Prolonged migraine aura or TIA/stroke?

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Courtesy of the British Migraine Association

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- Comorbidity of migraine and stroke
- Possible mechanisms of the association
- Features suggesting Aura or TIA/stroke
- Imaging

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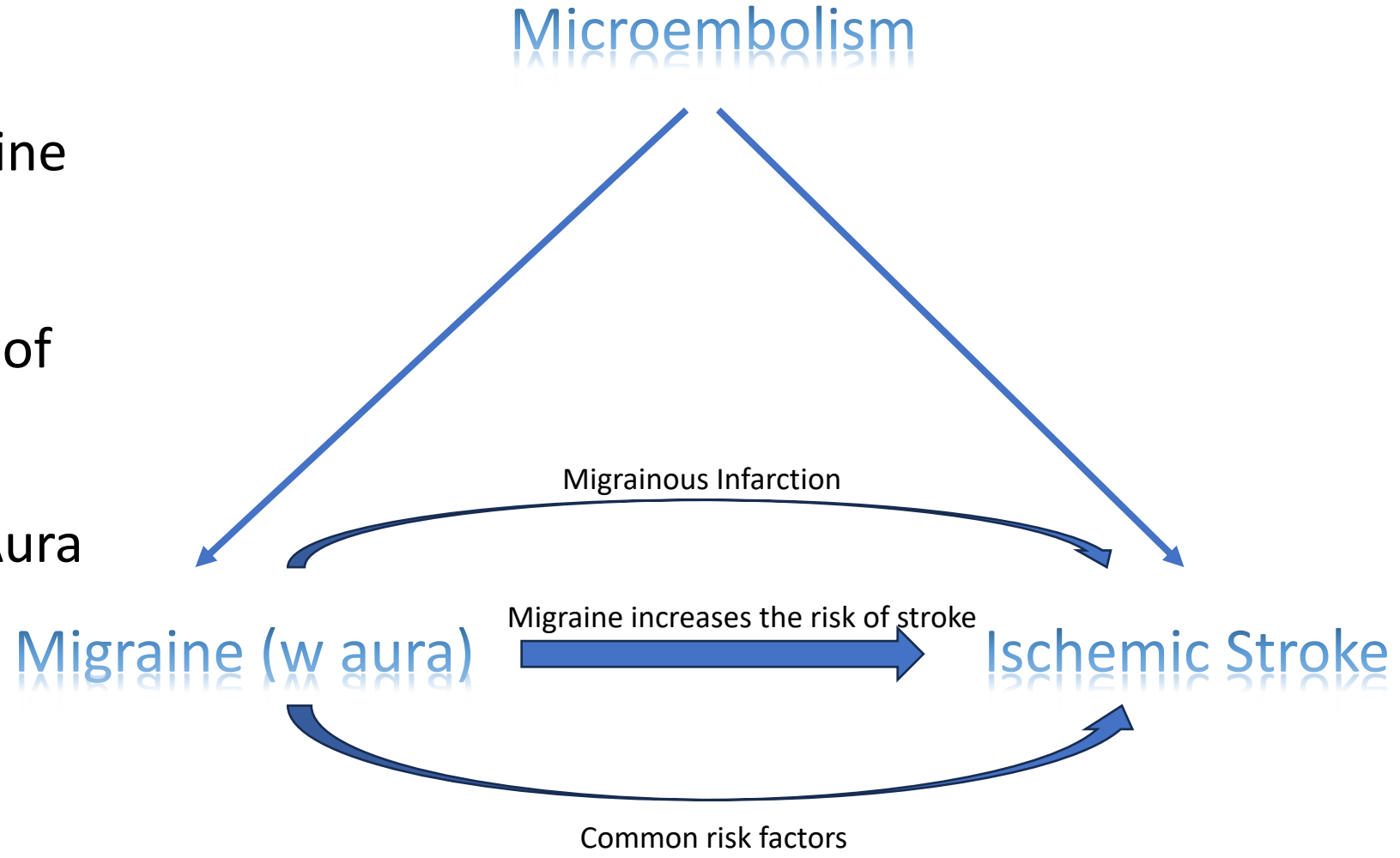
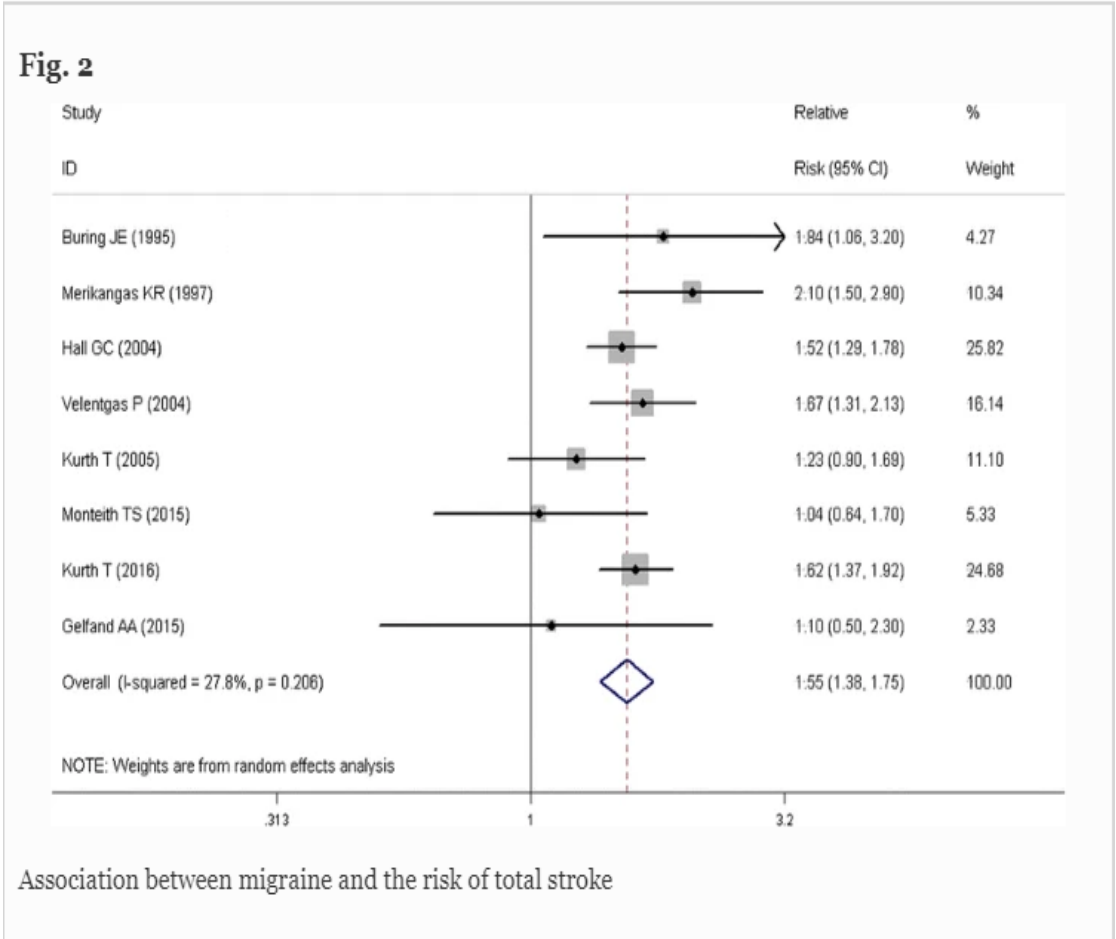


