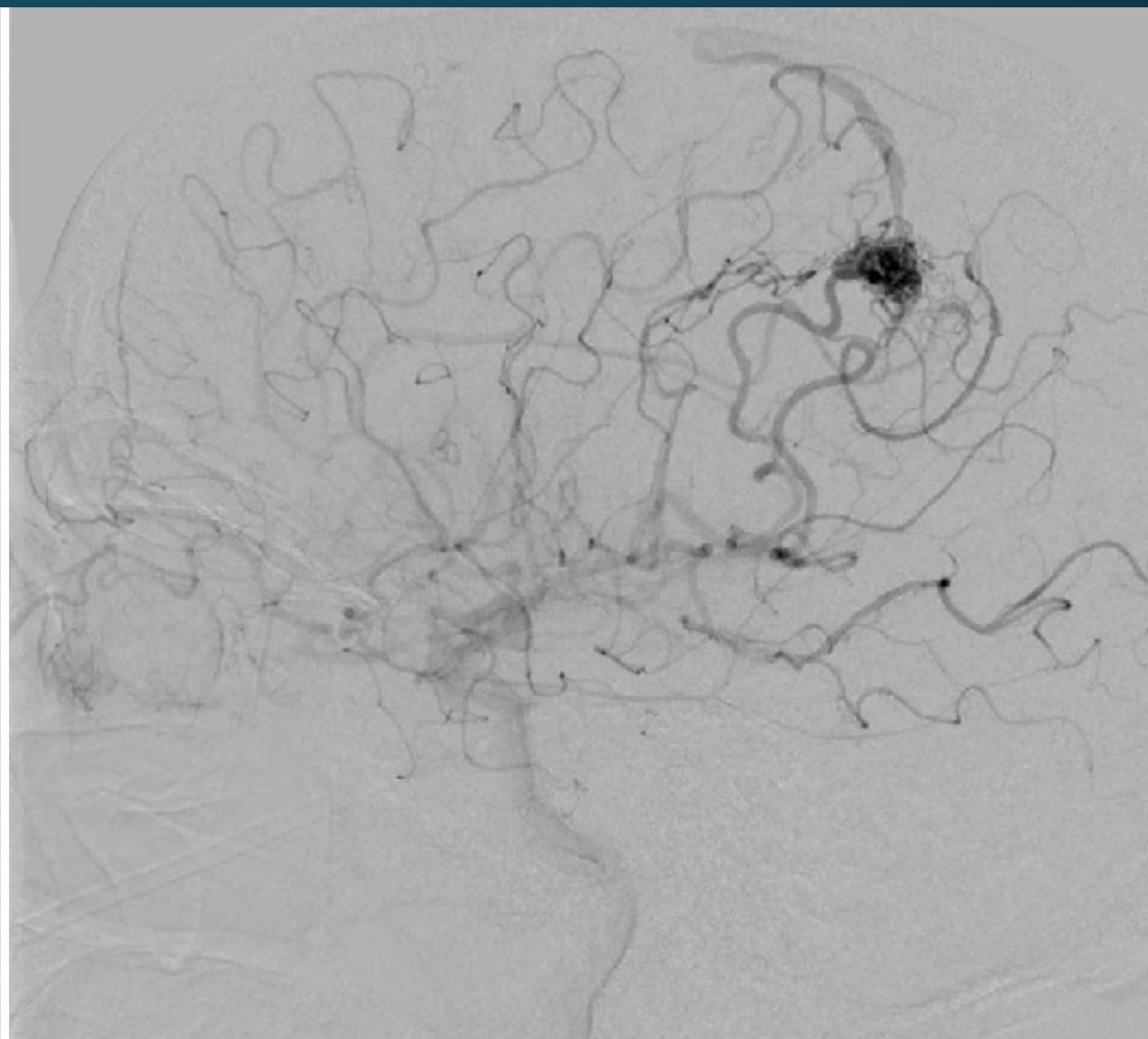
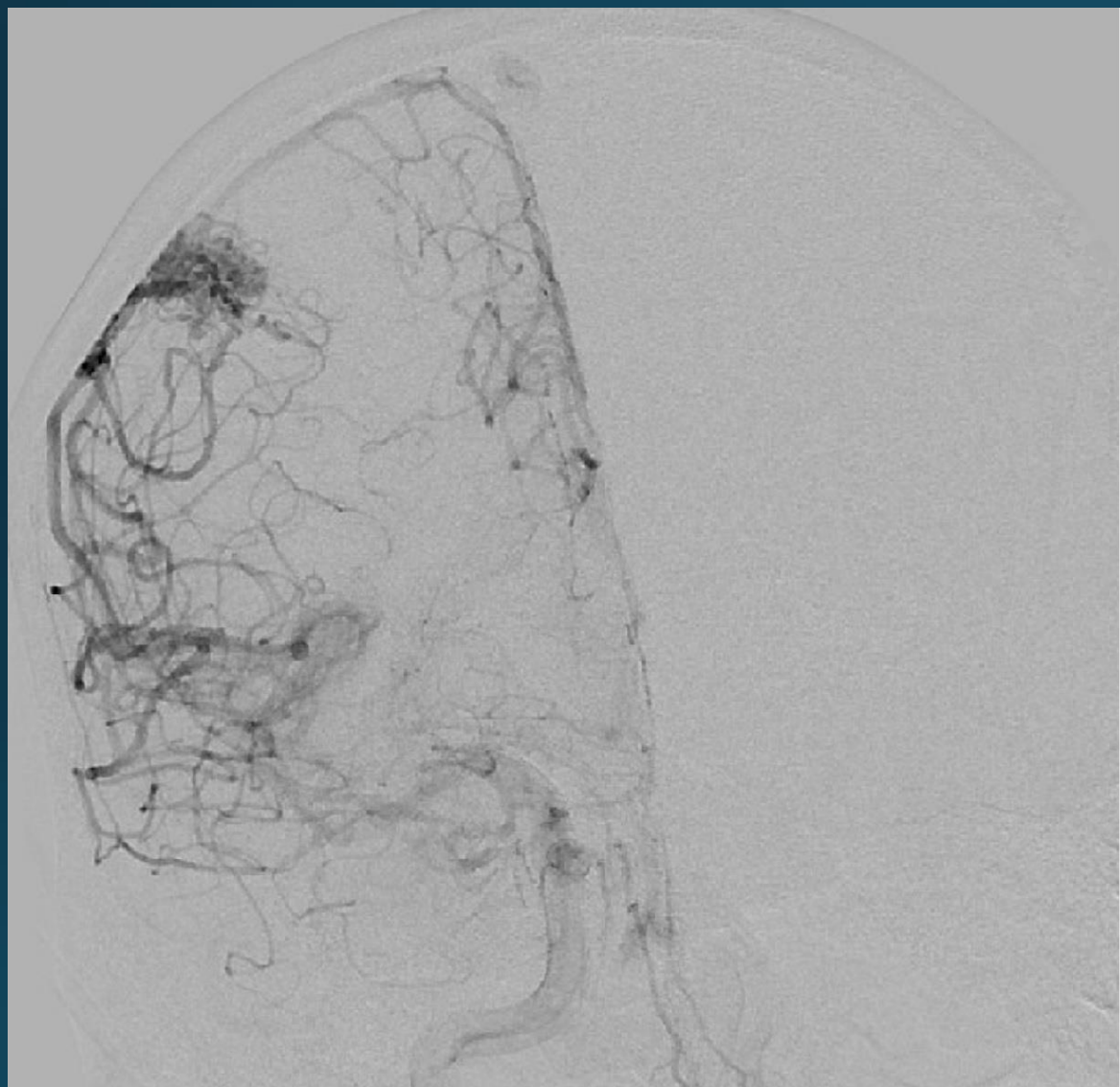
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Treatment adjunct ONLY

59yo M with HA, facial
droop, LUE weakness







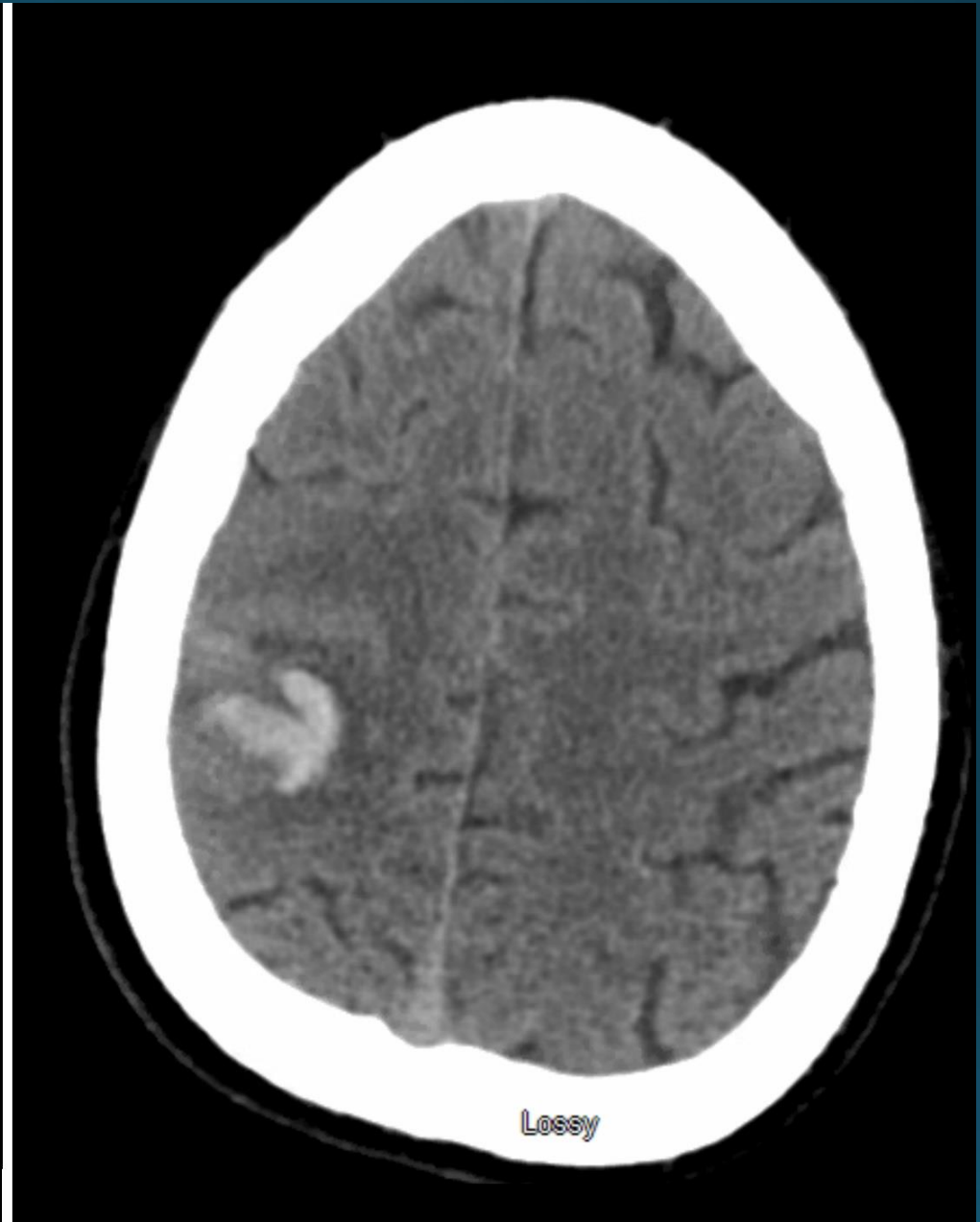
Observation

Stereotactic radiosurgery

Open surgical resection

Guiding principle:

Preservation of quality of life by
prevention of neurologic injury



~~Observation~~

Stereotactic radiosurgery

Open surgical resection

Guiding principle:

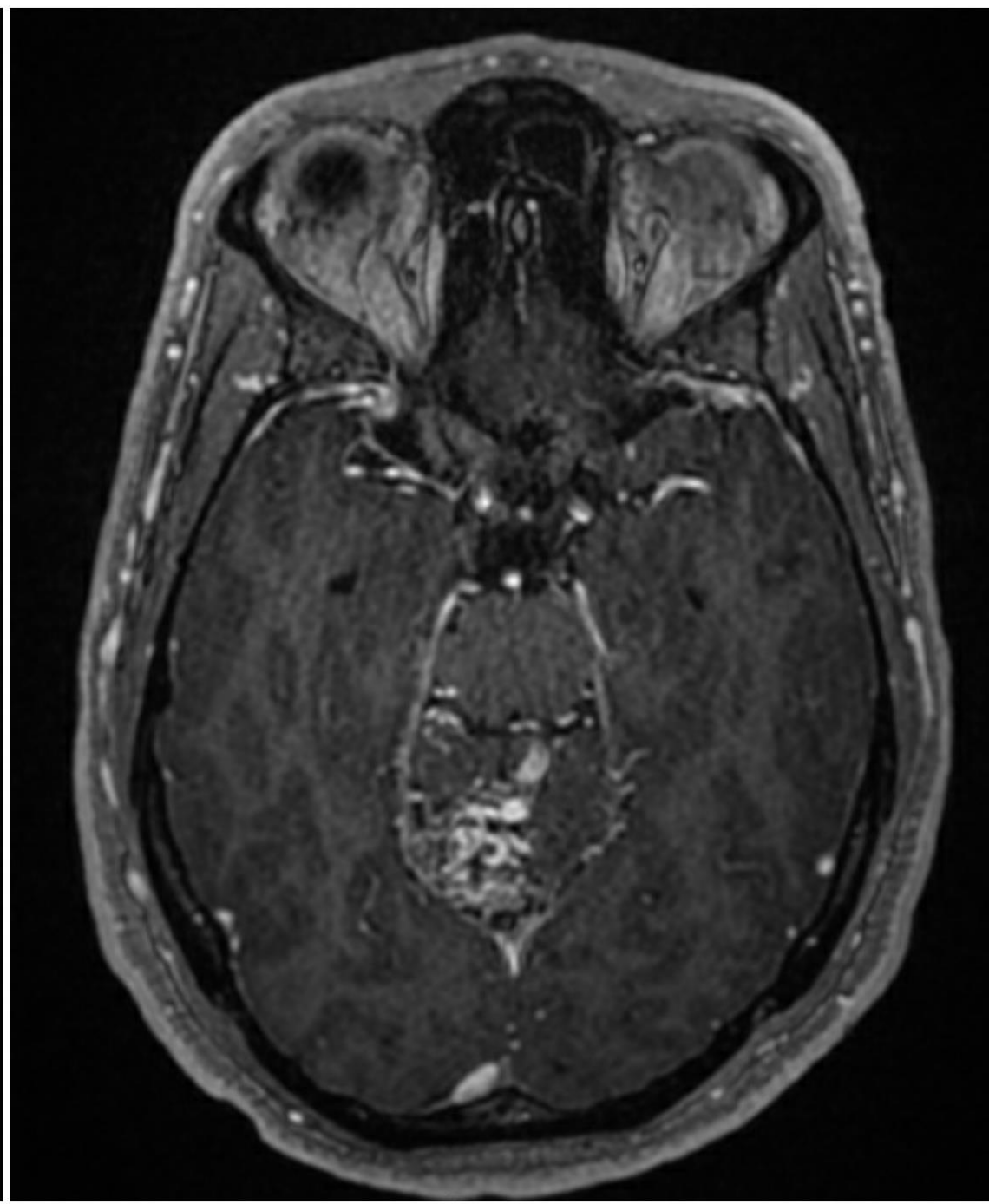
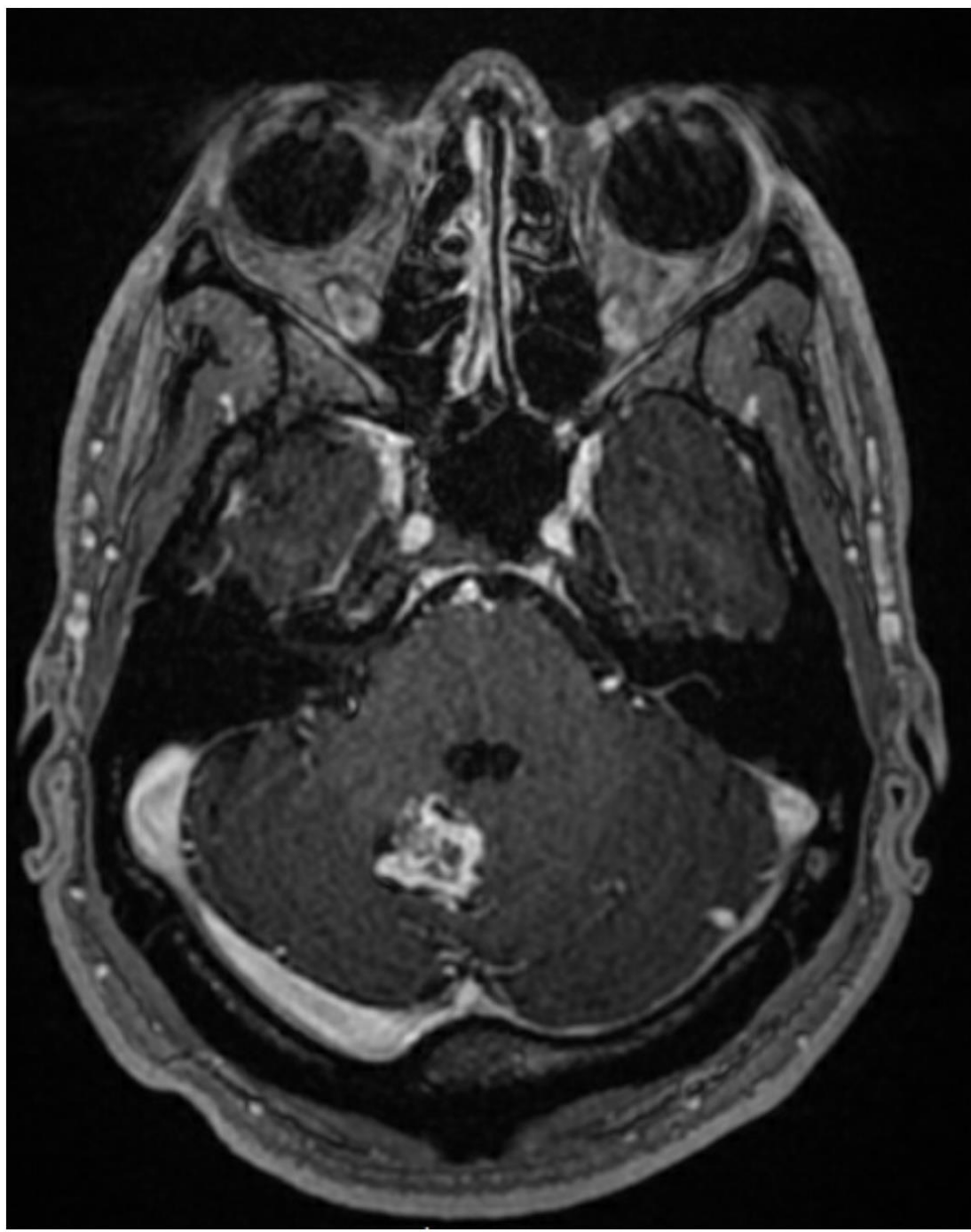
Preservation of quality of life by
prevention of neurologic injury

