



# Endovascular Treatment of Cerebral Aneurysms: Creation and Growth of a Comprehensive Clinical and Academic Program.

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Professor

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Kingston, Ontario Canada

Stroke Symposium 2023

June 14, 2023 St Lawrence College

## Conflict of Interest

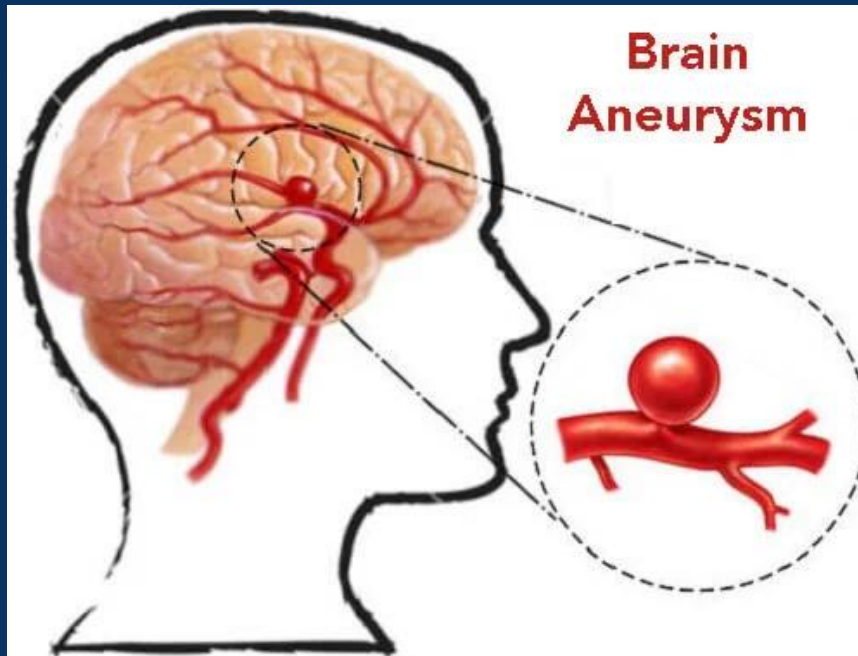


Recent CME support from Industry Medtronic and Stryker to Academic fund.

# What is a Brain Aneurysm? ....simply imagine a blow-out in your bicycle tire.

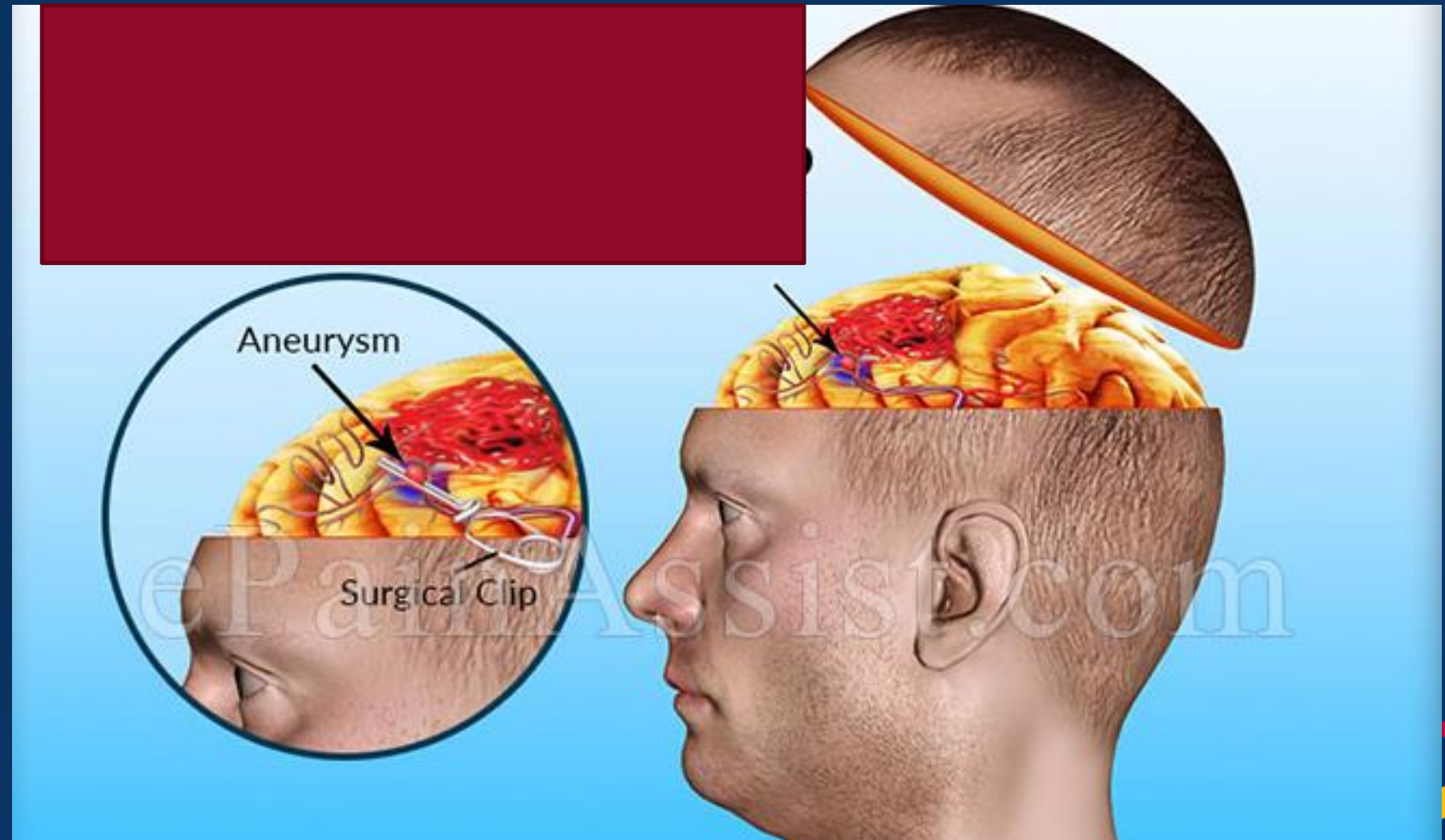


- A brain aneurysm is a weak spot along an artery of the brain that progressively bulges out till it forms an out-pouch “balloon-like”.
- The wall of the out pouch is weak and may rupture leading to a bleed in the brain.



