SAP
SOCIEDAD ARGENTINA DE PEDIATRÍA

2 **CONGRESO ARGENTINO DE MEDICINA INTERNA PEDIATRICA**

Dr Flavio Requejo
Seccion Neurointervencionismo
Hospital J P Garrahan

ACV
NUEVOS TRATAMIENTOS EN PEDIATRIA

TROMBECTOMIA MECANICA

TM es útil para mejorar la evolución del ACV isquémico en el adulto.

No existen ECAs en la población pediátrica para generalizar este procedimiento

Ischemic stroke

REVIEW

Mechanical thrombectomy for pediatric acute ischemic stroke: review of the literature

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Received 26 February 2016
Revised 29 June 2016
Accepted 30 June 2016
Published Online First 22 July 2016

ABSTRACT

Objective Given recent strongly positive randomized controlled adult mechanical thrombectomy trials, we sought to perform a comprehensive review of available literature on IA pediatric stroke intervention, with a focus on modern mechanical devices.

Methods PubMed search for pediatric patients undergoing IA treatment of acute ischemic stroke (AIS) using modern devices between 2008 and 2015. 29 patients were included in this analysis.

Results Average age was 10.3 years, 74.1% male, middle cerebral and basilar arteries represented 89.6% of 36 occluded vessels, and average pediatric stroke scale score of 18.1. Average time from symptom onset to intervention was 8.8 hours and 13.8% of patients received IV tissue plasminogen activator prior to mechanical thrombectomy. Stent retrievers were used in 58.6% of cases, the Penumbra system in 34.5%, and the Merci device in 27.6%. Modified Thrombolysis In Cerebral Infarction 2b/3 recanalization was achieved in 75.9% of cases. There were no major adverse events related to the intervention, although one procedure was associated with device malfunction without a definite change in long-term outcome. The average modified Rankin Scale (mRS) score was <1 (0.86) at the longest available follow-up period, based on clinical description or provided mRS score.

Conclusions This study suggests that mechanical thrombectomy in pediatric patients presenting with high pediatric NIH Stroke Scale scores and proximal large vessel occlusion is associated with high recanalization rates and excellent clinical outcome, although this is a retrospective review and the sample size is too small to make any definitive conclusions. This study provides class IVC evidence that endovascular treatment of pediatric AIS increases the chance of a good clinical outcome.

Supportive medical management specific to the underlying etiology of AIS is considered the standard of care in the pediatric population. Thrombolytic and IA therapy are rarely mentioned in the American Heart Association Stroke Council's Management of Stroke in Infants and Children and are only recommended as a last resort due to lack of level I evidence.[6] In light of recent consecutive strongly positive randomized controlled mechanical thrombectomy adult trials in the setting of emergent large vessel occlusion (ELVO) and a better understanding of patient selection, IA treatment of AIS in the pediatric population is increasingly being considered.[7–12]

As a next step in better understanding IA therapy in the pediatric population, we reviewed available published experience with mechanical thrombectomy using modern devices between 2008 and 2015 and summarized the data from 21 papers with a total of 29 patients. This paper represents the largest analysis to date on the subject of mechanical thrombectomy in pediatric stroke using modern devices.

METHODS

The following terms were used in an English language literature search in Ovid and PubMed: pediatric, boy, girl, child, childhood, adolescent, vertebral artery dissection, stroke, ischemia, occlusion, mechanical, endovascular, IA, thrombectomy, thrombolysis, and recanalization. In addition, references of each included article were reviewed for additional cases.

Each of the articles was thoroughly and individually reviewed. Cases using Penumbra aspiration or a stent retriever device (Solitaire, Trevo, Revive) were included, while reports using guidewire manipulation, balloon angioplasty, IA tissue plasminogen

Revisión 2016
29 ptes
"La trombectomía mecánica en pacientes pediátricos que se presentan con NIHSS alto y oclusión de un gran vaso cerebral se asocia con alto índice de canalización y una evolución clínica excelente".

Topical Review

Endovascular Therapies for Acute Ischemic Stroke in Children

Mary Ia-Ping Huang Cobb, MD; Avra S. Lazarakker, MD; L. Fernando Gonzalez, MD; Tony P. Smith, MD; Erik F. Hauck, MD; Ali R. Zomorodi, MD

Acute ischemic stroke (AIS) in the pediatric population occurs in 2.5 of 100 000 children.[1] With a mortality of 3% to 6% and morbidity up to 75%, patients with pediatric AIS experience recurrent strokes, lifelong deficits, and decreased quality of life.[2] The outcome of pediatric AIS is worsened by delayed diagnosis and lack of treatment protocols.[3] Children are often brought in early after symptom onset (on average 1.7 hours after onset). There is a 12.7-hour median time to diagnosis, with ≈90% of diagnoses made >24 hours after arrival.[4–6] Common differentials include epilepsy, complex migraines, inflammatory disease, intracranial infections, and intracranial tumors.

In adult AIS, there is overwhelming evidence to support intravenous (IV) tissue-type plasminogen activator (tPA) within 4.5 hours of symptom onset and mechanical thrombectomy (in large vessel occlusions) within 6 hours of symptom onset.[7–9] With the delay in diagnosis and lack of treatment protocols in the pediatric population, the efficacy and safety of these treatment strategies are unknown in this population. To date, there are no prospective trials on endovascular treatment in children. However, multiple case reports have demonstrated promising results. We performed here a retrospective case review of endovascular management of pediatric AIS, with a focus on efficacy and safety.

Methods

We performed a PubMed search of all pediatric AIS cases managed with endovascular treatment from January 1999 through October 2016 using the following medical subject headings (MESH): Any stroke AND pediatric stroke, thrombolysis, endovascular, thrombectomy, tissue plasminogen activator, and case report. We also searched the relevant articles in the bibliographies. All English written articles with reports of patients <18 years who received intra-arterial (IA) thrombolysis and IA mechanical thrombectomy with or without IV or IA fibrinolytics were included. Articles written in a language other than English or that did not provide technical details of the cases were excluded.

We evaluated baseline characteristics (eg, age, sex, and risk factors), imaging (vessels occluded), and treatment (eg, time to treatment, type of endovascular treatment). Outcomes were determined clinically and radiographically. Good clinical outcome was defined by a post procedural improvement on a pediatric National Institutes of Health Stroke Scale (NIHSS) of 0 to 4, modified Rankin Scale (mRS) of 0 to 2, or being asymptomatic. Thrombolysis in cerebral infarction (TICI) 2b and TICI 3 were considered complete recanalization, and TICI 1 and TICI 0 were considered as recanalization.[10] Complications were categorized into hemorrhage or other, symptomatic or asymptomatic.

Data were split into 2 groups: those who received IA fibrinolysis alone and those who received IA mechanical thrombectomy with or without IA tPA and IV tPA. Student *t* test was performed comparing Food and Drug Administration (FDA) approval devices to the combined IA tPA and non-FDA approved mechanical thrombectomy devices. Statistics were performed in *SAS JMP Pro* version 12.0.1 (SAS Corp, NC). χ^2 test was used to analyze nominal data. Mann–Whitney test for ordinal variables and ANOVA for continuous variables.

Results

We found 68 cases of pediatric AIS treated with IA fibrinolysis (n=24, 35.3%; Table I in the online-only Data Supplement) and IA mechanical thrombectomy (with or without IV or IA fibrinolysis, n=44, 64.7%; Table II in the online-only Data Supplement). The median age was 10.3 years old with a range of 1.6 to 18 years old (Table I). More males received mechanical thrombectomy than IA fibrinolytic treatment (80% versus 58.3%, $P=0.093$). The majority (82%) of the patients had AIS risk factors (eg, cardiac, vascular, infectious, and hypercoagulable) with no significant differences between the 2 groups ($P=0.09$, Table I).

Vessels occluded were almost evenly split between anterior and posterior circulations (51.5% versus 45.6%) with 2 patients who had occlusions in both areas, but no significant differences between the groups ($P=0.13$, Table 2).

The average time to treatment was 13.7 hours with a range of 1.5 to 72 hours ($P=0.98$).

Received December 29, 2016; final revision received April 20, 2017; accepted April 27, 2017.

From the Department of Neurosurgery (M.I.H.C., A.S.L., L.F.G., E.F.H., A.R.Z.) and Division of Interventional Radiology, Department of Radiology (T.P.S.), Duke University Hospital, Durham, NC.

The online-only Data Supplement is available with this article at http://stroke.ahajournals.org/lookup/suppl/doi:10.1161/STROKEAHA.117.016987/-/DC1.

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Stroke. 2017;48:2016–2020. DOI: 10.1161/STROKEAHA.117.016987.

Stroke is available at http://stroke.ahajournals.org DOI: 10.1161/STROKEAHA.117.016987

Revisión
2016
68 pacientes
TM factible, segura, eficaz
Mayor tiempo

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Thrombectomy 6 to 24 Hours after Stroke with a Mismatch between Deficit and Infarct

R.G. Nogueira, A.P. Jadhav, D.C. Haussen, A. Bonafe, R.F. Budzik, P. Bhuva, D.R. Yavagal, M. Ribo, C. Cognard, R.A. Hanel, C.A. Sila, A.E. Hassan, M. Millan, E.I. Levy, P. Mitchell, M. Chen, J.D. English, Q.A. Shah, F.L. Silver, V.M. Pereira, B.P. Mehta, B.W. Baxter, M.G. Abraham, P. Cardona, E. Veznedaroglu, F.R. Hellinger, L. Feng, J.F. Kirmani, D.K. Lopes, B.T. Jankowitz, M.R. Frankel, V. Costalat, N.A. Vora, A.J. Yoo, A.M. Malik, A.J. Furlan, M. Rubiera, A. Aghaebrahim, J.-M. Olivot, W.G. Tekle, R. Shields, T. Graves, R.J. Lewis, W.S. Smith, D.S. Liebeskind, J.L. Saver, and T.G. Jovin, for the DAWN Trial Investigators*

ABSTRACT

BACKGROUND

The effect of endovascular thrombectomy that is performed more than 6 hours after the onset of ischemic stroke is uncertain. Patients with a clinical deficit that is disproportionately severe relative to the infarct volume may benefit from late thrombectomy.

METHODS

We enrolled patients with occlusion of the intracranial internal carotid artery or proximal middle cerebral artery who had last been known to be well 6 to 24 hours earlier and who had a mismatch between the severity of the clinical deficit and the infarct volume, with mismatch criteria defined according to age (<80 years or ≥80 years). Patients were randomly assigned to thrombectomy plus standard care (the thrombectomy group) or to standard care alone (the control group). The coprimary end points were the mean score for disability on the utility-weighted modified Rankin scale (which ranges from 0 [death] to 10 [no symptoms or disability]) and the rate of functional independence (a score of 0, 1, or 2 on the modified Rankin scale, which ranges from 0 to 6, with higher scores indicating more severe disability) at 90 days.

RESULTS

A total of 206 patients were enrolled; 107 were assigned to the thrombectomy group and 99 to the control group. At 31 months, enrollment in the trial was stopped because of the results of a prespecified interim analysis. The mean score on the utility-weighted modified Rankin scale at 90 days was 5.5 in the thrombectomy group as compared with 3.4 in the control group (adjusted difference [Bayesian analysis], 2.0 points; 95% credible interval, 1.1 to 3.0; posterior probability of superiority, >0.999), and the rate of functional independence at 90 days was 49% in the thrombectomy group as compared with 13% in the control group (adjusted difference, 33 percentage points; 95% credible interval, 24 to 44; posterior probability of superiority, >0.999). The rate of symptomatic intracranial hemorrhage did not differ significantly between the two groups (6% in the thrombectomy group and 3% in the control group, P=0.50), nor did 90-day mortality (19% and 18%, respectively; P=1.00).