Migraine and the risk of stroke

Relative risk of Ischemic stroke

- for all migraineurs 1.64 (95% CI 1.22–2.20
- for with aura 2.14 (95% CI 1.33–3.43)
- for without aura 1.02 (95% CI 0.68–1.51)



Hu et. al. Migraine and the risk of stroke: an updated meta-analysis of prospective cohort studies, J Neurol Scie 2017:38,33–40

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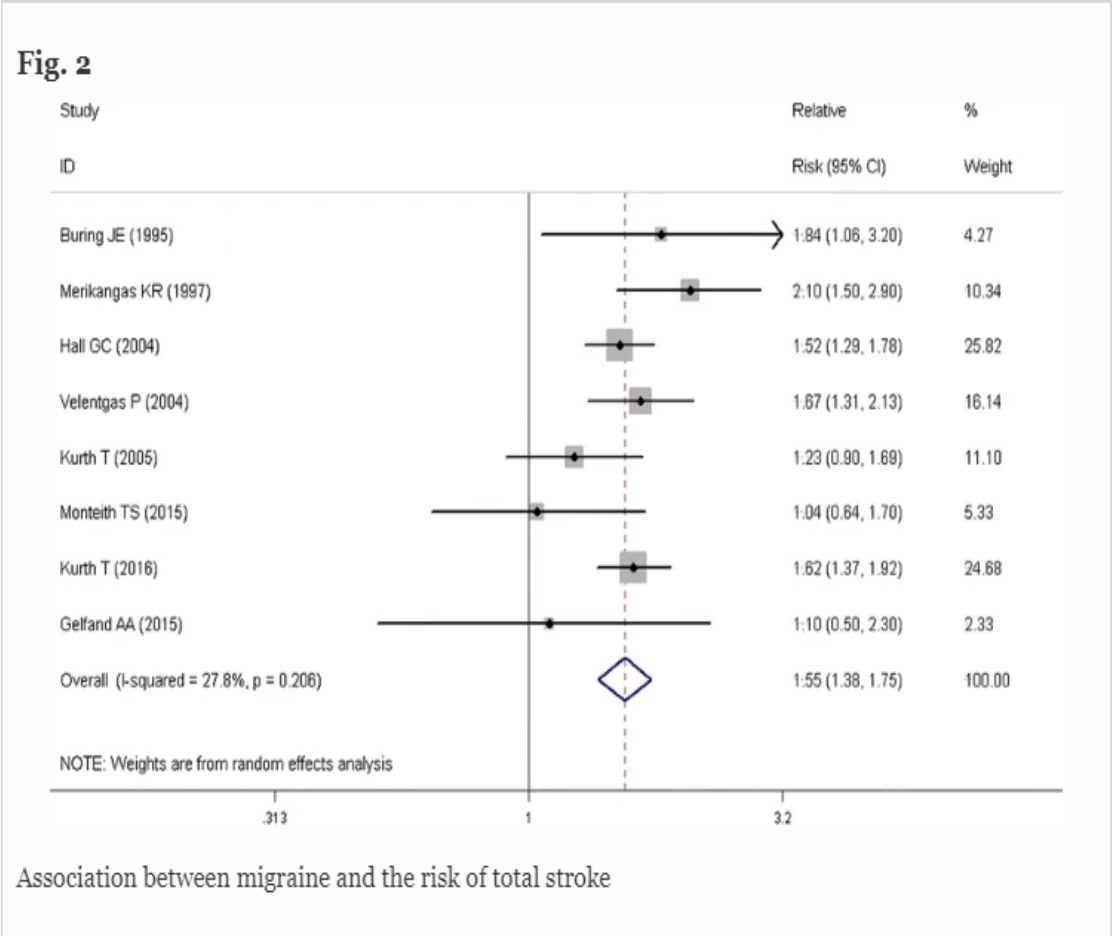

