ISNVD
International Society for Neurovascular Disease

INTERNATIONAL SOCIETY FOR NEUROVASCULAR DISEASE FERRARA 30-31 MAY ITALY

9° ANNUAL MEETING

CCSVI Prevalence and Jugular Percutaneous Transluminal Angioplasty (PTA) Indication in CCSVI-Associated Menière's Disease

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Disclosure Statement of Financial Interest

I Aldo Bruno **DO NOT** have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.

Menière P.: Maladies de l'oreille interne offrant des symptomes de la congestion cerebral apoplectiforme.
Gaz Med de Paris. 1861;16:88.

...if a serious hypacusia happens, then the cause of the vertigo is in the Labyrinth

Prospero Menière, 1861

He was the first to recognize that the function of equilibrium is in the inner ear

Symptoms he reported were
hypacusia, tinnitus, aural fullness and vertigo

Otology & Neurotology
26:74–81 © 2005, Otology & Neurotology, Inc.

Pathophysiology of Ménière's Syndrome: Are Symptoms Caused by Endolymphatic Hydrops?

Saumil N. Merchant, Joe C. Adams, and Joseph B. Nadol, Jr.

- Hystological and cytochemical alterations of fibrocytes and other nonsensory cells in the spiral ligament in an experimental model **precede and do not follow the Hydrops.**
- **EH would be caused by the rupture of the cellular and ultrustructural mechanisms controlling the endolymph omeostasis in the Stria Vascularis.**
- **These events could be provoked by cytotoxic events from unknown causes**

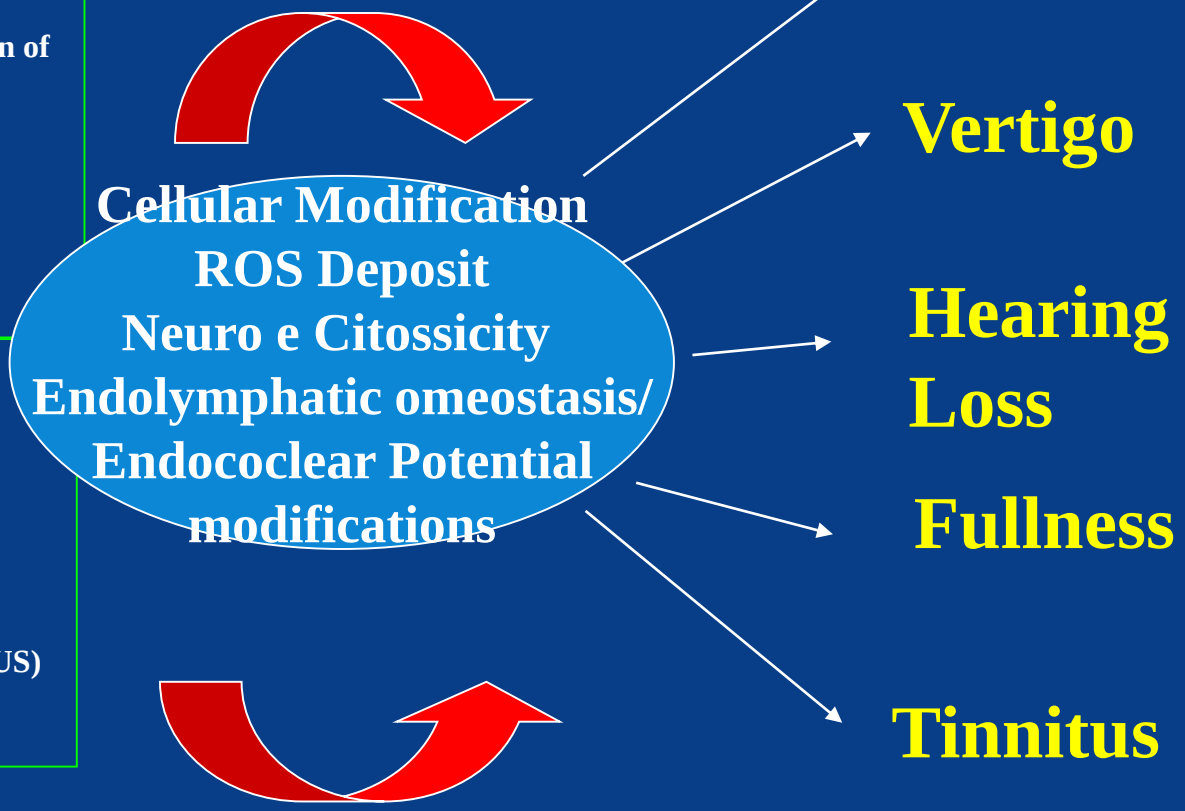
CONCLUSION

Endolymphatic hydrops should be considered as a histologic marker for Ménière's syndrome rather than being directly responsible for its symptoms.

Physiopatology of Meniere Disease

- Genetic Predisposition
- Autoimmunity
- Inflammation
- Blockage of the drainage/increase production of endolinfa
- ADH System- Aquaporine
- Canalopaty of membrane
- Headache

- Neurovegetaive Modification
- Viral Infection
- Diet deficiency
- Trauma
- Vascular factors (either arterous and VENOUS)
- ……



The modified“central dogma” of Meniere’s disease

(from an idea of Rauch and Merchant, 1989, 2005)

Epidemiology

- **Mean age of onset : 30-40 years old**
- **Rare in Childhood (1-2%)**
- **There are no significant gender differences**

Prevalence: data is not reliable

200-500/100.000 Finland (Gurkov,2016)

157/100.000 United Kingdom (Soheillipour, 2015)

50-100/ 100.000 China

100/ 100.000 USA

100/100.000 Italy

Currently there is no cure for Meniere's Disease

Dietary Therapy (low sodium diet)
Medical therapy (diuretics, betahistine,…)
Intratympanic therapy (steroids/ gentamicin)
Surgical therapy (sac decompression, selective vestibular neurotomy, labyrintectomy)

Intratympanic gentamicin and selective vestibular neurotomy are very effective in controlling vertigo
At present, Intratympanic gentamicin is the gold-therapy for the control of recurrent acute spells of vertigo in MD patients

Physiopatology of Meniere Disease

Our focus will be on the impairment of the venous drainage of the inner ear as a possible cause leading to…

Cellular Modification
ROS Deposit (Iron?)
Neuro e Citossicity
Endolymphatic homeostasis
Endococlear Potential modifications