CONCLUSIONS

Among patients with acute stroke who had last been known to be well 6 to 24 hours earlier and who had a mismatch between clinical deficit and infarct, outcomes for disability at 90 days were better with thrombectomy plus standard care than with standard care alone. (Funded by Stryker Neurovascular; DAWN ClinicalTrials.gov number, NCT02142283.)

The authors' full names, academic degrees, and affiliations are listed in the Appendix. Address reprint requests to Dr. Jovin at the University of Pittsburgh Medical Center Stroke Institute, Department of Neurology, Presbyterian University Hospital, 200 Lothrop St., C-400, Pittsburgh, PA 15217, or at jovintg@upmc.edu.

*A complete list of sites and investigators in the DAWN trial is provided in the Supplementary Appendix, available at NEJM.org.

Drs. Nogueira and Jovin contributed equally to this article.

This article was published on November 11, 2017, at NEJM.org.

DOI: 10.1056/NEJMoa1706442

- multicéntrico
- prospectivo
- randomizado
- abierto

2017

*"Pacientes con ACV isquémicos **entre las 6 y las 24 horas** del inicio de los síntomas, que tenían mismatch entre clínica y área infartada, sometidos a trombectomia mecanica, tuvieron mejor evolución que los pacientes con tratamiento estándar".*

Clinical Neurology
CASE REPORT

PDF

Endovascular thrombectomy in pediatric patients with large vessel occlusion

Hazem Shoirah[1], Hussain Shallwani[2], Adnan H Siddiqui[3], Elad I Levy[2], Cynthia L Kenmuir[4], Tudor G Jovin[4], Michael R Levitt[5], Louis J Kim[6], Julius Griauzde[7], Aditya S Pandey[8], Joseph J Gemmete[9], Todd Abruzzo[10], Adam S Arthur[11], Lucas Elijovich[12], Daniel Hoit[13], Ahmed Cheema[14], Amin Aghaebrahim[15], Eric Sauvageau[16], Ricardo Hanel[17], Andrew J Ringer[18], Fábio A Nascimento[19], Peter Kan[20], J Mocco[21]

Author affiliations +

Abstract

Background Pediatric acute ischemic stroke with underlying large vessel occlusion is a rare disease with significant morbidity and mortality. There is a paucity of data about the safety and outcomes of endovascular thrombectomy in these cases, especially with modern devices.

Methods We conducted a retrospective review of all pediatric stroke patients who underwent endovascular thrombectomy in nine US tertiary centers between 2008 and 2017.

Results Nineteen patients (63.2% male) with a mean (SD) age of 10.9(6) years and weight 44.6 (30.8) kg were included. Mean (SD) NIH Stroke Scale (NIHSS) score at presentation was 13.9 (5.7). CT-based assessment was obtained in 88.2% of the patients and 58.8% of the patients had perfusion-based assessment. All procedures were performed via the transfemoral approach. The first-pass device was stentriever in 52.6% of cases and aspiration in 36.8%. Successful revascularization was achieved in 89.5%

2018
19 pacientes
seguro y factible
dispositivos18 meses de edad

JNS PEDIATRICS
CLINICAL ARTICLE
J Neurosurg Pediatr 23:363–368, 2019

Mechanical thrombectomy using a Solitaire stent retriever in the treatment of pediatric acute ischemic stroke

Bing Zhou, MD,[1] Xiao-Chuan Wang, MD,[2] Jun-Yi Xiang, MD,[1] Ming-Zhao Zhang, MD,[1] Bo Li, MD,[1] Hai-Bo Jiang, MD,[2] and Xiao-Dong Lu, MD[2]

Departments of [1]Interventional and Vascular Surgery, and [2]Neurology, The Affiliated Hospital of Hangzhou Normal University, Hangzhou City, Zhejiang Province, China

OBJECTIVE Mechanical thrombectomy using a Solitaire stent retriever has been widely applied as a safe and effective method in adult acute ischemic stroke (AIS). However, due to the lack of data, the safety and effectiveness of mechanical thrombectomy using a Solitaire stent in pediatric AIS has not yet been verified. The purpose of this study was to explore the safety and effectiveness of mechanical thrombectomy using a Solitaire stent retriever for pediatric AIS.

METHODS Between January 2012 and December 2017, 7 cases of pediatric AIS were treated via mechanical thrombectomy using a Solitaire stent retriever. The clinical practice, imaging, and follow-up results were reviewed, and the data were summarized and analyzed.

RESULTS The ages of the 7 patients ranged from 7 to 14 years with an average age of 11.1 years. The preoperative National Institutes of Health Stroke Scale (NIHSS) scores ranged from 9 to 22 with an average of 15.4 points. A Solitaire stent retriever was used in all patients, averaging 1.7 applications of thrombectomy and combined balloon dilation in 2 cases. Grade 3 on the modified Thrombolysis In Cerebral Infarction scale of recanalization was achieved in 5 cases and grade 2b in 2 cases. Six patients improved and 1 patient died after thrombectomy. The average NIHSS score of the 6 cases was 3.67 at discharge. The average modified Rankin Scale score was 1 at the 3-month follow-up. Subarachnoid hemorrhage after thrombectomy occurred in 1 case and that patient died 3 days postoperatively.

CONCLUSIONS This study shows that mechanical thrombectomy using a Solitaire stent retriever has a high recanalization rate and excellent clinical prognosis in pediatric AIS. The safety of mechanical thrombectomy in pediatric AIS requires more clinical trials for confirmation.

https://thejns.org/doi/abs/10.3171/2018.9.PEDS18242

KEYWORDS acute ischemic stroke; AIS; mechanical thrombectomy; modified Thrombolysis In Cerebral Infarction; mTICI; follow-up; vascular disorders

PEDIATRIC acute ischemic stroke (AIS) is relatively rare compared to adult AIS, but it still plays an important role in pediatric death and disability.[1–3] With improvement in thrombectomy apparatus, the application of mechanical thrombectomy is increasingly used in adult AIS and shows good curative effect. However, because of the data scarcity and different pathogenesis in adults, it remains controversial whether mechanical thrombectomy can be used in pediatric AIS.[1–16] The purpose of this study was to analyze the safety and effectiveness of mechanical thrombectomy in the treatment of pediatric AIS.

Methods

Study Population

Before the study the inclusion criteria were formulated through negotiation between the neurologists and interventional neuroradiologists involved in the study, as follows:

ABBREVIATIONS ACA = anterior cerebral artery; AIS = acute ischemic stroke; DSA = digital subtraction angiography; ICA = internal carotid artery; MCA = middle cerebral artery; mRS = modified Rankin Scale; mTICI = modified Thrombolysis In Cerebral Infarction; NIHSS = National Institutes of Health Stroke Scale; PCA = posterior cerebral artery; PPH = postprocedural hemorrhage; sICH = symptomatic intracranial hemorrhage.

SUBMITTED April 13, 2018. ACCEPTED September 28, 2018.
INCLUDE WHEN CITING Published online January 4, 2019; DOI: 10.3171/2018.9.PEDS18242

2019
7 pacientes

alta tas de recanalizacion y buenas evoluciones usando stent retriever

Presentacion del Caso

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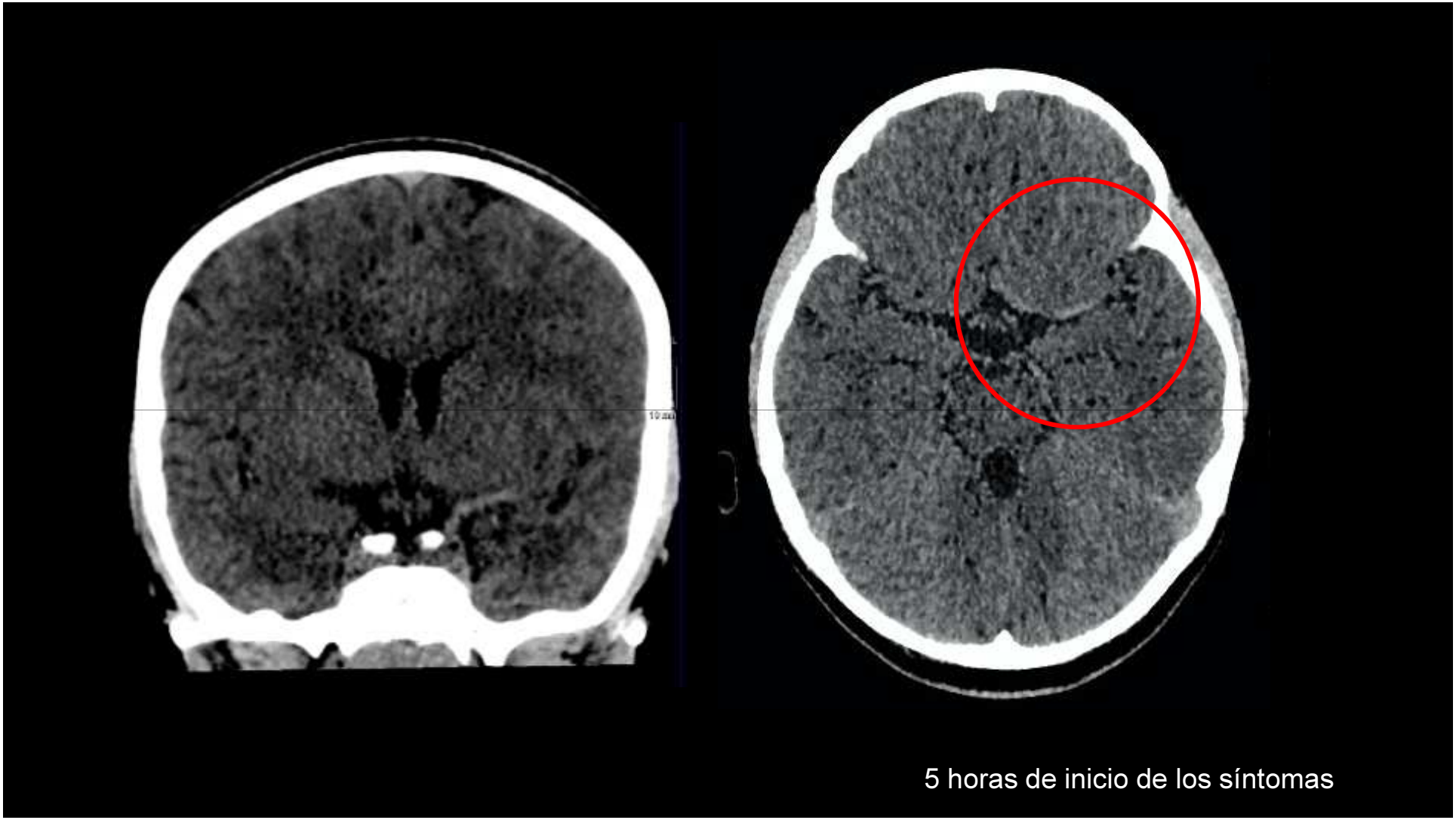
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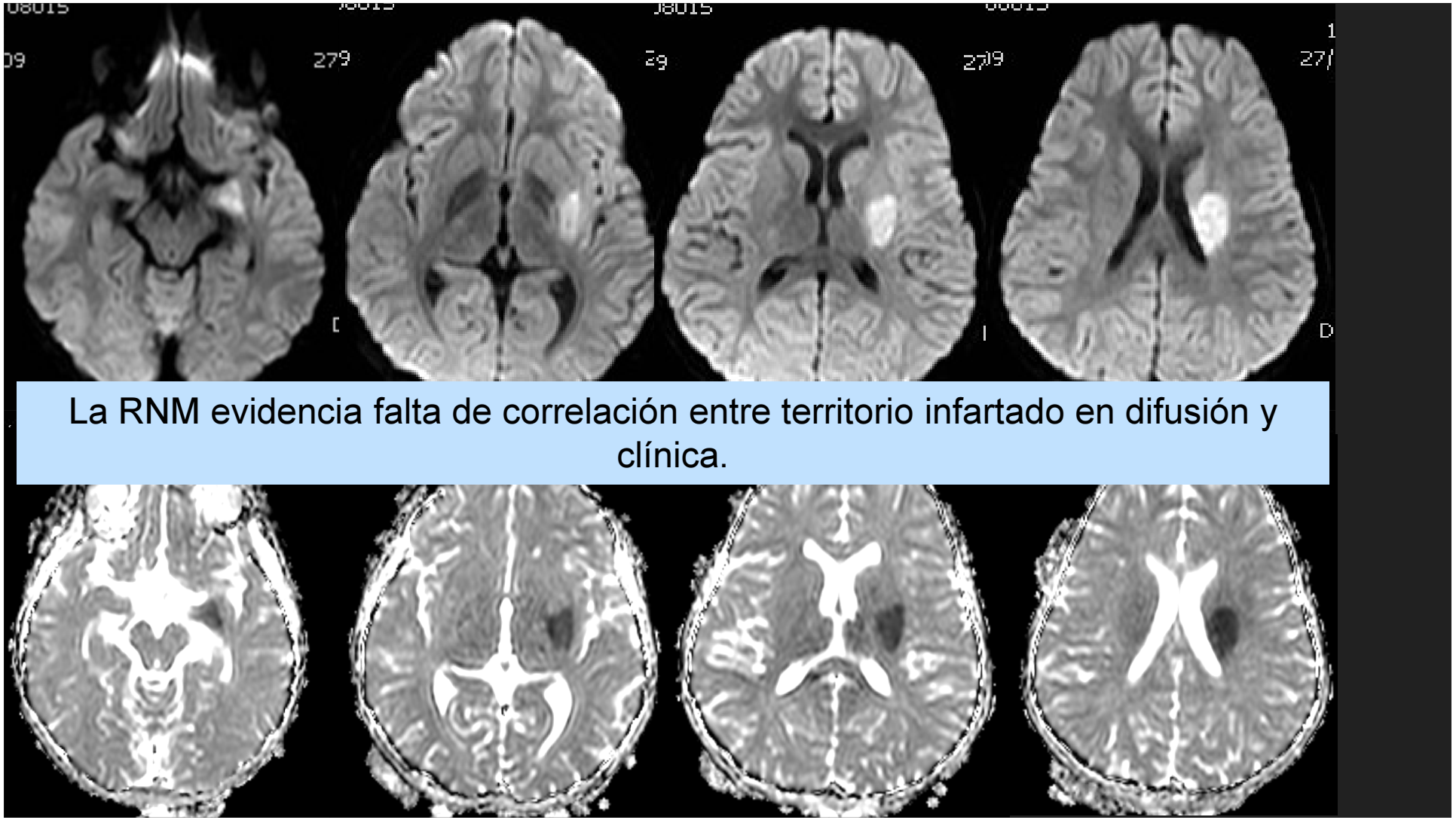

