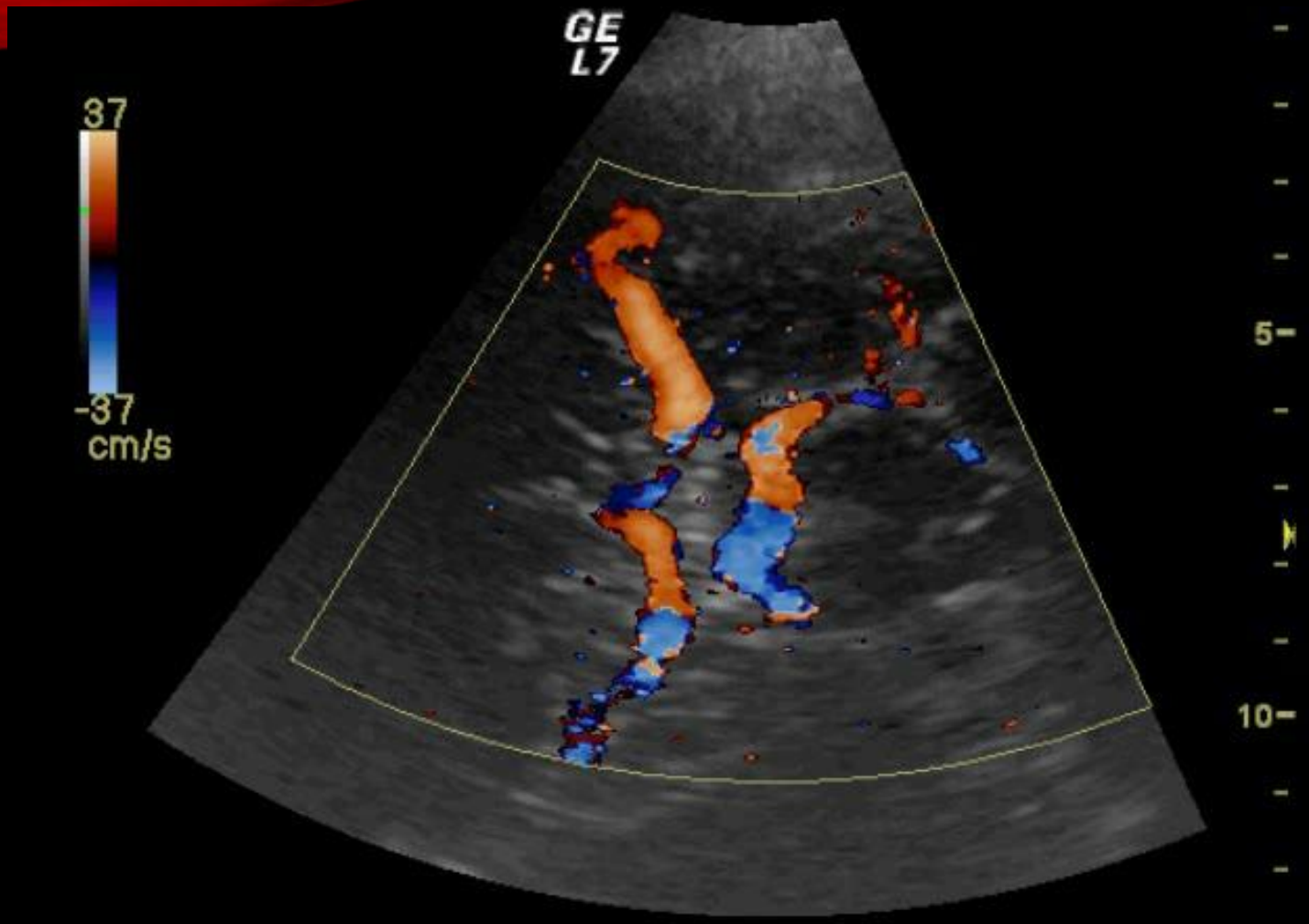
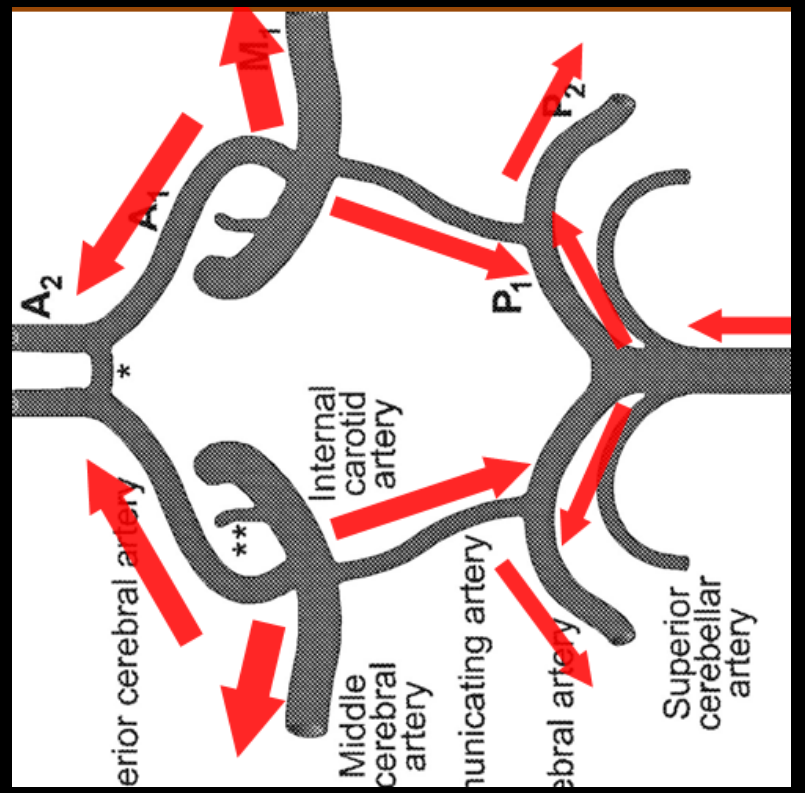
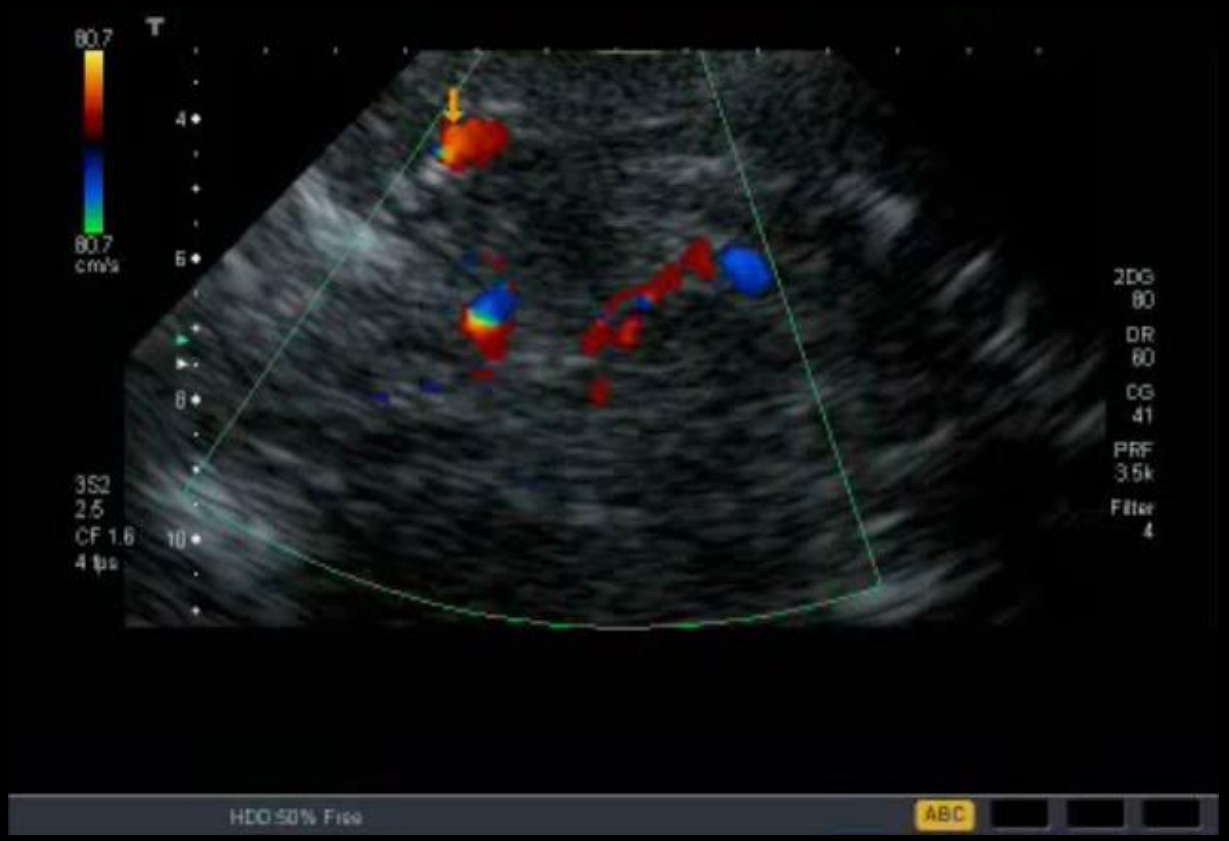
LE STENOSI (E ALTRE PATOLOGIE) INTRACRANICHE AL TCCD