# How Do We Treat Brain Aneurysms?

- Open Head Neurosurgery Procedure

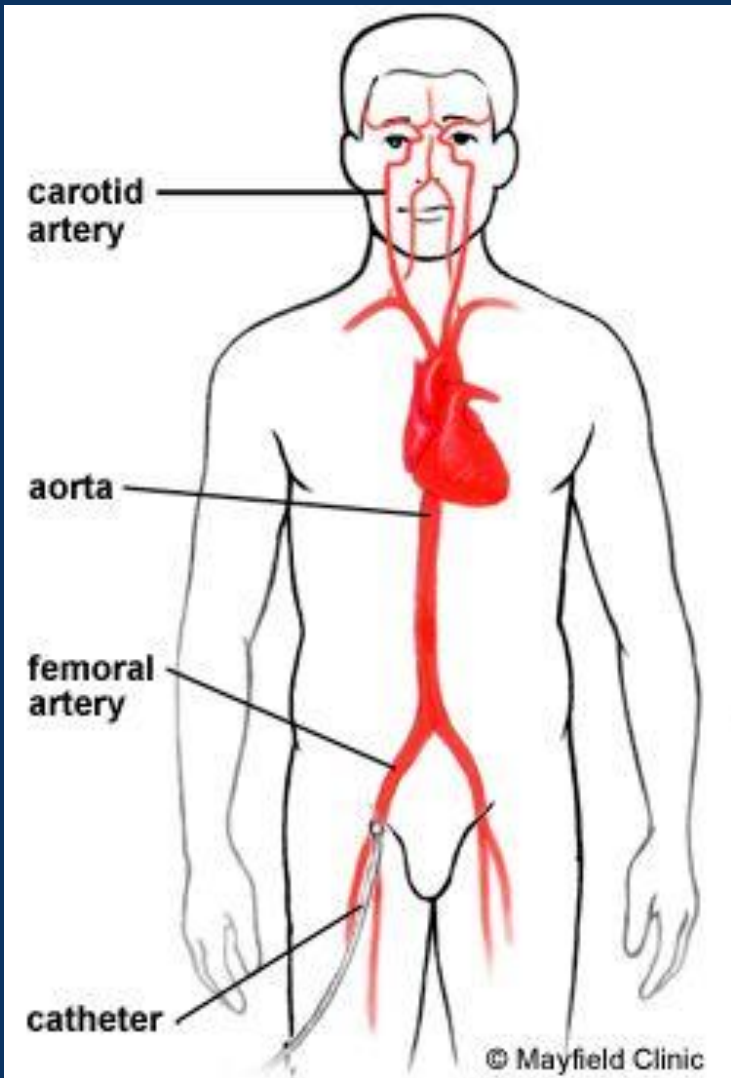


# How Do We Treat Brain Aneurysms?

## Coiling of Intracranial Aneurysms

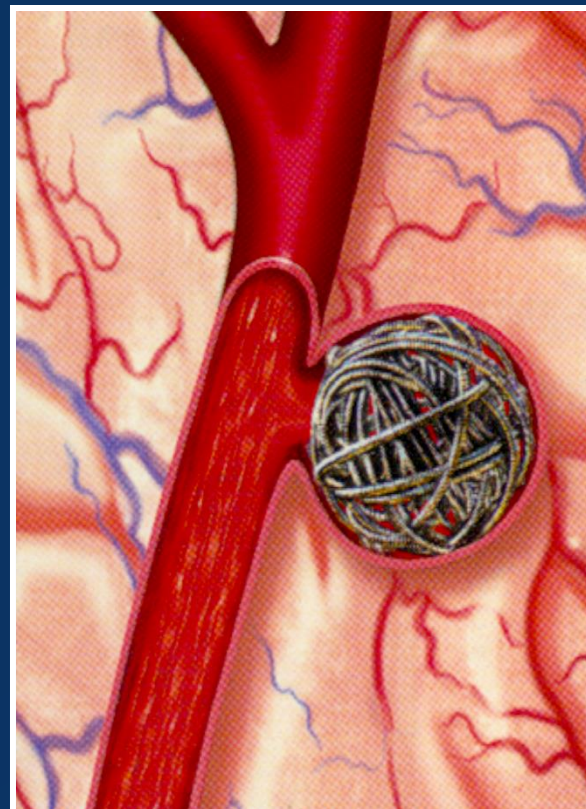
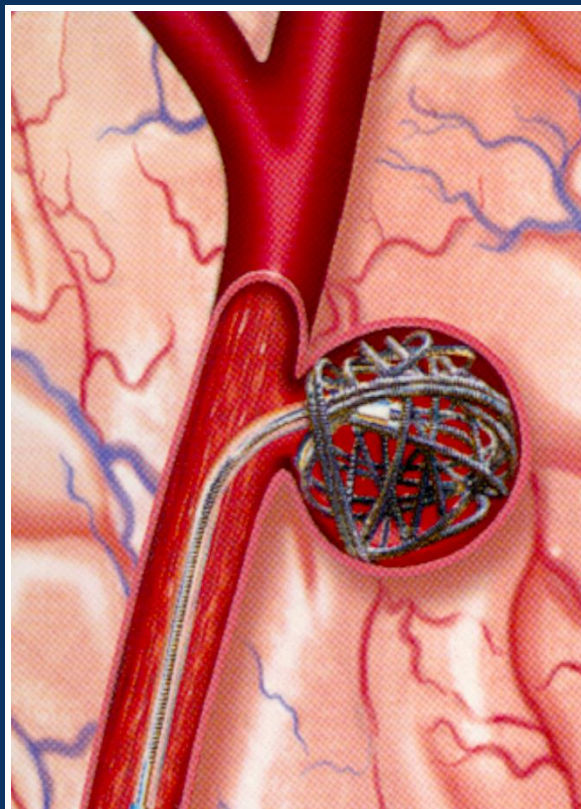
- Late 80' Guido Guglielmi at UCLA developed the first Platinum COIL;
- Superselective catheterization of the aneurysm;
- Filling the aneurysm with multiple coils till total occlusion is achieved;
- Adjunctive devices are used occasionally like stents or balloons.







The goal of the procedure is to achieve complete packing of the aneurysm with preservation of the parent artery.



# History and Background



- The Endovascular treatment of aneurysms with coils was developed by Dr Guido Guglielmi, Italian neurosurgeon, in Los Angeles in 1989.
- The Coils were initially FDA approved in 1995.
- ISAT trial\* : pt with coiling higher independent survival at 1 year, lower risk of seizures, higher risk of re-bleed, in comparison with clipping.
- THC: no significant difference between coiling and clipping at 1 year (Meta-analysis); however coiling has significant less length of stay.\*\*
- Complications of coiling: morbidity (5-6%),mortality (3-5%),the great majority being thrombo-embolic events.\*\*\*

\*ISAT TRIAL Molineaux et Al.: LANCET 2005 Sept 3-9;366 809-817.

\*\*Zhang et Al: World Neurosurgery Org:THCs and length of stay: a meta-analysis.

\*\*\* Pathuran M. :Complications of Aneurysm Coiling ,Interventional Neuroradiology

\*\*\* van Rooij et Al: Procedural complications of coiling AJNR 27,2006, 1498-1501

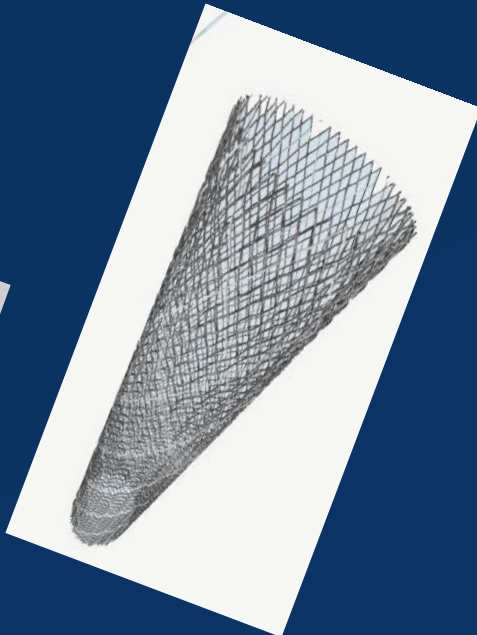
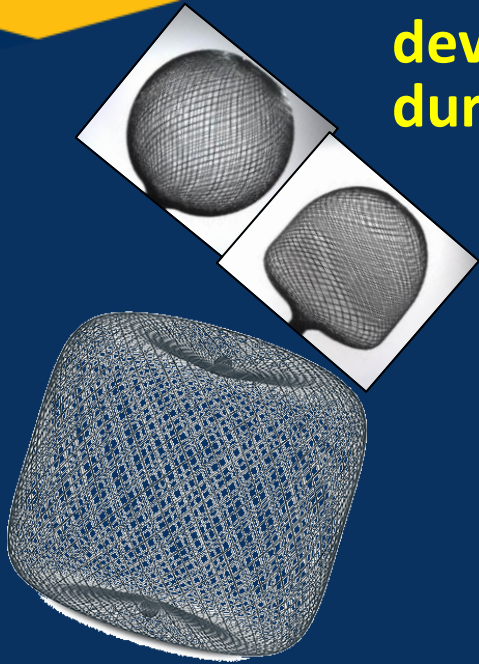


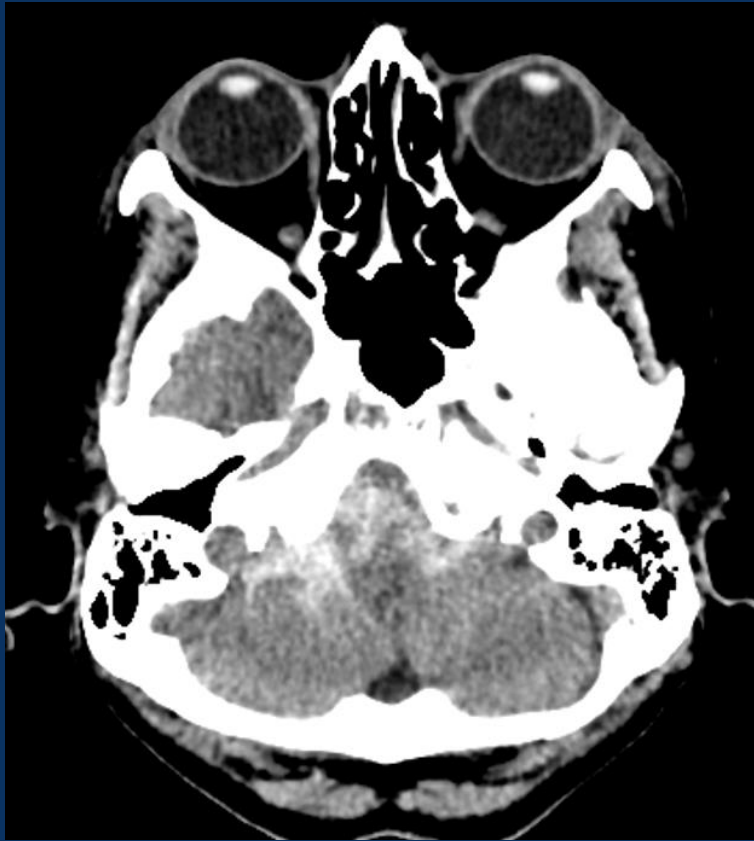
Since the early '90, the procedure has change with many new devices designed to provide a faster , safer patient's and more durable treatment



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- **Endosaccular Occlusion:** Coils, Stent assisted and balloon assisted techniques, endosaccular devices (Web, pCone, Medina);
- **Parent artery reconstruction:** Flow Diverters;
- **Sacrifice of the parent artery.**





# Outline



- Illustrate the phases leading to the creation of the program;
- Present the Comprehensive Coiling Program at KHSC;
- Review our performance in comparison with other centers in the province;
- Describe an innovative approach for elective coiling of Unruptured Aneurysms;
- Discuss future directions.

**1<sup>st</sup> presentation to Various Team Leaders  
and  
Senior KGH Leadership Jan 9<sup>th</sup>, 2019**

**Interventional Neuroradiology (INR)  
at  
Kingston Health Sciences Centre  
INNOVATION AND CONTINUITY OF CARE**

**Kingston Health  
Sciences Centre**

Centre des sciences de  
la santé de Kingston





## Timeline: A New Clinical Program from the vision to the creation of a Comprehensive Clinical and Academic Program

- From the vision to the creation of a business plan.
- KHSC senior leadership approval.
- Ontario Neurosurgery Performance Management group.
- OMHLTC approval: spring 2020 for Ruptured Aneurysms, spring 2021 for Unruptured aneurysms.
  
- KHSC Aneurysm coiling program for 2022-23: 32 Ruptured; 18 Unruptured.

Jan 2019 Vision



Nov 2019  
KHSC  
Approval



Jun 2020  
OMHLTC  
Approval



Sept 2019  
Business  
Plan



Jan 2020  
ONPMG and  
CCSO  
Approval

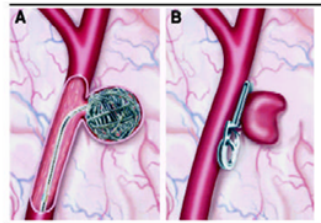


March 2021  
Approval  
Elective



**DRAFT V5**  
**Business Case**  
**Cerebral Aneurysm Coiling:**  
**an opportunity to improve outcomes for those ruptured aneurysms**  
**across Southeastern Ontario**

**DATE: Sept 6, 2019**  
**Incorporating review from Task Group**



**KHSC Sponsor(s):**  
Dr Omar Islam, Head, Radiology  
Dr. Donatella Tampieri, Lead Neuro Interventional Radiologist  
Dr. Chris Wallace, Head, Neurosurgery  
Karen Pearson, Operational Director, Diagnostic Imaging Services

**with support from**  
Cally Martin, Regional Director, Stroke Network of Southeastern Ontario (SEO) – contact person  
On behalf of the KHSC Cerebral Aneurysm Coiling Workgroup - membership list in Appendix A

**KHSC Executive Sponsor(s):** Dr Troy Jones, Executive VP, Health Information Services  
Dr Michael Fitzpatrick, Chief of Staff