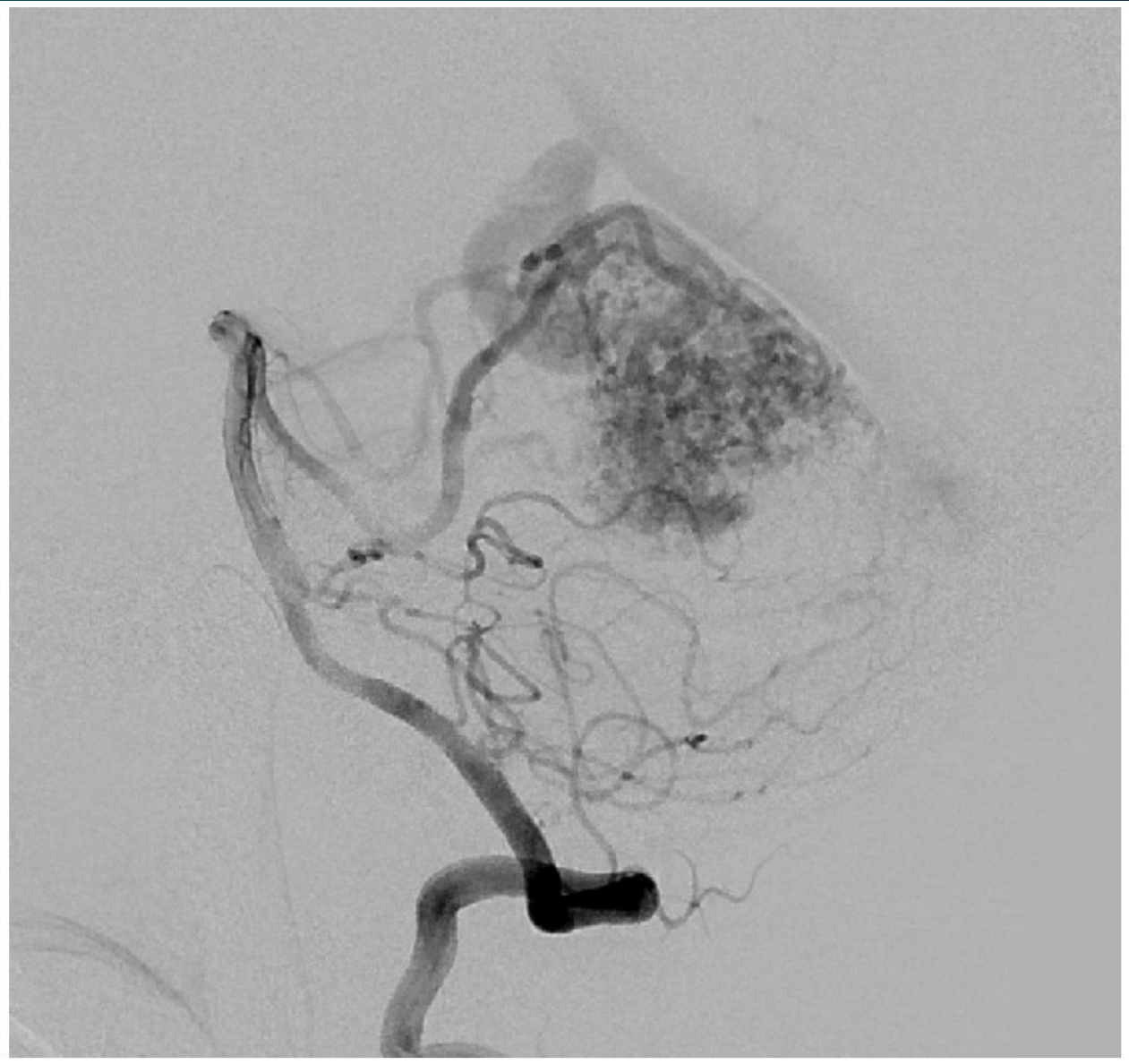
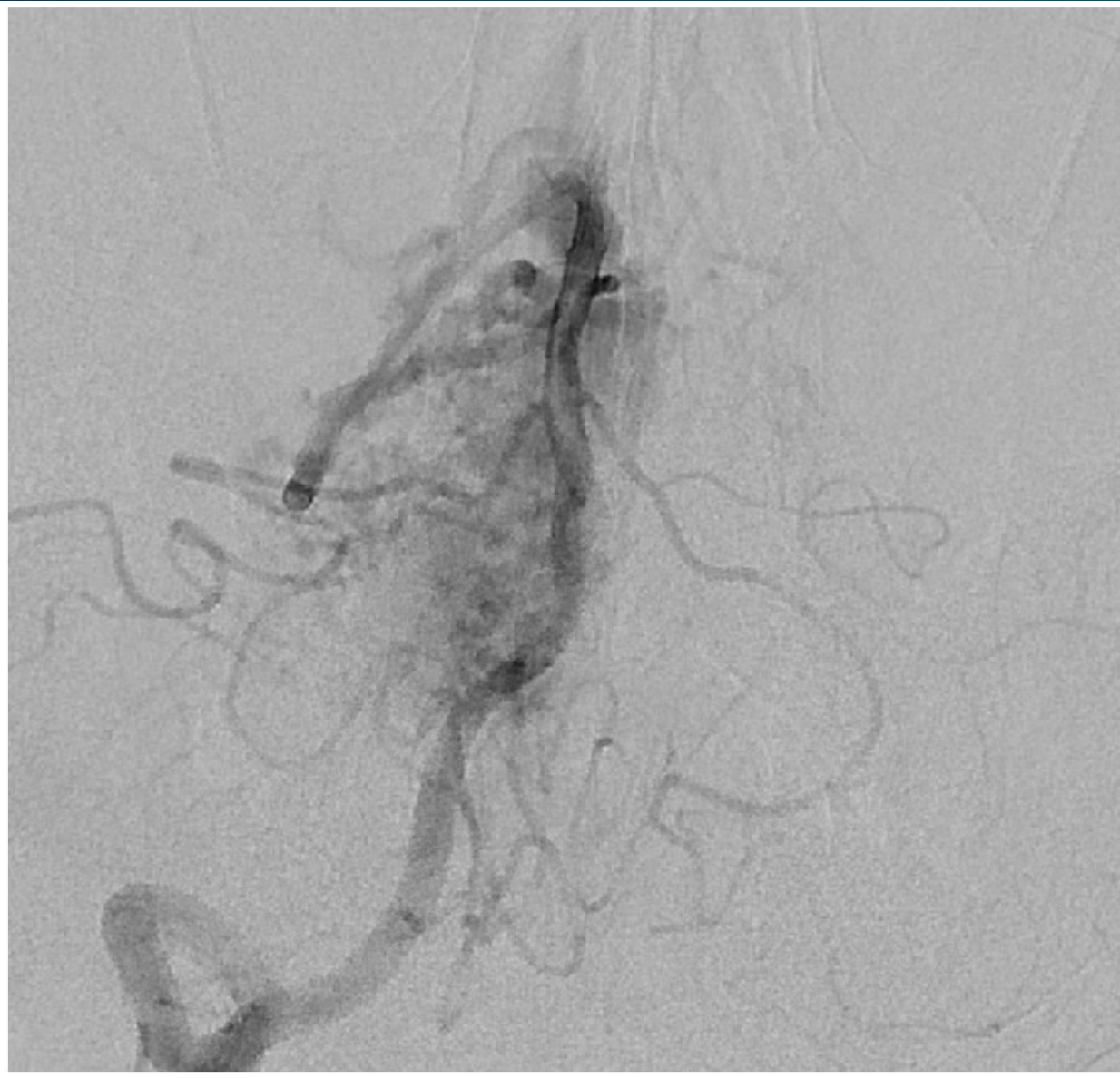
~~Observation~~