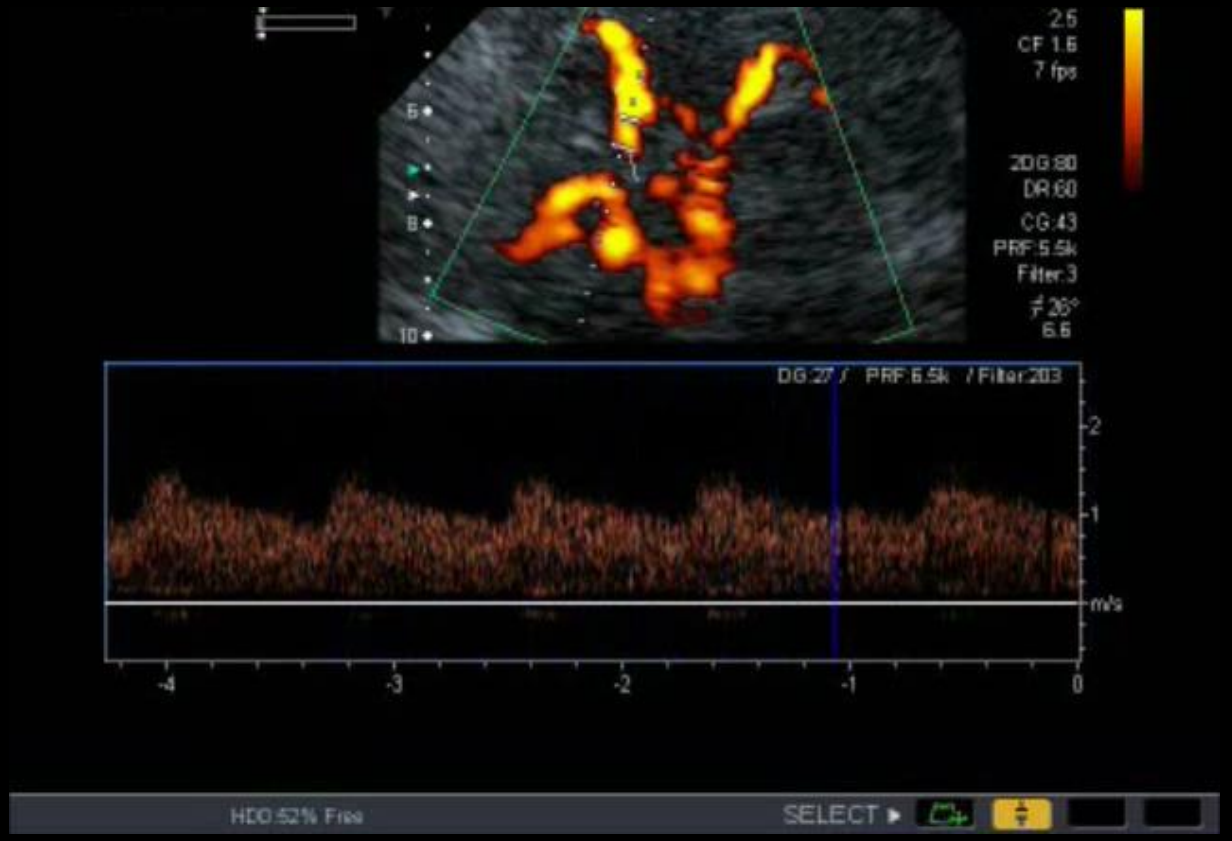
Enzo Sanzaro

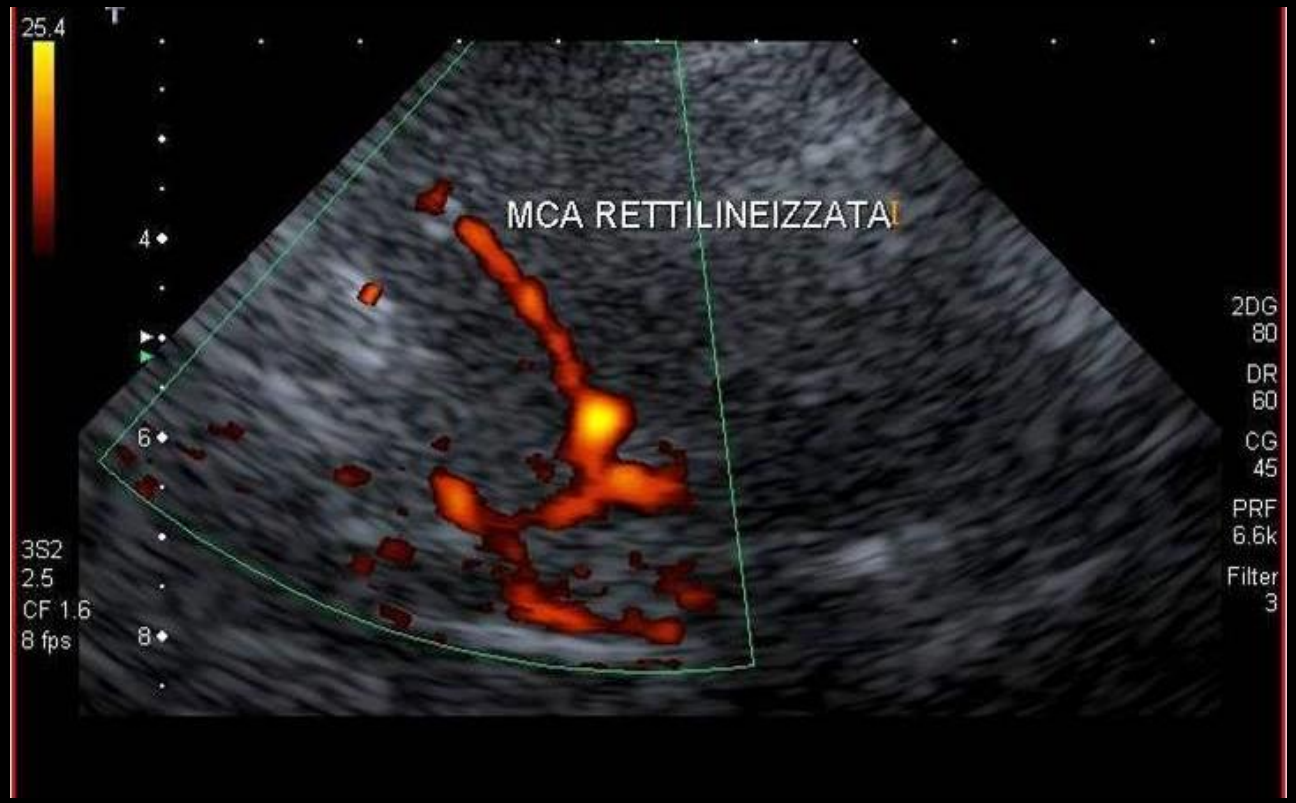
UOC provinciale di Neurologia – ASP Ragusa

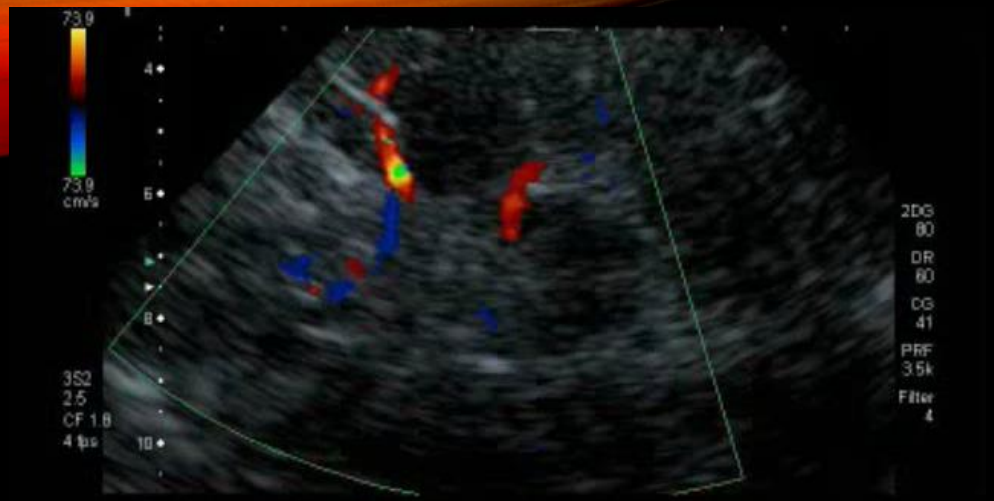

GE
L7
37
-37
cm/s
5
10

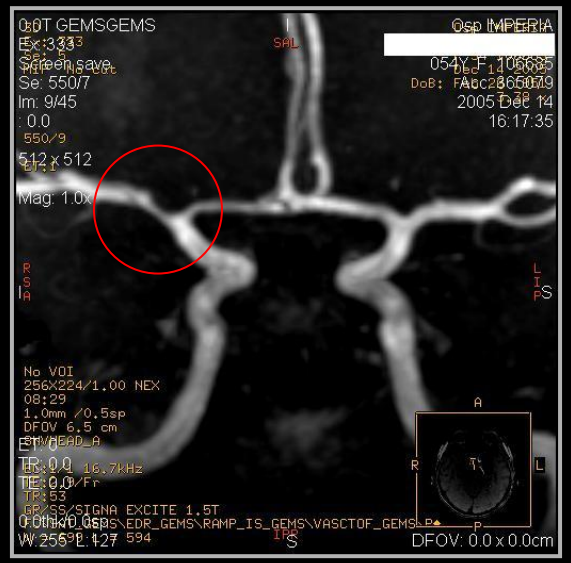

A2
A1
M1
P1
P2
*
**
Internal carotid artery
Middle cerebral artery
Superior cerebellar artery

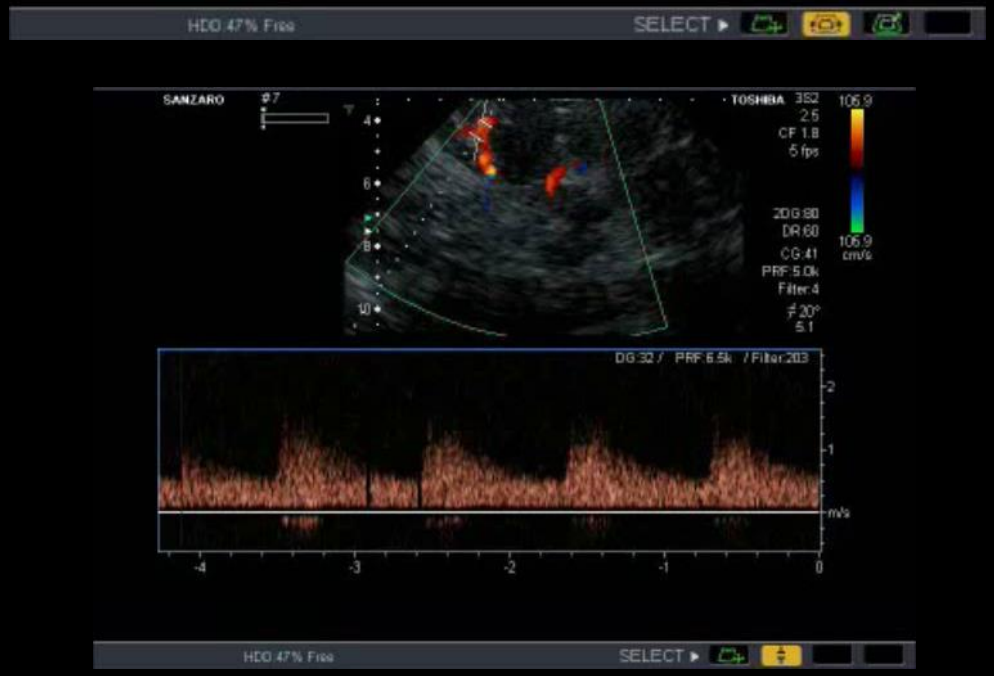

80.7
80.7
cm/s
2DG
80
DR
60
CG
41
PRF
3.5k
Filter
4
352
2.5
CF 1.6
4 fps
HDO 50% Free
ABC