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ARTICLE

Association between Migraine and Cryptogenic Ischemic Stroke in Young Adults

View article page

Nicolas Martinez-Majander, Ville Artto, Pauli Ylikotila, Bettina Sarnowski, Ulrike Waje-Andr ... See all authors

TABLE 3. Odds Ratios and 95% Confidence Intervals from Conditional Logistic Regression on the Association between Migraine and Cryptogenic Ischemic Stroke

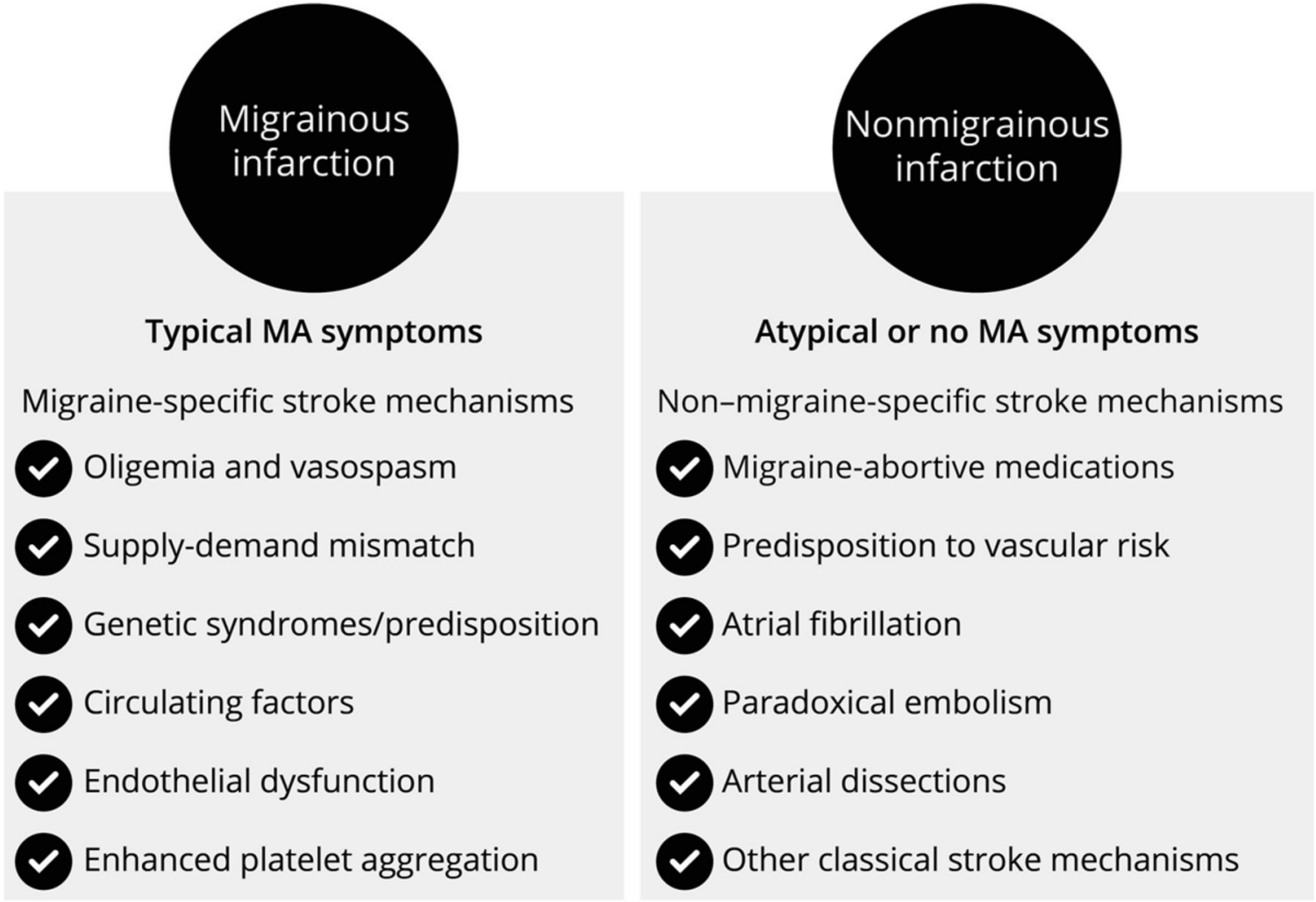
	Model Adjusted for Age and Level of Education	Model Adjusted for Demographics and Vascular Risk Factors[a]
All		
Migraine status		
No migraine	Reference	Reference
Migraine with aura	3.40 (2.20–5.25)	3.50 (2.19–5.61)
Migraine without aura	0.66 (0.31–1.39)	0.60 (0.27–1.31)
Any migraine vs no migraine	2.48 (1.68–3.65)	2.48 (1.63–3.76)
Women		
Migraine status		
No migraine	Reference	Reference
Migraine with aura	4.14 (2.22–7.73)	4.32 (2.16–8.65)
Migraine without aura	0.66 (0.31–1.39)	0.63 (0.22–1.82)
Any migraine vs no migraine	3.04 (1.73–5.34)	2.97 (1.61–5.47)
Men		
Migraine status		
No migraine	Reference	Reference
Migraine with aura	2.89 (1.54–5.41)	3.61 (1.75–7.45)
Migraine without aura	0.52 (0.16–5.41)	0.56 (1.15–2.14)
Any migraine vs no migraine	2.04 (1.19–3.49)	2.47 (1.32–4.61)

[a]Adjusted for age, level of education, hypertension, diabetes, current tobacco smoking, physical inactivity, heavy alcohol use, and waist-to-hip ratio. In women, models were further adjusted for oral estrogen use but not for diabetes due to its low frequency.