## Comprehensive Aneurysms Coiling Program at KHSC

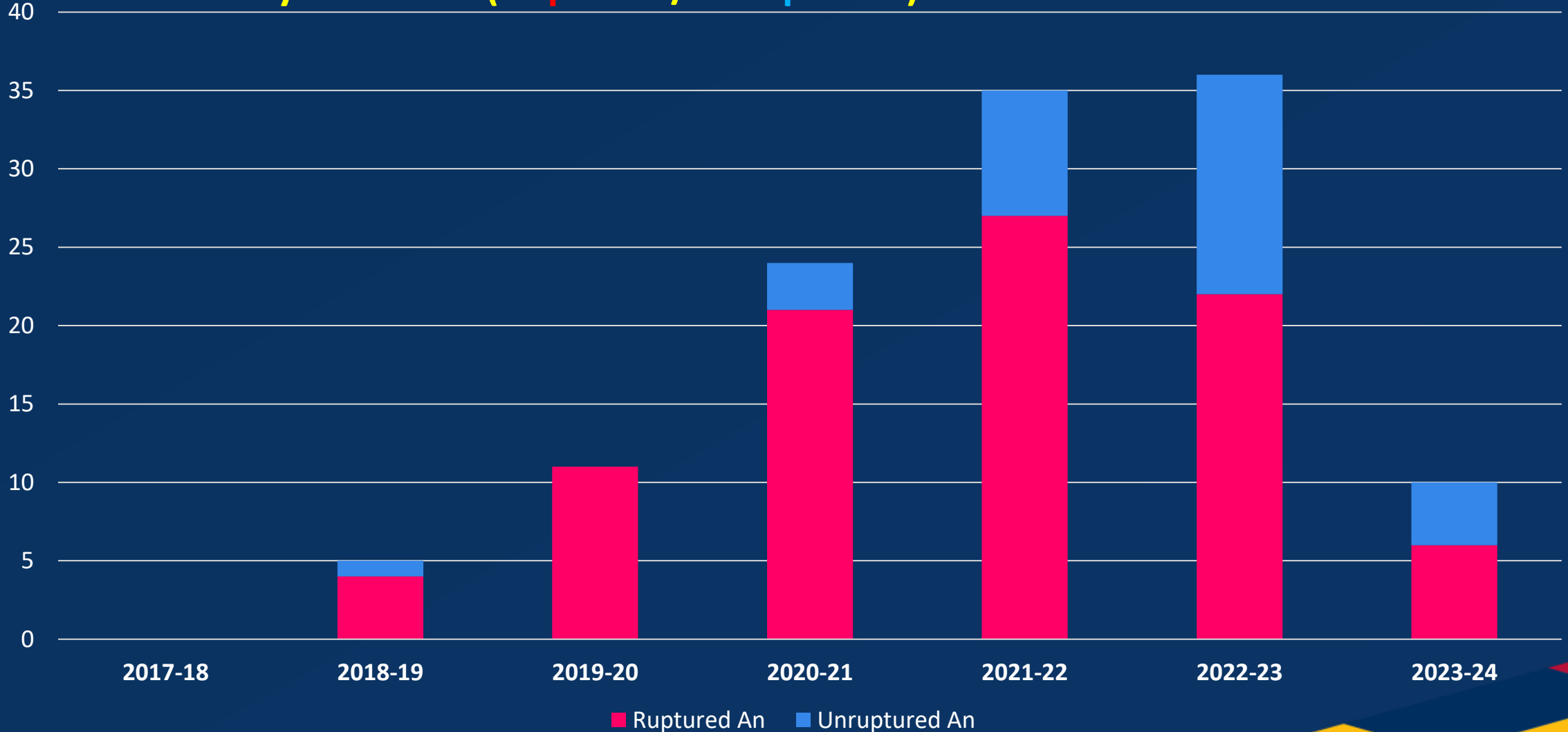
- Clinical Program: urgent and elective patients; patient in-hospital flow, data collections.
- Academic Program: Cerebrovascular round; Advances in INR Annual lecture, Hot topic VP.
- Research: original research and participation in multicentric trials and registries .



# Aneurysms treated with Endovascular Technique at KGH :

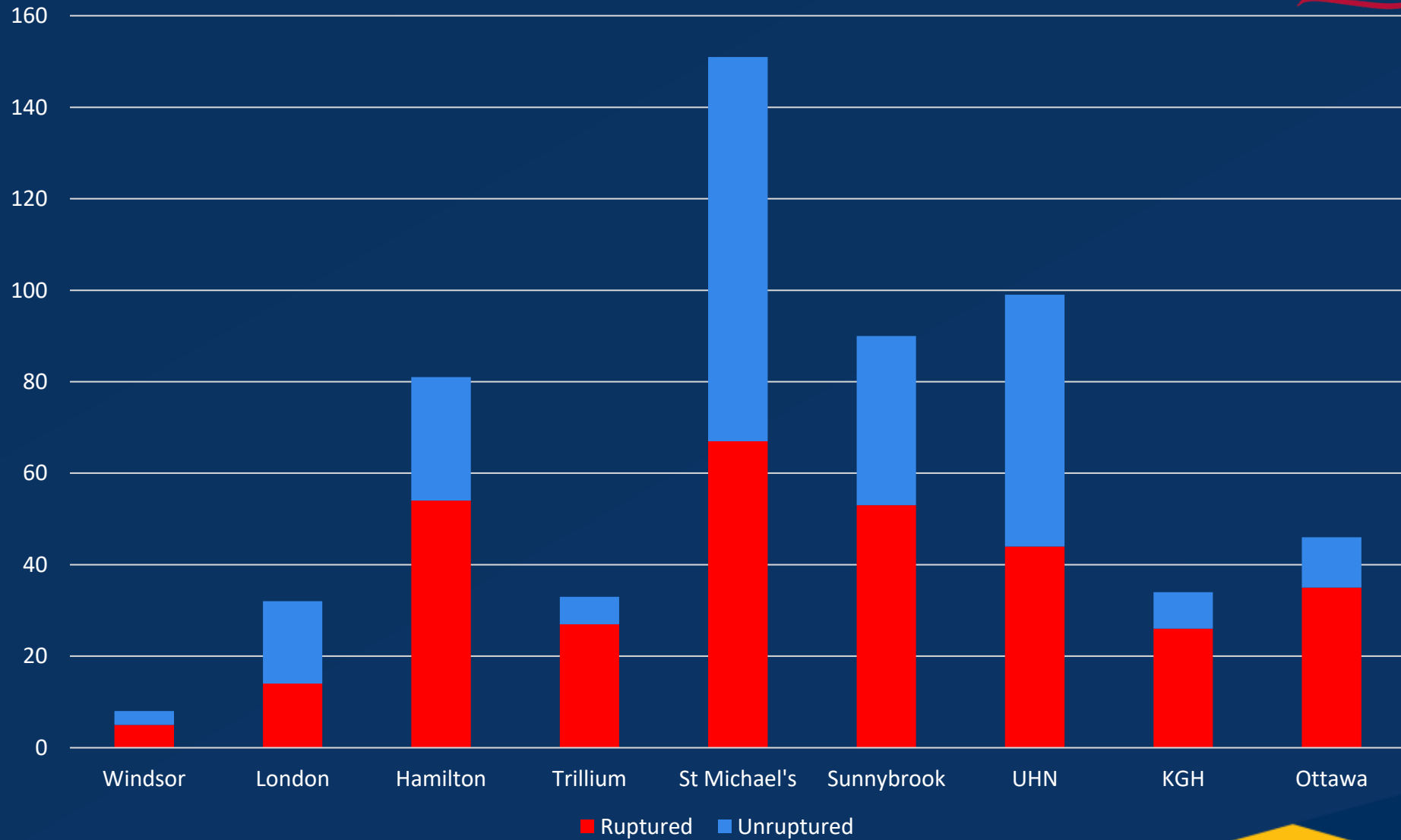


## Total Aneurysm Coiled (Ruptured/Unruptured)

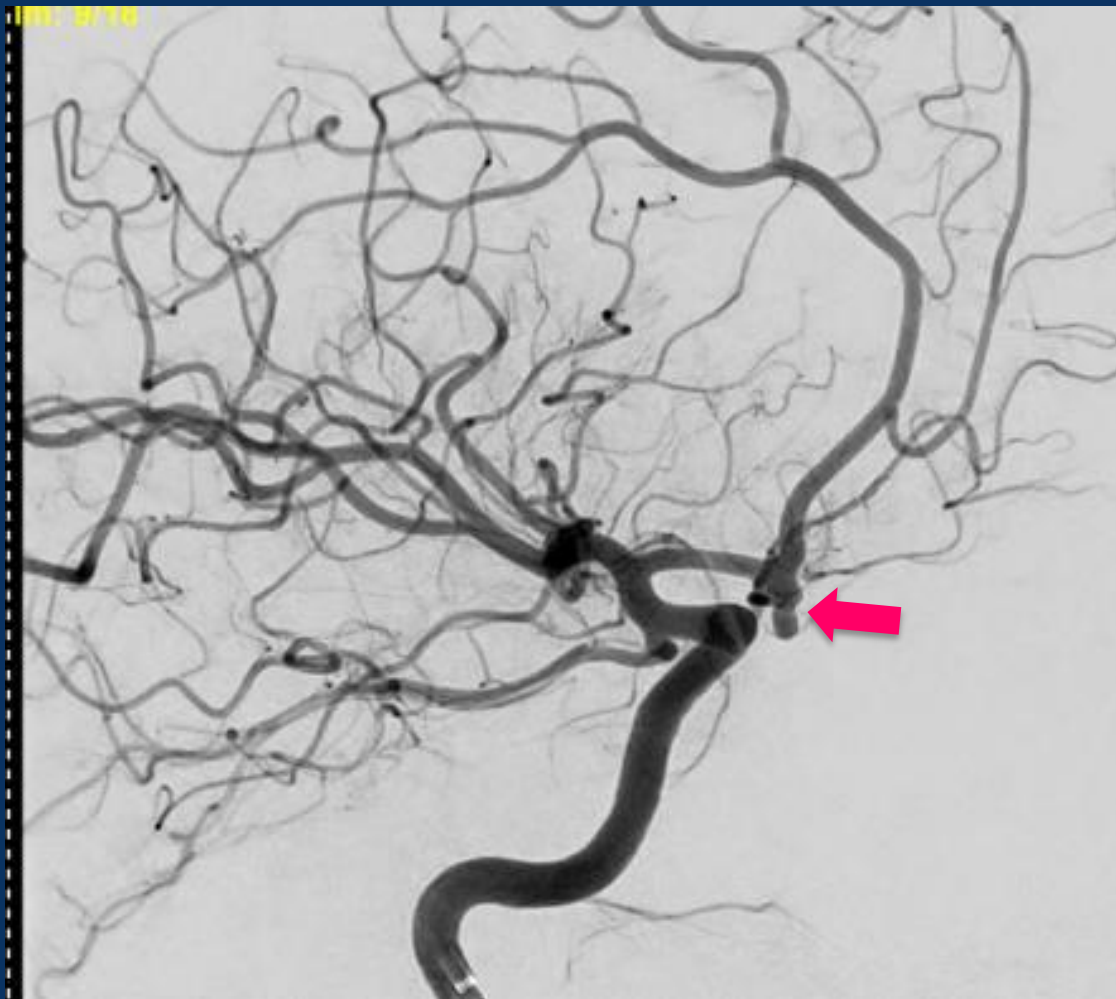




# Coiled Aneurysms in Ontario FY 2021-22



# Balloon Assisted Coiling



DummyPatName!