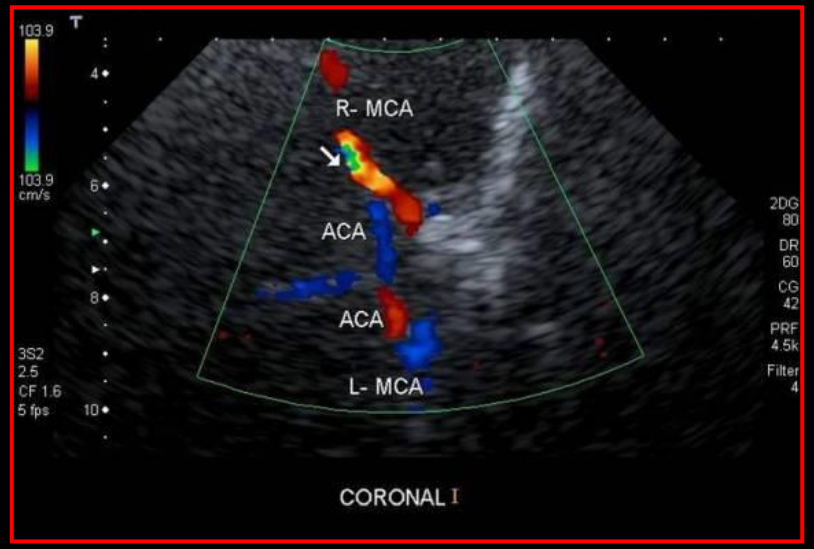

2.5
CF 1.6
7 fps
2DG 80
DR 60
CG 43
PRF 5.5k
Filter 3
DG 27 / PRF 6.5k / Filter 203
m/s
HDO 52% Free
SELECT


MCA RETTILINEIZZATA
25.4
4
6
8
3S2
2.5
CF 1.6
8 fps
2DG
80
DR
60
CG
45
PRF
6.6k
Filter
3


73.9
73.9
cm/s
2DG
80
DR
60
CG
41
PRF
3.5k
Filter
4
3S2
2.5
CF 1.8
4 fps


3.0T GEMSGEMS
Osp IMPERIA
Screen save
Se: 550/7
Im: 9/45
: 0.0
550/9
512 x 512
Mag: 1.0x
2005 Dec 14
16:17:35
No VOI
256X224/1.00 NEX
08:29
1.0mm /0.5sp
DFOV 6.5 cm
TR: 0.0
TE: 0.0
GR/SS/SIGNA EXCITE 1.5T
DFOV: 0.0 x 0.0cm


HDD 47% Free
SELECT
SANZARO
TOSHIBA
3S2
2.5
CF 1.8
5 fps
2DG 80
DR 60
CG 41
PRF 5.0k
Filter 4
DG 32 / PRF 6.5k / Filter 203
HDD 47% Free
SELECT


103.9
103.9
cm/s
R- MCA
ACA
ACA
L- MCA
3S2
2.5
CF 1.6
5 fps
2DG
80
DR
60
CG
42
PRF
4.5k
Filter
4
CORONAL I

La stenosi intracranica è un processo dinamico e può essere aggravata da diversi fattori:

- trombo locale
- emboli
- vasospasmo
- alterazione della vasoreattività
- compensi già attivati che possono essere fonte di furto
- alterazioni del ritmo cardiaco
- alterazioni della pressione arteriosa
- processi infiammatori della parete vasale, vasculiti, linfomi

Criteri di stenosi

Stroke. 1999 Jan;30(1):87-92.

Assessment of ≥50% and <50% Intracranial Stenoses by Transcranial Color-Coded Duplex Sonography

Ralf W. Baumgartner, MD; Heinrich P. Mattle, MD; Gerhard Schroth, MD

Criteri emodinamici

Valori di cut-off di PSV per le stenosi >50% sono:

- ACA ≥155 cm/sec
- ACM≥220 cm/sec
- ACP ≥145 cm/sec
- AB ≥140 cm/sec
- AV ≥120 cm/sec
- Presenza di segnali a bassa frequenza e flusso retrogrado nel punto di stenosi
- Riduzione della velocità massima e media distalmente alla stenosi
- Per le stenosi serrate, tipico rumore, dovuto alla dispersione del segnale *(cry-seagull)*

Criteri di stenosi

Stroke. 1999 Jan;30(1):87-92.

Assessment of ≥50% and <50% Intracranial Stenoses by Transcranial Color-Coded Duplex Sonography

Ralf W. Baumgartner, MD; Heinrich P. Mattle, MD; Gerhard Schroth, MD

Criteri emodinamici

Valori di cut-off di PSV per le stenosi <50% sono:

- ACA ≥120 cm/sec
- ACM≥155 cm/sec
- ACP ≥100 cm/sec
- AB ≥100 cm/sec
- AV ≥90 cm/sec

Criteri di stenosi

Stroke. 1999 Jan;30(1):87-92.

Assessment of ≥50% and <50% Intracranial Stenoses by Transcranial Color-Coded Duplex Sonography

Ralf W. Baumgartner, MD; Heinrich P. Mattle, MD; Gerhard Schroth, MD

Criteri colorimetrici

- Modificazione del segnale color nel tratto intrastenotico
- Presenza di effetto *aliasing* (indice di elevate frequenze)

Diversi sono i fattori che possono influire nella valutazione spettrale velocimetrica della stenosi

Fattori che possono influire sulla riduzione della velocità sono:

a) aumento della pressione intracranica
b) riduzione della gittata cardiaca
c) età avanzata del paziente
d) occlusione di un vaso periferico

Fattori che possono influire su un incremento della velocità sono:

a) aumento di velocità di flusso nei vasi che fungono da circoli di compenso per arterie intracerebrali stenotiche o per malformazioni artero-venose
b) vasodilatazione dei vasi cerebrali per meccanismi di autoregolazione in corso di ictus cerebrale o trauma cranico
c) presenza di malattie sistemiche (anemia microcitica, anemia falciforme, ipertiroidismo)

IMPATTO DELLE STENOSI INTRACRANICHE

- Causano il 5-10% degli ictus ischemici

Stroke 1995;26:14-20

- Sono di più frequente riscontro nelle popolazioni asiatiche
- Comportano un rischio annuo di recidiva di ictus compreso tra il 10 ed il 50%

Stroke 1985;16:397-406

Neurology 2000;55:490-497

- Circa la metà delle recidive sono disabilitanti

Stroke 2009;40:1999-2003

Etiology of intracranial stenosis in young patients: a high-resolution magnetic resonance imaging study

Ann Transl Med 2017;5(16):319

Yu-Yuan Xu[1], Ming-Li Li[2], Shan Gao[1], Zheng-Yu Jin[2], Zhao-Yong Sun[2], Jie Chen[1], Bo Hou[2], Hai-Long Zhou[2], Feng Feng[2], Wei-Hai Xu[1]

Results: Eccentric stenosis was observed in 98 (80.3%) patients and concentric stenosis in 24 (19.7%) patients. The patients with eccentric stenosis were older (37.5±6.8 *vs.* 31.4±8.4 years old, P<0.001) and more likely had atherosclerosis risk factors (56.1% *vs.* 25.0%, P=0.006). The patients >35 years old had higher prevalence (90.1% *vs.* 66.7%, P=0.001) of eccentric stenosis and atherosclerosis factors (60.6% *vs.* 35.3%, P=0.006) than the patients ≤35 years old. Most of the patients with concentric stenosis were ≤35 years old (17/24, 70.8%) and were female (16/24, 66.7%). Binary Logistic analysis suggested smoking (OR =3.171; 95% CI, 1.210–8.314) and remodeling ratio (OR =1.625; 95% CI, 1.001–2.636) were independent predictive factors for symptomatic stenosis.

Conclusions: Atherosclerosis is the most common cause of intracranial stenosis in Chinese young patients. Non-atherosclerosis disease is an important etiology in young female, especially in the patients aged 35 years old or younger.