347 consecutive patients aged 18 to 49 years with a recent cryptogenic ischemic stroke (CIS) and 347 age- and sex-matched (5 years) stroke-free controls were enrolled

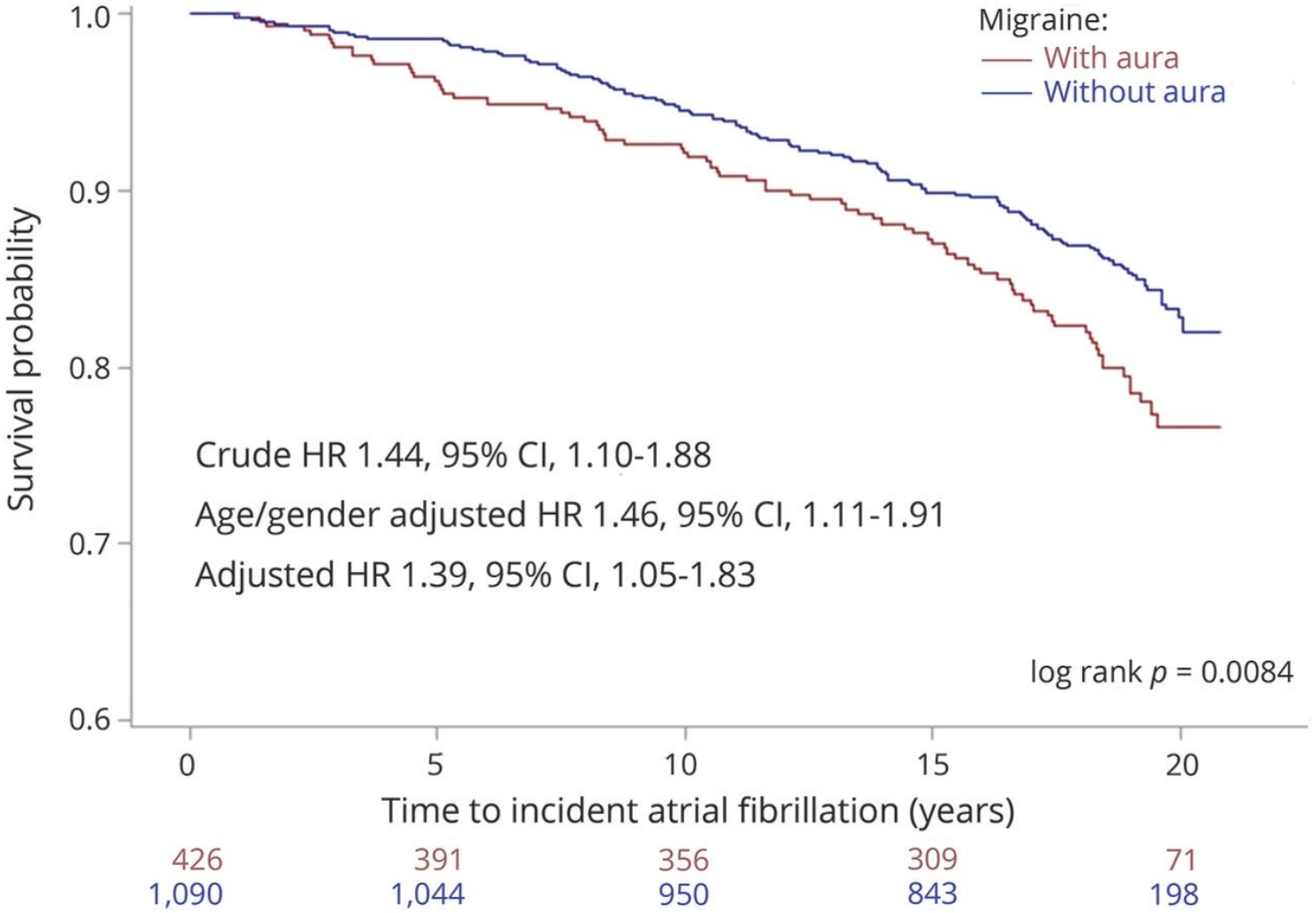
MA has a strong association with CIS in young patients, independent of vascular risk factors and presence of PFO

Figure 2 Potential Mechanisms of Migrainous and Nonmigrainous Infarctions in Patients With Migraine



Simona Sacco et al. Neurology 2023;100:716-726

Kaplan-Meier curves depicting 20-year outcome of incident atrial fibrillation in participants with migraine with visual aura and those with migraine without aura



Migraine with aura was associated with increased risk of incident AF

This may potentially lead to ischemic strokes

Souvik Sen et al. Neurology 2018;91:e2202-e2210

AMERICAN ACADEMY OF NEUROLOGY

Stroke mimics

- A stroke mimic is defined as a nonvascular disease that presents with stroke-like symptoms

- Stroke mimics include e.g. migraine, seizures metabolic disorder, infection, space-occupying lesion, syncope, and functional disorder

- Migraine with aura is the final diagnosis in more than 1% of patients evaluated in the emergency setting for the suspicion of acute ischemic stroke, and it is responsible for about 1.8% of thrombolytic treatments

