Diagnóstico de cefaleas secundarias y primarias

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Neurólogo

Epidemiologia

- En el mundo existen casi 3 billones de personas con cefaleas,
- De ellas 1.89 billones son por cefalea tensional y 1.04 por migraña
- La cefalea tensional la prevalencia global estandarizada por edad es 30.8% para mujeres y 21% para hombres
- Mientras que la prevalencia de la migraña es 19% para mujeres y 10% para hombres

español		inglés
Mil	1,000	Thousand
Mil cien	1,100	Eleven hundred
Millardo (Mil millones)	1,000,000,000	Billion
Billón (millón de millones)	1,000,000,000,000	Trillion
Trillón (billón de billones)	1,000,000,000,000,000,000	Quintillion

GBD 2016 Headache Collaborators. Global, regional, and national burden of migraine and tension-type headache, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet Neurol 2018;17(11):954-976

Cefalea secundaria

Warning Signals to Raise Suspicion of Secondary Causes of Headache Using the Mnemonic SNOOP$_4$[a] TABLE 1-1

Letter	Warning signal	Features	Differential diagnosis
S	Systemic symptoms	Fever, night sweats, chills, weight loss, jaw claudication	Metastases, giant cell arteritis, infection (central nervous system, systemic)
	Secondary diseases	Cancer, immunosuppression, chronic infection (human immunodeficiency virus [HIV], tuberculosis)	
N	Neurologic symptoms/signs	Confusion, focal neurologic symptoms/signs, diplopia, transient visual obscurations, pulsatile tinnitus Amsler test	Mass lesion, structural lesion, stroke, hydrocephalus
O	Onset	Thunderclap	Reversible cerebral vasoconstriction syndrome (RCVS), stroke, subarachnoid hemorrhage, cerebral venous sinus thrombosis, arterial dissection, pituitary apoplexy, idiopathic intracranial hypertension
O	Older (age >50 years)	New onset, persistent/progressive headache	Mass lesion, giant cell arteritis
P1	Positional	Orthostatic, recumbent, or worsens with change in position	Low intracranial pressure (CSF leak), mass lesion, cerebral venous sinus thrombosis, sinus pathology
P2	Prior history	New onset or change to persistent/daily headache	Mass lesion, infection (central nervous system/ systemic)
P3	Pregnancy/ postpartum	New onset during pregnancy	Cerebral venous sinus thrombosis, preeclampsia, RCVS, pituitary lesion, stroke
P4	Precipitated by Valsalva	Cough, sneeze, bending, straining	Intracranial/posterior fossa mass, Chiari malformation

CSF = cerebrospinal fluid.
[a] Data from Dodick DW, Semin Neurol.[3]

Table I: Names of Conditions and Diseases With Links to Numb Chin Syndrome

Numb Chin Syndrome Links		
Non-Dental Related	Metastatic or Recurrent Cancer	Breast Lung Prostate Lymphoma Leukemia
	Systemic Disease	Multiple Sclerosis Diabetes
	Other	Benign tumors Radiotherapy Osteomyelitis Abscess
Dental Related	Iatrogenic Trauma	Extractions Mandibular surgery Implants Ill fitting dentures

Please note that metastatic and recurrent cancer of the breast ranks the highest followed by lymphoma

Caso clinico

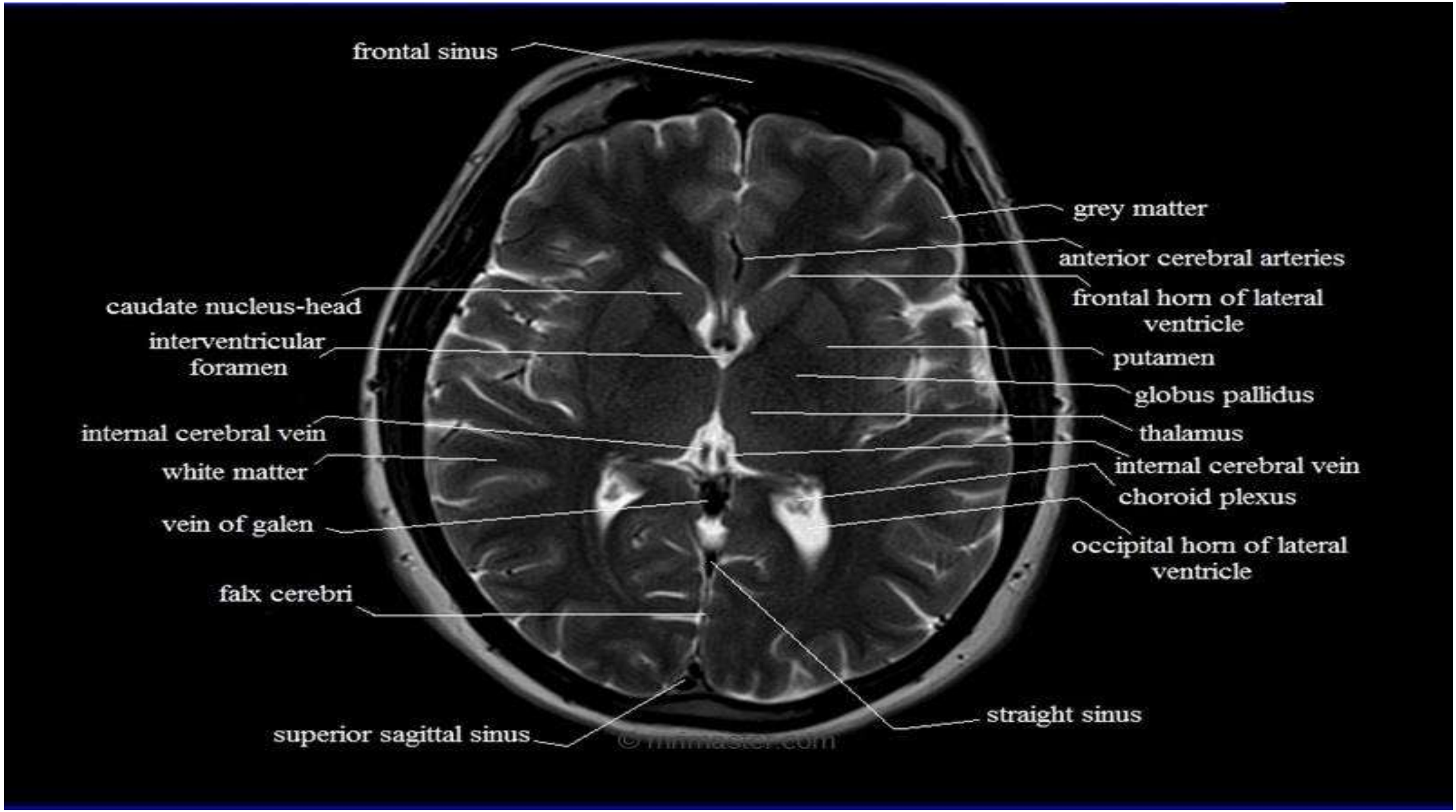
- Un hombre de 38 años acudió al servicio de urgencias para evaluación de cefalea. El dolor de cabeza comenzó repentinamente durante el coito y fue de una calidad palpitante. Comenzó en la región occipital, pero luego se generalizó rápidamente para envolver toda su cabeza. Vomitó dos veces y refirió náuseas continuas y sensibilidad a la luz, y el dolor de cabeza empeoró con el movimiento.

Caso clinico

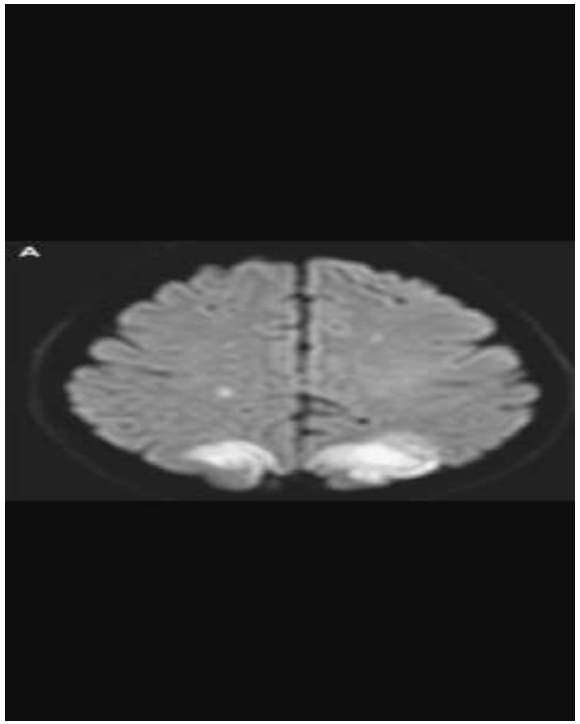
- Su examen fue notable por presión arterial elevada (160/98 mm Hg), pero todos los demás signos vitales y examen neurológico fueron normales. La TC craneal sin contraste fue normal y la punción lumbar fue acelular con proteínas y glucosa normales. El médico del servicio de urgencias diagnosticó al paciente con migraña, lo tranquilizó y le dio de alta con una prescripción de 10 comprimidos de oxicodona.

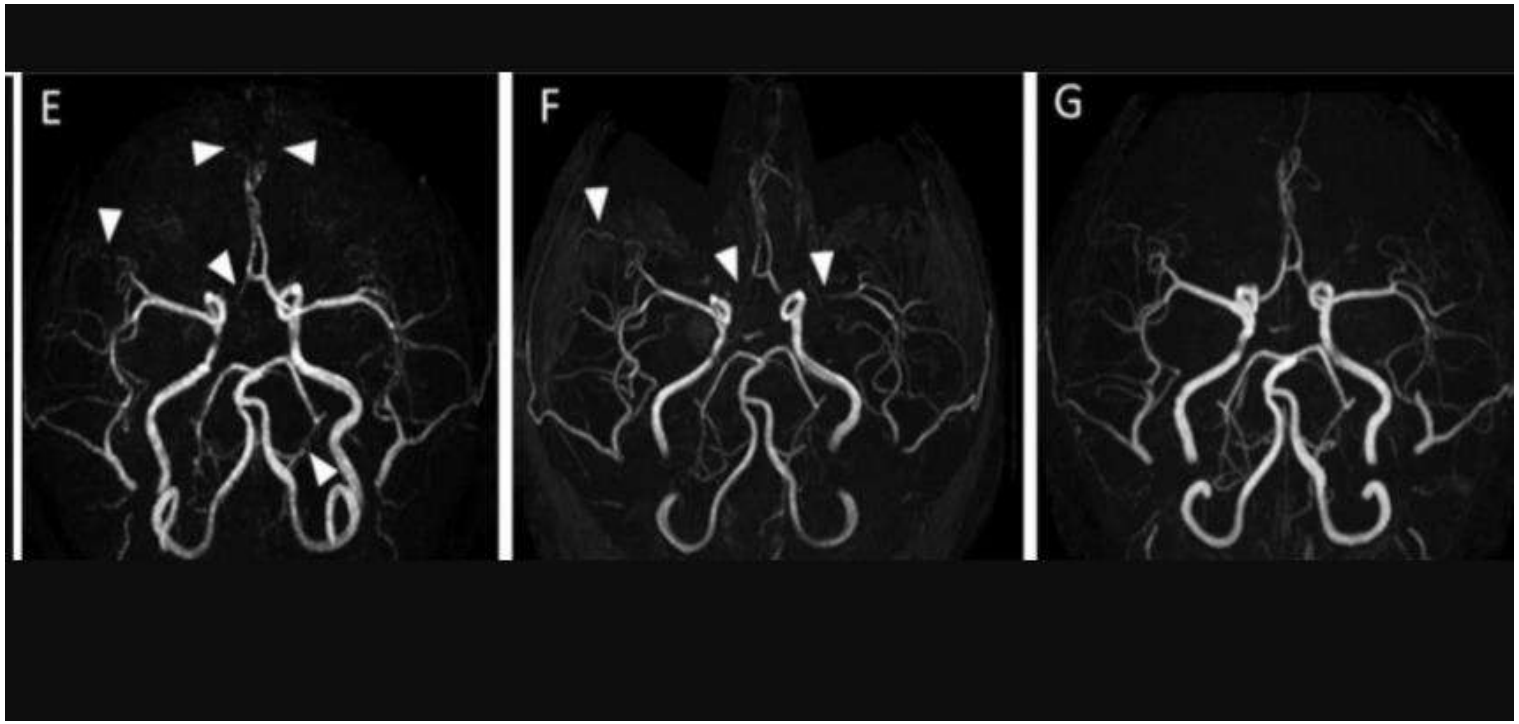
Caso clinico

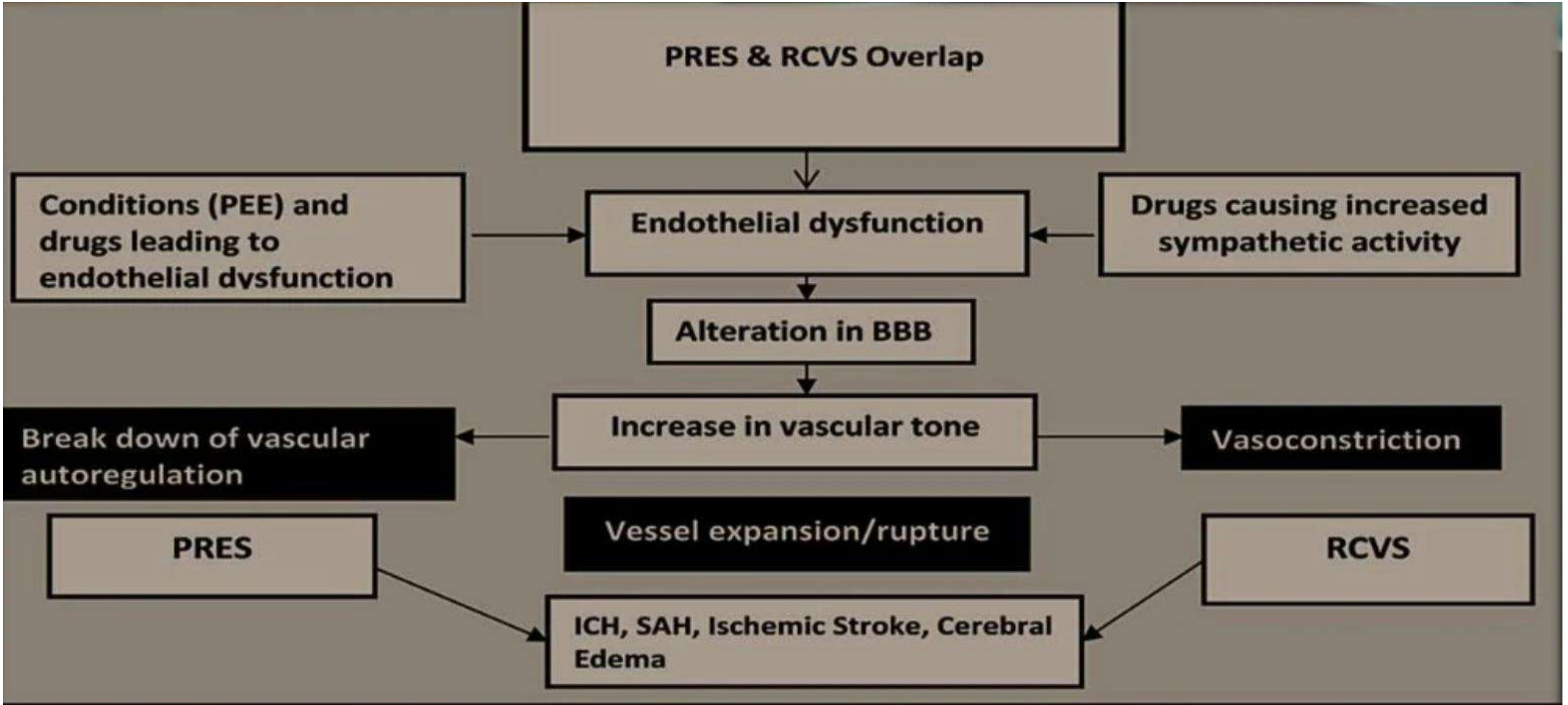
- El paciente regresó al servicio de urgencias 2 días después con un dolor de cabeza recurrente que se presentó mientras se esforzaba en el inodoro. Fue explosivo y generalizado, y nuevamente vomitó varias veces. El examen nuevamente reveló presión arterial elevada (170/100 mm Hg) y la repetición de la TC de cabeza fue nuevamente negativa. Se solicitó una resonancia magnética cerebral con gadolinio:


frontal sinus
grey matter
anterior cerebral arteries
caudate nucleus-head
frontal horn of lateral ventricle
interventricular foramen
putamen
globus pallidus
internal cerebral vein
thalamus
white matter
internal cerebral vein
choroid plexus
vein of galen
occipital horn of lateral ventricle
falx cerebri
straight sinus
superior sagittal sinus

RCVS: Reversible Cerebral Vasoconstriction Syndrome







Abbreviations: PEE= Preeclampsia/Eclampsia, PRES= Posterior reversible encephalopathy syndrome, RCVS= Reversible cerebral vasospasm, BBB= Blood brain barrier, ICH= Intracranial hemorrhage, SAH= Subarachnoid hemorrhage

O'Neal MA, Feske SK Stroke in pregnancy: a case-oriented review Practical Neurology Published Online First: 08 September 2015.

Fenotipos de cefaleas primarias

- Migraña: Generalmente unilateral, pulsátil, fotofobia, nausea, inhibición, intensidad
- Cluster: Lagrimeo unilateral, congestion nasal, rinorrea
- Tipo Tensional: Opresion “sorda”, sin síntomas acompañantes
- Estos síntomas se presentan también en una extensa variedad de enfermedades secundarias

- Puede haber traslape de cefaleas, y de debe de estar pendiente de Las banderas rojas, el perfil temporal. Ver abordaje SNOOP4 (Posicion, Previos Hx, Pregan, Prec-Val)
- Cefalea simple, súbita o perdida de períodos libres de cefaleas, entre cefaleas recurrentes, a pesar del fenotipo de la cefalea.
- Recordar el apartado de la Classification of Headache Disorders, Third Edition (ICHD-3): No existe mejor explicación de otro transtorno ICHD-3

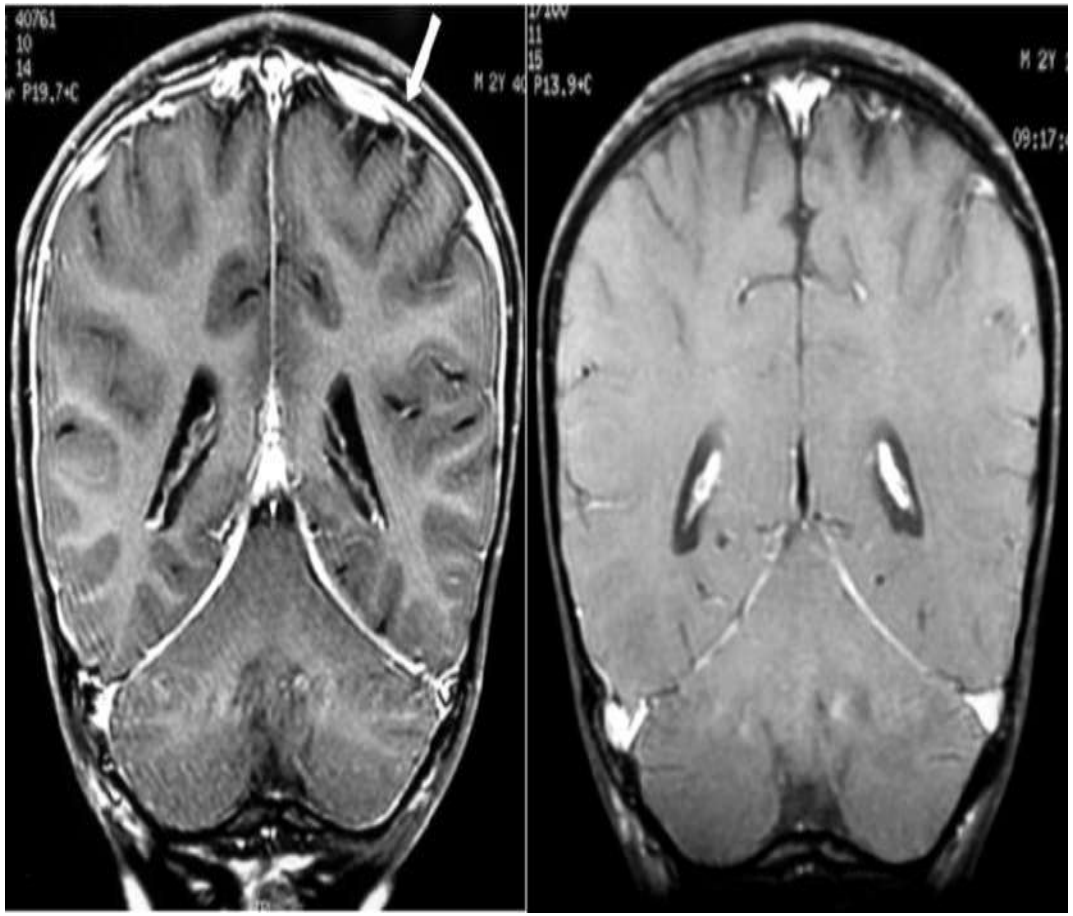
Neuroimagen en cefaleas

- TAC sin contraste es de limitada utilidad:
  - Es útil como detector de sangre como hemorragia subaracnoidea, hematoma subdural, epidural o hemorragia intraparenquimatosa.
  - Es útil en análisis de la ventana ósea para fracturas en traumas
  - El 50% de los TAC son innecesarios
- Ojo con el TAC en niños de forma repetitiva quienes son vulnerables a la exposición de radiación, existe un riesgo aumentado de cáncer por TAC en la infancia según un reporte de los institutos nacionales del cáncer.

- Meulepas JM, Ronckers CM, Smets A, et al. Radiation exposure from pediatric CT scans and subsequent cancer risk in the Netherlands. J Natl Cancer Inst 2019;111(3):256-263.

Utilidad de RMI del cerebro en cefaleas

- P: Presión intracraneana: Hipertension intracreana (Idiopática y secundaria), Hipotensión intracraneal (Fuga de LCR)
- I : Infección: Meningitis, encefalitis, cerebritis, sinusitis esfenoidal
- N: Neoplasias: Neoplasias parenquimatosas, y extraaxiales, especialmente en la fosa posterior, carcinomatosis meníngea, tumores hipofisiarios, metástasis cerebrales.



Disorders Associated With Thunderclap Headache

Vascular (vascular imaging required)

- Subarachnoid hemorrhage
- Arterial (vertebral, carotid, intracranial artery) dissection
- Cerebral venous sinus/cortical vein thrombosis
- Reversible cerebral vasoconstriction syndrome

Nonvascular

- Spontaneous intracranial hypotension
- Pituitary apoplexy
- Colloid cyst of the third ventricle
- Acute hypertensive crisis

Hemorragia subaranoidea
Claves de recuerdo

Acrónimo de HBSA

- PITS
- P: Parenchymal
- I:Intraventricular
- T:Truncal
- S:Sulci

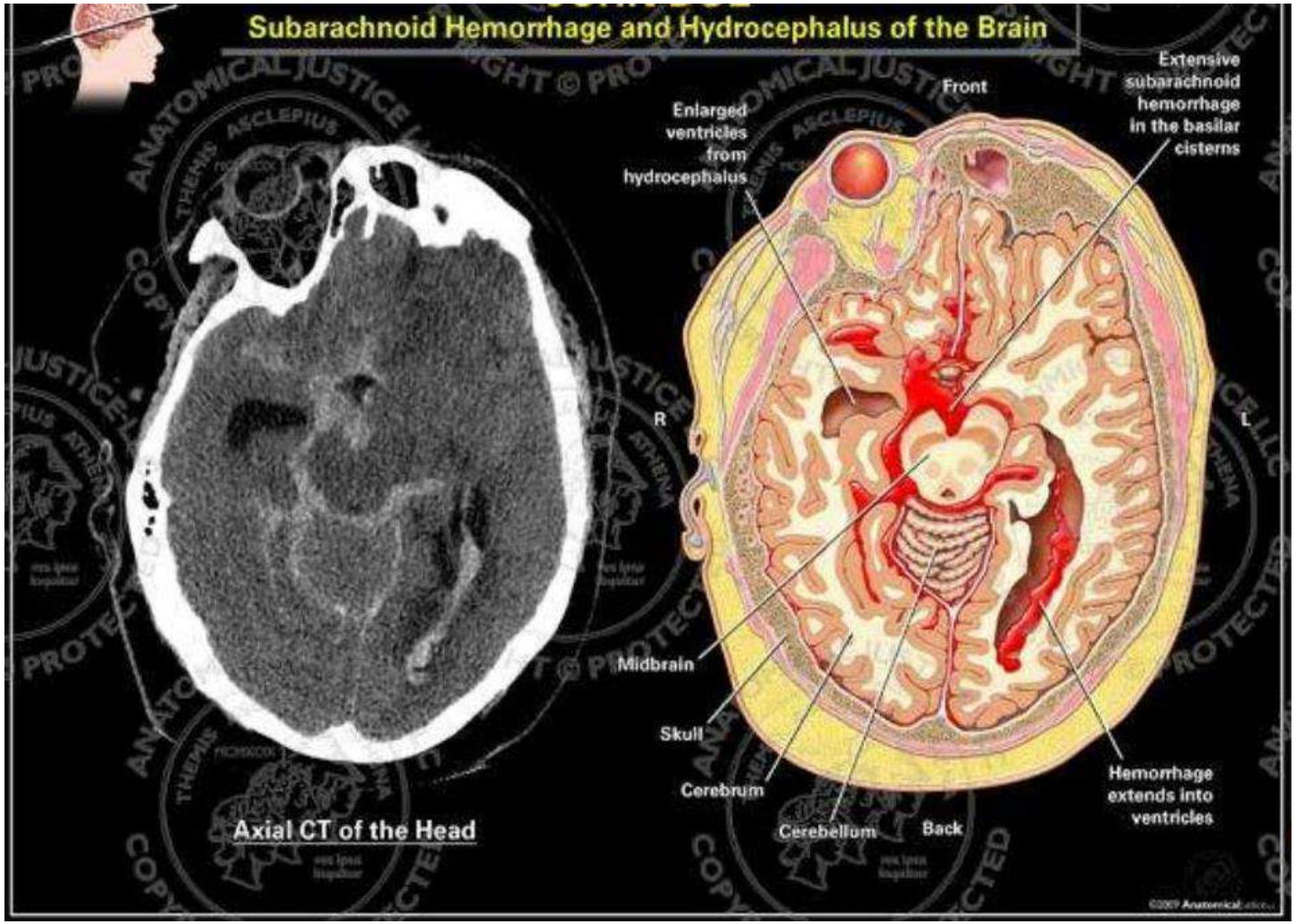


TABLE 1-2

Disorders Associated With Thunderclap Headache

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Nonvascular

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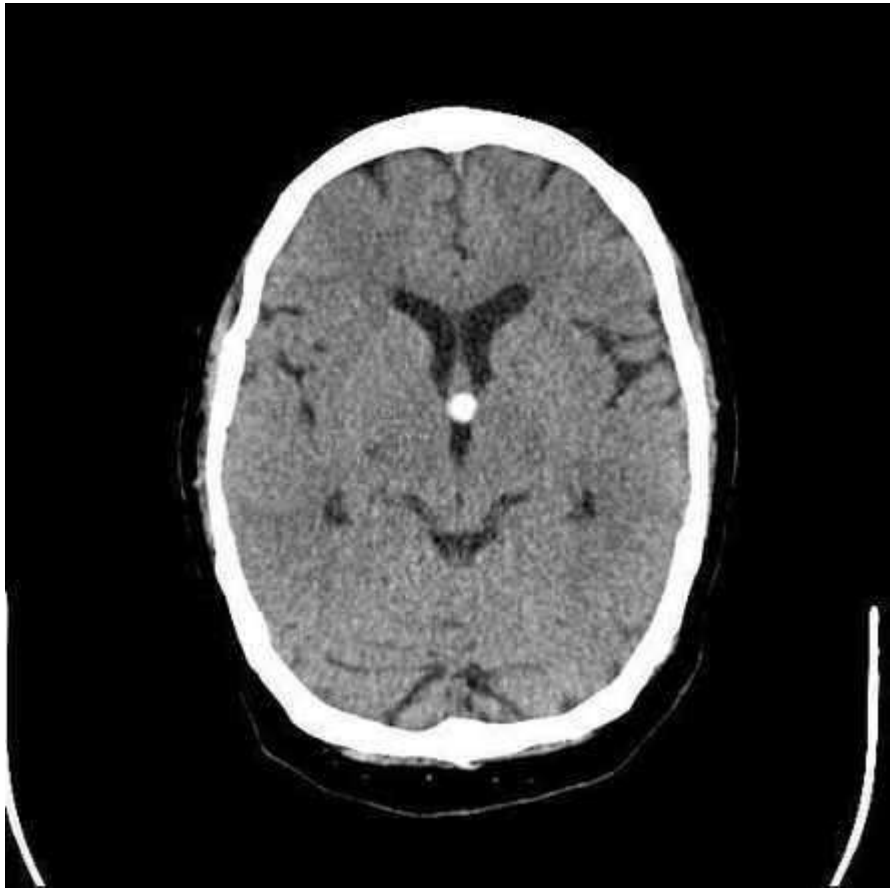
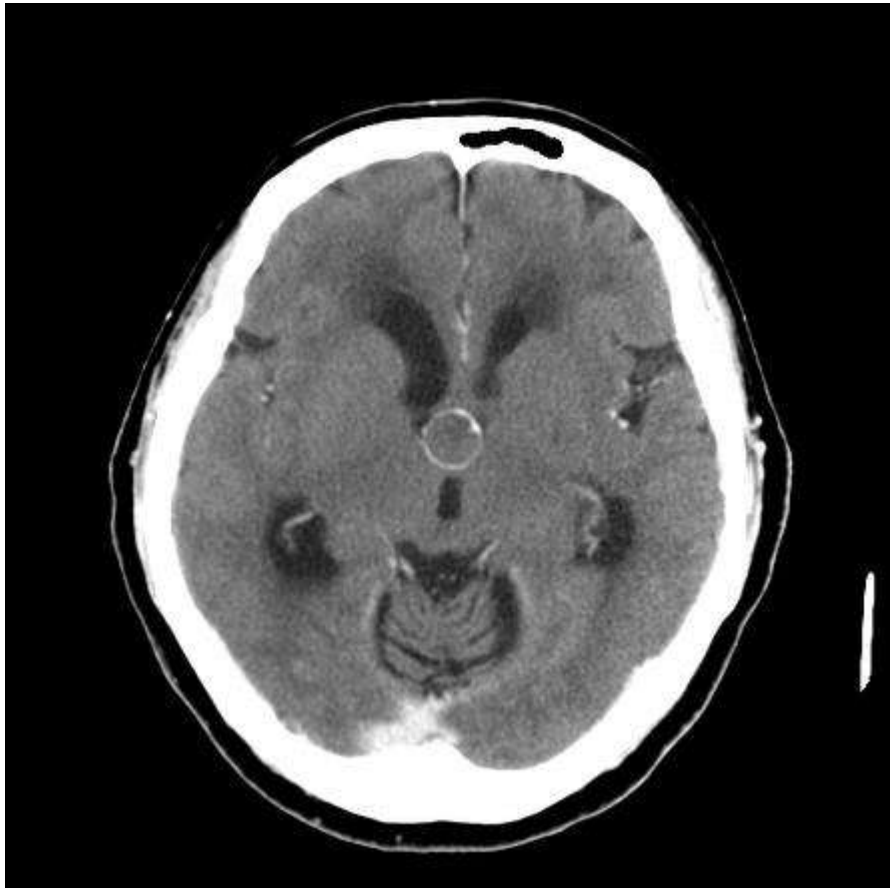
Quiste coloide del III ventrículo





7.4.1.1 Headache attributed to colloid cyst of the third ventricle

Description:

Headache caused by colloid cyst of the third ventricle, presenting very characteristically as recurrent attacks with thunderclap onset, often triggered by postural change or Valsalva-like manœuvre, and associated with reduced level or loss of consciousness.

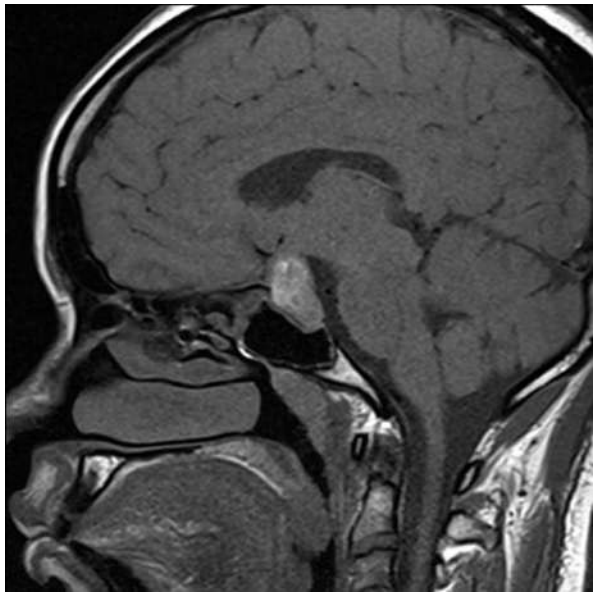
Diagnostic criteria:

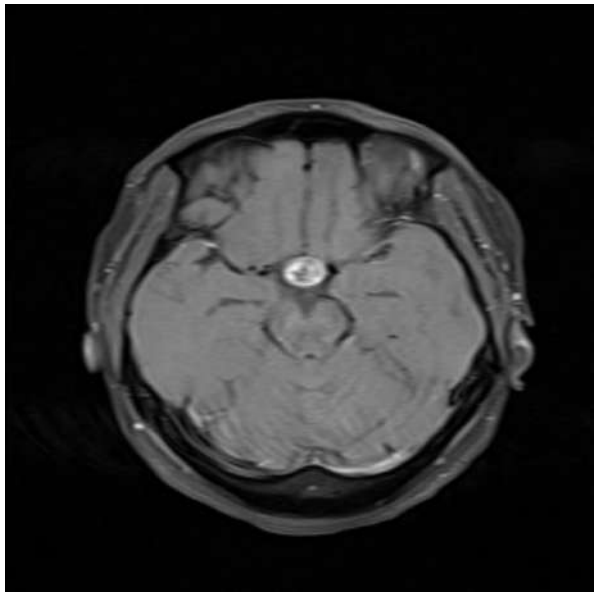
A. Headache fulfilling criterion C
B. A colloid cyst of the third ventricle has been demonstrated
C. Evidence of causation demonstrated by both of the following:
    1. headache has developed in temporal relation to development of the colloid cyst, or led to its discovery
    2. either or both of the following:
        a)headache is recurrent, with thunderclap onset and accompanied by reduced level or loss of consciousness
        b)headache has significantly improved or resolved in temporal relation to successful treatment of the colloid cyst
D. Not better accounted for by another ICHD-3 diagnosis.

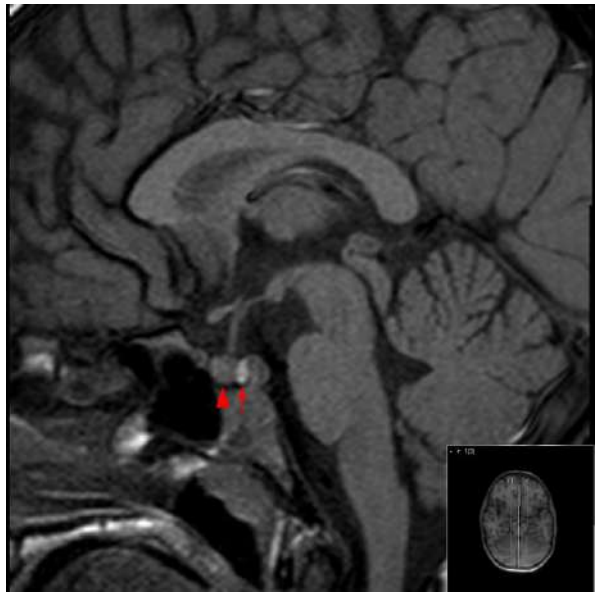
Comments:

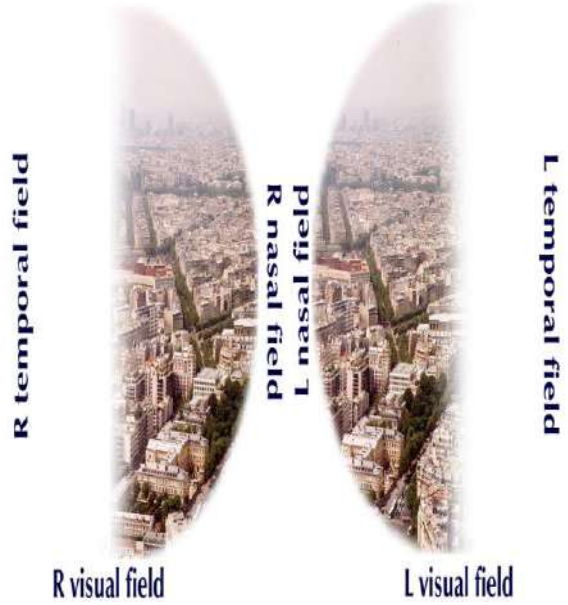
The vast majority of colloid cysts of the third ventricle are discovered incidentally, having been asymptomatic. Nevertheless, their position immediately adjacent to the foramen of Monro can, on occasion, result in sudden obstructive hydrocephalus, causing headache with thunderclap onset and reduced level or loss of consciousness. This highly characteristic presentation should lead to rapid diagnosis.

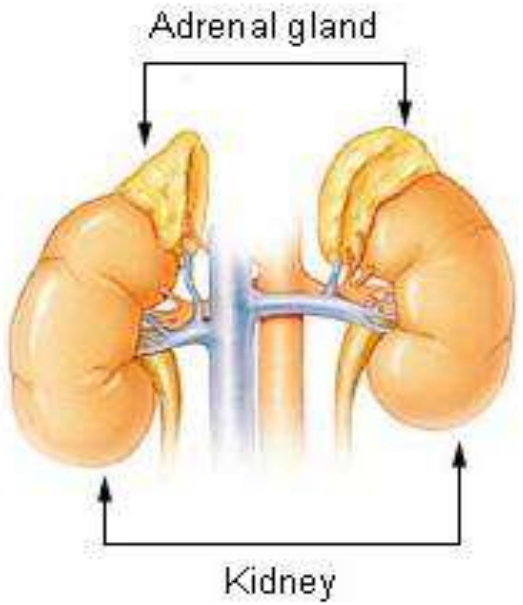
7.4.1.1 *Headache attributed to colloid cyst of the third ventricle* signals a life-threatening emergency.