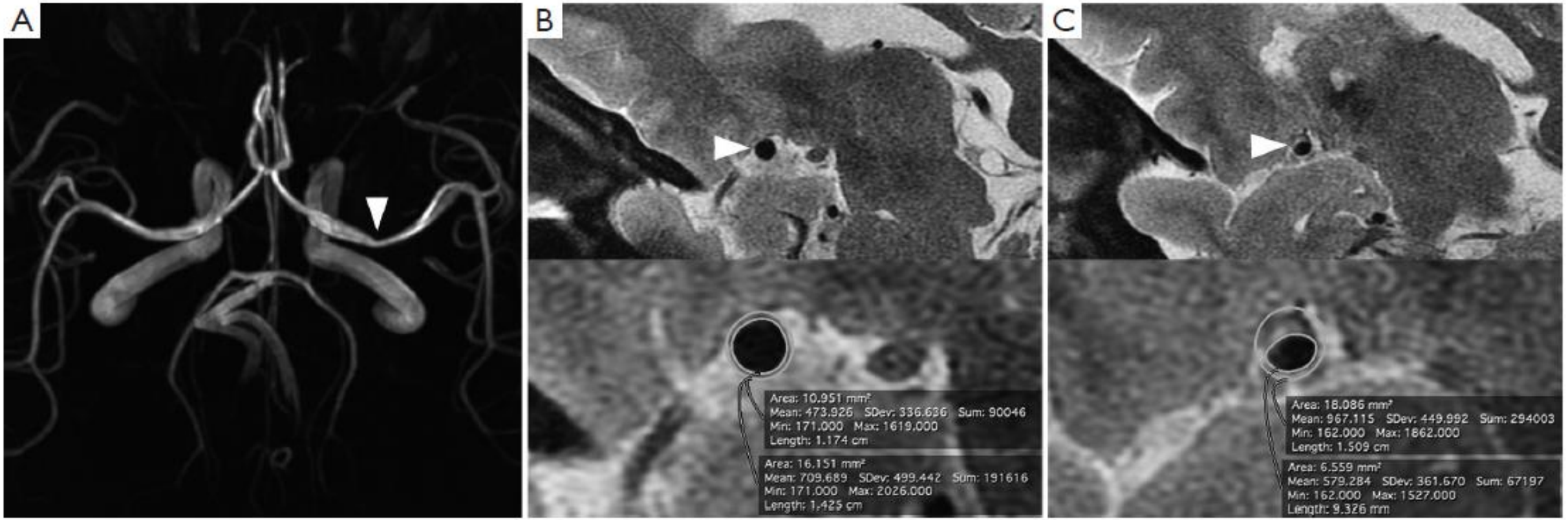
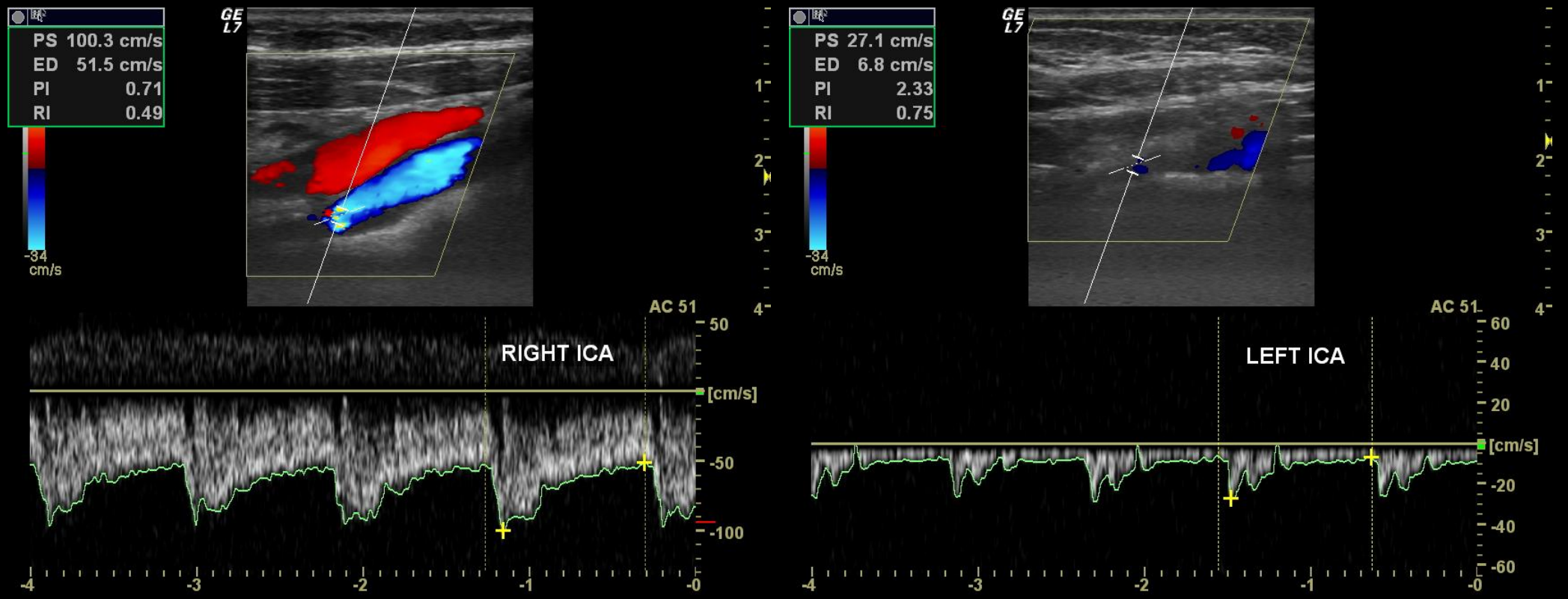
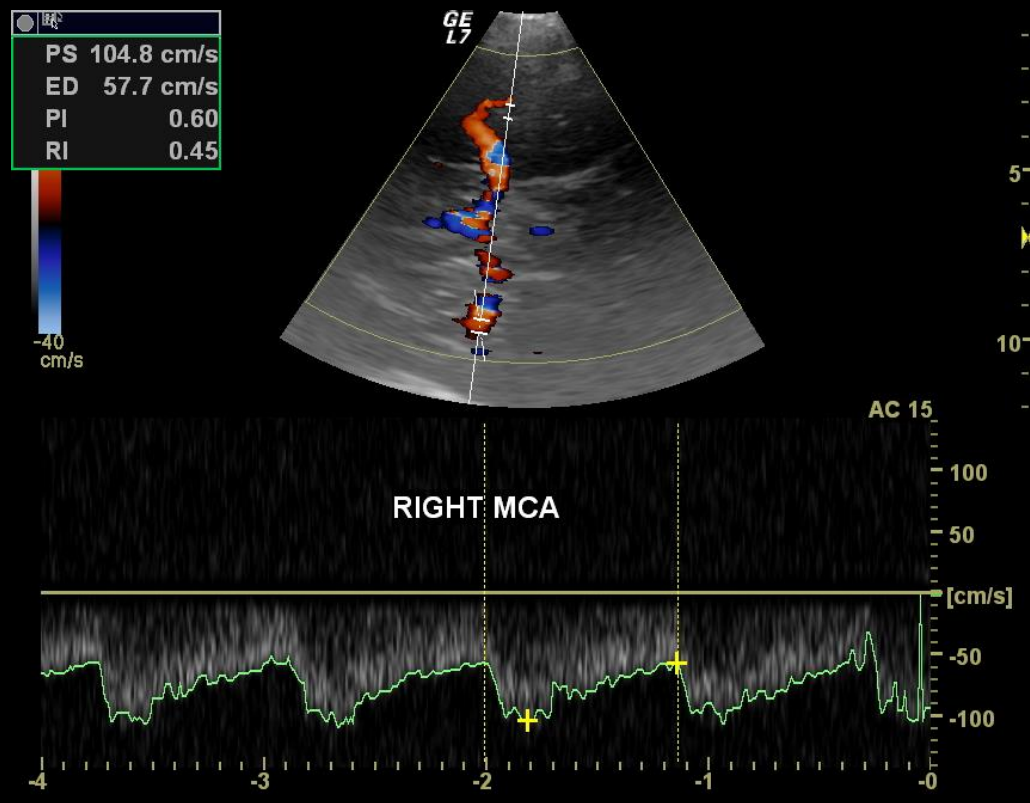
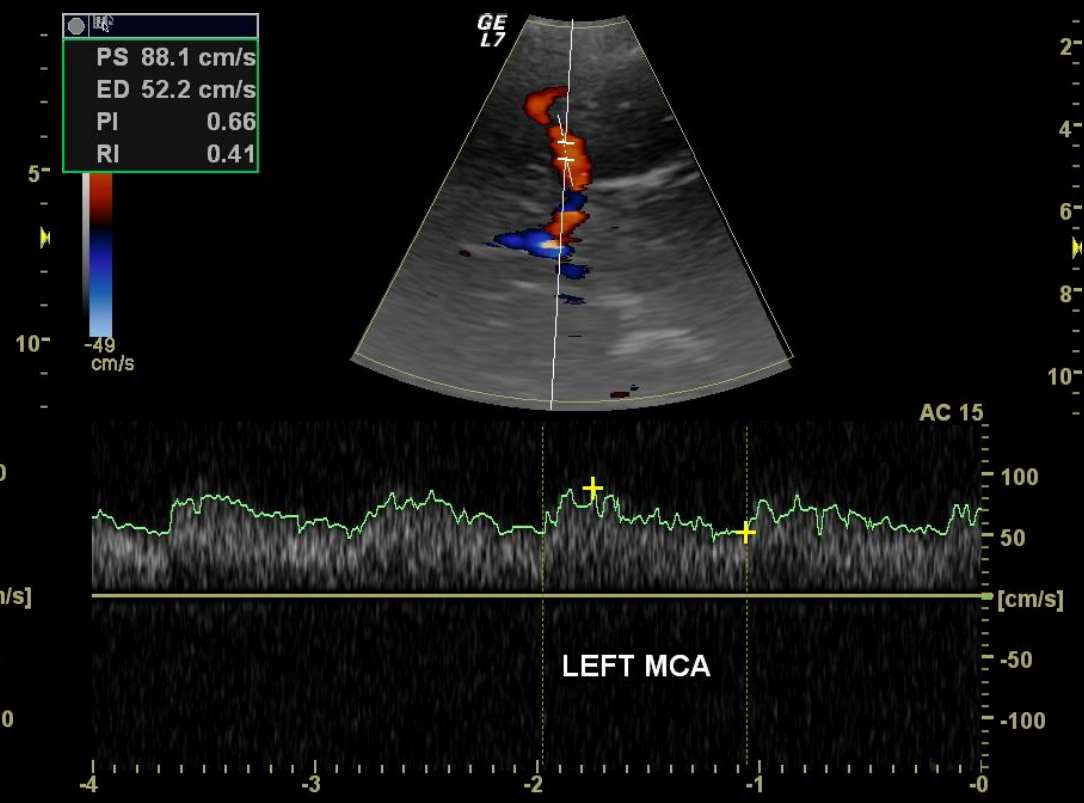
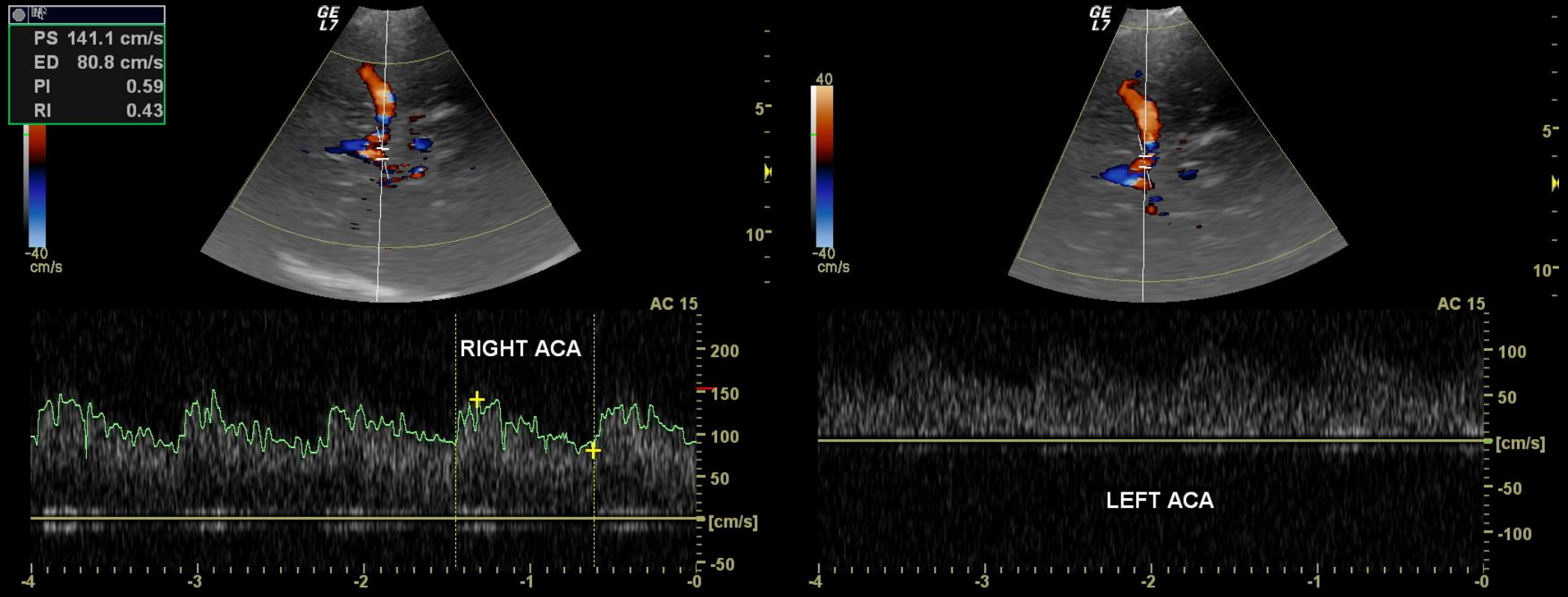