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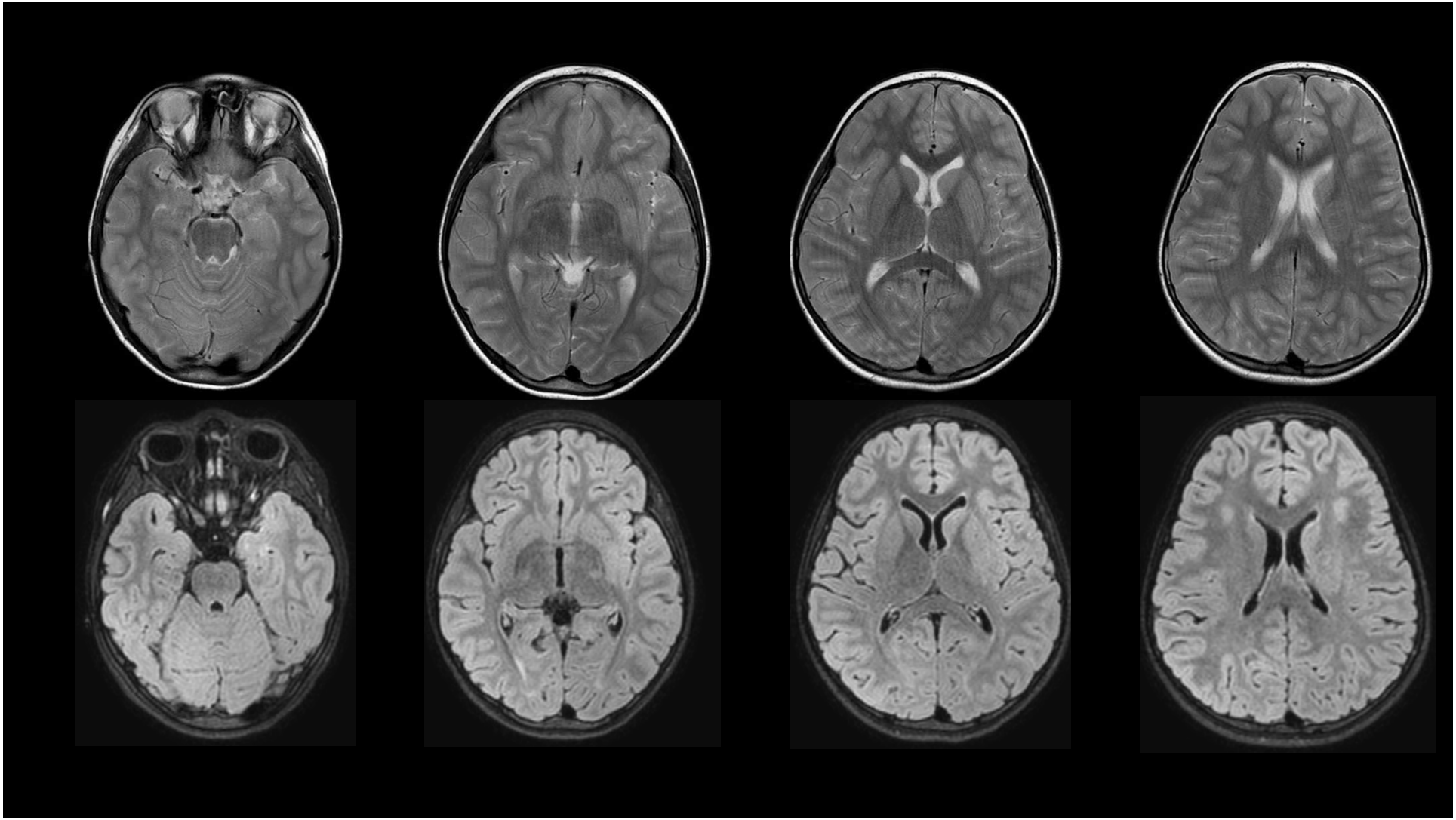