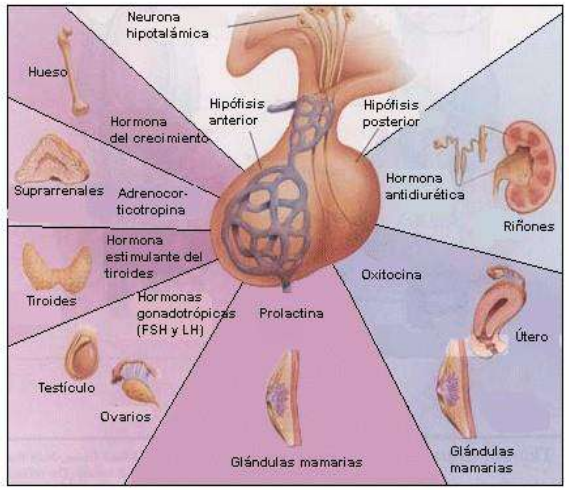












Hormonas hipofisarias

Headache attributed to pituitary apoplexy

Description:

Headache caused by pituitary apoplexy, usually with sudden (even thunderclap) onset and severe intensity, and accompanied from onset or later by visual symptoms and/or hypopituitarism.

Diagnostic criteria:

A. Any new headache fulfilling criterion C
B. Acute haemorrhagic pituitary infarction has been diagnosed
C. Evidence of causation demonstrated by at least two of the following:
    1. headache has developed in close temporal relation to other symptoms and/or clinical signs of pituitary apoplexy, or has led to the diagnosis of pituitary apoplexy
    2. either or both of the following:
        a) headache has significantly worsened in parallel with other symptoms and/or clinical signs of pituitary apoplexy
        b) headache has significantly improved in parallel with other symptoms and/or clinical signs of improvement of pituitary apoplexy
    3. headache is severe and of sudden or thunderclap onset
D. Not better accounted for by another ICHD-3 diagnosis.

Comments:

The rare clinical syndrome of pituitary apoplexy is an acute, life-threatening condition. It is one of the causes of non-aneurysmal subarachnoid haemorrhage.

It is also one of the causes of thunderclap headache. Most cases occur as the first presentation of rapid enlargement of non-functioning pituitary macroadenomas due to haemorrhage and/or infarction.

MRI is more sensitive than CT scan for detecting intrasellar pathology.

ARTICLE CLASS OF EVIDENCE

$RCVS_2$ score and diagnostic approach for reversible cerebral vasoconstriction syndrome

Eva A. Rocha, MD, M. Akif Topcuoglu, MD, Gisele S. Silva, MD, PhD, and Aneesh B. Singhal, MD

Neurology® 2019;92:e639-e647. doi:10.1212/WNL.0000000000006917

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Abstract

Objective

To develop a method to distinguish reversible cerebral vasoconstriction syndrome (RCVS) from other large/medium-vessel intracranial arteriopathies.

Methods

We identified consecutive patients from our institutional databases admitted in 2013–2017 with newly diagnosed RCVS (n = 30) or non-RCVS arteriopathy (n = 80). Admission clinical and imaging features were compared. Multivariate logistic regression modeling was used to develop a discriminatory score. Score validity was tested in a separate cohort of patients with RCVS and its closest mimic, primary angiitis of the CNS (PACNS). In addition, key variables were used to develop a bedside approach to distinguish RCVS from non-RCVS arteriopathies.

Results

The RCVS group had significantly more women, vasoconstrictive triggers, thunderclap headaches, normal brain imaging results, and better outcomes. Beta coefficients from the multivariate regression model yielding the best *c*-statistic (0.989) were used to develop the $RCVS_2$ score (range −2 to +10; recurrent/single thunderclap headache; carotid artery involvement; vasoconstrictive trigger; sex; subarachnoid hemorrhage). Score ≥5 had 99% specificity and 90% sensitivity for diagnosing RCVS, and score ≤2 had 100% specificity and 85% sensitivity for excluding RCVS. Scores 3–4 had 86% specificity and 10% sensitivity for diagnosing RCVS. The score showed similar performance to distinguish RCVS from PACNS in the validation cohort. A clinical approach based on recurrent thunderclap headaches, trigger and normal brain scans, or convexity subarachnoid hemorrhage correctly diagnosed 25 of 37 patients with $RCVS_2$ scores 3–4 across the derivation and validation cohorts.

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Table 4 $RCVS_2$ score

Criteria	Value
Recurrent or single TCH	
Present	5
Absent	0
Carotid artery (intracranial)	
Affected	2
Not affected	0
Vasoconstrictive trigger	
Present	3
Absent	0
Sex	
Female	1
Male	0
Subarachnoid hemorrhage	
Present	1
Absent	0

Abbreviation: TCH = thunderclap headache.

JAMA Network

JAMA Neurology

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PMCID: PMC6515981
PMID: 30776059

Assessing Spinal Cerebrospinal Fluid Leaks in Spontaneous Intracranial Hypotension With a Scoring System Based on Brain Magnetic Resonance Imaging Findings

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Hipotensión intracraneana espontánea
Acróstico SEEPS: Filtración

Imaging Features of Intracranial Hypotension Using the Mnemonic SEEPS[a,b]

Imaging feature	Prevalence range
Subdural fluid collection	36-50%
Enhancement of pachymeninges	56-83%
Engorgement of venous sinuses	48-93%
Pituitary enlargement/hyperemia	5-63%
Sagging of brain	18-61%

[a] Data from Schievink WI, JAMA.[9]
[b] Invariably secondary to spinal CSF leak.

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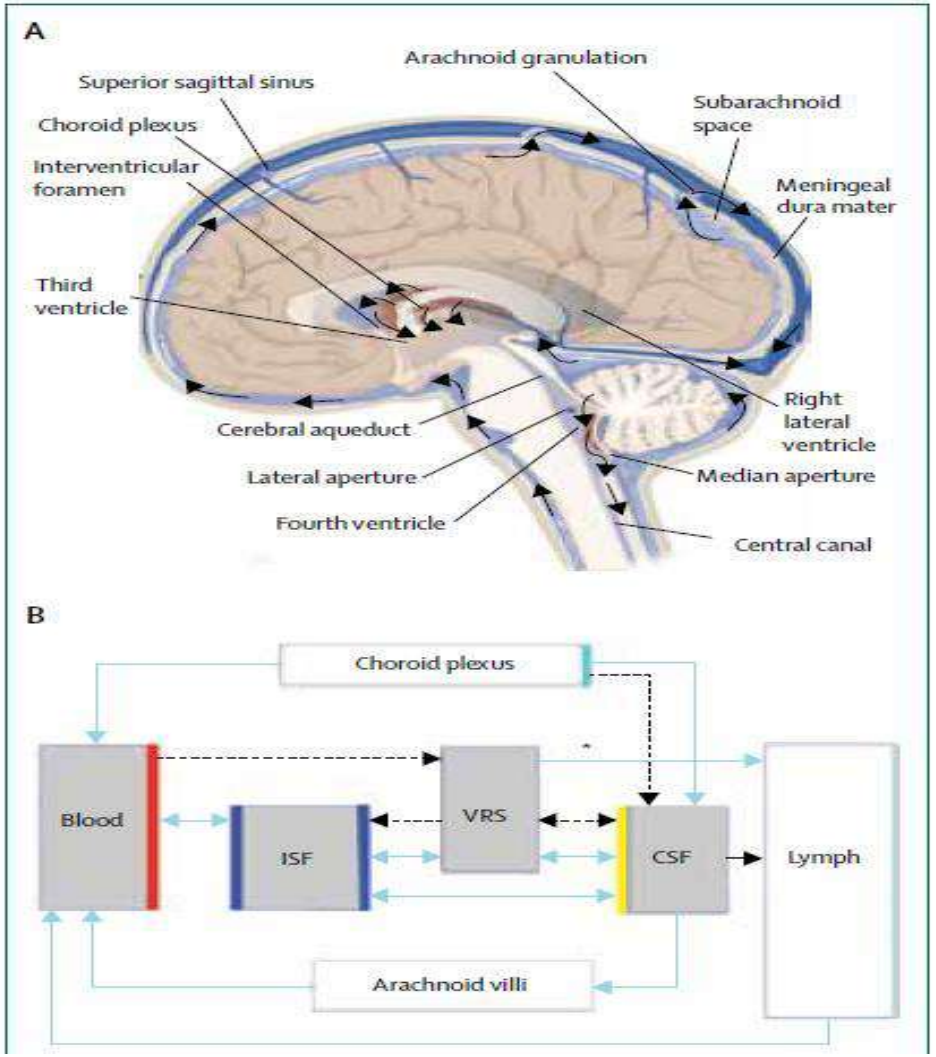
Hipotensión intracraneana espontánea

Causes of decreased intracranial pressure

- True hypovolaemic state (reduced total body water)
- CSF shunt overdrainage
- Traumatic CSF leaks
  - After definite trauma: eg, motor vehicle accident or sporting injury
  - After surgical procedure
  - After dural puncture: lumbar puncture, inadvertent dural puncture
- Spontaneous CSF leaks
  - Unknown cause (sometimes secondary to chronic increased intracranial pressure)
  - Meningeal diverticulae
  - Connective tissue disorders: Marfan's syndrome, Marfanoid features, Ehlers–Danlos syndrome, unclassified connective tissue disorder, hyperflexible joints, retinal detachment at young age, elastin or fibrillin abnormalities
  - Spondylitic dural tear
  - Trivial trauma: eg, exertion, sports, Valsalva manoeuvres, coitus, falls, chiropractic manipulation



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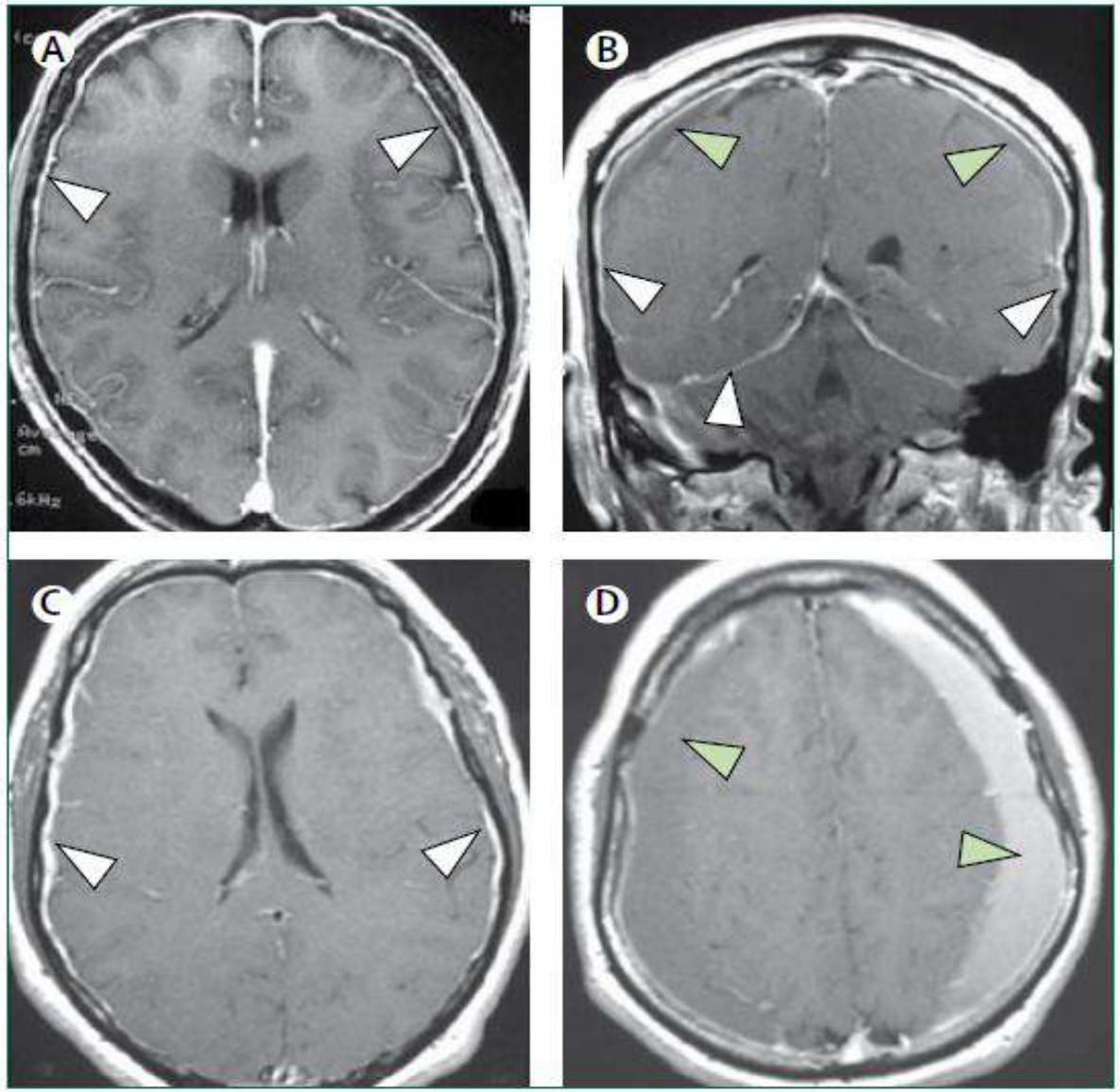

Figure 4: **Brain MRI in patients with spontaneous intracranial hypotension**
T1-weighted gadolinium-enhanced axial MRI (A) showing a diffuse pachymeningeal gadolinium enhancement (white arrows). T1-weighted

Typical MR findings in IH. A, Midline sagittal T1-weighted image showing the "sagging brain" appearance with distortion of the anterior margin of the pons and medulla (black arrows) and decreased vertical dimension of the suprasellar cistern and sagging tub...

Imaging Features of Intracranial Hypotension Using the Mnemonic SEEPS[a,b]

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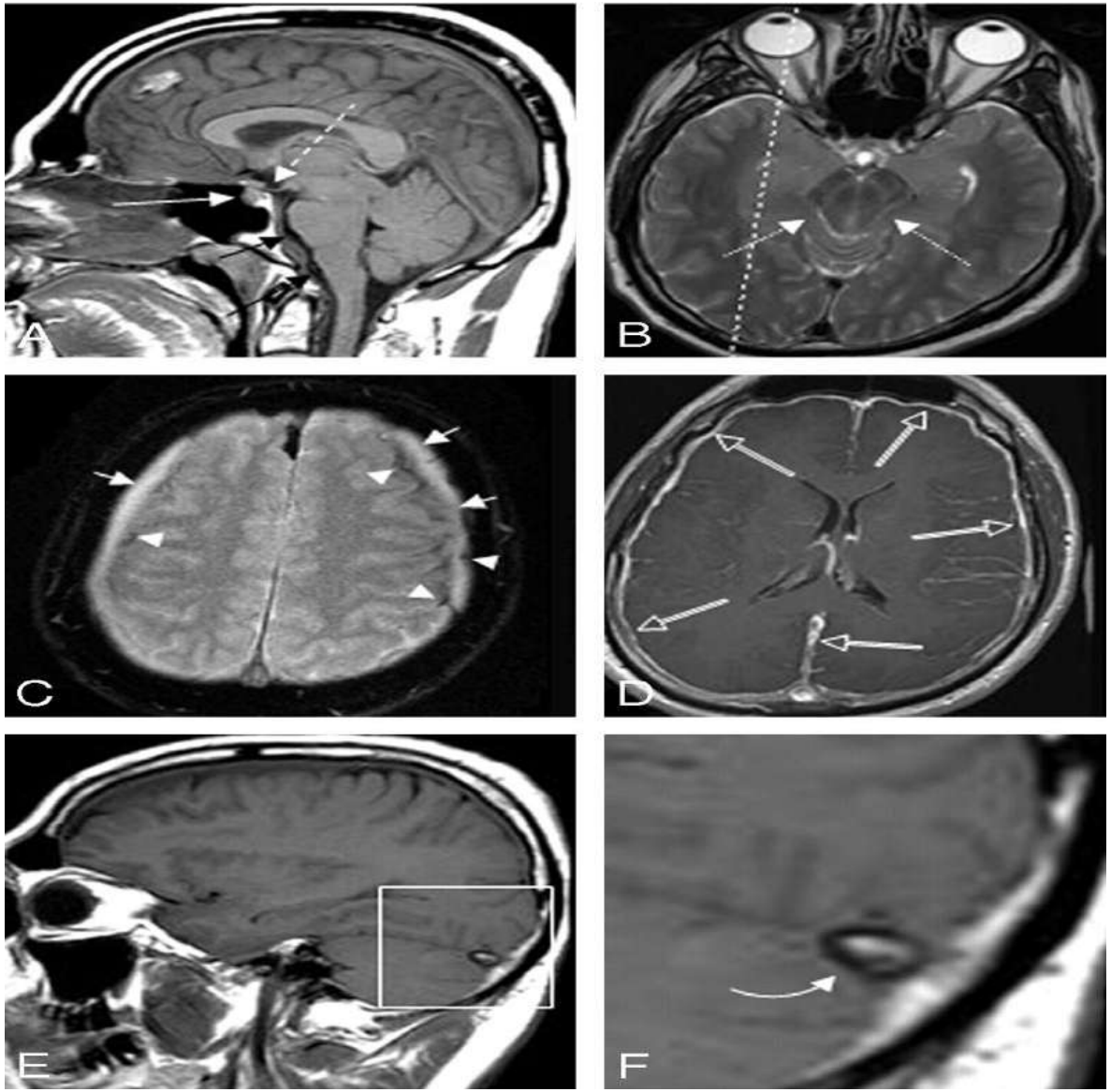
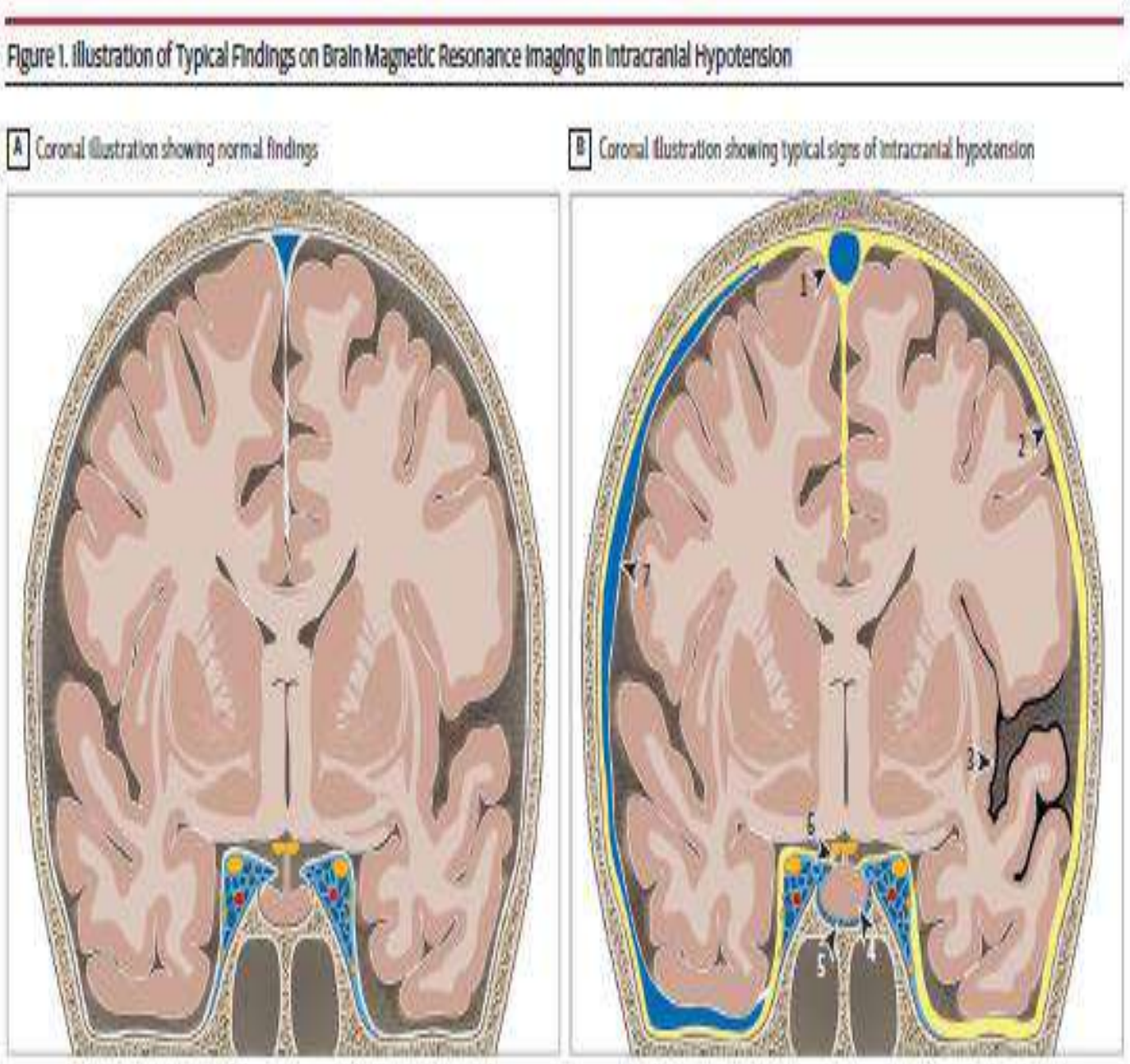


R.I. Farb et al. AJNR Am J Neuroradiol 2007;28:1489-1493



Corte coronal

1.Agrandamiento ovoideo del seno sagital superior

2. Reforzamiento paquimeningueo

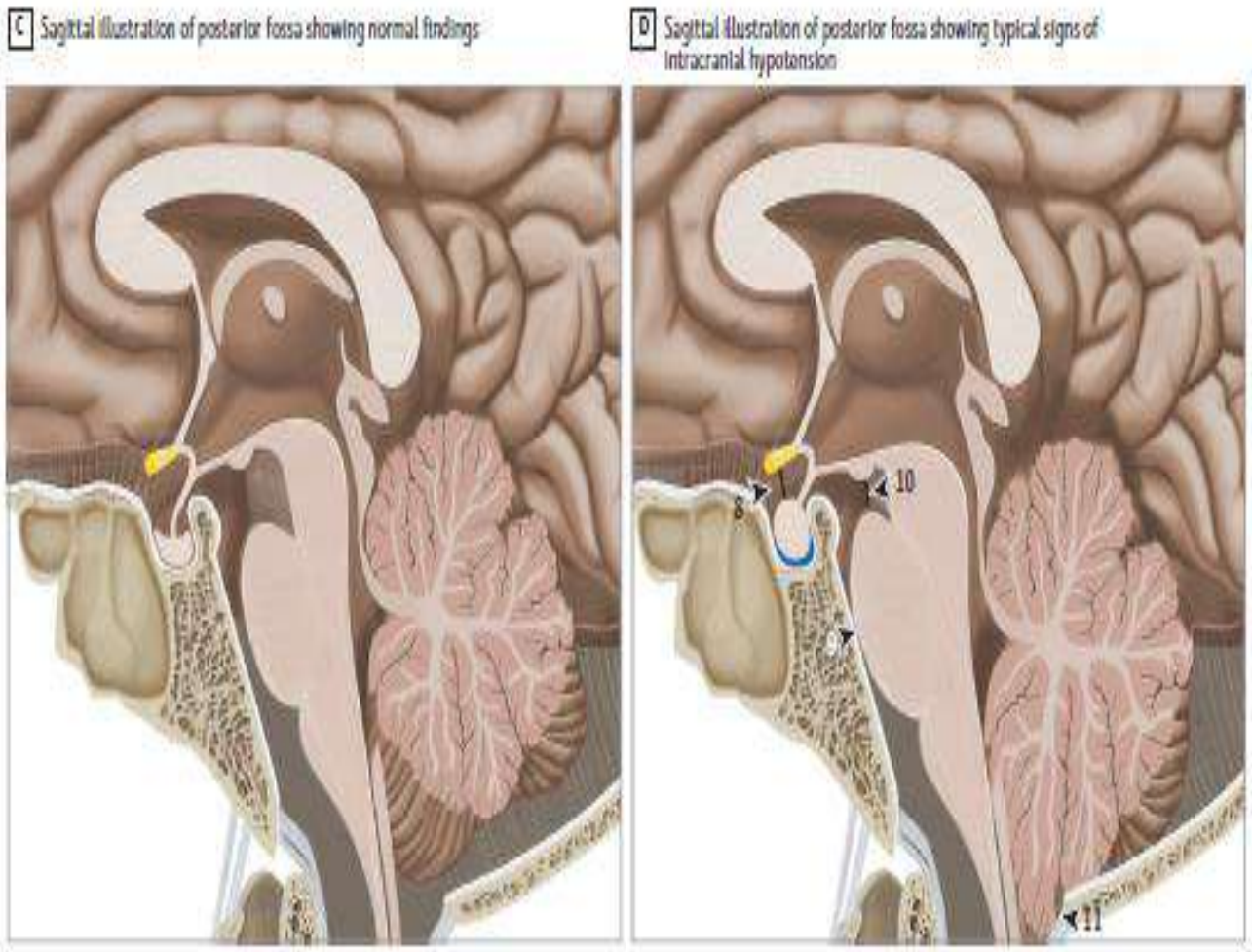
3. Siderosis superficial

4. Agrandamiento de la hipófisis

5. Prominencia del seno intercabernoso

6. Borramiento de la cisterna suprasellar

7. Colección subdural



A, Coronal illustration of the brain demonstrating normal findings. B, Coronal illustration of the brain with typical findings in a patient with a spinal cerebrospinal fluid leak with venous engorgement of the superior sagittal sinus (arrowhead 1), pachymeningeal enhancement (arrowhead 2), superficial siderosis (arrowhead 3), enlarged pituitary gland (arrowhead 4), prominent intercavernous sinus (arrowhead 5), effaced suprasellar cistern (arrowhead 6), and subdural fluid collection (arrowhead 7). C, Sagittal illustration of the posterior fossa demonstrating normal findings. D, Sagittal illustration of the posterior fossa with typical findings in patients with a spinal cerebrospinal fluid leak with effaced suprasellar cistern (arrowhead 8; pathologic ≤4 mm), effacement of the prepontine cistern (arrowhead 9; pathologic ≤5 mm), decreased mamillopontine distance (arrowhead 10; pathologic ≤6.5 mm), and low-lying cerebellar tonsils (arrowhead 11).

Corte sagital

8.Borramiento o estrechamiento de la cisterna suprasellar ≤ 4 mm

9. Borramiento o estrechamiento de la cisterna prepontina ≤ 5 mm

10. Reducción de la distancia mamilopontina ≤ 6.5 mm

11. Descenso de la tonsilas cerebelares

PUNTUACION DE HIPOTENSION INTRACRANEANA ESPONTANEA (SIH) POR FUGA DE LCR

- El score tiene 6 dominios
- 3 son cualitativos
- 3 son cuantitativos
- **3 tienes mas valor cuantitativo:SSS,RPM,CSS**
- Altas probabilidades SIH: ≥ 5
- Intermedias probabilidades SIH: 3 a 4
- Bajas probabilidades SIH: ≤ 2

Scoring System Using Six Imaging Signs Most Discriminative for Spontaneous Intracranial Hypotension[a]

Imaging characteristic	Point score
Engorgement of venous sinus	2
Pachymeningeal enhancement	2
Subdural fluid collection	1
Suprasellar cistern (≤4 mm)	2
Prepontine cistern (≤5 mm)	1
Mamillopontine distance (≤6.5 mm)	1

[a] Data from Dobrocky T, et al, JAMA Neurol.[12]

Factores de imágenes de hipertensión intracraneal idiopática

Imaging Features of Idiopathic Intracranial Hypertension[a]

Imaging feature	Sensitivity/specificity
Reduced pituitary gland height (empty sella syndrome)	80%/64%
Increased optic nerve sheath diameter	51%/83%
Flattening of posterior globe	97%/53%
Transverse venous sinus stenosis	78%/unknown
Any three out of four features	64%/100%

[a] Data from Mallery RM, et al, J Neuroophthalmol.[8]

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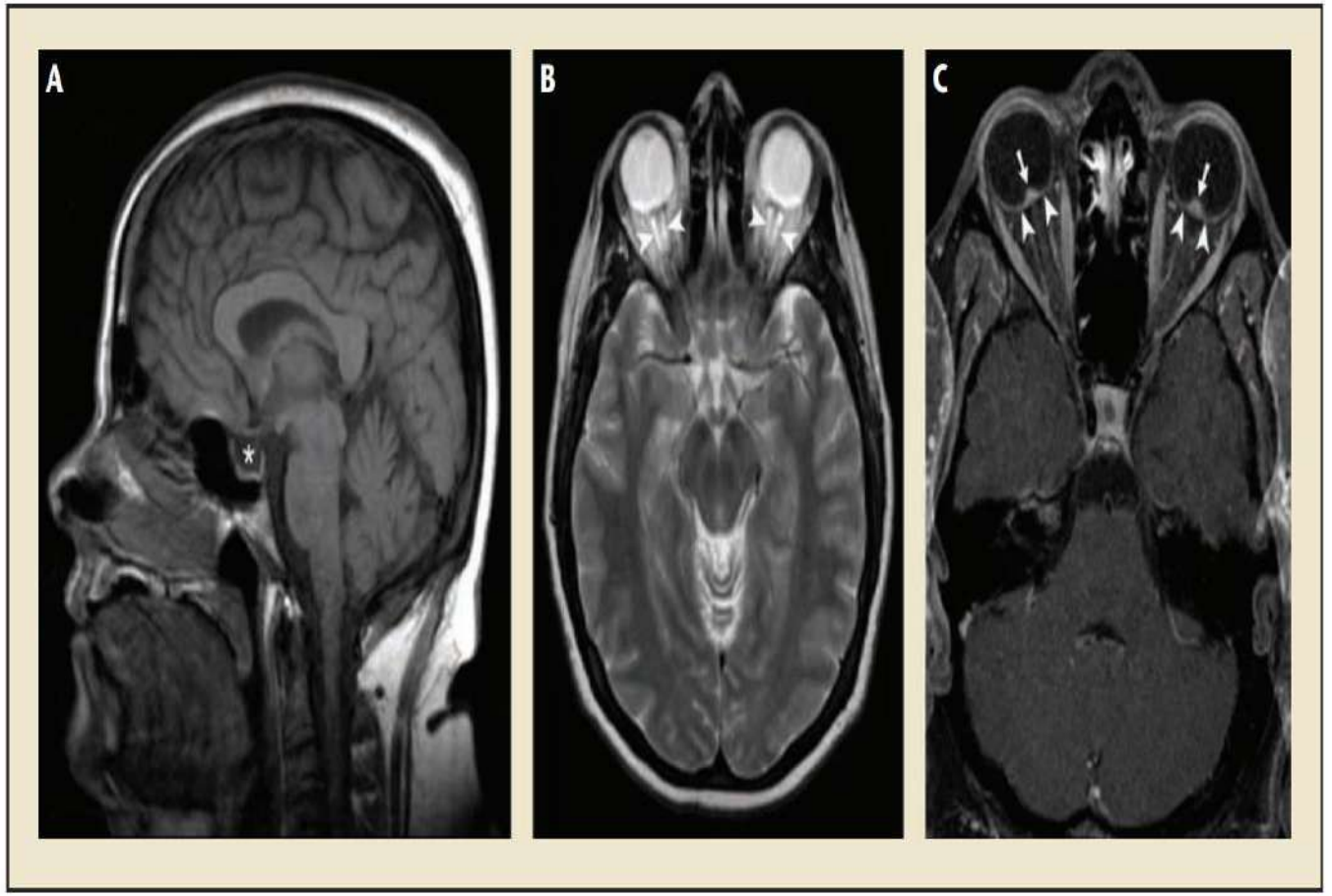
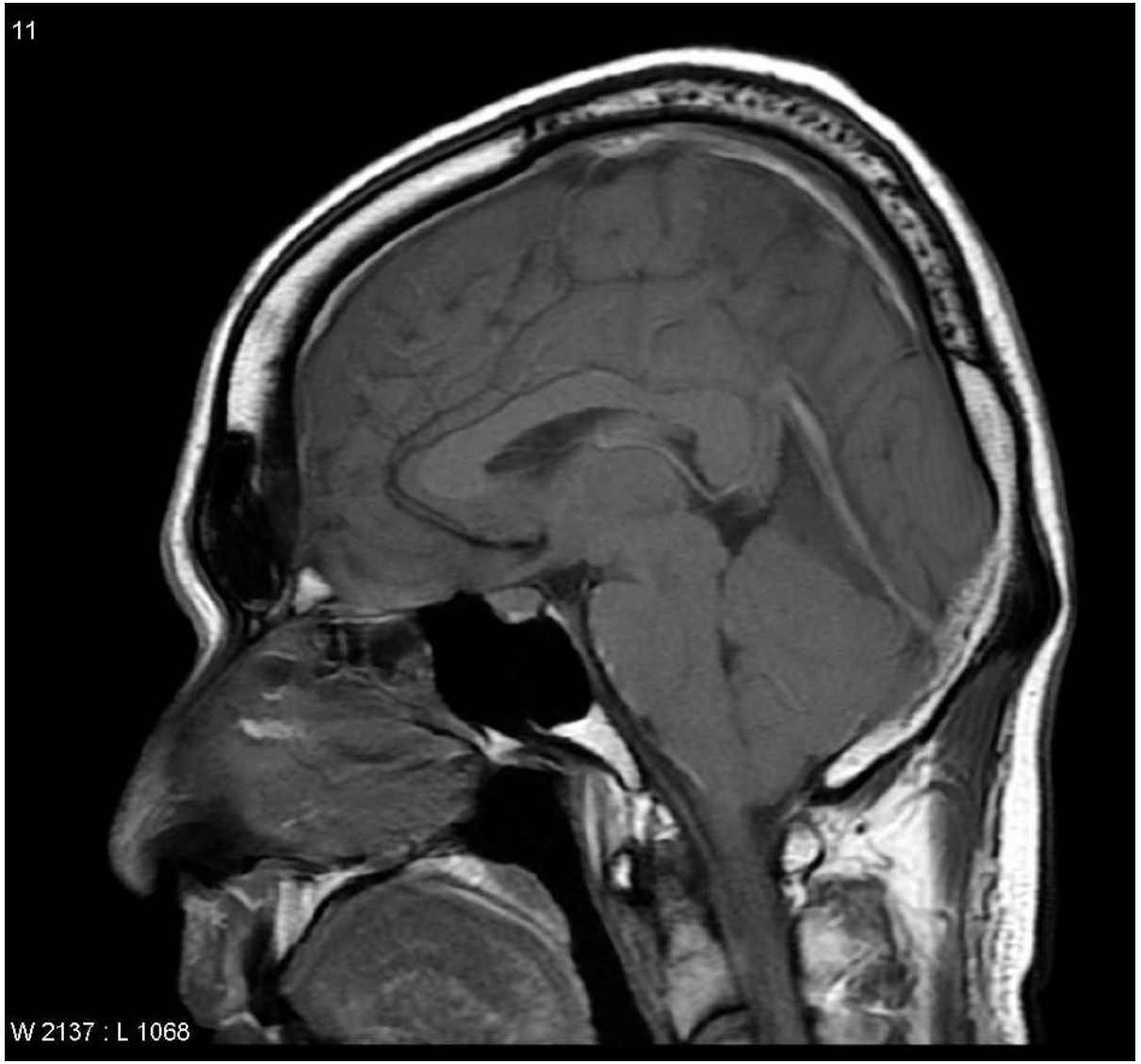
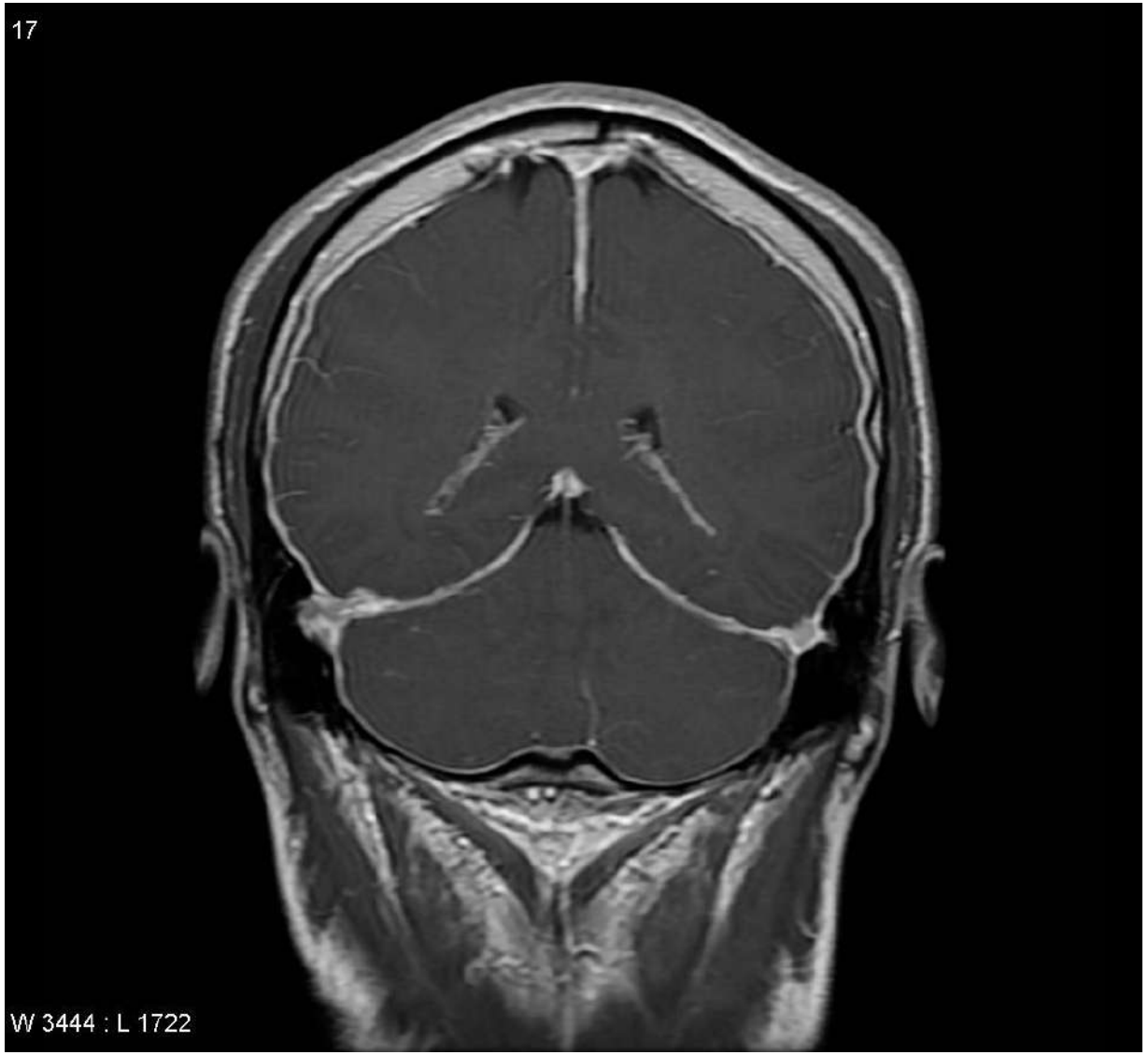
Figure 3. *Imaging findings in idiopathic intracranial hypertension.* **(A)** *Empty sella (*) on sagittal T1-weighted imaging.* **(B)** *Dilated optic nerve sheaths* (arrowheads) *on axial T2-weighted imaging.* **(C)** *Posterior globe flattening* (arrowheads) *and enhancement of protruding optic nerve heads* (arrows) *on axial T1-weighted imaging with contrast.*







Realse paquimeningueo: 2
Diámetro suprasellar ≤ 4 mm: 2
Diametro prepontino ≤ 5 mm: 1
Diametro Mamilo-pontino ≤ 6.5 mm:1

TOTAL: 6/9 ALTAS POSIBILIDADES DE SIH

4 causas de acentuación paquimeníguea: SIH, Sarcoidosis, Granulomatosis+angiitis, Carcinomatosis paquimeninguea

Factores de imágenes de hipertensión intracraneal idiopática

Imaging Features of Idiopathic Intracranial Hypertension[a]

Imaging feature	Sensitivity/specificity
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[a] Data from Mallery RM, et al. J Neuroophthalmol.[8]

Figure 4. *Transverse cerebral venous sinus stenosis in a patient with idiopathic intracranial hypertension, as seen on contrast-enhanced magnetic resonance venography. There is a long narrow stenosis of the right transverse venous sinus (arrowheads) and a hypoplastic left transverse venous sinus. (A) Sagittal plane. (B) Coronal plane. (C) Axial plane.*

Reconstrucciones útiles de RMI en cefalea thunderclaps

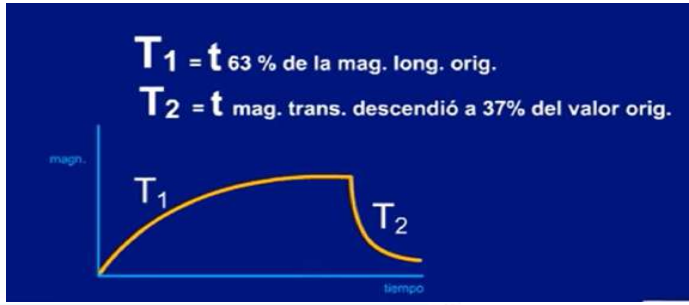
Recommended MRI Sequences When Evaluating for Thunderclap Headache[a] TABLE 1-6

MRI sequences	Imaging features
T1, T2	Exclude structural lesions or blood products (eg, pituitary apoplexy)
Fluid-attenuated inversion recovery (FLAIR)/ contrast-enhanced FLAIR/dynamic contrast-enhanced MRI	White matter lesions and distal hyperintense vessels (RCVS), subtle (sulcal) subarachnoid hemorrhage (SAH), posterior reversible encephalopathy syndrome (PRES) (with/without RCVS)
Gradient recalled echo (GRE) (T2*) or susceptibility-weighted imaging (SWI)	Hemosiderin deposition from subtle SAH or parenchymal microbleeds
Diffusion-weighted imaging/apparent diffusion coefficient	Vasogenic and cytotoxic edema (eg, PRES versus ischemic stroke)
Magnetic resonance angiography (MRA)	Exclude vasoconstriction, aneurysm, dissection
Magnetic resonance venography (MRV)	Exclude cerebral venous sinus/cortical vein thrombosis
T1 with contrast (axial, sagittal, coronal)	CSF leak/spontaneous intracranial hypotension
Cervical T1 fat saturation with contrast	Exclude cervical carotid artery dissection

CSF = cerebrospinal fluid; MRI = magnetic resonance imaging.