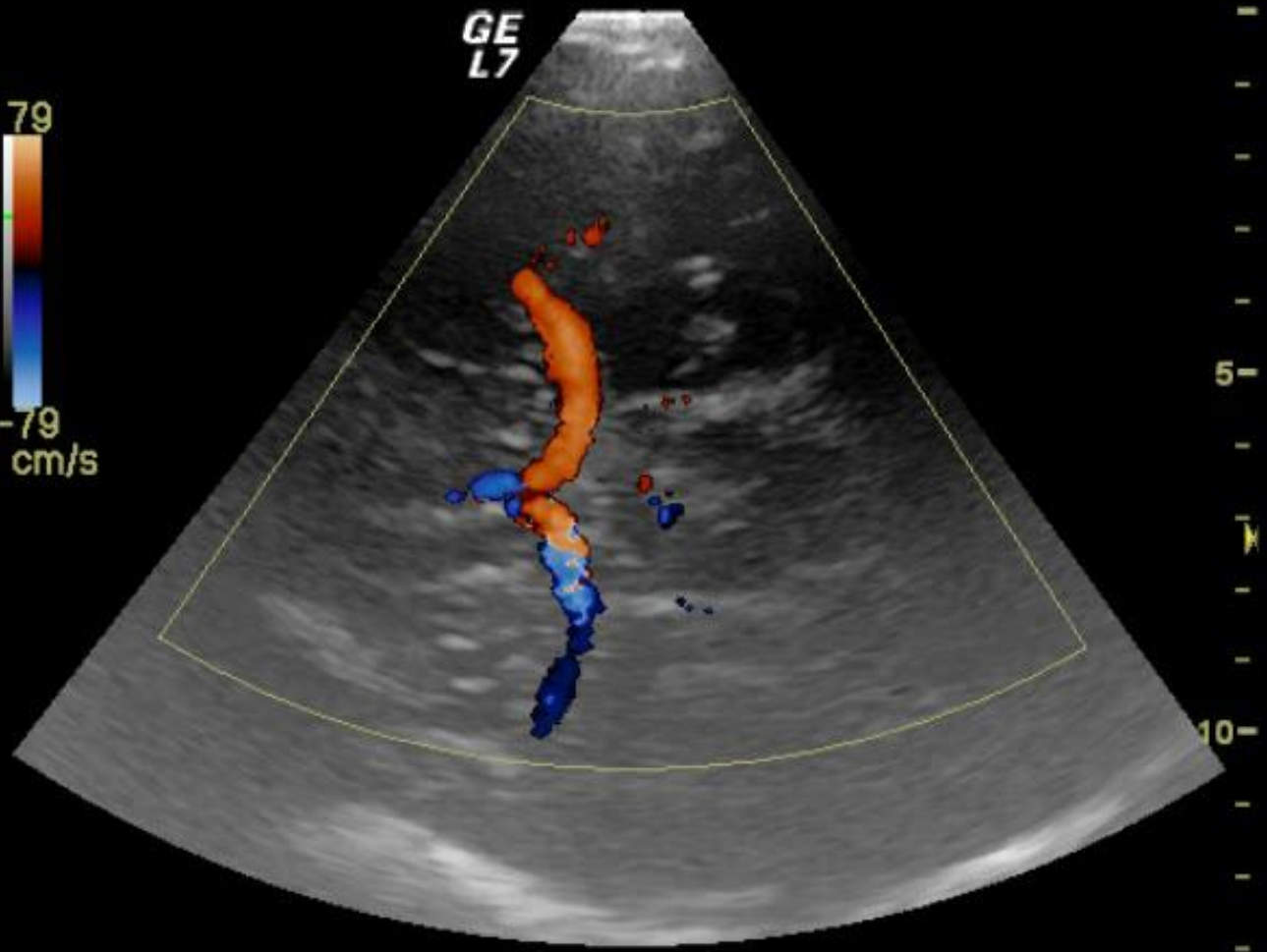
Figure 1 Measurements of vessel area and luminal area. Magnetic resonance angiography (A) shows a stenosis at the M1 segment of left MCA (arrowhead). On high-resolution MRI, the vessel wall images (B, arrowhead) at the maximal lumen narrowing site and the reference site (C, arrowhead) are shown. The vessel area and luminal area of the sites can be measured (demonstrated by the magnified images). MCA, middle cerebral artery; MRI, magnetic resonance imaging.

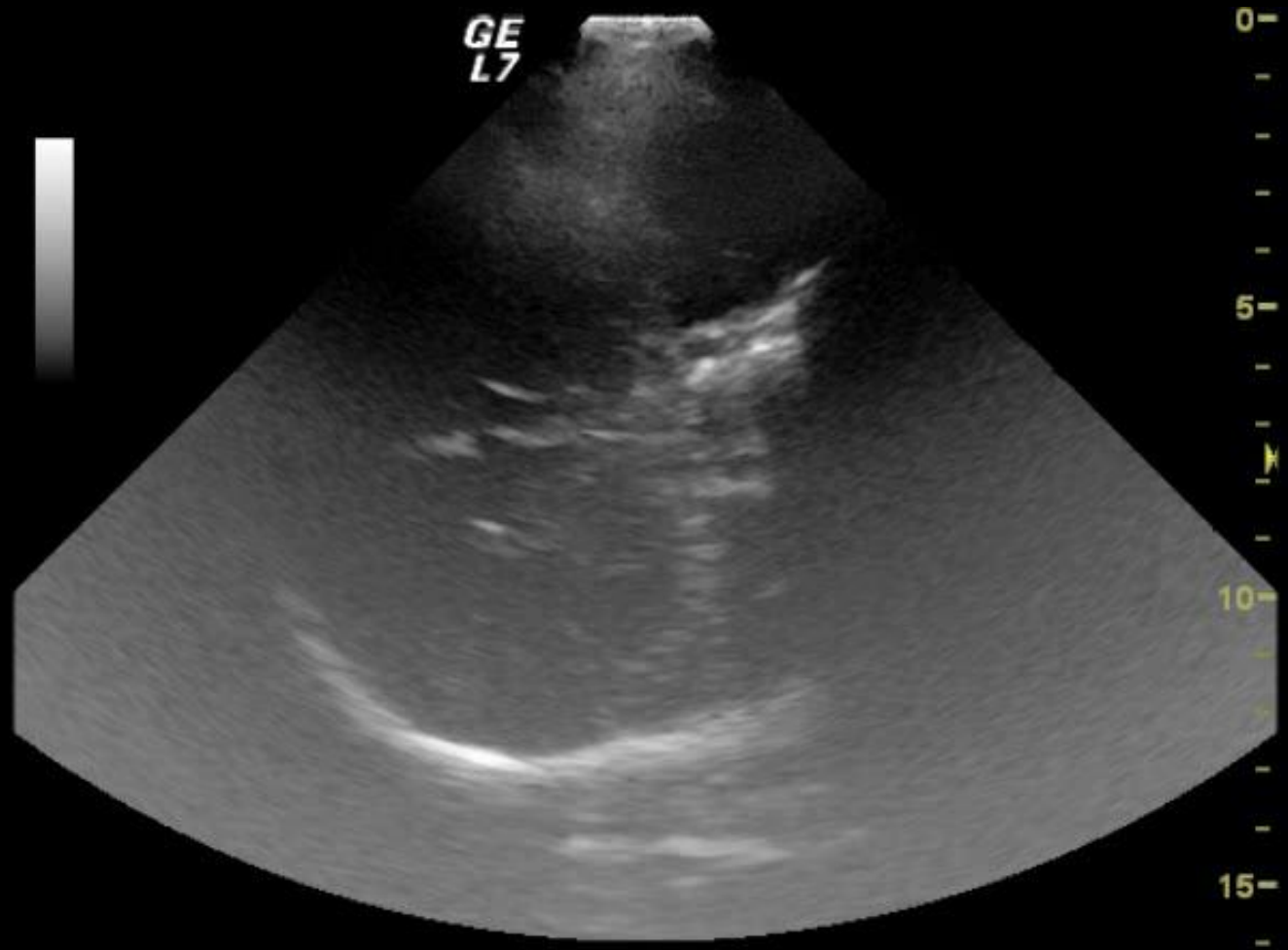

PS 100.3 cm/s
ED 51.5 cm/s
PI 0.71
RI 0.49
-34 cm/s
GE L7
AC 51
RIGHT ICA
50
[cm/s]
-50
-100
-4
-3
-2
-1
-0
1
2
3
4
PS 27.1 cm/s
ED 6.8 cm/s
PI 2.33
RI 0.75
-34 cm/s
GE L7
AC 51
LEFT ICA
60
40
20
[cm/s]
-20
-40
-60
-4
-3
-2
-1
-0
1
2
3
4

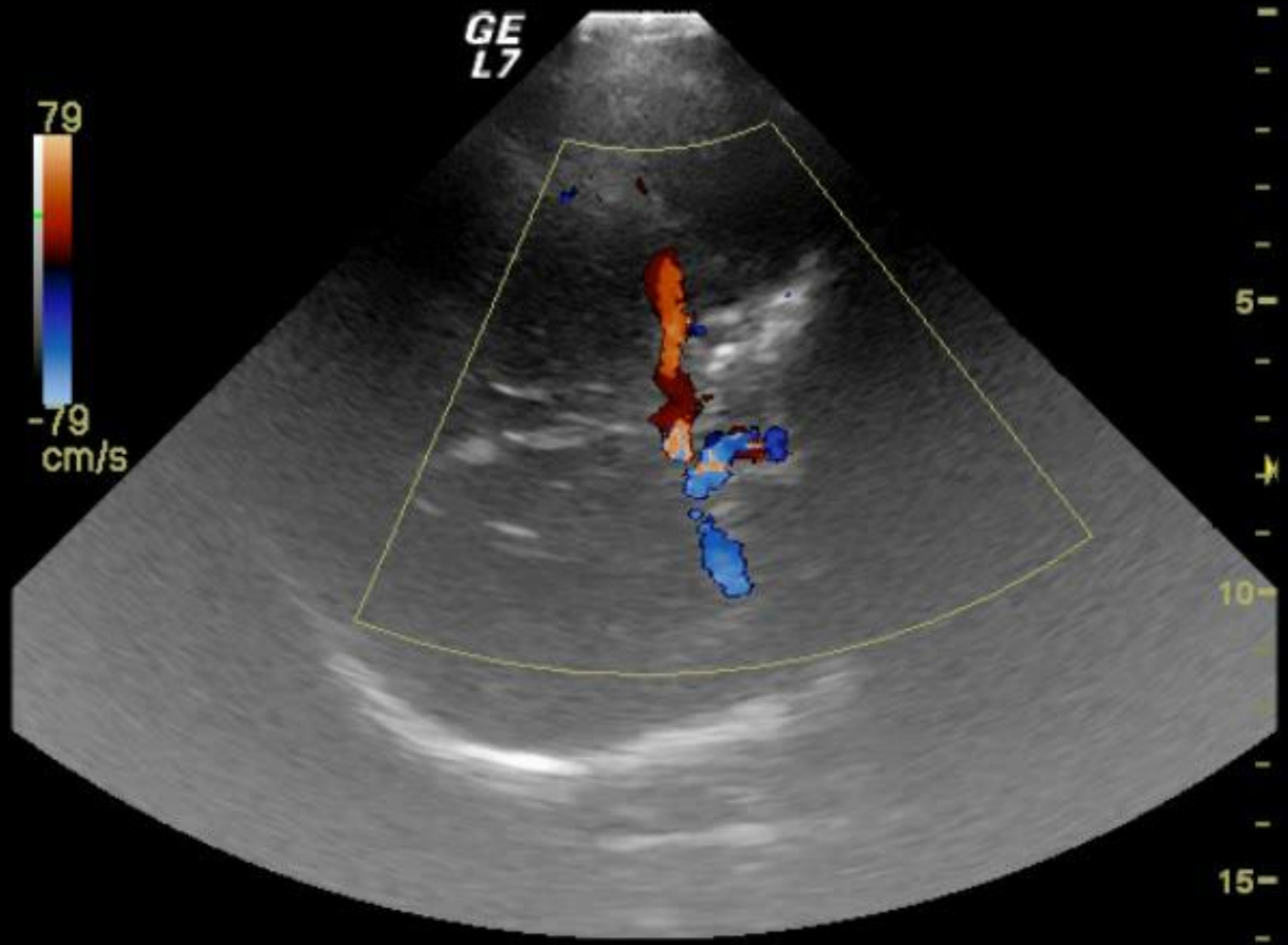

PS 104.8 cm/s
ED 57.7 cm/s
PI 0.60
RI 0.45
-40
cm/s
GE
L7
AC 15
RIGHT MCA
100
50
[cm/s]
-50
-100
-4
-3
-2
-1
-0

