STROKE:ICTUS
Arterial and Venous Interventions

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Interventionism in Arterial and Venous Brain Thrombosis

Introduction.

We presented several cases that exemplify arterial / venous cerebral thrombotic pathology and its involvement in cerebral hemodynamic changes, briefly reviewing the physics of cerebral perfusion.

It also demonstrates the utility of advanced interventional techniques dedicated to the management of thrombotic vascular pathology that explains most of the cerebrovascular events,

known by its English denomination STROKE.

Interventionism in Arterial and Venous Brain Thrombosis

Cerebral Perfusion:

The skull is a closed bone cavity, cerebral blood flow is determined by the presence of an adequate arterial blood supply, an adequate venous drainage and a cerebrospinal fluid in a normal amount, any of the factors that are altered changes cerebral perfusion and g to the activation of the self-regulation mechanism.
Cerebral Blood Flow is equal to the cerebral perfusion pressure / cerebral vascular resistance.
Average Blood Pressure: Diastolic Pressure plus 1/3 of the pulse pressure.
Brain autoregulation limit of 50 to 150 mean arterial pressure

Interventionism in Arterial and Venous Brain Thrombosis

Intracranial pressure:

Jugular Venous Pressure. Cerebral blood flow approximately 750 ml / min, 15% of cardiac output or equivalent to normal cerebral blood flow 50-60cc / 100 gr of tissue per minute.

Dysfunction in the penumbra area (1) with 30 cc of blood per 100 grams of brain tissue, the cells most sensitive to ischemia are the neurons, then the glial cells and finally the endothelial cells. (2)

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Interventionism in Arterial and Venous Brain Thrombosis

Venous Thrombosis:

Epidemiology Dural sinus thrombosis is a complex disease (3) that can produce symptoms between headache (4) to brain herniation and can lead to a mortality rate of up to 10%. It represents 1% of all strokes (5), first-line therapy is anticoagulation, but endovascular treatment seems to promise better results, (6) (7) in at least 85% of patients a factor can be determined of risk for thrombosis. Radiological and Angiographic Diagnosis There are typical radiological signs and both diagnostic modalities such as contrast tomography and resonance are useful according to availability.

Sign of lace and delta
Decreased attenuation due to congestion
Asymmetry Herniation
Delay in the emptying and absence of visualization of the dural sinus structures.

In the magnetic resonance, a confirmed MRT TOF correlation is found, carefully considering the possible "pitfalls" (8)

Diagnostic angiography as an invasive procedure is reserved for suspicious cases with inconclusive CT and MRI images and in whom endovascular treatment is intended.

Venous circulation: Start of venous opacification at 5 seconds after arterial contrast injection and complete at 8 seconds.

Direct venography is performed by retrograde jugular approach and is reserved for endovascular treatment.

The venous pressure that is normally less than 10cm of water should be measured.

Conventional treatment with anticoagulation (9) aims to stop the spread of the thrombus and favor recanalization, in addition to avoiding systemic complications such as venous or pulmonary embolisms, even though there is parenchymal hemorrhage related to the haemorrhagic transformation of venous infarction (10).

Endovascular treatment

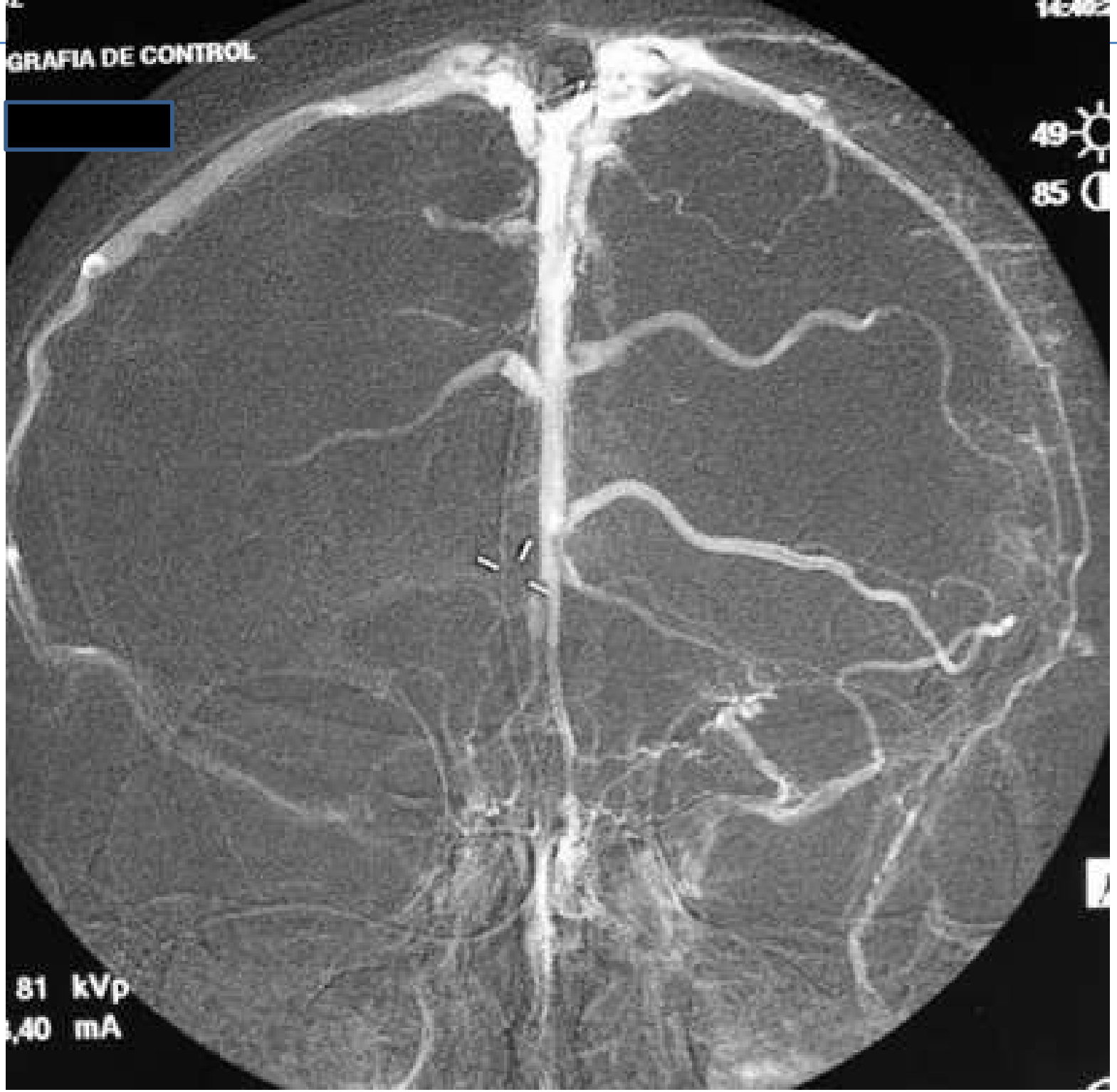
Endovascular management (11) with catheter-directed therapies (12) with adjuvant thrombectomies, angioplasties, thrombolysis and even stenting is a therapeutic tool in patients who do not improve with anticoagulation or who show progression of the clinical presentation, management has been described interventionist (8) even up to a week of evolution of the disease. (13) Most of the institutions combine systemic anticoagulation with thrombectomy therapy with rheolithic catheters (14) / thrombolytics for the most critical patients. The transvenous approach via the femoral vein of sinus thrombosis for thrombectomy with thromboaspiration, angioplasty and stent retrievers (15) as mechanical treatments, can be life-saving in patients with hemorrhagic compromise and contraindication for systemic thrombolysis, thrombectomy decreases pressure intracranial immediately (16). Randomized multi-institutional clinical trials with a larger number of participants are needed to compare sufficiently. The effect of intrasinus thrombolysis and mechanical thrombectomy against standard anticoagulation therapy. (16) Surgical management is reserved for its invasion as an extreme measure in very sick patients, open approach is performed for direct thrombectomy or thrombolysis catheter implantation (17) and for decompressive craniectomy in patients with large lesions with risk of herniation and death. (18)

FOLLOWUP.