Cephalalgia
Volume 38, Issue 14, December 2018, Pages 2068-2078

https://doi.org/10.1177/0333102418767999

Review

When migraine mimics stroke: A systematic review

Alberto Terrin[1], Giulia Toldo[1], Mario Ermani[1], Federico Mainardi[2], and Ferdinando Maggioni[1]

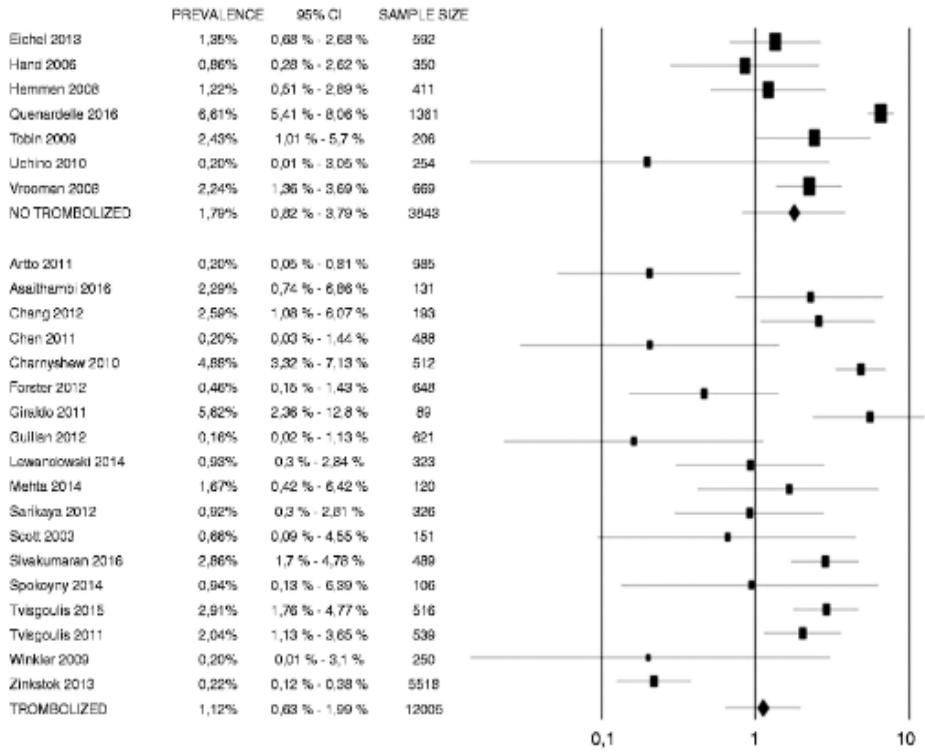


Figure 3. Absolute prevalence of migraine with aura (%) among patients evaluated in an emergency setting for a suspected acute ischemic stroke (first group) and among patients treated with rt-PA (second group).

As a consequence

- If migraine patient is falsely diagnosed to suffer stroke – the patient is exposed to patentially hazardous treatments e.g. rTPA

- If stroke patient is falsely diagnosed to suffer migraine – the patient is left without stroke prevention and other stroke treatments

Miten erotan migreeniauran TIA-kohtauksesta?

Kallela Duodecim 2012;128(9):971-7 (Finnish)
How do I distinguish migraine aura from TIA attack?

1959-2023

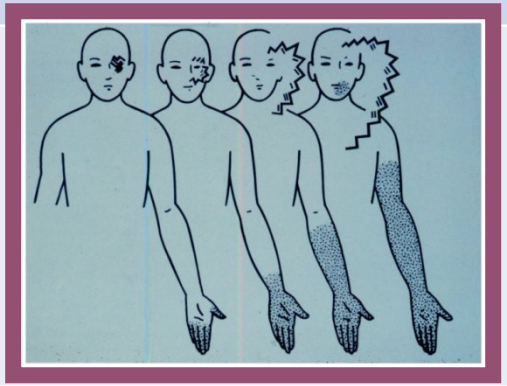
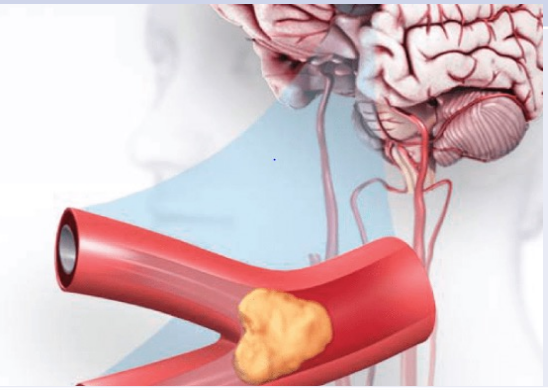
TAULUKKO 1. Migreeniauran ja TIA:n tyypilliset kliiniset piirteet.