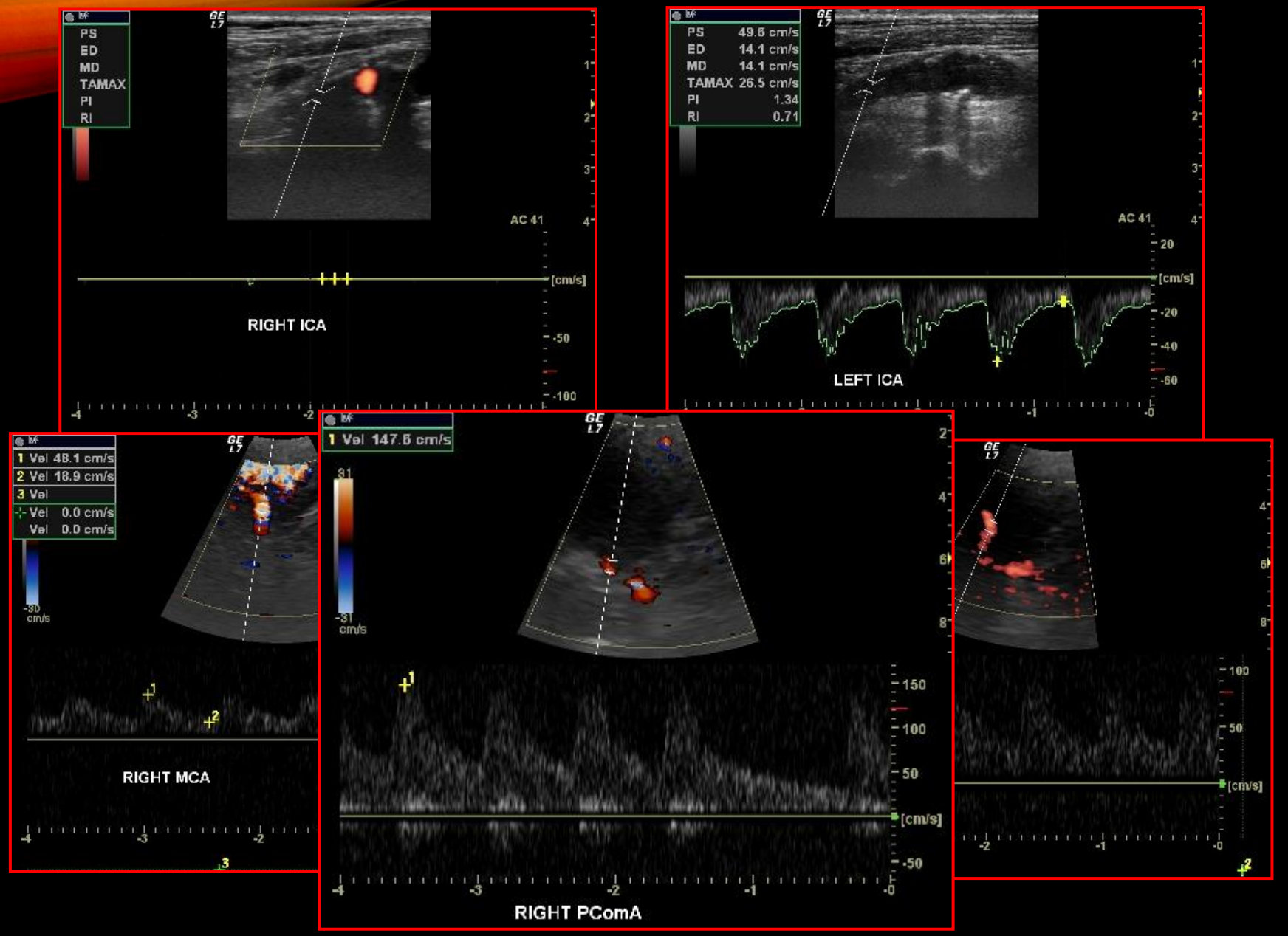

PS 88.1 cm/s
ED 52.2 cm/s
PI 0.66
RI 0.41
-49
cm/s
GE
L7
AC 15
LEFT MCA
100
50
[cm/s]
-50
-100
-4
-3
-2
-1
-0

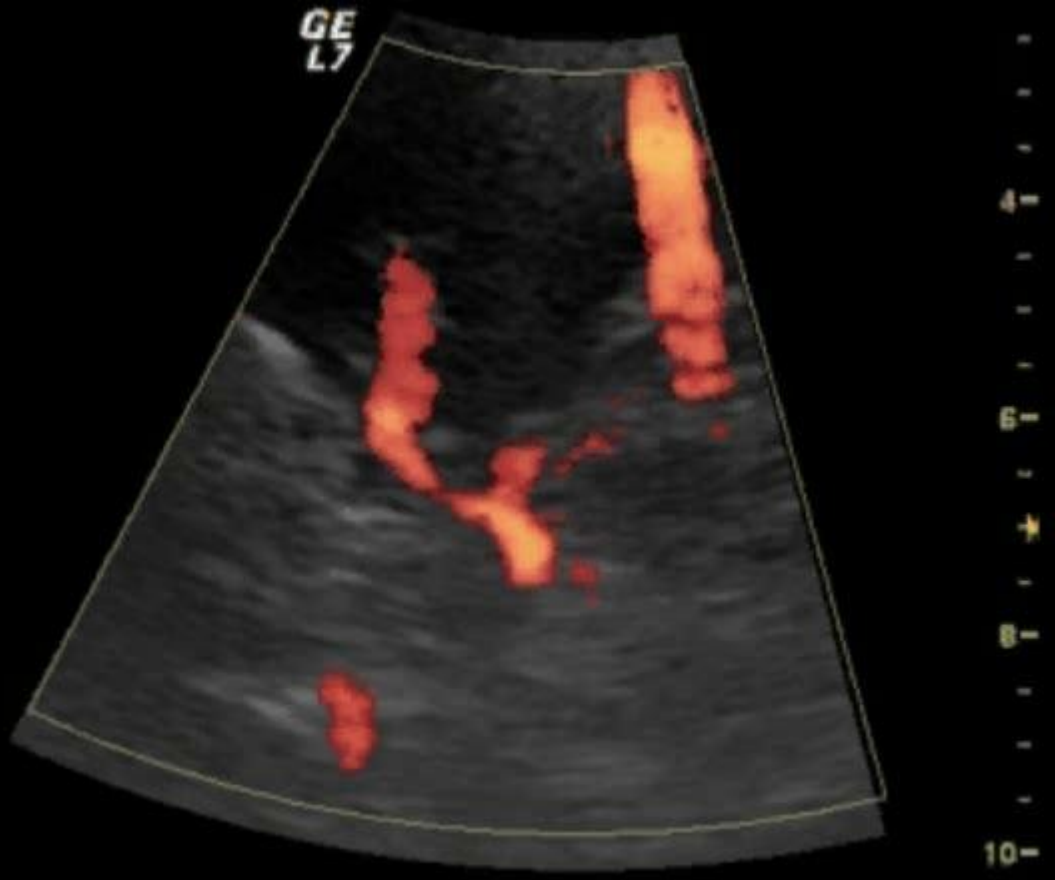

PS 141.1 cm/s
ED 80.8 cm/s
PI 0.59
RI 0.43
-40
cm/s
GE
L7
5
10
40
-40
cm/s
GE
L7
5
10
AC 15
RIGHT ACA
200
150
100
50
[cm/s]
-50
-4
-3
-2
-1
-0
AC 15
100
50
[cm/s]
-50
-100
LEFT ACA
-4
-3
-2
-1
-0