Molan, Karen  
DummyPatID!

Zoom:0.9

Se: 8003 (9002)(SC)

Im: 1/48

DummyAcc!  
Comparison  
21/04/2021

VS  
SITY



Lossy : JPEG-Lossy:100

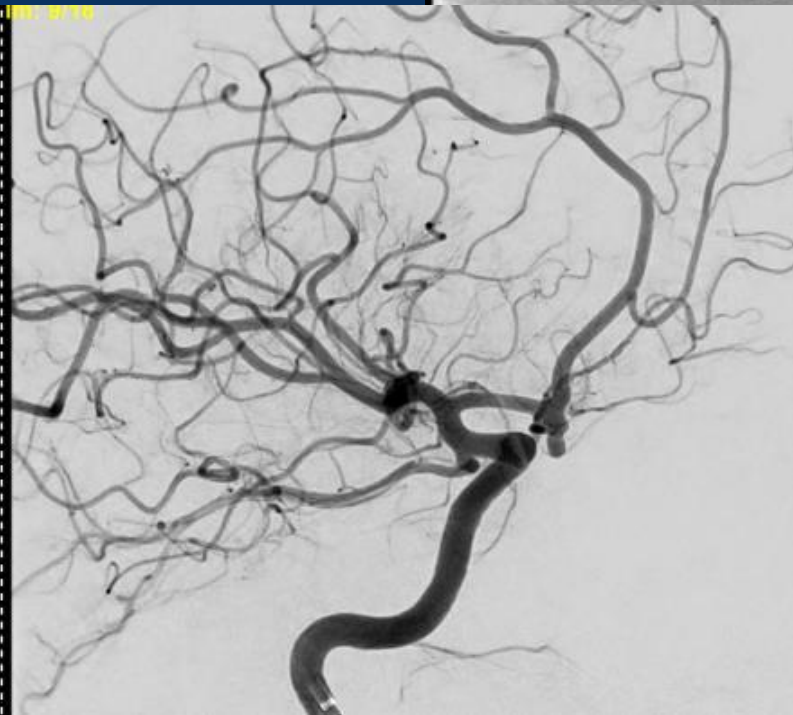
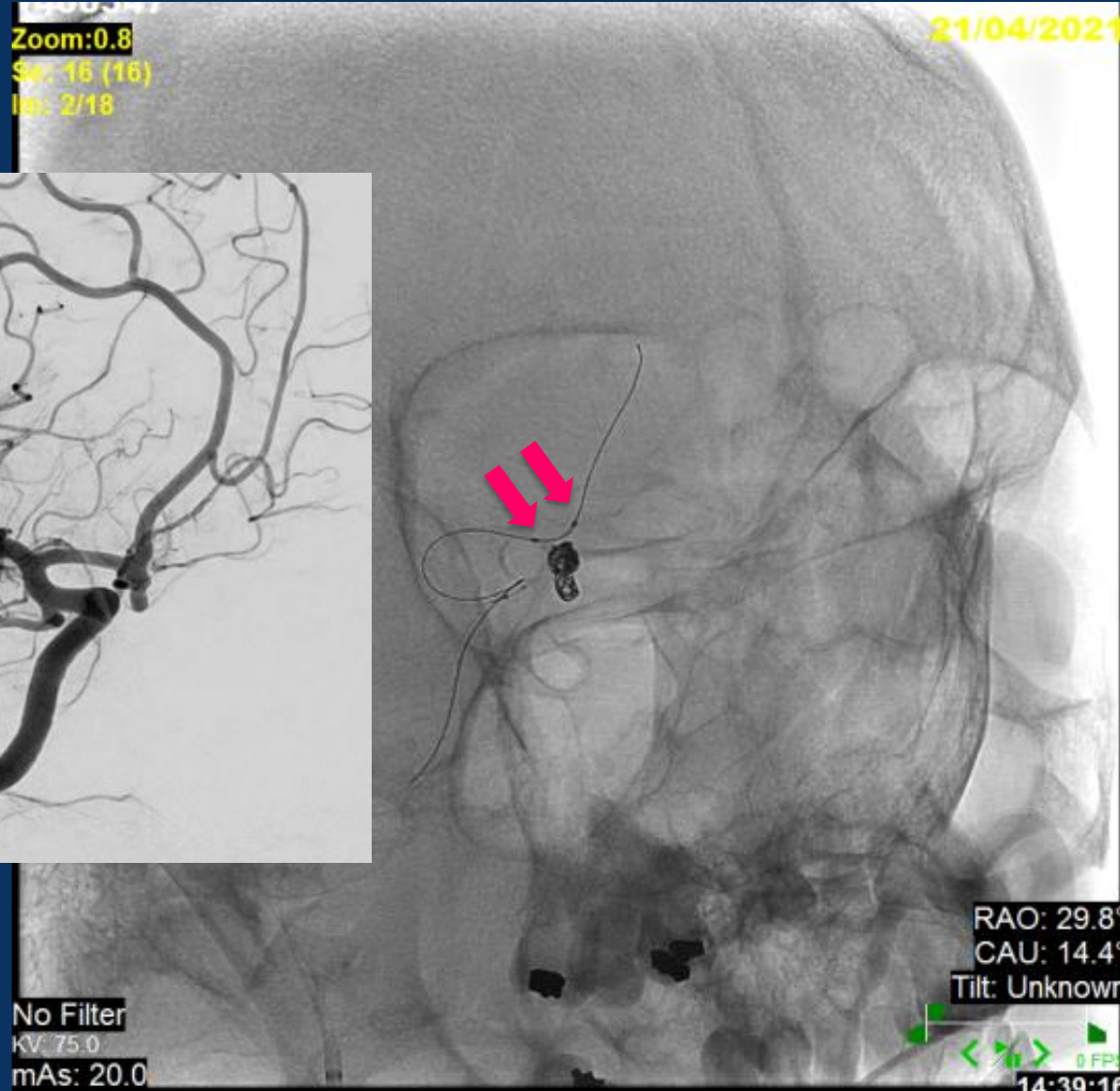
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C:128

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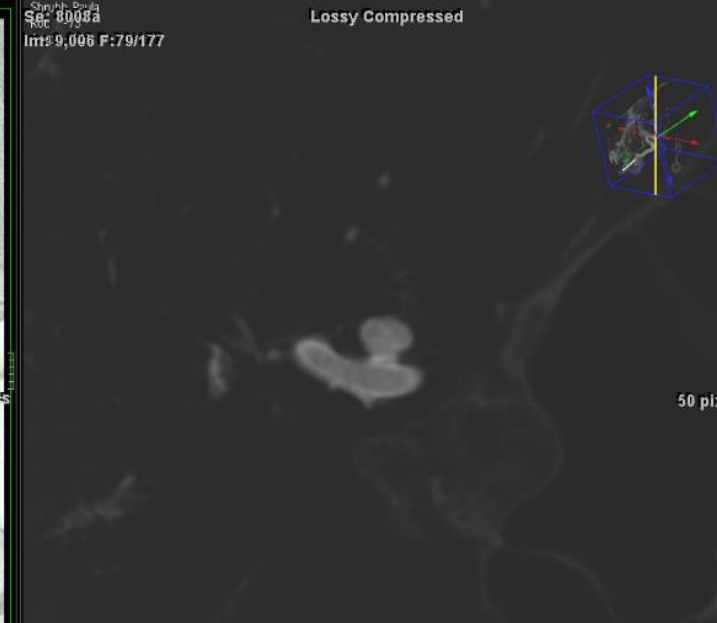
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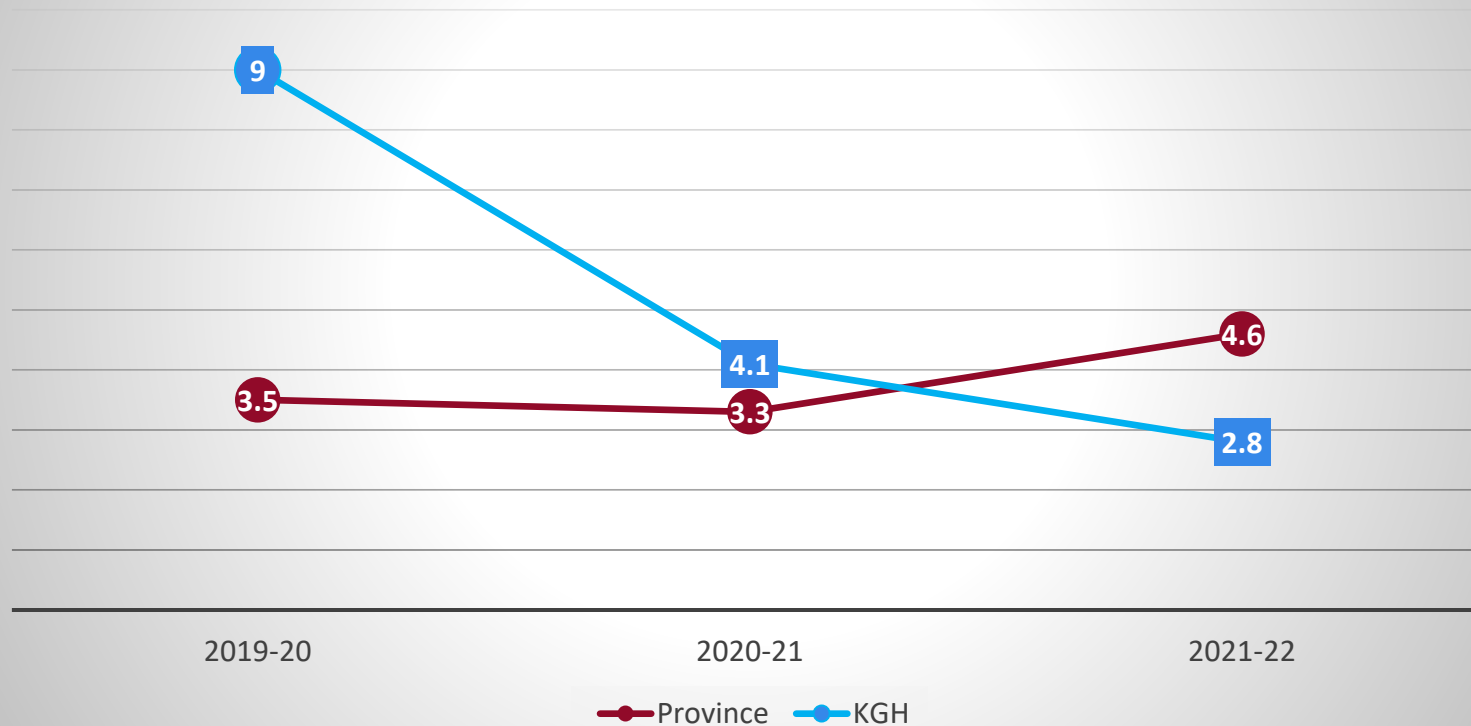
# Flow Diversion: Rt. Paraophthalmic Blister An.