Endolymphatic Hydrops

Vertigo

Hearing Loss

Tinnitus

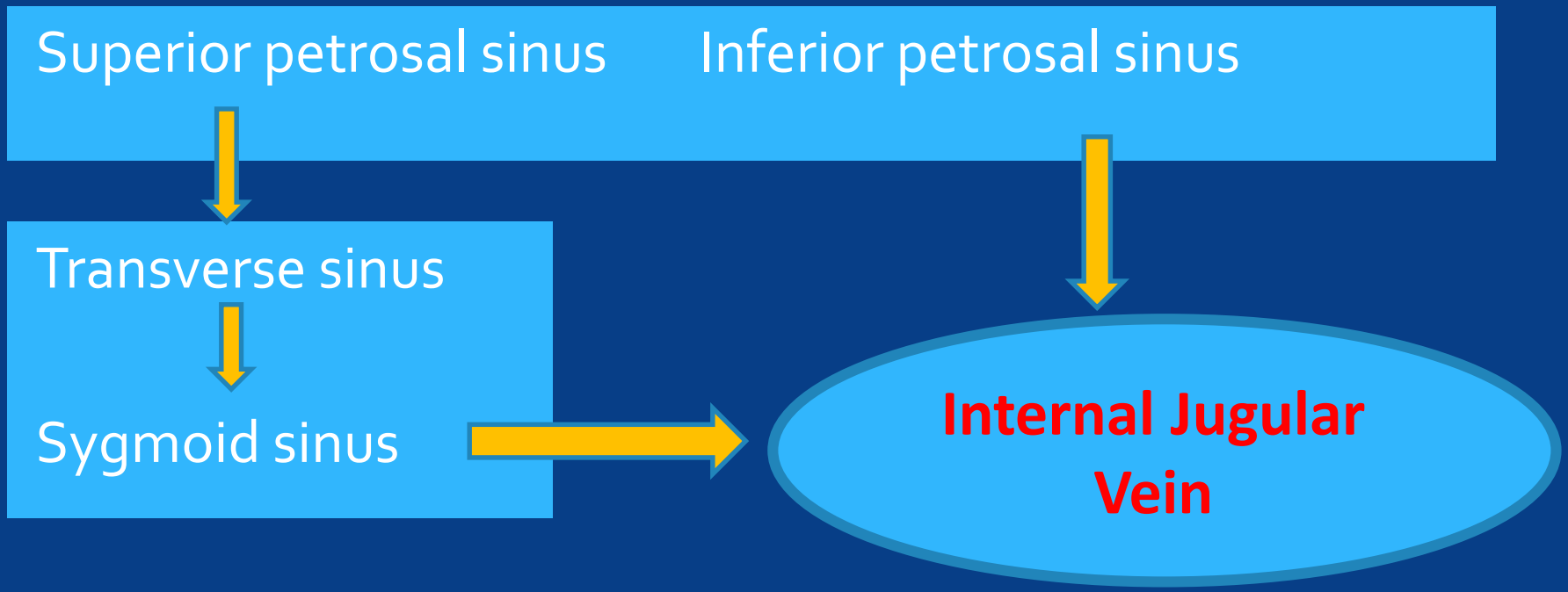
Aural fullness

VENOUS DRAINAGE

Internal auditory vein

Vein of cochlear aqueduct

Vein of vestibular aqueduct



Laryngoscope 2007 Feb;117(2):194-8.

A potential portal flow in the inner ear.

Friis M, Qvortrup K.
Source Department of Otolaryngology, Head and Neck Surgery, Unviersity of Copenhagen, Rigshospitalet, Copenhagen, Denmark.
morten_friis@hotmail.com

Abstract

Objectives/Hypothesis: The aim of the present study was to visualize the flow direction of blood in the extraosseous part of the vein of the vestibular aqueduct (VVA) and to explore the effect of an induced obstruction in the distal part of the VVA before it merges with the sigmoid sinus. The endolymphatic sac has been implicated as a potential endocrine gland, which venules drain to the VVA. A reversal of the direction of flow in the VVA toward the inner ear could, through vestibular arteriovenous anastomosis, cause portal circulation in the inner ear.

Study Design: The authors conducted an experimental animal study using in vivo fluorescence microscopy.

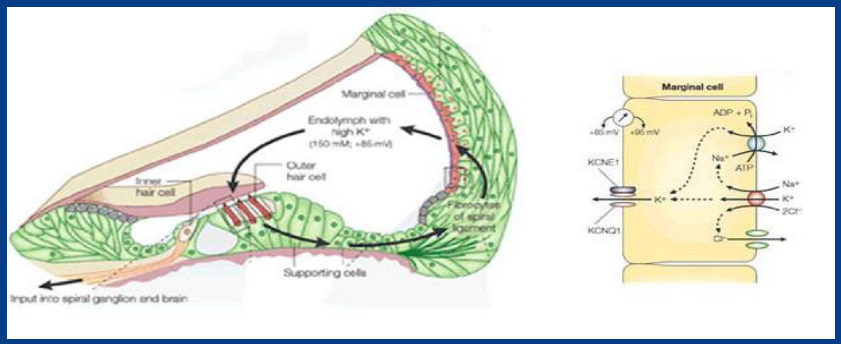
Results: Obstructing the distal part of the VVA just before it empties into the sigmoid sinus immediately reverses the flow of blood in the VVA toward the inner ear. We considered: SE produces ADH which, in a little amount, through the anomalous portal flow of the inner ear, could affect the idro-ionic metabolism of the inner ear fluids

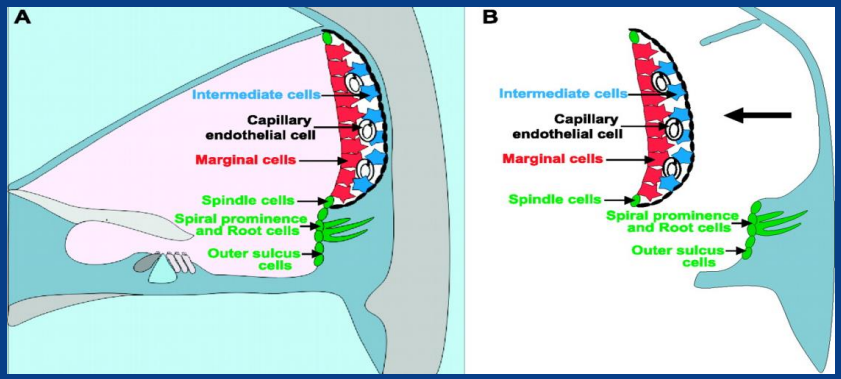
Conclusions: After an obstruction of the VVA, the drained venous blood from the endolymphatic sac may enter a portal circulation in the inner ear, which could cause disturbances in the endolymph homeostasis and potentially symptoms as seen in Meniere disease