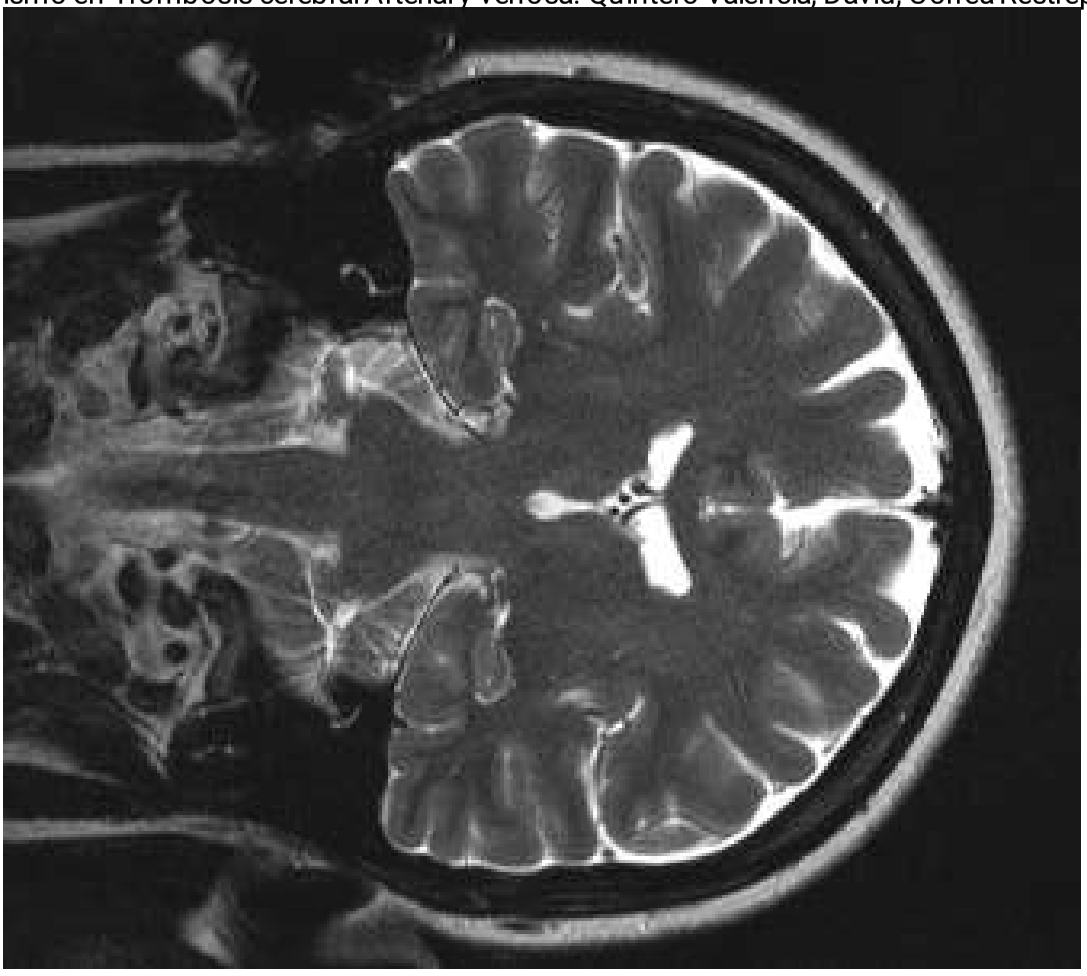
Anticoagulation is recommended with an INR goal of 2 to 3 at least for six months or one year and indefinitely for patients with unchanging risk factor, in addition to changing the planning method for one not based on estrogen or prophylaxis in obstetric events such as pregnancy, with follow-up of images at least 3 months after the procedure to assess recanalization. (19)

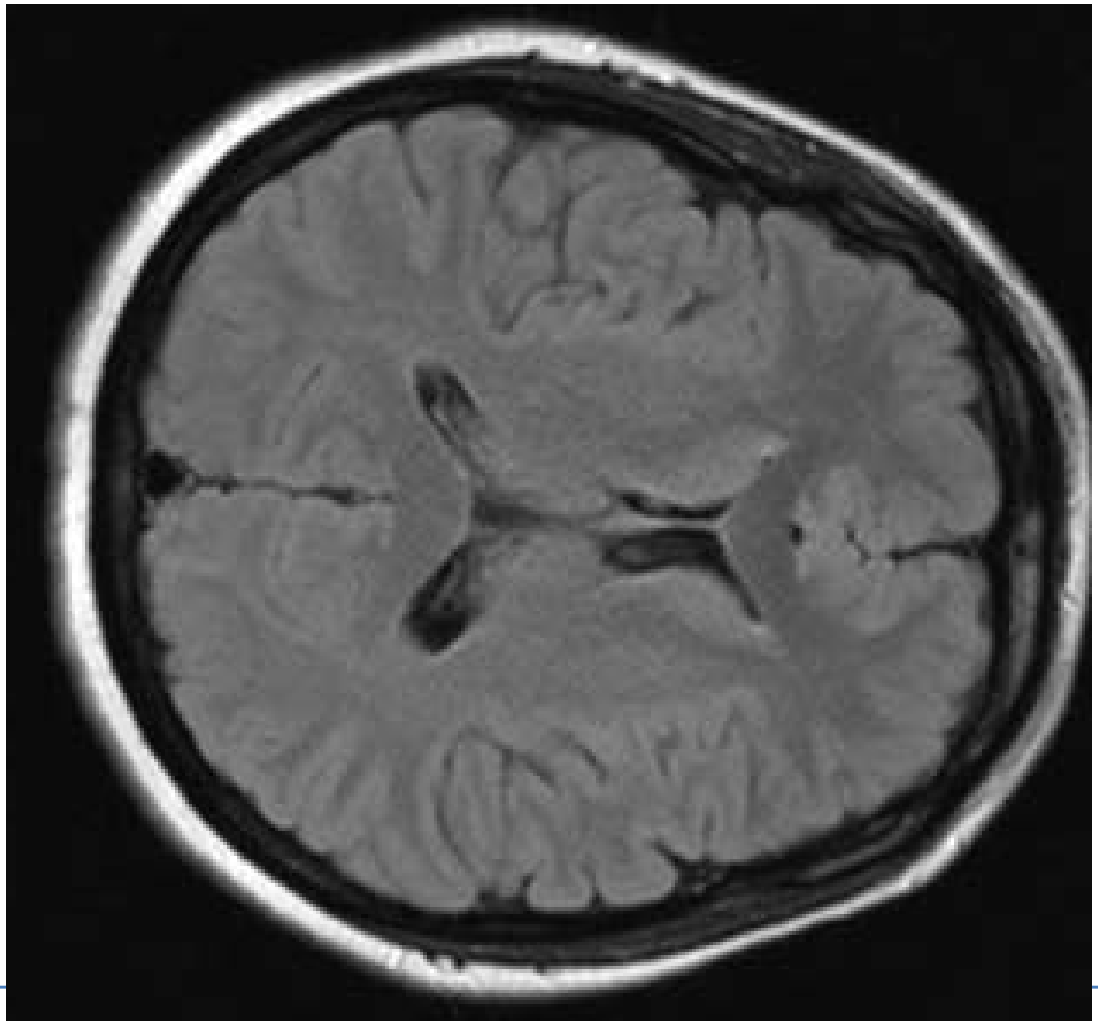
Cases.

Patient of 25 years with thrombosis of the cerebral venous sinuses of a week of evolution. On November 5, 2014, thrombolysis directed by a microcatheter from the superior longitudinal sinus was initiated. In aseptic conditions, after cleaning the right groin with chlorhexidine, the 6F venous introducer was changed by an arrow 8f introducer 11cms long. Using a 0.35 x 150 cm angulated hydrophilic guidewire, a Neuron MAX 6F 088 Guide catheter was advanced through the venous introducer into the right jugular bulb. It is coupled to a perfusion of heparinized saline solution with nimodipine, through a Y-valve. When injecting non-ionic iodinated contrast medium, obstruction of the right sigmoid sinus was demonstrated. The 5MAX ACE reperfusion catheter of the 132 cm long PENUMBRA system guided by a Headway 17 microcatheter supported by an extra support Traxcess 014 microguide is passed coaxially. Each is coupled to an infusion of heparinized saline with nimodipine, through a Y-valve (2 valves). Subsequently, the 5MAX ACE catheter was connected to the suction pump and, using the suction tube connected to the suction bottle, within a period of one hour, the thrombi were aspirated, leaving the recanalized sinuses 90%. The magnetic resonance control demonstrates total resolution.