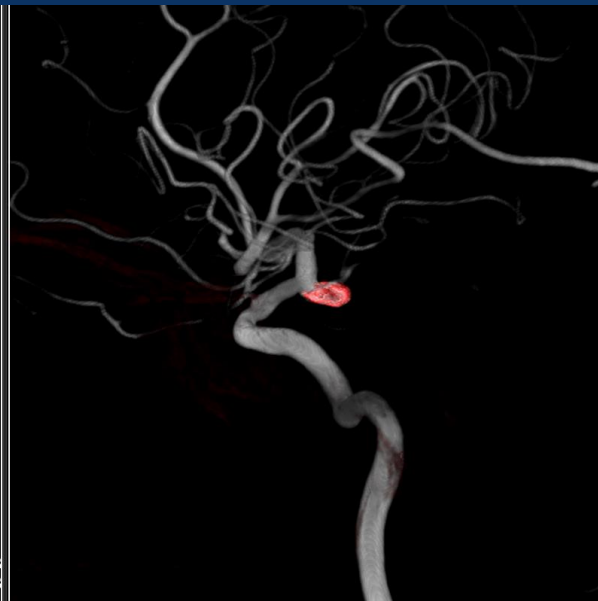
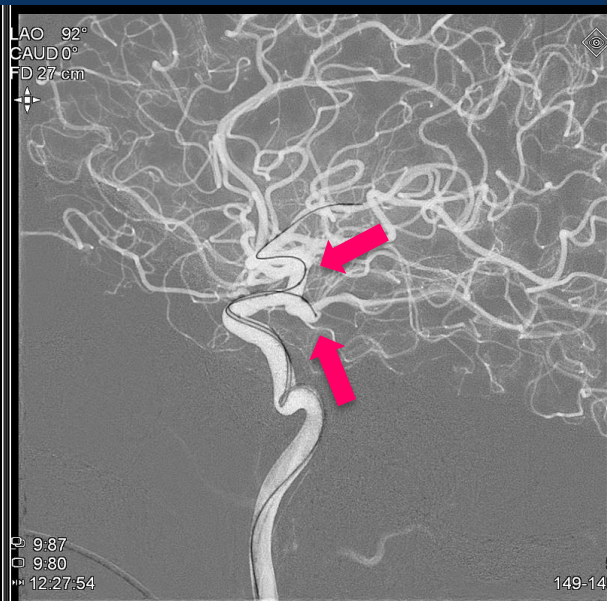
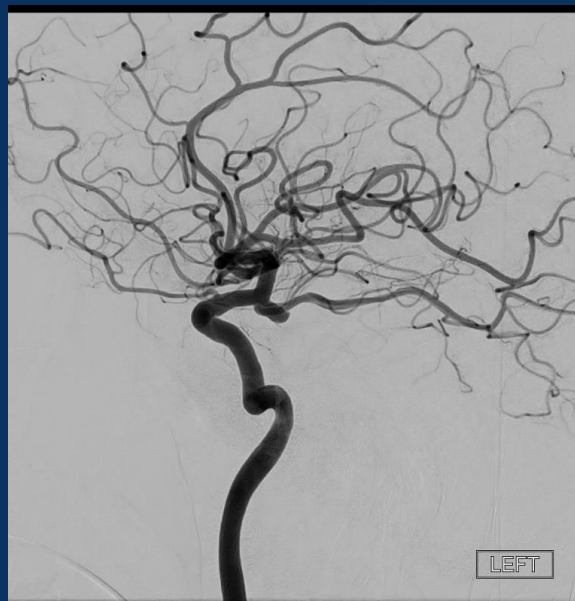
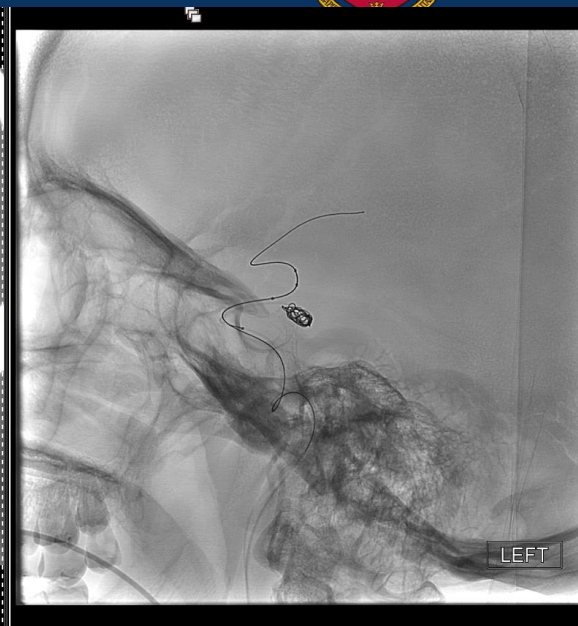
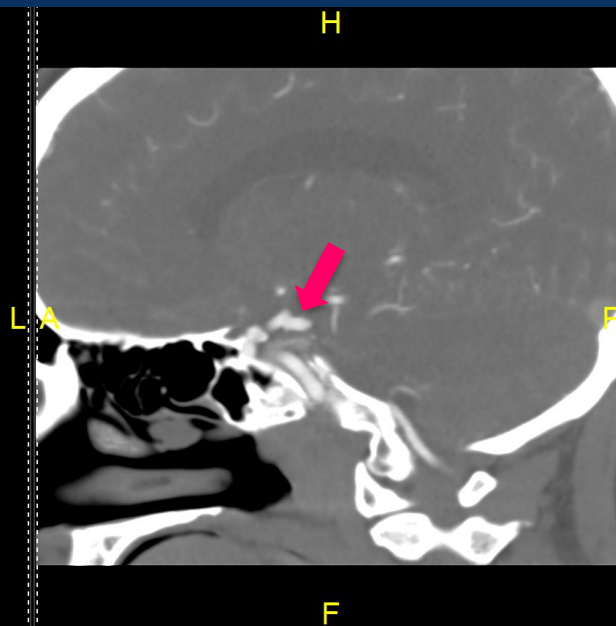
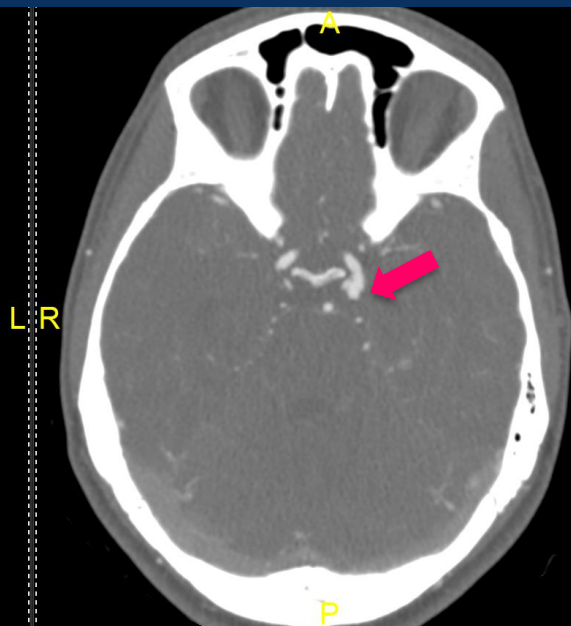
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## Intra-procedural Complications: Stroke/Bleed Combined (%)



# 30 yo Female, Grade 1 SAH: Left Pcom Aneurysm, Balloon Assisted Coiling.





## Patients Follow Up:

### DEFINITION:

### Raymond Classification

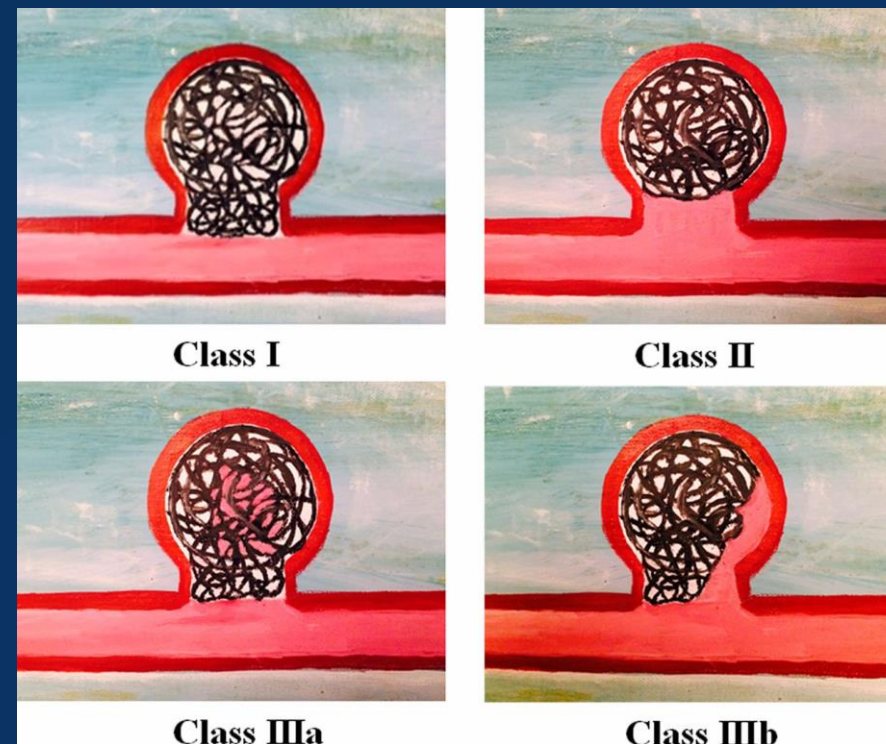
- class I: complete obliteration;
- class II: residual neck;
- class III: residual aneurysm;

mod in 2015 by Mascitelli in

class IIIa ( contrast pooling in the interstices between the coils);

class IIIb (contrast pooling between coils and aneurysm wall).