Stereotactic radiosurgery

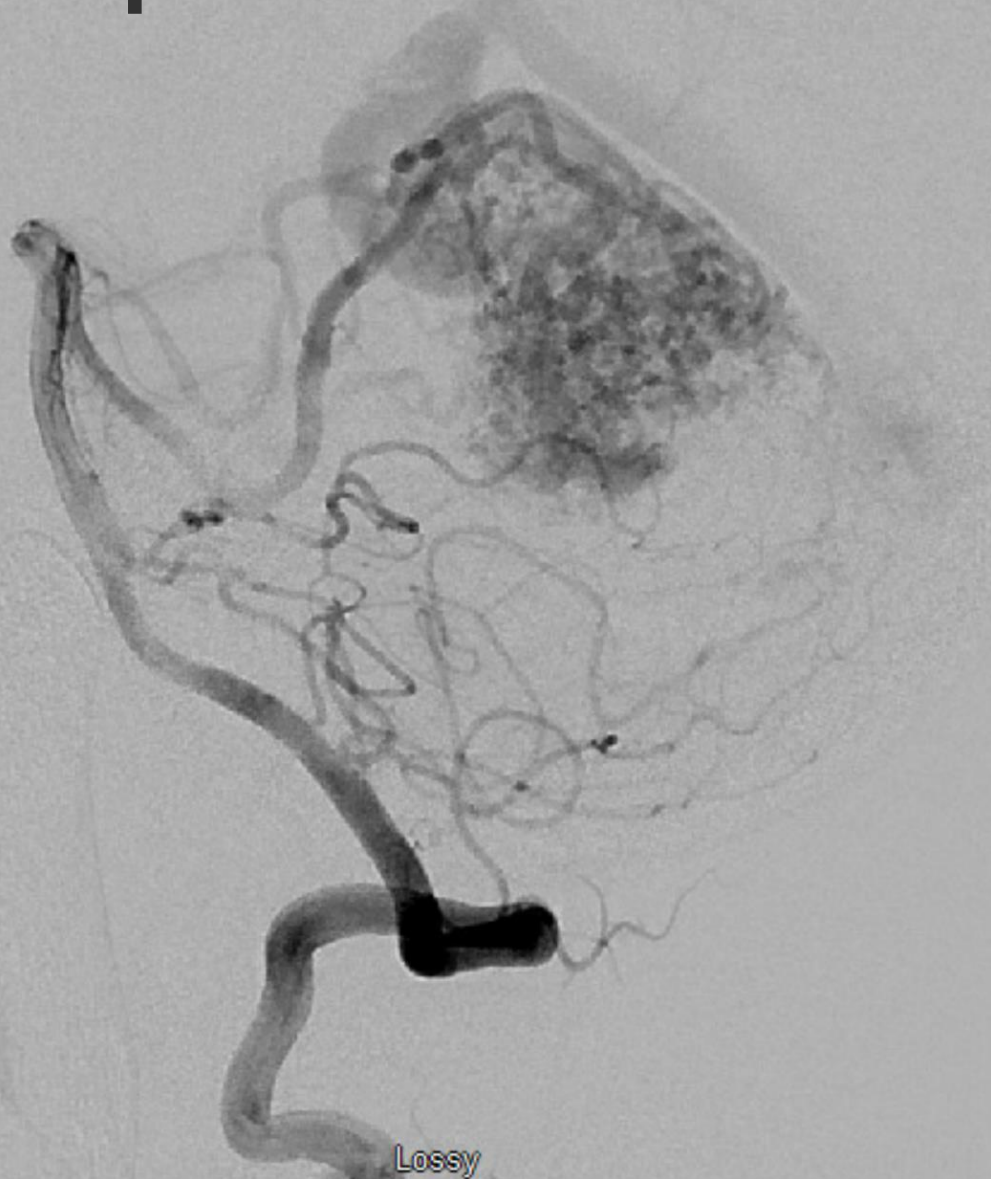
~~Open surgical resection~~

38M with new left facial
droop





Preop



Postop



Observation

Stereotactic radiosurgery

Open surgical resection

Treatment

Aneurysms

Observation

Endovascular treatment

Open surgical treatment

1933 – Norman Dott & Egas Moniz

23yo with L CN3 palsy

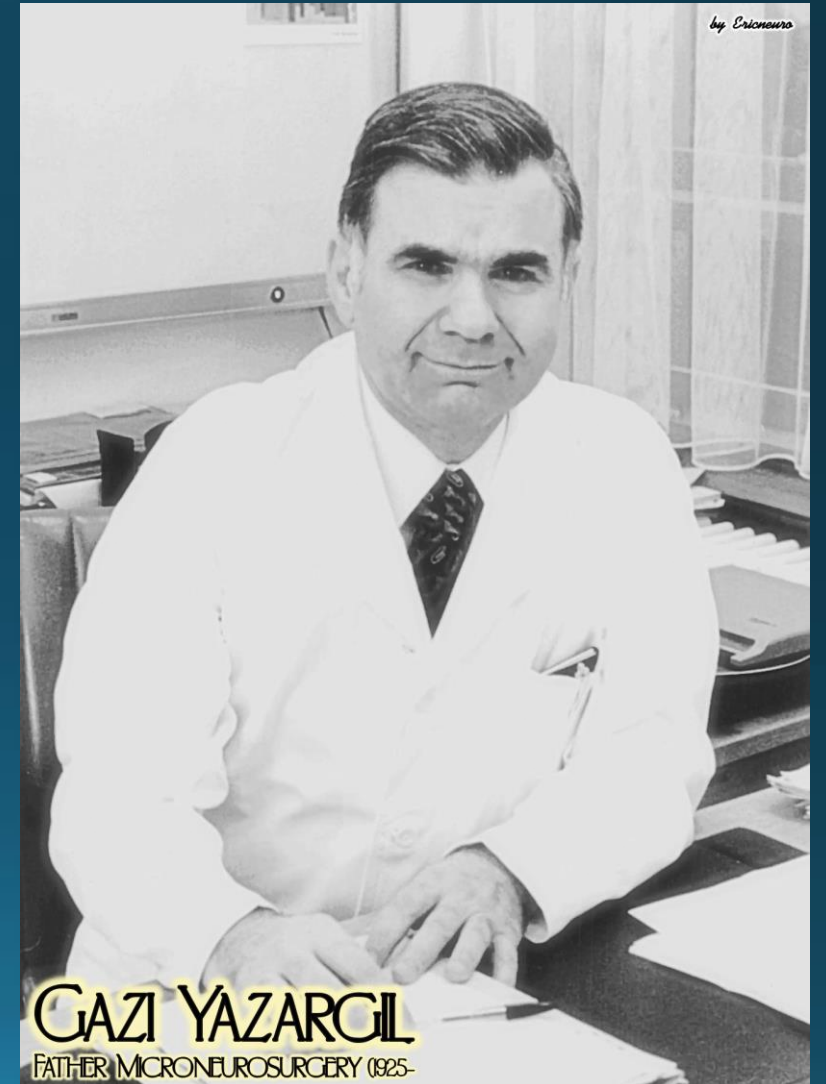
- LP – xanthochromia

Treated by left ICA ligation

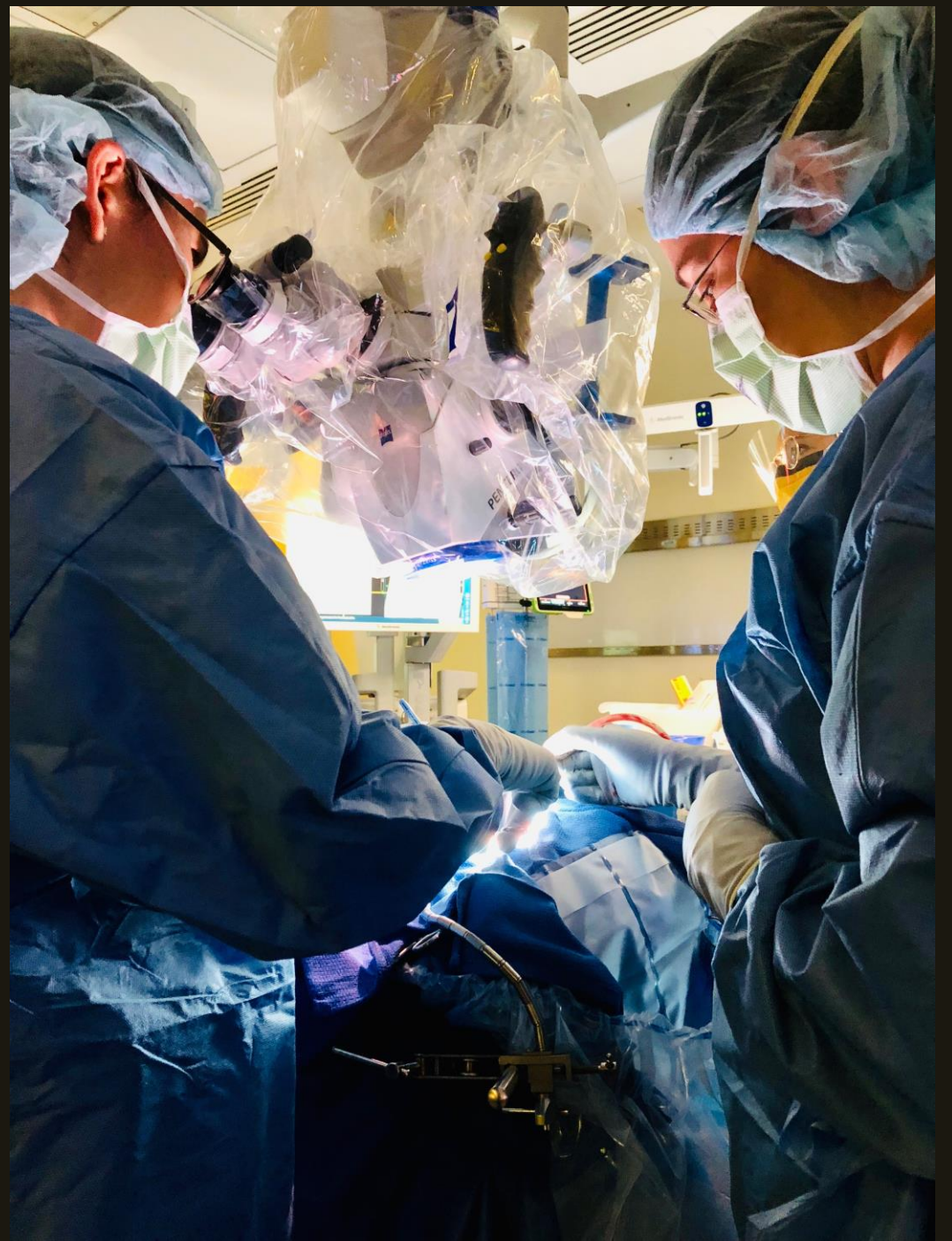


1967

Microneurosurgery



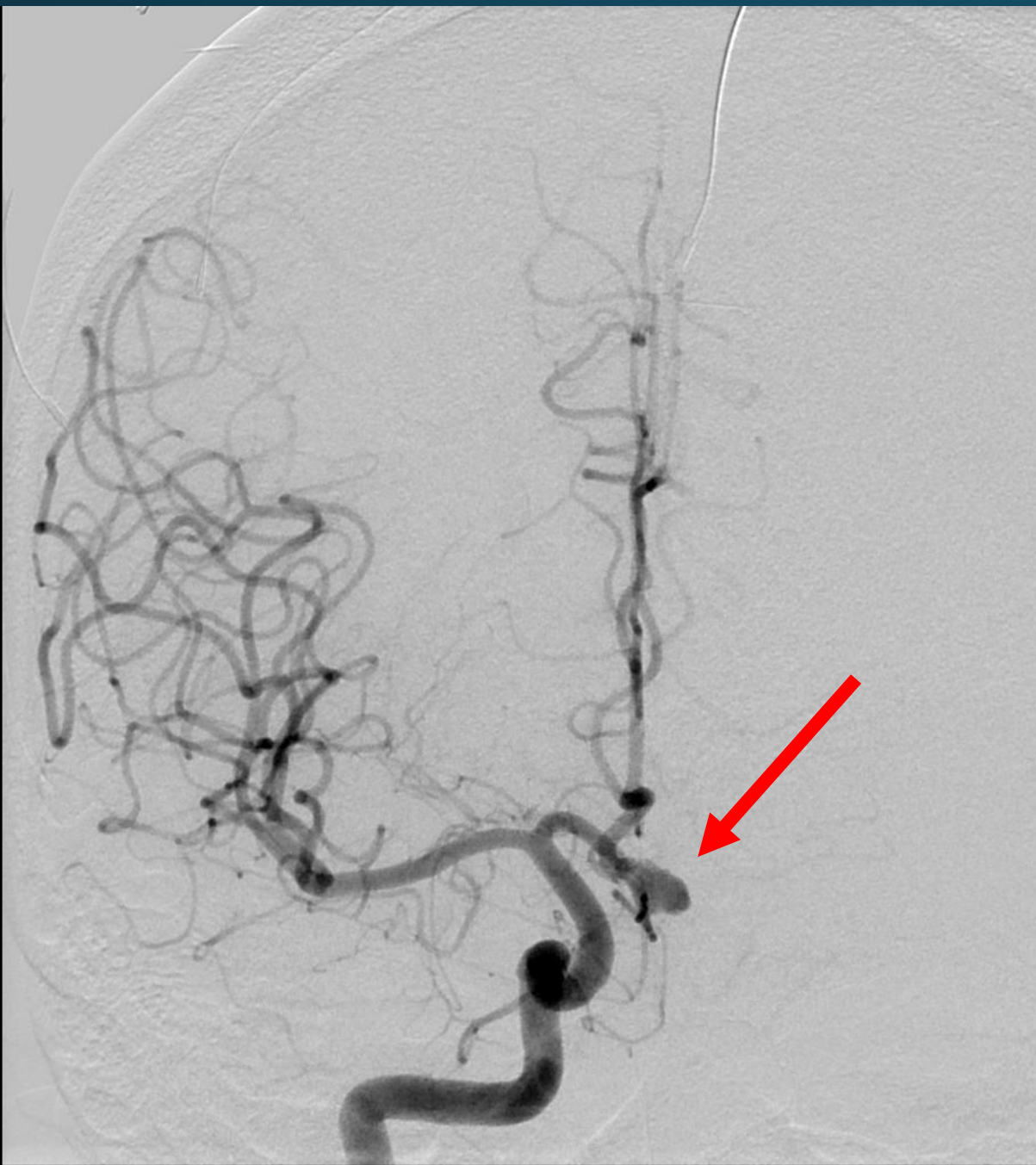
https://fr.wikipedia.org/wiki/Gazi_Ya%C5%9Fargil#/media/Fichier:Gazi_Yazargil_father_of_Modern_Microneurosurgery.png



Cerebrovascular bypass grafting

Endovascular coiling

- 1990 - First Guglielmi coil deployed in humans
- Balloon-assisted coiling
- Stent-assisted coiling



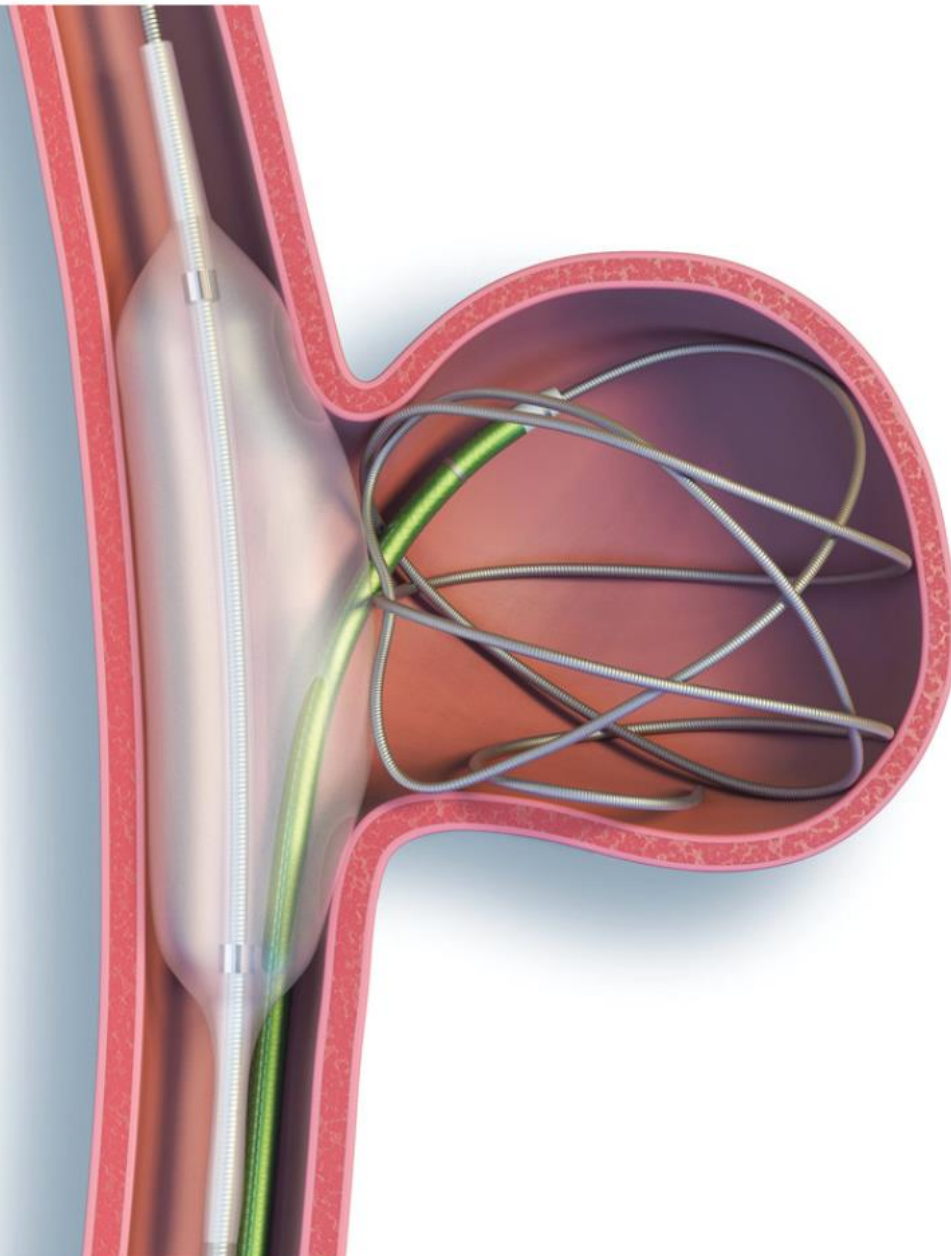
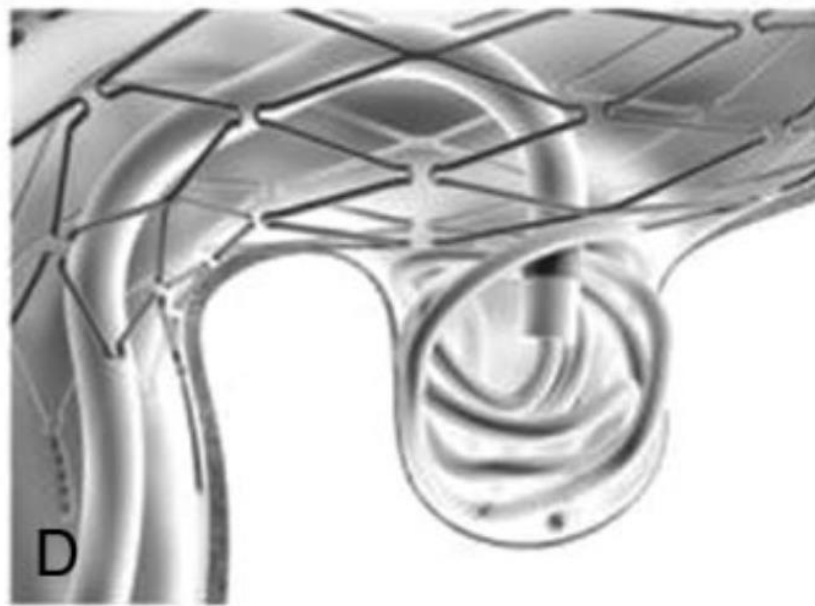
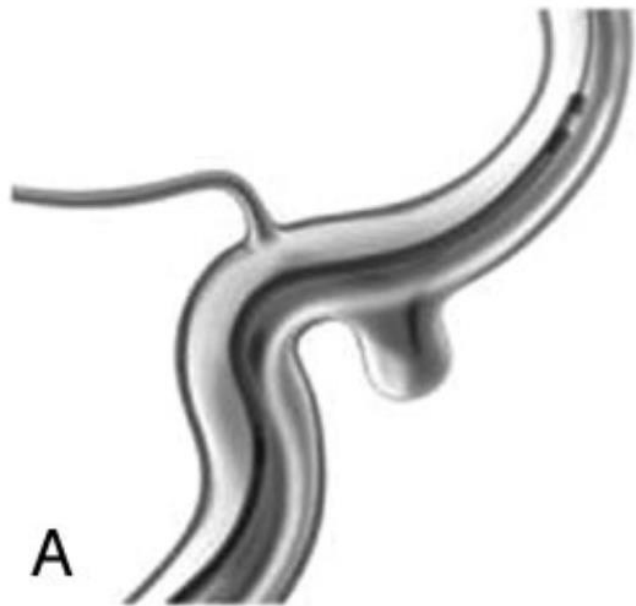


Figure 2. Remodeling technique for sidewall aneurysm.