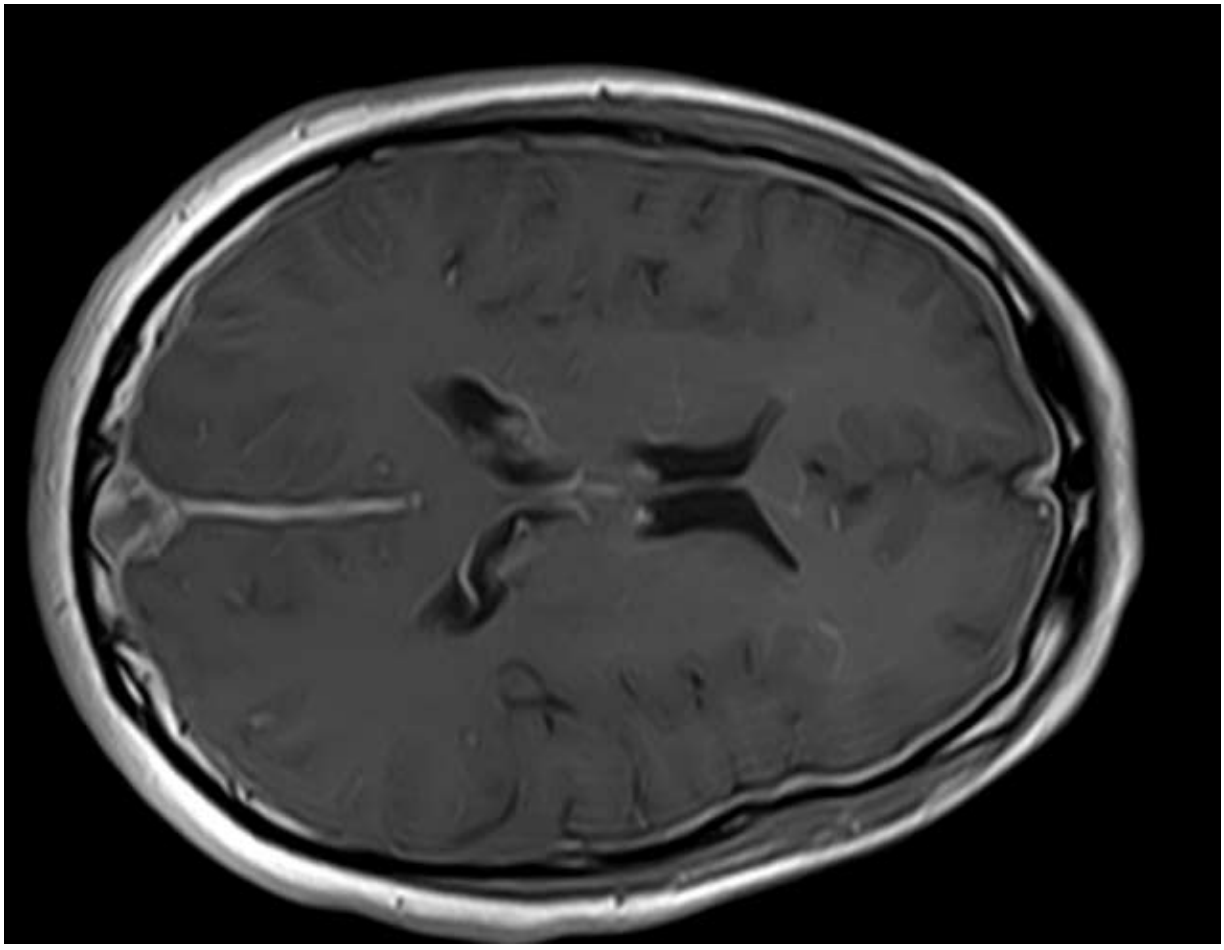
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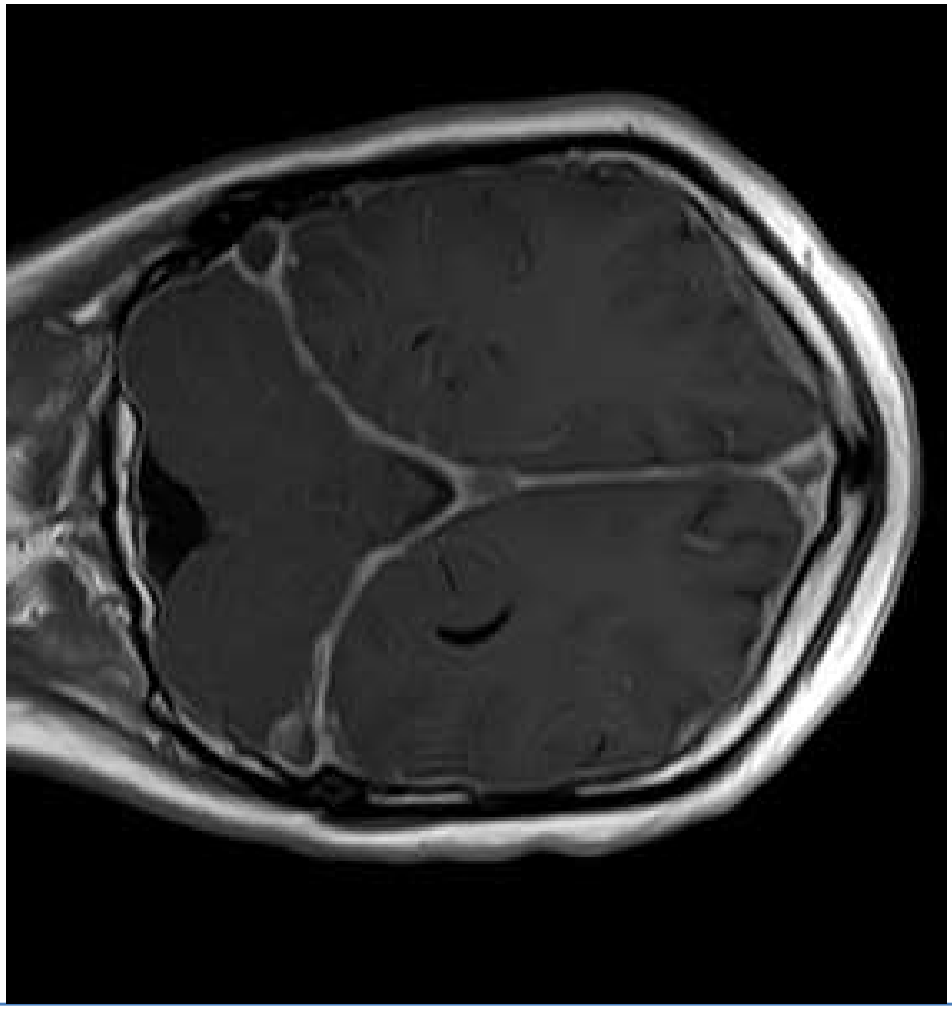


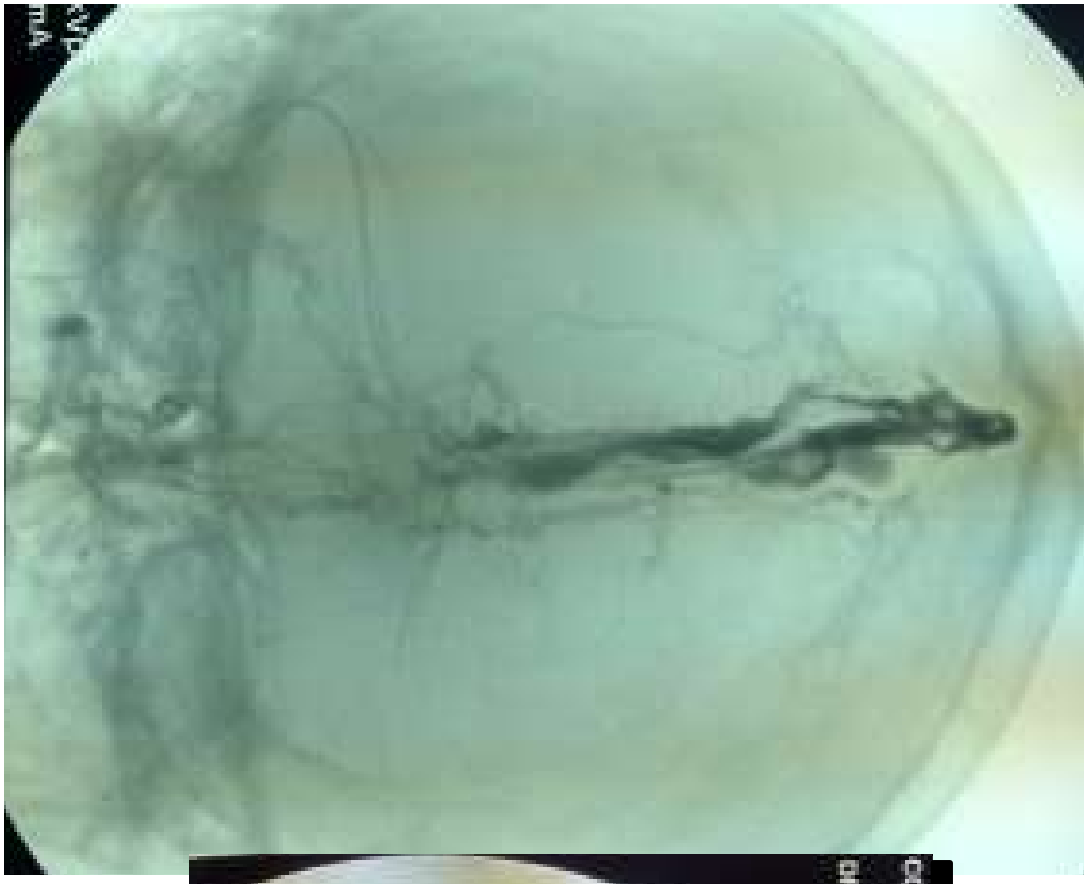


Casos

We present the case of a 33-year-old male patient with a diagnosis of dural sinus thrombosis. He arrives on his own from the city of Monteria, with several weeks of progressive headache, who underwent magnetic resonance imaging. Contrasting brain that demonstrates bilateral sigmoid sagittal dural sinus thrombosis, arrives for endovascular treatment with thrombolysis and thrombectomies. With color Doppler guidance, using the Seldinger technique, arteriography is performed that shows arterial vascular permeability in the late venous phases; thrombotic occlusion of the sagittal sinus is demonstrated. Endovascular management is performed and evolves in an appropriate manner. Images are displayed.