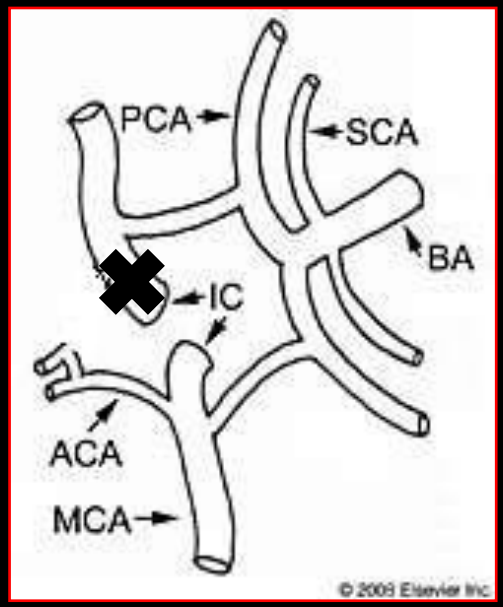

GE
L7
79
-79
cm/s
5
10

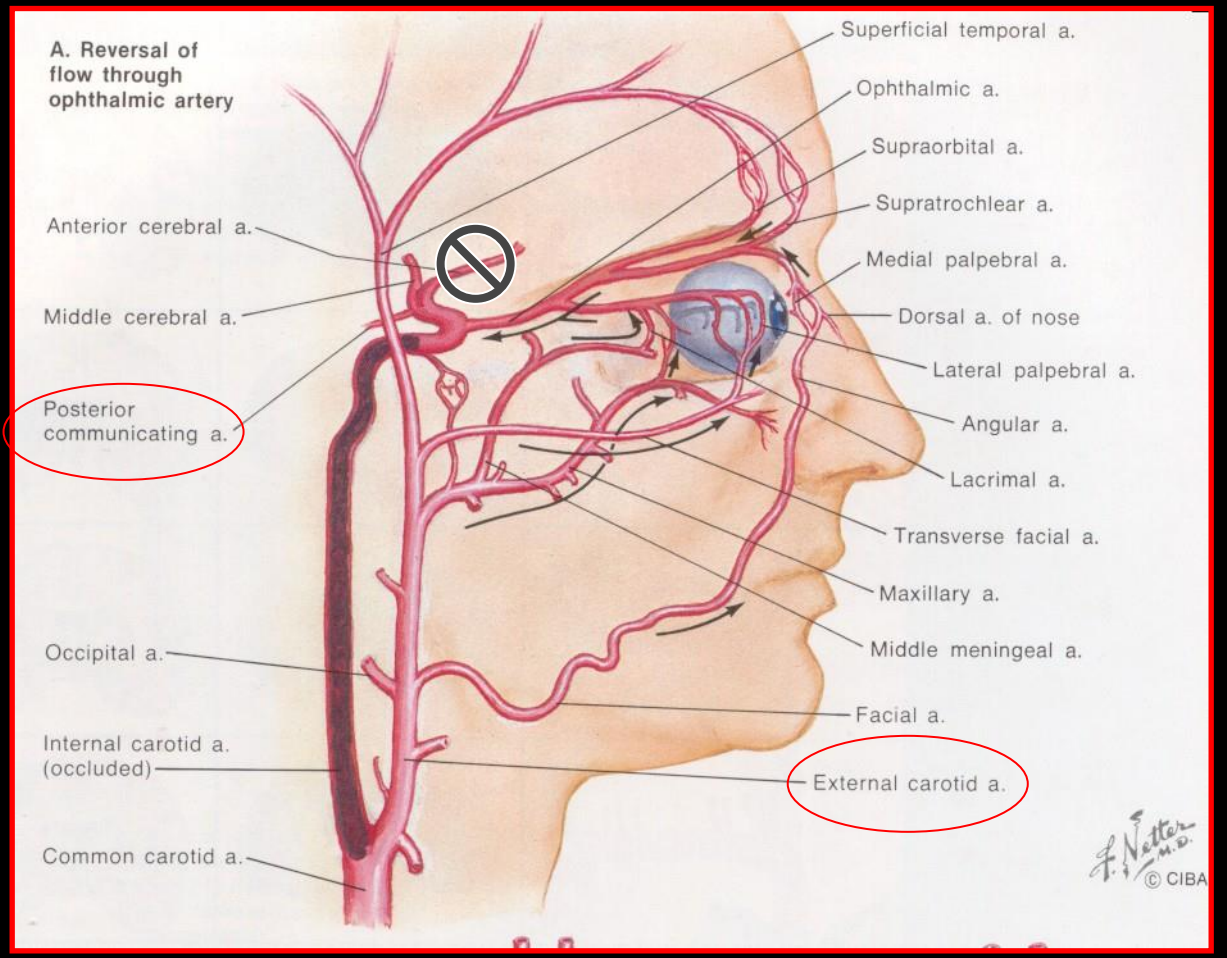

GE
L7
0
5
10
15

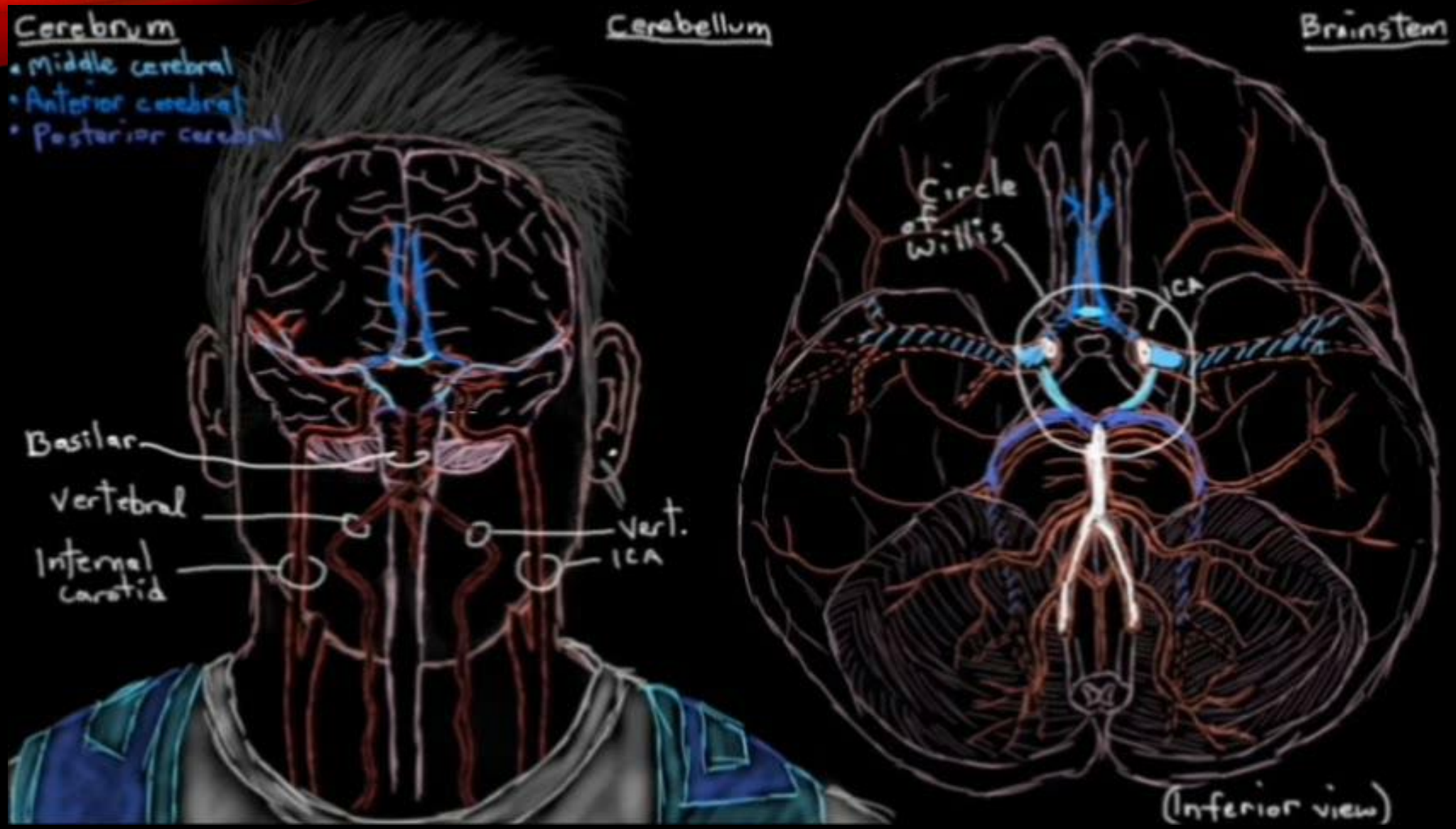

GE
L7
79
-79
cm/s
5
10
15

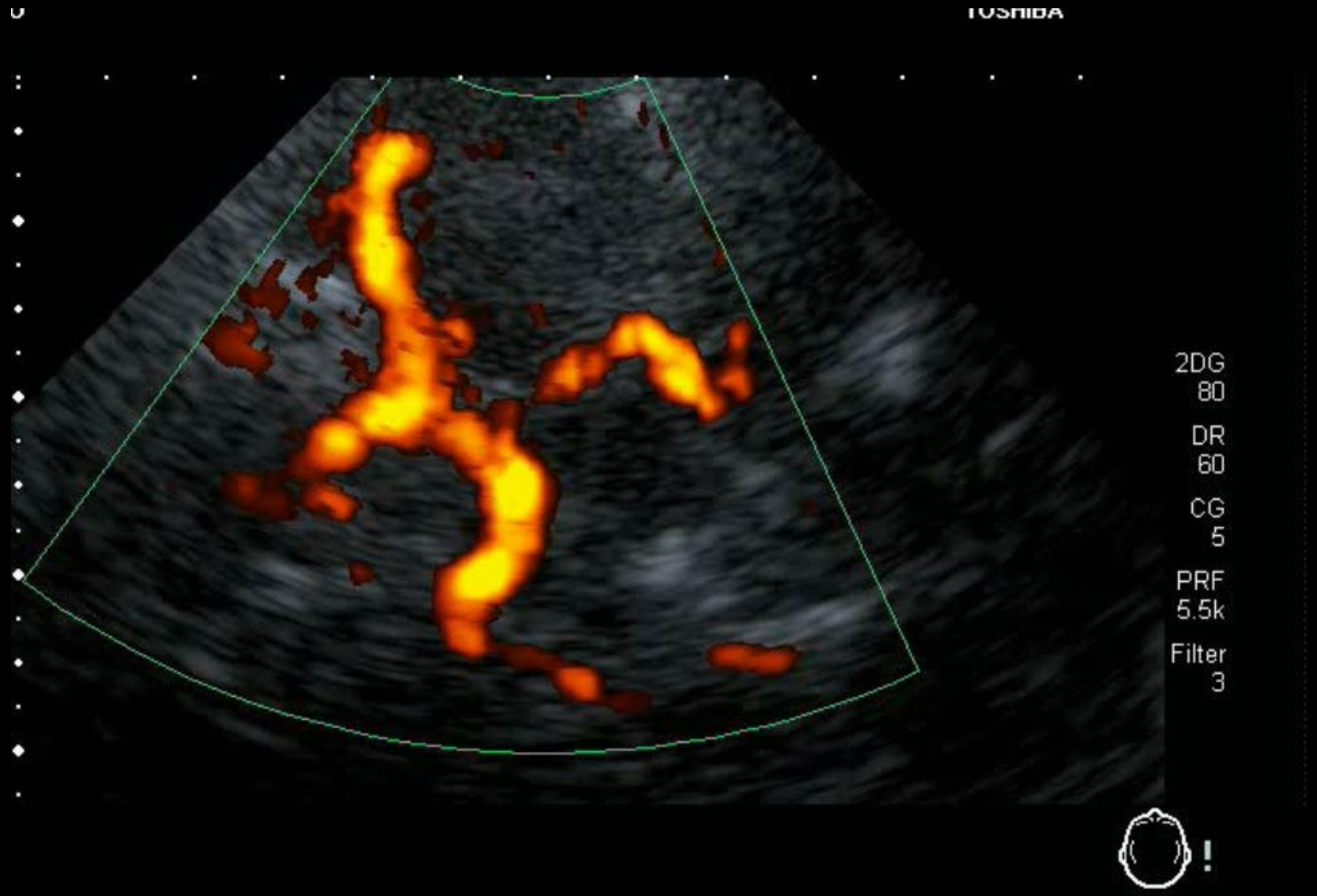

PS
ED
MD
TAMAX
PI
RI
AC 41
[cm/s]
RIGHT ICA
PS 49.6 cm/s
ED 14.1 cm/s
MD 14.1 cm/s
TAMAX 26.5 cm/s
PI 1.34
RI 0.71
AC 41
[cm/s]
LEFT ICA
1 Vel 48.1 cm/s
2 Vel 18.9 cm/s
3 Vel
Vel 0.0 cm/s
Vel 0.0 cm/s
RIGHT MCA
1 Vel 147.6 cm/s
[cm/s]
RIGHT PComA
[cm/s]


GE
L7
4
6
8
10


PCA
SCA
BA
IC
ACA
MCA
© 2009 Elsevier Inc.