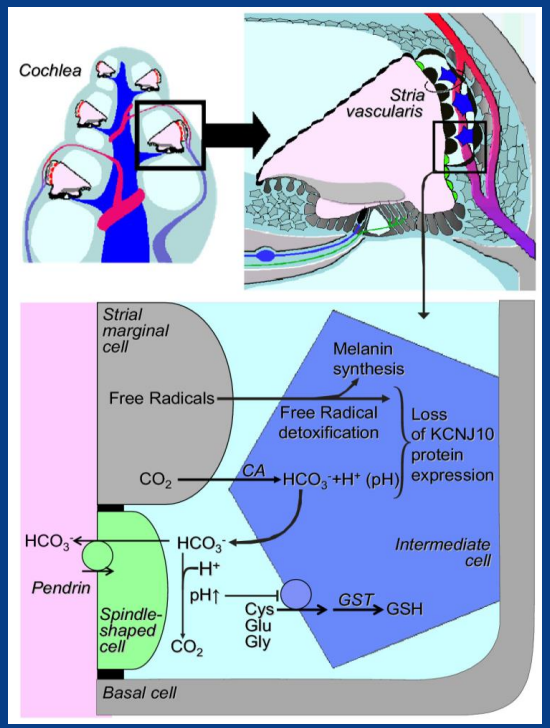
VASCULAR FINDINGS IN MD

Stria vascularis has an important role in the production, reabsorbtion and metabolysm of endolymph. It has been hypothesized that it is involved in pathological events leading to Endolymphatic Hydrops in Menière' disease

Remember: stria vascularis has only vascular epythelium

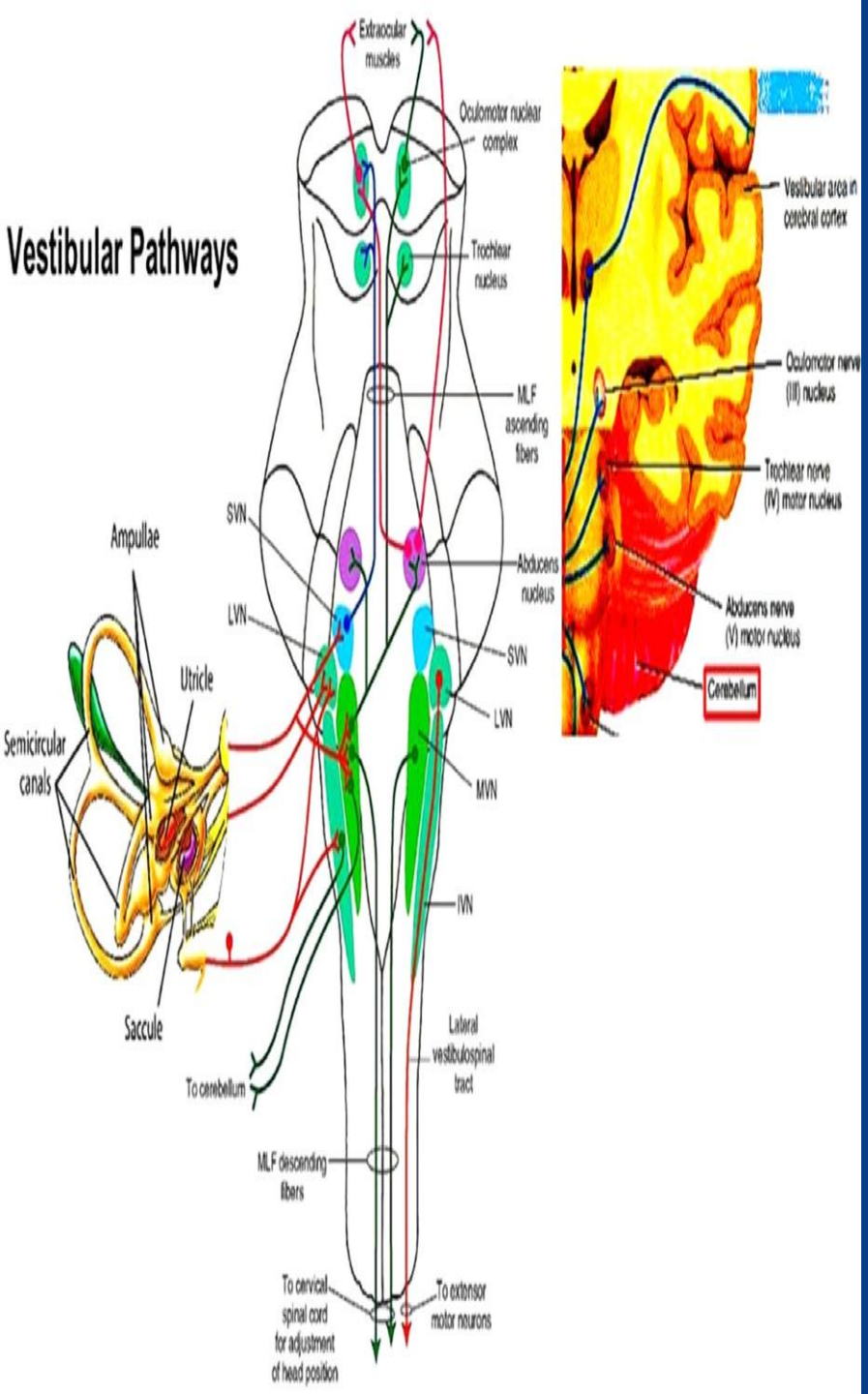






Vascular findings in MD

- Stria vascularis is severely atrophic and degenerated in patients with MD. (Paparella et al., 2007)
- The number of vessels in the stria vascularis in ears with MD is smaller than in normal controls in all cochlear turns. (Paparella et al., 2009)



Our speculation is supported by the data reported by O' Malley et al. who found microglia-like cells in the cochlea (O'Malley et al., 2016) and in the vestibular apparatus (Echard et al., 2015) of patients with autoimmune diseases such as Meniere disease. This aggression by microglia may determine a lesion with an area large enough to generate vertigo (Venneti et al., 2013).