Migreeniaura	TIA	Kommentti
Auratyypit yleisyysjärjestyksessä: visuaalinen, puhe, sensorinen (hyvin harvoin motorinen)	Motorinen, puheeseen liittyvä, sensorinen tai visuaalinen (vaihtelee iskemia-alueen paikan mukaan)	Motorinen oire (hemipareesi) liittyy harvinaiseen familiaaliseen hemiplegiseen migreeniin (FHM) Hemipareesi on TIA:n tyyppioire
Oireisto ilmaantuu ja väistyy asteittain	Äkillinen alku ja nopea korjaantuminen	Migreenioire vaikeutuu minuuttien (≥ 5 min) aikana Aivoverenkierron häiriö saavuttaa huippunsa heti
Kohtaukset toistuvat vuosien aikana pitkälti samankaltaisina	Yksi tai useampi kohtaus päivien tai muutaman viikon sisällä	Migreenitaipumus säilyy koko elämän TIA puolestaan enteilee pysyvämpää puutosoiretta (aivoinfarktia) lähipäivien aikana
Oireet kestävät kymmeniä minuutteja	Oireet kestävät minuutteja	TIA on äkillisempi oire kuin migreeniuara
Päänsärky seuraa neurologista oiretta (ja näin on tapahtunut usein aiemminkin)	Päänsärkyä esiintyy harvoin, mutta se saattaa myös edeltää neurologista oiretta	Migreeniaura voi toisinaan esiintyä ilman päänsärkyä ("migreenin ekvivalentti")
Kohtaukset alkavat alle 40 vuoden iässä (usein jo lapsena tai teini-iässä)	Kohtausten ilmaantuvuus lisääntyy iän myötä	Potilas on nuori ja terve – epäile migreeniauraa Potilas on vanha ja sairas – epäile TIA-kohtausta
Potilaalla ei useinkaan ole verenkiertosairautta tai sen riskitekijöitä	Potilaalla on useasti verenkiertosairaus tai sen riskitekijöitä	Mitä suurempi ABCD²-pistemäärä, sitä suurempi aivoinfarktin riski
Suvussa on migreenipotilaita (joilla on aurallinen tai hemiplegінen migreeni)	Suvussa esiintyy verenkiertosairauksia tai niiden riskitekijöitä, jopa nuorella iällä	Sukuanamneesi on tärkeä motorisen oireen selvittelyssä (nimenomaan epäiltäessä familiaalista hemiplegistä migreeniä)

ABCD² (age, blood pressure, clinical duration, diabetes). A = ikä, ≥ 60 vuotta = 1 piste, B = verenpaine, ≥ 140/90 mmHg = 1 piste, C = oireisto, toispuolinen lihasheikkous = 2 pistettä, puhehäiriö ilman lihasheikkoutta = 1 piste, D = oireen kesto, 10–59 minuuttia = 1 piste, ≥ 60 minuuttia = 2 pistettä, D = diabetes = 1 piste

Clinical features of migraine aura and TIA

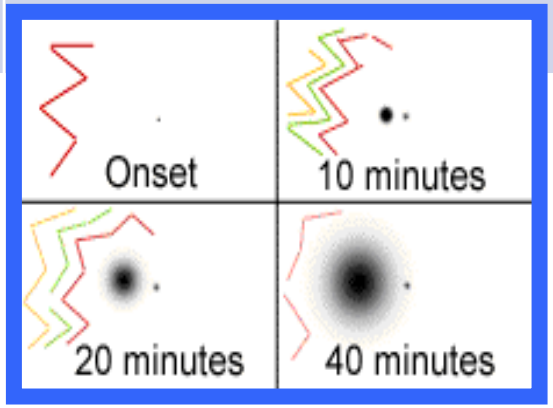
Kallela Duodecim 2012;128(9):971-7 (Finnish)

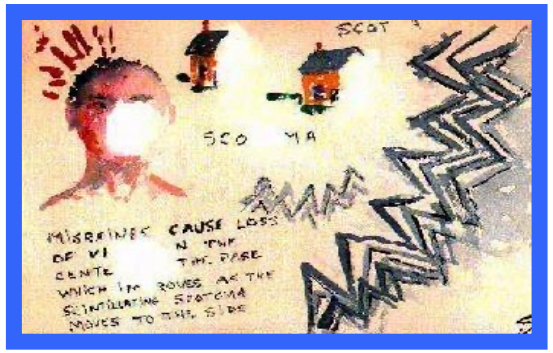
	Aura	TIA	Comment
Development of symptoms Prodromal symptoms?	Gradually (=march of symptoms) Prodrome symptoms (food cravings, mood changes, fatigue…)	Sudden No prodrome symptoms	The aura symptoms worsen over minutes Cerebrovascular disorder reaches its peak immediately
			
Symptoms	Aura symptoms in order of frequency: 1. Visual (almost always) 2. Aphasic 3. Sensory (4. only rarely motor)	Motor, aphasic, sensory or visual (varies by the location of the ischemic area)	Motor symptoms (hemiparesis) only associated with a rare hemiplegic migraine Hemiparesis is a typical symptom of TIA

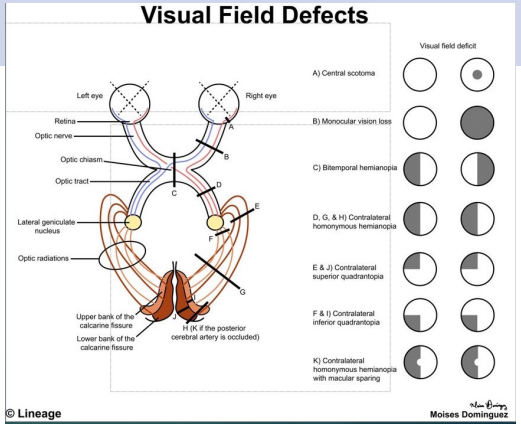
Clinical features of migraine aura and TIA

Kallela Duodecim 2012;128(9):971-7

	Aura	TIA	Comment
Positive or negative symptoms	Zig zags Flashes Tingling	Loss of vision Loss of sensation	Zigzag lines that are gradually floating across field of vision – Aura Sudden amaurosis fugax or homonymous hemianopsia – TIA/Stroke

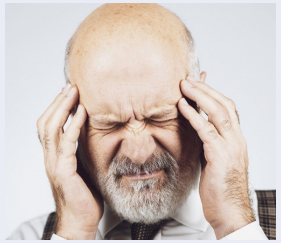






Clinical features of migraine aura and TIA (continues…)