[a] Data from Chen SP et. al, J Headache Pain.[15]

Thunderclaps Headache



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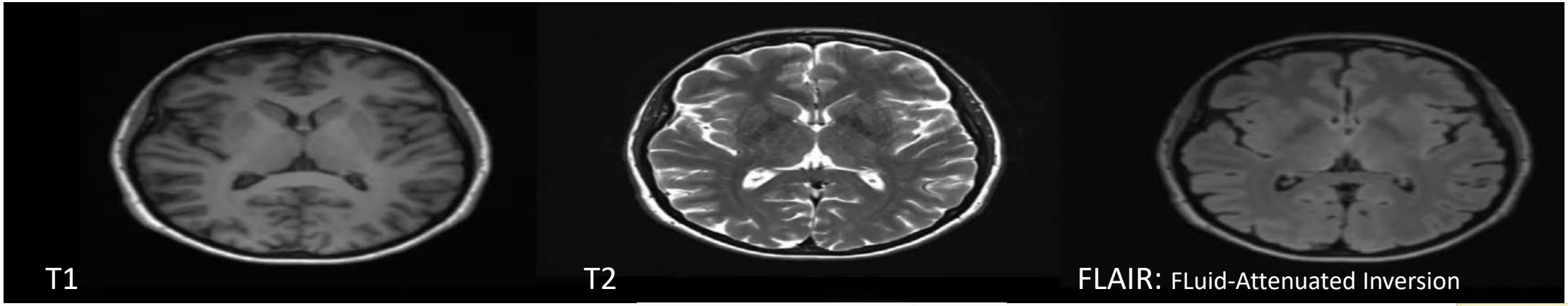

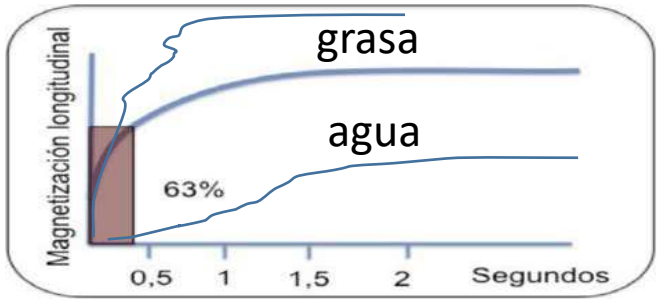

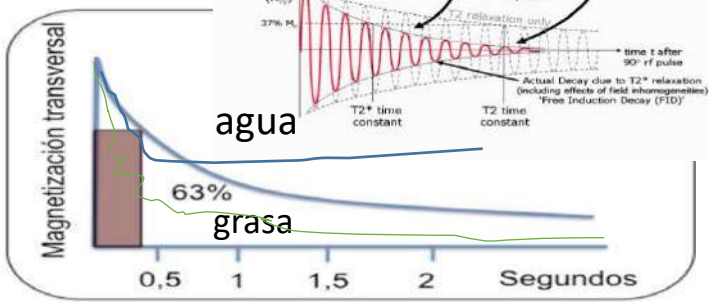

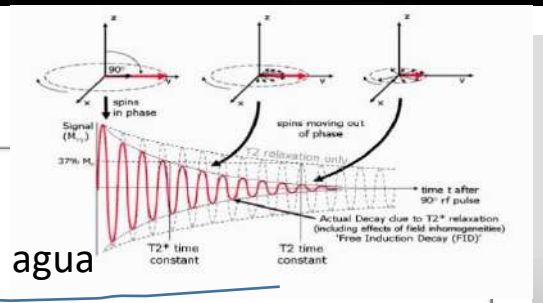

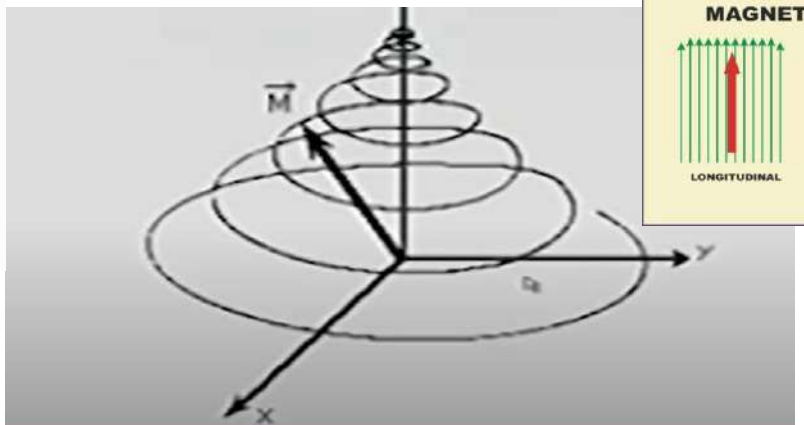

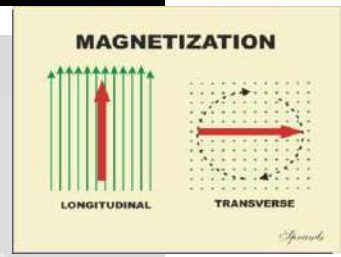

Thunderclaps Headache

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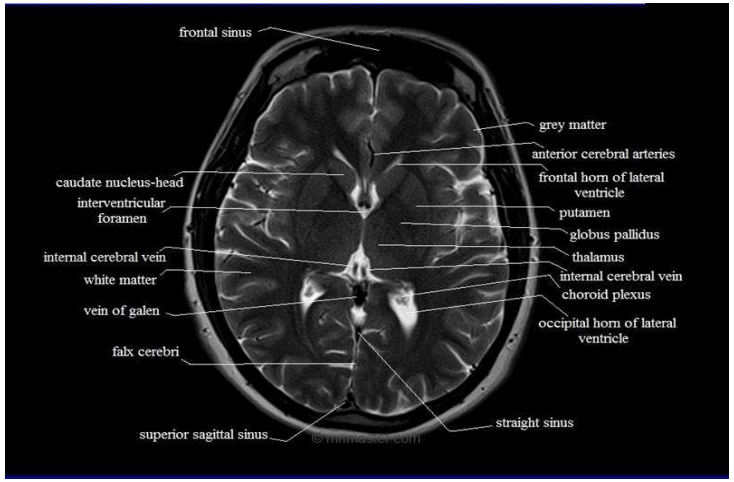
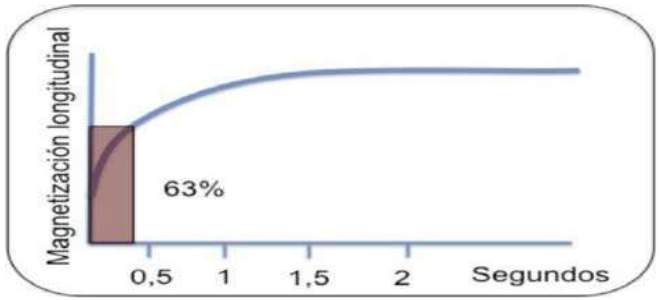
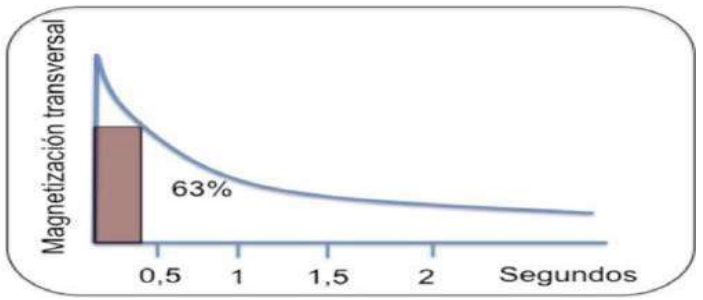
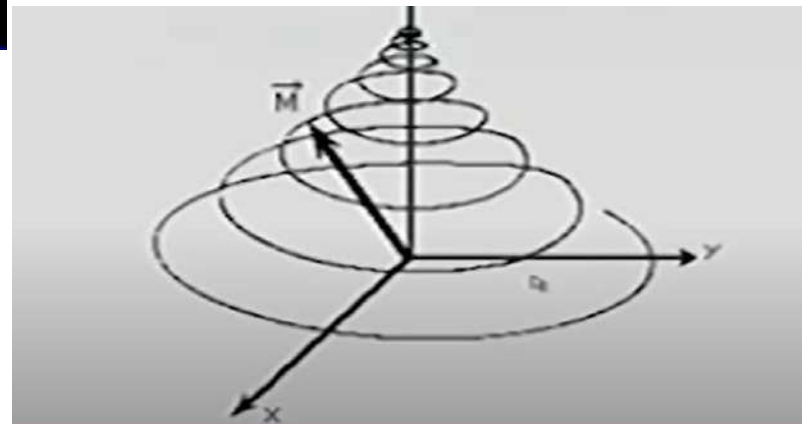








Emisión de pulso y EXCITACIÓN

RELAJACIÓN y recepción de la señal

- -Hiperintenso
- -Isointenso
- -Hipointenso

- Hiperintenso
- “Se ve más blanco”, “brilla más”, “da más señal”

- Hipointenso

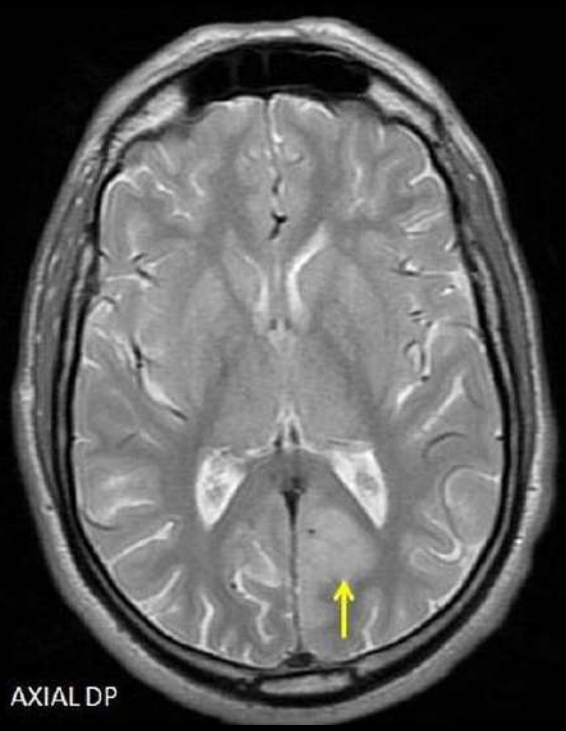
- “Se ve más negro”, “no brilla”, “sale oscuro”, “tiene menos señal”.

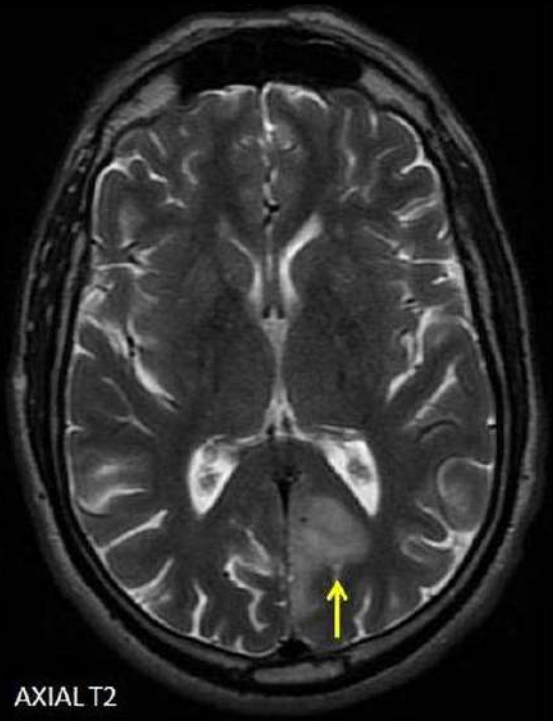
Valor del pixel y contraste de imagen

- Factores intrínsecos
  - Densidad protónica
  - T1
  - T2
  - Flujo
  - Difusión
- Factores extrínsecos
  - TR Tiempo recuperación
  - TE Tiempo ECO
  - Flip angle (ángulo de inclinación)
  - TI Tiempo de inversión
  - Factor turbo/longitud del tren de ecos
  - Valor b intensidad o módulo del campo **magnético**
  - Y muchos más (bobinas, filtros, cortes, adquisiciones…)

Potenciación

En una imagen potenciada en DP,
las sustancias con DP alta serán HIPER
las sustancias con DP baja serán HIPO


AXIAL DP

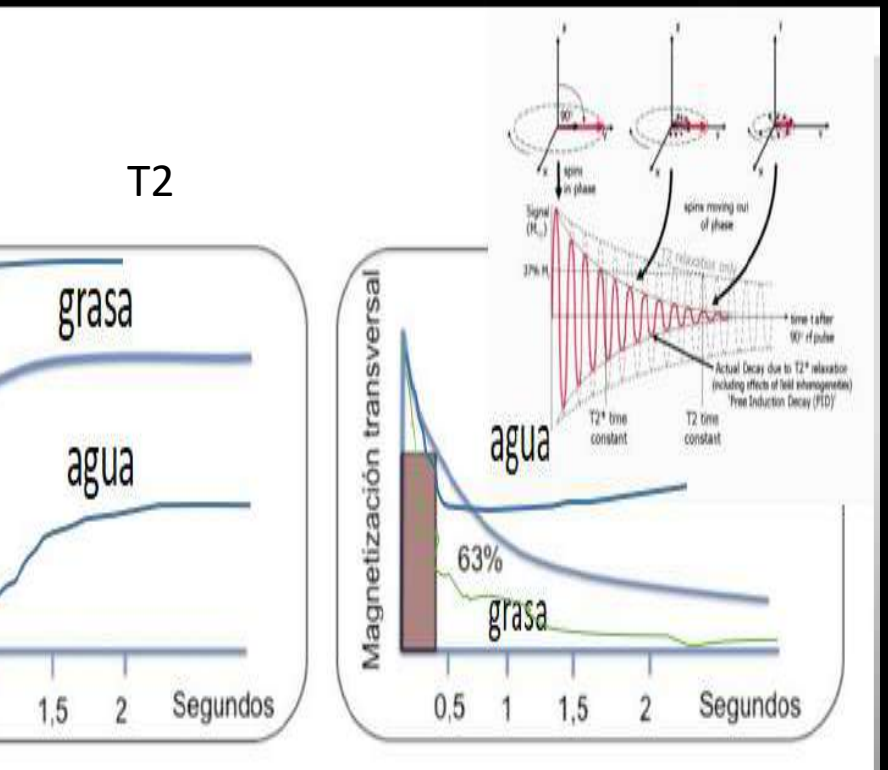

AXIAL T2

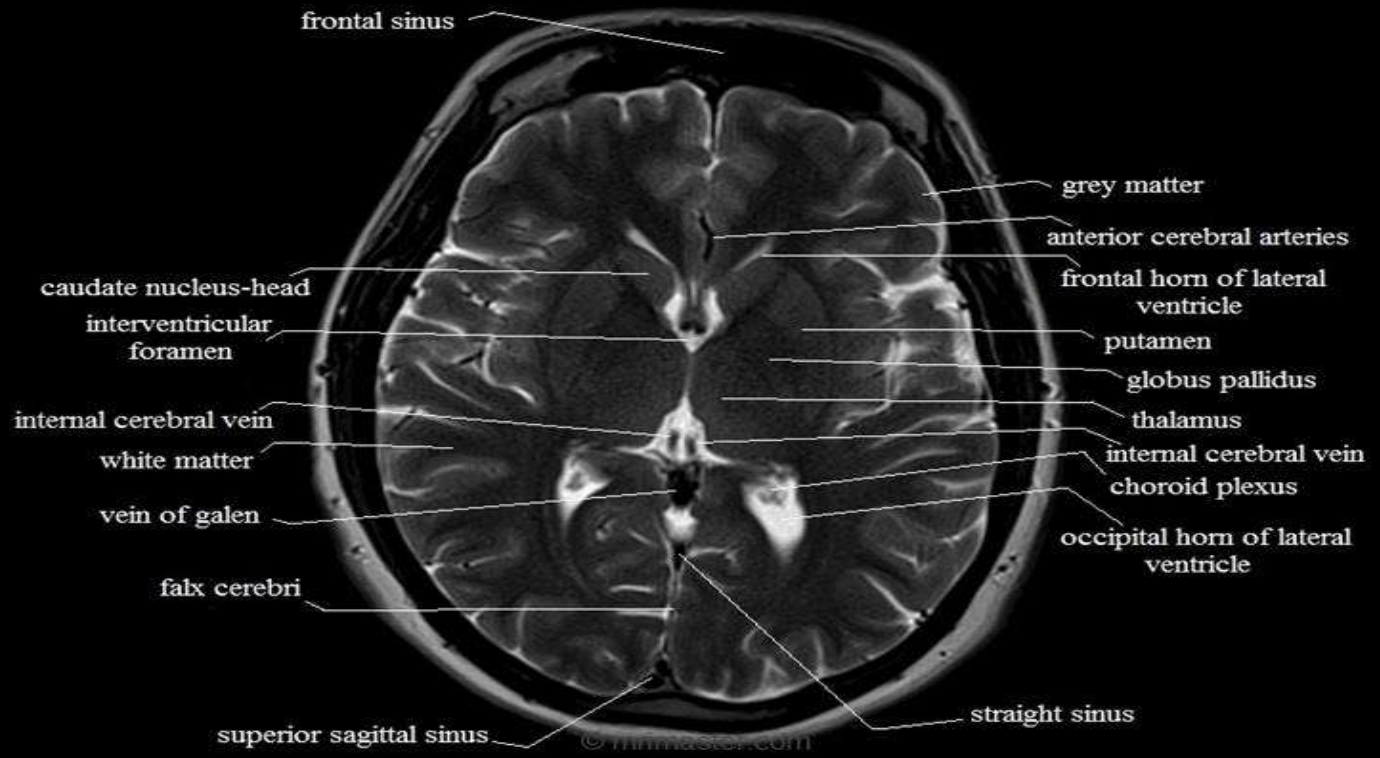
Potenciación

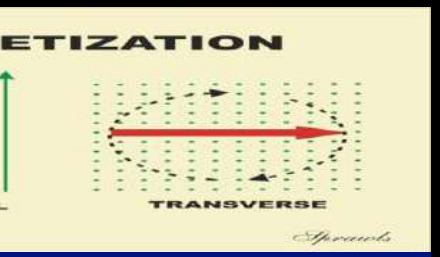
En una imagen <u>potenciada en T2</u>,

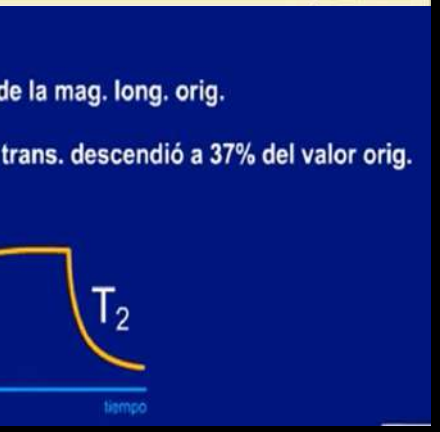
las sustancias con T2 largo serán HIPER

las sustancias con T2 corto serán HIPO



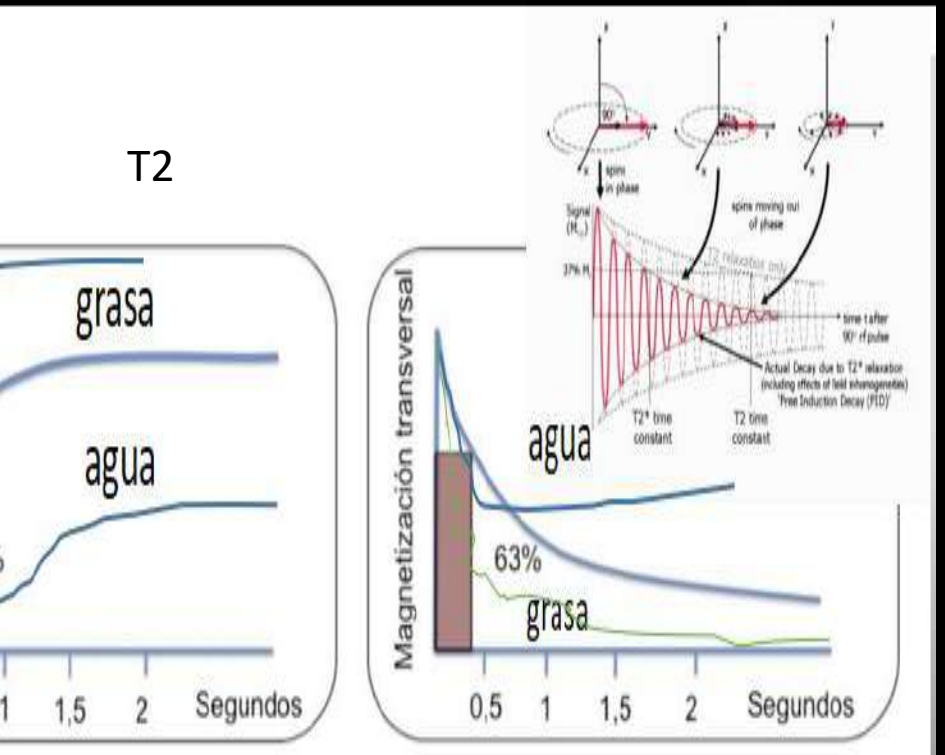


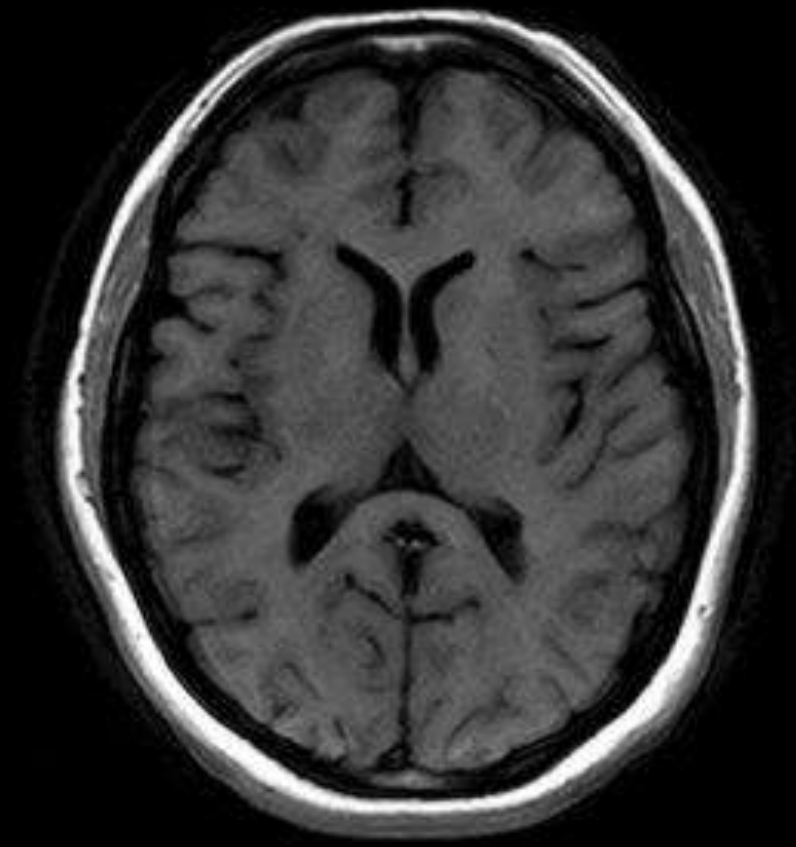




Potenciación

En una imagen <u>potenciada en T1</u>,
las sustancias con T1 largo serán HIPO
las sustancias con T1 corto serán HIPER





- “SI EL AGUA BRILLA, ES QUE LA SECUENCIA ESTÁ POTENCIADA EN T2.”

Thunderclaps Headache

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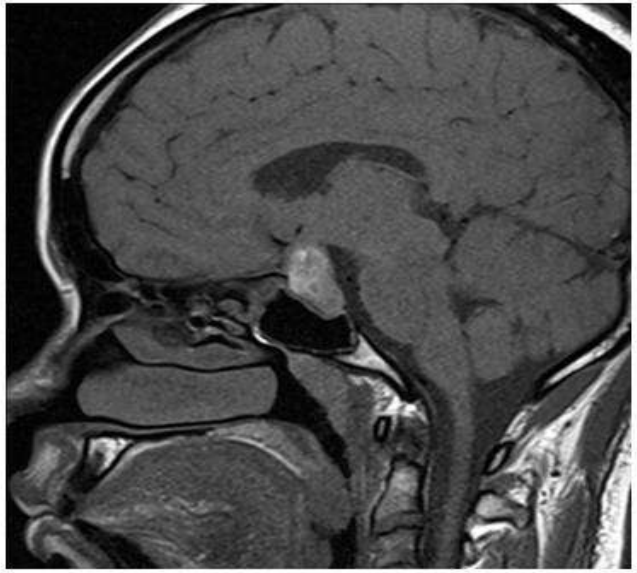
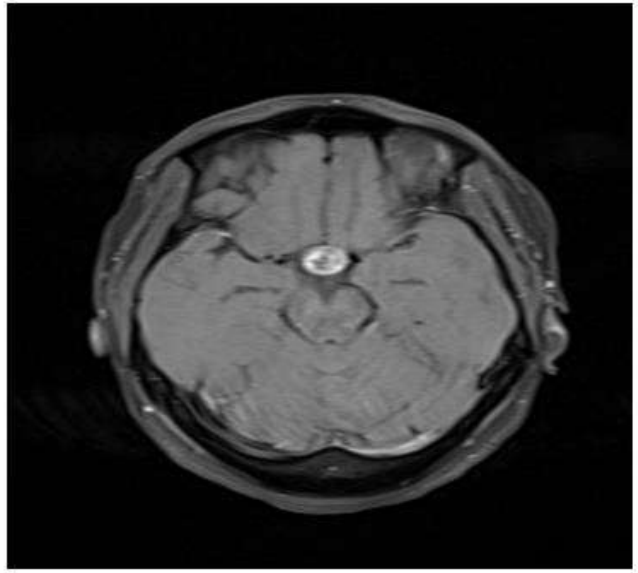
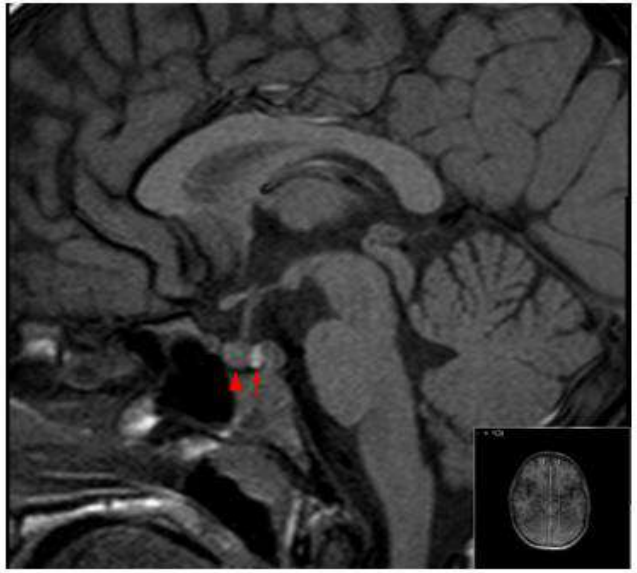
MRI sequences	Imaging features
T1, T2	Exclude structural lesions or blood products (eg, pituitary apoplexy)







Thunderclaps Headache

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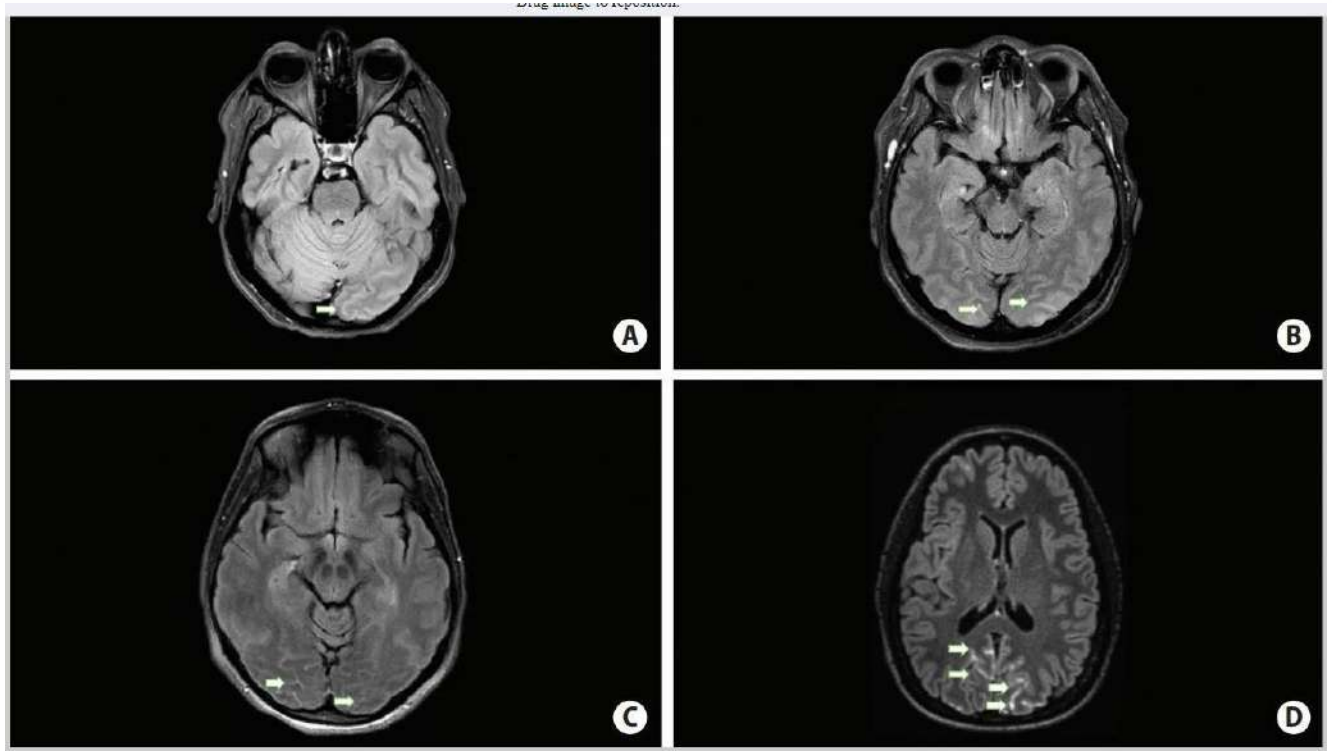
MRI sequences	Imaging features
Fluid-attenuated inversion recovery (FLAIR)/ contrast-enhanced FLAIR/dynamic contrast-enhanced MRI	White matter lesions and distal hyperintense vessels (RCVS), subtle (sulcal) subarachnoid hemorrhage (SAH), posterior reversible encephalopathy syndrome (PRES) (with/without RCVS)

CE-FLAIR



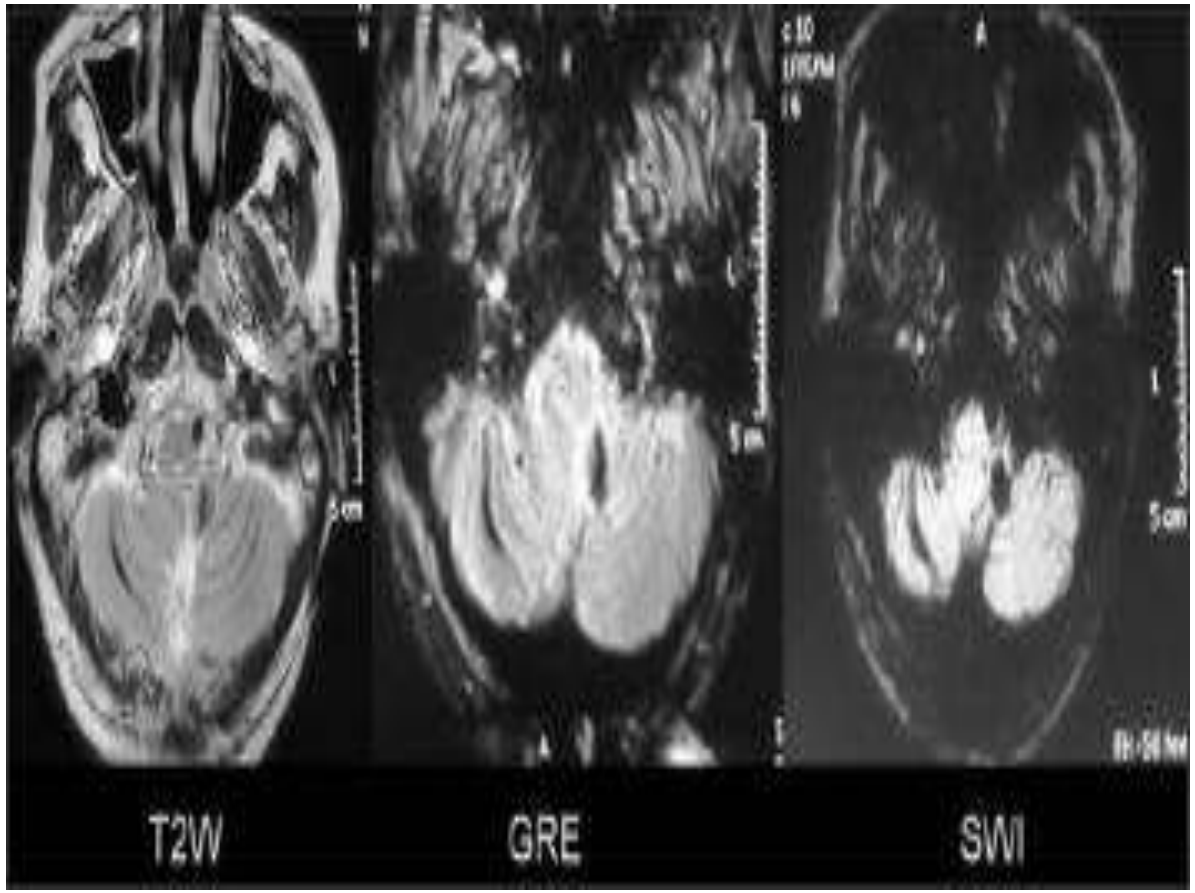
Thunderclaps Headache

Recommended MRI Sequences When Evaluating for Thunderclap Headache[a] TABLE 1-6

MRI sequences	Imaging features
Gradient recalled echo (GRE) (T2*) or susceptibility-weighted imaging (SWI)	Hemosiderin deposition from subtle SAH or parenchymal microbleeds

Varón de 75 años, hipertenso, 2 años de cefalea holocraneal pulsátil de inicio insidioso durante 2 años, de intensidad 6/10, incapacitante en ocasiones. Con FNfobia/FTfobia, vómitos y mareos. Se agravan con los mov. de la cabeza, toser e inclinarse hacia adelante. Sin disautonomía. El 50% típicas de migrañas. No cefaleas en adolescencia, pero pte con MCI. No thunderclap Headache. No TCE. SV NL. Art. Temp Nl. MMT: 19/30. Test frontales 11/18, bajo en finalización del patrón visual, flexibilidad mental, prueba de patrón motor alterno y comportamiento de prensión positiva. Hipoacusia neurosensorial bilateral. (D>I). Disadiadococinesia, dedo-nariz ANL, ataxia truncal a la izq a la marcha. Hipoacusa tono puro, AEP: Patron neurosensorial.