Trentino
Alto Adige
Valle d'Aosta
Friuli Venezia Giulia
Lombardia
Veneto
Piemonte
Emilia Romagna
Ligunia
Toscana
Marche
Umbria
Lazio
Abruzzo
Molise
Sardegna
Puglia
Campania
Basilicata
Calabria
Sicilia

AMMI ONLUS

ASSOCIAZIONE MALATI MENIÈRE INSIEME

Ethics

The experimental study was approved by the local authority and was in accordance with the guiding principles in the care of patients

- ALL PATIENTS ENROLLED IN THIS STUDY WERE ALREADY IN TREATMENT AT REFERRED ENT DEPARTMENTS.

- SOME OF THEM PREVIOUSLY UNDERWENT INTRATYMPANIC INJECTION OR SURGICAL TREATMENT FOR MENIERE'S DISEASE SYMPTOMS, HOWEVER WITHOUT RECEIVING BENEFITS

- OUR GROUP WORKED ON BOTH DIAGNOSIS AND THERAPY- PTA OF CCSVI IN MENIERE'S DISEASE

Neck veins to be examined within the CCSVI Examination Protocol

IJVs – Internal Jugular Veins (examined side Left and Right both sitting 90° and supine 0° position)

VVs – Vertebral Veins (examined side Left and Right both sitting 90° and supine 0° position)

MATERIAL and METHODS 2013-2019

520 Patients with definite Meniere's disease

250 men, 270 women

Age 44 +/- 22.3 years

Definite Meniere's disease

- Two or more definitive spontaneous episodes of vertigo 20 minutes or longer
- Audiometrically documented hearing loss on at least one occasion
- Tinnitus or aural fullness in the treated ear
- Other cases excluded

102 healthy subjects

48 men and 54 women

Age 49.3 +/- 7.8

CCSVI Positivity in definite Meniere's disease

- **416/520 PATIENTS WITH MD (80%)**
- 12/102 HEALTHY SUBJECTS (12%)

P<0.001

In Meniere'Disease there is often a lesion of both IJV

In Unilateral, the side with Meniere's has more significant lesions.

In the bilateral form, the side with the longest onset of disease has a greater steno-obstruction.

However, there are exceptions

MRI PROTOCOL

MRI BRAIN, EAR AND ARTERIAL AND VENOUS SYSTEM OF THE NECK AND OF THE BRAIN

Evalutation of the ear
(exclude neurinoma VIII and ponto-cerebellar angle assessment)

Evaluatation of intracranial arterial and venous vascular system
(Trasverse-Sigmoid Sinus, Upper and Inferior Petrus Sinus)

Evaluatation of the arterial and venous system of the neck (Flow rate and volume of all IJV)
Evaluatation of Thin Layer Sequence of the neck vessels to analyse the CSA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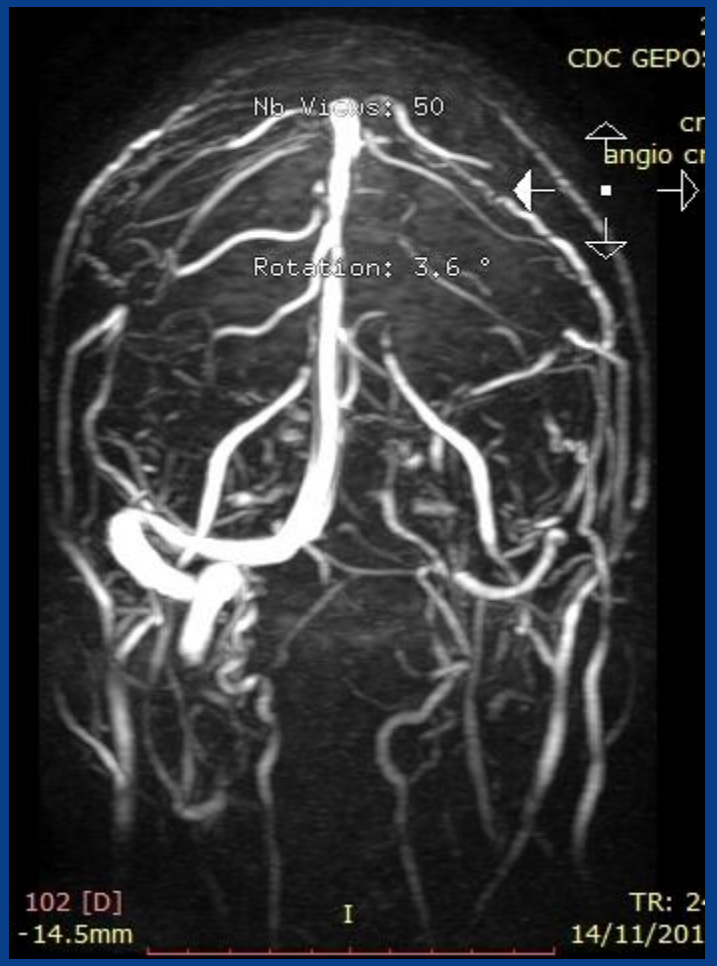
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PTA for CCSVI: Our Protocol

- ✓ Local anesthesia
- ✓ Percutaneous trans-femoral venous catheterization (sn / dx)
- ✓ Cavography (Lower and Upper)
- ✓ Selective catheterization of the internal jugular veins and of the azygos vein
- ✓ Selective venography in the three projections and assessment of the empty time
- ✓ Sodium heparin 2500 IU
- ✓ PTA balloon non-compliant with Ø 10-20 mm (routine Ø 14-16 mm) for IGV and 8-12 for AV
- ✓ control angiography
- ✓ Manual compression for hemostasis
- ✓ Compressive dressing (no need for percutaneous systems of hemostasis)
- ✓ Bed rest with leg extended for 12 hours

The main criteria adopted to define stenosis of the IJV or AV with venography were:

- At least 50% stenosis of the vein compared with the diameter of an adjacent segment of the vein.
- Emptying time of over 6 seconds in all vein projections.
- Intraluminal abnormalities (web, septa, valvular).
- Collateral veins with a faster emptying time compared with IJV or AV.