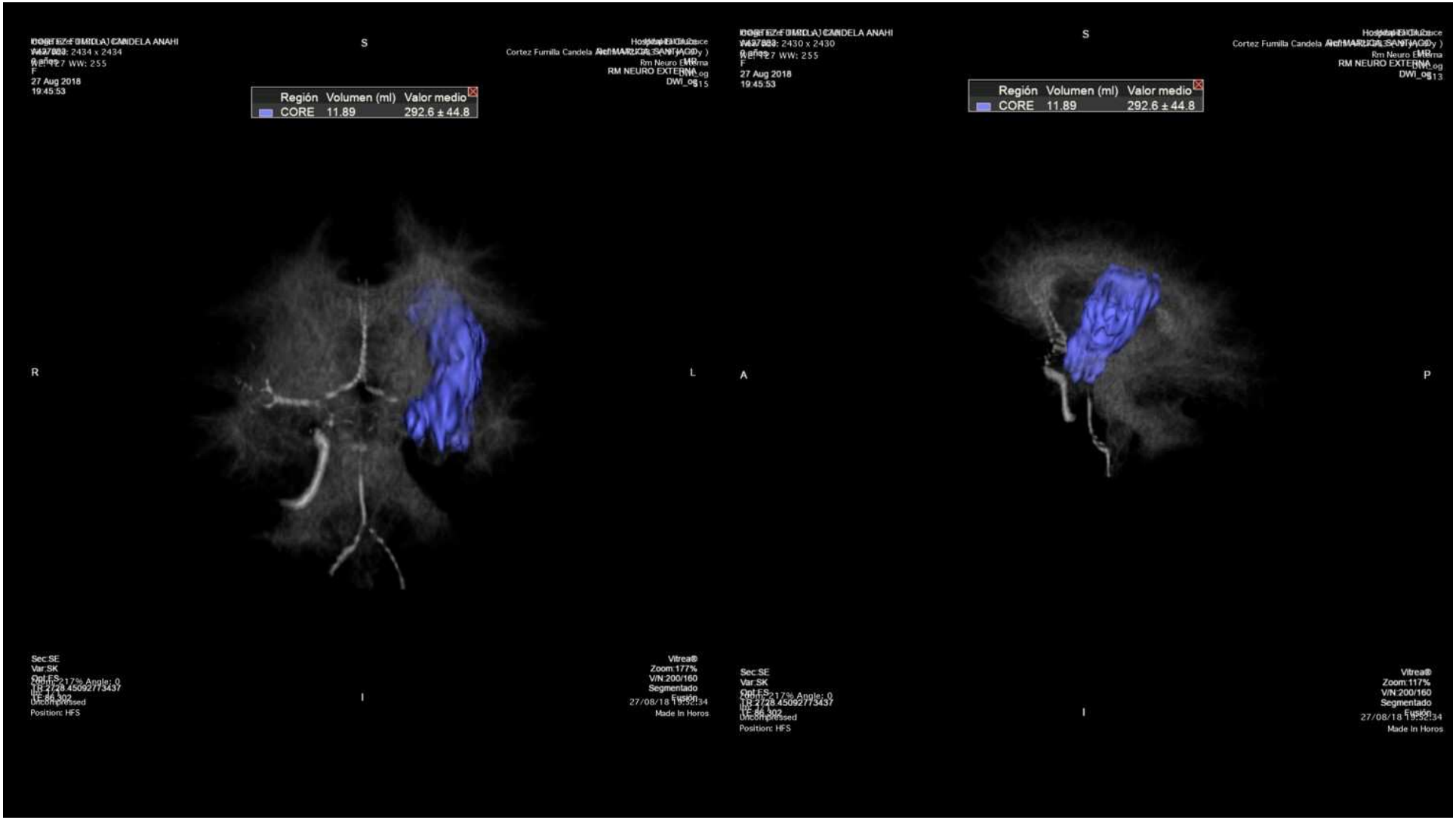
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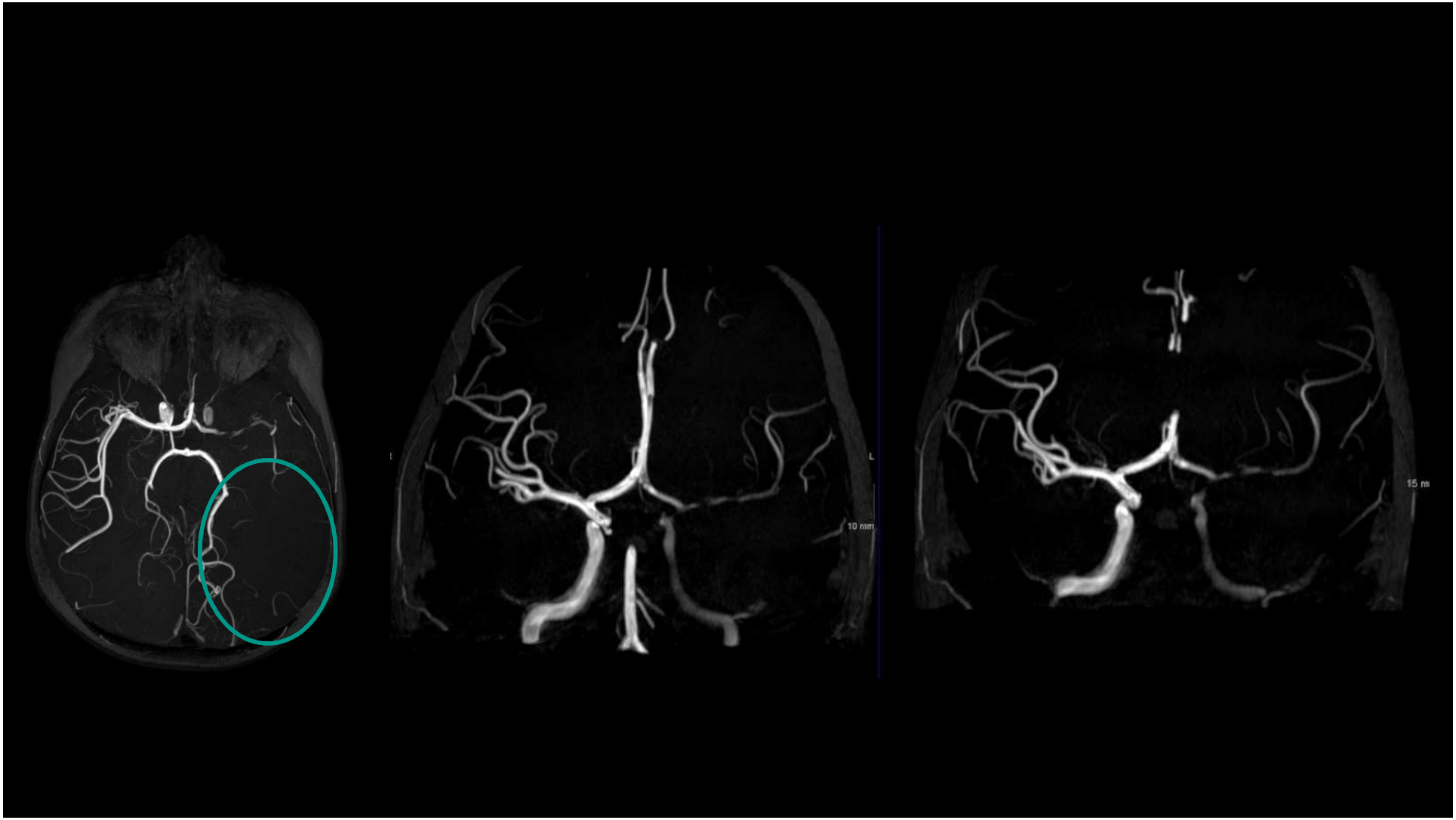
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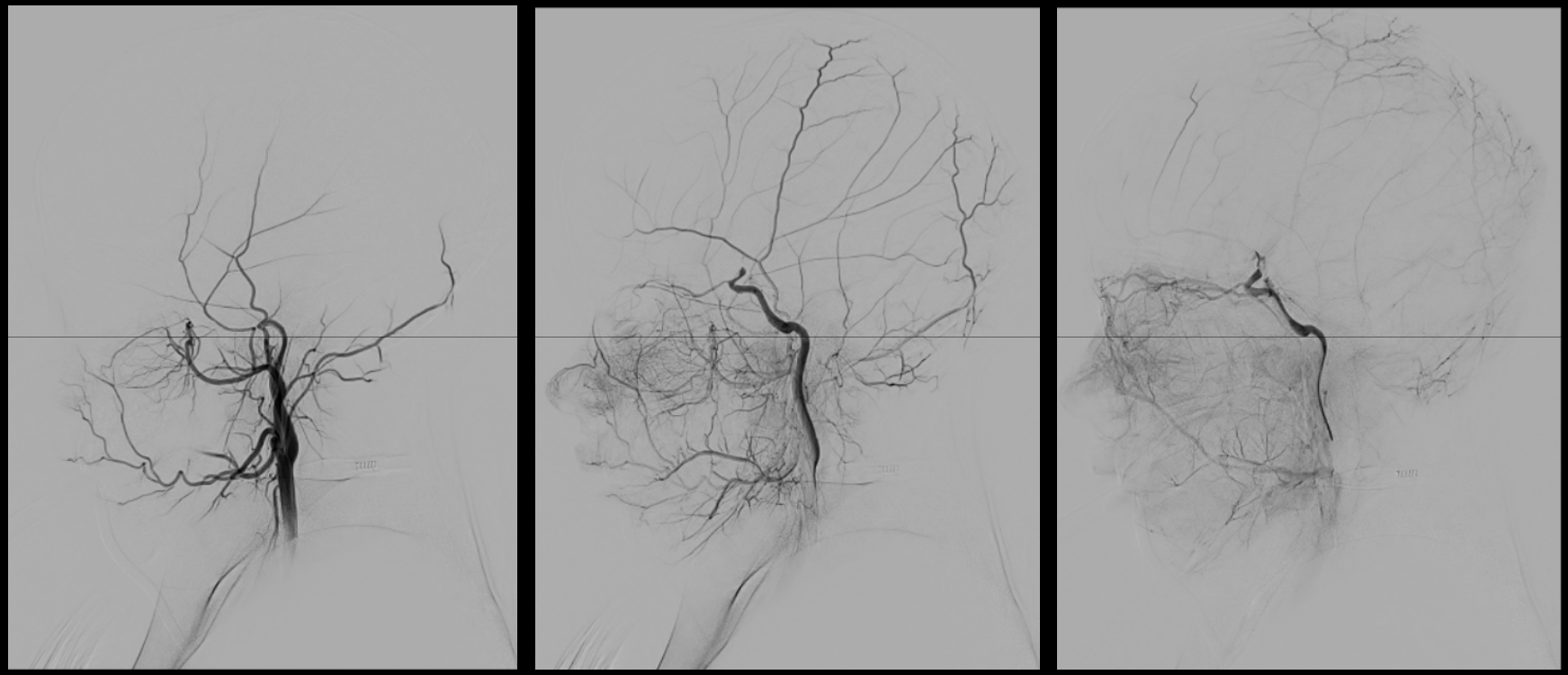