Class IIIa tends to progress to complete occlusion more than IIIb.

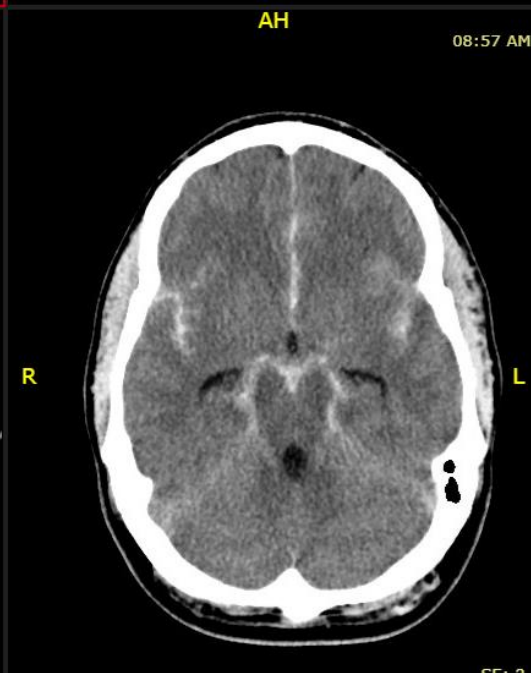
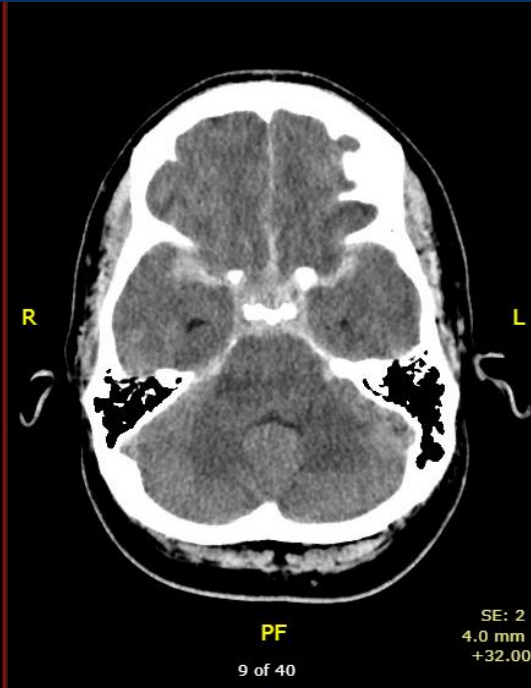
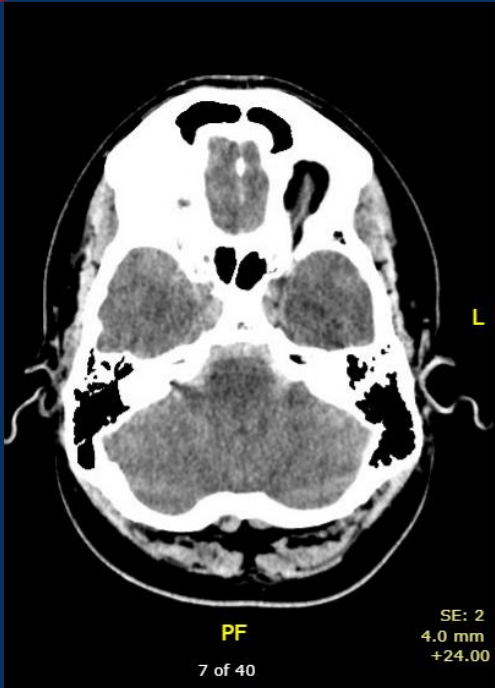


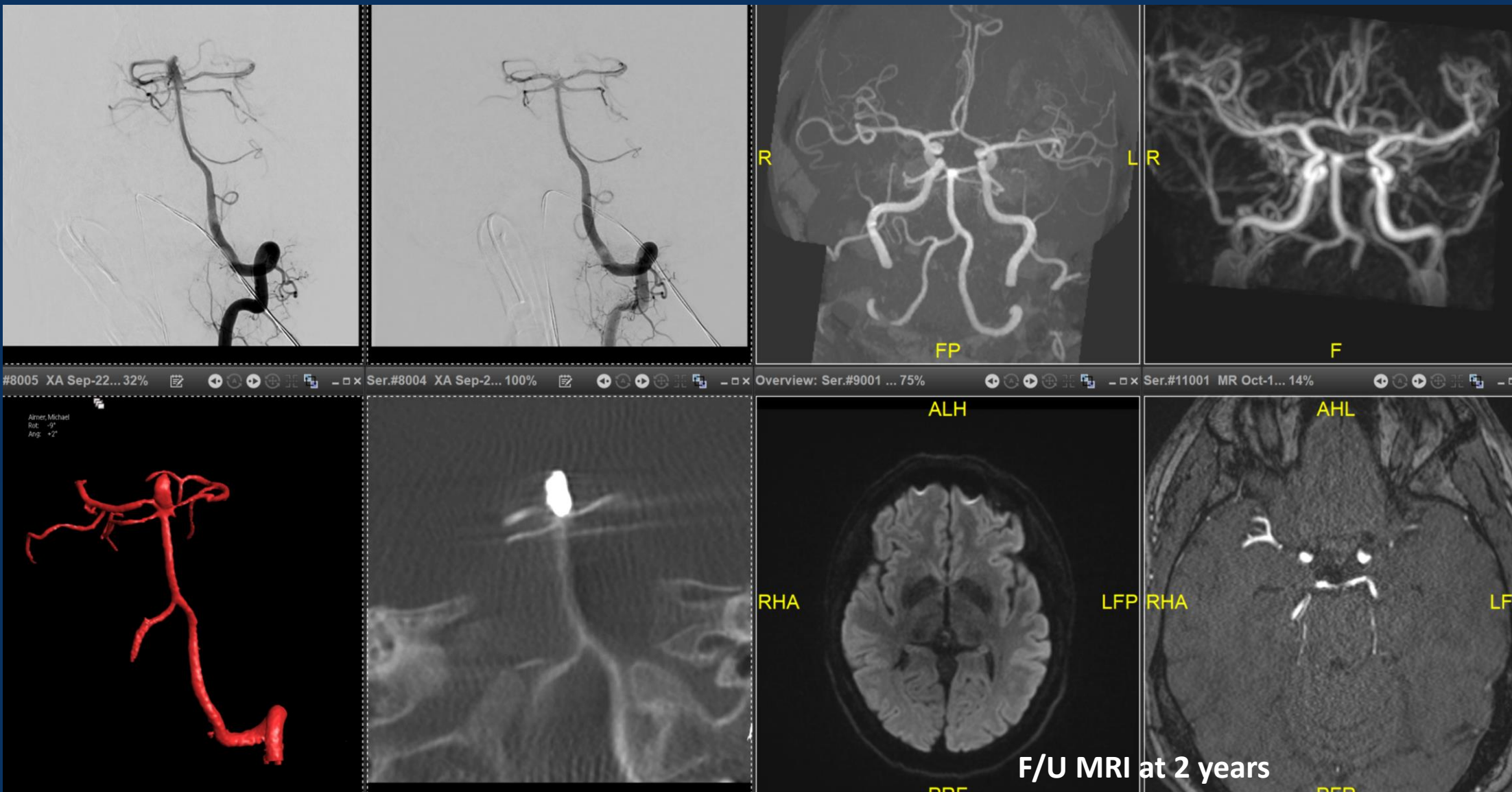
# KHSC Protocol for Imaging F/U after coiling

- HOW: MRI-MRA Pre and Post Gado

WHEN: 6m, 12m, 24m, 3y and subsequently every 5 y.







# Coiling of Elective Unruptured Aneurysms

- Incidental findings of a cerebral aneurysm in the anterior or posterior circulation;
- Risks factors: family history, previous SAH in pts with multiple aneurysms; size ( $\geq$  than 7mm anterior circulation;  $\geq$  or + than 5 posterior circulation), aneurysm morphology;
- Patients risks factors: elevated BP, smoker.
- Other factors: pts requiring long term anticoagulation; other surgery required etc.

# Unruptured Aneurysms: Patient's Flow



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Pre-Procedure  
Assessment

Aneurysm Clinic  
Dr DJ Cook

Neurovascular  
Round

INR  
(DT and  
Navigator Nurse)

PSSC at HDH

Intervention  
Day Hospital

SDAC

Procedure in  
IVR  
(Dr BM, Dr DT)