Kallela Duodecim 2012;128(9):971-7

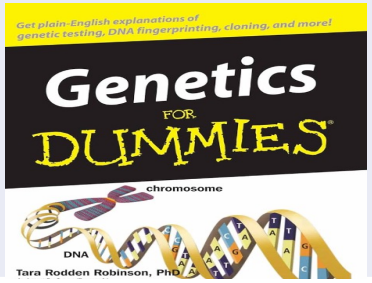
	Aura	TIA	Comment
Duration 	The symptoms last for tens of minutes	The symptoms last for minutes	TIA is a more sudden attack than a migraine
Headache 	Headache follows neurological symptoms	Headache is rare, but it may also precede a neurological symptom	Migraine aura can sometimes occur without a headache ("migraine equivalent")

Clinical features of migraine aura and TIA

Kallela Duodecim 2012;128(9):971-7

	Aura	TIA	Comment
Recurrence	The attacks repeat themselves over the years in largely similar ways	One or more attacks within a few days (or weeks)	Migraine tendency might remain throughout life TIA might foreshadow a more permanent deficit (infarction) in the coming days
Age	Attacks begin under the age of 40 (often already as a child or in adolescence)	The incidence of attacks increases with age	The patient is young and healthy – suspect aura The patient is old and sick – suspect a TIA

Clinical features of migraine aura and TIA (continues…)

	Aura	TIA	Comment
Vascular risk factors	The patient often does not have a vascular disease or its risk factors	The patient often has a vascular disease or its risk factors 	The larger the ABCD2 - score, the greater the risk of cerebral infarction
Family history 	Migraine sufferers in the family	Vascular diseases (or risk factors) in the family	Family history is especially important when evaluating motor symptoms (e.g. when suspecting familial hemiplegic migraine)

Kallela Duodecim 2012;128(9):971-7

Original Article

Cephalalgia
An International Journal of Headache

International Headache Society

Explicit diagnostic criteria for transient ischemic attacks to differentiate it from migraine with aura

Elena R Lebedeva[1,2], Natalia M Gurary[3], Denis V Gilev[4], Anne Francke Christensen[5] and Jes Olesen[5]