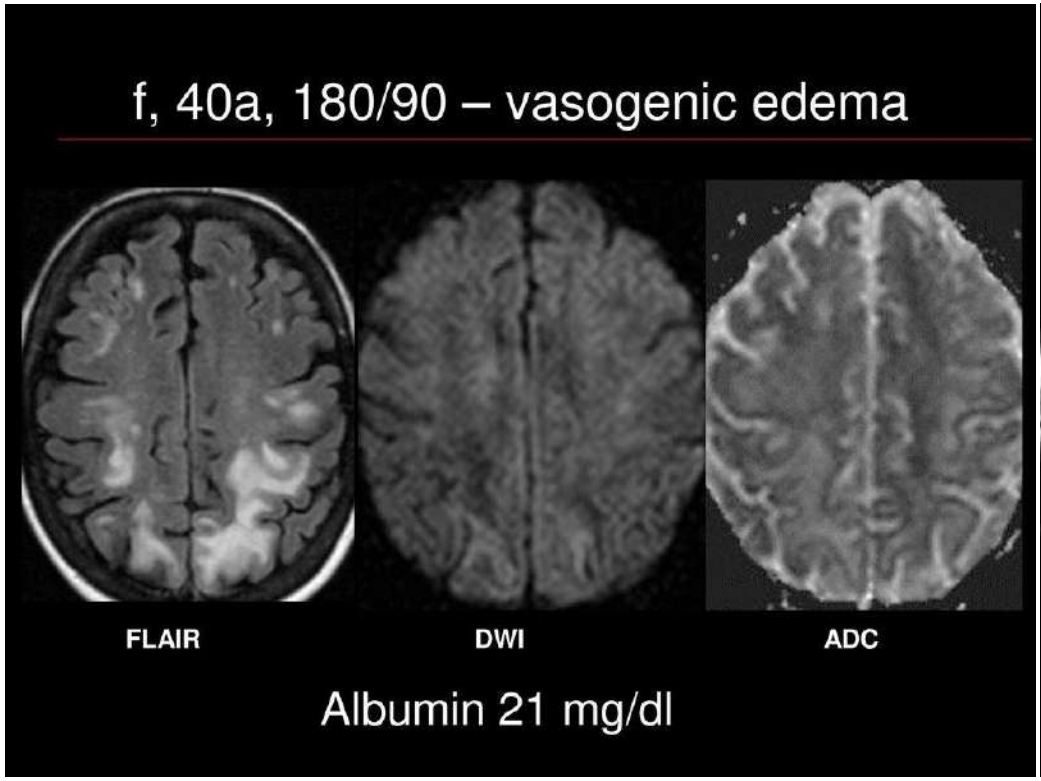
Dx. Sx cerebelar izquierdo, MCI vasc, migraña crónica (ICHD-3)+Cefalea secundaria II.6.1.1.2. BHC, PFH, PFR, Metabol: Nl, LCR: NL. RMI: hemosiderina en el cerebelo y alrededor del tronco encefálico que sugiere Sangramiento crónico. No angiopatia amiloide. RMI-arterial, RMI de columna con efecto mielográfico: Nl. aRMI. Dx Hemorragia subaracnoidea Sutil.

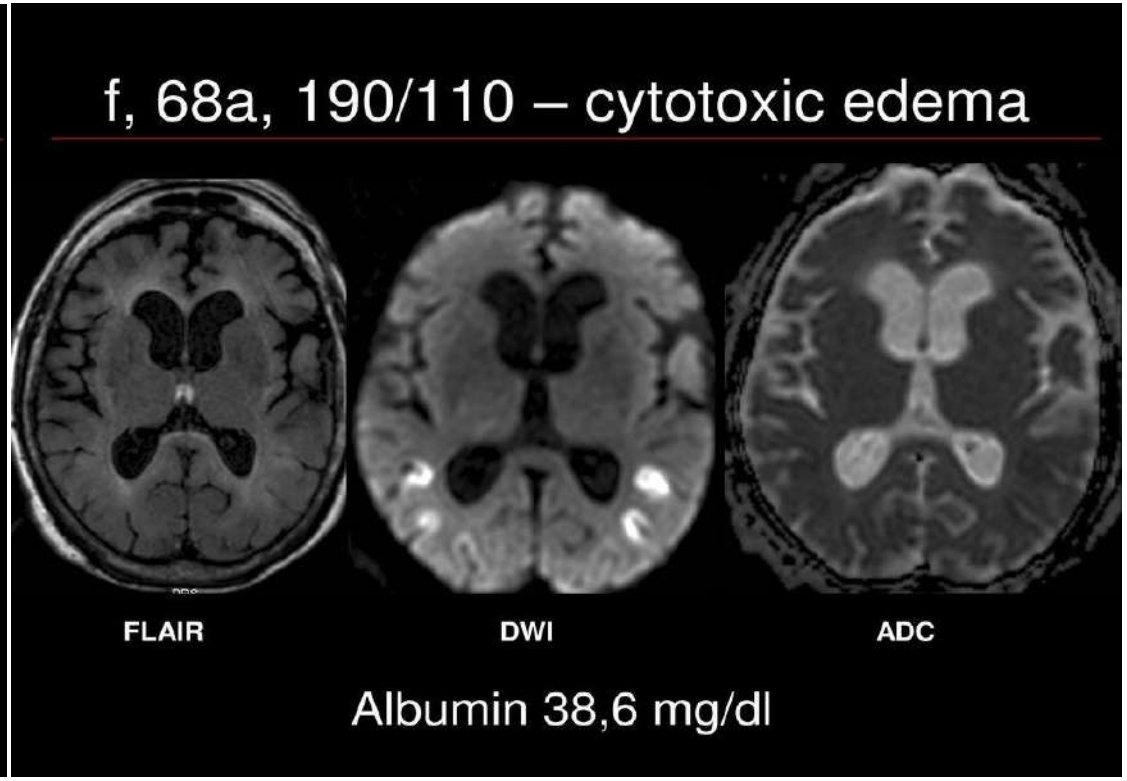


Thunderclaps Headache

Recommended MRI Sequences When Evaluating for Thunderclap Headache[a] TABLE 1-6

MRI sequences	Imaging features
Diffusion-weighted imaging/apparent diffusion coefficient ADC	Vasogenic and cytotoxic edema (eg, PRES versus ischemic stroke)





Type of edema in PRES depends on serum albumin

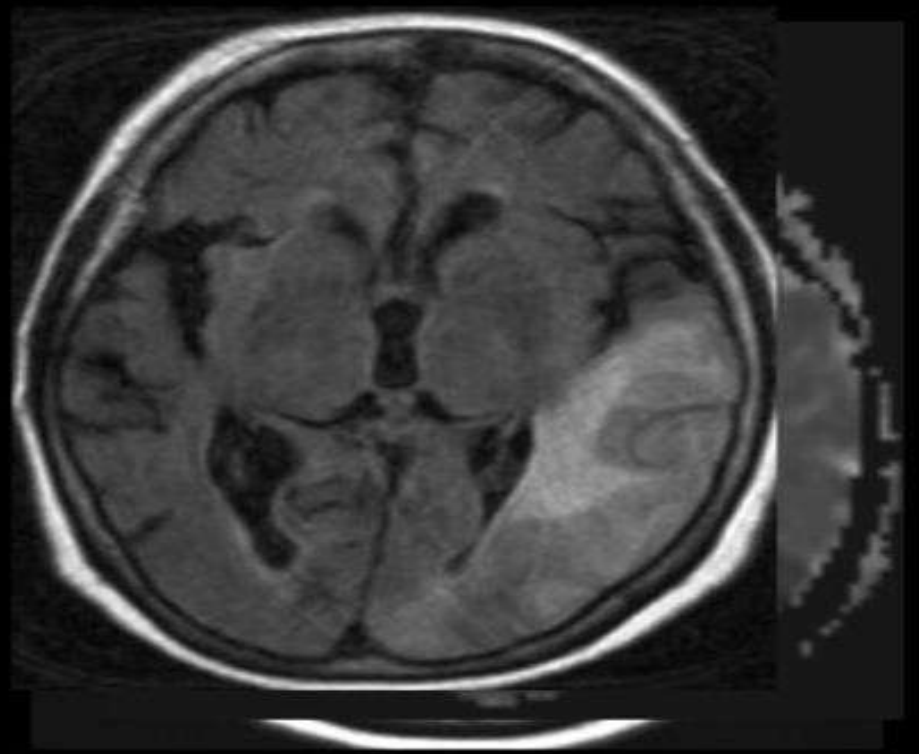
Agnes Pirker

Dpt. of Neurology
Medical University of Vienna, Austria

PRES: Posterior Reversible Encephalopathy Syndrome

PRES

- Cerebral vasogenic edema
  - cytotoxic edema?
- Excessive hypertension overvhelms cerebral autoregulatory mechanisms
  - immunosuppresion, renal diseases, sepsis, malignancies…
- posterior circulation
  - other localizations?



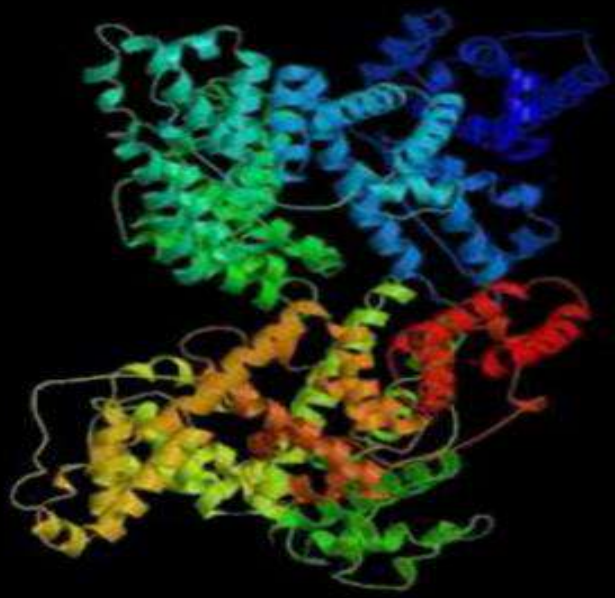
Hinchey et al. NEJM 1996, Paulson et al. Cerebraovasc Brain metab Rev 1990,
Sheth et al. Eur Neurol 1996, Müller-Mang et al. Neurorad 2009, Bartynski et al AJNR 2006

What determines type of edema in PRES?

- Serum albumin?
  - 75% of Plasma-Protein
  - 75% of COP
  - COP acts against perfusion pressure

  - scavanges ROS Eliminadores de especies reactivas de oxigeno
  - prevents endothel from damage

  - low in many conditions prone to PRES (elevated turnover or damage through ROS)



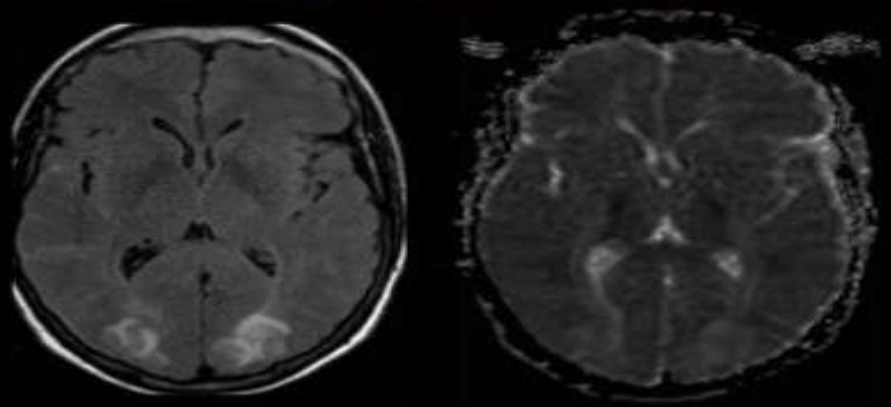
COP: COLLOID ONCOTIC PRESSURE
ROS: REACTIVE OXYGEN SPECIES

Quinlan et al, Hepatology 2005

Study

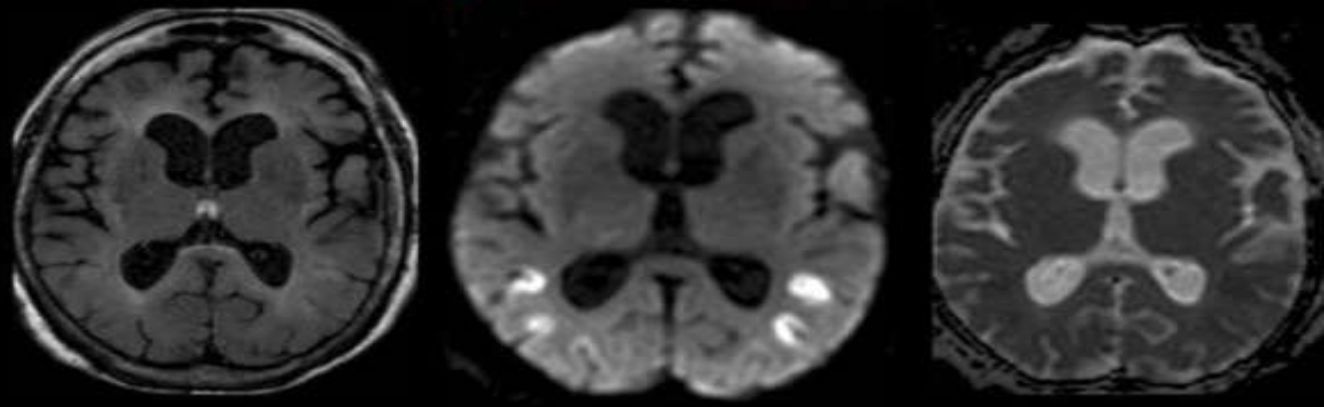
- 28 patients
- albumin, routine chemistry, RBC, WBC
- Type of edema: cytotoxic vs. vasogenic
  - FLAIR, DWI, ADC-maps

vasogenic edema



FLAIR ADC

cytotoxic edema

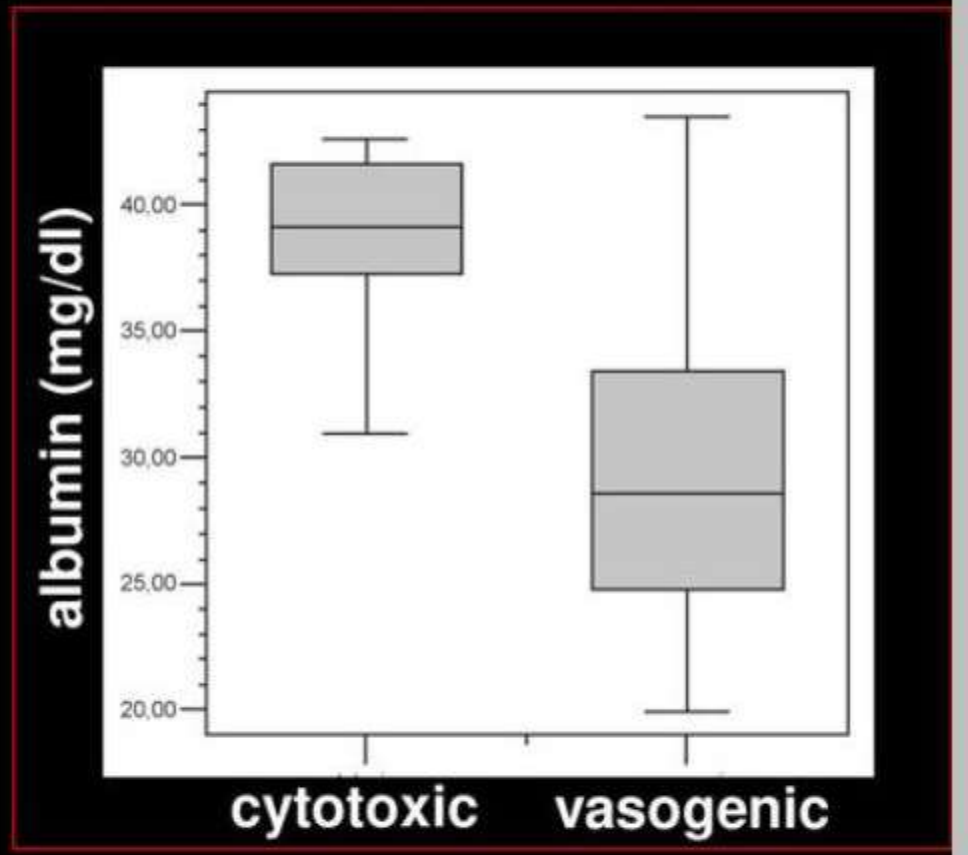


FLAIR DWI ADC

Results I

- 21 female, 7 male
- mean age 43± 18,6
- etiology:
  - pregnancy (8), hypertension (11), immunosuppressive drugs (11), sepsis (1)

- edema:
  - 22 vasogenic, 6 cytotoxic
- albumin lower in vasogenic than in cytotoxic edema,
  - 29,3mg/dl ±4,2 vs 38,4mg/dl ±6,7, p<0,01

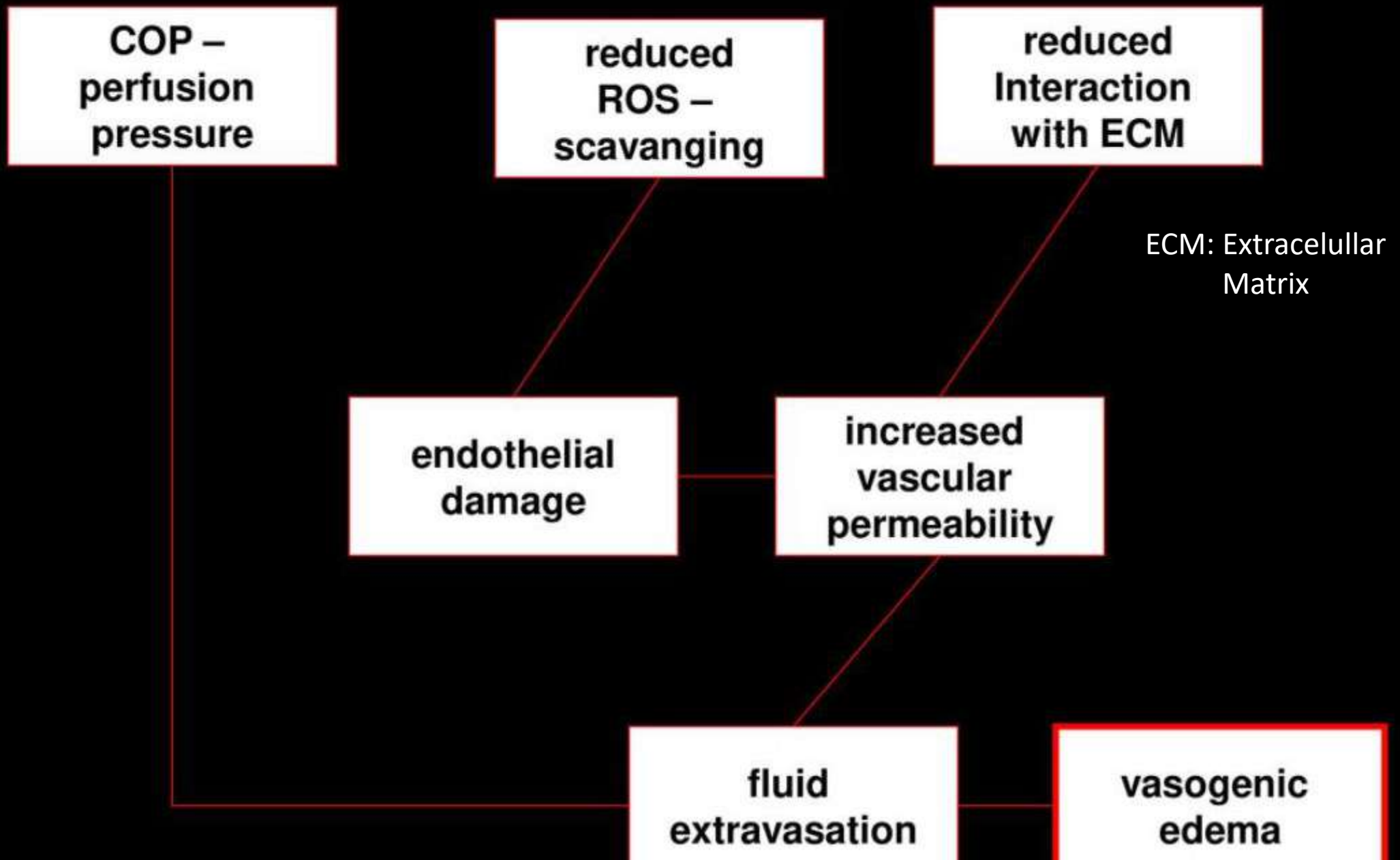


Results II

	Vasogenic edema	Cytotoxic edema	p
Age	40,9 (16,76)	50,67 (24)	0,38
female	16 (72)	6(100)	0,149
Na	137,5 (3,4)	134,8 (5,5)	0,54
K	4,2 (0,32)	3,6 (0,32)	0,153
Cl	104,5 (3,92)	98,2 (7,33)	0,07
Ca	2,16 (0,31)	2,2 (0,23)	0,9
Kreatinin	0,92 (0,66-2,4)	0,91 (0,62-1,67)	0,76
Albumin**	29,26 (6,71)	38,43 (4,2)	0,004
AST	45 (24-79)	32 (21-45)	0,22
ALT	23 (10-145)	23 (18-41)	0,98
GGT	73 (18-178)	130 (79-200)	0,37
RBC	3,61 (0,78)	4,11 (0,60)	0,26
Hb	11 (2,56)	12 (2,15)	0,14
Hk	33,16 (7,72)	36,65 (5,74)	0,25
WBC	11,16 (5,69)	7,62 (5,11)	0,18
Thr	175,03 (110,45)	202,58 (155,77)	0,7

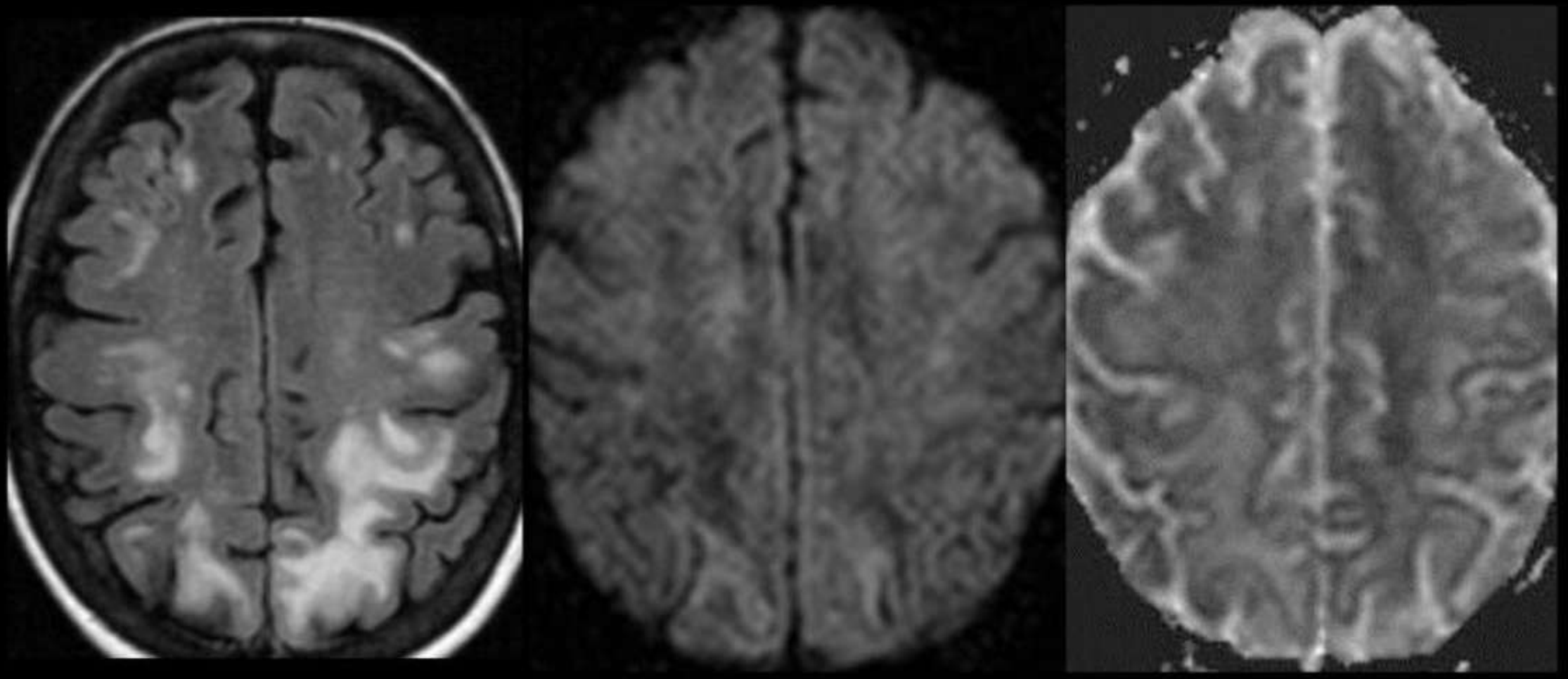
	Vasogenic edema	Cytotoxic edema	p
Hypertension	8 (73)	3 (75)	0,73
Pregnancy	7 (44)	1 (16)	0,35
Immunsuppression	9 (41)	2 (33)	0,56
Tumor*	2 (9)	3 (50)	0,05
Transplantation	4 (18)	1 (16)	0,72
Coma, Delirium	17 (90)	4 (80)	0,52
Seizure	15(83)	4(80)	0,65
Disturbance of vision	7 (64)	3 (60)	0,65
Headache*	2 (17)	4 (80)	0,03

Decreased albumin involved in Pathogenesis of PRES



ECM: Extracelullar Matrix

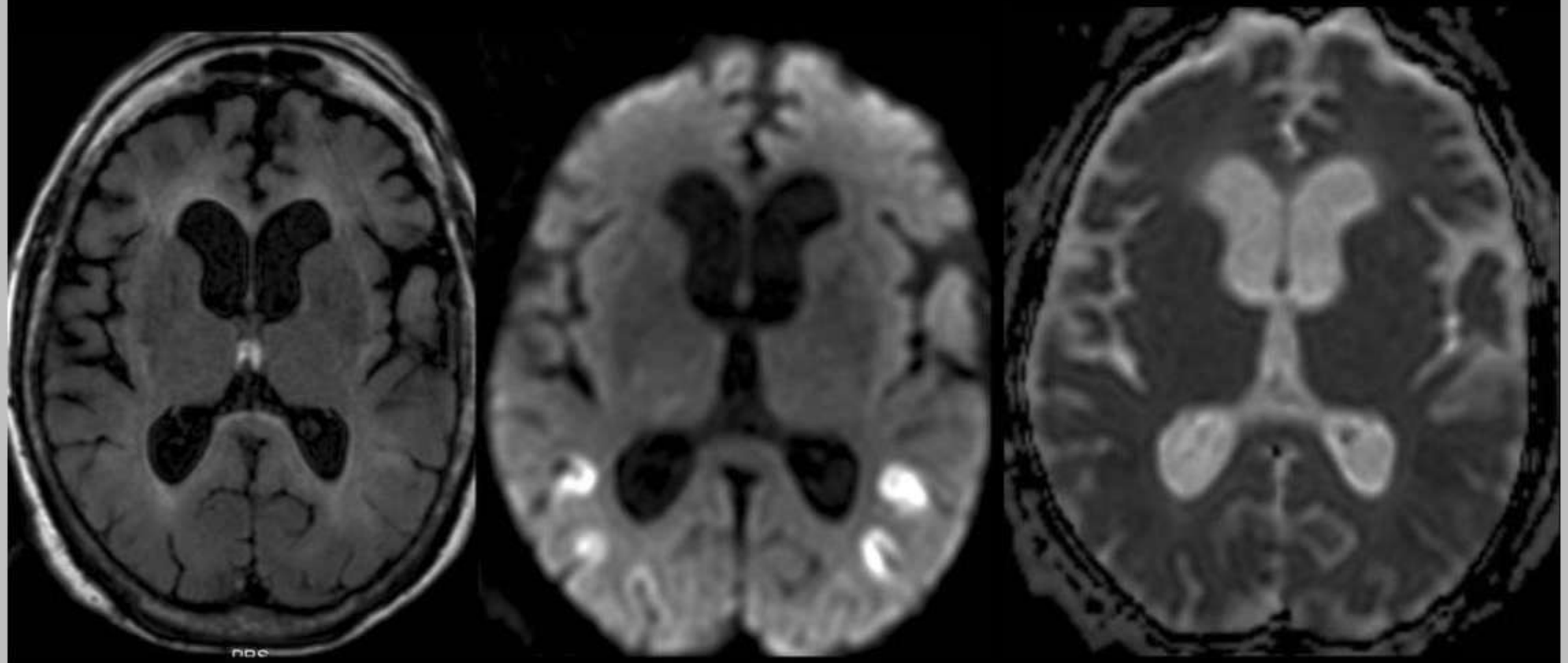
f, 40a, 180/90 – vasogenic edema



FLAIR DWI ADC

Albumin 21 mg/dl

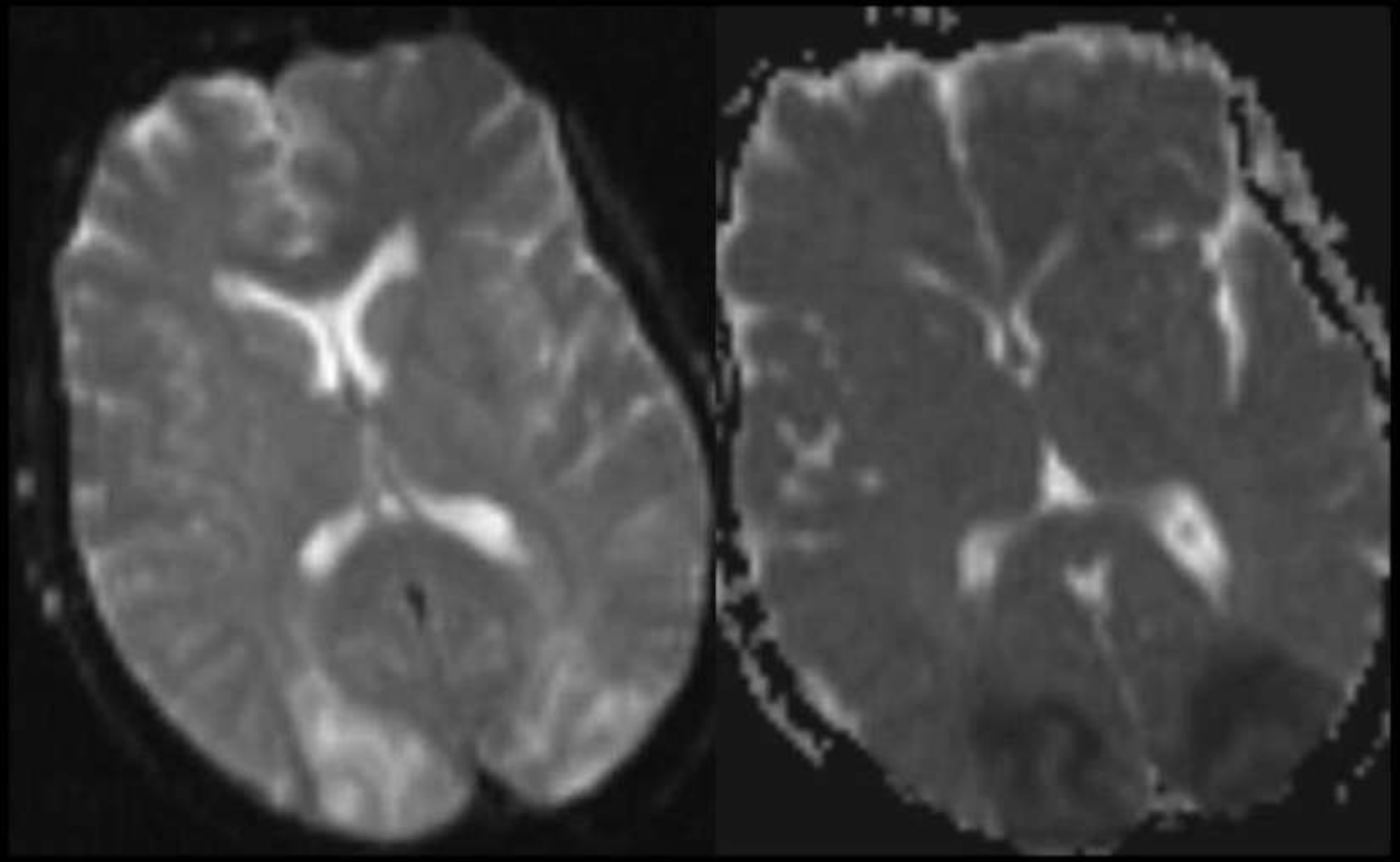
f, 68a, 190/110 – cytotoxic edema



FLAIR DWI ADC

Albumin 38,6 mg/dl

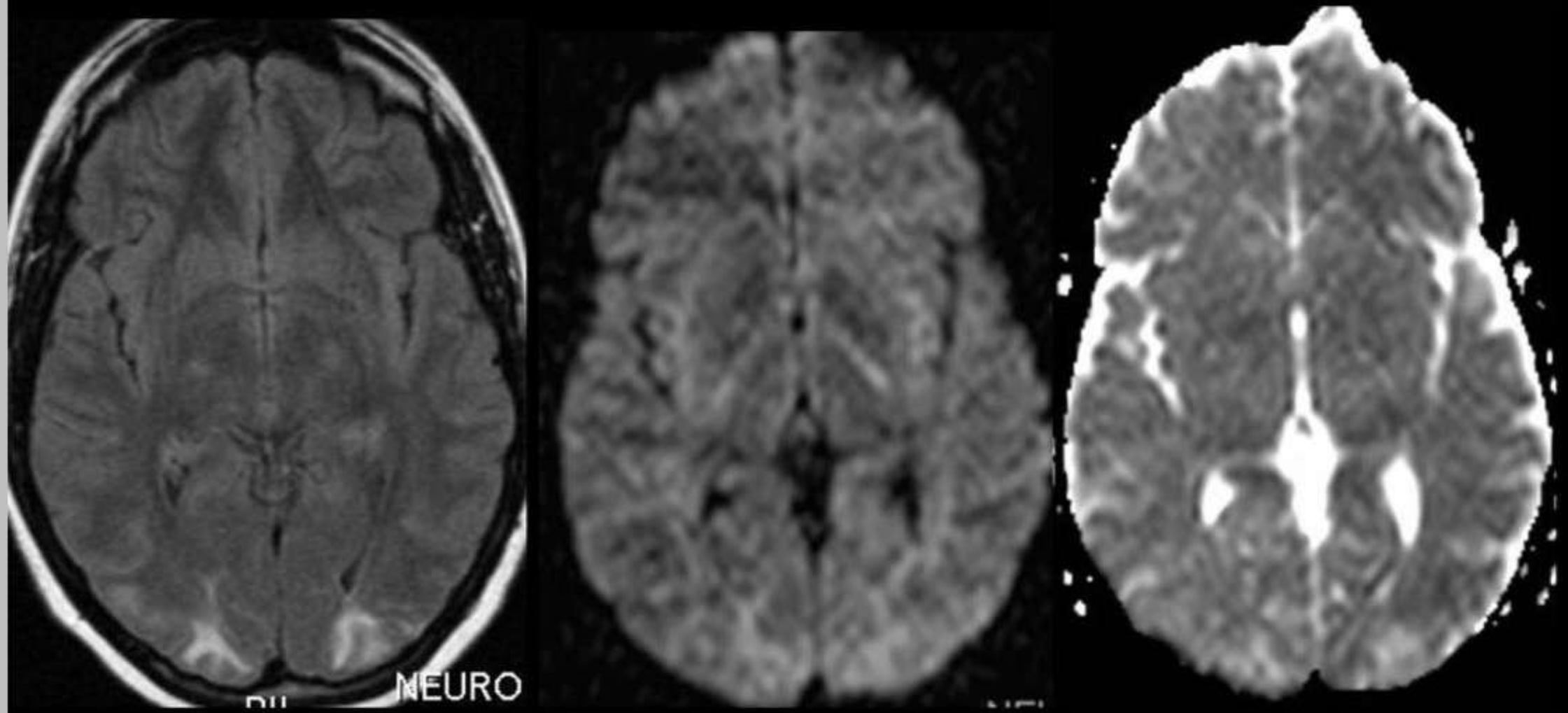
f, 30a, pulmoTx, CyA – cytotoxic edema



DWI ADC

Albumin 41,2 mg/dl

f, 22a, SLE, CyA – vasogenic edema



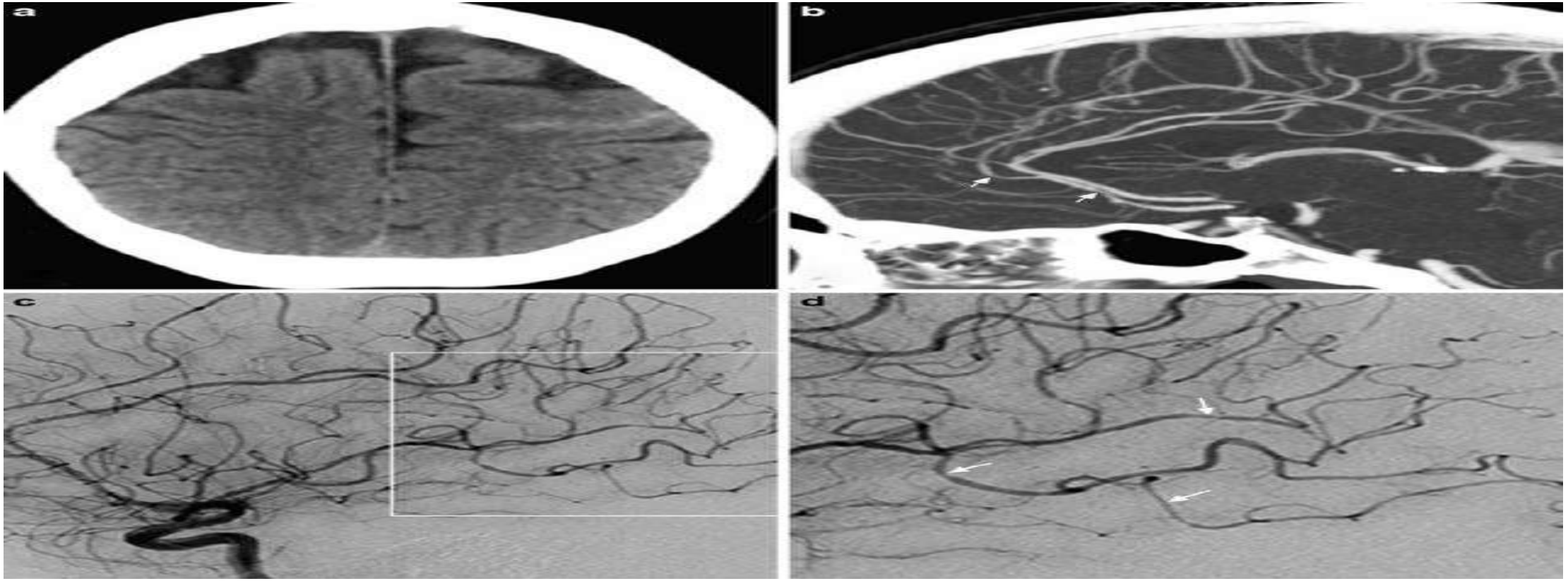
FLAIR DWI ADC

Albumin 24,7 mg/dl

Reconstrucciones útiles de RMI en cefalea thunderclaps

Recommended MRI Sequences When Evaluating for Thunderclap Headache[a] TABLE 1-6

MRI sequences	Imaging features
Magnetic resonance angiography (MRA)	Exclude vasoconstriction, aneurysm, dissection