PACU

SDAC



Follow up

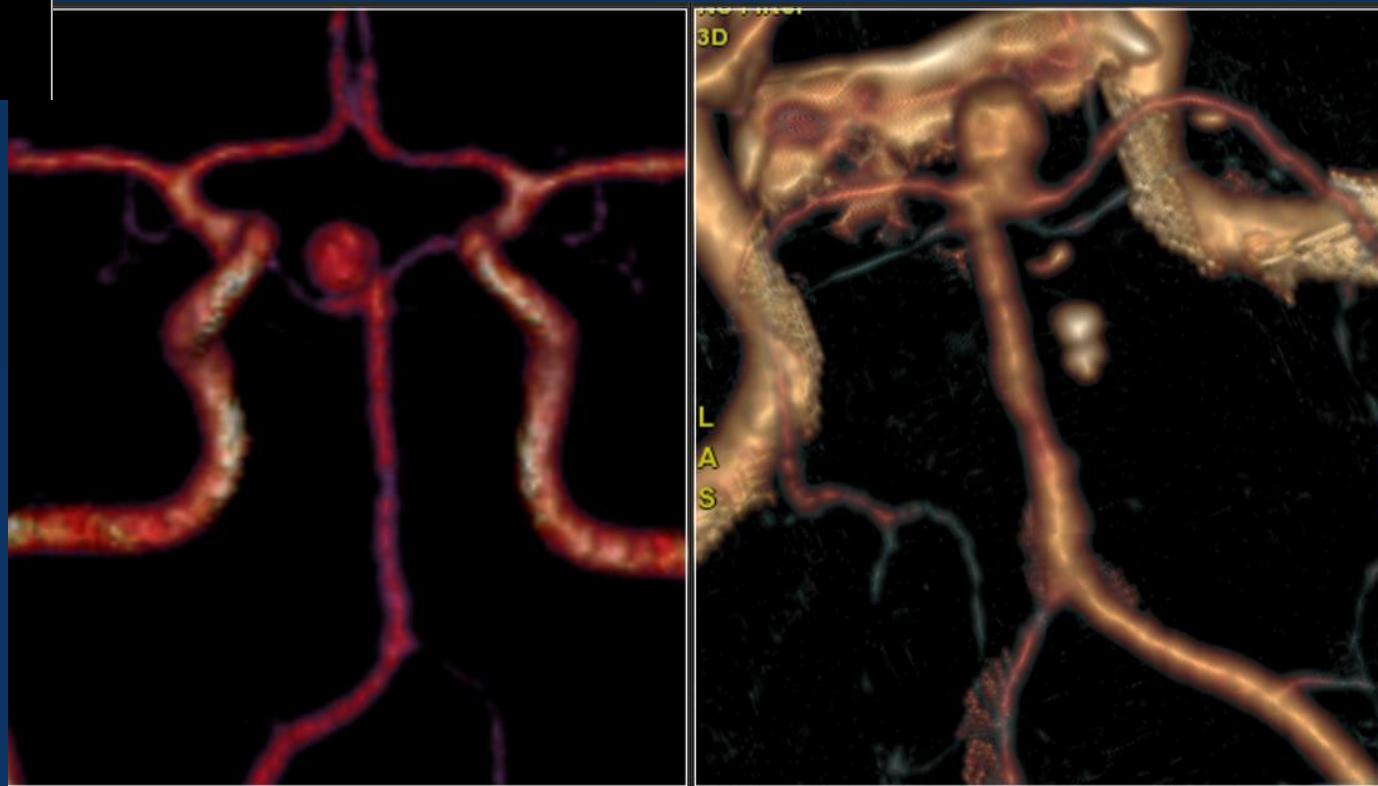
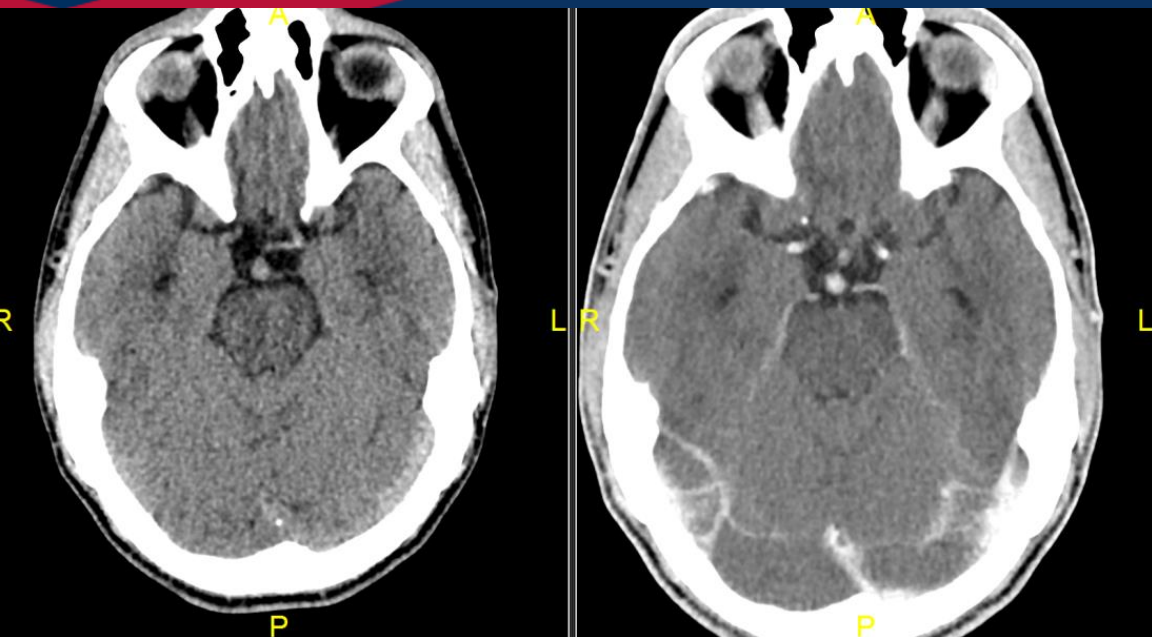
F/U NeuroSx

F/U MRI

F/U INR

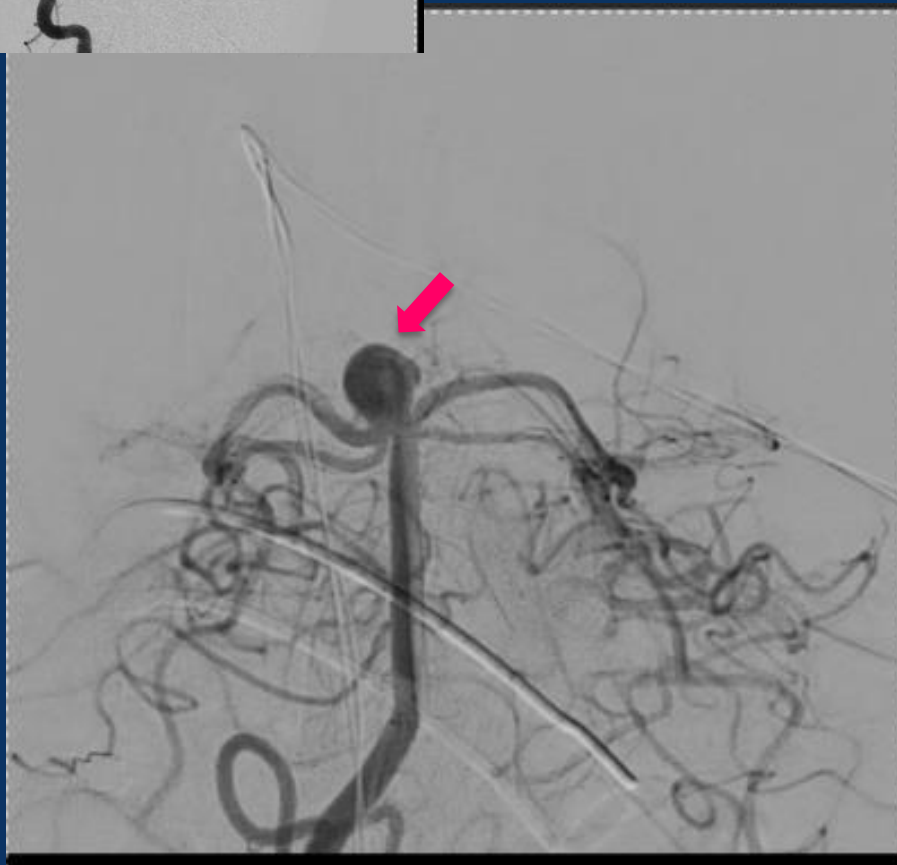
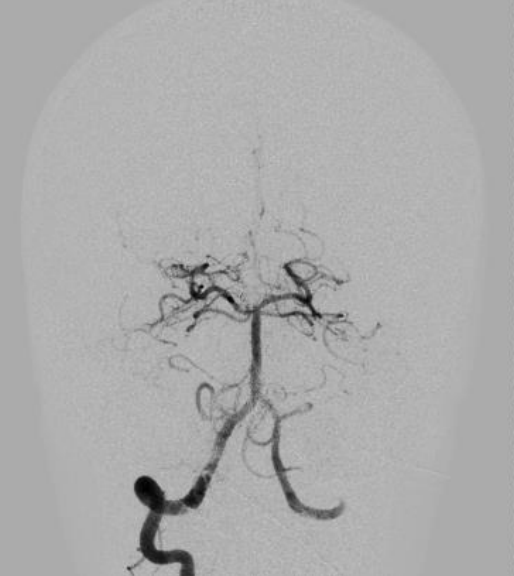


42 yo male pt  
Incidental discovery of Unruptured  
Basilar Apex Aneurysm

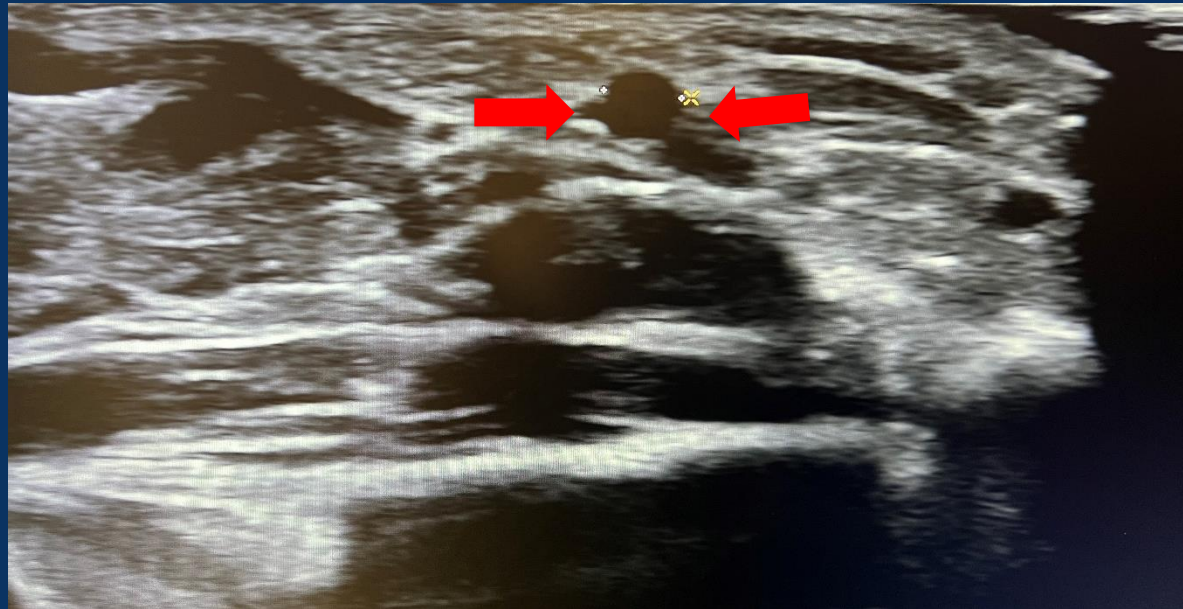




## Coiling of Basilar Apex Aneurysm



# Radial Approach



<http://dx.doi.org/10.5469/neuroint.2016.11.1.37>



[Surg Neurol Int](#), 2017; 8: 73.