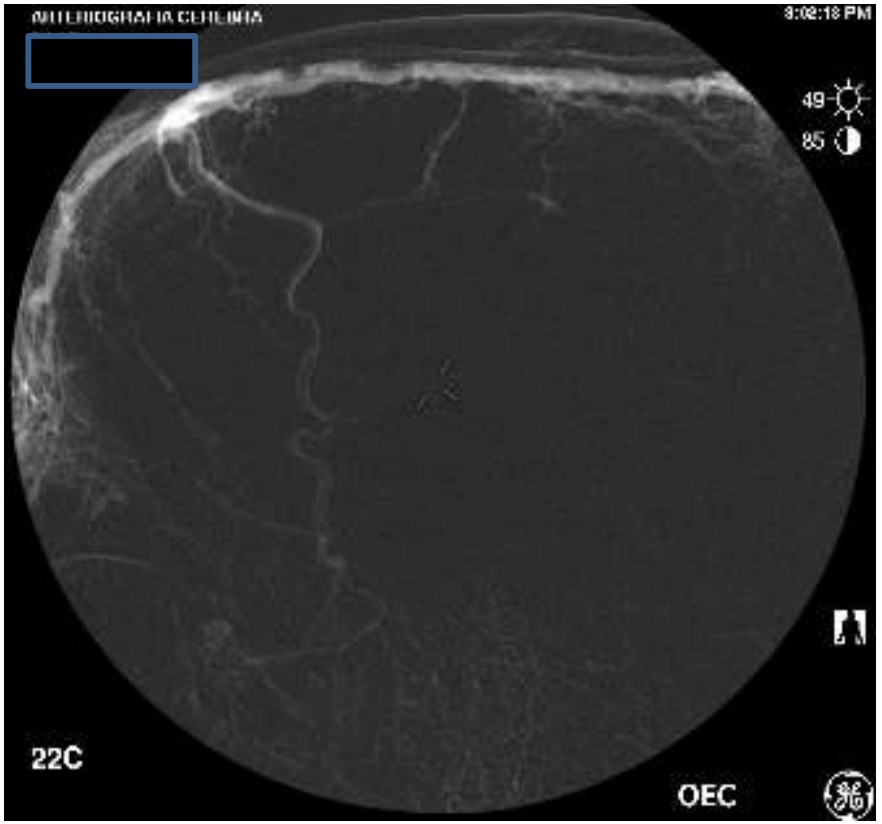


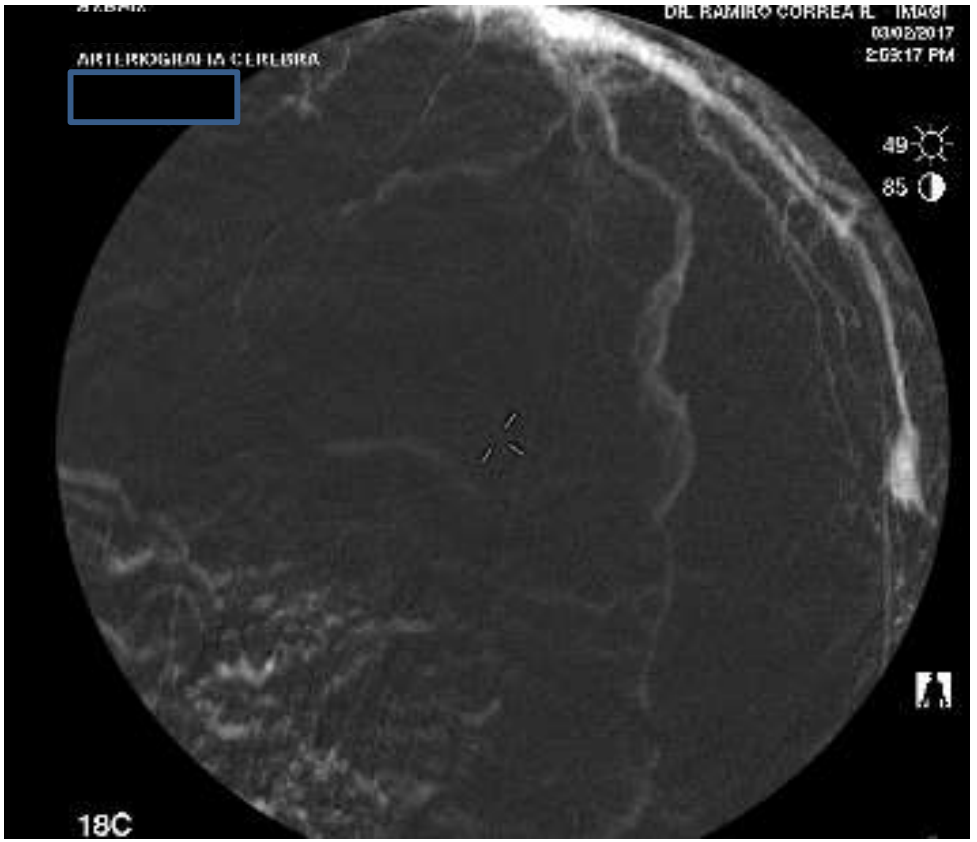

CONTROL TROMBOLISIS
DR. QUINTERO

His proximal end was coupled to a perfusion of heparinized saline through a Y-valve, and cerebral arteriography was performed, obstructing all the cerebral venous sinuses. Under aseptic conditions, using a micro-function set, a 7F introducer was passed through the right common femoral vein and through it, with the help of a 0.035 angulated hydrophilic guide, a microvention thrombus aspiration catheter was passed (Sofia 6F) and entered through the sigmoid sinus to the superior sagittal sinus, aspirating multiple thrombi during the ascent (about 20 grams). After aspiration, a Headway 21 microcatheter was passed with the aid of a Traxcess .014 guide to the anterior third of the superior sagittal sinus and ordered to be connected to a perfusion of rtPA 05mg an hour and to monitor the thrombolysis in 24 hours. After cleaning the arterial introducer of the left groin, with iodized soap through the introducer carried by the patient, through the left common femoral artery, with the help of a 035 angulated hydrophilic guide, a Simons 5F hydrophilic catheter was passed. Cerebral arteriography for control of thrombolysis was performed.









The venographic review on November 7 showed incipient recanalization of the superior sagittal sinus. The transverse sinuses, sigmoid, rectum, and distal half of the superior sagittal remain obstructed. Given the risk of continuing thrombolytic rtPA and the risk of leaving brain venous thrombosis unresolved, it was considered an absolute indication for intracranial endovascular therapy with aspiration of thrombi using the PENUMBRA system with succesfull recanalization

STROKE

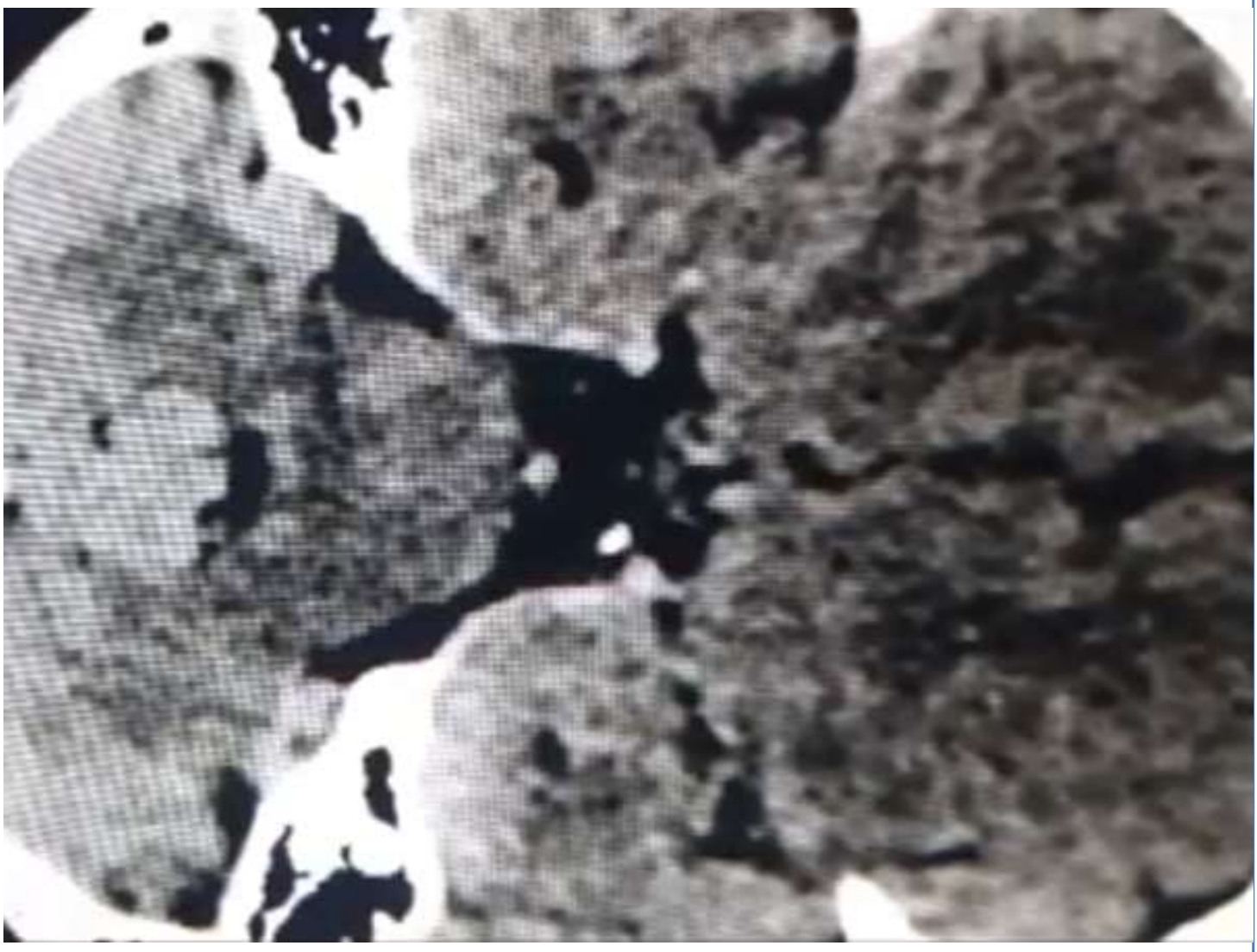
Cerebrovascular arterial event. It is defined as the thrombotic occlusion of a cerebral artery, related to systemic embolism, primarily as the origin of atrial fibrillation in 45% of ventricular dysfunction, 25% of valvular disease, in 10% of miscellaneous or cryptogenic origin, with 2 or more causes, or a cause not determined by 20%. Intracranial atheromatosis with in situ thrombosis related to systemic arterial disease with hypertension and cerebral disease such as small vessel lipohyalinosis. **Pathophysiology** The polygon of Willis defines certain arterial territories for each blood vessel with which the clinical deficits in patients are related. The ischemic penumbra around the nucleus with viable but dysfunctional cells given by the decrease in blood flow with 30 cc / 100 gr of tissue or core infarction, where the cells are already dead by a flow of less than 10 cc per 100 gr of sustained tissue that triggers the ischemic cascade. The calculated neuronal loss is 32,000 cells per second