Type A (4%) **stenosis of both proximal segments of the Azygos vein and the IJV with a contralateral IJV size increased (> cross-sectional area)**

Type B (35%) **hemodynamically significant stenosis of both IJV and proximal Azygos Vein**

Type C (60%) **bilateral stenosis of the IJV with normal azygos**

Type D (1%) **multiple azygos and lumbar system lesions .**

In Meniere's Disease mainly Type C and Type B of CCSVI were observed

The collateral circulations that occur most frequently are those of the condylar system, pterygoid plexus and thyroid veins


BEFORE PTA


AFTER PTA


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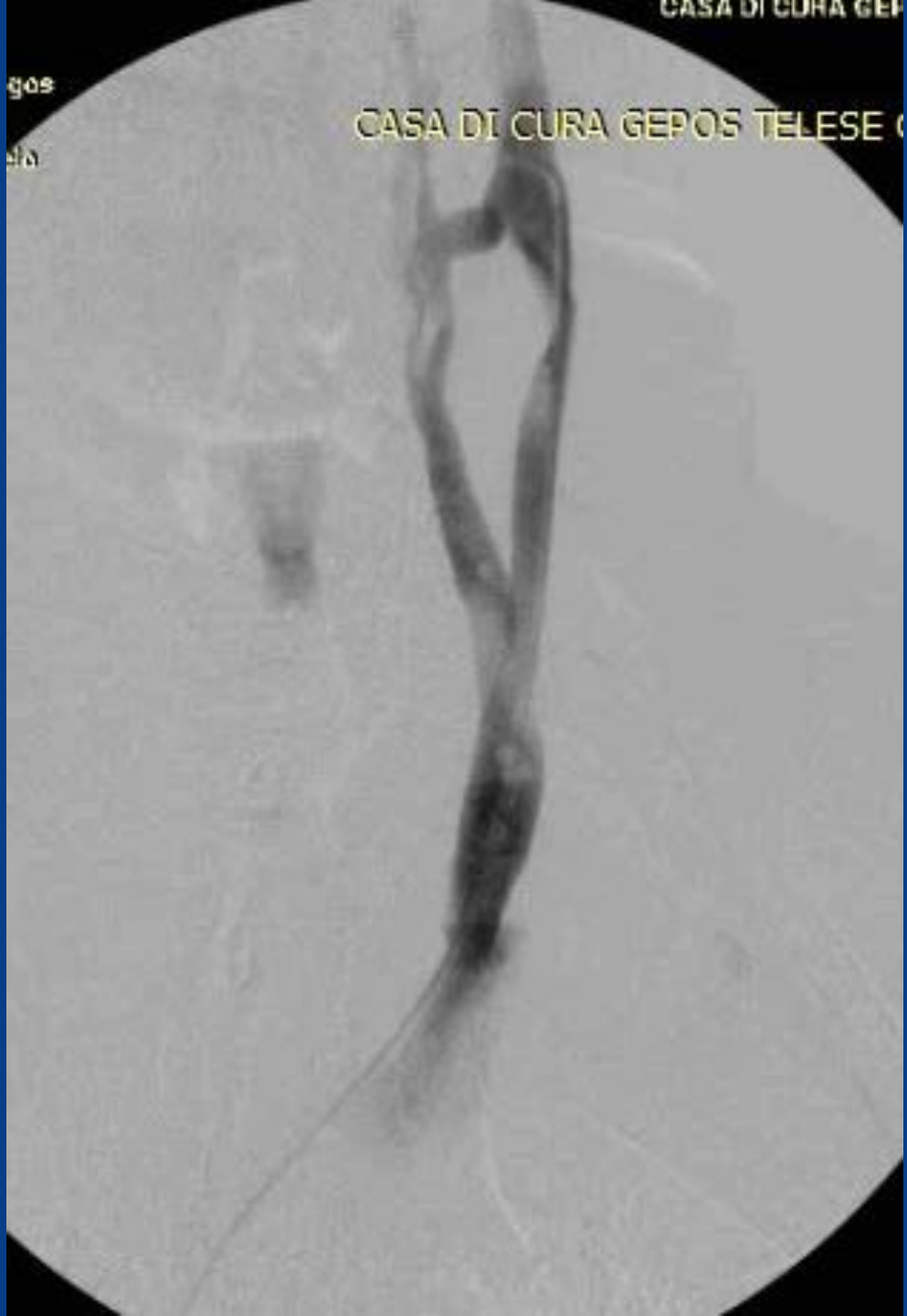
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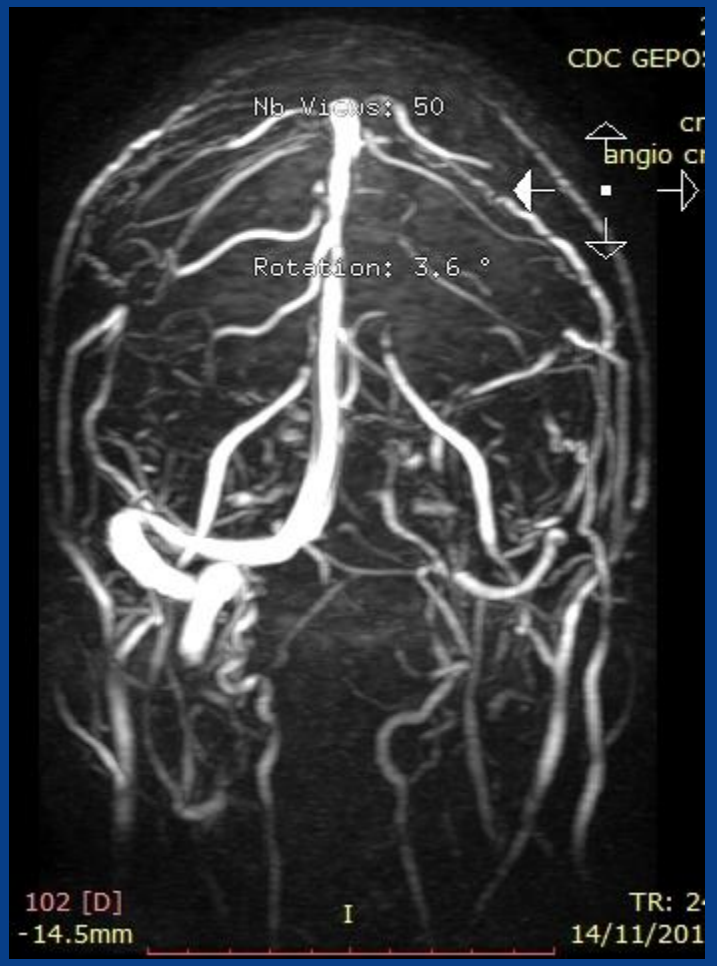
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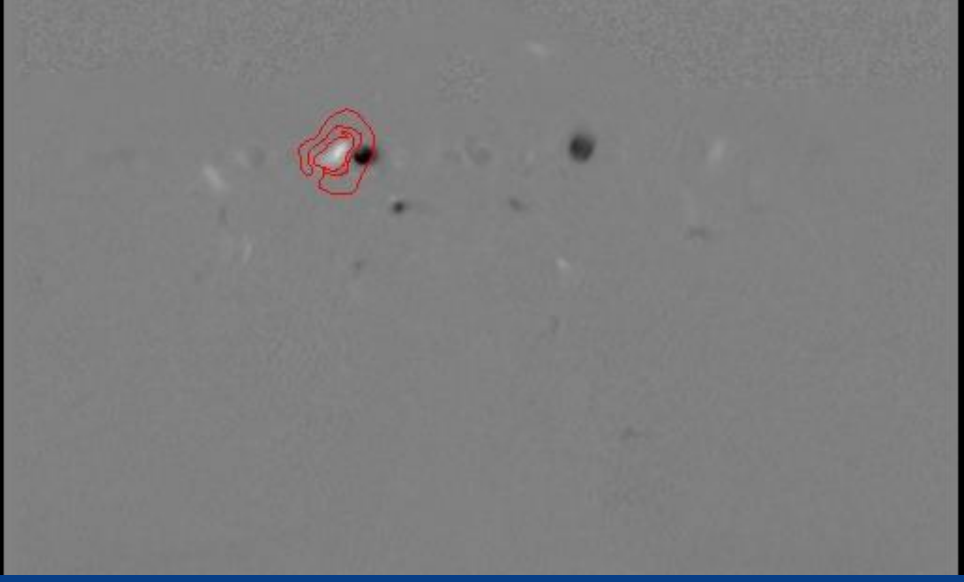