PMCID: PMC5445653

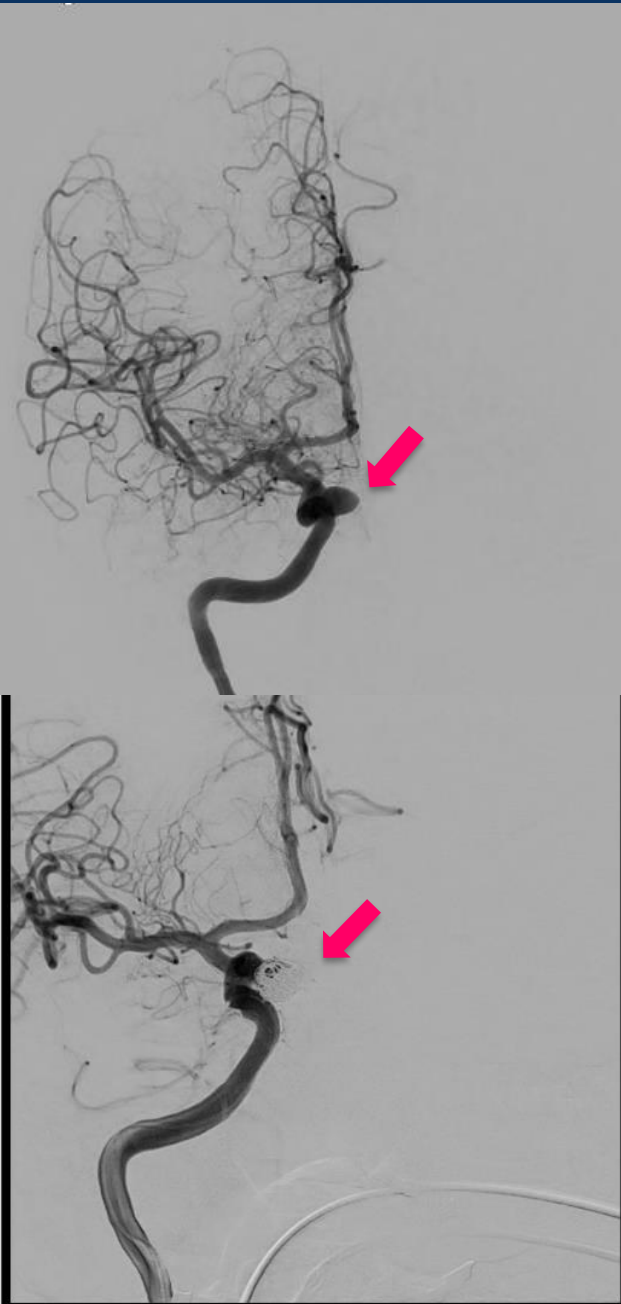
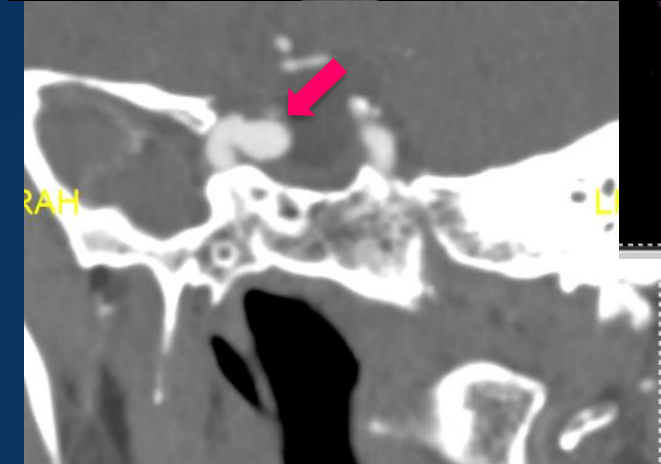
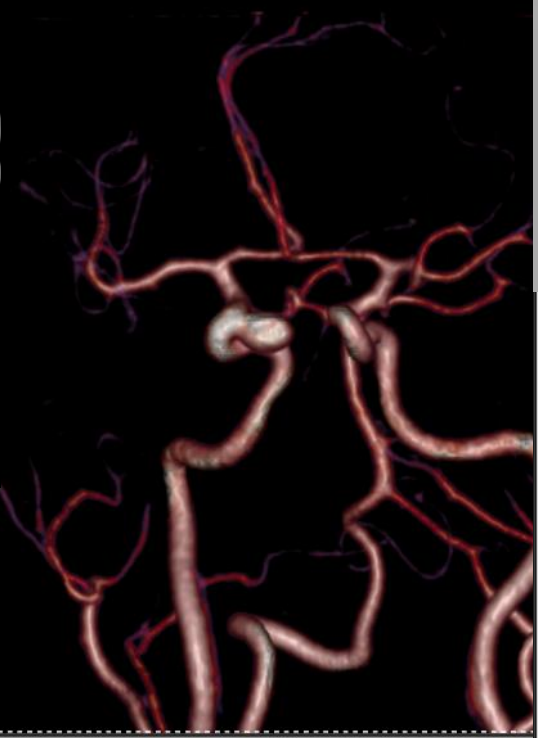
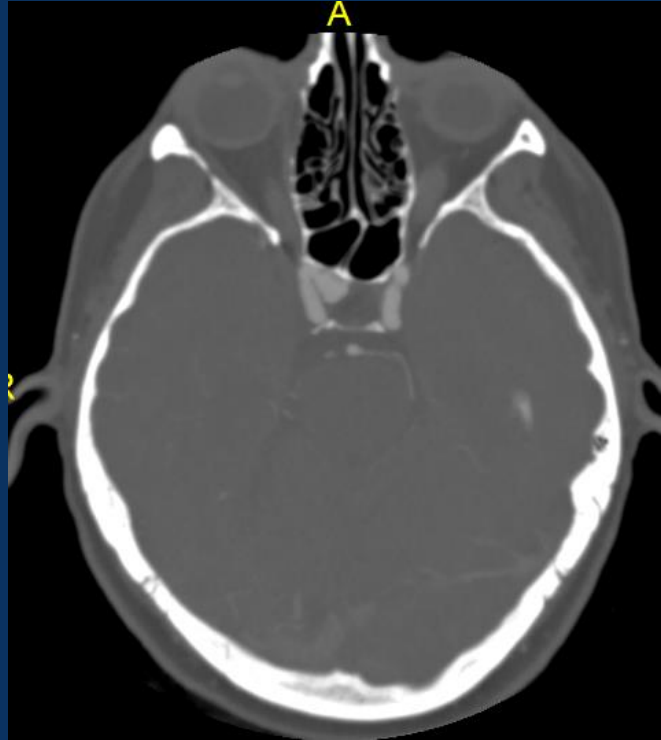
Published online 2017 May 10. doi: [10.4103/sni.sni\\_393\\_16](https://doi.org/10.4103/sni.sni_393_16)

PMID: [28584676](https://pubmed.ncbi.nlm.nih.gov/28584676/)

Transradial approach to treating endovascular cerebral aneurysms: Case series and technical note

[Javier Goland](#),<sup>1,2,\*</sup> [Gustavo Fabián Doroszuk](#),<sup>1</sup> [Silvia Lina Garbugino](#),<sup>2</sup> and [María Paula Ypa](#)<sup>2</sup>

# Stent Assisted Coiling Radial Approach





# Comprehensive Aneurysms Coiling Program at KHSC



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- Clinical Program: urgent and elective patients; patient in-hospital flow, data collections.
- Academic Program: Cerebrovascular round; Advances in INR Annual lecture, Hot topic VP.
- Research: original research and participation in multicentric trials and registries (Evolve trial ,Vessel's Wall Imaging).



# Academia: Annual Advances in INR lecture, Hot Topic VP



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## ADVANCES IN INTERVENTIONAL NEURORADIOLOGY

First Annual Lecture Series

Presented by the Queen's Department of Diagnostic Radiology & the Department of Medicine

JUNE 10, 2021 | 7:45AM (EST)

ZOOM

Click [HERE](#) to join

**Dr. Stephen Lownie MD, FRCSC**



Dr. Stephen Lownie is a neurosurgeon and neurointerventionalist with interests in vascular and skull base diseases. He is a Professor in the Department of Surgery, Division of Neurosurgery, at Dalhousie University, and Emeritus Professor in the Departments of Clinical Neurological Sciences, Medical Imaging and Otolaryngology at Western University in London, Ontario

**"Neurointervention: Three decades of change, 1991-2021"**

This event is an Accredited Group Learning Activity (Section 1) as defined by the Maintenance of Certification program of the Royal College of Physicians and Surgeons of Canada, and approved by Queen's University (Max. no. of hours: 1)



## ADVANCES IN INTERVENTIONAL NEURORADIOLOGY

Second Annual Lecture Series

Presented by the Queen's Department of Diagnostic Radiology & the Department of Medicine

MAY 12, 2022 | 7:45AM (EST)

ZOOM

Click [HERE](#) to join

**Presenter: Dr. Jai Shankar**  
Radiologist and Professor | Max Rady College of  
Medicine | University of Manitoba



### Learning Objectives

1. Natural history of chronic subdural hematoma
2. Management options for chronic subdural hematoma and evidence thereof
3. Novel management option for chronic subdural hematoma- EMMA

**"Endovascular Treatment of Chronic Subdural Hematomas"**

This event is an Accredited Group Learning Activity (Section 1) as defined by the Maintenance of Certification program of the Royal College of Physicians and Surgeons of Canada, and approved by Queen's University (Max. no. of hours: 1)



## ADVANCES IN INTERVENTIONAL NEURORADIOLOGY

Third Annual Lecture Series

Presented by the Queen's Department of Diagnostic Radiology & the Department of Medicine

MAY 10 & 11, 2023

**Dr. Brian Van Adel**

Associate Professor, McMaster University  
Neurologist, Hamilton General Hospital

### Lecture 1

Wednesday, May 10 - 6:00pm  
"Endovascular Treatment of Complex Cerebral Aneurysms"

Click [HERE](#) to join virtual lecture

### Lecture 2

Thursday, May 11 - 7:45am  
Etherington Auditorium  
"Stroke: The Difficult EVTs"

Click [HERE](#) to join virtual lecture

### Learning Objectives

1. Management of complex intracranial aneurysms.
2. Novel techniques for aneurysms treatment.
3. Difficult treatment decision in EVTs
4. Technical management of difficult EVTs.



This event is an Accredited Group Learning Activity (Section 1) as defined by the Maintenance of Certification program of the Royal College of Physicians and Surgeons of Canada, and approved by Queen's University (Max. no. of hours: 1)



## Future Directions:

- Ensure growth and sustainability of the Program;
- Expand to other INR areas (AVM and fistula) : 3<sup>rd</sup> Biplane Angio Suite for IVR;
- Eventually build a training program;
- Solidify our participation in clinical trials and research.



*Team of Professionals committed to the common goal of Patient's Care!*



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