Stroke.

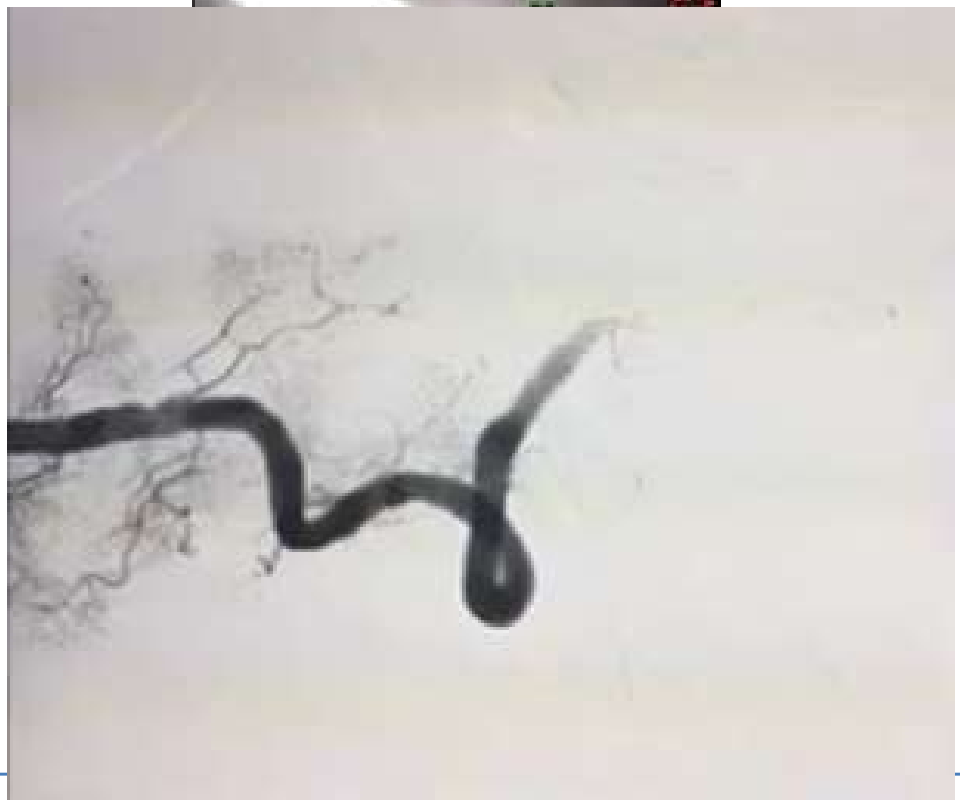
Epidemiology.
In a study conducted in Sabaneta, Antioquia, in a population of 13,588 subjects from the same region, an annual incidence adjusted for age and gender of 0.89 / 1.01 was found.
Radiological and Angiographic Diagnosis: This topic is the domain of all radiologists who attend emergencies, it is out of the interest of this work.
Conventional treatment: The acute event in the first hours is intended to decrease the volume of the affected tissue, avoiding the infarction of the penumbra area and hypotension, and favoring self-regulation through the management of glycemia, and intracranial hypertension And rehabilitation in patients with infarction and residual deficit.
Endovascular treatment

Cases

We present the case of a middle-aged patient, who comes on anticoagulation with poor adherence and with a history of left subclavian arterial thrombosis. They bring her to the emergency department in a sudden coma of 30 minutes of evolution. Brain thrombosis is suspected, which is why a simple tomography is performed that shows hyperdensity of the basilar artery and rules out hemorrhage. Extensive study with angiotomography (figures 1 and 2) per protocol shows occlusion of the vertebro-basilar axis in the cap, long thrombus greater than 5 mm that probably will not resolve with systemic venous thrombolysis. In conjunction with emergency medicine, it was decided to perform systemic thrombolysis according to guidelines at 0.9 mg x kg maximum 90 mg and, given the extension of the thrombus in the basilar artery, configuring an ischemic syndrome of subsequent circulation, it was decided to carry out a mechanical thrombectomy with thrombus aspiration. With color Doppler guide, with micro-function set and Seldinger single-wall technique, it is instrumented with a 6F x 90 cm introducer, right femoral introducer, with continuous perfusion through hemostatic valve and with vertebral catheter and regular hydrophilic guide 0.35 for arteriography showing thrombosis of the left vertebral artery in the V4 portion, which is why we proceeded to recanalize with a thromboaspiration catheter in the neurological territory (SOFIA commercial house) and with mechanical thrombus aspiration with a 50 syringe attached to a three-way stopcock . It is achieved in at least 3 steps almost complete recanalization of the vertebro-basilar axis. The patient progressed satisfactorily without residual deficit in the post treatment. Images are displayed.