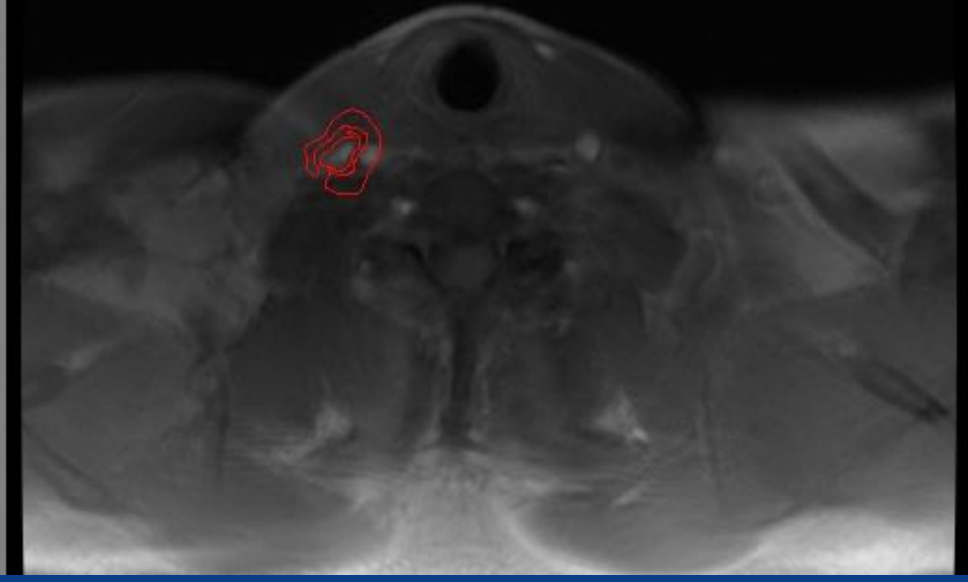

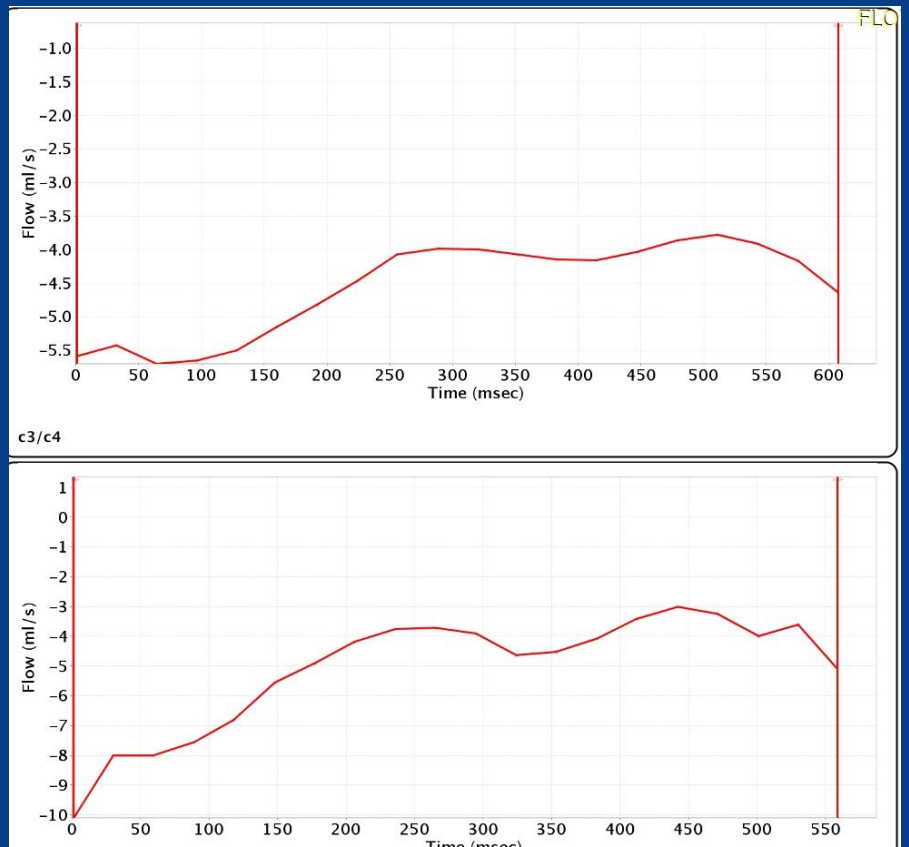
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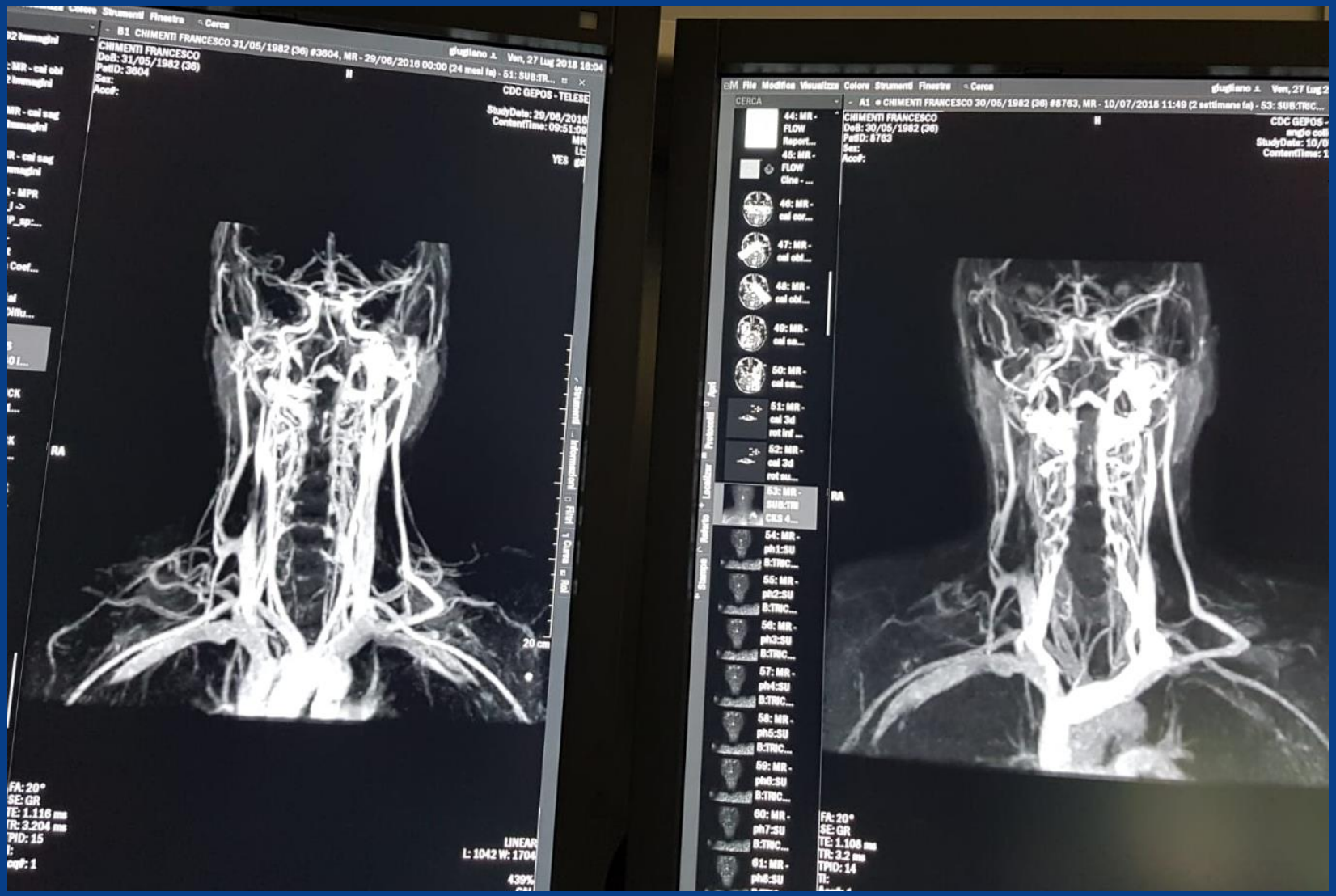