Pierot, Laurent, and Ajay K. Wakhloo. "Endovascular Treatment of Intracranial Aneurysms: Current Status." *Stroke* 44, no. 7 (July 2013): 2046–54. <https://doi.org/10.1161/STROKEAHA.113.000733>.



Akpek, Sergin, Anil Arat, Hesham Morsi, Richard P Klucznick, Charles M Strother, and Michel E Mawad. "Self-Expandable Stent-Assisted Coiling of Wide-Necked Intracranial Aneurysms: A Single-Center Experience," 2005, 9.

Guiding principle:

Preservation of quality of life by
prevention of neurologic injury

Observation

Endovascular treatment

Open surgical treatment

Question #1:
Ruptured?

Ruptured aneurysms

Observation

Endovascular treatment

Open surgical treatment

~~Observation~~

Endovascular treatment

Open surgical treatment

Ruptured aneurysms

- One every 18 minutes in the US
- 30-45% mortality
- 1/3 moderate to severe disability
- Re-rupture rate 15-20% within 2 weeks

Ruptured aneurysms with vasospasm

~~Observation~~

Endovascular treatment

Open surgical treatment

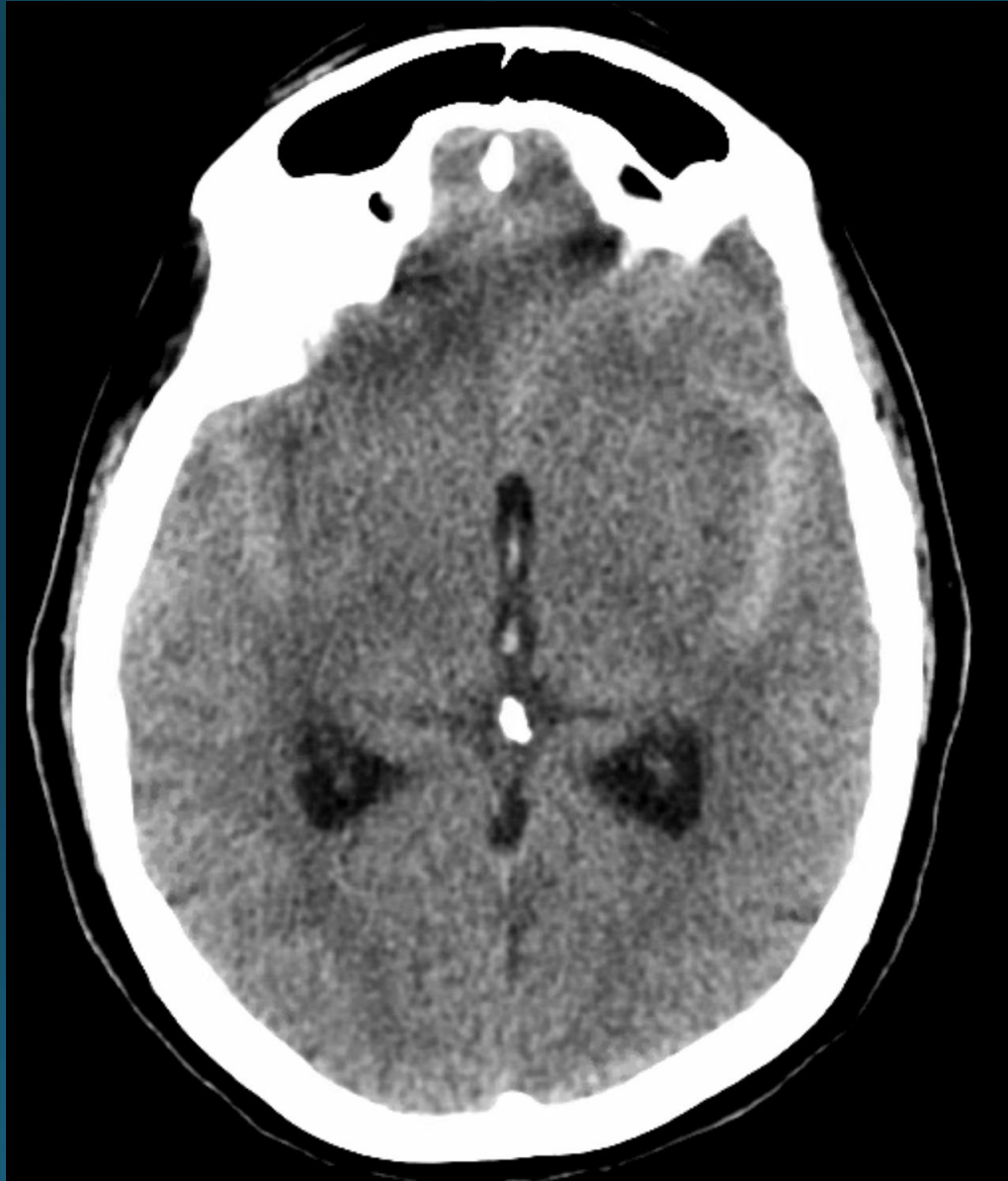
~~Observation~~

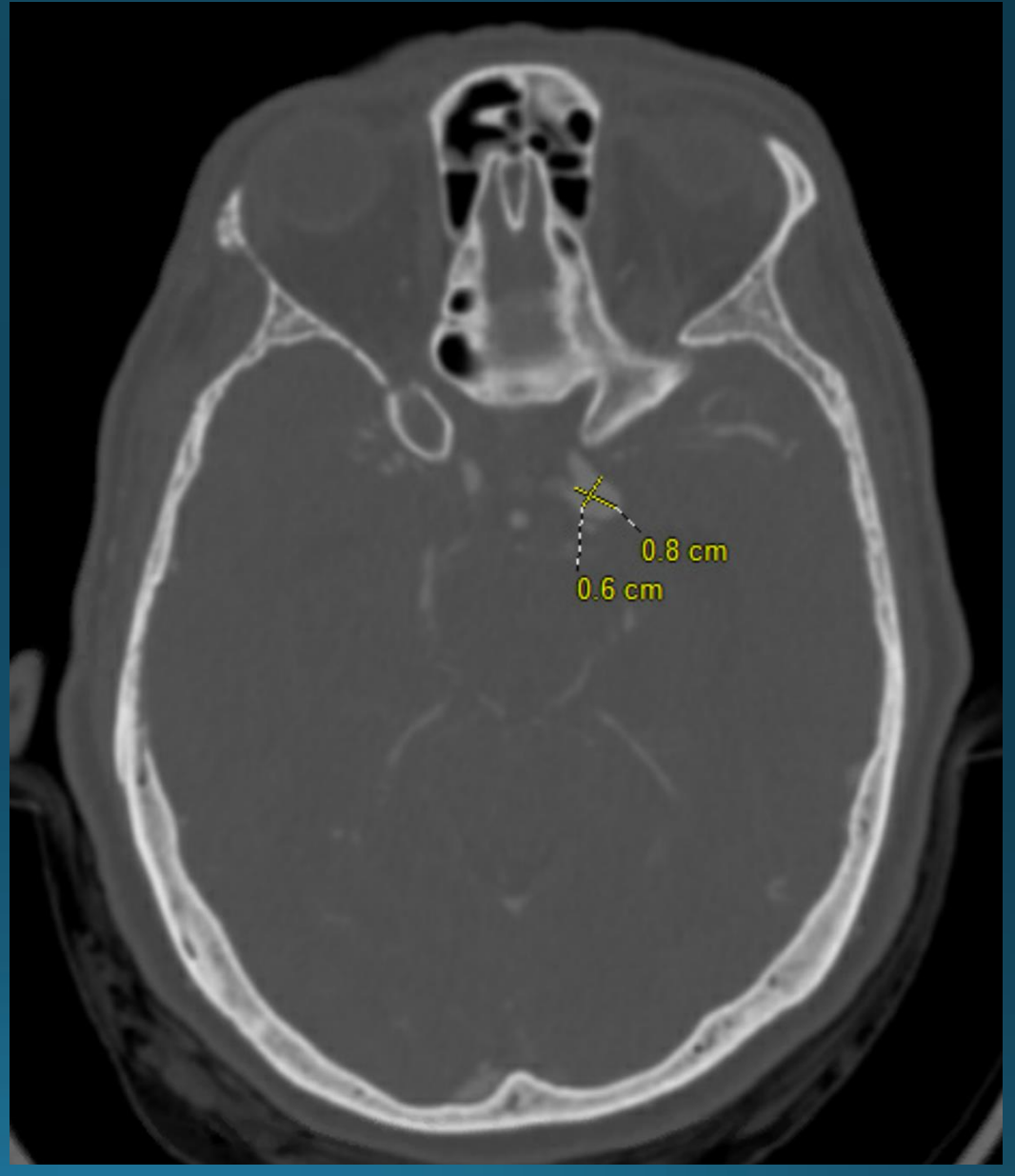
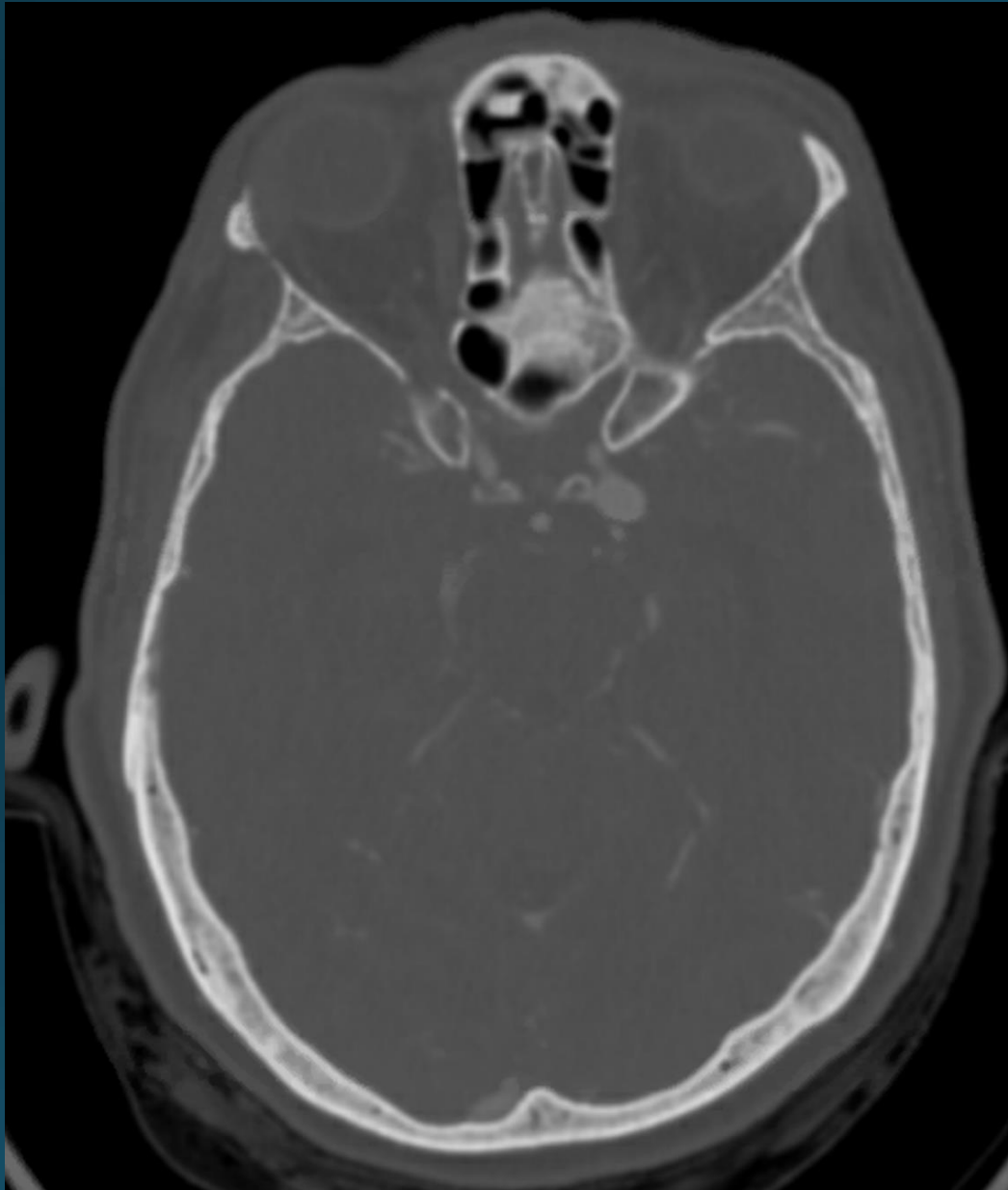
Endovascular treatment