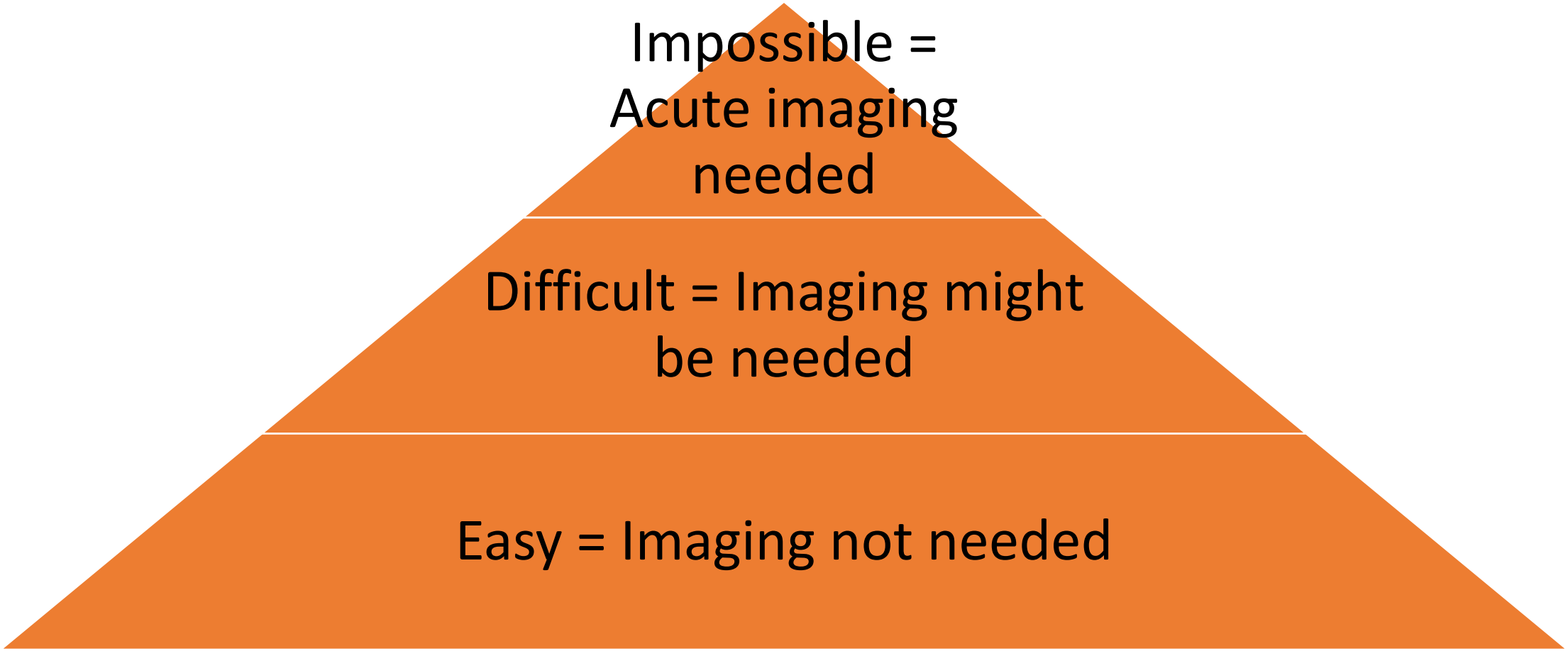
Cephalalgia
2018, Vol. 38(8) 1463–1470

DOI: 10.1177/0333102417736901
journals.sagepub.com/home/cep
SAGE

A. Sudden onset of fully reversible neurological or retinal symptoms (typically hemiparesis, hemihypesthesia, aphasia, neglect, amaurosis fugax, hemianopsia or hemiataxia)
B. Duration < 24 hours
C. At least two of the following:
    1. At least one symptom is maximal in < 1 minute (no gradual spread)
    2. Two or more symptoms occur simultaneously
    3. Symptoms in the form of deficits (no irritative symptoms such as photopsias, pins and needles etc)
    4. No headache accompanies or follows the neurological symptoms within one hour
D. None of the following isolated symptoms (can occur together with more typical symptoms): shaking spells, diplopia, dizziness, vertigo, syncope, decreased level of consciousness, confusion, hyperventilation associated paresthesias, unexplained falls, amnesia
E. No evidence of acute infarction in the relevant area on neuroimaging

Figure 1. Proposed tissue based diagnostic criteria for transient ischemic attacks*.
*All letter headings must be fulfilled.

Differential diagnosis between migraine aura and TIA



Cephalalgia
Volume 34, Issue 11, October 2014, Pages 870-876

https://doi.org/10.1177/0333102414523339

Original Article

Perfusion patterns in migraine with aura

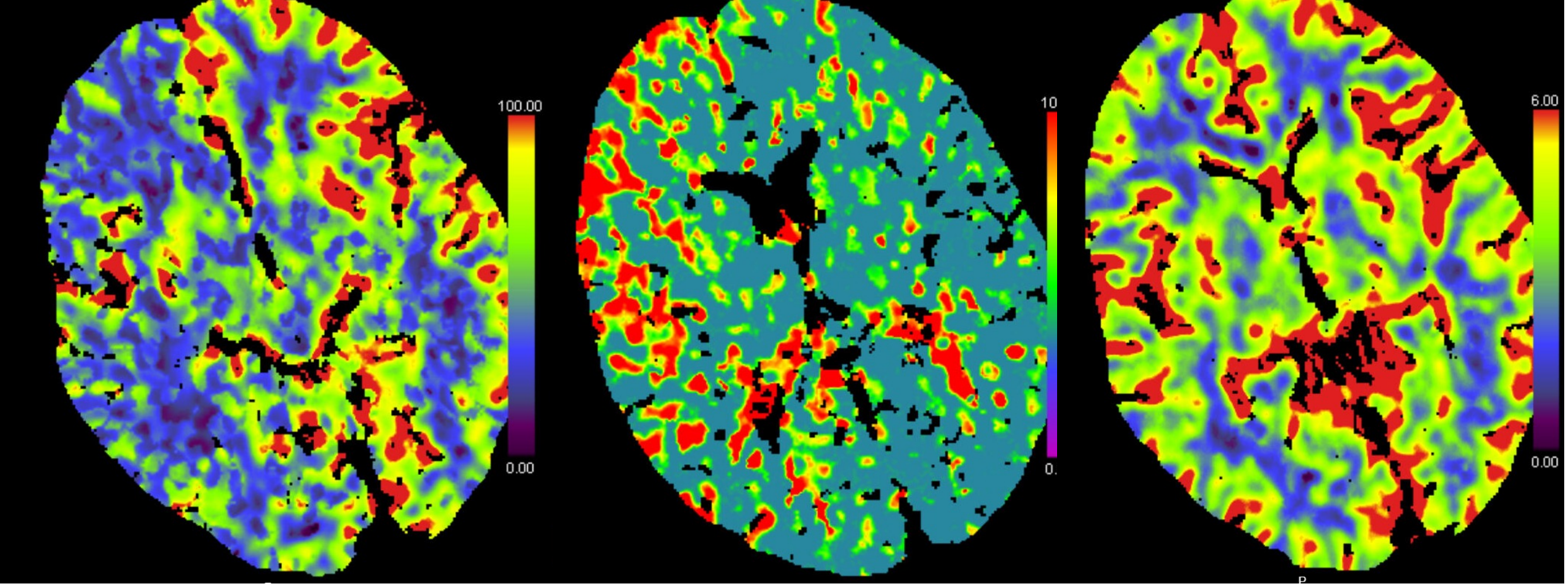
Alex Förster[1], Holger Wenz[1], Hans U Kerl[1], Marc A Brockmann[1,2], and Christoph Groden[1]

- Migraine aura is usually associated with a perfusion deficit not limited to a specific vascular territory, and a moderate increase of time to peak (TTP)

- Hypoperfusion restricted to a single vascular territory with a marked increase of TTP and/or mean transit time (MTT) is atypical for migraine with aura and suggestive of acute ischemic stroke

Case report of a young man

- No vascular risk factors
- Hemiplegic migraine from childhood
- Now the patient was brought to ER because sudden global aphasia and left side hemiparesis (aphasia was new symptom)
- Visual neglect
- NIHSS 12



CT-angiography was normal, however, CT-perfusion demonstrated hypoperfusion in the right ACA, MCA, and PCA territory, as well as in the left ACA territory (Cerebral Blood Flow and Mean Transit Time), but Cerebral Blood Volume was normal.

The depicted distribution of CT-perfusion deficit - not limited to a specific vascular territory - in the context of this patient case suggests aura.

Many thanks to Daniel Strbian for his help with the case report

Conclusion

- Association between migraine and stroke is complex
- Migraine with aura increases the risk of ischemic stroke
- In most cases differentation of the two is relatively easy
- Imaging might be considered in some cases (and of course always if stroke is suspected)