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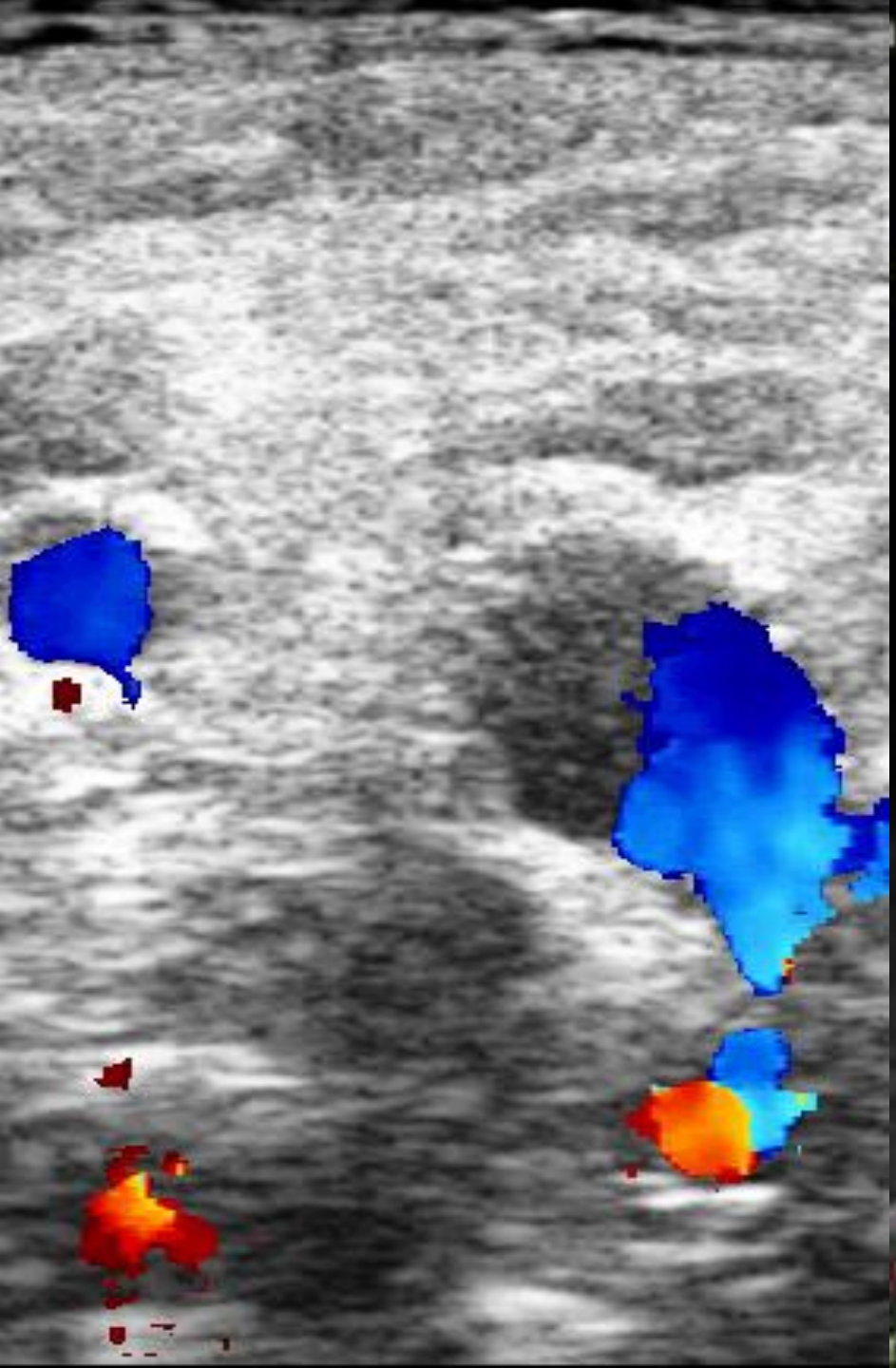
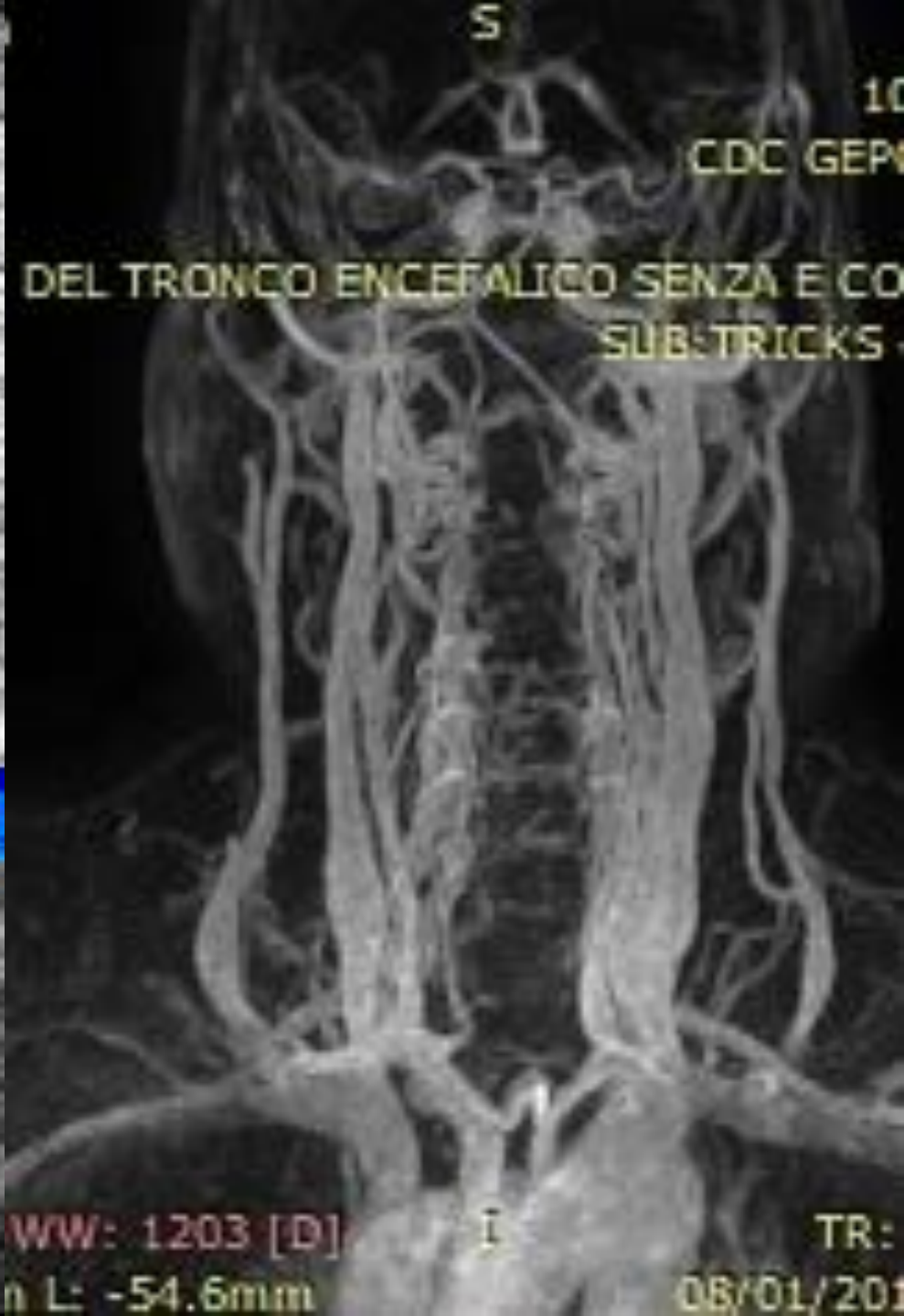
2018