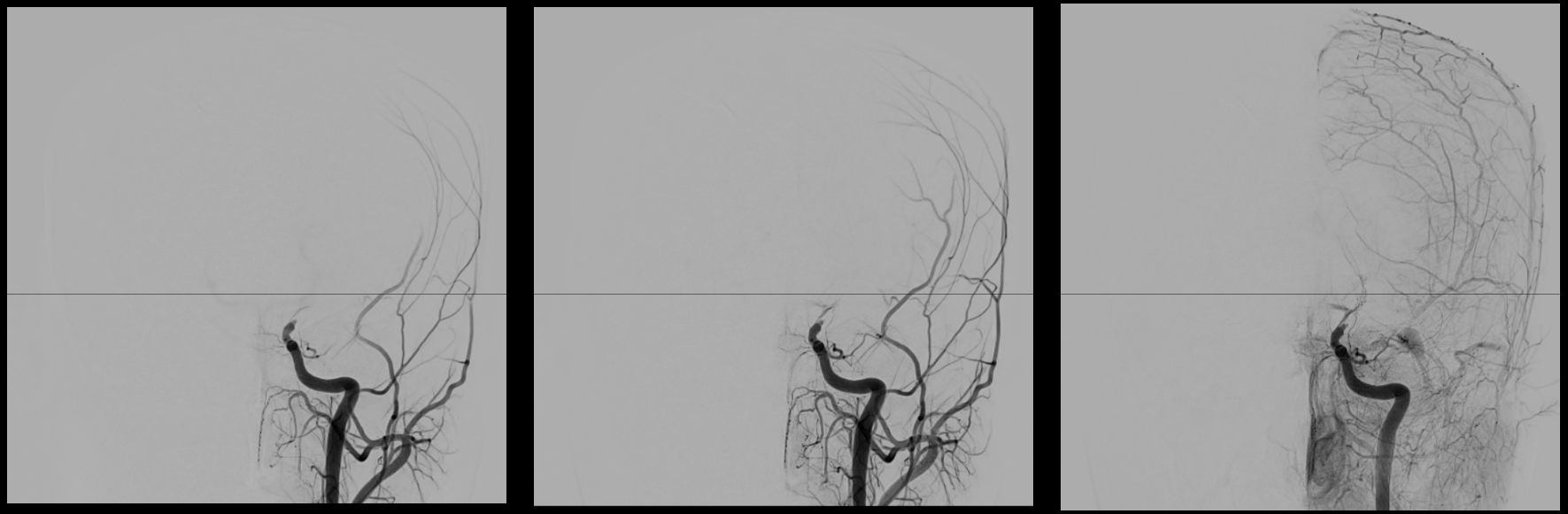

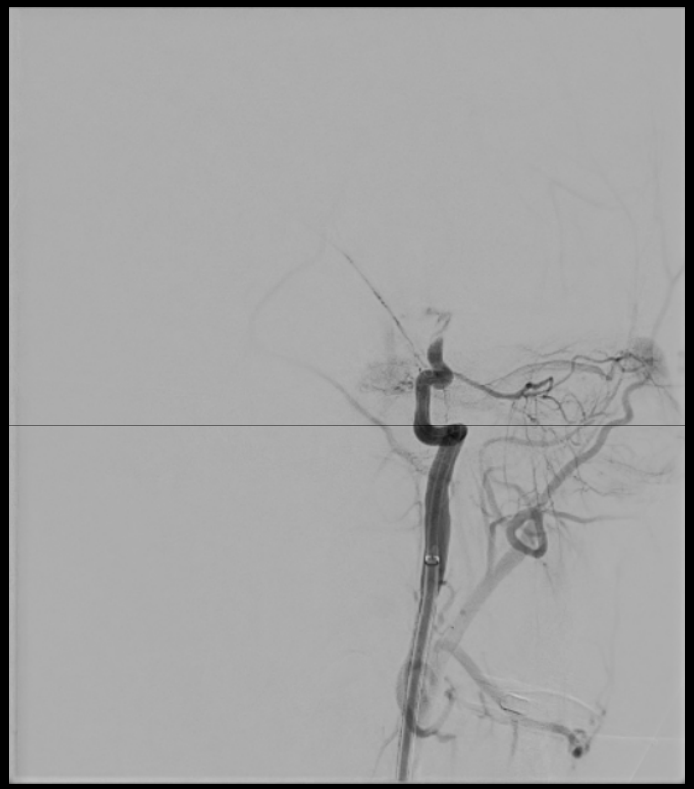

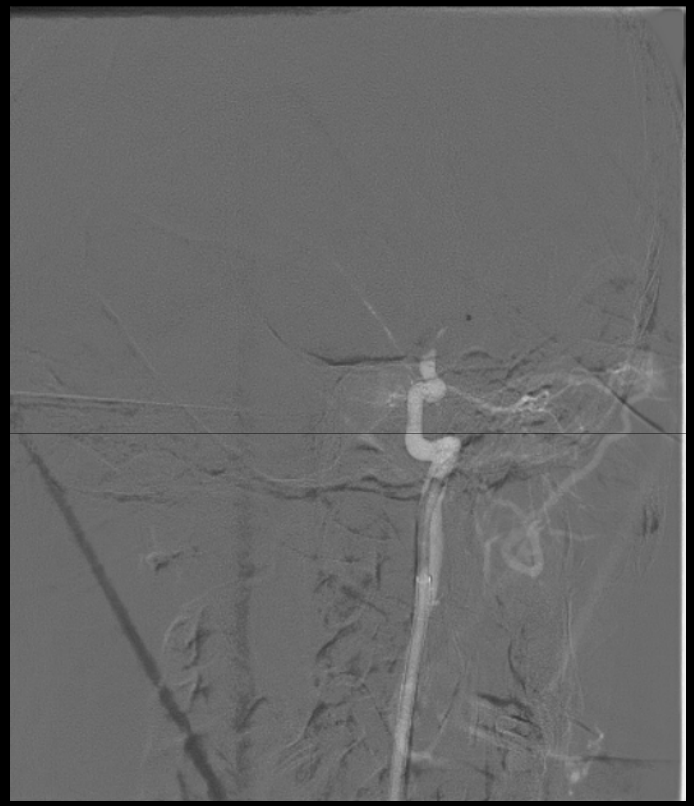

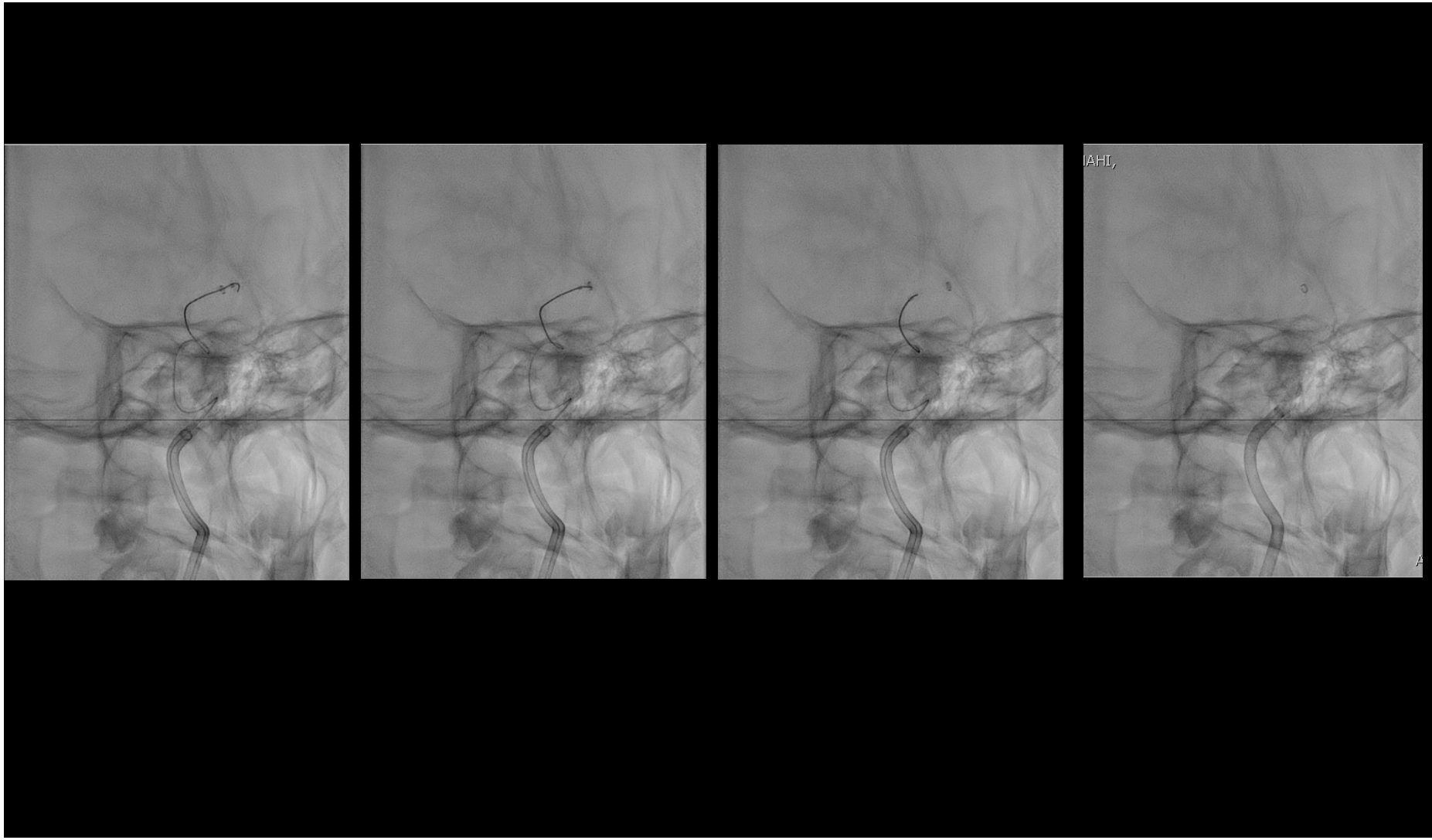

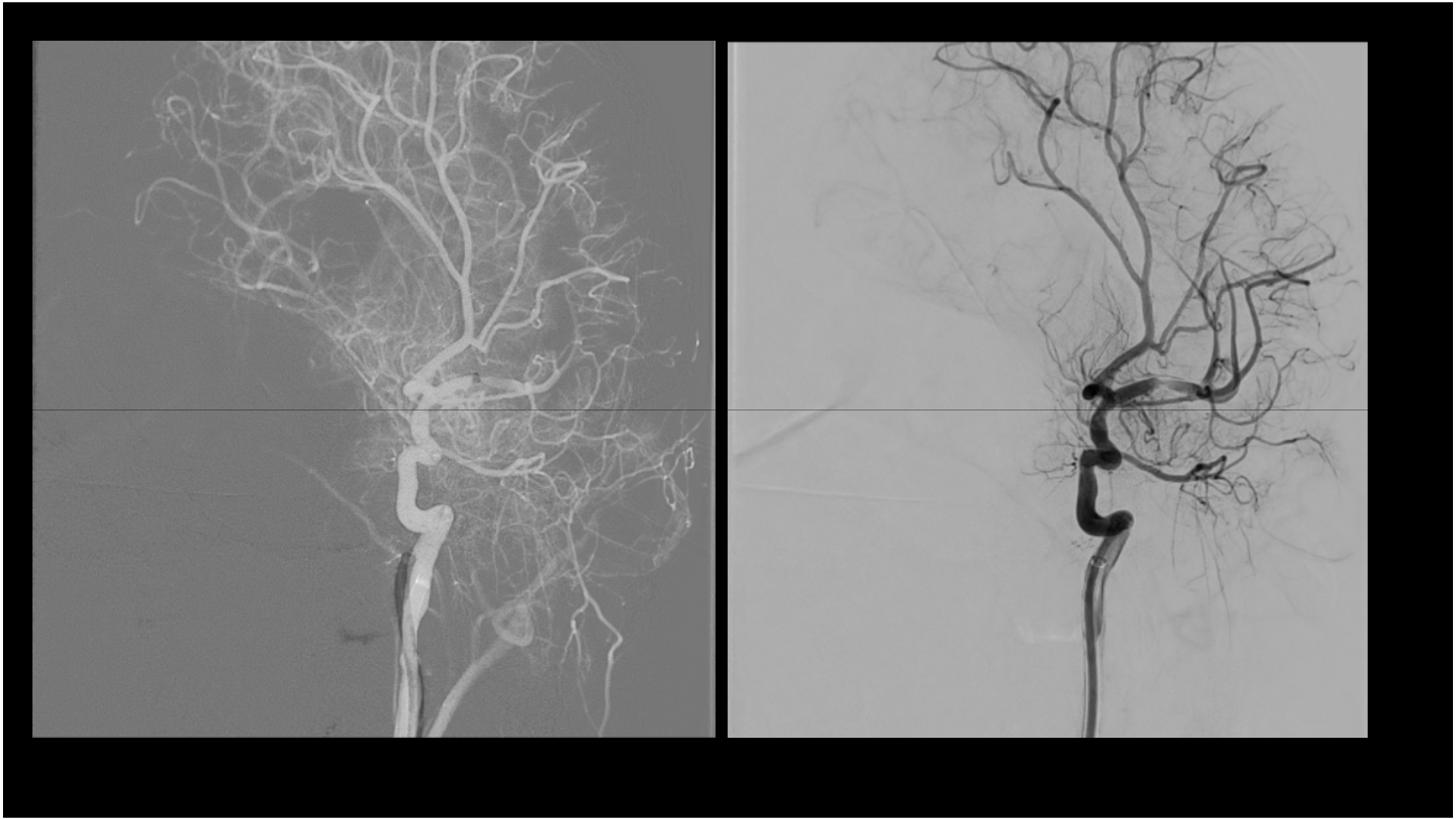

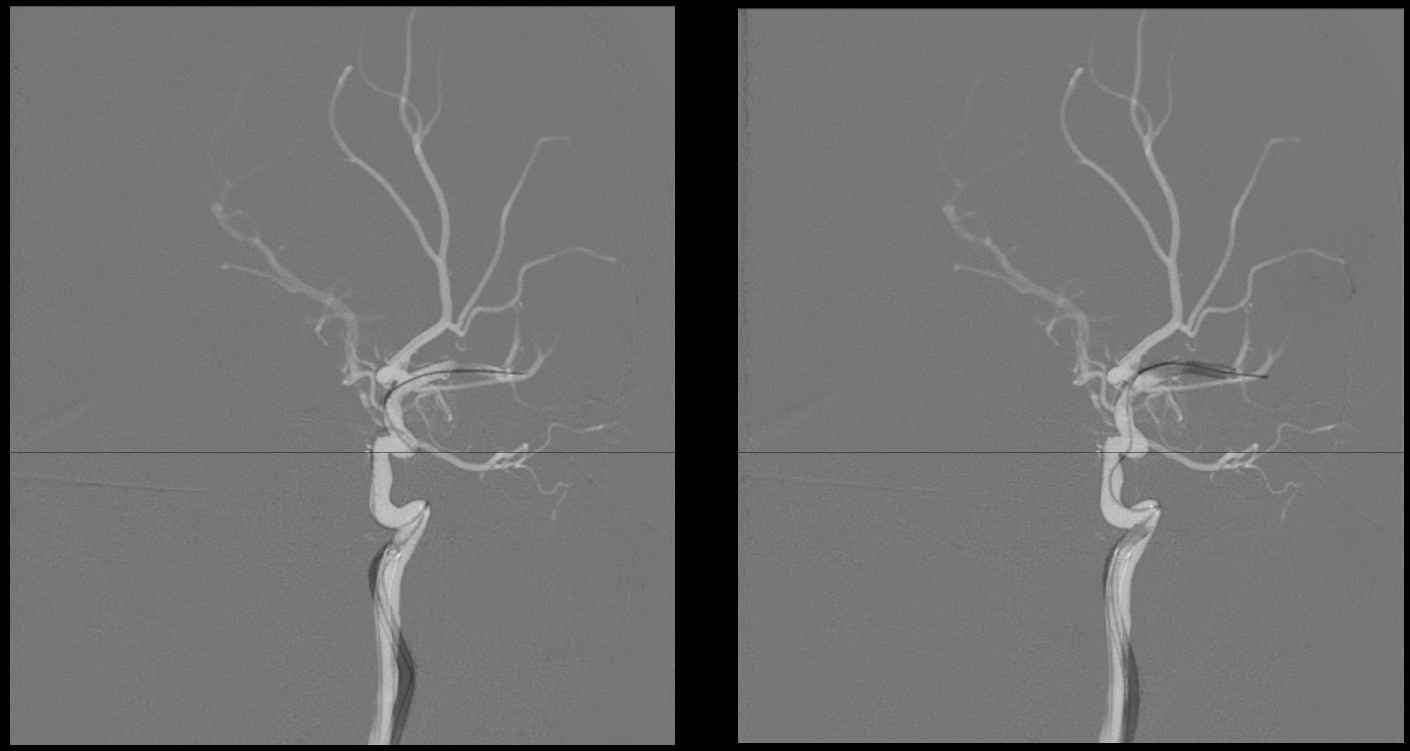