~~Open surgical treatment~~

Vasospasm + surgery =
massive stroke

61 yo F with WHOL







Observation

Endovascular treatment

Open surgical treatment

~~Observation~~

Endovascular treatment

Open surgical treatment



Follow up



Observation

Endovascular treatment

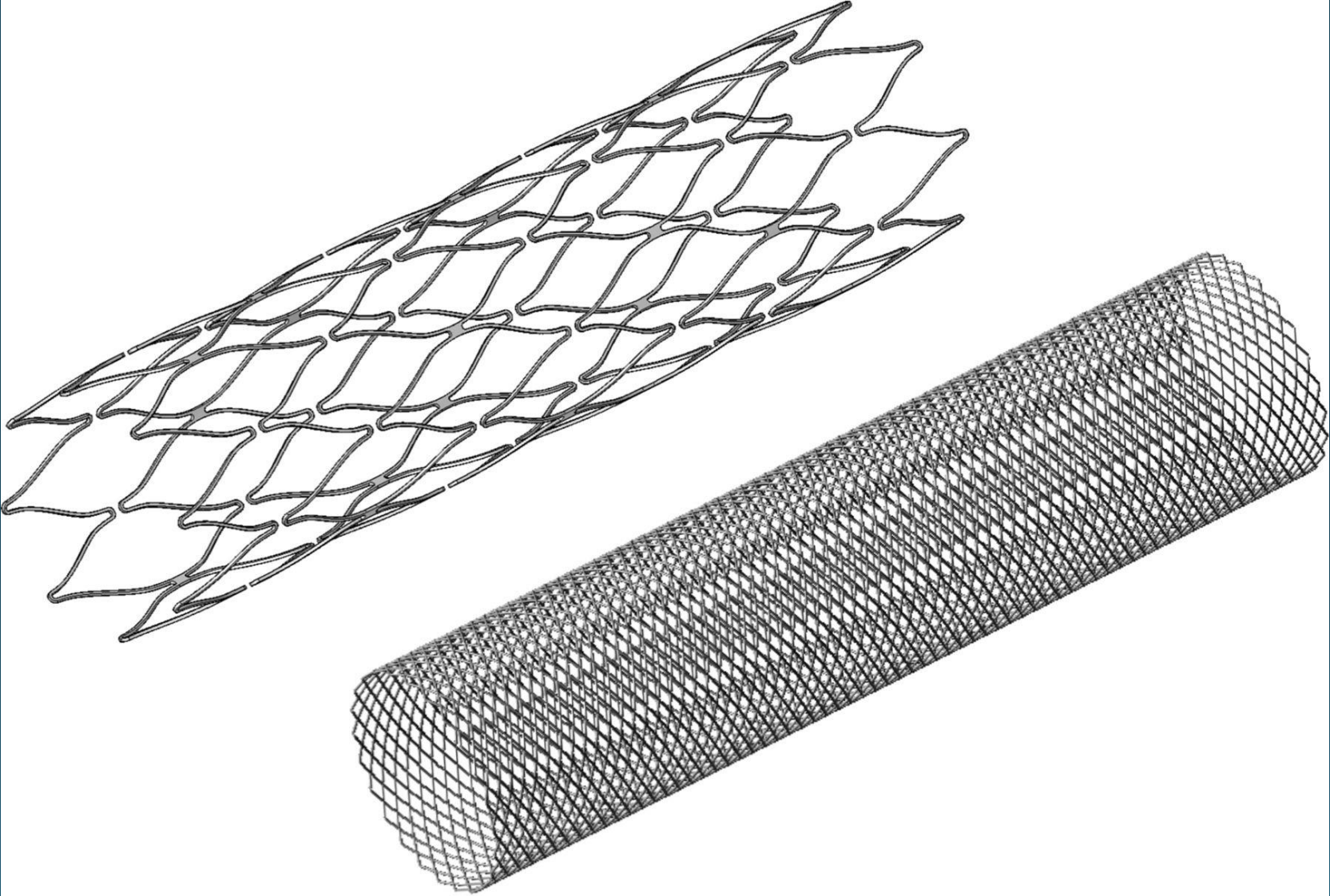
Open surgical treatment

~~Observation~~

Flow diverting stent

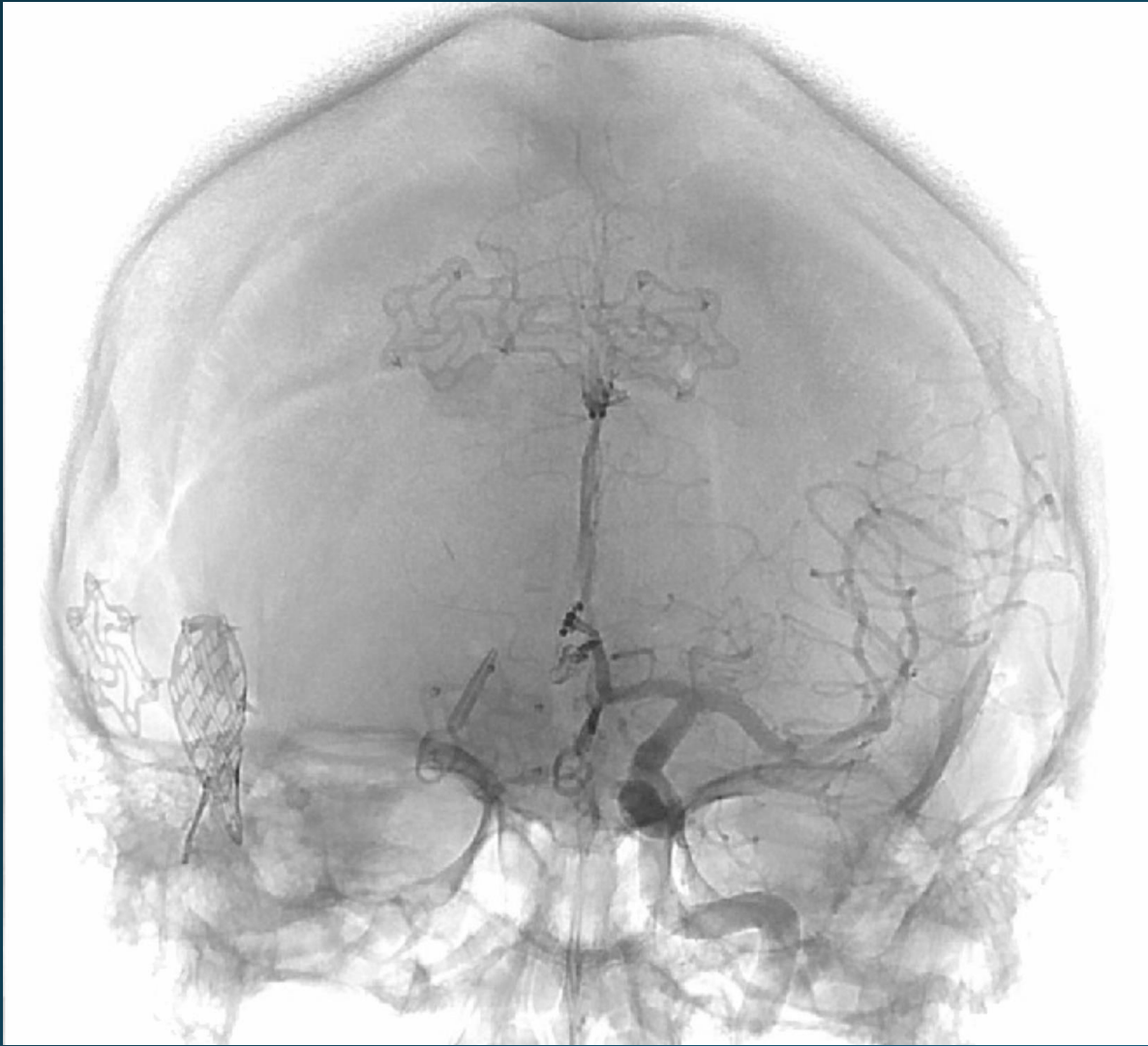
Open surgical treatment

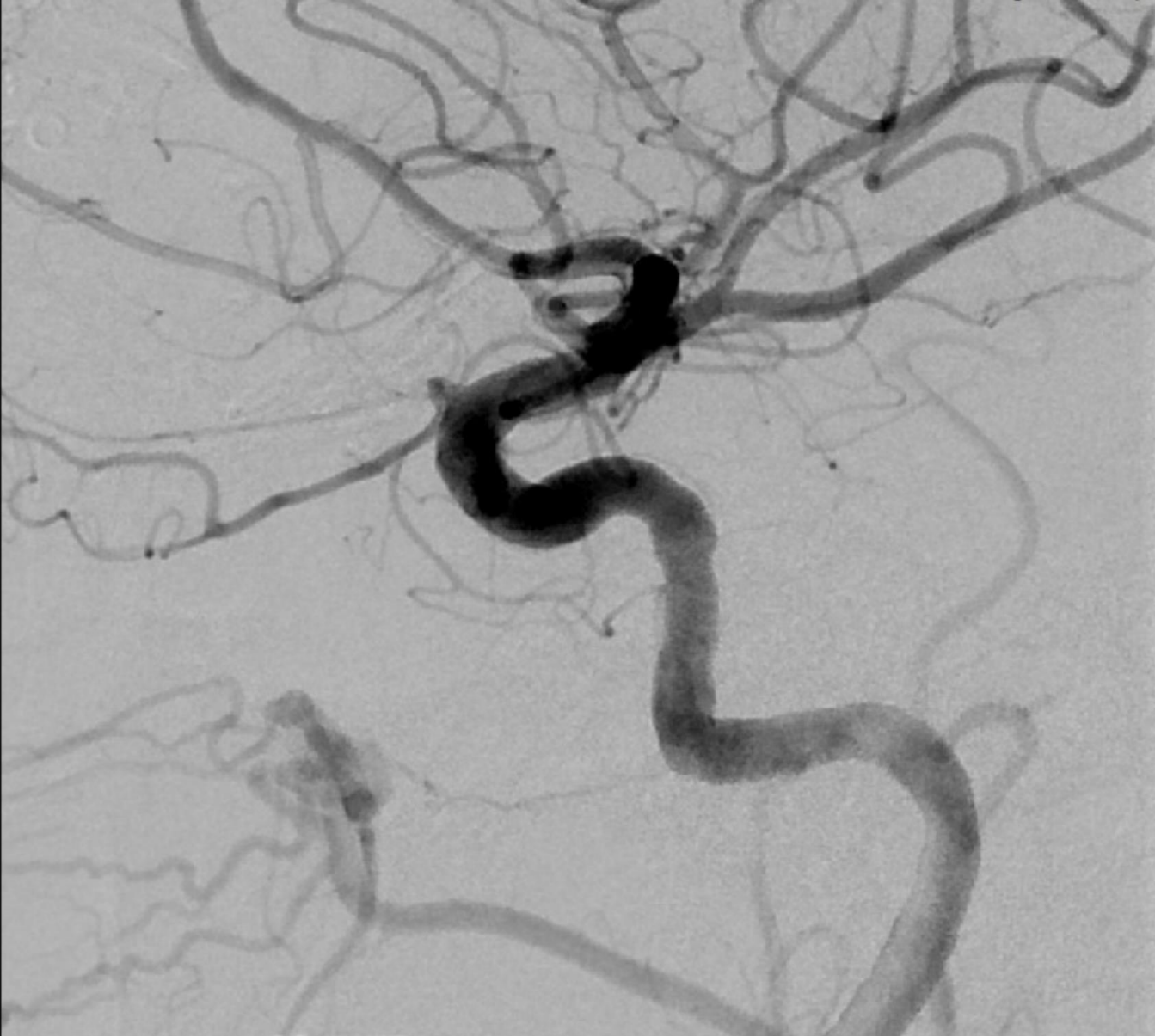
Flow diverting stent

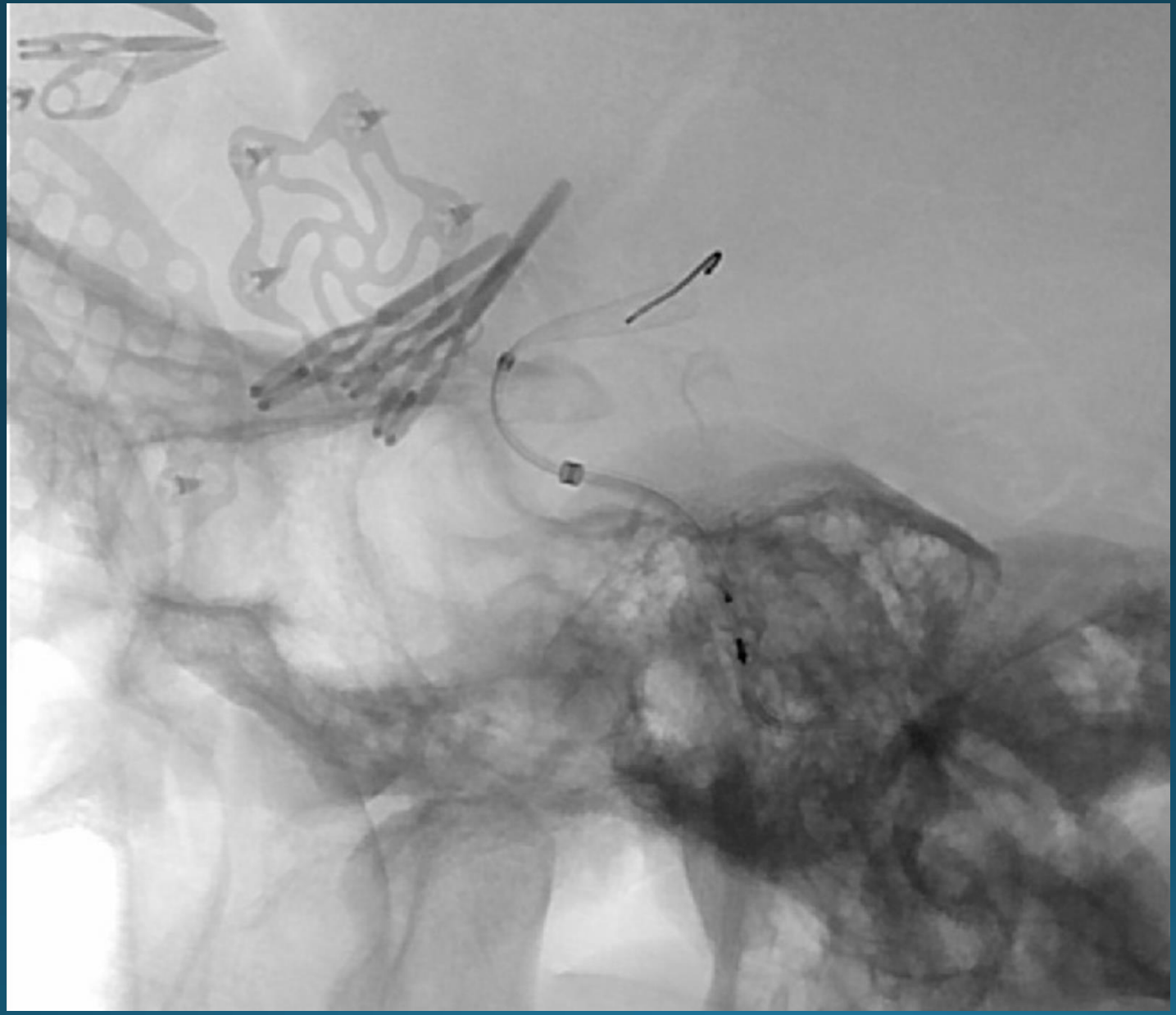


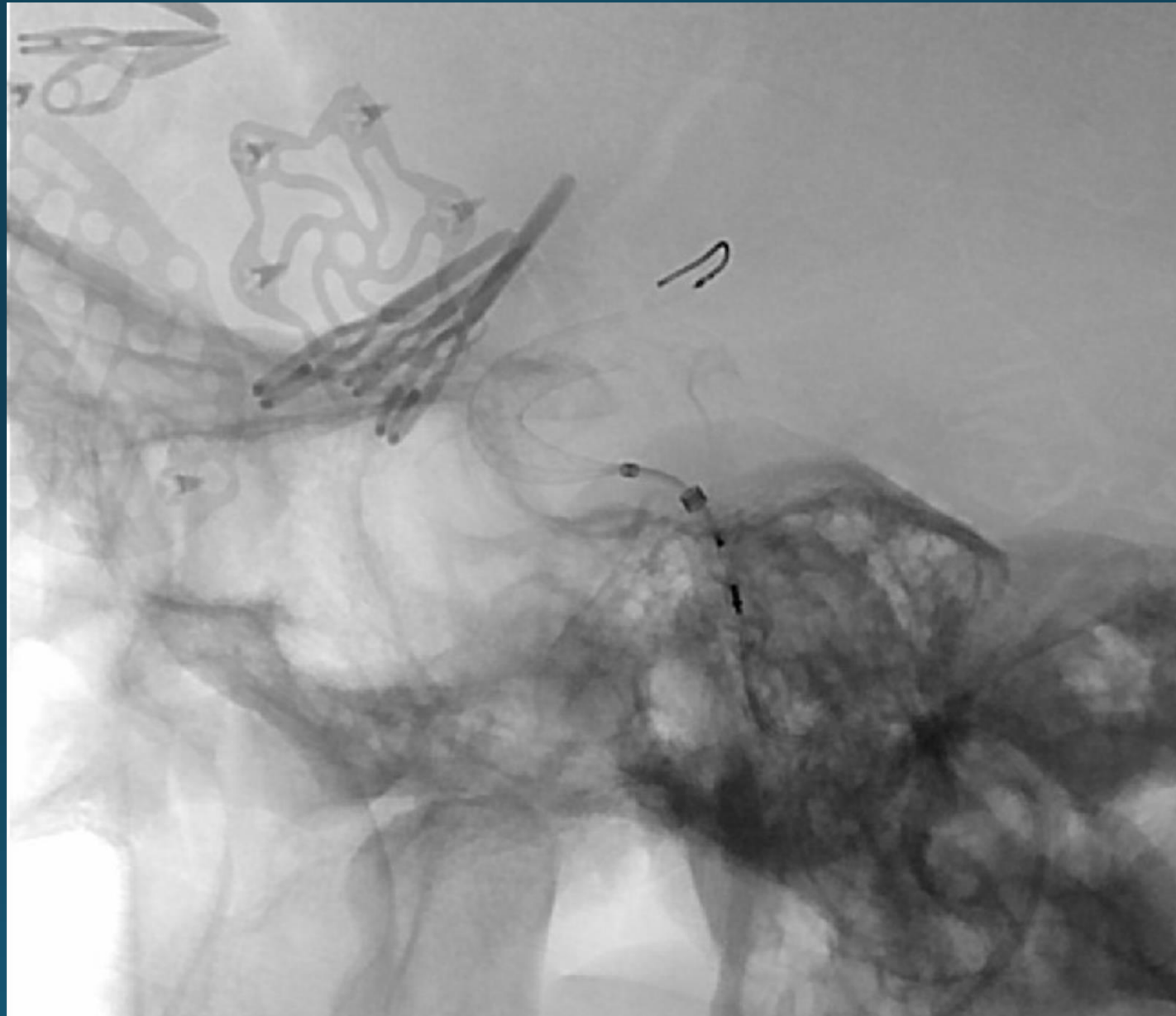
60yo F

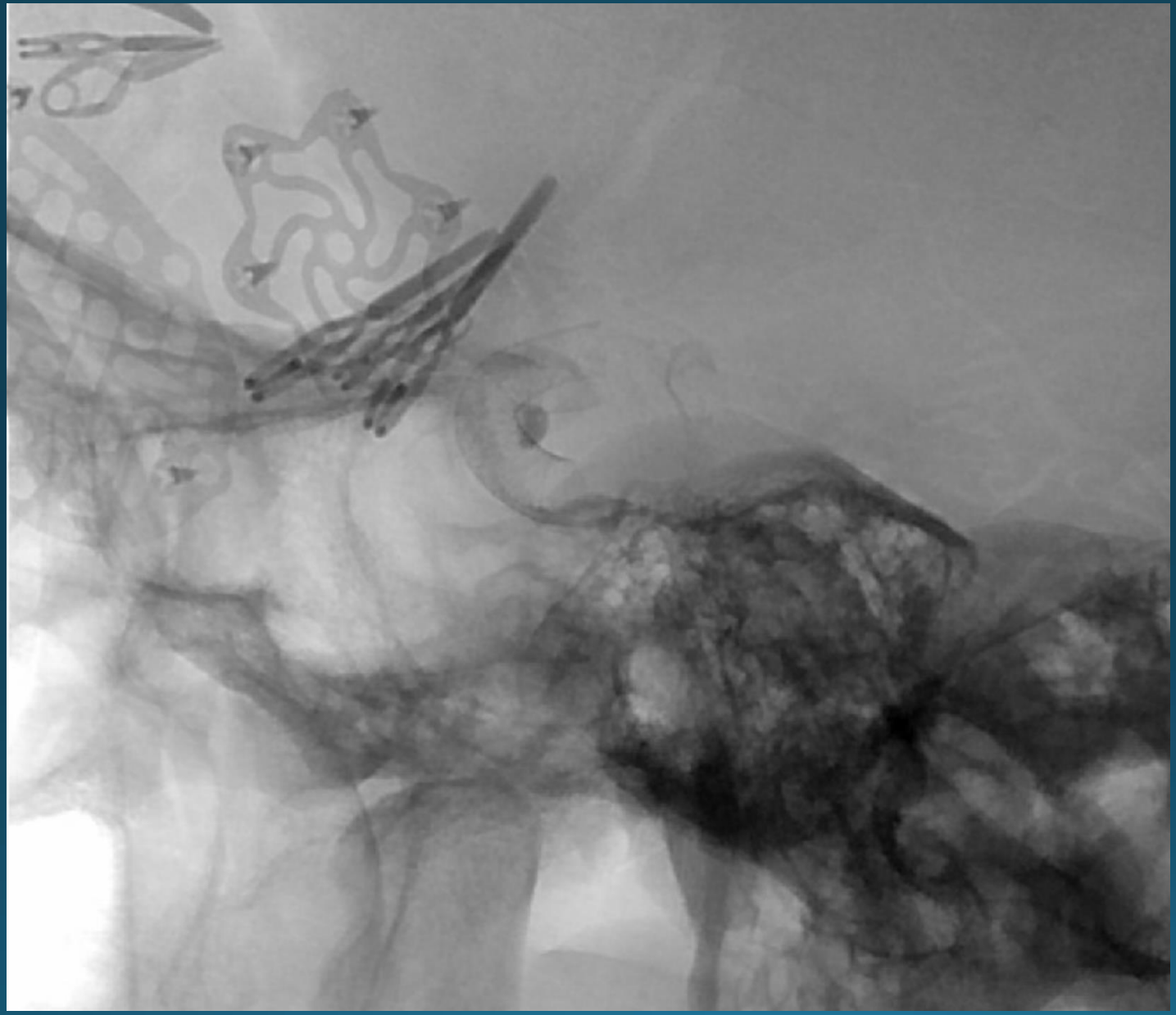
Prior craniotomy for
aneurysm clipping x 3