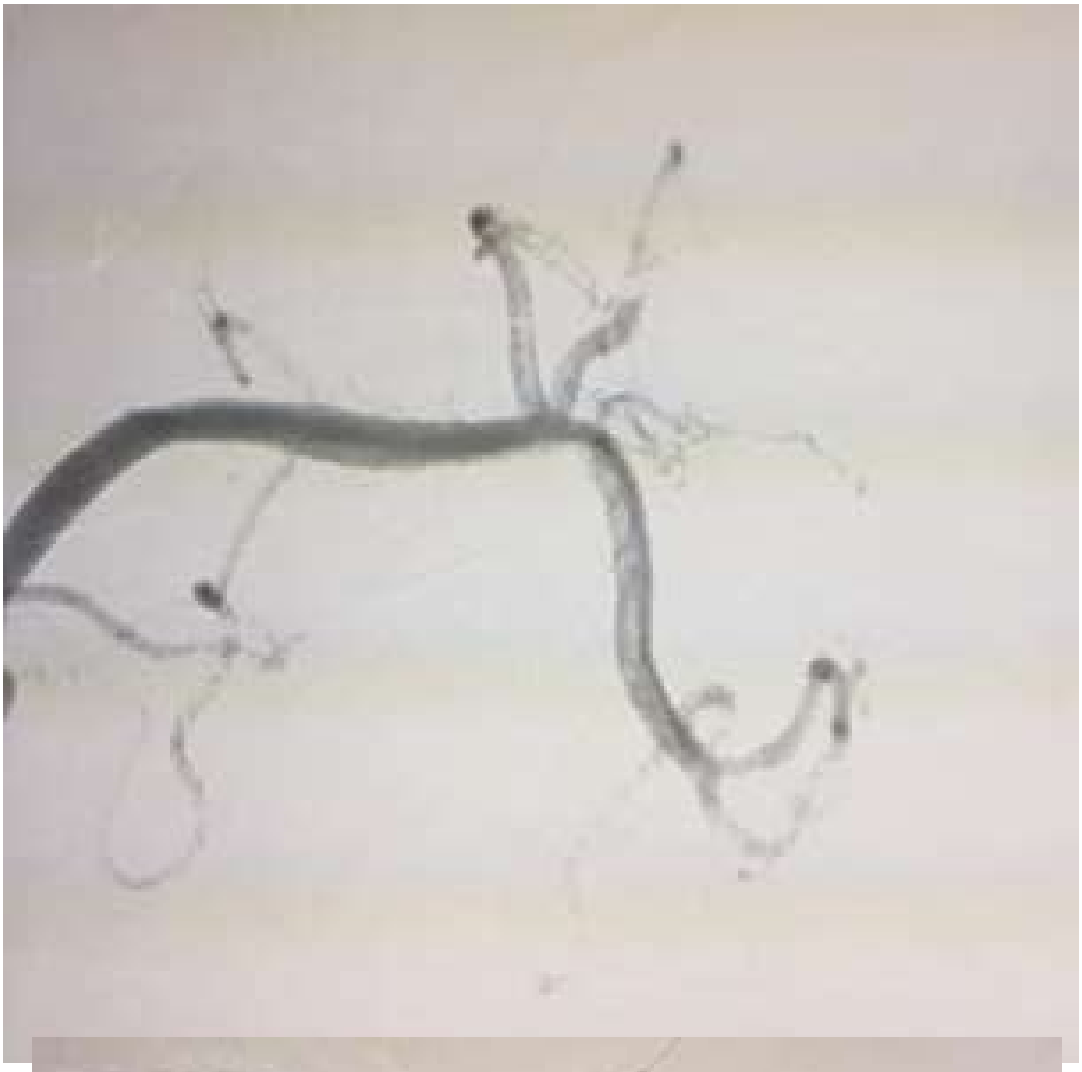










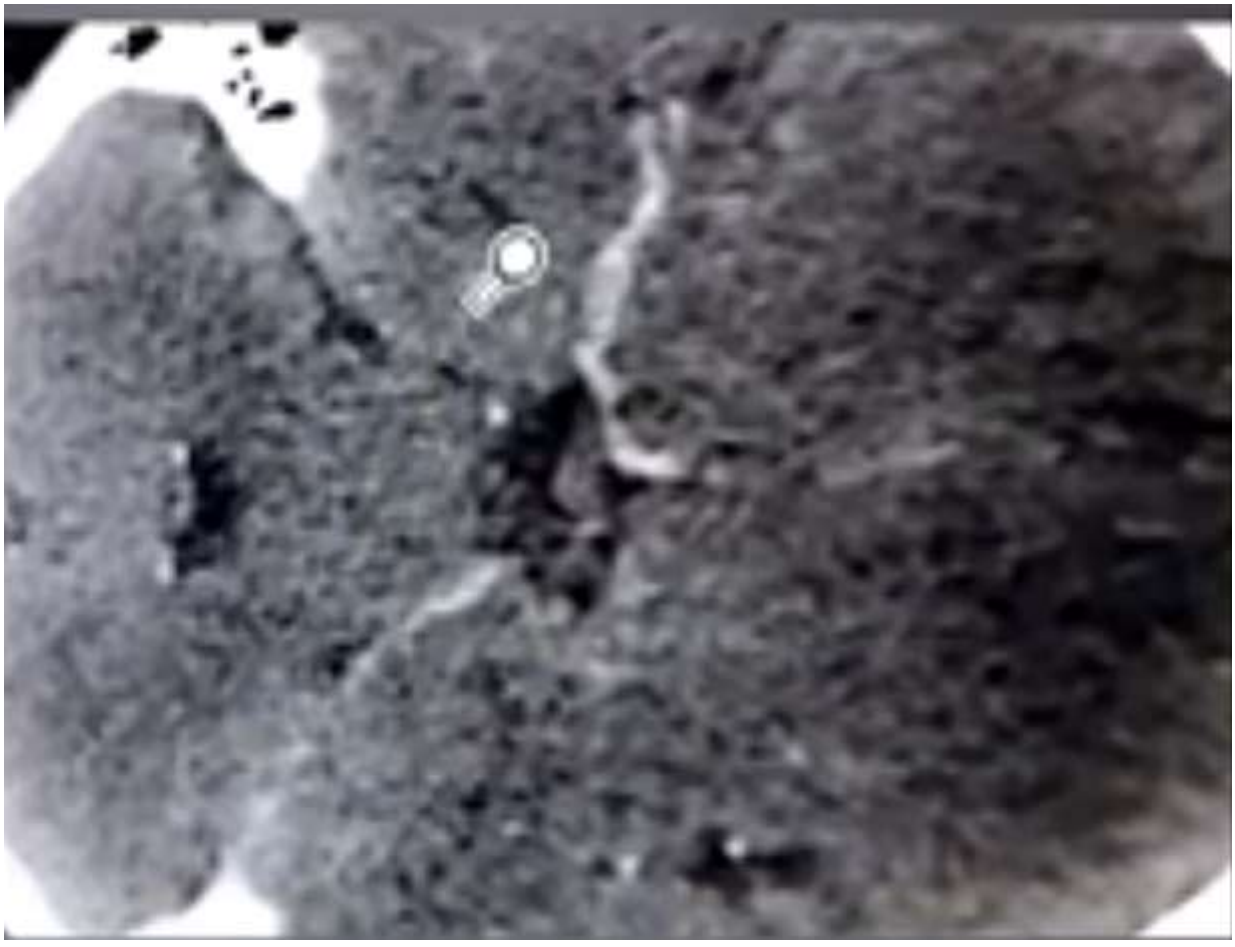


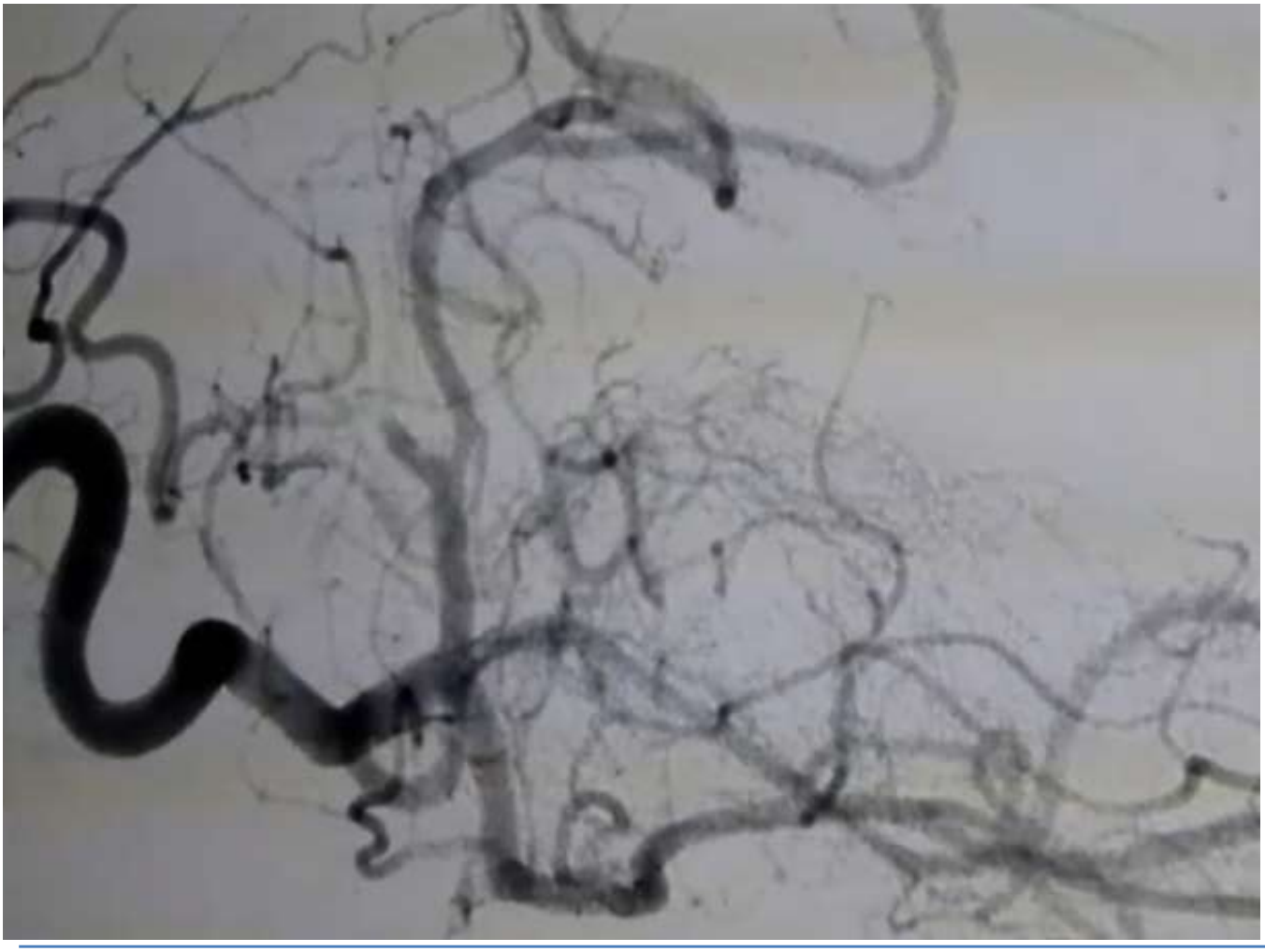


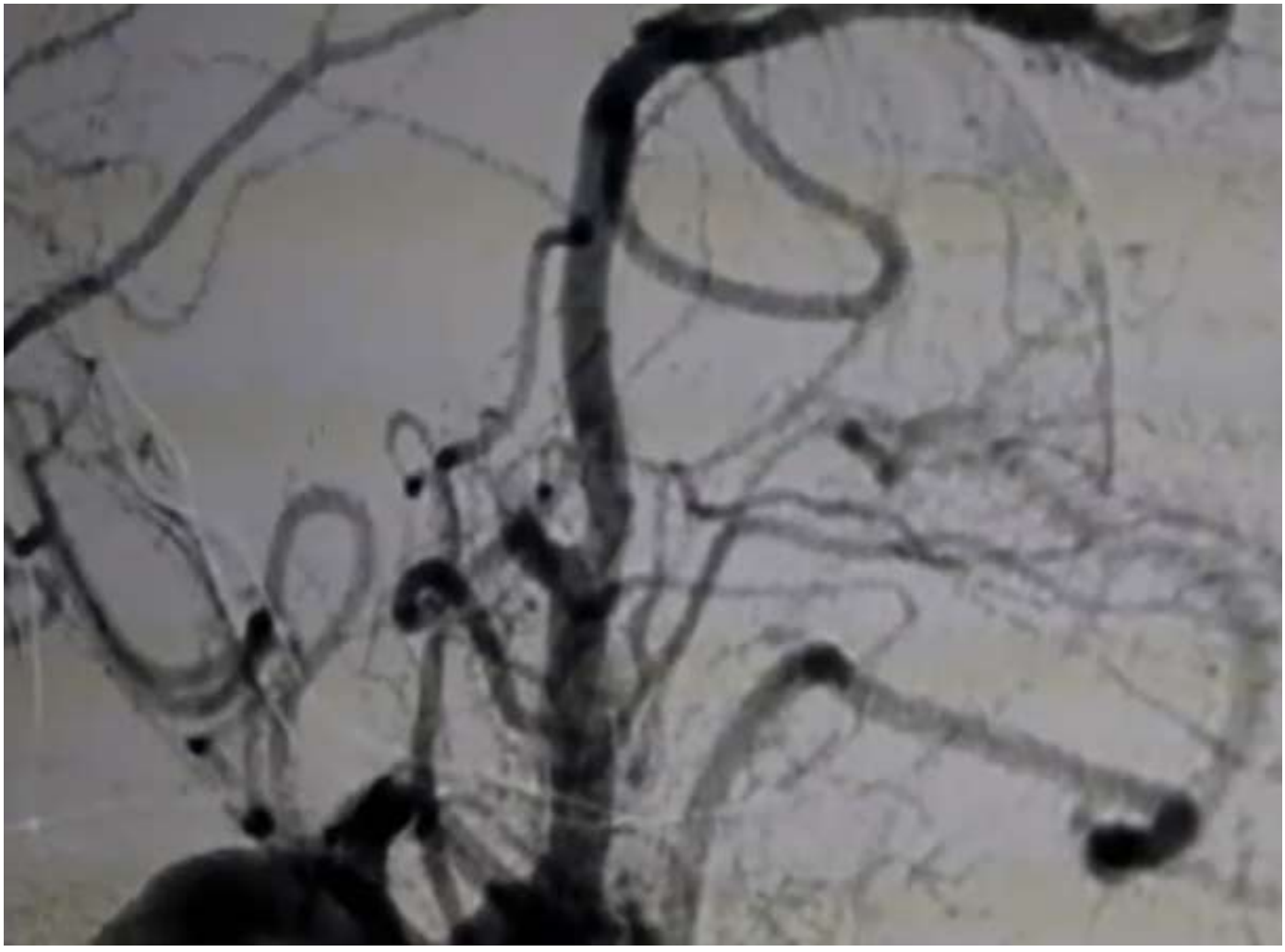
Cases

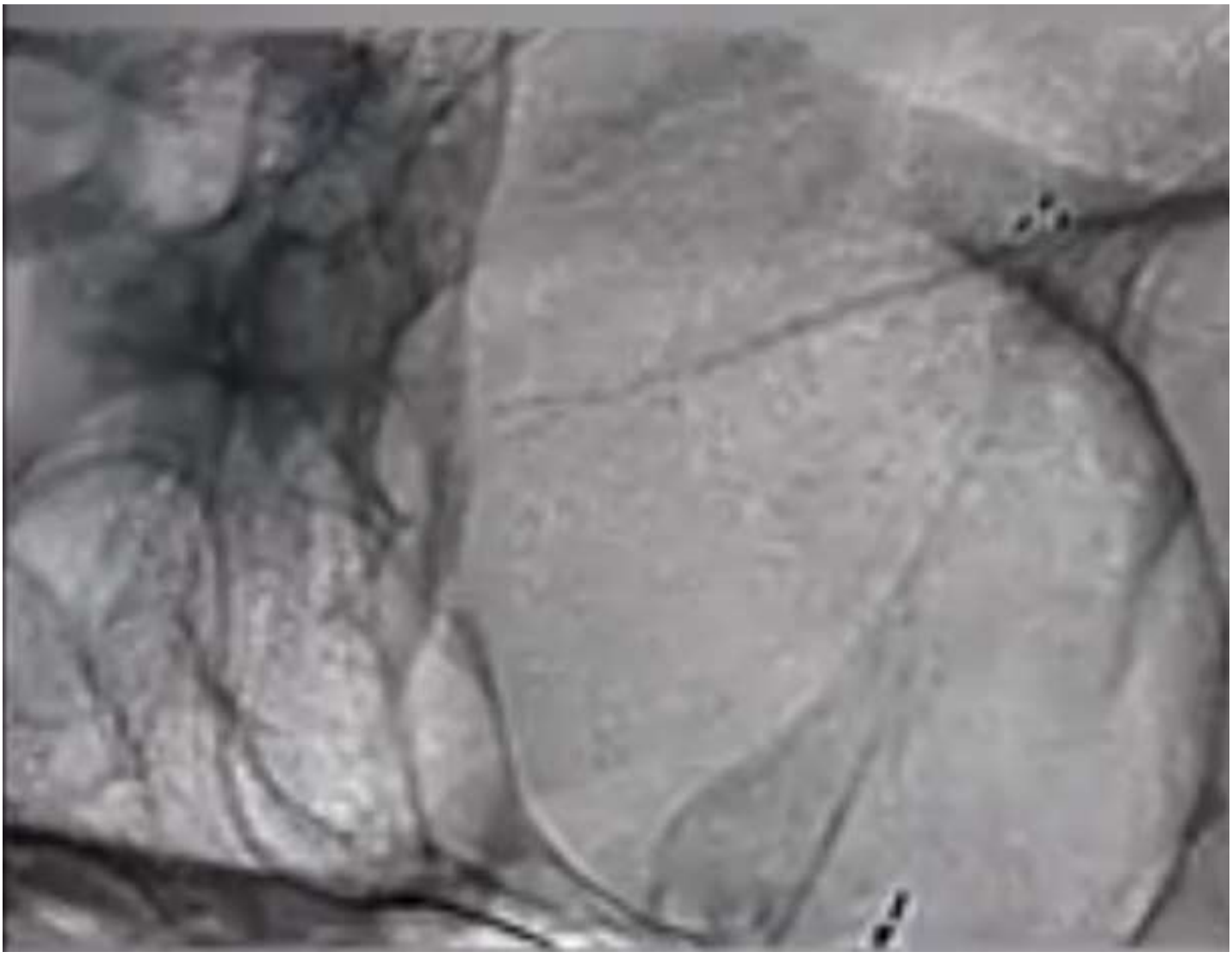
ARTERIAL TROMBECTOMY WITH STENT RETRIEVER SOLITAIRE.

We present the case of a patient in the fourth decade of life with a history of autoimmune disease, enter with neurological motor and sensory deficit, and left hemiparesis for which she is admitted to the emergency service of the Medellin Clinic, where tomography is performed initial that discards hemorrhage, in addition angioCT with thrombotic occlusion of the inferior branch of the right middle cerebral artery. Thrombolysis and subsequent percutaneous approach with arteriography and thrombectomy with Stent Retriever Solitaire. Complete recanalization is achieved and the patient progresses satisfactorily without residual neurological deficit. We show images.