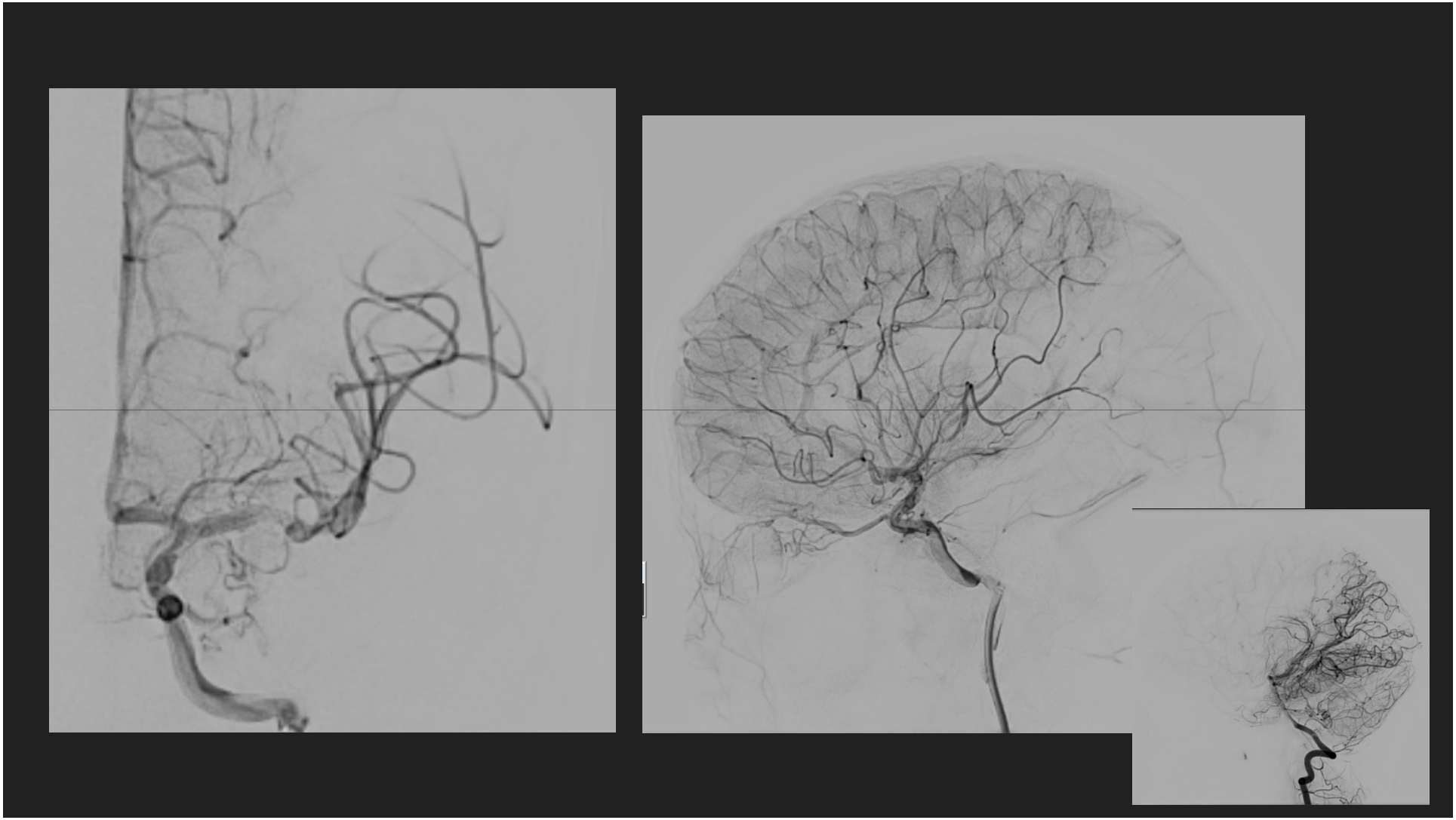

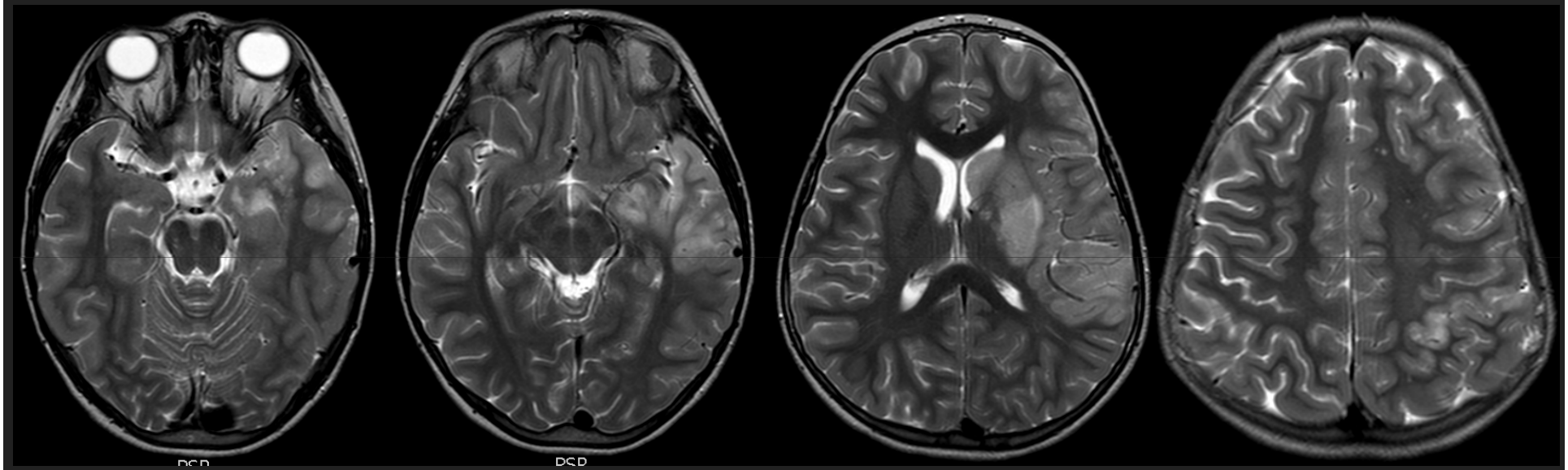
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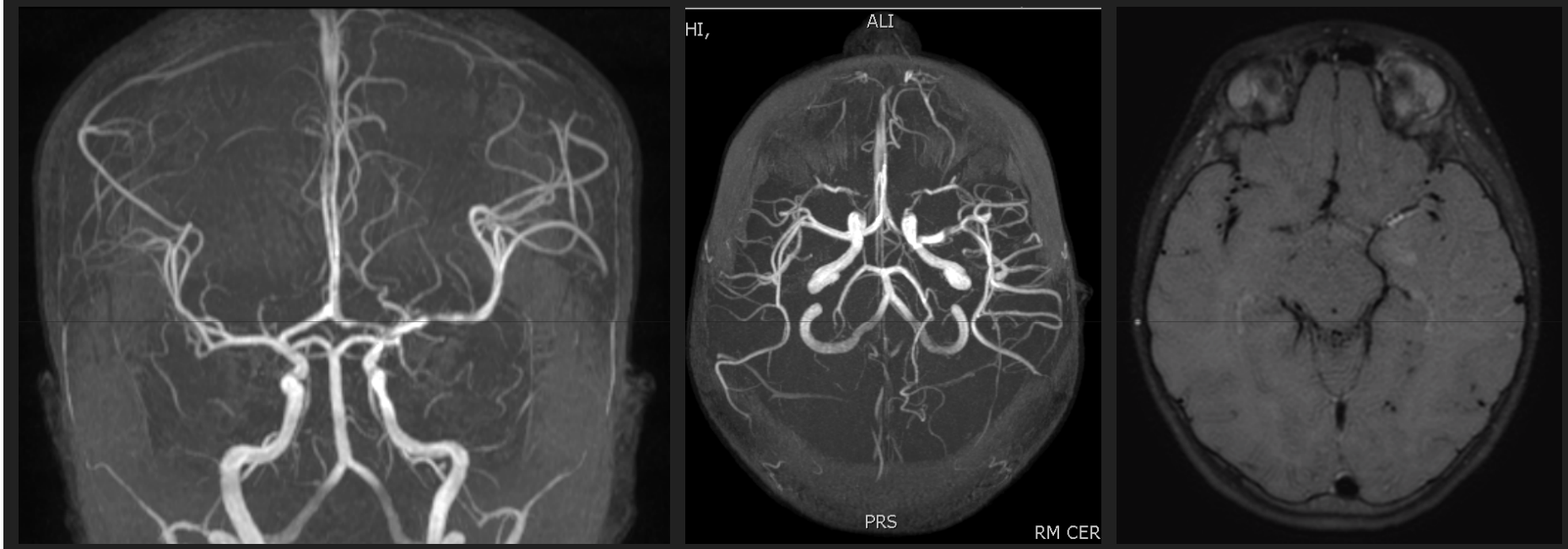
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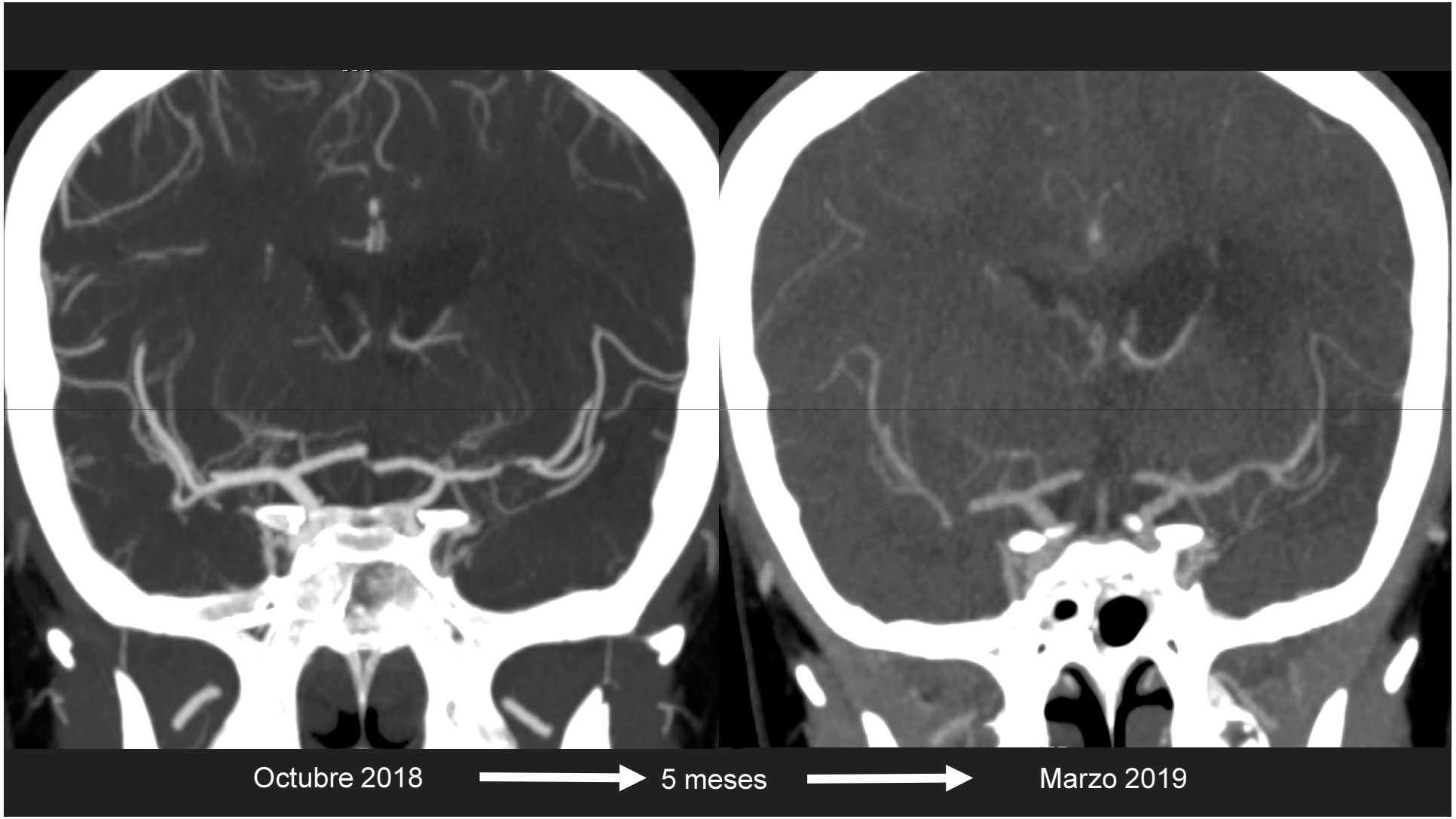