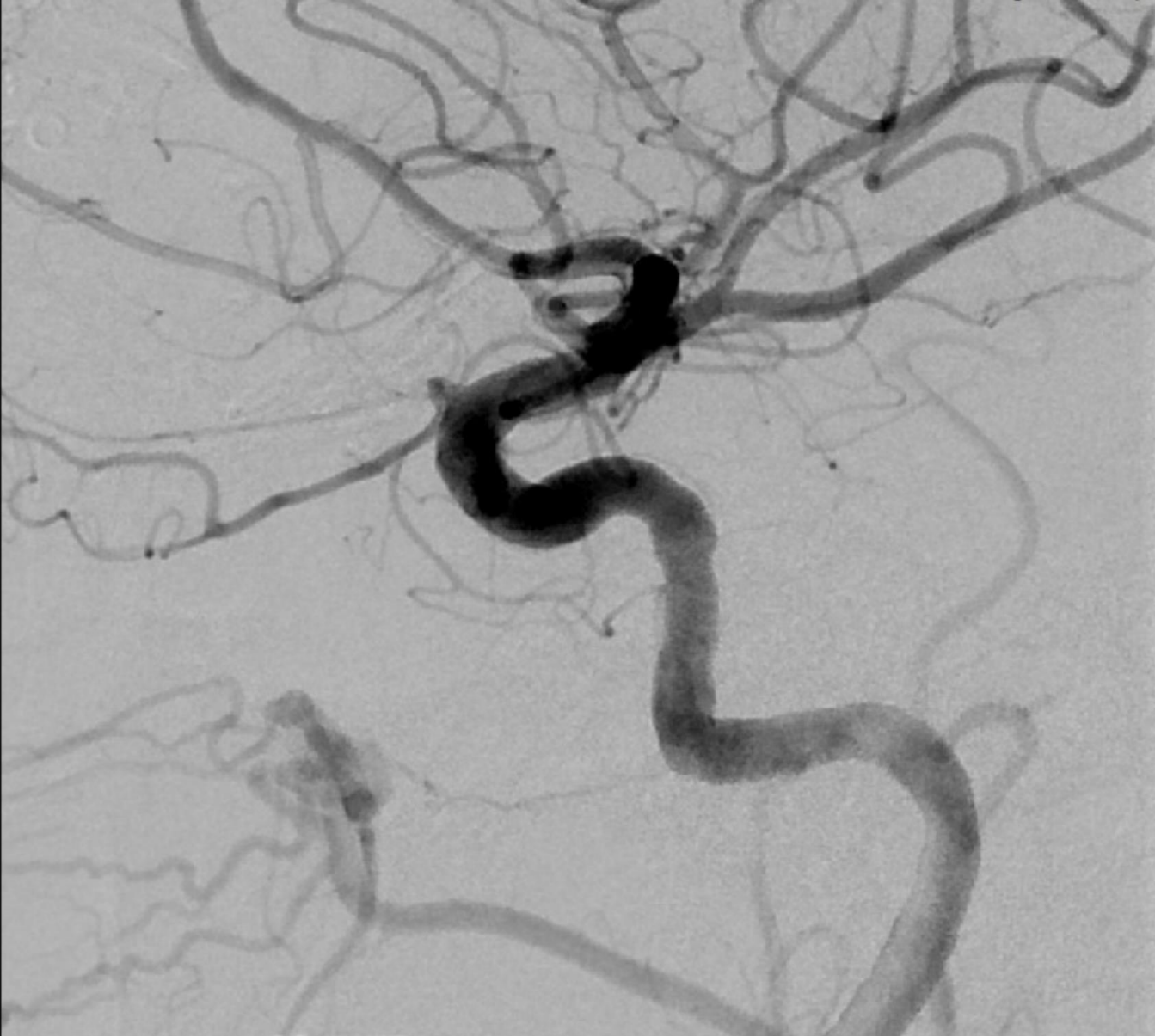


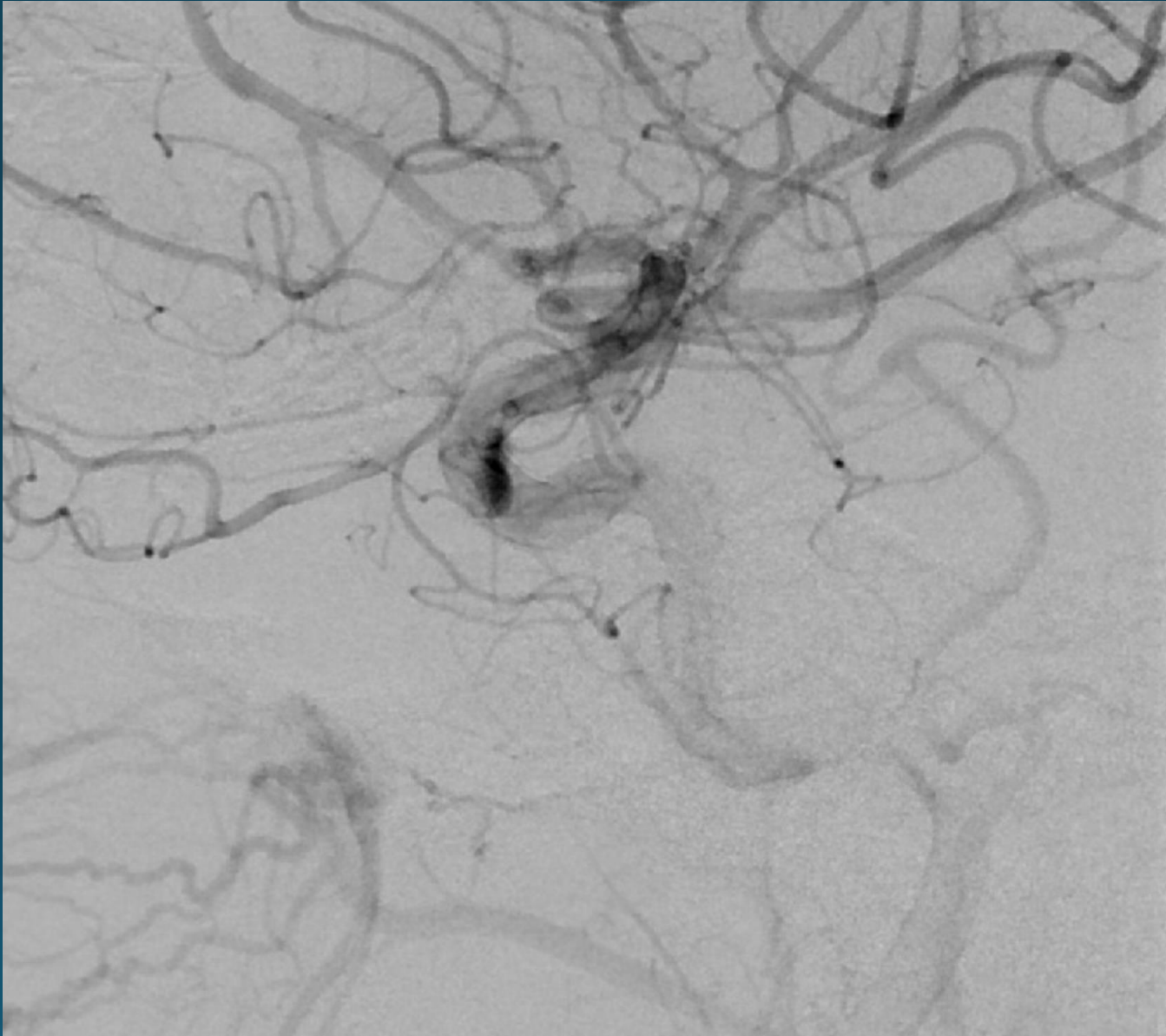












61 yo F with recurrent
aneurysm



~~Observation~~

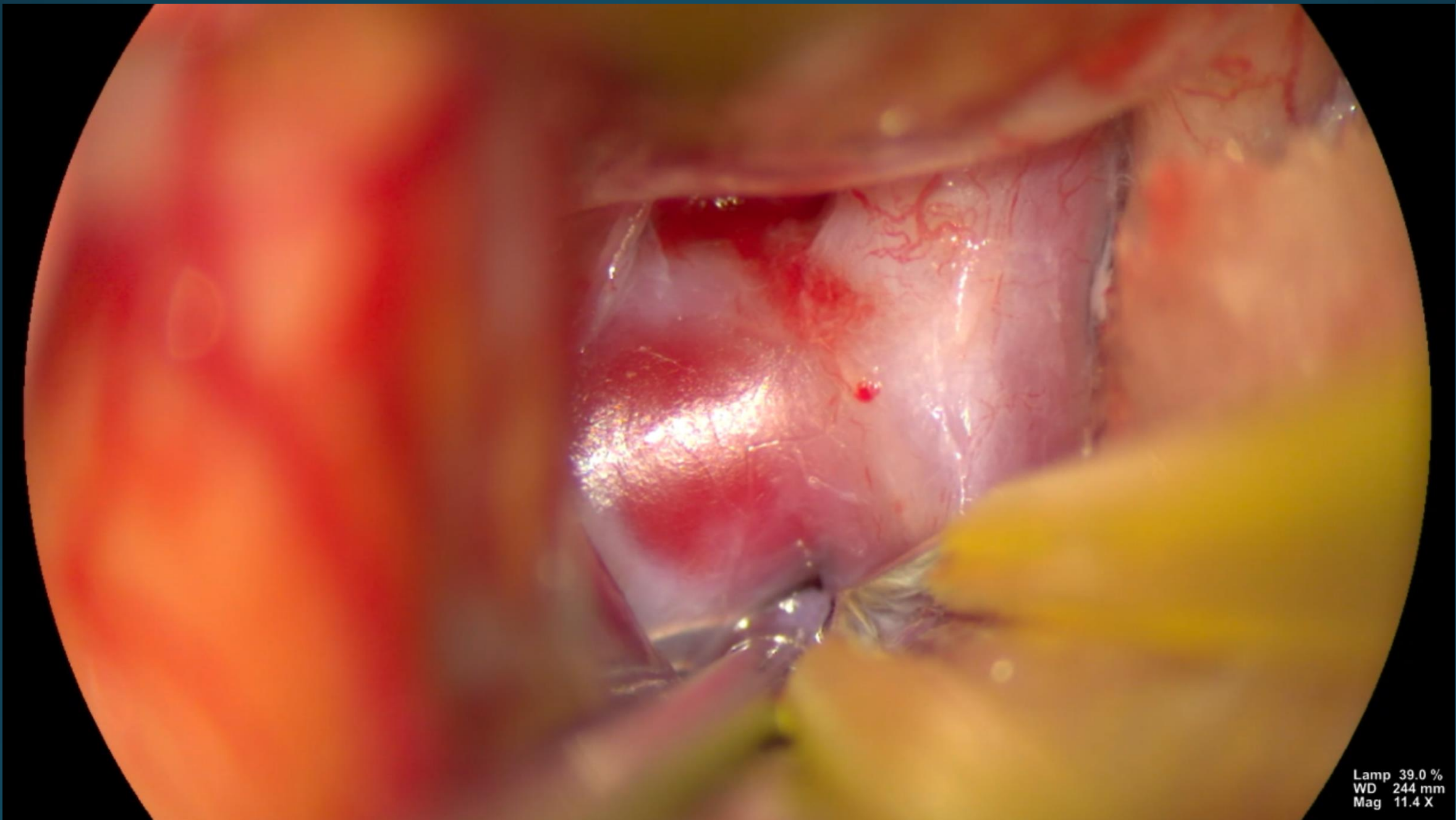
Flow diverting stent

Open surgical treatment

~~Observation~~

Flow diverting stent

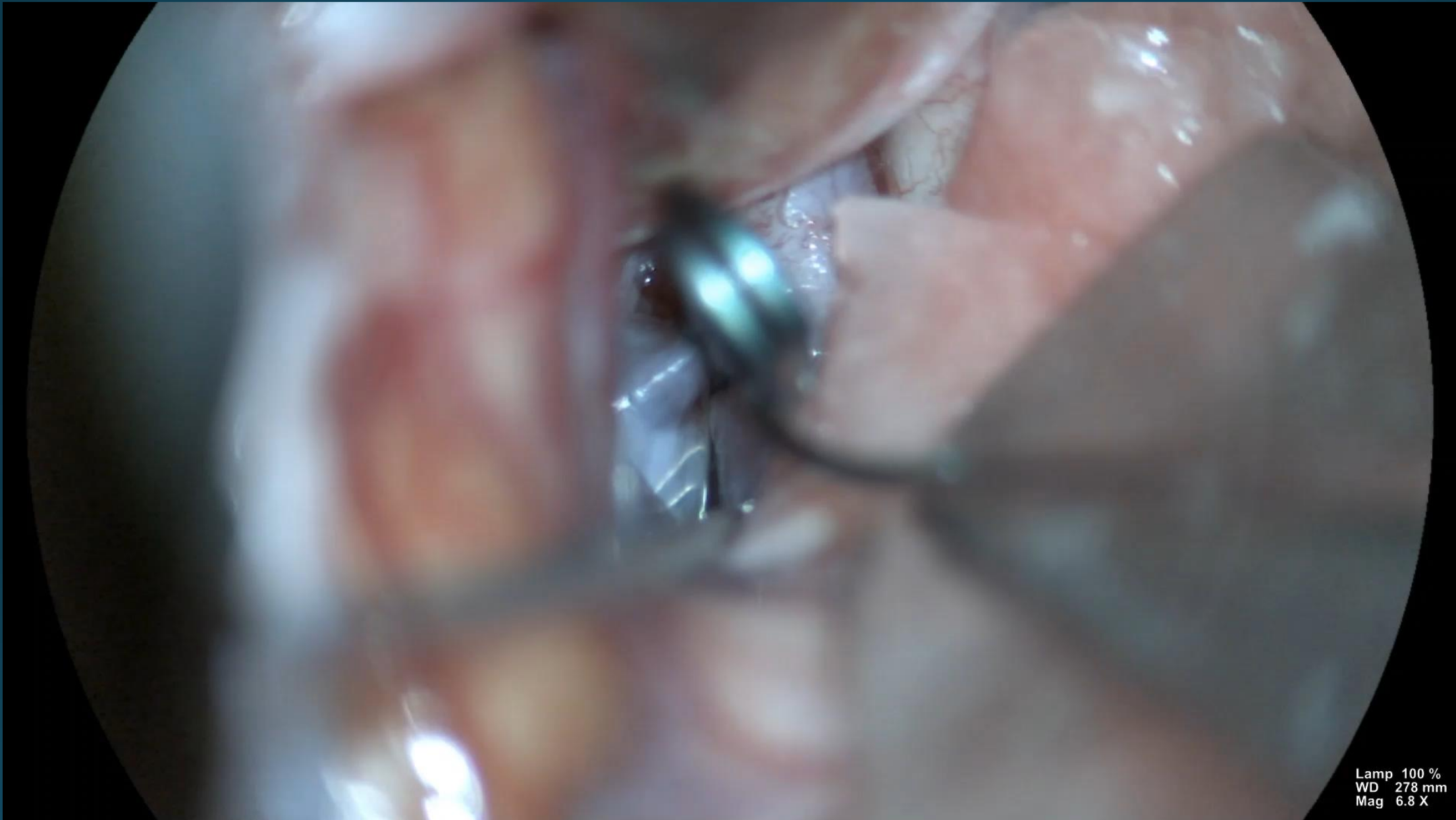
Open surgical treatment



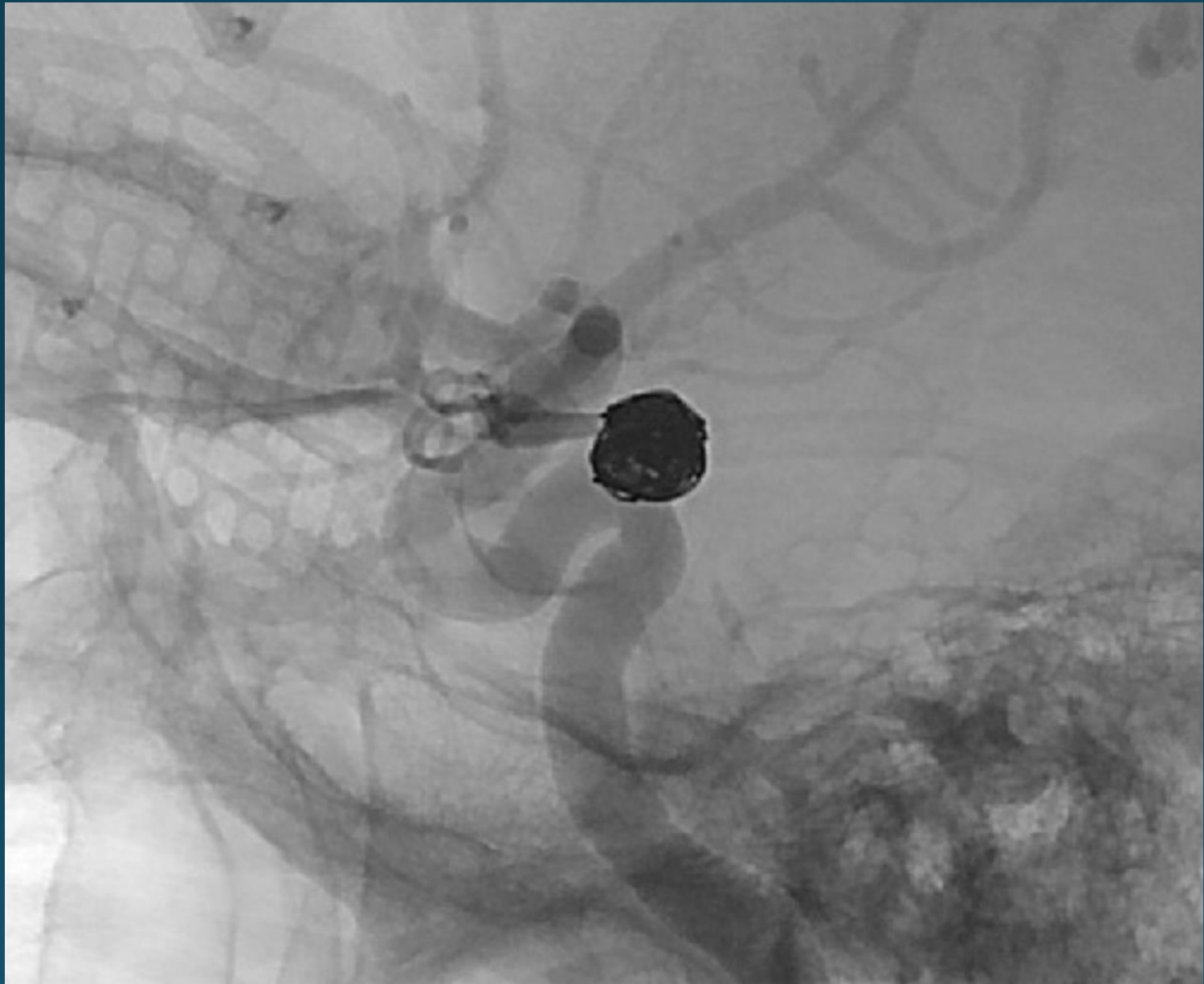
Lamp 39.0 %