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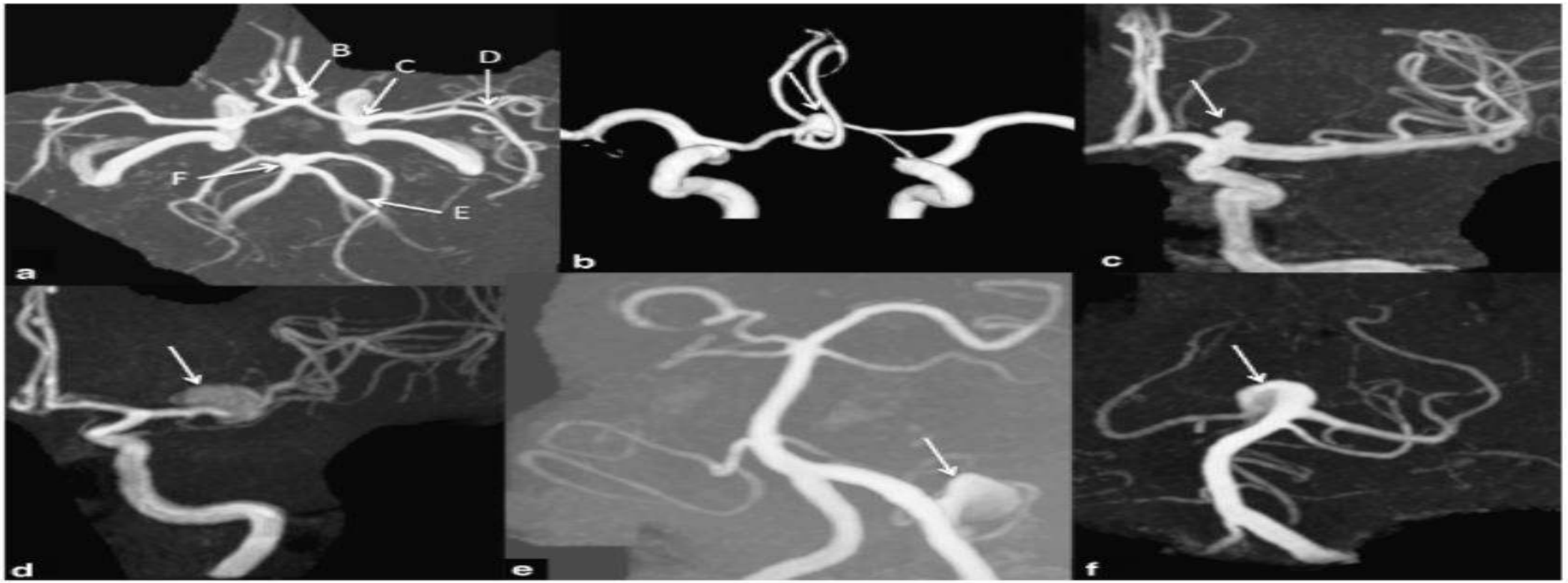

Reconstrucciones útiles de RMI en cefalea thunderclaps

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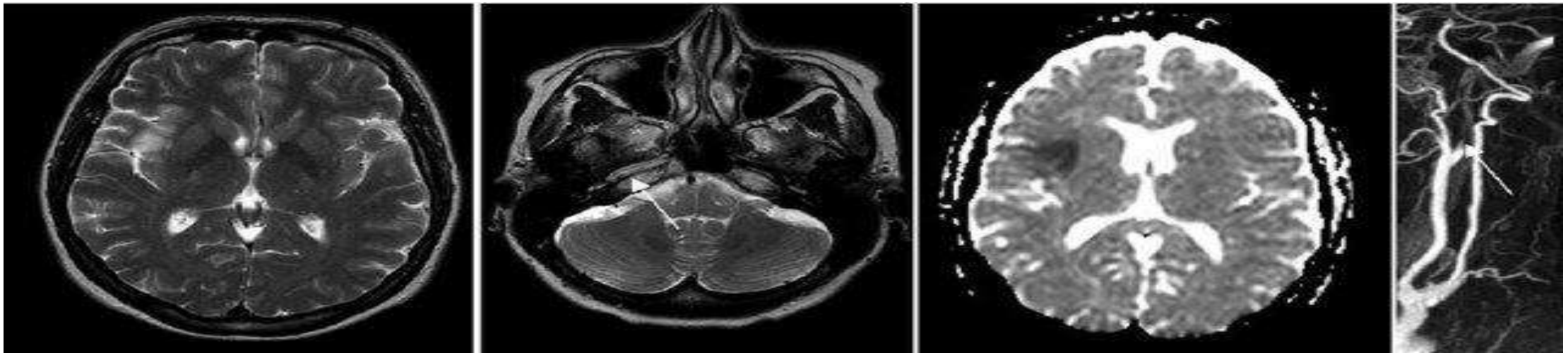
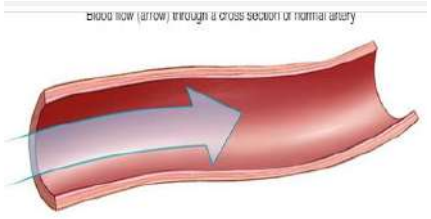
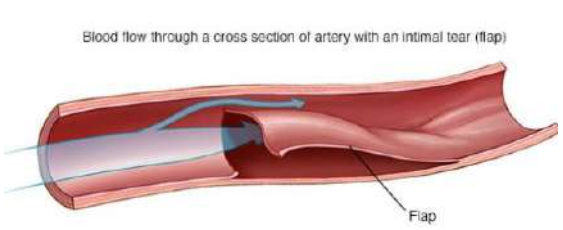
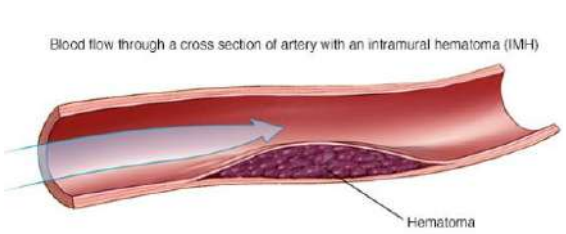
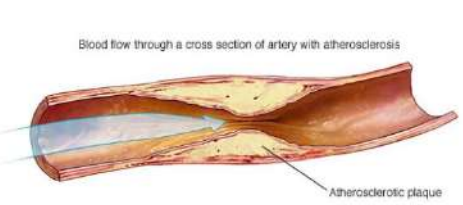






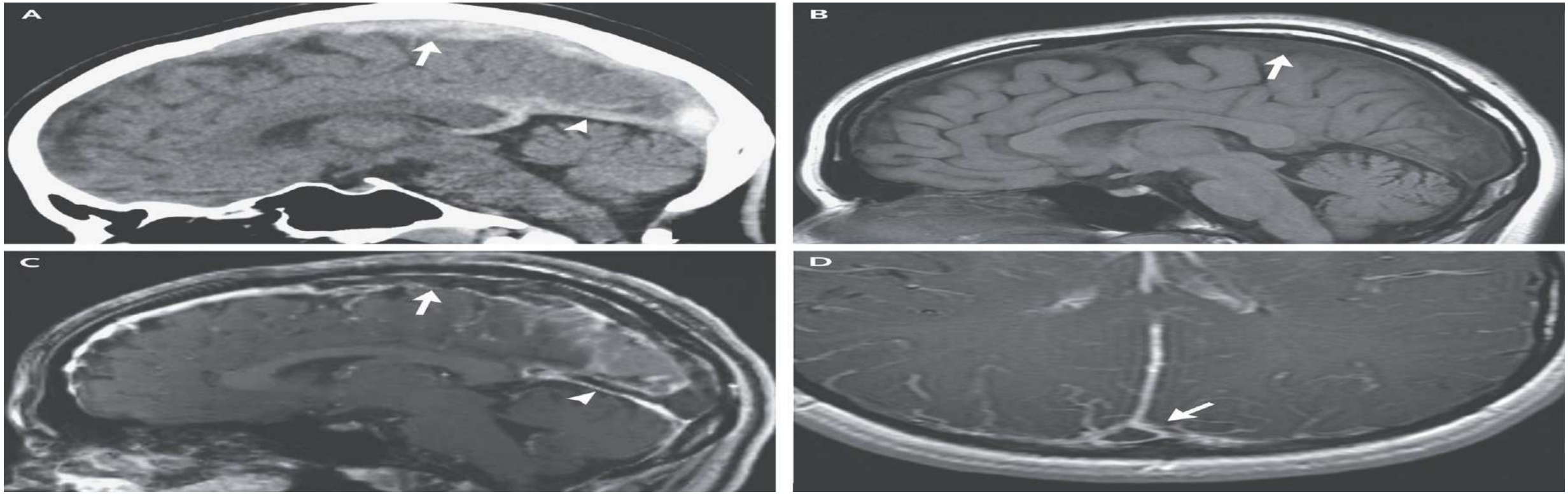




Reconstrucciones útiles de RMI en cefalea thunderclaps

Recommended MRI Sequences When Evaluating for Thunderclap Headache[a] TABLE 1-6

MRI sequences	Imaging features
Magnetic resonance venography (MRV)	Exclude cerebral venous sinus/cortical vein thrombosis



Reconstrucciones útiles de RMI en cefalea thunderclaps

Recommended MRI Sequences When Evaluating for Thunderclap Headache[a] TABLE 1-6

MRI sequences	Imaging features
T1 with contrast (axial, sagittal, coronal)	CSF leak/spontaneous intracranial hypotension

Mujer diestra de 58 años con antecedentes de Síndrome de Marfan, reemplazo de válvula aórtica mecánica, anticoagulada con warfarina, y la hipertensión presentó al NYU Medical Center quejándose de un severo, dolor de cabeza de aparición repentina después de esforzarse al defecar.

Ella describió su dolor de cabeza como difuso con radiación a el cuello, mareos y aturdimiento. Ella tenía experimentó un solo episodio de náuseas severas con vómitos. El dolor de cabeza empeoró en posición vertical ,

En el examen neurológico, el paciente estaba despierto, alerta, y totalmente orientado. Sus nervios craneales estaban muy intactos. No tenía déficits focales motores, sensoriales o cerebelosos. El examen fundoscópico no reveló papiledema. Hallazgos del examen físico compatibles con el síndrome de Marfan incluía dolichostenomelia y aracnodactilia, y su examen cardiovascular confirmó una aorta mecánica válvula. El resto de su examen no fue contributivo. El INR del paciente fue de 4.2, consistente con warfarina anticoagulación. Todas las demás pruebas de laboratorio estaban dentro límites normales.

Reconstrucciones útiles de RMI en cefalea thunderclaps

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Reconstrucciones útiles de RMI en cefalea thunderclaps

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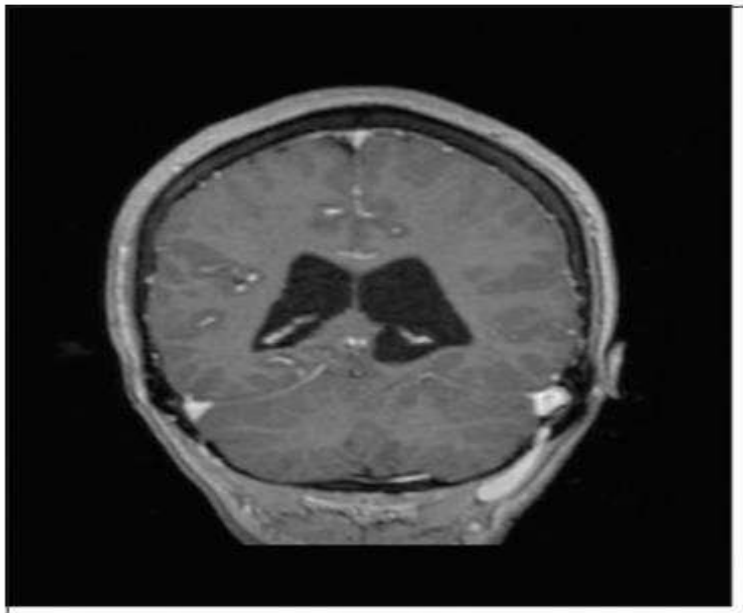
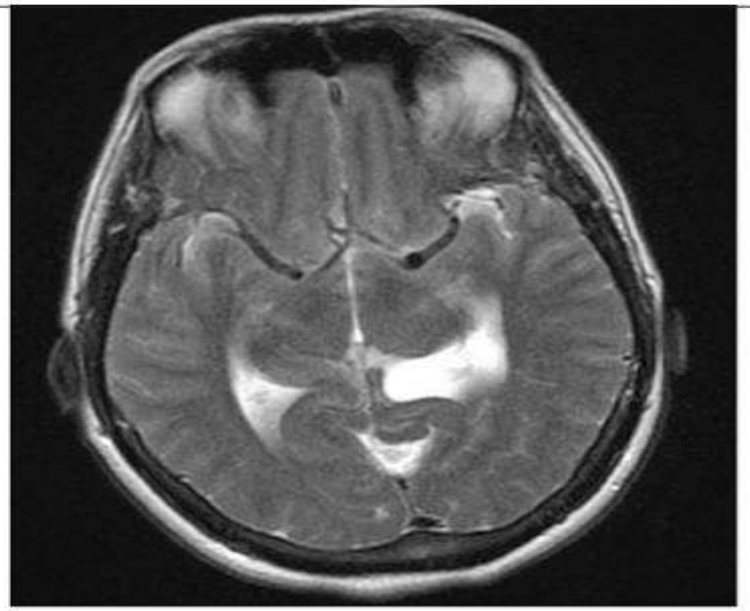
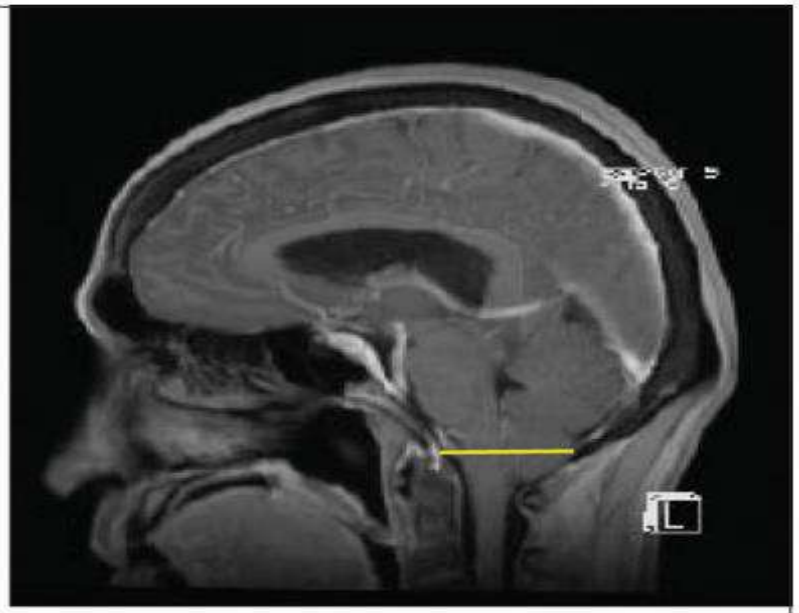


Coronal T1-weighted MRI with gadolinium. Mild dilatation of the lateral ventricles, left atrial diverticulum.

a



Axial T2-weighted MRI. Left atrial diverticulum.

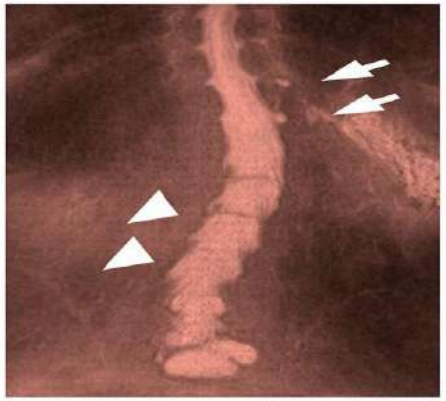


Sagittal T1-weighted MRI with gadolinium. Foramen magnum highlighted in yellow (McRae's line). Inferior displacement of cerebellar tonsils.

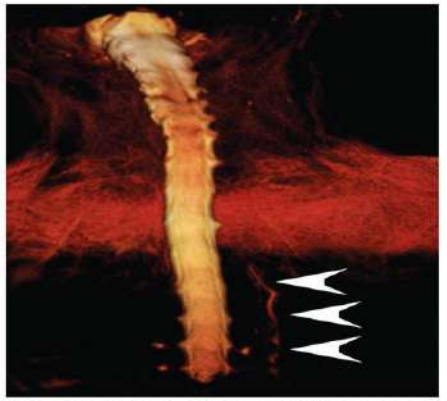
Reconstrucciones útiles de RMI en cefalea thunderclaps

Recommended MRI Sequences When Evaluating for Thunderclap Headache[a] TABLE 1-6

MRI sequences	Imaging features
T1 with contrast (axial, sagittal, coronal)	CSF leak/spontaneous intracranial hypotension

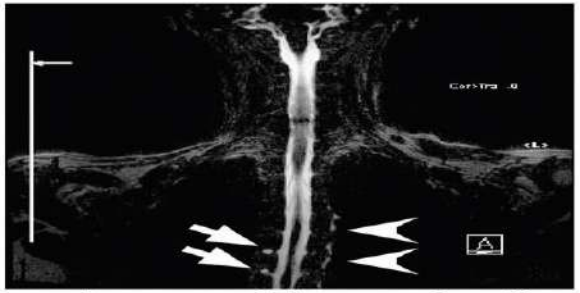


MR myelogram of the thoraco-lumbar spine. Dural ectasia (trian-gles), root sleeve cysts (arrows).

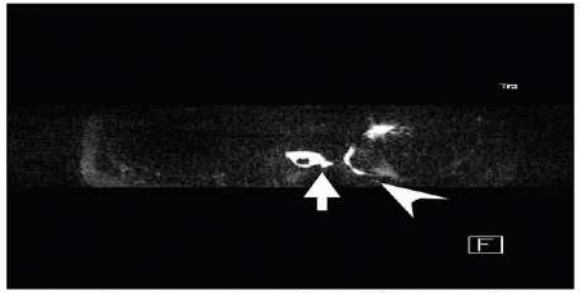


MR myelogram of the cervico-thoracic spine, 3D reconstruction. Paraspinal CSF bands (arrowheads).

https://radiopaedia.org/cases/mri-myelogram-with-gadolinium



MR myelogram of the cervico-thoracic spine. Paraspinal CSF bands (arrow-heads), root sleeve cysts (arrows).



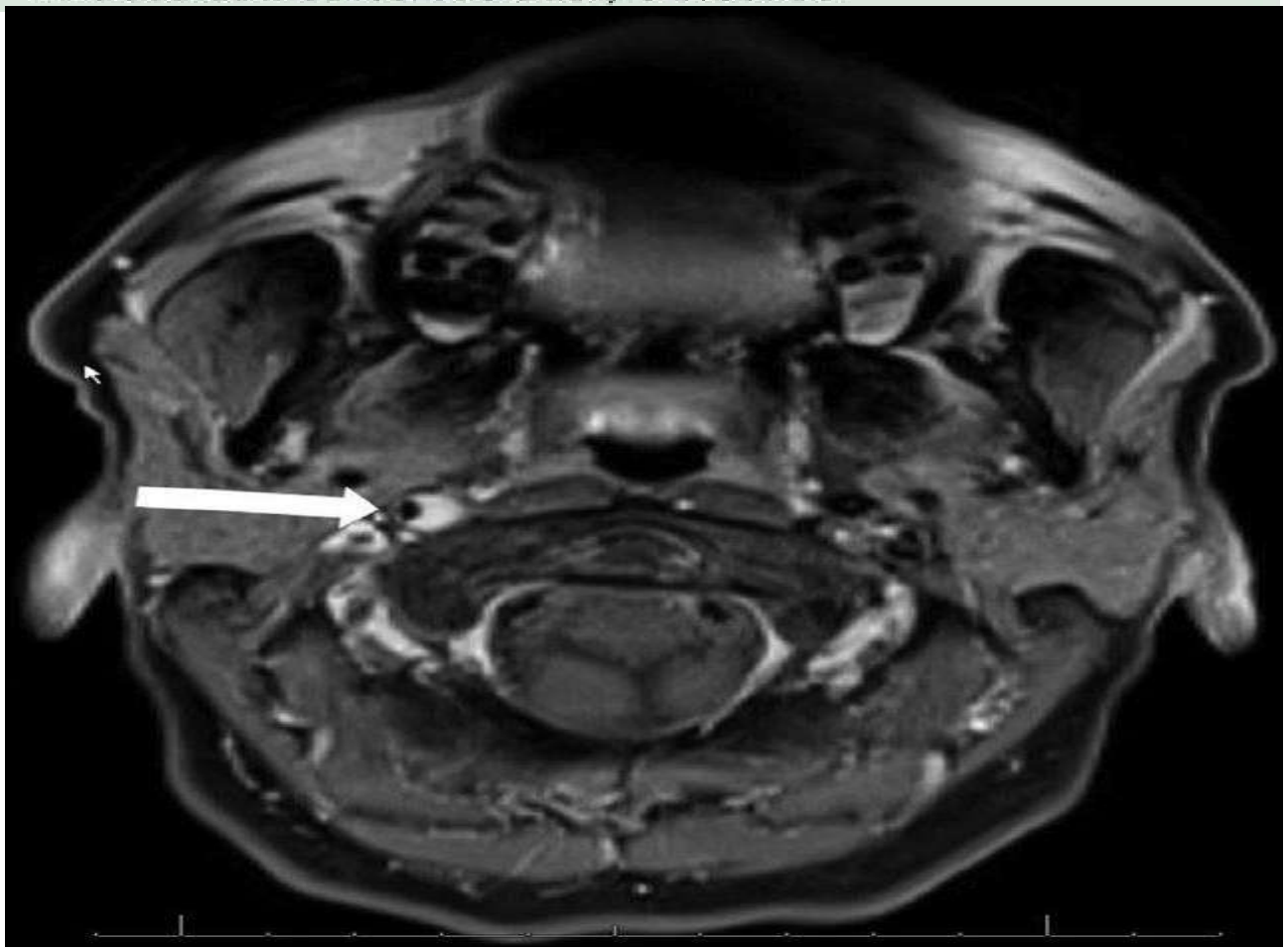
MR myelogram of the thoracic spine, axial plane. Extravasation of CSF (arrowhead), root sleeve cyst (arrow).

Reconstrucciones útiles de RMI en cefalea thunderclaps

Recommended MRI Sequences When Evaluating for Thunderclap Headache[a] TABLE 1-6

MRI sequences	Imaging features
Cervical T1 fat saturation with contrast	Exclude cervical carotid artery dissection

- Mujer,28 años, APP: 1ª de Neuralgia amiotrofica cervical, EMG denervación neurógena crónica del m. serrato anterior der. Acude por dolor cervical irradiado a ambos hombros. Ella presentó a su local neurólogo, ex neurolog Nl. Los exámenes físicos y neurológicos fueron normales. Tx PDNx 5dias. Mejoro 7 días. RMI cervical convencional HD (-) pero una DAB izq no muestra DH pero si una DAV IZQUIERDA, no antecedentes médicos y familiares de HCTD



Imágenes ponderadas en T1 con saturación de grasa con contraste

La saturación de grasa es suprimir la señal del tejido adiposo normal para reducir el artefacto de desplazamiento químico, mejorar la visualización de la captación del material de contraste y la caracterización del tejido, se inserta un módulo especial de supresión de grasa al comienzo de una secuencia de RMI

Se logra con cinco técnicas: Saturación de grasa espectral, recuperación de inversión de tau corta (STIR), presaturación espectral con recuperación de inversión (SPAIR), método dixon y método de excitación de agua.

Reconstrucciones útiles de RMI en cefalea thunderclaps

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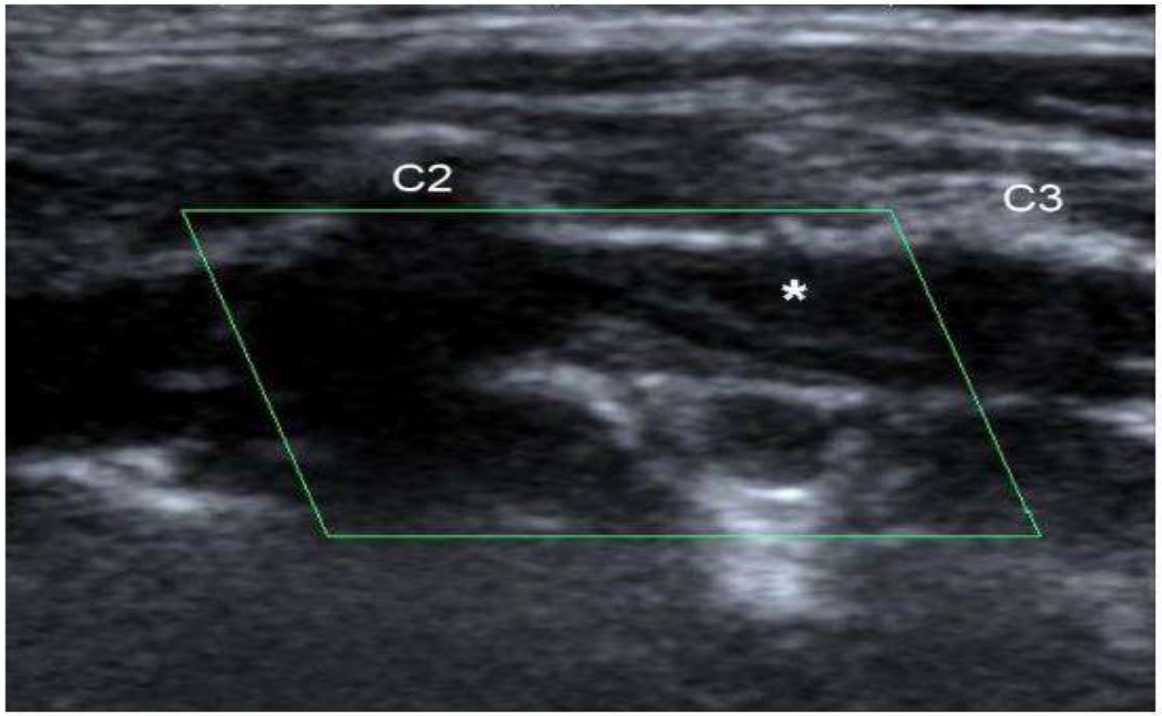

Figure 1 Duplex ultrasound (B-mode) shows narrowing of left intervertebral VA. The asterisk indicates the false lumen caused by intramural hematoma.
Abbreviation: VA, vertebral artery.

Reconstrucciones útiles de RMI en cefalea thunderclaps

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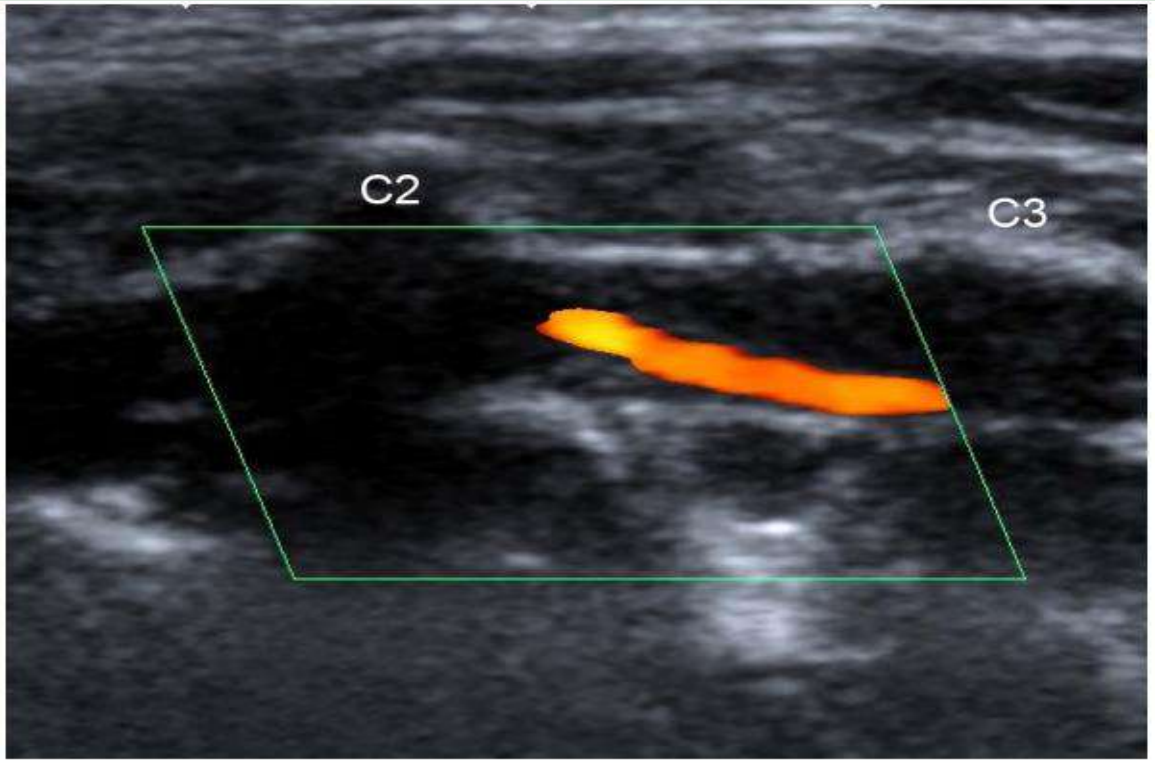

Figure 2 Color flow longitudinal duplex ultrasound highlights the severe luminal narrowing of left intervertebral VA due to intramural hematoma.
Abbreviation: VA, vertebral artery.

Reconstrucciones útiles de RMI en cefalea thunderclaps

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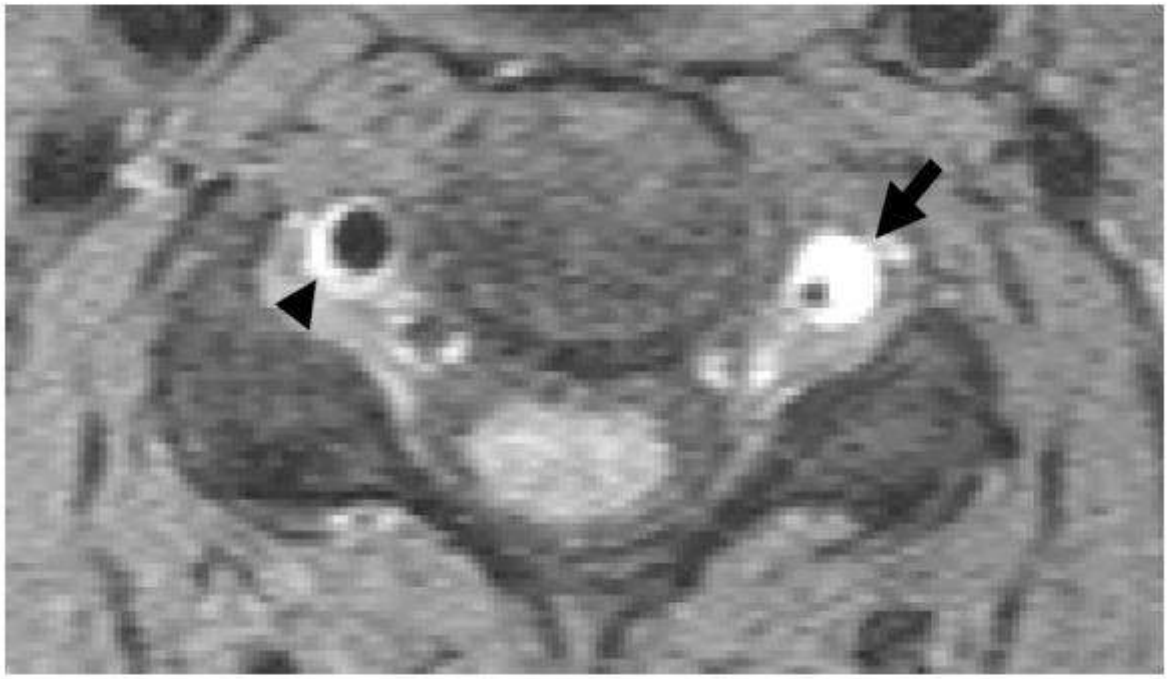

Figure 4 The axial fat-saturated T1 MRI sequence shows dissection of the left (arrow) and dissection of the right VA (arrow head).
Abbreviations: MRI, magnetic resonance imaging; VA, vertebral artery.

ICHD-3 Diagnostic Criteria for Migraine Without Aura[a]

Migraine without aura

A At least five attacks[b] fulfilling criteria B-D

B Headache attacks lasting 4-72 hours (untreated or unsuccessfully treated)[c,d]

C Headache has at least two of the following four characteristics:

- **1** Unilateral location
- **2** Pulsating quality
- **3** Moderate or severe pain intensity
- **4** Aggravation by or causing avoidance of routine physical activity (eg, walking or climbing stairs)

D During headache at least one of the following:

- **1** Nausea and/or vomiting
- **2** Photophobia and phonophobia

E Not better accounted for by another *ICHD-3* diagnosis

ICHD-3 = International Classification of Headache Disorders, Third Edition.

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[b] One or a few migraine attacks may be difficult to distinguish from symptomatic migrainelike attacks. Furthermore, the nature of a single or a few attacks may be difficult to understand. Therefore, at least five attacks are required. Individuals who otherwise meet criteria for migraine without aura but have had fewer than five attacks should be coded probable migraine without aura.

[c] When the patient falls asleep during migraine and wakes up without it, duration of the attack is reckoned until the time of awakening.

[d] In children and adolescents (aged under 18 years), attacks may last 2-72 hours (the evidence for untreated durations of less than two hours in children has not been substantiated).

ICHD-3 Diagnostic Criteria for Migraine With Aura and Migraine With Typical Aura[a]

Migraine with aura

A At least two attacks fulfilling criteria B and C

B One or more of the following fully reversible aura symptoms:

1. Visual Centellenos entre otros
2. Sensory Pinchazos, entre otros
3. Speech and/or language Disartria puede ser, la afasia es un síntoma unilateral
4. Motor Puede durar hasta 72 horas
5. Brainstem vértigo (no mareo), tinitus (no oído lleno), diplopía (no visión borrosa), GCS ≤13
6. Retinal

C At least three of the following six characteristics:

1. At least one aura symptom spreads gradually over ≥5 minutes
2. Two or more aura symptoms occur in succession
3. Each individual aura symptom lasts 5-60 minutes[b]
4. At least one aura symptom is unilateral[c]
5. At least one aura symptom is positive[d]
6. The aura is accompanied, or followed within 60 minutes, by headache

D Not better accounted for by another *ICHD-3* diagnosis

Migraine with typical aura

A Attacks fulfilling criteria for migraine with aura and criterion B below

B Aura with both of the following:

1. Fully reversible visual, sensory, and/or speech/language symptoms
2. No motor, brainstem, or retinal symptoms

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[b] When, for example, three symptoms occur during an aura, the acceptable maximal duration is 3 × 60 minutes. Motor symptoms may last up to 72 hours.

[c] Aphasia is always regarded as a unilateral symptom; dysarthria may or may not be.

[d] Scintillations and pins and needles are positive symptoms of aura.