Octubre 2018
5 meses
Marzo 2019

Actualmente

Hemiparesia derecha (4 menos/5)

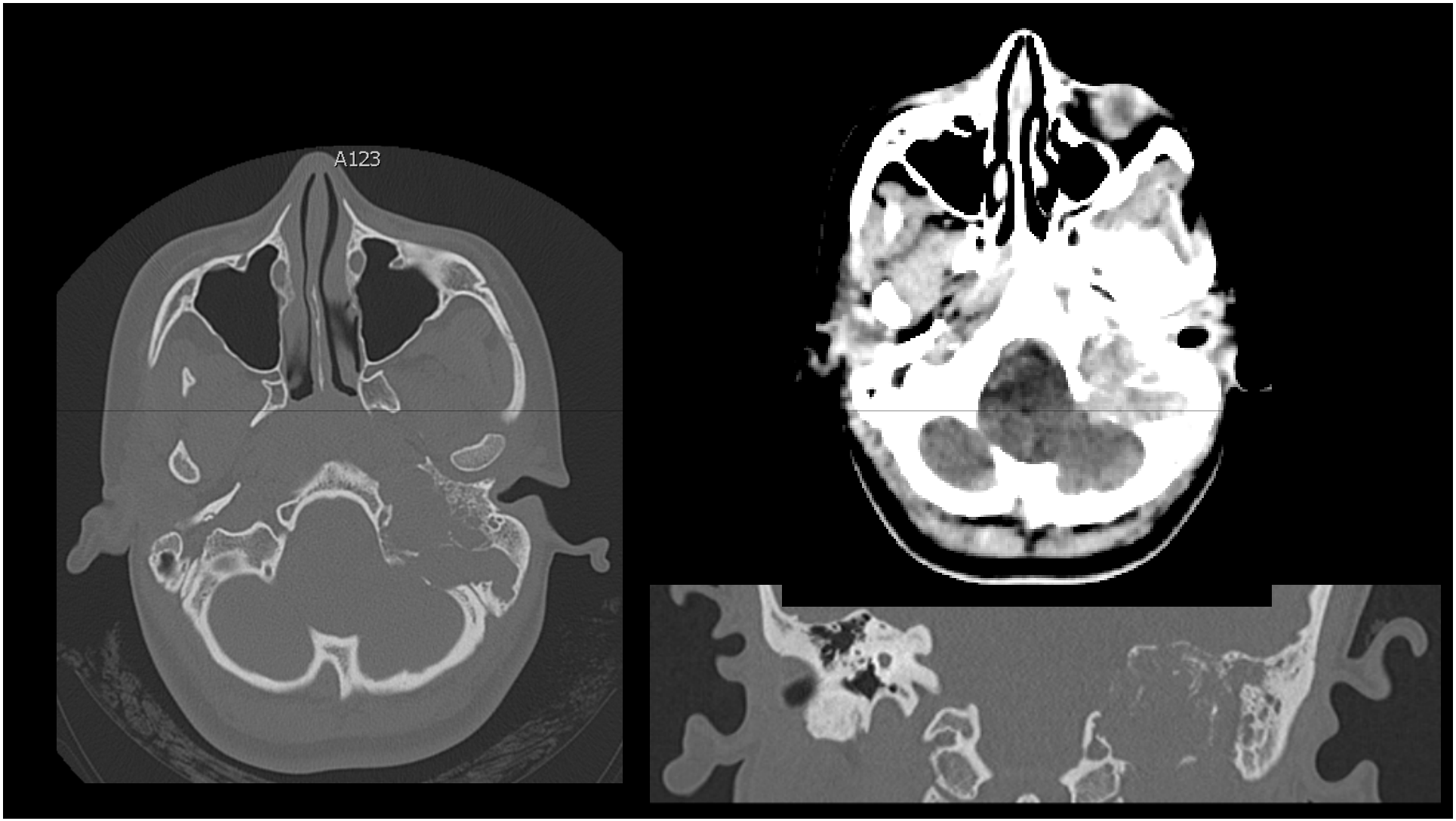
Afasia leve

Escolaridad Normal

La TM efectuada antes de 24 horas del inicio de los síntomas es avalada por el estudio DAWN.
La falta de correlación entre el área afectada en la difusión y la clínica y la presencia de colaterales leptomeníngeas en la paciente se interpretaron como indicadores favorables para efectuar la TM.