WD 244 mm
Mag 11.4 X



Lamp 39.0 %
WD 244 mm
Mag 11.4 X



Lamp 100 %
WD 278 mm
Mag 6.8 X





67yo F

“My eye won’t open”

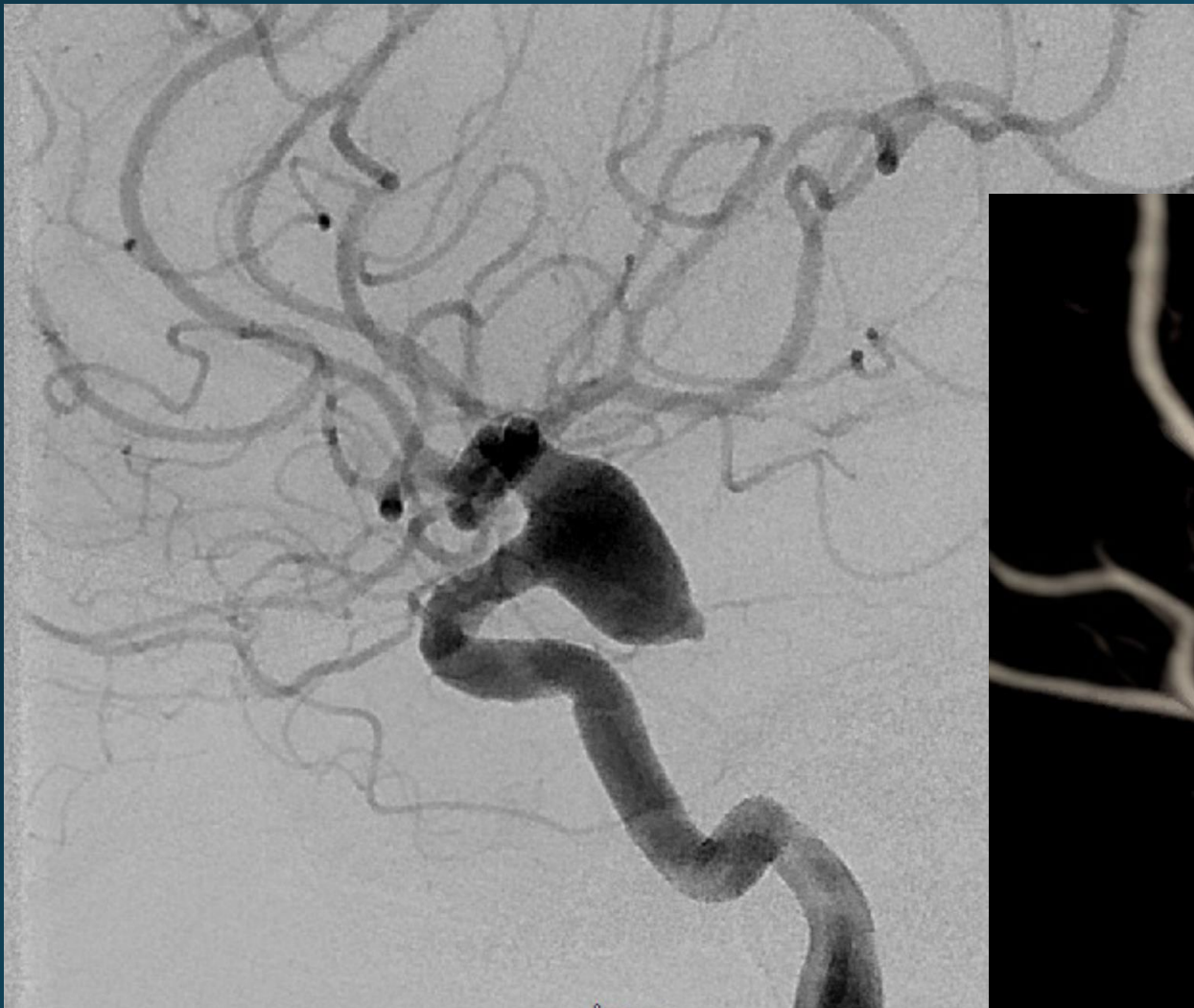
Clinical course

- Severe headache 17 days prior to admission (PTA)
- WHOL 15 days PTA
- Slept through days - 13-14 PTA
- “I thought I had COVID” - 7-9 days PTA
- “My eye wouldn’t open” -2 days PTA

“Maybe I should go see a doctor”