ICHD-3 Diagnostic Criteria for Chronic Migraine[a]

Chronic migraine

A Headache (migrainelike or tension-type-like[b]) on ≥15 days/month for >3 months, and fulfilling criteria B and C

B Occurring in a patient who has had at least five attacks fulfilling criteria B-D for migraine without aura and/or criteria B and C for migraine with aura

C On ≥8 days/month for >3 months, fulfilling any of the following[c]:

1. Criteria C and D for migraine without aura
2. Criteria B and C for migraine with aura
3. Believed by the patient to be migraine at onset and relieved by a triptan or ergot derivative

D Not better accounted for by another *ICHD-3* diagnosis[d,e,f]

Observaciones sobre el mínimo criterio para migrañas

- 5 ataques son necesarios para el diagnóstico esto es para evitar la siniestra cefalea secundaria (Hemorragia subaracnoidea), la HBSA puede cumplir todos los criterios clínicos de migraña pero no la frecuencia.
- Un simple factor no es suficiente para el diagnostico de migraña.
- Se necesitan 5 episodios, el criterio temporal (4 a 72 horas), pero al menos 2 criterios de dolor y un criterio asociado
- Existen pacientes que cumple criterio de dolor o criterio de síntomas asociado para establecerse como probable
- Pte con 5 episodios de cefalea bilateral o generalizada, como apretón, de moderada intensidad, que cause evitación de actividad física, aun sin fotofobia o nausea cumple el criterio probable de migraña, mayor de 18 años.

ICHD-3 Diagnostic Criteria for Medication-Overuse Headache[a,b]

Medication-overuse headache

A Headache occurring on ≥15 days/month in a patient with a preexisting headache disorder

B Regular overuse for >3 months of one or more drugs that can be taken for acute and/or symptomatic treatment of headache[c,d,e]

C Not better accounted for by another *ICHD-3* diagnosis

ICHD-3 = International Classification of Headache Disorders, Third Edition.

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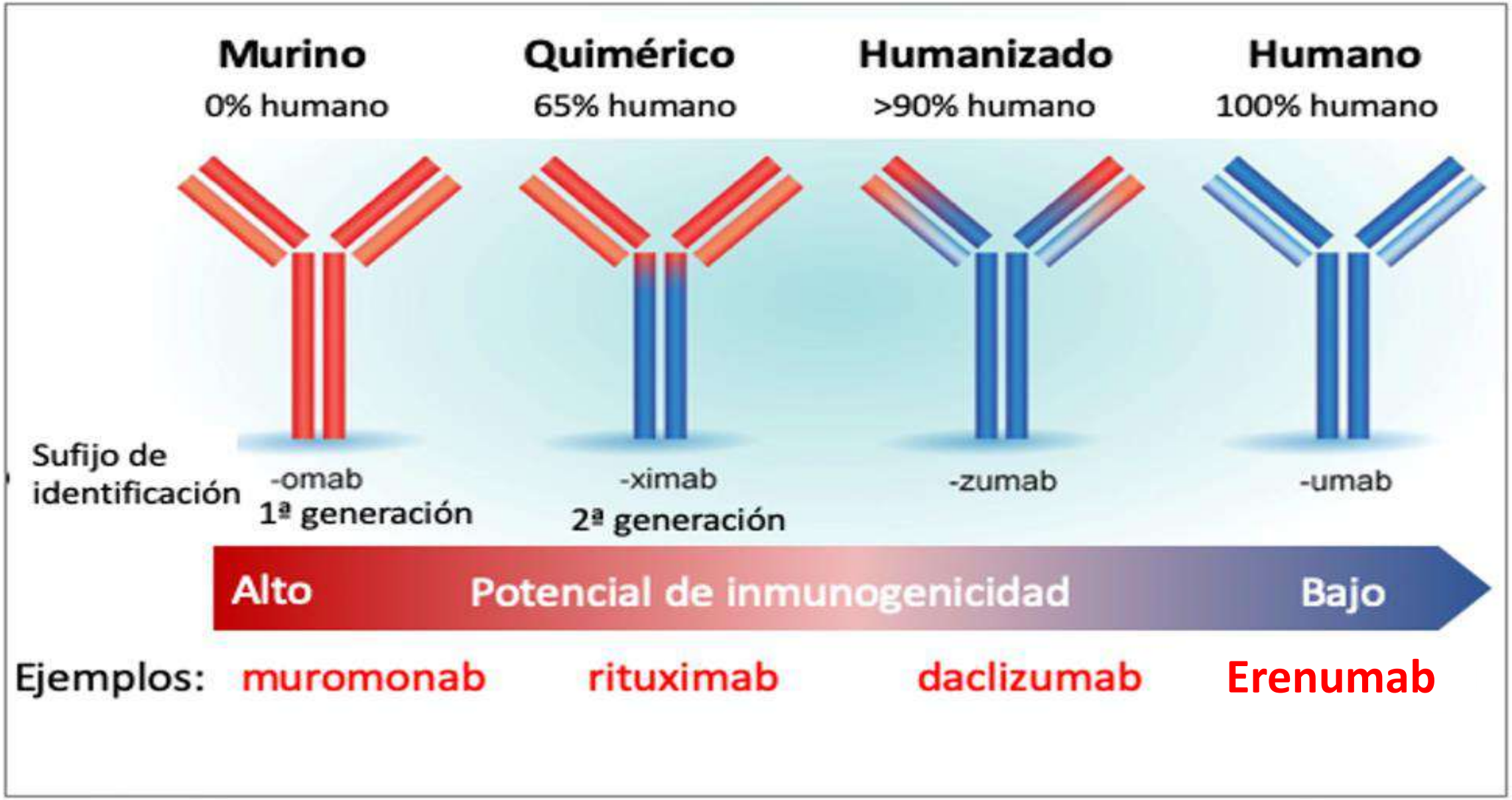
[b] Overuse is defined by the use of all acute medication on >10 days per month except for simple analgesics (eg, acetaminophen, nonsteroidal anti-inflammatory drugs), for which overuse is defined as use on >15 days per month.

[c] Patients should be coded for one or more subtypes of medication-overuse headache according to the specific medication(s) overused and the criteria for each below. For example, a patient who fulfils the criteria for triptan-overuse headache and the criteria for one of the subforms of nonopioid analgesic–overuse headache should receive both these codes. The exception occurs when patients overuse combination-analgesic medications, who are coded combination-analgesic-overuse headache and not according to each constituent of the combination-analgesic medication.

[d] Patients who use multiple drugs for acute or symptomatic treatment of headache may do so in a manner that constitutes overuse even though no individual drug or class of drug is overused; such patients should be coded medication-overuse headache attributed to multiple drug classes not individually overused.

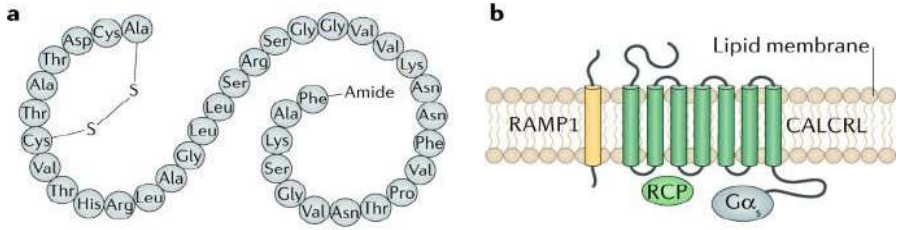
[e] Patients who are clearly overusing multiple drugs for acute or symptomatic treatment of headache but cannot give an adequate account of their names and/or quantities are coded medication-overuse headache attributed to unspecified or unverified overuse of multiple drug classes until better information is available. In almost all cases, this necessitates diary follow-up.


Murino
0% humano
Quimérico
65% humano
Humanizado
>90% humano
Humano
100% humano
Sufijo de identificación
-omab
1ª generación
-ximab
2ª generación
-zumab
-umab
Alto
Potencial de inmunogenicidad
Bajo
Ejemplos:
muromonab
rituximab
daclizumab
Erenumab

Mecanismos de acción de los nuevos anti-migrañosos

CALCRL: Calcitonin Receptor-Like Receptor

RAMP1: Receptor Activity Modifying Protein 1



Anti-CGRP antibody

Vyepti Eptinezumab

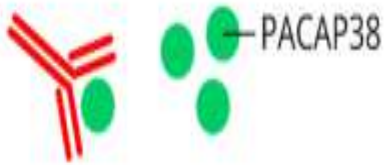
Ajovy Fremanezumab

Emgality Galcanezumab

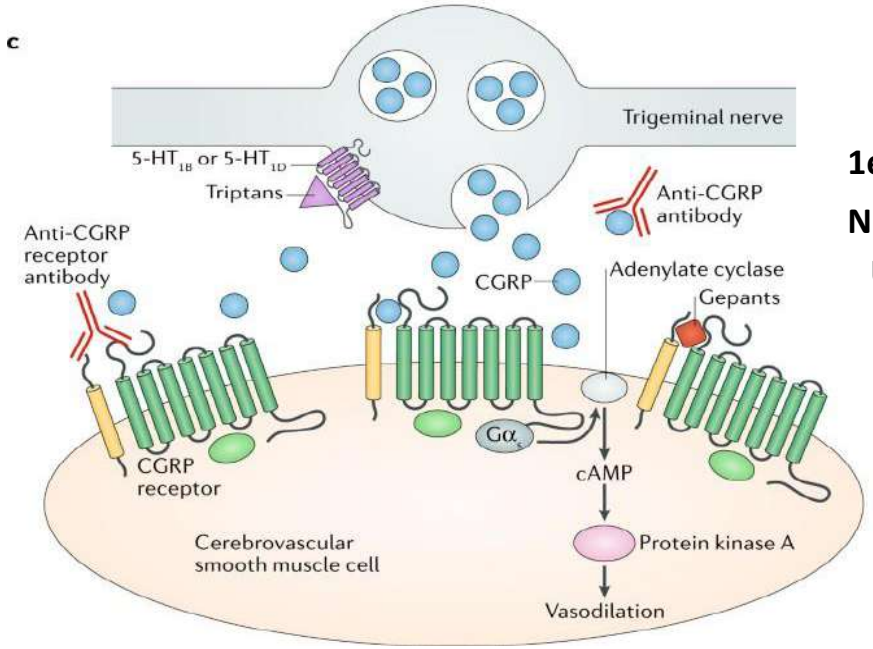
Anti-PACAP38 antibody

ALD1910

Posible Efecto profilactivo



Pituitary adenylate cyclasa-activatin polipetide



CGRP receptor antagonist

1er oral, Prev Atogepant

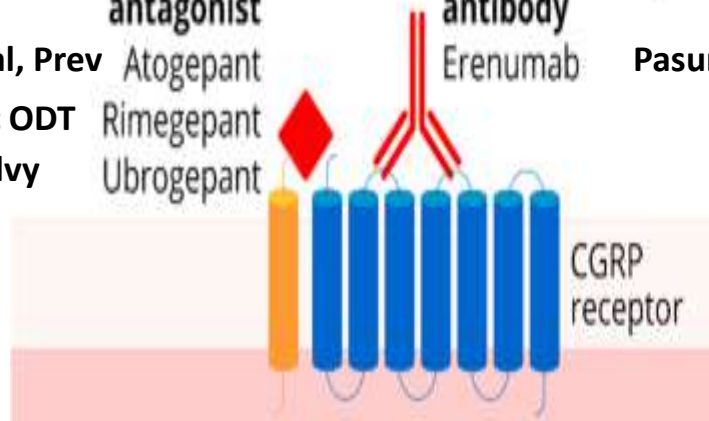
Nurtec ODT Rimegepant

Ubrelvy Ubrogepant

Anti-CGRP receptor antibody

Erenumab

Pasurta

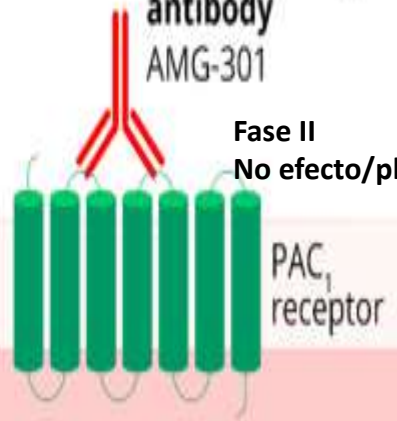


Anti-PAC1 receptor antibody

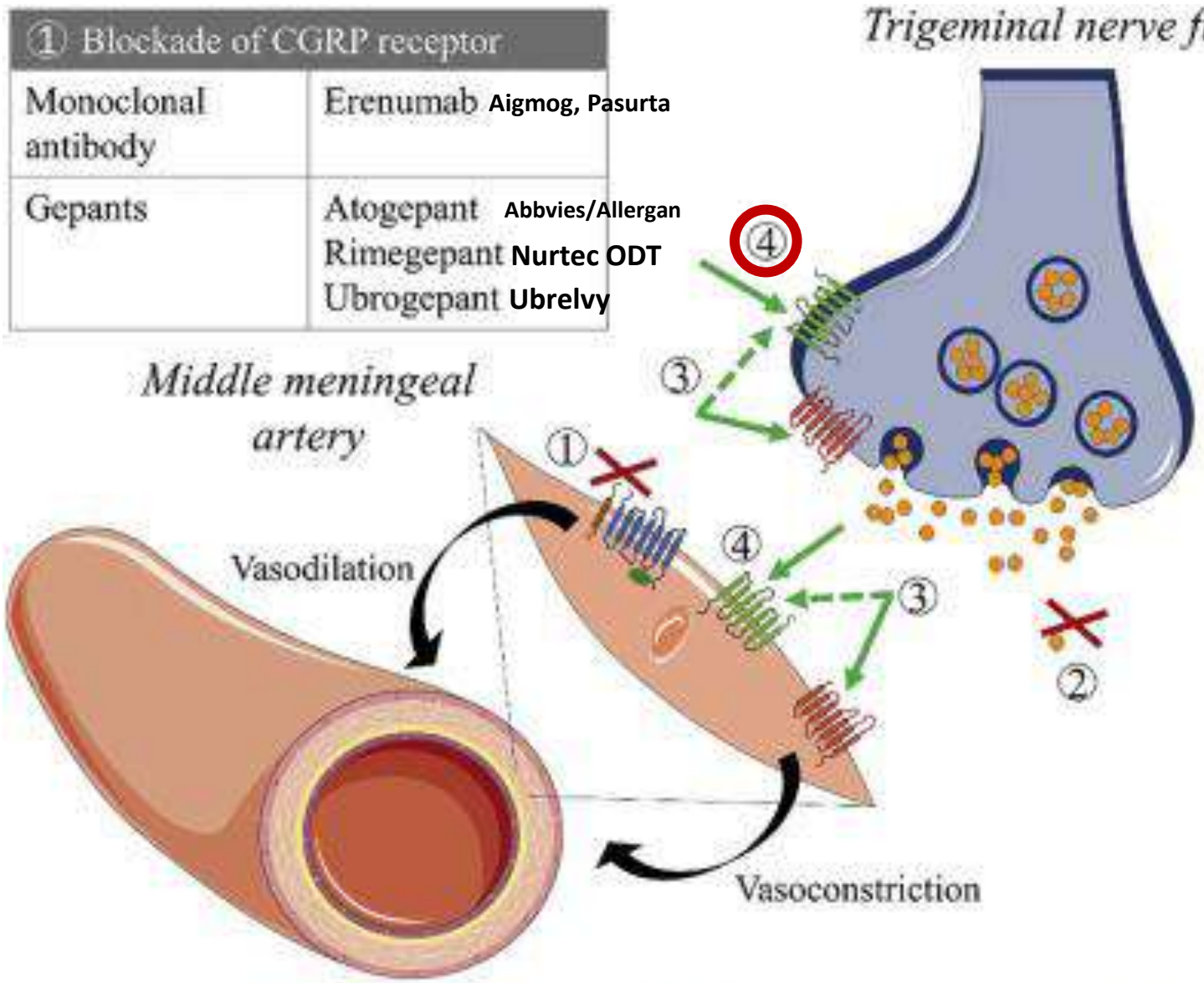
AMG-301

Fase II

No efecto/placebo



① Blockade of CGRP receptor	
Monoclonal antibody	Erenumab Aigmog, Pasurta
Gepants	Atogepant Abbvies/Allergan Rimegepant Nurtec ODT Ubrogepant Ubrelvy



② Blockade of CGRP		
Monoclonal antibody	Eptinezumab	Vyepti
	Fremanezumab	Ajovy
	Galcanezumab	Emgality

③ Stimulation of 5-HT$_{1B/1D(1F)}$ receptor		
Triptans	Almotriptan	Axert, genericos
	Eletriptan	Relpax, Relert, G
	Frovatriptan	Frova, Menatriptran,G
	Naratriptan	Amerge, genericos
	Rizatriptan	Maxalt, genericos
	Sumatriptan	Imitrex,Tolestan, G
	Zolmitriptan	Zoming, genericos

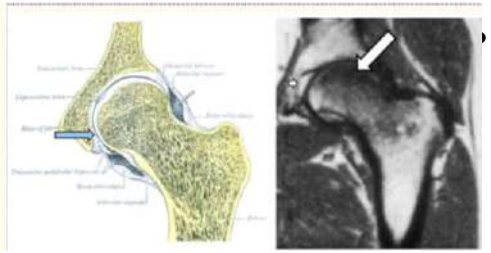
④ Stimulation of 5-HT$_{1F}$ receptor		
Ditans	Lasmiditan	Reyvow

Antes del buzz de migraña aguda

- Opciones de tratamiento
- Migraña presuntiva
  - En la sala de emergencia con síntomas persistentes
- Migraña aguda
  - Síntomas Leves a moderados, no embarazo
  - Síntomas severos, no embarazo
  - En embarazo
- Migraña progresiva
  - Frecuentes, recurrentes, severas/síntomas incapacitantes, no embarazo
  - Frecuentes, recurrentes, severos/existe embarazo

Antes del buzz de migraña aguda

- Opciones de tratamiento
- Migraña presuntiva
  - En la sala de emergencia con síntomas persistentes
    - Tx de rescate
    - + oxigeno de alto flujo a 15 litros por minuto:
      - Ozkurt B, Cinar O, Cevik E, et al, Efficacy of high-flow oxygen therapy in all types of headache: a prospetive randomized Placebo control trial. Amer J Emerg med. 2012 Nov;30(9).1760-4
    - + esteroides EV
      - Dexametasona 8-16 mg EV dosis única
      - Ojo con la osteonecrosis. Complicación rara e irreversible.
        - Orr SL, Friedman BW, Christie SC, et al, Management of adults with acute migraine in the emergency deparment: The American Headache Society evidence assessment of parenteral pharmacotherapies. Headache 2016 jun, 56(6): 911-40

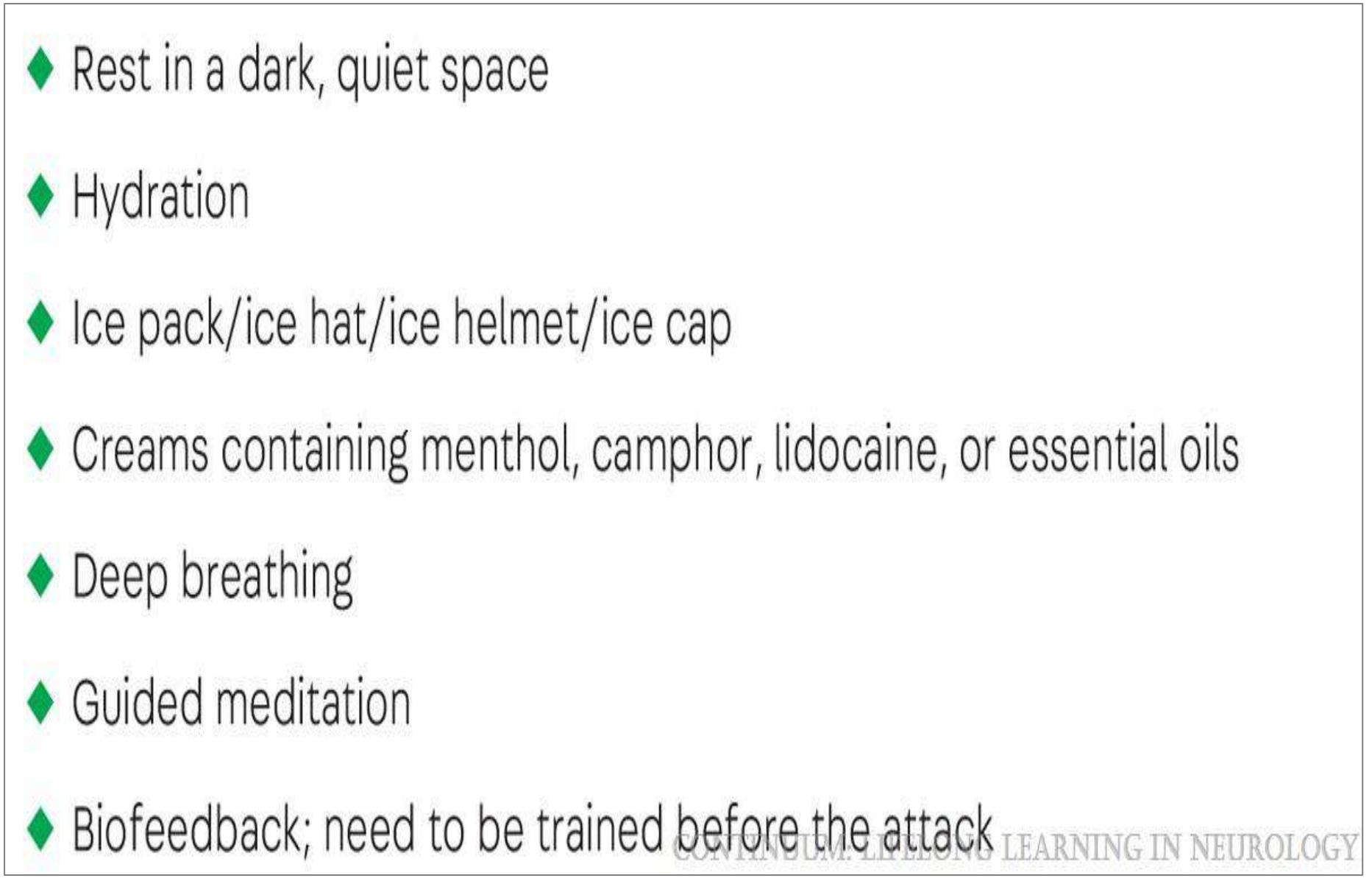


    - + secobarbital

Antes del buzz de migraña aguda

- Opciones de tratamiento
- Migraña presuntiva
  - En la sala de emergencia con síntomas persistentes
- Migraña aguda
  - Síntomas Leves a moderados, no embarazo
  - Síntomas severos, no embarazo
  - En embarazo
- Migraña progresiva
  - Frecuentes, recurrentes, severas/síntomas incapacitantes, no embarazo
  - Frecuentes, recurrentes, severos/existe embarazo

TRATAMIENTOS NO FARMACOLÓCOS PARA MIGRAÑAS AGUDAS



Acute Migraine Treatment

Ailani, Jessica

CONTINUUM: Lifelong Learning in Neurology27(3):597-612, June 2021.

doi: 10.1212/CON.0000000000000956

Migraña aguda con síntomas leves a moderados, no embarazo

- **1ª. Opción: AINES/ASA (Derry S, 2013; Cady RK, 2000,Golstein J, 2005)**
  - **Primera opción: oral o EV**
    - **Smith TR, 2005, Diener HC, 2006; Krymchantowski AV, 2005; GhelardiniC, 2004; Wenzel RG, 2002; Silberstein SD, 2001**
    - **ASA 900 A 1000mg dosis única y luego 325 a 975 oral cada 4 a 6 horas, hasta 4000 mg/dia**
    - **Diclofenac potásico 50 mg dosis única (polvo disuelto), seguido de 50 mg 3 veces PRN.**
      - **MacGregor A, 2000;Lipton RB,2010**
    - **Ibuprofeno: 800 mg dosis única, seguido de 400 a 800 mg cada 4 a 6 horas PRN, máx 2400 mg/día.**
      - **Rabbie RD,2013**
    - **Naproxeno 500-1000 mg dosis única seguido de 250 a 500 mg oral cada dia PRN, max- 1250mg/día**
    - **Celecocib oral solución (Elyxib) 120 mg mg, DS/24 h**
  - **Segunda opción**
    - **Celecocib 200 mg 2 veces al dia PRN**
    - **Indometacina 50 a 200 mg/dia, oral (de liberación inmediata)2 o 3 divididas**
  - **+ Antieméticos:**
    - **Metoclopramida 5-10 mg, oral, im, ev cada 6 a 8 horas, PRN max 45mg/d**
    - **Proclorperazine maleato: 5-10 mg cada 6 a 8 horas PRN, max 40 mg/dia; 25 mg via rectal/dia**
    - **Prometacina 12.5-25 mg (Oral, IM, EV, rectal) cada 4 a 6 horas PRN max 100 mg/dia**
  - **+ Hidratación**
    - **Oral o EV especialmente útil en el contexto de nausas y vómitos. (Bhatia MS,2006; Blau,2005,Spigt,2005**

Antes del buzz de migraña aguda

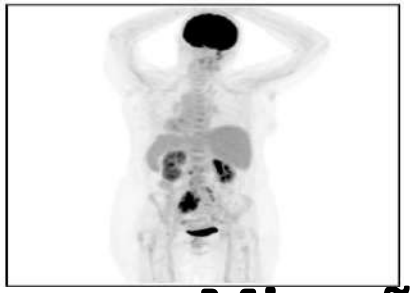
- **Migraña aguda con síntomas leves a moderados, no embarazo**
  - **2ª Opción: Acetaminofén monoterapia**
    - **325-1000 mg (Oral, rectal) cada 4 a 6 horas PRN, max 4000 mg/d.**
      - **Derry, 2013, Efectos adv: Pfaffenrath V, 1998; López P, 2006; Fox AW, 2005;**
    - **+Antieheméticos + hidratación**
  - **3ª Opción: Acetaminofén/Aspirina/cafeína (Excedrin Migraine): 2 Tab#1/24h**
    - **Goldstein J, 2006;Blumenthal HJ, 2006;Diener HC, 2005**
  - **+ Antieheméticos + hidratación**

Antes del buzz de migraña aguda

- **Migraña aguda con síntomas severas sin embarazo.** **Loder E, 2003. Cuidado en pacientes con CAD, no usar & ergotamínicos,**
  - **1ª Opción: TRIPTANOS: el tx temprano es mejor**
    - Lipton RB, 2001; Derry CJ, 2012;Cady RK, 2000;Cady rk, Lipton,2000; Cady RK, 2001;Halpern, 2002;Das-INSA S,2011. **Tienen efecto de sedación y habitúan como opiodes** Wenzel RG, 2002, Silverstein SD,2001
    - **Almotriptan (Axert) 6.25 mg a 12.5 mg, VO, como dosis simple (DS) o puede repetirse a las 2 horas (DR2H), max 25 mg/día**
    - **Eletriptan (Relert) 20 a 40 mg, VO, DS, DR2H, máximo 80 mg/día**
    - **Rizatriptan (Maxalt, RPD 10) 5 a 10 mg DS, DR2H max 30mg/día (ojo: c/concomitante con propranolol debe bajase la dosis de rizaptriptan)**
    - **Sumatriptan (En el Salv. Esta combinado con naproxeno: Tolestan. Brandes JL, 2007) Withe WB, 2011: Puede usarse en HTA**
      - **SC 3-6 mg, DS, DR2H, max 12 mg/día (mejor opcion).**
      - **oral 25-100 DS, DR2H, max 200 mg/día**
      - **Intranasal-solución: 5-20 mg aplicar en una fosa nasal, DS, DR2H, max 40 mg/día.**
        - **Efectivos MacGregor A, 2000;Ferrari MD,2001**
      - **Intranasal-polvo: 22 mg, aplicar en una FN, DS, DR2H, max 44 mg/día**
    - **Zolmitriptan (Zoming)**
      - **Oral 1.25 a 5 mg, DS, DR2H, max 10 mg**
      - **Intranasal, 2.5-5mg, en una fosa nasal, DS,DR2H, max 10mg/día**
  - **+ Antieméticos, + Hidratación, + AINES**

Antes del buzz de migraña aguda

- **Migraña aguda con síntomas severas sin embarazo**
  - **TRIPTANOS, segunda opción:**
    - **Frovatriptan (Menatriptran) 2.5 mg, VO, DS, DR2H, max 7.5 mg/d**
    - **Naratriptran (Amerge) 1 a 2.5 mg, VO, DS,DR2H,max 5mg/d**
  - **+ Antihemeticos+ Hidratación+ AINES**



Antes del buzz de migraña aguda

- **Migraña aguda con síntomas severas sin embarazo**
  - **2ª opción: Alcaloides ergotamínicos**
    - **Dihidroergotamina (DHE) 1mg (SC, IM, EV), DS, DR-PRN, max EV: 2 mg/día, max SC: IM: 3mg/día, Max todas las rutas: 6 mg/semana**
    - **Ergotamina/cafeína**
      - **Oral (Cafergot) 1/100 a 2/200 mg (1 o 2 tabletas), DS, DR c/30 min PRN, max 6/600 mg (6 tabletas)o 10/100 (10 tabs)/sem)**
      - **Rectal: 1 supositorio: 2/100, DS, DR c/60 min PRN, max: 4/200 mg (2 supositorios/dia o 10/500 es decir 5 supositorios/semana)**
    - **Eficacia: triptanos > ergotamínicos. Magnoux E, 2004; Tflet-Hanser P, 2000;Evers S, 2009**
    - **DHE en USA, > efectiva al incio, EV es 1a línea, pero no esta aprobado por la FDA. Evans RW, 2004.**
    - **Ergotaminicos nunca usar con triptanos por farmacología: Ergot son agonistas en 5HtR+actividad sobre Receptores de dopamina y Receptores adrenérgicos= limita al eficacia+efecto adv: nausea, HTA, vasocontricción periférica. Silberstein SD, 1997**
    - **Cuidado con el ergotismo por MOH: intensa vasocontricción periférica, IAM, malform fetal, fibrosis retroperitoneal. Acs N,2006; Raymond GV, 1995;Prescrire Int, 2002 Dec,11(62):186-9**
  - **+ Antieméticos + Hidratación + AINES**

Migraña aguda con síntomas severas sin embarazo 2ª opcion: Alcaloides ergotaminicos en ELS

- **2ª opción: Alcaloides ergotamínicos en El Salvador: 1/100 a 2/200 mg (1 o 2 tabletas), DS, DR c/30 min PRN, max 6/600 mg (6 tabletas)o 10/100 (10 tabs)/sem)**
  - **Ergotamina 1 mg+cafeína 100 mg:**
    - **Migrasil (Lab suizos);Ergotan plus tabletas, Ergotamina+cafeína de Carosa, Migratec de Tecnofarma, Fencafen 100/1 de Tecnoquimicas, Dolopan forte tableta recubierta de Carosa**
  - **Ergotomina 1 mg+cafeína 100 mg+Paracetamol 300 mg:**
    - **Migrasil forte de Lab Suizos**
  - **Ergotamina 1mg+cafeína 40 mg+Acetaminofen 500 mg:**
    - **Avamigran de Altian pharma, Sindolan de calox**
  - **Ergotamina 1 mg+Cafeina 40 mg+Acetaminofen 450 mg:**
    - **Spar.Migran Compuesto recubierto de Teramed; Medpharma, Migradolosina de Piersan,**
  - **Ergotamina 1 mg+cafeína 100 mg+paracetamol 400 mg + Alcaloides belladona 0.1 mg-atropina-hioscina-escopolamina:**
    - **Migretil Comprimidos de Bial**
  - **Ergotamina 1mg+Clolixinato de Lisina 125:**
    - **Migradorixina de MegaLabs, Migraptan de Lamfer laboratorios.**
- **+ Antieméticos + Hidratación + AINES**

Antes del buzz de migraña aguda

- **Migraña aguda con síntomas severas sin embarazo**
  - **3ª opción: Corticosteroides**
    - **Prednisona 5 mg titulando hasta 60 mg/dia con alimento**
    - **Dexametasona 6 mg vo/IV o Metilpredisolona 32 mg/dia, y detitular.**
  - **Observaciones.**
  - **Son tratamientos de 3ª línea cuando fallan los pasos 1 o 2**
  - **Los esteroides son off-label como rescate, para ataques prolongados (>3d)**
  - **Reducen la inflamación estéril en migrañas**
  - **Útiles para evitar la deprivación en MOH. Evers S, 2011**
  - **No usar mas de 5 días por aumento del riesgo de osteonecrosis irreversible**
  - **Usar la dosis mas baja de inicio, titular y detitular en función del cuadro clínico**
  - **+ Antieméticos + Hidratación + AINES**

Antes del buzz de migraña aguda

- **Migraña aguda con síntomas severas sin embarazo**
  - **4ª opción: Compuestos que contienen butabalbital**
    - **En USA luego de los AINES es el segundo grupo mas usado**
    - **No Placebo-RCT**
      - **Derosier FS, 2012: Butabalbital+Sumatriptan+Naproxeno, Double-Blind, Placebo-Cruzado-controlado CT, Headache 2012 Apr;52(4):530-43**
    - **Efectos sedantes pueden causar dependencia, MOH dificil de revertir.**
    - **Mejor opción en pacientes con cefaleas infrecuentes + intolerancia a MD o contraindicaciones**
    - **Puede contribuir al desarrollo de IRC, e insuficiencia hepática y puede ser fatal.**
      - **Rahman 1993;Vaughan JV, 1967;The dangers of actetaminophen Health News, 2006 jun;12(6):4;Blendis L,2006; Fontana RJ, 2001; Moling O, 2006**
    - **La suspensión brusca puede causar convulsions.**
      - **Enzel RG, 2002; Silverstein SD, 2001**
    - **Es más útil por la sedación y efecto ansiolítico pero da tolerancia**
  - **+ Antieméticos + Hidratación + AINES**

Antes del buzz de migraña aguda

- **Migraña aguda**
  - **En embarazo**
    - **Acetaminofen 325-1000 mg VO, Rectal cada 4-6 horas PRN, max 4000 mg**
  - **Observaciones:**
  - **Es mas útil que placebo, pero menos efectivos que AINES**
  - **Seguro en embarazo:**
    - **Pfaffenrath V, 1998, López P, Med Clin (Barc) 2006; Fox AW, 2005; Conner SJ, 2005**
  - **Puede causar MOH, hay formulaciones rectales.**
  - **El uso excesivo relacionado con IRC, IHC.**
    - **Rahman A, 1993;Vaughan JV, 1967;The danger of acetaminophen, 2006;Blendis L, 2006; Fontana RJ, 2001; Moling O, 2006**
- **+Antihemeticos (Metoclopramida 6 mg hasta max 45 mg/d PRN)**
- **+Hidratacion**
- **+Magnesium: 1-2 gr EV, DS.**

Indicaciones de drogas nuevas: Gepantes, Ditanes, Nuevos dispositivos

- Indicaciones: Disponibilidad MD, Costo/Beneficio, Tx por Md, >18a,Dx ICHD-3 migraña con o si aura o migraña crónica, y cualquiera de lo siguiente:
- A. La existencia de contraindicaciones o intolerancia a triptanos
- B. Indecuada respuesta a ≥ 2 triptanos sugerencia demostrada por cualquiera de los siguientes escalas: https://headachejournal.onlinelibrary.wiley.com. AHS
  1. Questionarios de validades de tratamientos de migraña aguda:
     1. **mTOQ-5**, **Migraine-ACT**, **PPMQ-R**, **FIS**, **PGIC**
     2. Certificación clínica.

MTOQ-5: Migraine Treatment Optimization Questionnaire

1. Es ud. capaz de regresar rápidamente a sus actividades normales (P.E: Trabajo, familia, ocio, actividades sociales) después de tomar su medicación para la migraña?	**•Trate tempranamente:** **• Incrementar dosis** **• Cambiar de medicación con mayor eficacia** **• Combine medicación**
2. Puede la medicación antimigrañosa aliviar el dolor en 2 horas en la mayoria de los ataques?	**•Trate tempranamente.** **• Cambie de medicación de mayor eficacia y consistencia**
3. Puede una sola dosis de la medicación aliviar la migraña y mantenerse sin migraña por al menos 24 horas?	**• Tratar tempranamente** **• Incrementar dosis** **• Considera una droga con bajo índice de recurrencia o respuestas que superen las 24 horas como:Rizatriptan o frovatriptan**
4. Es su medicación antimigrañosa bien tolerada?	**•Trate tempranamente** **• Reduzca dosis** **• Considere el uso de drogas con mayor perfil de tolerabilidad: almotriptán, naratriptán y frovatriptán**
5. Está Ud. suficientemente confortable con la medicación antimigrañosa de tal forma que pueda se capaz de retomar sus actividades diarias?	**• Si el paciente está satisfecho en las 4 preguntas anteriores pero no está satisfecho en la pregunta en general, discuta las expectativas, o considere tratamiento preventivo**

Nurtec ODT
rimegepant

Antes del buzz de migraña aguda

rimegepant tablet, disintegrating
75 mg

- Medicamentos nuevos.
- Pequeñas moléculas antagonistas del recetor de CGRPR (Gepantes)
  - **Rimegepant (Nurtec) ODT, Bloqueadores del peptide relacionado con el Gen de Melatonina**
    - **Indicaciones: Cefalea aguda y Prevención**
    - **Dosis 75 mg, VO #1 por crisis aguda**
    - **Prevención : 75 mg, VO cada día de forma continua**
    - **Efectos adv: Serias hipersensibilidad a la medicación, disnea, rash, Reacciones comunes: nauseas, dolor abdominal, dispepsia**

Nurtec ODT
rimegepant

Antes del buzz de migraña aguda

rimegepant tablet, disintegrating
75 mg

- **Medicamentos nuevos.**
- **Pequeñas moléculas antagonistas del recetor de CGRPR (Gepantes)**
    - **Ubrogepant (Ubrelvy)**
    - **Tab de 50 y 100 mg,**
    - **Dosis: 50 a 100 mg PO # 1, DS, DR-PRN: 2H, max 200 mg/24 horas**
    - **Dosis en IRC. CrCl 15 a 29 mg, max 50 mg/dosis, CrCl <15 evitar**
    - **Dosis en IHC: Child-pugh C: Max 50mg/dosis**
    - **Reacciones serias: No se han reportado**
    - **Reacciones comunes: Nausea, somnolencia, xerostomia**

Antes del buzz de migraña aguda

- **Medicamentos nuevos.**
- **Pequeñas moléculas antagonistas del recetor de CGRPR (Gepantes)**
  - **Ubrogepant (Ubrelvy)**
    - **Tab de 50 y 100 mg,**
    - **Dosis: 50 a 100 mg PO # 1, DS, DR-PRN: 2H, max 200 mg/24 horas**
    - **Dosis en IRC. CrCl 15 a 29 mg, max 50 mg/dosis, CrCl <15 evitar**
    - **Dosis en IHC: Child-pugh C: Max 50mg/dosis**
    - **Reacciones serias: No se han reportado**
    - **Reacciones comunes: Nausea, somnolencia, xerostomia**

Antes del buzz de migraña aguda

- **Medicamentos nuevos. (Ditanes)**
  - **Agonista de los receptors serotoninérgicos (5-HT_{1F})**
  - **Lasmiditan (Reyvow de Eli Lylli)**
    - **Tab de 50,100 y 200 mg,**
    - **Dosis: 50 a 200 mg PO # 1, DS, max 200 mg/24 horas**
    - **Dosis en IRC: No necesita ajustes**
    - **Dosis en IHC: No esta definido**
    - **Reacciones serias: Depresión del SNC, Sx Serotoninergico, Excervación de cefaleas (uso > 10 días/mes). Max uso 6 dosis en /6 meses.**
    - **Reacciones comunes: Mareo, parestesias, sedación, fatiga, nauseas, vomitos, debilidad muscular, rash por hipersensibilidad, bradicardias, Presione elevadas**

Antes del buzz de migraña aguda

- **Medicamentos nuevos.**
- **Pequeñas moléculas antagonistas del recetor de CGRPR (Gepantes)**
  - **Atogepant (FDA aprovo el 30 de marzo del 2021, no brand)**
  - **Sera comercializado por AbbVies Lab y Allergan del estudio ADVANCE**
    - **Tab de 10,30 (Migraña aguda),60 mg (Migraña aguda y Prevencion de Migraña de alta frecuencia 4-14 episodios/dia**
    - **Reacciones comunes: Constipación, nauseas, Infecciones Respiratorias leve**

Antes del buzz de migraña aguda

- Celecoxib, aprobado desde 1998, pero se ha aprobado su formación en solución oral
  - Lipton RB, Efficacy, tolerability, and safety of DFN-15 (celecoxib oral solution, 25 mg/ml) in the acute treatment of episodic migraine: A randomized, double-blind, placebo-controlled study. *Headache* 2020;60(1):58-70. 47,71;
  - *Drug Approval Package: Elyxyb*. https://www.acces sdata.fda.gov/drugs atfda_docs/nda/2020/21215 7Orig 1s000 TOC.cfm. Accessed March 15, 2021.
- Tiene importantes advertencias de viñeta
  - Trombosis cardiovascular
  - Contraindicada en injerto de bypass de injerto coronario
  - Sangramientos de ulceras mas en ancianos, pacientes con APP de ulcera péptica y sangramientos gastrointestinales.