RIGHT SIDE

LEFT SIDE

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BEFORE PTA

AFTER PTA


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CASA DI CURA GEPOS TELESE CHIRURGI
20
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OUR CLINICAL SERIES

Vascular Surgeon: Aldo BRUNO, Telese Terme, Benevento (Italy)

From April 2013 to April 2019

151 PTA PROCEDURES

- 70 Male
- 81 Female

Mean Age: 47 years.

Unilateral Meniere's Disease : 105 cases
Bilateral Meniere's disease: 46 cases
Onset of the disease from 1 to 28 years

All patients, either unilateral and bilateral MD, were operated bilaterally

RESULTS

Angiographic success vs Intention-To-Treat: 130/151 (84.5%)

Major complications (DVT, rupture, hemorrhage) : 0%

Minor complications (Fibrosis IGV by sonography after one month and one case of inguinal hematoma): 5/151 pts (<3%)

Unchanged: 10/151 pts (7%)

Secondary Clinical deterioration : 20/151 pts (14%)

Restenosis of jugular lesions: 12 pts (8%)

Nine of them presented worsening of Meniere's disease symptoms

Results of PTA on Meniere's disease symptoms

ONLY BY ENT EVALUTATION

The venous stasis of the head and neck veins may be considered a further etiopathogenetic mechanism which adds to many other already known mechanisms that still define MD as a multifactorial disease


THANK YOU VERY MUCH