Observation

Flow diverting stent

Open surgical treatment

~~Observation~~

Flow diverting stent

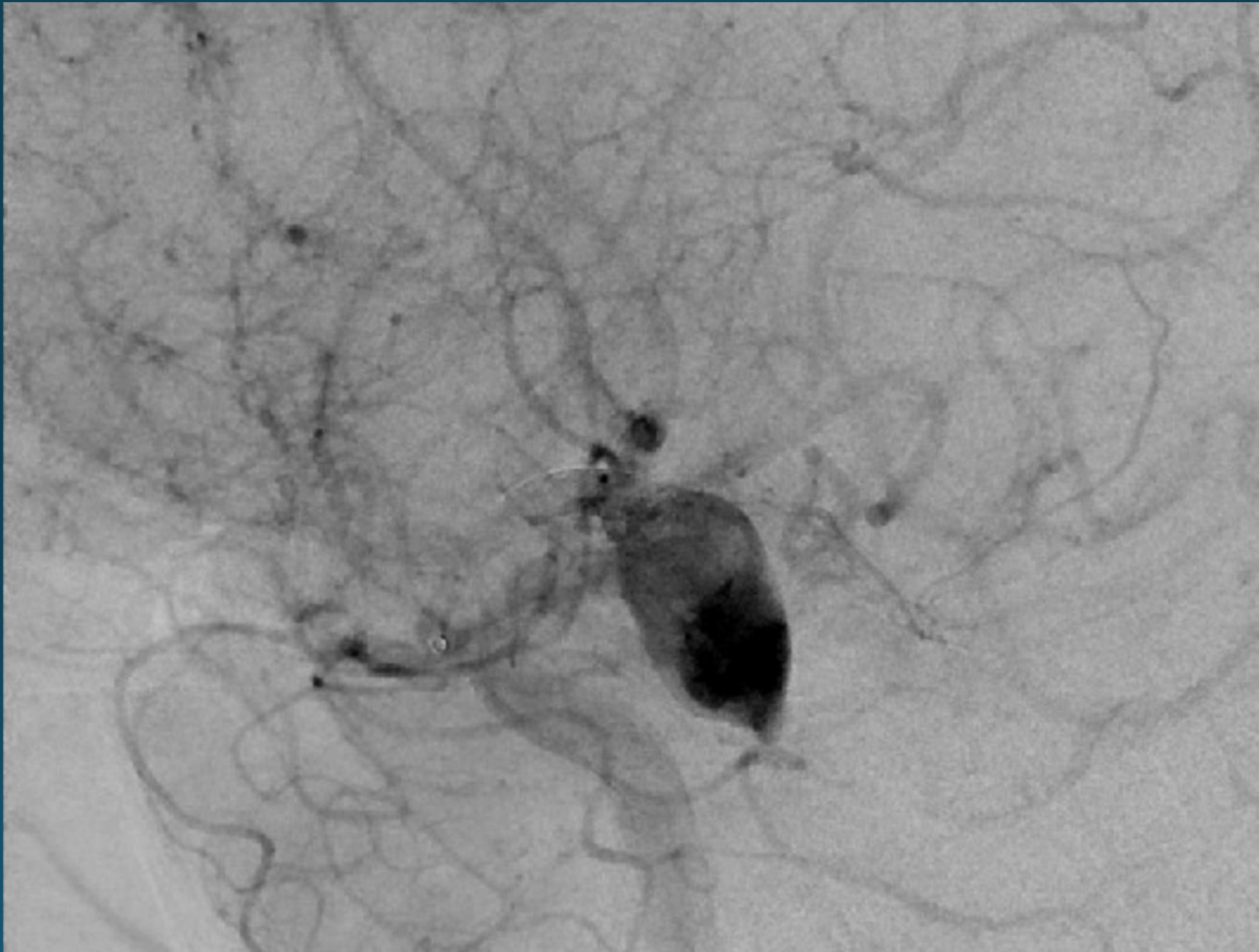
Open surgical treatment

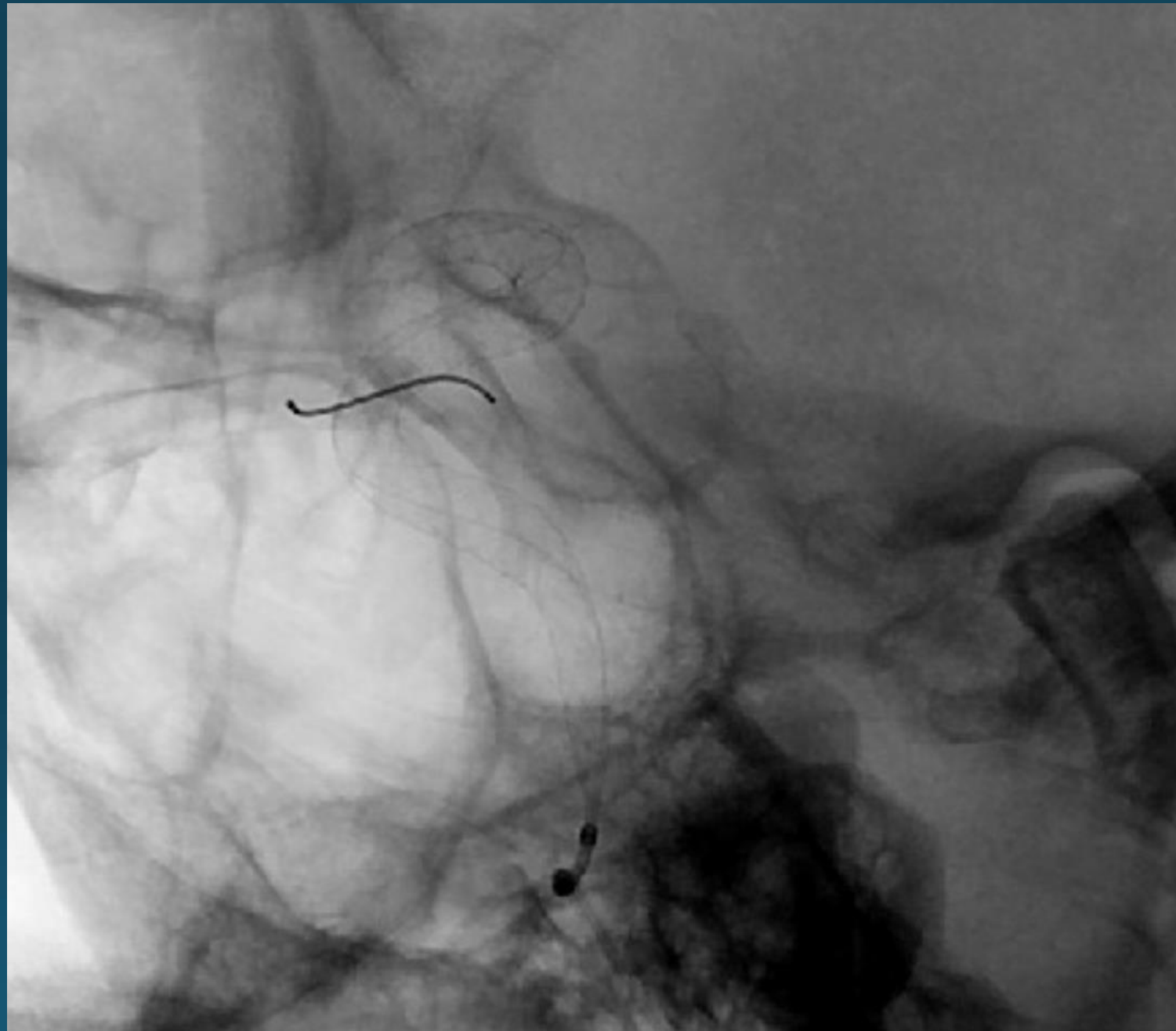
~~Observation~~

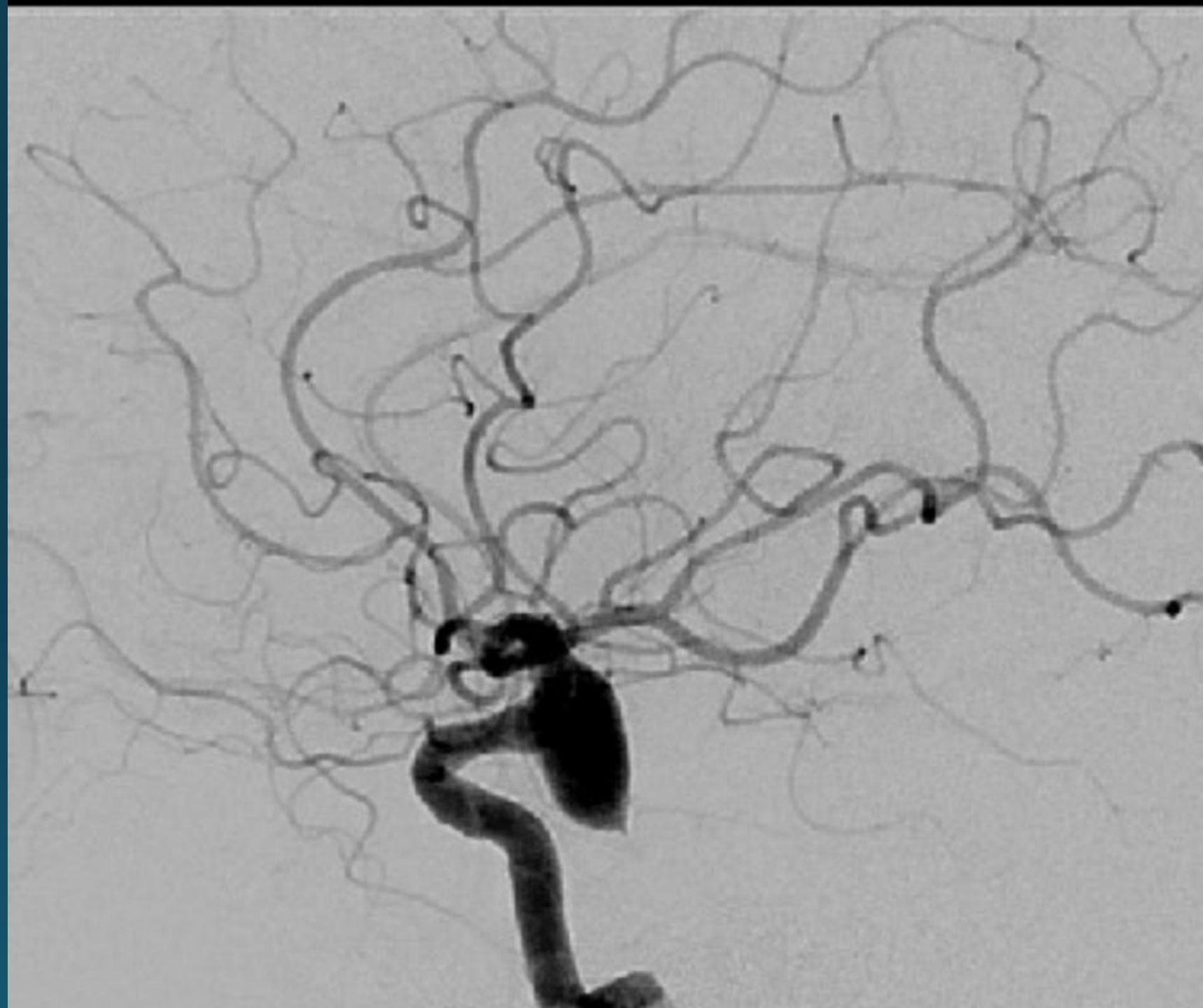
Flow diverting stent

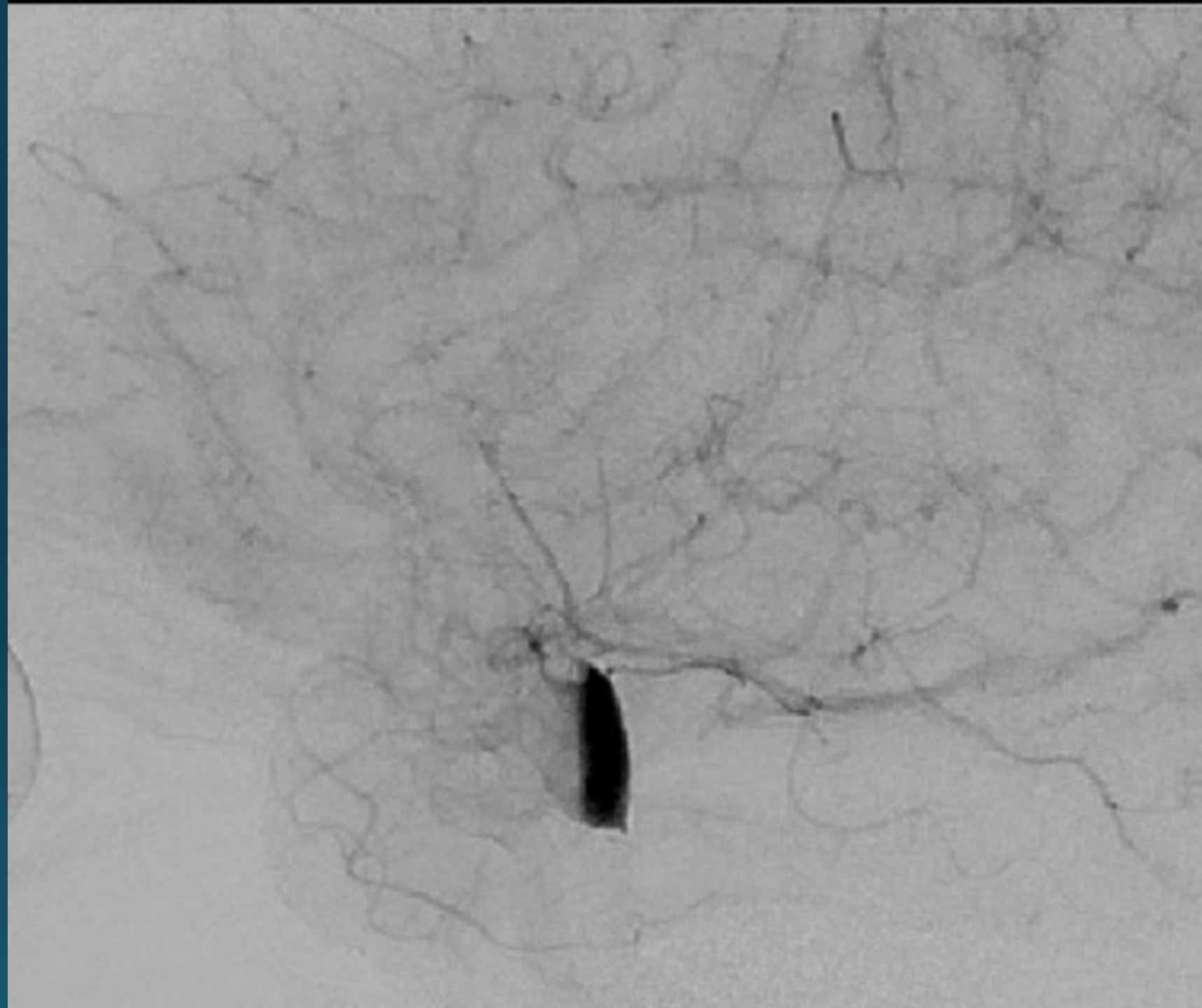
Open surgical treatment



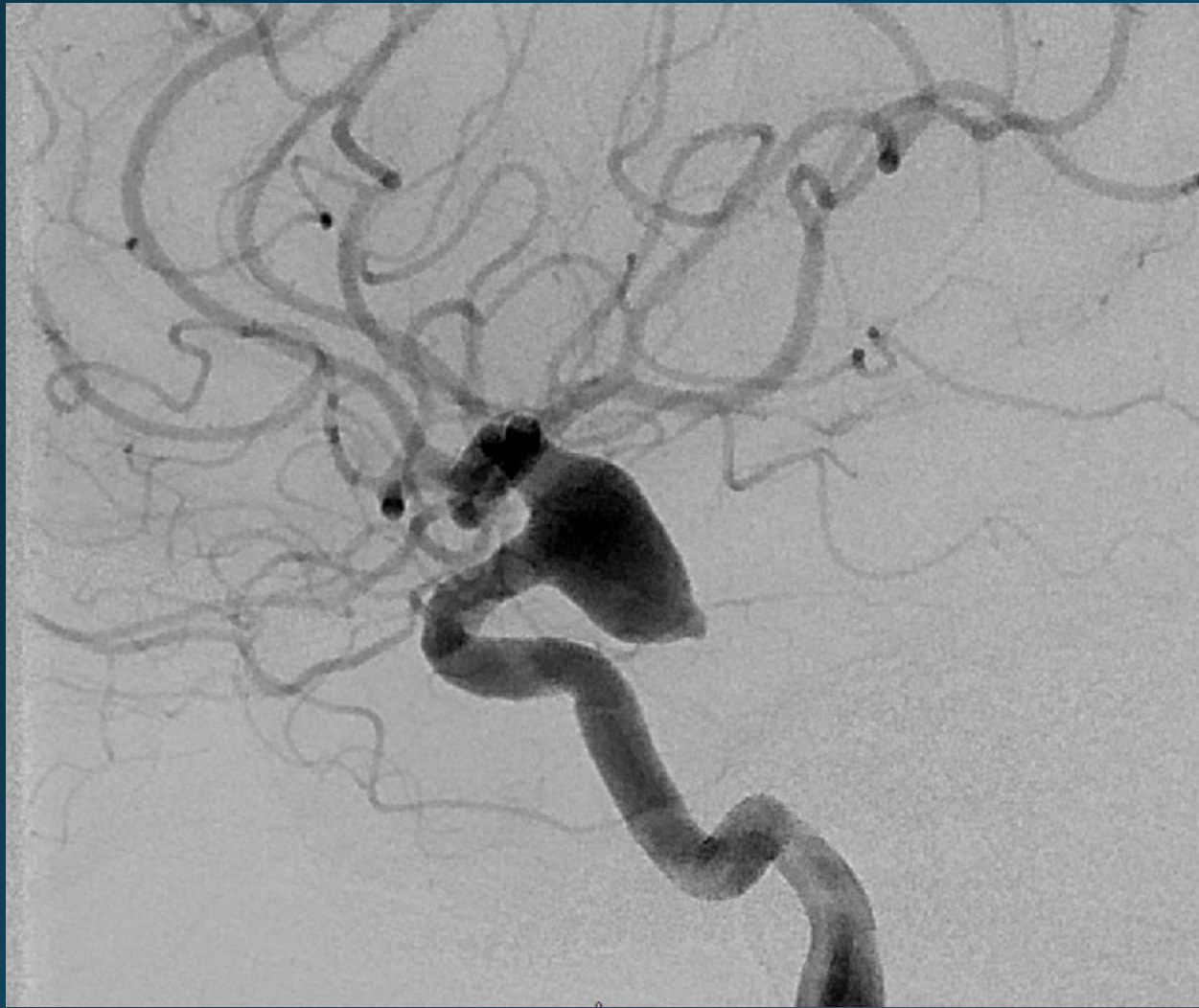








2 month follow up



Observation

Endovascular treatment

Open surgical treatment

Guiding principle:

Preservation of quality of life by
prevention of neurologic injury

Questions?