Select Summary of American and Canadian Headache Societies Guidelines for Acute Migraine Treatment

Medication	American Headache Society[8]	Canadian Headache Society[7]
Acetaminophen 1000 mg for nonincapacitating attacks	Strong evidence (Level A)	Strong evidence
Aspirin 500 mg, diclofenac 50 mg or 100 mg, ibuprofen 200 mg or 400 mg, naproxen 500 mg or 550 mg	Strong evidence (Level A)	Strong evidence
Triptans	Strong evidence (Level A)	Strong evidence
Dihydroergotamine nasal spray	Strong evidence (Level A)	Weak evidence but may be first line in some cases
Dihydroergotamine IV/IM/subcutaneous	Medium evidence (Level B)	Weak evidence but may be first line in some cases
Acetaminophen/aspirin/caffeine	Strong evidence (Level A)	Not addressed
Butorphanol nasal spray	Strong evidence (Level A)	Weak evidence, should not use
Codeine	Medium to weak evidence (Level B/C)	Weak evidence, should not use
Tramadol	Medium evidence (Level B)	Weak evidence, should not use

IM = intramuscular; IV = intravenous.

CONTINUUM: LIFELONG LEARNING IN NEUROLOGY

Acute Migraine Treatment

Ailani, Jessica

CONTINUUM: Lifelong Learning in Neurology27(3):597-612, June 2021.doi: 10.1212/CON.0000000000000956

Medication	Most common adverse events and warnings
Acetaminophen	Nausea, vomiting, headache, and insomnia
Nonsteroidal anti-inflammatory drugs (NSAIDs)	NSAIDs have a US Food and Drug Administration (FDA) boxed warning regarding cardiovascular and gastrointestinal risk; discuss medication-overuse headache with patients
	Common side effects of NSAIDs include nausea, vomiting, constipation, diarrhea, reduced appetite, headache, dizziness, rash, and drowsiness
	Other possible adverse events include edema, renal failure, liver failure, allergic reaction causing anaphylaxis, and bleeding
	NSAIDs (except aspirin) may increase the risk of myocardial infarction or stroke with increased duration of use and when used in those with underlying risk factors for cardiovascular disease
Triptans	Triptans have an FDA boxed warning regarding cerebrovascular or cardiovascular disease and risk of serotonin syndrome when used with other serotonin drugs; discuss medication-overuse headache with patients
	Triptans are contraindicated in patients with a history of cardiovascular or cerebrovascular disease, including those with uncontrolled hypertension, peripheral vascular disease, or cardiac arrhythmias; patients with ischemic bowel disease; and those with hemiplegic migraine.
	Common side effects can include nausea, dizziness, somnolence, paresthesia, dry mouth, dyspepsia, feeling hot or cold, chest pain/tightness, flushing, throat/neck symptoms, heaviness sensation
Ergotamines	FDA boxed warnings for ergotamines include risk of life-threatening peripheral ischemia with coadministration with potent cytochrome P450 3A4 isozyme (CYP3A4) inhibitors
	Common side effects of dihydroergotamine include rhinitis, nausea, altered sense of taste, dizziness, vomiting, flushing
Ditans	Warning for medication-overuse headache and driving restriction for 8 hours after use; Schedule V controlled substance
	Common side effects include dizziness, fatigue, paresthesia, and sedation
Gepants	Use with caution in medications that use the CYP3A4 system and breast cancer resistance protein or P-glycoprotein–only inhibitors
	Common side effects include nausea and somnolence

[a] Data from Cooper W, et al, Postgrad Med.[12]

CONTINUUM: LIFELONG LEARNING IN NEUROLOGY

Menos efectos adversos:
almotriptán,
Naratriptán
frovatriptán

Acute Migraine Treatment

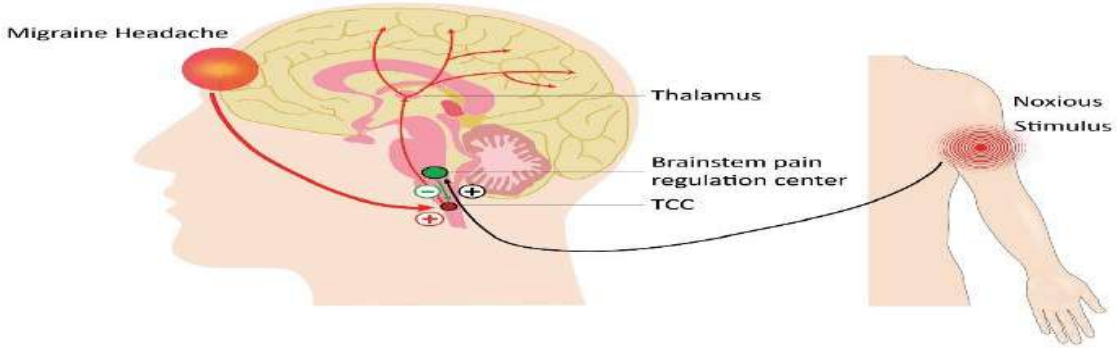
Ailani, Jessica

CONTINUUM: Lifelong Learning in Neurology27(3):597-612, June 2021.

doi: 10.1212/CON.0000000000000956

Side Effects of Acute Migraine Medicationsa

REN: Remote Electrical Neuromodulation



Definición: El dispositivo REN es una estimulación transcutánea estimulación eléctrica en la parte superior del brazo.

Mecanismo de acción: Induce acondicionamiento modulación del dolor y activa un endógeno descendente analgesia. Rapoport AM, 2020
Aprobado FDA para el Tx agudo de la migraña en adultos por resultados positivos RCT, Yarnitsky D, 2019
Util con buena tolerabilidad y seguridad
Efectos comunes indeseables: parestesia en el área del dispositivo
Beneficios:
Puede reducir el uso de medicamentos
Reduce MOH

Moduladores en migraña aguda, y efectos adversos

Device	Dosing	Side effects
External trigeminal stimulation	1 hour during migraine attack	Paresthesia
Single-pulse transcranial magnetic stimulation	Three pulses up to 3 times per attack as needed	Lightheaded, tingling, tinnitus
Noninvasive vagus nerve stimulation	Bilateral 120 seconds to right and left of neck within 20 minutes of onset of attack; repeat once after 15 minutes	Application site discomfort, nasopharyngitis
Remote electrical neuromodulation	To upper arm for 45 minutes within 1 hour of onset; increase stimulation until perceptible but nonpainful	Transient warmth, redness, or tingling sensation into the arm

[Acute Migraine Treatment]

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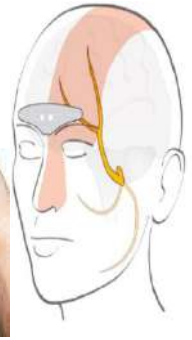
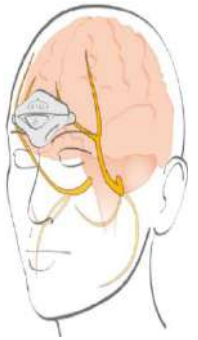
Wolters Kluwer





	AHS 2021[1]	NICE 2015[2]	CHS 2013[3]	AHS-ED 2016[4]	CHS-ED 2014[5]
almotriptan (PO)	established efficacy	offer w/ or w/o NSAID	strong rec for use (high-quality evidence)	n/a	n/a
eletriptan (PO)	established efficacy	offer w/ or w/o NSAID	strong rec for use (high-quality evidence)	n/a	n/a
frovatriptan (PO)	established efficacy	offer w/ or w/o NSAID	strong rec for use (high-quality evidence)	n/a	n/a
naratriptan (PO)	established efficacy	offer w/ or w/o NSAID	strong rec for use (high-quality evidence)	n/a	n/a
rizatriptan (PO)	established efficacy	offer w/ or w/o NSAID	strong rec for use (high-quality evidence)	n/a	n/a
sumatriptan (PO, SC, intranasal)	established efficacy	offer w/ or w/o NSAID	strong rec for use (high-quality evidence)	SC: highly likely effective; offer (Level B)	SC: strong rec for use (mod-quality evidence)
zolmitriptan (PO, intranasal)	established efficacy	offer w/ or w/o NSAID	strong rec for use (high-quality evidence)	n/a	n/a

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Guideline Comparison | Ergots

	AHS 2021[1]	NICE 2015[2]	CHS 2013[3]	AHS-ED 2016[4]	CHS-ED 2014[5]
dihydroergotamine (SC, IM, IV, intranasal)	probably effective	don't offer ergots	intranasal, SC: weak rec for use (mod-quality evidence)	SC, IV: possibly effective; no rec (Level U)	SC, IM: weak rec for use (low-quality evidence)
ergotamine (PO, SC)	probably effective	don't offer ergots	PO: weak rec for use; not for routine use (mod-quality evidence)	SC: insufficient evidence; no rec (Level U)	SC: weak rec for use (low-quality evidence)

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Guideline Comparison | Analgesics/NSAIDs

	AHS 2021[1]	NICE 2015[2]	CHS 2013[3]	AHS-ED 2016[4]	CHS-ED 2014[5]
aspirin (PO, IV)	established efficacy	consider as mono-tx	PO: strong rec for use (high-quality evidence)	IV: likely effective; may offer (Level C)	n/a
celecoxib solution (PO)	established efficacy	n/a	n/a	n/a	n/a
diclofenac (PO, IM)	established efficacy	offer w/ or w/o triptan PO	PO: strong rec for use (high-quality evidence)	IM: possibly effective; may offer (Level C)	IM: weak rec to avoid use (low-quality evidence)
ibuprofen (PO)	established efficacy	offer w/ or w/o triptan PO	strong rec for use (high-quality evidence)	n/a	n/a
naproxen (PO)	established efficacy	offer w/ or w/o triptan	strong rec for use (high-quality evidence)	n/a	n/a
APAP (PO, IV) Acetaminophen	probably effective w/ codeine or tramadol	offer w/ or w/o triptan	strong rec for use (high-quality evidence)	IV: possibly effective; may offer (Level C)	IV: weak rec to avoid use (mod-quality evidence)

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	AHS 2021[1]	NICE 2015[2]	CHS 2013[3]	AHS-ED 2016[4]	CHS-ED 2014[5]
flurbiprofen (PO)	probably effective	offer w/ or w/o triptan	n/a	n/a	n/a
isometheptene/ dichloralphenazone/ APAP (PO)	probably effective	n/a	n/a	n/a	n/a
ketoprofen (PO)	probably effective	offer w/ or w/o triptan	n/a	n/a	n/a
ketorolac (IM, IV)	probably effective	offer w/ or w/o triptan	IM: consider as rescue med	likely effective; may offer (Level C)	strong rec for use (low-quality evidence)
lysine acetylsalicylic acid (IV)	n/a	n/a	n/a	n/a	strong rec for use (mod-quality evidence)
lysine clonixinate (IV)	n/a	n/a	n/a	insufficient evidence; no rec (Level U)	weak rec to avoid use (low-quality evidence)

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Guideline Comparison | Opioids/Barbiturates

	AHS 2021[1]	NICE 2015[2]	CHS 2013[3]	AHS-ED 2016[4]	CHS-ED 2014[5]
butalbital-containing combos (PO)	established efficacy	n/a	strong rec to avoid use (low-quality evidence)	n/a	n/a
butorphanol nasal	established efficacy, but rec to avoid use	don't offer opioids	strong rec to avoid use (low-quality evidence)	n/a	n/a
codeine-containing combos (PO, IM)	probably effective	don't offer opioids	PO: weak rec for use; not for routine use (low-quality evidence)	n/a	IM: weak rec for use (low-quality evidence)
tramadol/APAP (PO)	probably effective	don't offer opioids	weak rec for use; not for routine use (mod-quality evidence)	n/a	n/a
hydromorphone (IV)	n/a	don't offer opioids	n/a	insufficient evidence; may avoid (Level C)	n/a
meperidine (IM)	n/a	don't offer opioids	n/a	possibly effective; no rec (Level U)	weak rec for use (low-quality evidence)

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Guideline Comparison | Opioids/Barbiturates

	AHS 2021[1]	NICE 2015[2]	CHS 2013[3]	AHS-ED 2016[4]	CHS-ED 2014[5]
morphine (IV)	n/a	don't offer opioids	n/a	possibly ineffective; may avoid (Level C)	weak rec to avoid use (low-quality evidence)
nalbuphine (IV)	n/a	don't offer opioids	n/a	insufficient evidence; no rec (Level U)	n/a
tramadol (PO, IM)	n/a	don't offer opioids	PO: weak rec for use; not for routine use (low-quality evidence)	IM: insufficient evidence; no rec (Level U)	IM: weak rec to avoid use (low-quality evidence)

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	AHS 2021[1]	NICE 2015[2]	CHS 2013[3]	AHS-ED 2016[4]	CHS-ED 2014[5]
chlorpromazine (PO, IM, IV)	probably effective as antiemetic	n/a	n/a	IV: possibly effective; may offer (Level C)	IV: weak rec for use (mod-quality evidence)
droperidol (IM)	probably effective as antiemetic	n/a	n/a	likely effective; may offer (Level C)	weak rec to avoid use (low-quality evidence)
metoclopramide (PO, IV)	probably effective as antiemetic	consider w/ other acute tx	PO: strong rec for use as antiemetic (mod-quality evidence)	IV: highly likely to be effective; should offer (Level B)	IV: strong rec for use (mod-quality evidence)
prochlorperazine (PO, PR, IV)	probably effective as antiemetic	consider w/ other acute tx	consider as adjunctive tx	IV: highly likely effective; should offer (Level B)	IV: strong rec for use (high-quality evidence)
promethazine (PO, PR, IM, IV)	probably effective as antiemetic	n/a	n/a	insufficient evidence; no rec (Level U)	n/a
diphenhydramine (IV)	n/a	n/a	n/a	likely ineffective; may avoid (Level C)	n/a
granisetron (IV)	n/a	n/a	n/a	n/a	strong rec to avoid use (low-quality evidence)

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	AHS 2021[1]	NICE 2015[2]	CHS 2013[3]	AHS-ED 2016[4]	CHS-ED 2014[5]
haloperidol (IV)	n/a	n/a	n/a	likely effective; may offer (Level C)	strong rec to avoid use (low-quality evidence)
trimethobenzamide (IM, IV)	n/a	n/a	n/a	insufficient evidence; no rec (Level U)	IV: strong rec to avoid use (mod-quality evidence)

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Guideline Comparison | Other

	AHS 2021[1]	NICE 2015[2]	CHS 2013[3]	AHS-ED 2016[4]	CHS-ED 2014[5]
magnesium sulfate (IV)	probably effective	n/a	n/a	insufficient evidence; no rec (Level U)	weak rec to avoid use (mod-quality evidence)
dexamethasone (IV)	n/a	n/a	n/a	IV: possibly ineffective; no rec (Level U)	strong rec to avoid use (mod-quality evidence)
ketamine (IV)	n/a	n/a	n/a	n/a	weak rec for use (low-quality evidence)
lasmiditan (PO)	established efficacy	n/a	n/a	n/a	n/a
lidocaine oronasopharyngeal solution (intranasal)	n/a	n/a	n/a	n/a	weak rec for use (low-quality evidence)
lidocaine (IV)	n/a	n/a	n/a	possibly ineffective; may avoid (Level C)	weak rec to avoid use (low-quality evidence)

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Guideline Comparison | Other

	AHS 2021[1]	NICE 2015[2]	CHS 2013[3]	AHS-ED 2016[4]	CHS-ED 2014[5]
				(Level C)	evidence)
octreotide (IV)	n/a	n/a	n/a	possibly ineffective; may avoid (Level C)	weak rec to avoid use (mod-quality evidence)
propofol (IV)	n/a	n/a	n/a	possibly effective up to 45 min; no rec (Level U)	weak rec to avoid use (low-quality evidence)
rimegepant (PO)	established efficacy	n/a	n/a	n/a	n/a
triamcinolone (SC)	n/a	n/a	n/a	no rec (insufficient evidence)	n/a
ubrogepant (PO)	established efficacy	n/a	n/a	n/a	n/a
valproate (IV)	n/a	n/a	n/a	possibly effective; may offer (Level C)	weak rec to avoid use (low-quality evidence)

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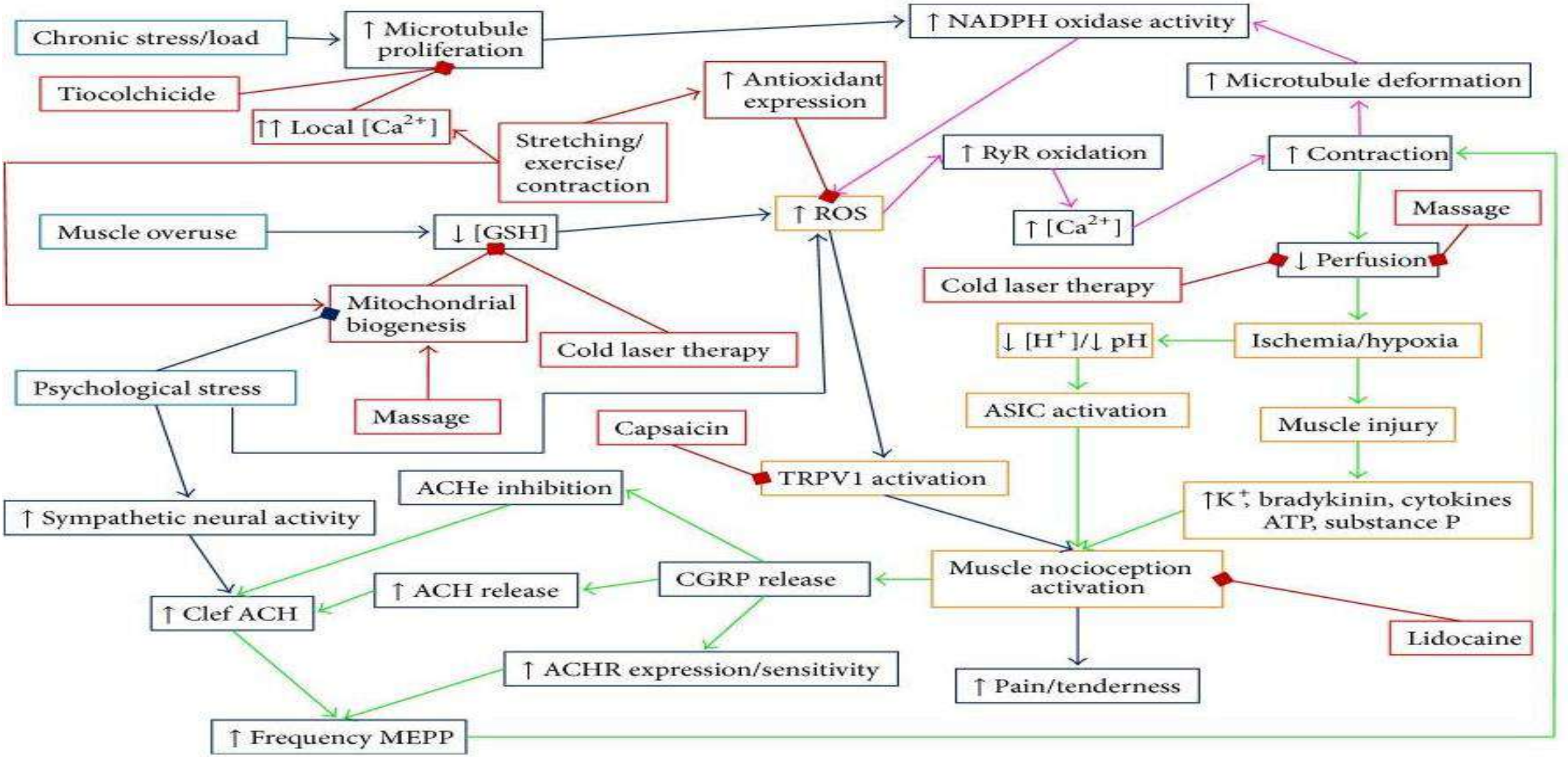
Base clínica de procedimientos para el dolor miofacial



Summary of the Procedures for Headache Disorders Most Commonly Performed by Neurologists

Procedure	Treatment type	Injection frequency	Evidence highlights
OnabotulinumtoxinA	Preventive	12-week intervals	Randomized controlled trials for chronic migraine[2,3] Randomized controlled trial for sleep-related bruxism[12] Observational studies for new daily persistent headache,[13] chronic posttraumatic headache,[14] nummular headache,[15] trigeminal neuralgia[16]
Peripheral nerve blocks	Acute, short-term preventive	Single or repeated at 2-week or longer intervals as needed	Randomized controlled trials for migraine (short-term prevention)[6–9,17] Randomized controlled trials for migraine in emergency department[18,19] Randomized controlled trials for cluster headache (short-term prevention)[4,5] Observational studies in pediatric,[20] pregnant,[21] and geriatric[22] populations
Trigger point injections	Acute, short-term preventive	Single or repeated at 2-week or longer intervals as needed	Randomized controlled trials for tension-type headache[10,11]
Sphenopalatine ganglion blocks	Acute, short-term preventive	Single or repeated twice weekly or longer intervals as needed	Randomized controlled trial for acute and preventive treatment of chronic migraine[23,24] Randomized controlled trial for acute headache in emergency department[25]

Clinic-based Procedures for Headache

Robbins, Matthew S.

CONTINUUM: Lifelong Learning in Neurology27(3):732-745, June 2021.

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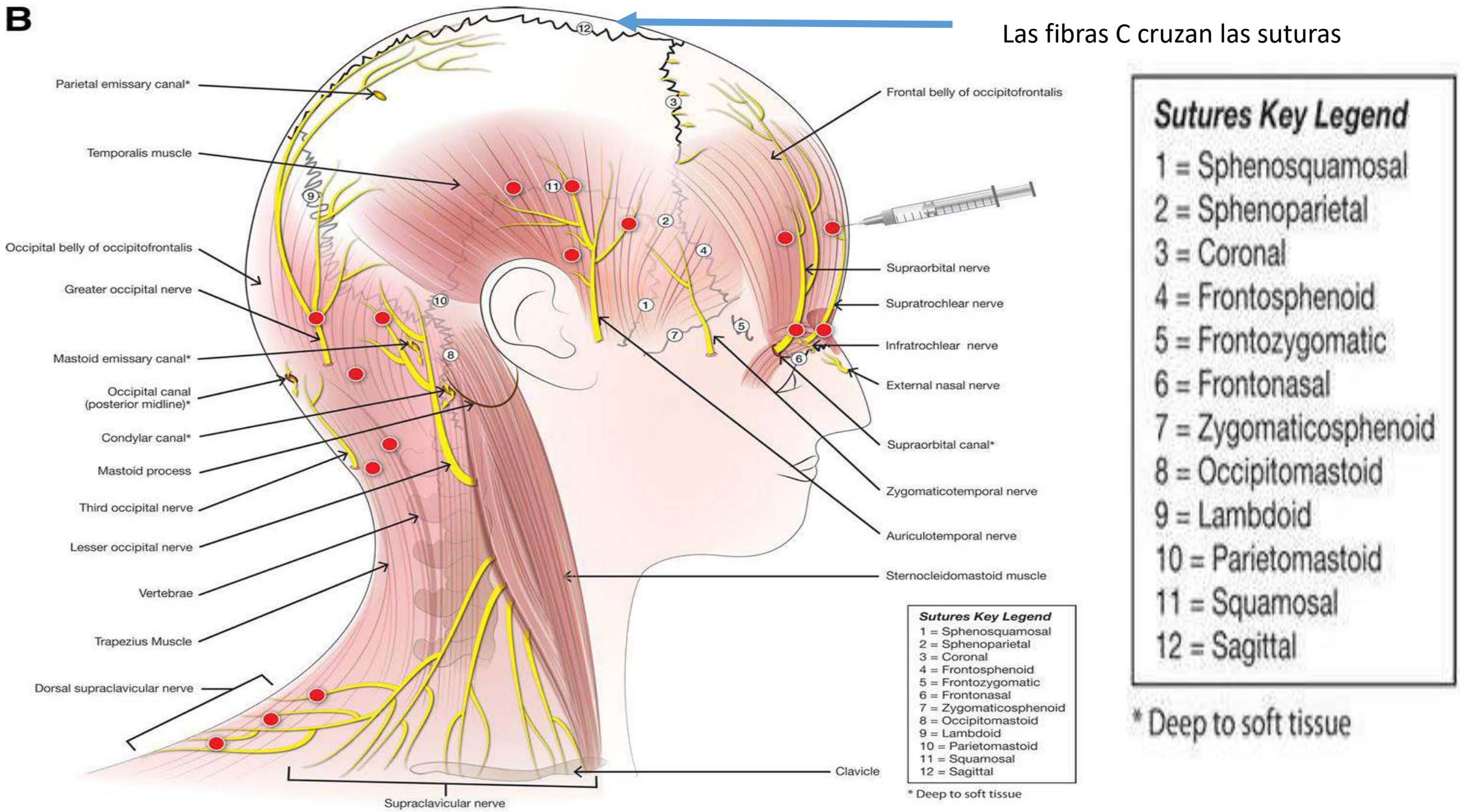
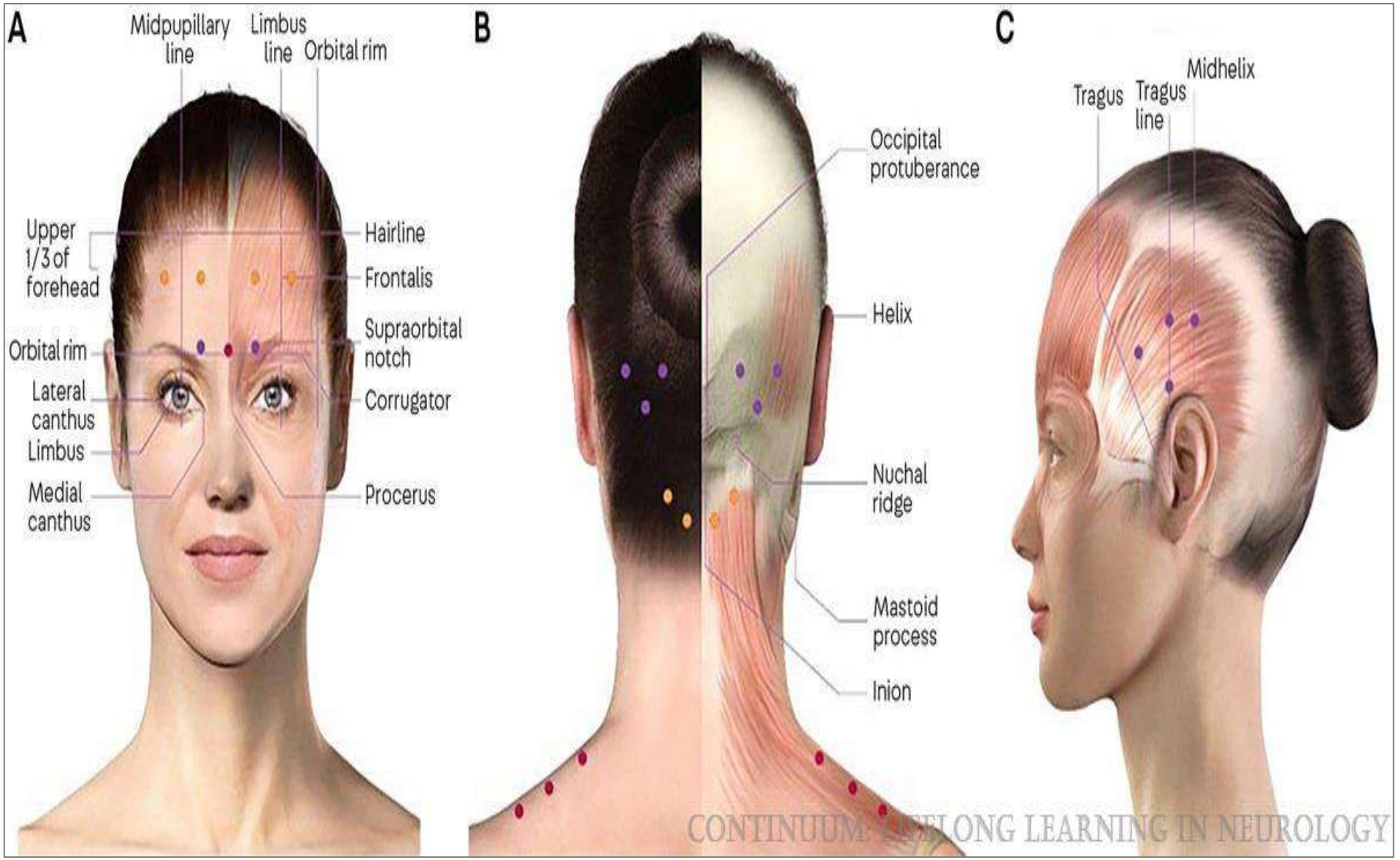

B
Las fibras C cruzan las suturas
Parietal emissary canal*
Temporalis muscle
Occipital belly of occipitofrontalis
Greater occipital nerve
Mastoid emissary canal*
Occipital canal (posterior midline)*
Condylar canal*
Mastoid process
Third occipital nerve
Lesser occipital nerve
Vertebrae
Trapezius Muscle
Dorsal supraclavicular nerve
Supraclavicular nerve
Clavicle
Frontal belly of occipitofrontalis
Supraorbital nerve
Supratrochlear nerve
Infratrochlear nerve
External nasal nerve
Supraorbital canal*
Zygomaticotemporal nerve
Auriculotemporal nerve
Sternocleidomastoid muscle
Sutures Key Legend
1 = Sphenosquamosal
2 = Sphenoparietal
3 = Coronal
4 = Frontosphenoid
5 = Frontozygomatic
6 = Frontonasal
7 = Zygomaticosphenoid
8 = Occipitomastoid
9 = Lambdoid
10 = Parietomastoid
11 = Squamosal
12 = Sagittal
* Deep to soft tissue
Sutures Key Legend
1 = Sphenosquamosal
2 = Sphenoparietal
3 = Coronal
4 = Frontosphenoid
5 = Frontozygomatic
6 = Frontonasal
7 = Zygomaticosphenoid
8 = Occipitomastoid
9 = Lambdoid
10 = Parietomastoid
11 = Squamosal
12 = Sagittal
* Deep to soft tissue

Injection paradigm for onabotulinumtoxinA in the treatment of chronic migraine



[Clinic-based Procedures for Headache]

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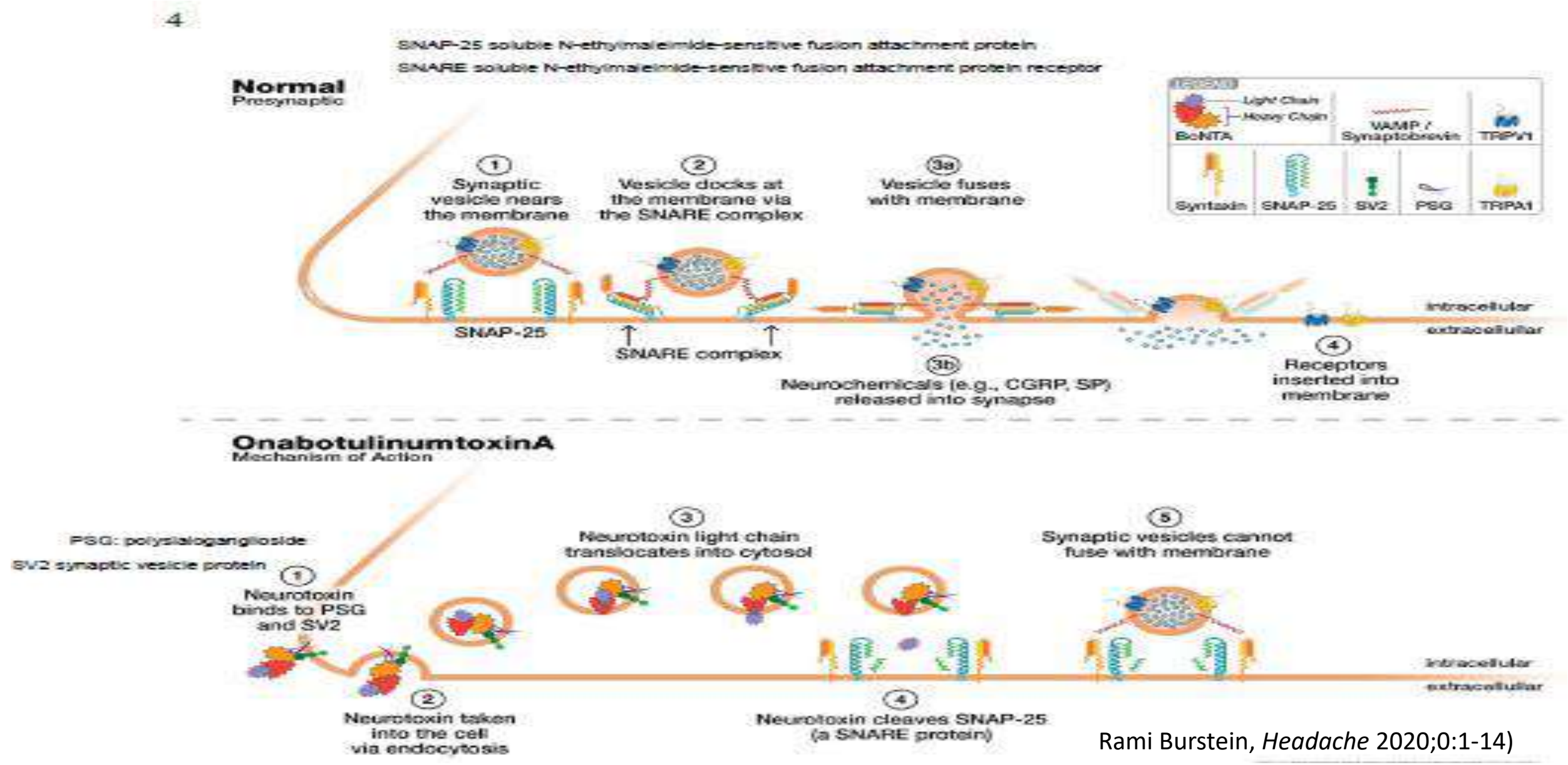
Injection site locations for onabotulinumtoxinA in the treatment of migraine include the following muscles: corrugator (A, purple dots), procerus (A, red dot), frontalis (A, orange dots), occipitalis (B, purple dots), cervical paraspinal muscles (B, orange dots), trapezius (B, red dots), and temporalis (C, purple dots).Modified with permission from Blumenfeld A, et al, Headache.33 © 2017 Allergan plc.