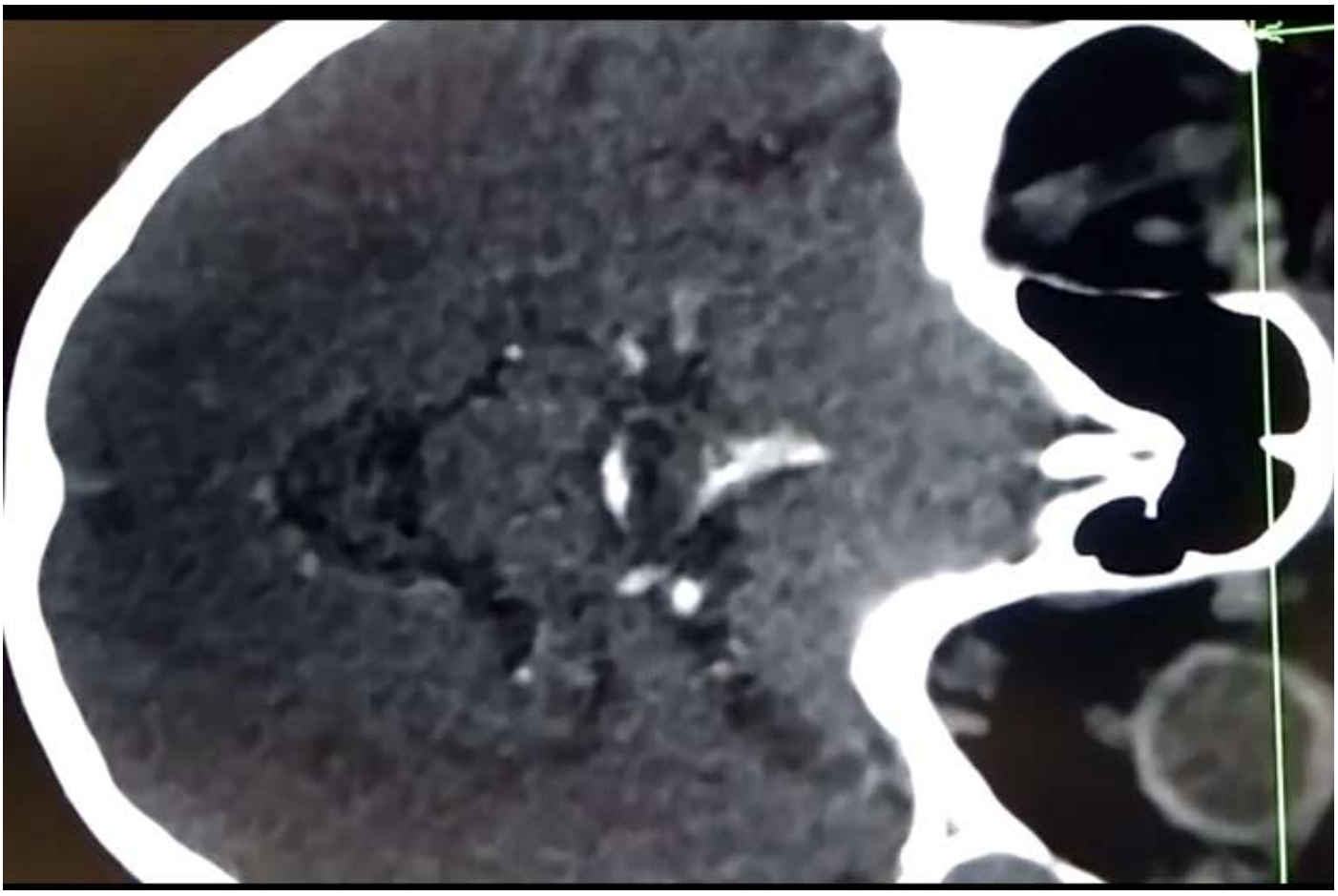




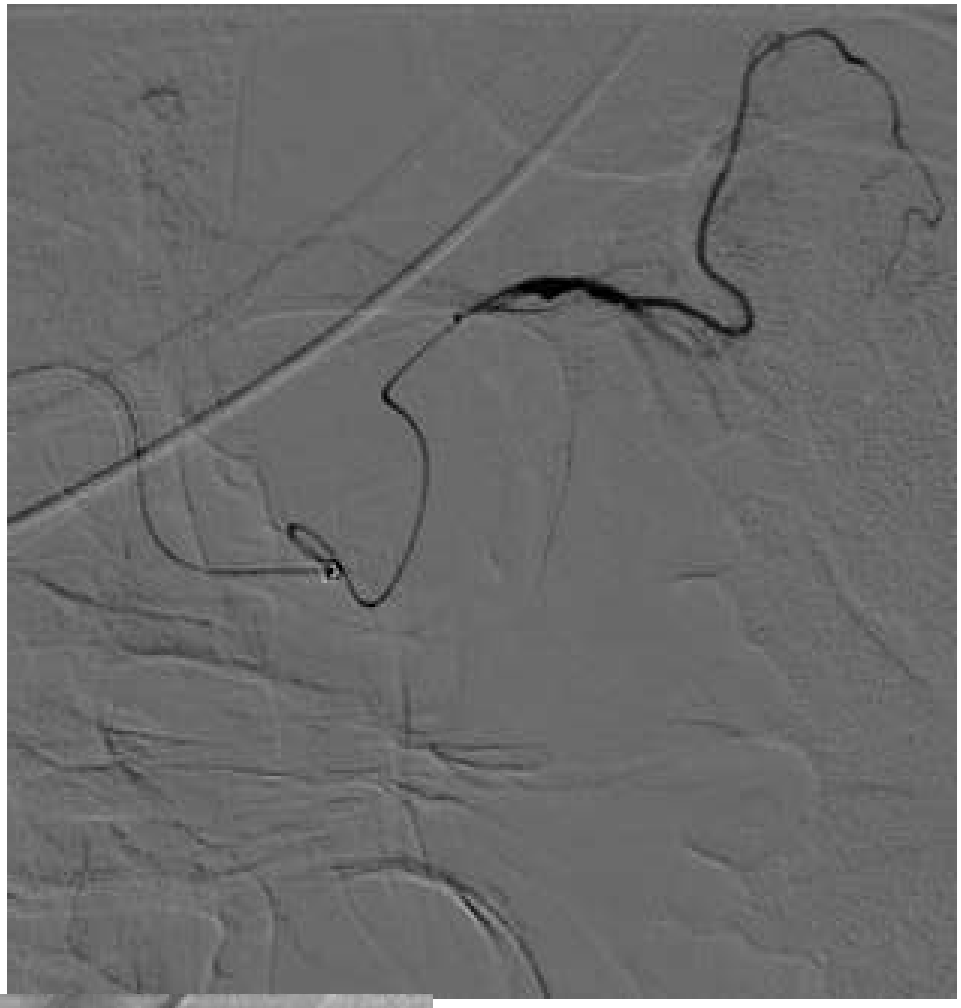
Cases

ARTERIAL TROMBECTOMY WITH THROMBOASPIRATION.
We present the case of a patient in the seventh decade of life with sudden neurological symptoms, in a coma, admitted with neurological motor and sensory deficit, for which she is admitted to the emergency department of the Medellín Clinic in the West where tomography is performed initial that discards hemorrhage, in addition angiotac with thrombotic occlusion of the right middle cerebral artery. Thrombolysis was performed and then a percutaneous approach with arteriography and thrombectomy with Sofia thromboaspiration catheter. Complete recanalization is achieved and the patient progresses satisfactorily without residual neurological deficit. Images are shown.





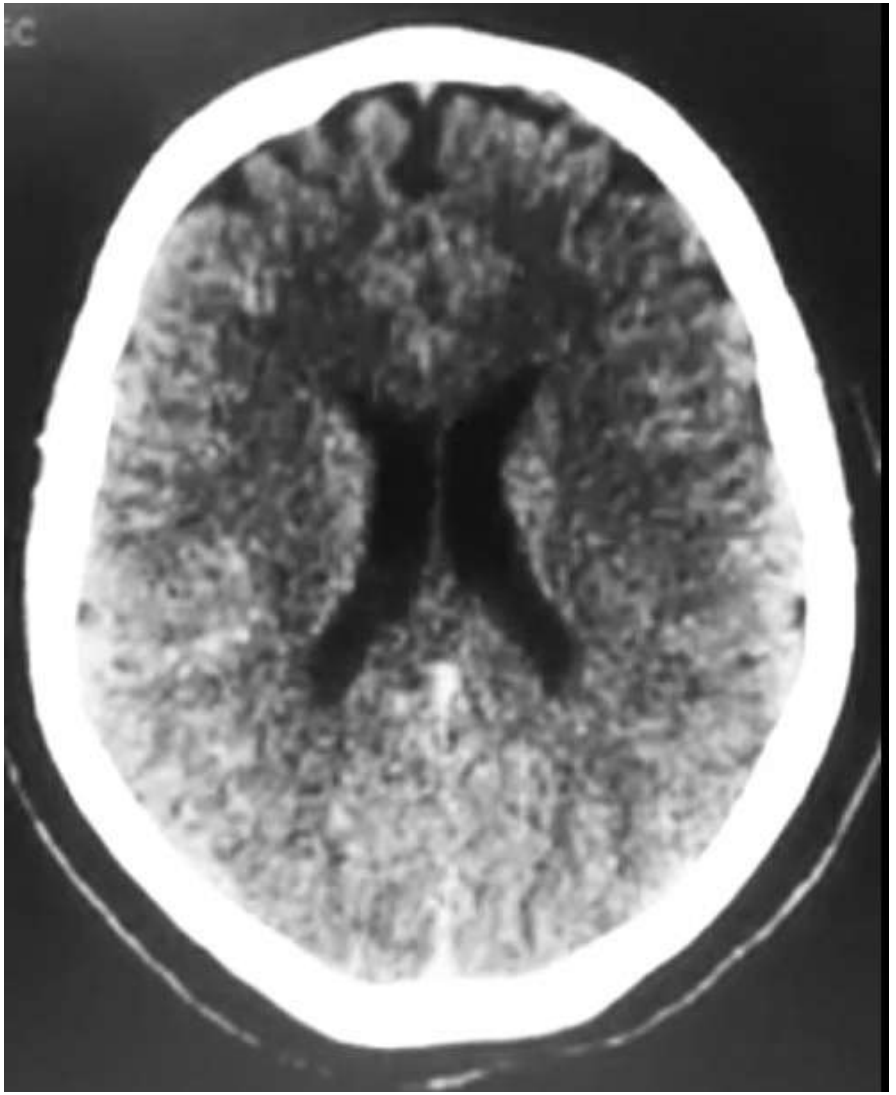








Control tomography that does not show Infarct



Conclusion

Dedicated neurovascular care units are needed (32)
The treatment of a disease as aggressive as cerebral thrombosis should be similarly aggressive in some cases with the premise all or nothing, where a patient can recover from the severe deficit that compromises their quality of life and that of the caregivers involved in an event massive vascular

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