13 AÑOS

TUMOR GLOMICO MIXTO
TIMPANICO / YUGULAR.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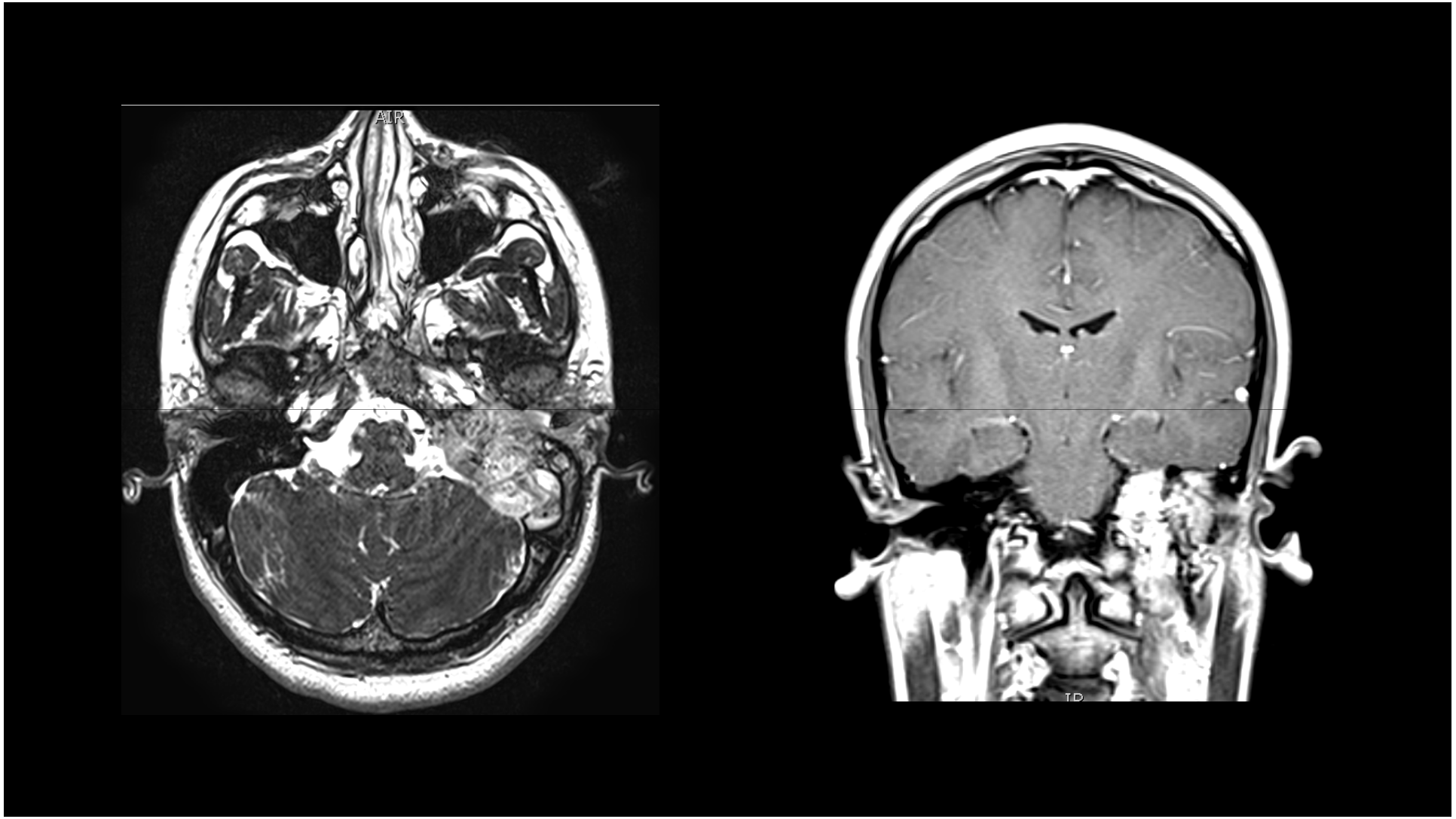
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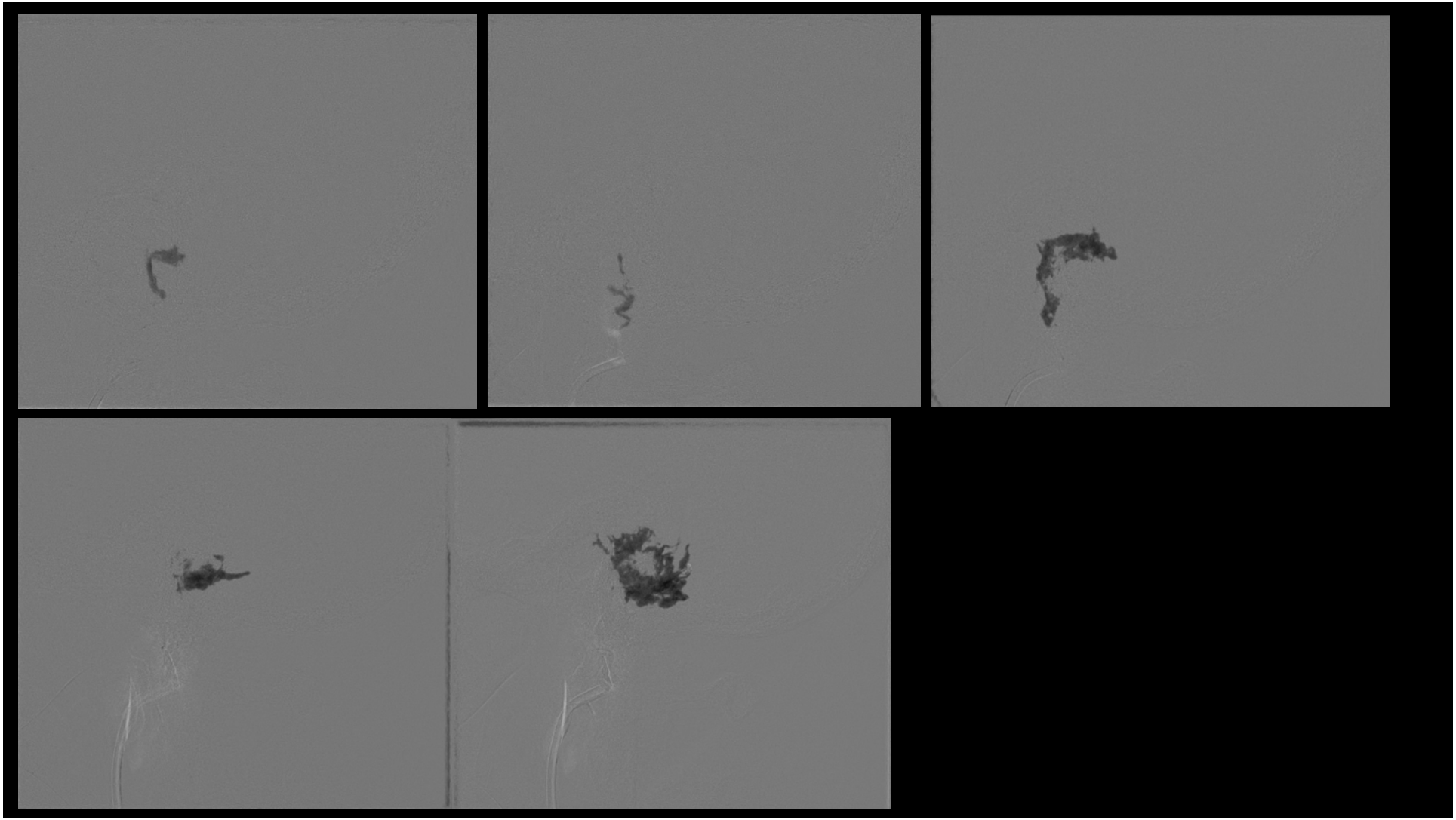
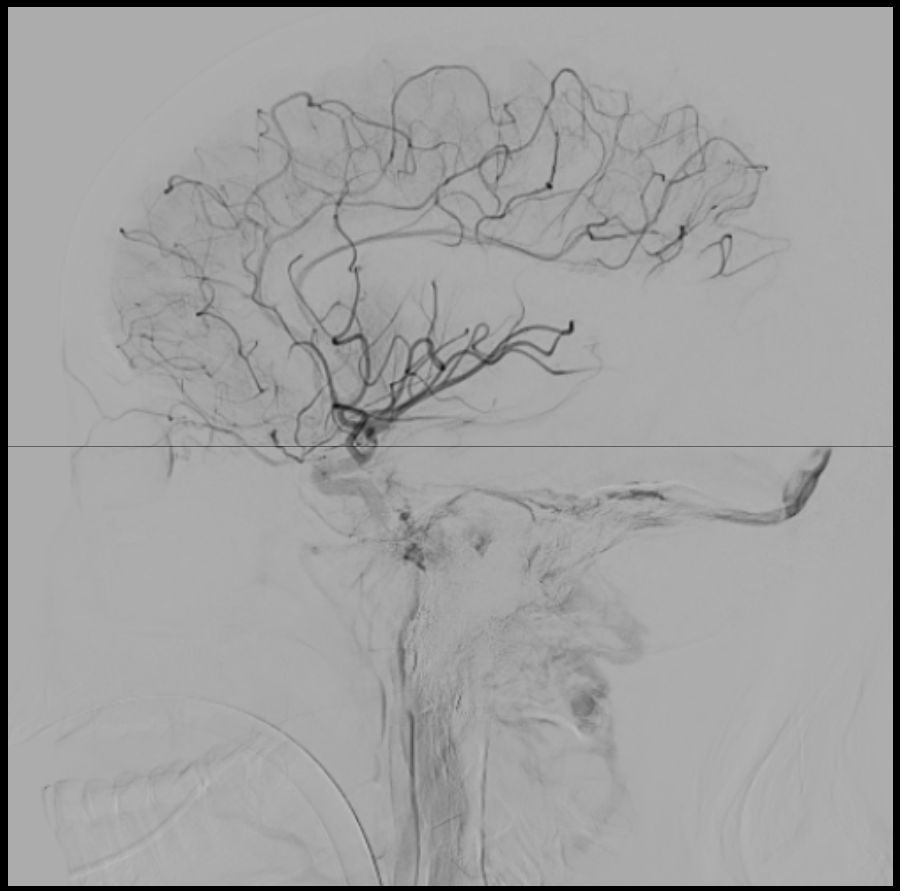
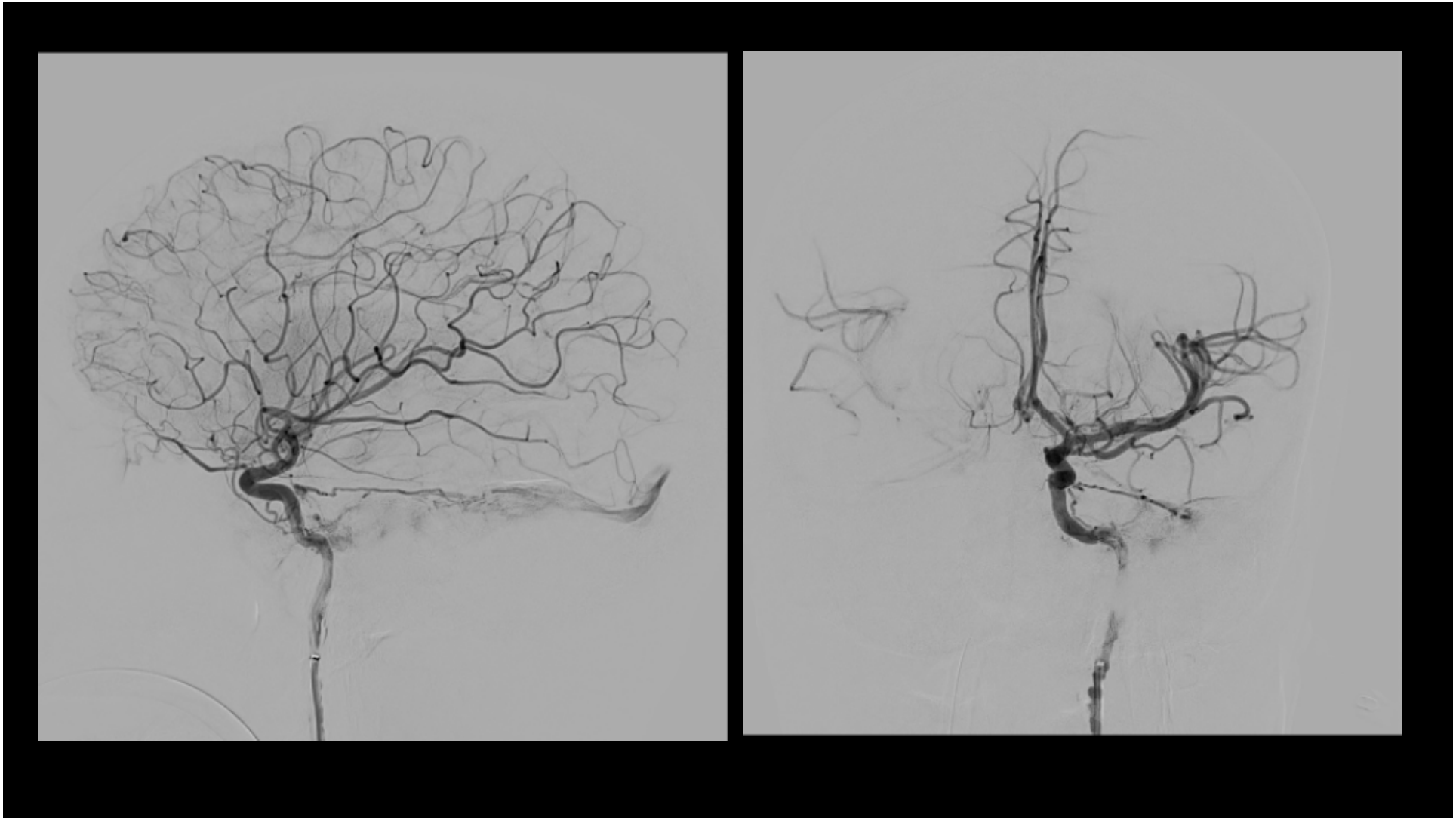
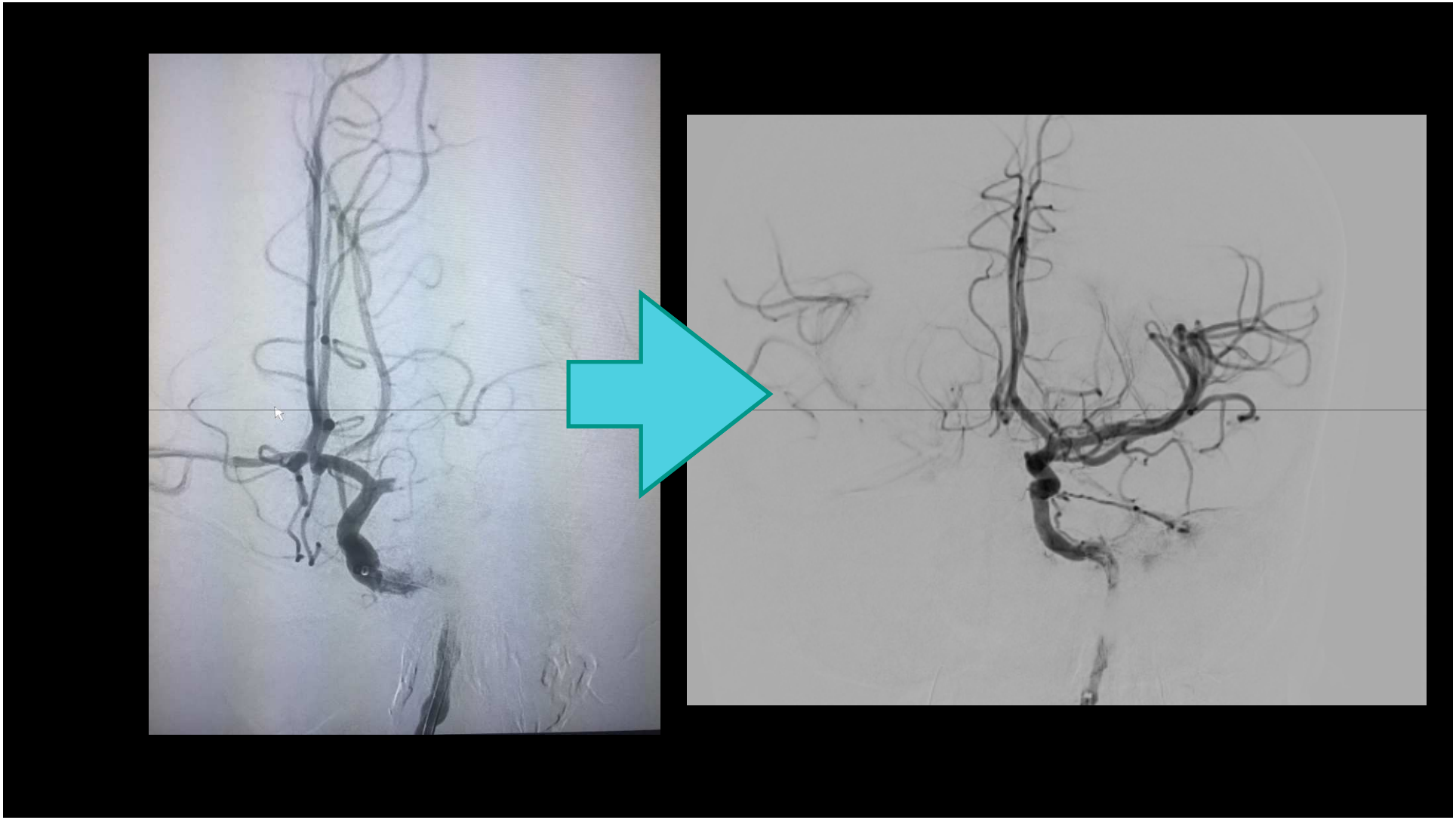




STENT RETRIEVER





PIEZA DE ONYX MIGRADA

CONCLUSIONES

En casos seleccionados la TM puede ser efectuada en niños con oclu

Sería deseable realizar ECAs multicentricos.

Cardioembolicos

Corazon artificial

THANK YOU
MERCI
GRACIAS
DANKE
GRAZIE
תודה
շնորհակալություն

HOSPITAL J P GARRAHAN