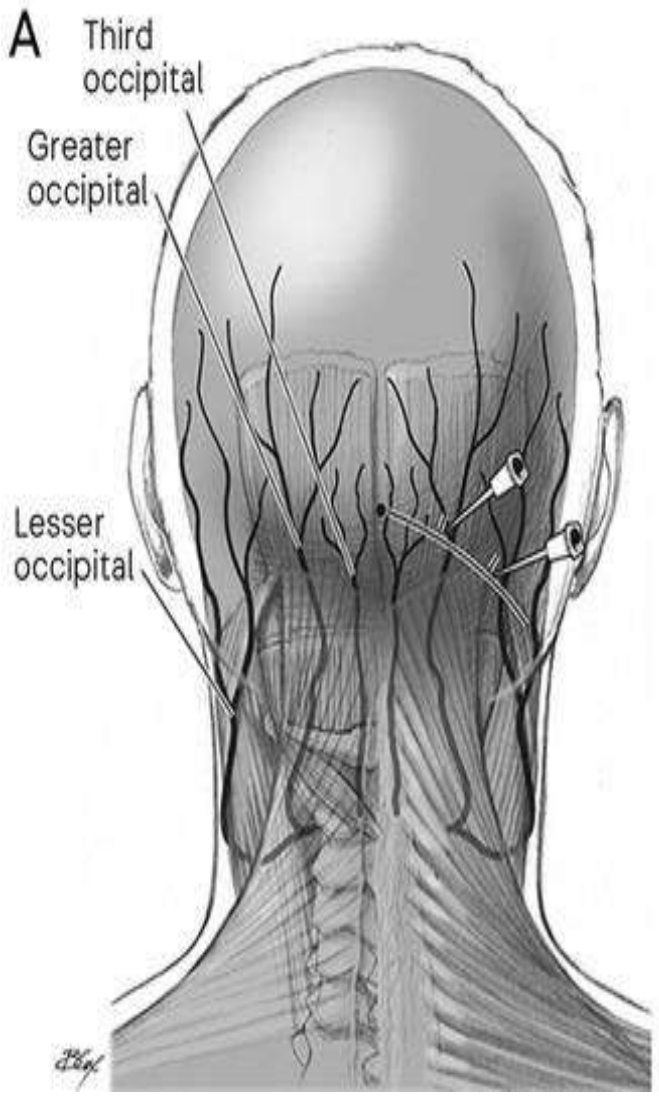
Mecanismo de acción de toxina onanbotulinun tipo A

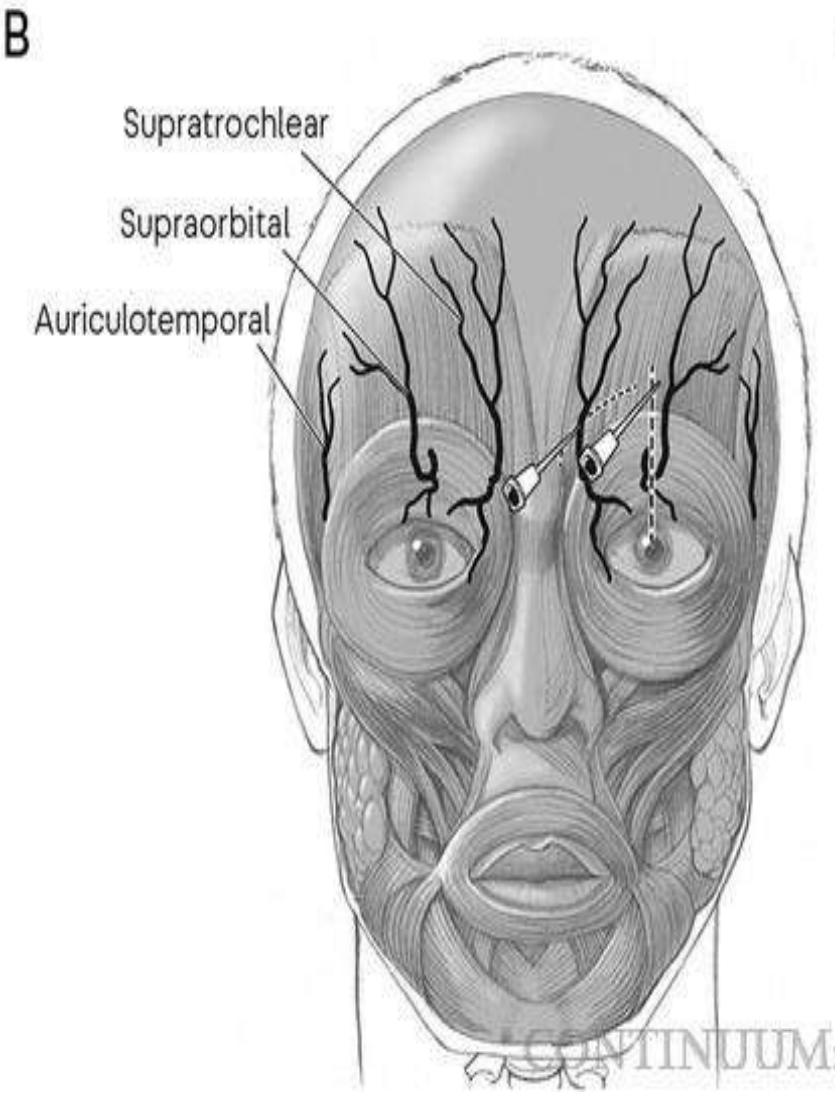


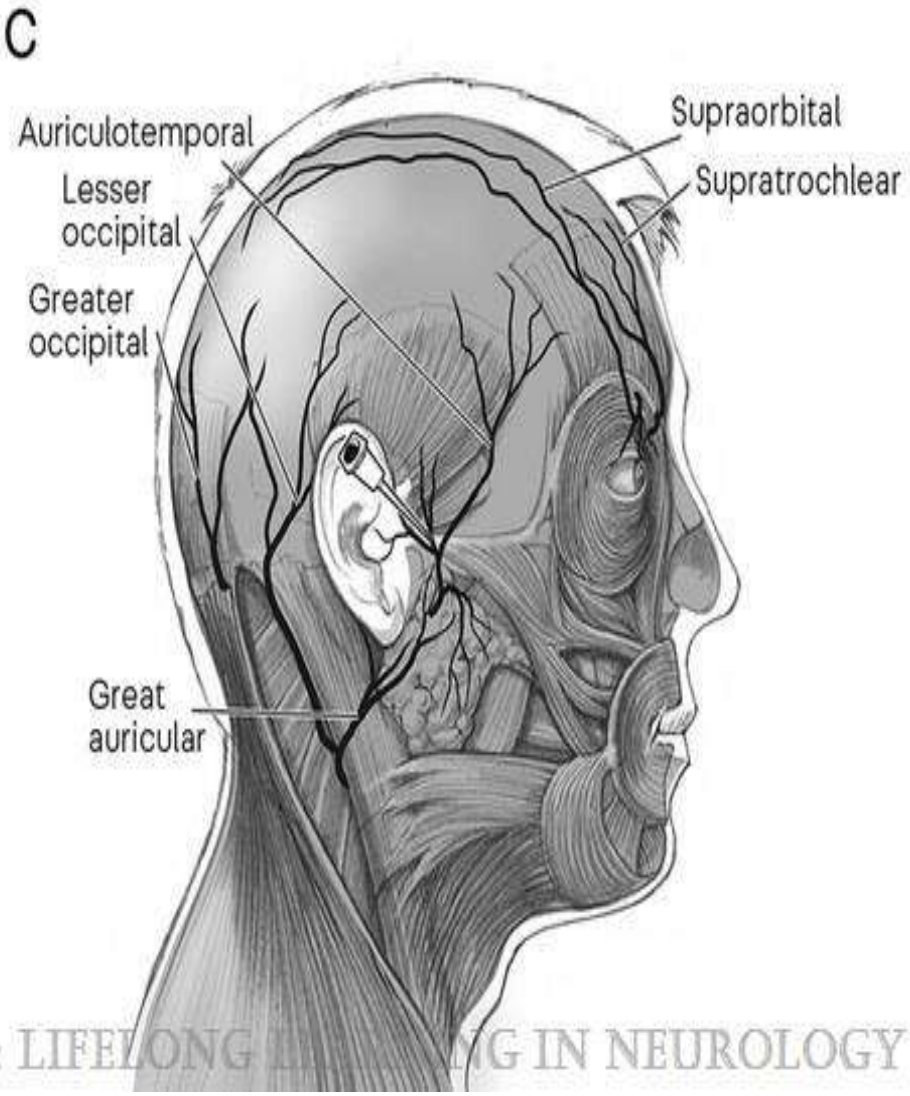
Rami Burstein, *Headache* 2020;0:1-14)

sinaptosoma de 25 kDa (SNAP-25), sintaxina y sinaptobrevina

Procedimientos clínicos para el dolor de cabeza
BLOQUES DE NERVIOS PERIFÉRICOS







Safety Considerations for the Performance of Peripheral Nerve Blocks and Trigger Point Injections for Headache Disorders

Safety consideration	Concern	Action
Local anesthesia allergy	Allergic reaction, anaphylaxis	Use corticosteroids only
Pregnancy	Maternal and fetal toxicity	Use lidocaine or ropivacaine instead of bupivacaine; avoid steroids, particularly betamethasone and dexamethasone
Vasovagal attacks	Near syncope or syncope	Perform and allow for extra time in supine position; use bupivacaine instead of lidocaine; use lower anesthetic concentration; reduce total number of injections
Open skull defect or craniotomy	Intracranial anesthetic diffusion	Avoid injections in such locations
Antithrombotic or anticoagulant use	Hematoma	Compress at injection site for several minutes after injection
Cosmetic concerns	Alopecia	Avoid or use lower dose of steroids
Unclear anatomic landmarks because of body habitus	Pneumothorax	Avoid trapezius injections; use small gauge needle; use technology guidance (ultrasound, EMG)

EMG = electromyography.

[a] Modified with permission from Blumenfeld A, et al, Headache.[41] © 2013 American Headache Society.

Clinic-based Procedures for Headache

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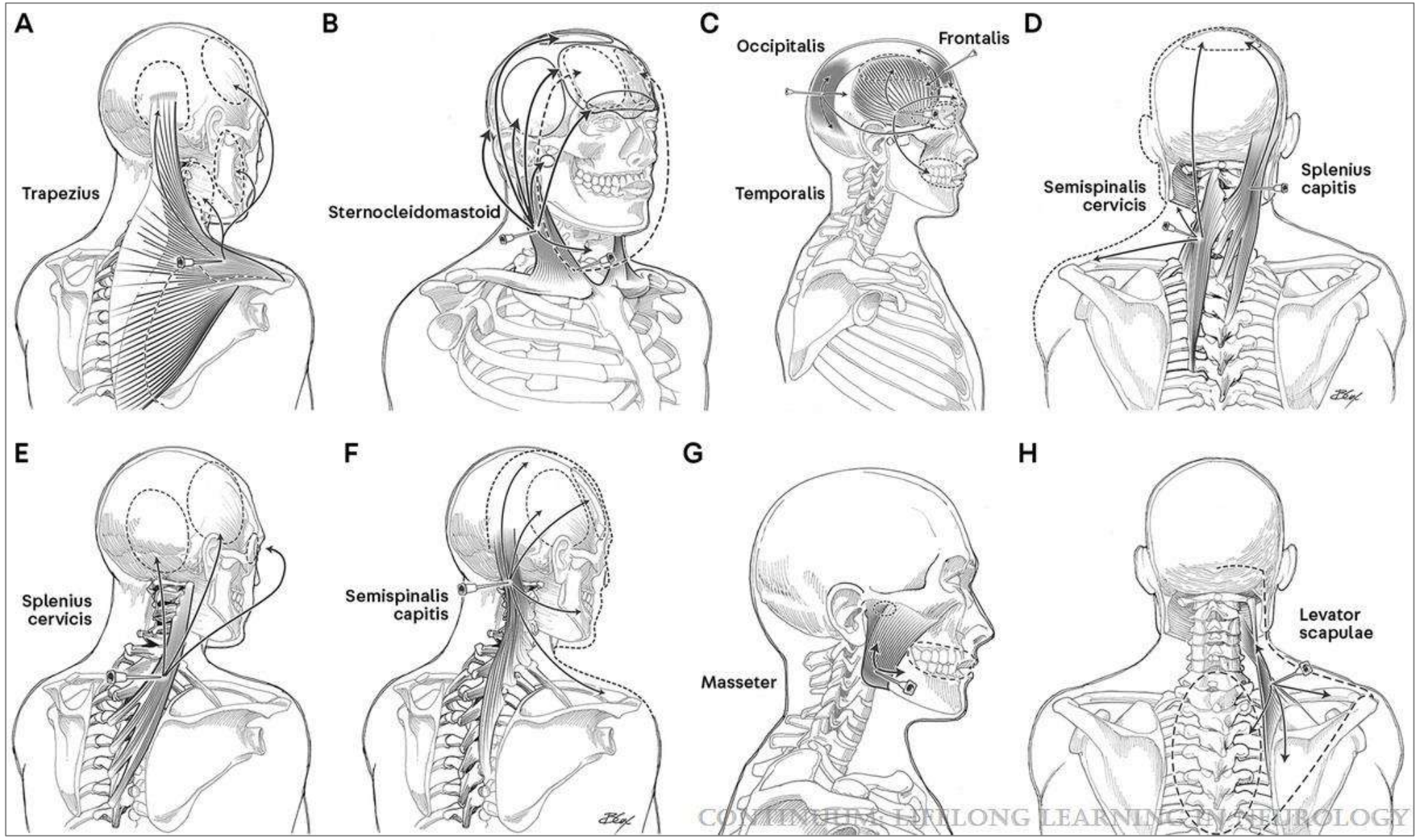
Common sites for trigger point injections for headache disorders



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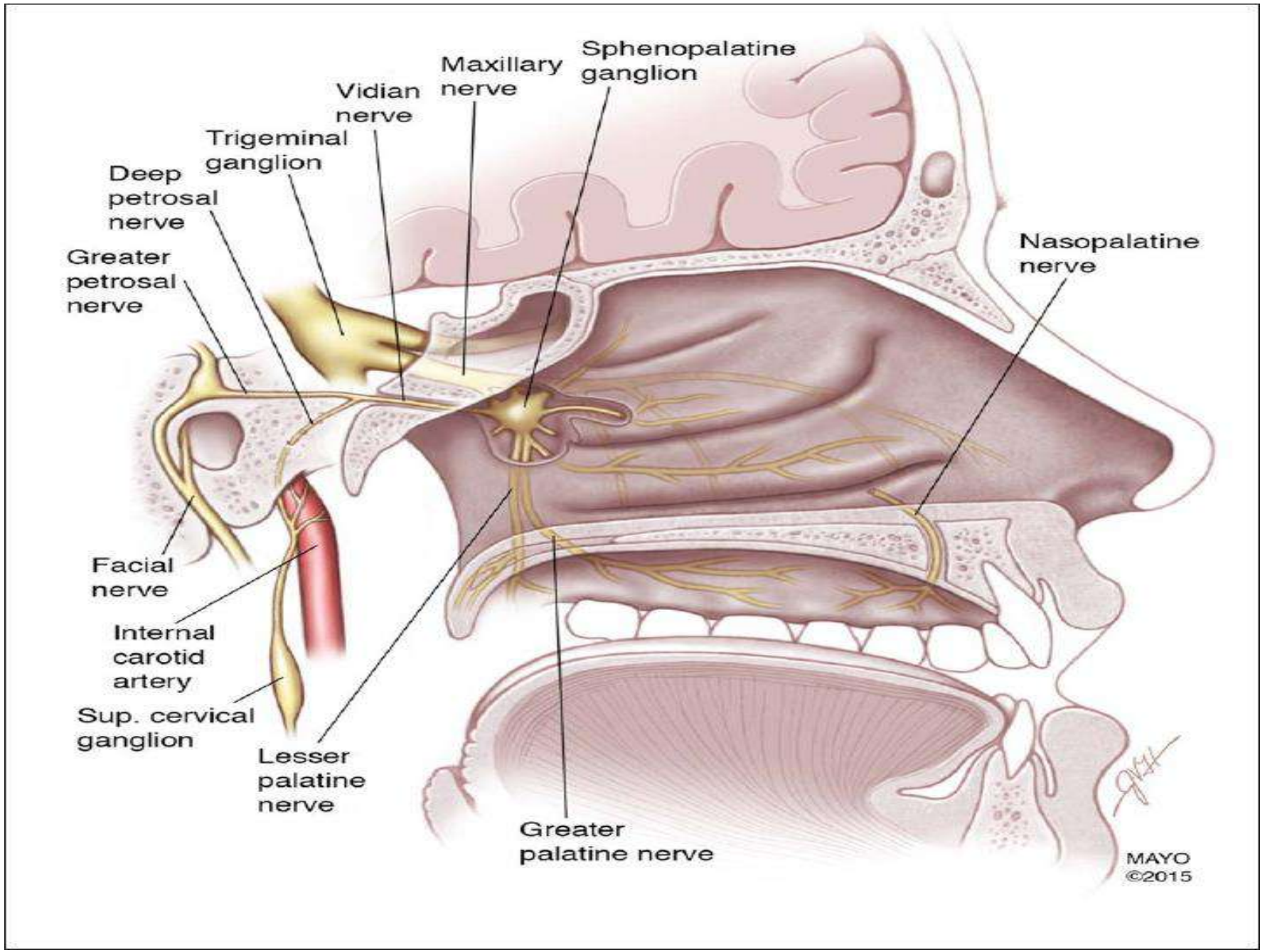
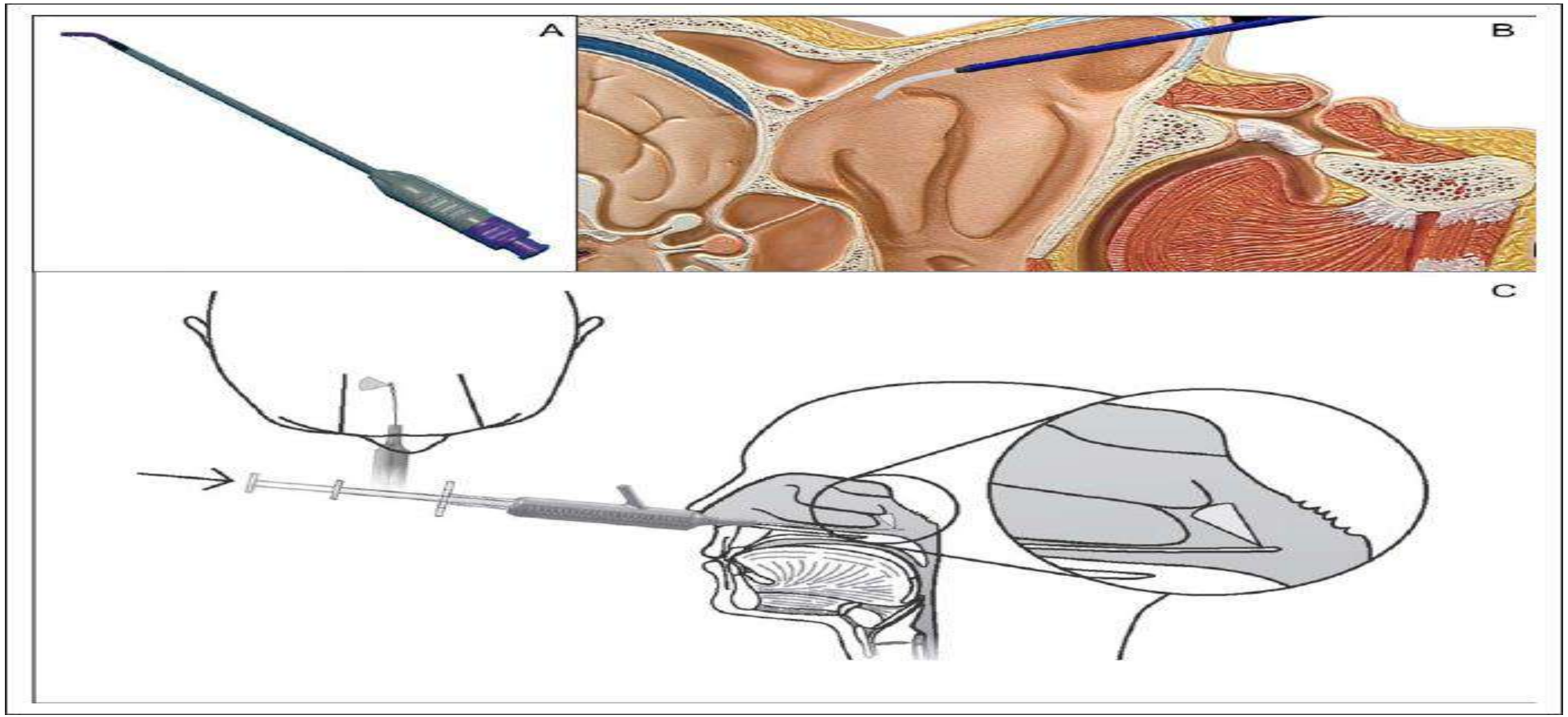


Bloqueo al ganglio esfeno palatino

Técnica de infiltración del ganglio esfenopalatino



Bloqueo al ganglio esfeno palatino

- Evidencia limitada y depende de un catéter especial
- El ganglio esfenopalatino es un gran ganglio parasimpático que se encuentra en la fosa pterigopalatina que también contiene proyecciones simpática y trigémino (V2).
- El ganglio esfenopalatino es un objetivo razonable para los bloqueos y la neuromodulación, ya que es la estructura periférica clave involucrada en la expresión de los síntomas autonómicos craneales y desempeña un papel importante en el reflejo trigeminoautonómico en las cefalalgias autonómicas del trigémino y la migraña y en la regulación del flujo sanguíneo cerebral

Antes de buzz de migraña
Cuando prevenir

INDICACIONES DE INICIAR

- Compromete la calidad de vida, pese a todo.
- ≥4/mes o ≥ 8 días de cefalea/mes
- Falla terapéutica o contraindicaciones o efectos secundarios por tx agudo
- Preferencia del paciente (mejorar la calidad de vida)
- Variente de migraña: Migraña hemipléjica, basilar, auras severas, infarto migraños

INDICACIONES DE SUSPENDER

- Efectos adversos:
- El paciente desarrolla reacciones adversas intolerables o una reacción farmacológica grave.
- El fármaco no demuestra una eficacia ni siquiera parcial después de 2 meses de terapia y se han eliminado trastornos como el abuso agudo de medicación.
- El paciente ha mostrado un beneficio significativo. Si los dolores de cabeza están bien controlados durante al menos 6 meses, disminuya lentamente y, si es posible, suspenda el medicamento.

TABLE 4 Criteria for identifying patients for preventive treatment[8]

Prevention should be …	Headache days/ month	Degree of disability required[a]
Offered	6 or more	None
	4 or more	Some
	3 or more	Severe
Considered	4 or 5	None
	3	Some
	2	Severe

[a]As can be measured by the Migraine Disability Assessment Scale, Migraine Physical Function Impact Diary, or Headache Impact Test.

The American Headache Society Consensus Statement: Update on integrating new migraine treatments into clinical practice
Jessica Ailani MD. *Headache.* 2021;00:1–19.

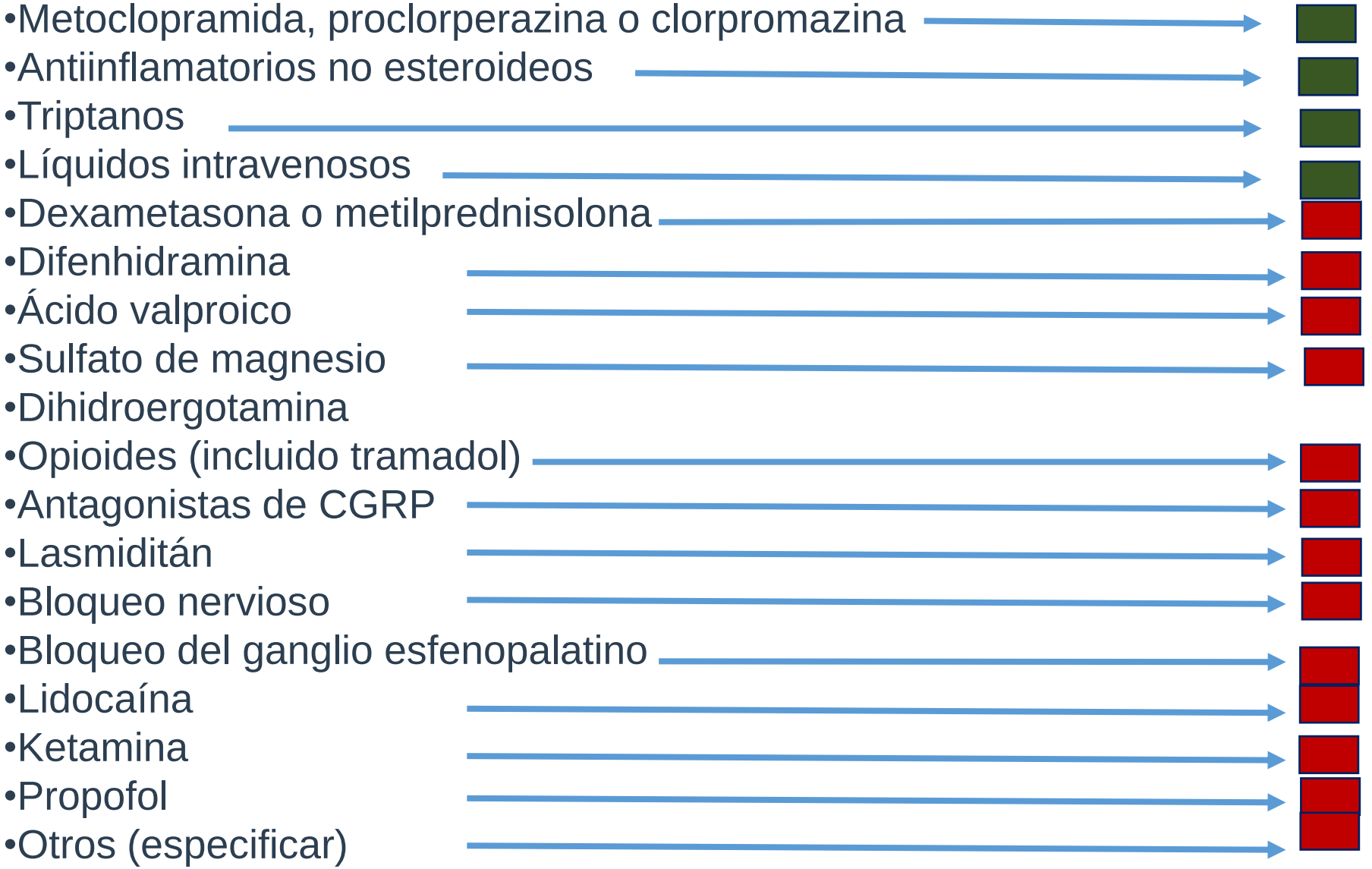
BUZZ de migraña crónica en el contexto de un tratamiento agudo

- **CASO**
  Una mujer de 18 años con migraña sin aura acude al Servicio de Urgencias con dolores de cabeza similares a sus migrañas anteriores, excepto que han persistido durante más de 72 horas. Además, tuvo varios episodios de emesis. No toma ninguna medicación diaria. Ha probado ibuprofeno y sumatriptán (más de 24 horas antes de la presentación) sin alivio. Actualmente, la gravedad de su dolor de cabeza se califica en 9/10. Su peso es de 70 kg y su IMC es de 22. Sus exámenes generales y neurológicos son normales. Su TC de cabeza es normal.

1. **¿Cuál sería su tratamiento de primera línea? Si usaría una combinación de medicamentos, seleccione todos los que correspondan.** *

- Metoclopramida, proclorperazina o clorpromazina ☐
- Antiinflamatorios no esteroideos ☐
- Triptanos ☐
- Líquidos intravenosos ☐
- Dexametasona o metilprednisolona ☐
- Difenhidramina ☐
- Ácido valproico ☐
- Sulfato de magnesio ☐
- Dihidroergotamina
- Opioides (incluido tramadol) ☐
- Antagonistas de CGRP ☐
- Lasmiditán ☐
- Bloqueo nervioso ☐
- Bloqueo del ganglio esfenopalatino ☐
- Lidocaína ☐
- Ketamina ☐
- Propofol ☐
- Otros (especificar) ☐

1. **¿Cuál sería su tratamiento de primera línea? Si usaría una combinación de medicamentos, seleccione todos los que correspondan.** *



Metoclopramida, proclorperazina o clorpromazina - Vía de administración : *

- ◯ Oral
- ◯ Intravenoso
- ◯ Intramuscular
- ◯ Subcutáneo
- ◯ Intranasal
- ◯ Sublingual
- ◯ Otros (especificar

Metoclopramida, proclorperazina o clorpromazina - Medicamento específico : *

Metoclopramida, proclorperazina o clorpromazina - Dosis (mg) : *

Antiinflamatorios no esteroideos - Vía de administración : *

- ◯ Oral
- ◯ Intravenoso
- ◯ Intramuscular
- ◯ Subcutáneo
- ◯ Intranasal
- ◯ Sublingual
- ◯ Otros (especificar

Metoclopramida, proclorperazina o clorpromazina - Vía de administración : *

- ◯ Oral
- ● Intravenoso
- ◯ Intramuscular
- ◯ Subcutáneo
- ◯ Intranasal
- ◯ Sublingual
- ◯ Otros (especificar

Metoclopramida, proclorperazina o clorpromazina - Medicamento específico : *

Metoclopramida

Metoclopramida, proclorperazina o clorpromazina - Dosis (mg) : *

5-10 mg EV cada 6 a 8 horas
max 45 mg/dia

Antiinflamatorios no esteroideos - Vía de administración : *

- ◯ Oral
- ● Intravenoso
- ◯ Intramuscular
- ◯ Subcutáneo
- ◯ Intranasal
- ◯ Sublingual
- ◯ Otros (especificar

Antiinflamatorios no esteroideos - Medicación específica : *

Ketorolaco

Antiinflamatorios no esteroides - Dosis (mg) : *

60

Triptanos - Vía de administración : *

- ○ Oral
- ● Intravenoso
- ○ Intramuscular
- ○ Subcutáneo
- ○ Intranasal
- ○ Sublingual
- ○ Otros (especificar

Triptanos - Medicamento específico : *

Eletriptán

Triptanos - Dosis (mg) : *

40

2. **Reevalúa a la paciente 2 horas después de la intervención de primera línea y ella informa que su dolor de cabeza todavía está presente y no ha cambiado en severidad. ¿Cuál sería su tratamiento de segunda línea? Si usaría una combinación de medicamentos, seleccione todos los que correspondan.** *

- [ ] Metoclopramida, proclorperazina o clorpromazina
- [ ] Antiinflamatorios no esteroideos
- [ ] Triptanos
- [ ] Líquidos intravenosos
- [ ] Dexametasona o metilprednisolona
- [ ] Difenhidramina
- [ ] Ácido valproico
- [ ] Sulfato de magnesio
- [ ] Dihidroergotamina
- [ ] Opioides (incluido tramadol)
- [ ] Antagonistas de CGRP
- [ ] Lasmiditán
- [ ] Bloqueo nervioso
- [ ] Bloqueo del ganglio esfenopalatino
- [ ] Lidocaína
- [ ] Ketamina
- [ ] Propofol
- [ ] Admita el manejo de pacientes hospitalizados antes de probar un segundo medicamento
- [ ] Otros (especificar)

2. **Reevalúa a la paciente 2 horas después de la intervención de primera línea y ella informa que su dolor de cabeza todavía está presente y no ha cambiado en severidad. ¿Cuál sería su tratamiento de segunda línea? Si usaría una combinación de medicamentos, seleccione todos los que correspondan.** *

- [ ] Metoclopramida, proclorperazina o clorpromazina
- [ ] Antiinflamatorios no esteroideos
- [ ] Triptanos
- [ ] Líquidos intravenosos
- [ ] Dexametasona o metilprednisolona
- [ ] Difenhidramina
- [ ] Ácido valproico
- [ ] Sulfato de magnesio
- [x] Dihidroergotamina
- [ ] Opioides (incluido tramadol)
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- [ ] Lasmiditán
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- [ ] Lidocaína
- [ ] Ketamina
- [ ] Propofol
- [ ] Admita el manejo de pacientes hospitalizados antes de probar un segundo medicamento
- [ ] Otros (especifica Butorfanol, nasal 1 mg cada 3 horas controlar

1 mg nasal, cada 15 min, # 2, max 4 actuaciones/crisis, 6/dia, 8/semana

1 mg sc/IM/EV #1,DS, SR C/hora, Max SC,IM: 3 mg/24 horas, 6/semana. Max EV: 2 mg/dia, 6mg/semana cada 15 min, # 2, max 4 actuaciones/crisis, 6/dia, 8/semana

Antagonistas de CGRP - Vía de administración : *

- (●) Oral
- ( ) Intravenoso
- ( ) Intramuscular
- ( ) Subcutáneo
- ( ) Intranasal
- ( ) Sublingual
- ( ) Otros (especificar

Antagonistas de CGRP - Medicamento específico : *

Ubrogepant

Antagonistas de CGRP - Dosis (mg) : *

100 mg VO, DS, DR en 2 horas, max 200 mg/24h

3. **¿Cuáles son sus criterios de alta en el servicio de urgencias para este paciente? Es de destacar que, al inicio del estudio, no tiene dolor de cabeza. Elija todas las que correspondan.** *

- [ ] Remisión completa del dolor de cabeza.
- [ ] Mejora del dolor de cabeza en al menos un 50% desde la gravedad en el momento de la presentación.
- [ ] Mejoría del dolor de cabeza en al menos un 25% desde la gravedad en el momento de la presentación.
- [ ] Capaz de tolerar la ingesta oral
- [ ] Otros (especificar

3. **¿Cuáles son sus criterios de alta en el servicio de urgencias para este paciente? Es de destacar que, al inicio del estudio, no tiene dolor de cabeza. Elija todas las que correspondan.** *

- [x] Remisión completa del dolor de cabeza.
- [x] Mejora del dolor de cabeza en al menos un 50% desde la gravedad en el momento de la presentación.
- [ ] Mejoría del dolor de cabeza en al menos un 25% desde la gravedad en el momento de la presentación.
- [x] Capaz de tolerar la ingesta oral
- [ ] Otros (especificar

4. **La paciente informa que su dolor de cabeza ahora es de 10/10. La admites para manejo hospitalario. ¿Qué intervenciones usaría primero para tratar sus dolores de cabeza en un entorno hospitalario? Si desea utilizar una combinación, seleccione todas las que correspondan.**

- [ ] Metoclopramida, proclorperazina o clorpromazina
- [ ] Antiinflamatorios no esteroideos
- [ ] Triptanos
- [ ] Líquidos intravenosos
- [ ] Dexametasona o metilprednisolona
- [ ] Difenhidramina
- [ ] Ácido valproico
- [ ] Sulfato de magnesio
- [ ] Dihidroergotamina
- [ ] Opioides (incluido tramadol)
- [ ] Antagonistas de CGRP
- [ ] Lasmiditán
- [ ] Bloqueo nervioso
- [ ] Bloqueo del ganglio esfenopalatino
- [ ] Lidocaína
- [ ] Ketamina
- [ ] Propofol
- [ ] En mi consulta no se proporciona terapia para el dolor de cabeza para pacientes hospitalizados

4. **La paciente informa que su dolor de cabeza ahora es de 10/10. La admites para manejo hospitalario. ¿Qué intervenciones usaría primero para tratar sus dolores de cabeza en un entorno hospitalario? Si desea utilizar una combinación, seleccione todas las que correspondan.**

- [ ] Metoclopramida, proclorperazina o clorpromazina
- [ ] Antiinflamatorios no esteroideos
- [ ] Triptanos
- [ ] Líquidos intravenosos
- [x] Dexametasona o metilprednisolona
- [ ] Difenhidramina
- [ ] Ácido valproico
- [ ] Sulfato de magnesio
- [ ] Dihidroergotamina
- [ ] Opioides (incluido tramadol)
- [ ] Antagonistas de CGRP
- [x] Lasmiditán
- [x] Bloqueo nervioso
- [x] Bloqueo del ganglio esfenopalatino
- [ ] Lidocaína
- [ ] Ketamina
- [ ] Propofol
- [ ] En mi consulta no se proporciona terapia para el dolor de cabeza para pacientes hospitalizados

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EFNS GUIDELINES/CME ARTICLE

Treatment of medication overuse headache – guideline of the EFNS headache panel

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Keywords:
medication overuse headache, withdrawal therapy, withdrawal headache

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Background: Medication overuse headache is a common condition with a population-based prevalence of more than 1–2%. Treatment is based on education, withdrawal treatment (detoxification), and prophylactic treatment. It also includes management of withdrawal headache.

Aims: This guideline aims to give treatment recommendations for this headache.

Materials and methods: Evaluation of the scientific literature.

Results: Abrupt withdrawal or tapering down of overused medication is recommended, the type of withdrawal therapy is probably not relevant for the outcome of the patient. However, inpatient withdrawal therapy is recommended for patients overusing opioids, benzodiazepine, or barbiturates. It is further recommended to start individualized prophylactic drug treatment at the first day of withdrawal therapy or even before. The only drug with moderate evidence for the prophylactic treatment in patients with chronic migraine and medication overuse is topiramate up to 200 mg. Corticosteroids (at least 60 mg prednisone or prednisolone) and amitriptyline (up to 50 mg) are possibly effective in the treatment of withdrawal symptoms. Patients after withdrawal therapy should be followed up regularly to prevent relapse of medication overuse.

Discussion and conclusion: Medication overuse headache can be treated according to evidence-based recommendations.

Dexametasona o metilprednisolona - Vía de administración : *

- ○ Oral
- ● Intravenoso
- ○ Intramuscular
- ○ Subcutáneo
- ○ Intranasal
- ○ Sublingual
- ○ Otros (especificar)

Dexametasona o metilprednisolona - Medicamento especifico : *

Dexametasona

Dexametasona o metilprednisolona - Dosis (mg) : *

6 mg

Dexametasona o metilprednisolona - Número de dosis : *

cada 6 -8 h, por 2 días, detitular

Lasmiditan - Vía de administración : *

- ● Oral
- ○ Intravenoso
- ○ Intramuscular
- ○ Subcutáneo
- ○ Intranasal
- ○ Sublingual
- ○ Otros (especificar)

Dosis 200 mg, DS

5. **Después del tratamiento hospitalario, el dolor de cabeza remite y es dada de alta. Continúa siguiéndola de forma ambulatoria. Sigue teniendo fuertes dolores de cabeza (7-9 / 10) dos veces por semana, lo que le hace faltar al trabajo. Decide iniciar una medicación preventiva. Ella probó propranolol, amitriptilina, verapamilo, topiramato y terapia cognitivo-conductual sin una mejoría significativa. ¿Qué probarías a continuación como tratamiento preventivo para sus migrañas? Clasifique sus 3 mejores opciones.** *

	1	2	3
Antagonistas de péptidos relacionados con el gen de la calcitonina	○	○	○
Inyecciones de toxina botulínica	○	○	○
Acupuntura	○	○	○
Neuromodulacion	○	○	○
Biorretroalimentación	○	○	○
Bloqueos nerviosos	○	○	○
Bloqueo del ganglio esfenopalatino	○	○	○
Otro: especifique en el cuadro Comentarios	○	○	○

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	1	2	3
Antagonistas de péptidos relacionados con el gen de la calcitonina	●	○	○
Inyecciones de toxina botulínica	○	○	○
Acupuntura	○	○	○
Neuromodulacion	○	●	○
Biorretroalimentación	○	○	○
Bloqueos nerviosos	○	○	○
Bloqueo del ganglio esfenopalatino	○	○	●
Otro: especifique en el cuadro Comentarios	○	○	○

6. **En su consulta, ¿cuál de los siguientes métodos de neuromodulación ha utilizado para la prevención del dolor de cabeza? Seleccione todas las que correspondan.** *

- [x] Estimulación magnética transcraneal de un solo pulso
- [ ] Neuromodulación eléctrica remota
- [x] Neuroestimulación transcutánea supraorbitaria
- [ ] Estimulación del nervio vago no invasivo
- [ ] Neuromodulación cerebral multicanal no invasiva
- [ ] No tengo acceso a neuromodulación
- [ ] No uso neuromodulacion
- [ ] Otros (especificar

GRACIAS