A. Reversal of flow through ophthalmic artery
Superficial temporal a.
Ophthalmic a.
Supraorbital a.
Supratrochlear a.
Anterior cerebral a.
Medial palpebral a.
Middle cerebral a.
Dorsal a. of nose
Lateral palpebral a.
Posterior communicating a.
Angular a.
Lacrimal a.
Transverse facial a.
Maxillary a.
Occipital a.
Middle meningeal a.
Facial a.
Internal carotid a. (occluded)
External carotid a.
Common carotid a.
F. Netter M.D.
© CIBA


Cerebrum
• Middle cerebral
• Anterior cerebral
• Posterior cerebral
Cerebellum
Brainstem
Basilar
Vertebral
Internal carotid
Vert.
ICA
Circle of Willis
ICA
(Inferior view)


TOSHIBA
2DG
80
DR
60
CG
5
PRF
5.5k
Filter
3

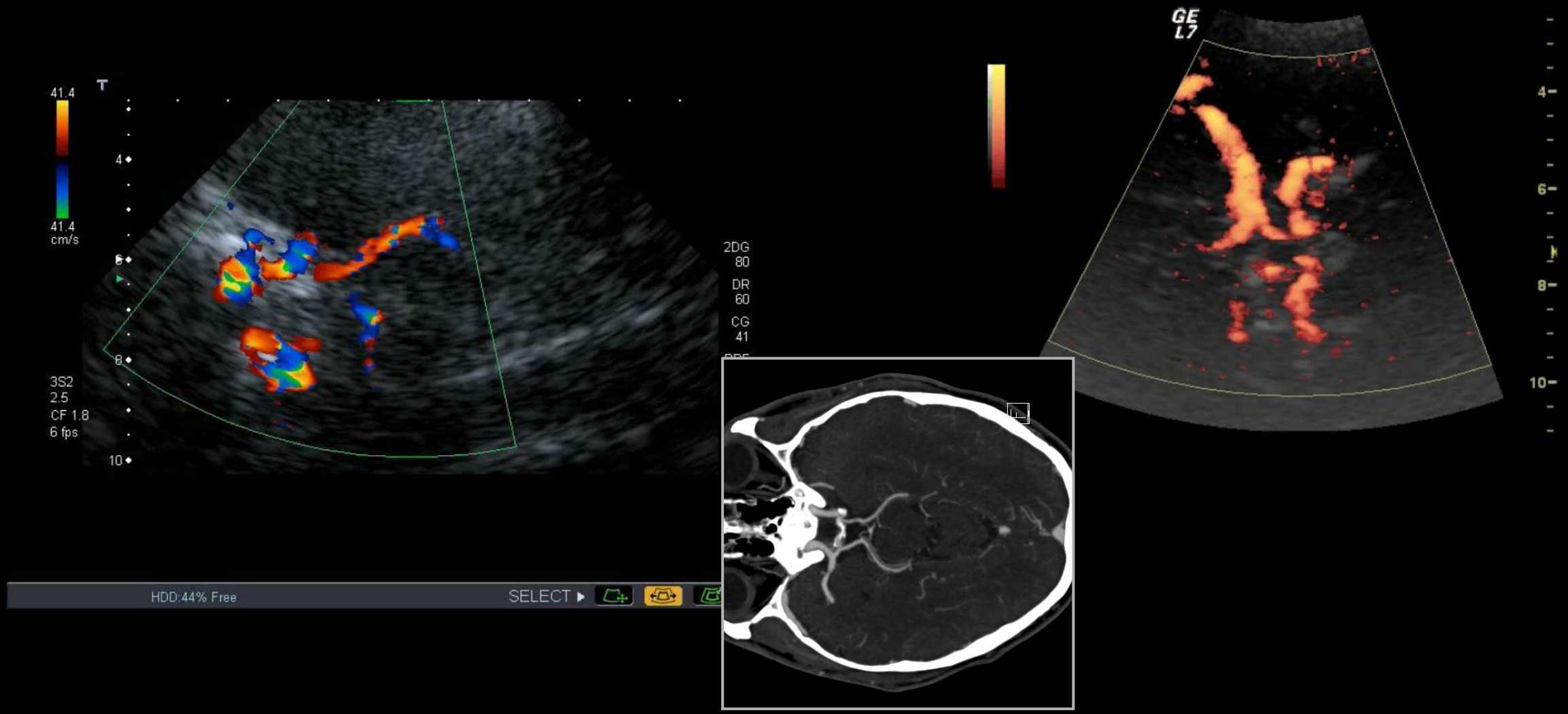
ICTUS ISCHEMICO ACUTO

- Valutazione dei tronchi sovraortici

- Valutazione del poligono di Willis
  - Circoli di compenso
  - Stenosi intracraniche
  - Ricanalizzazione

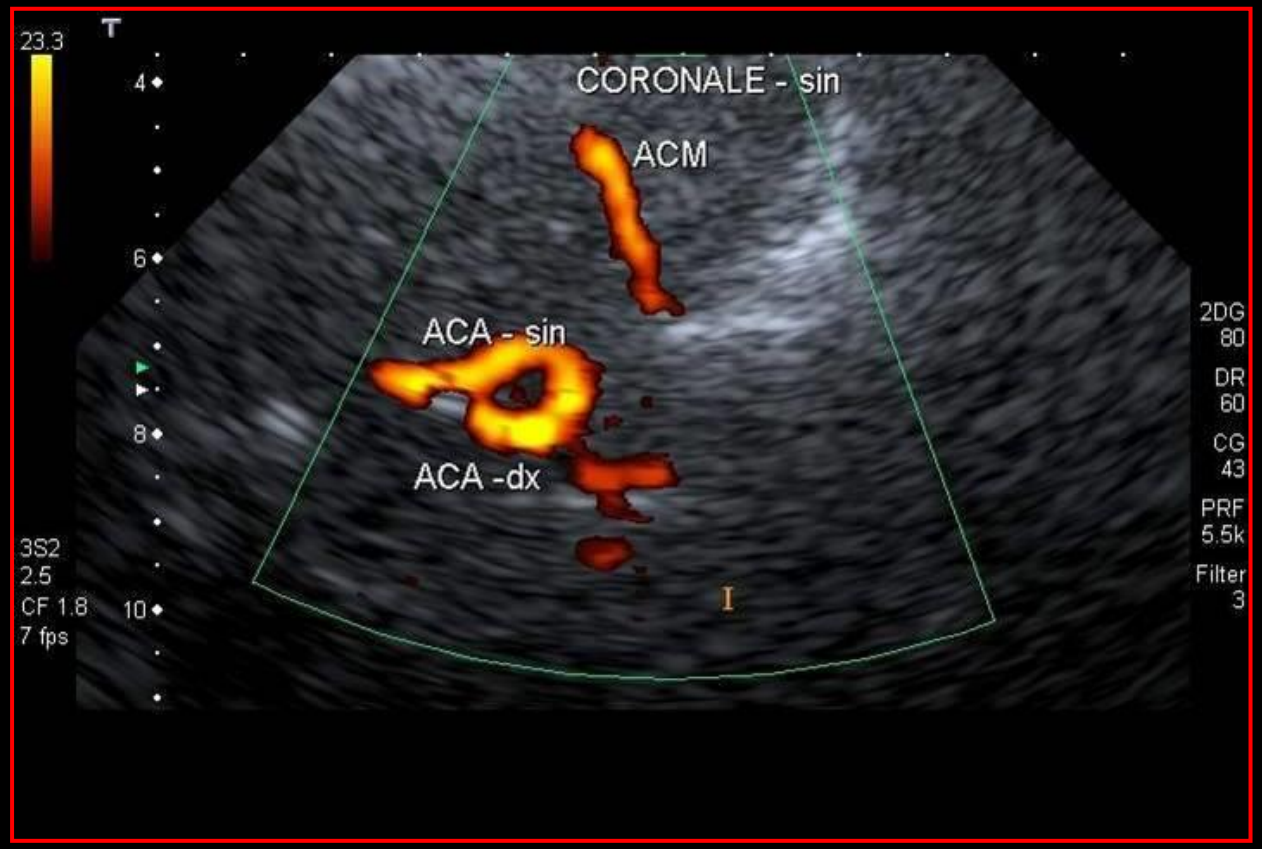
ANOMALIE DI DECORSO E VARIANTI ANATOMICHE

A. Cerebrale Posteriore da ACI



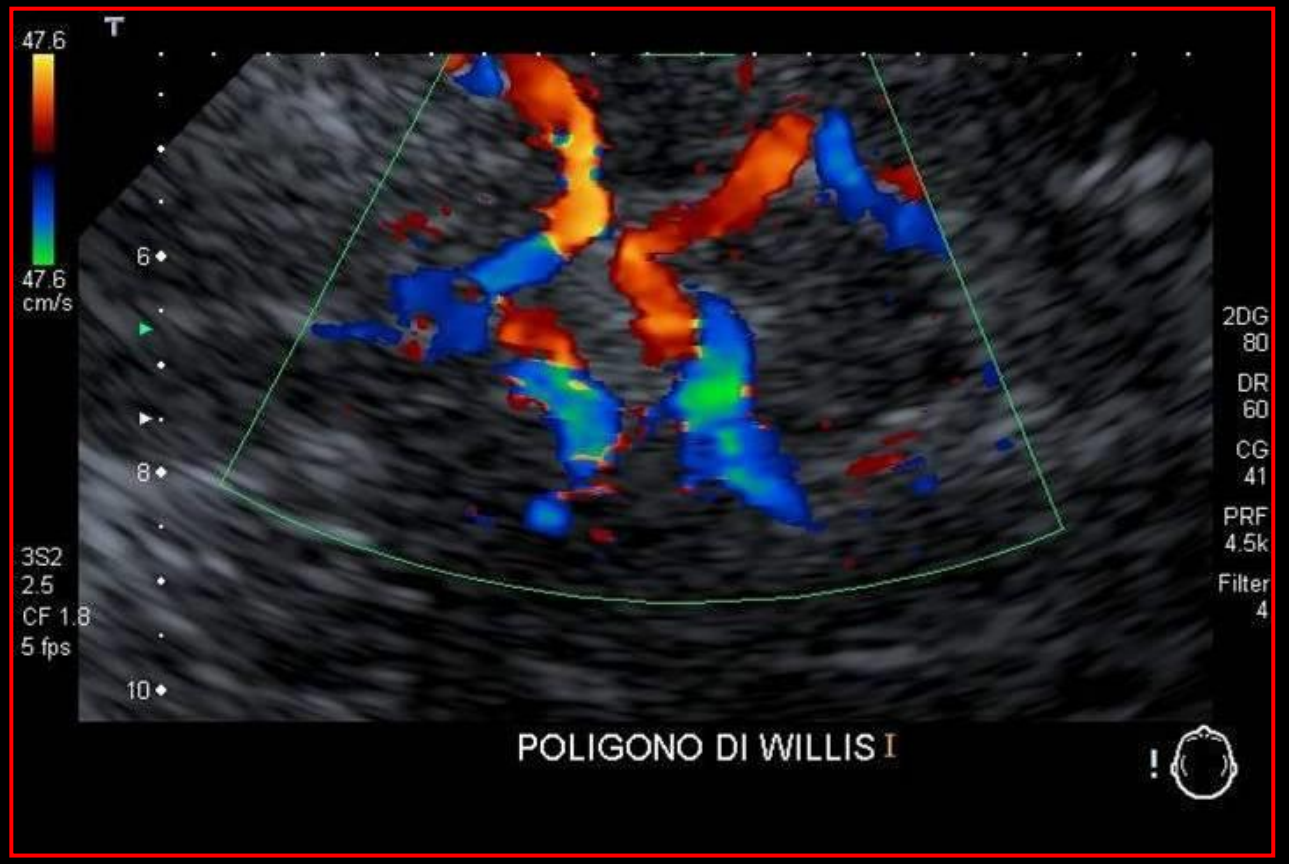
ANOMALIE DI DECORSO E VARIANTI ANATOMICHE

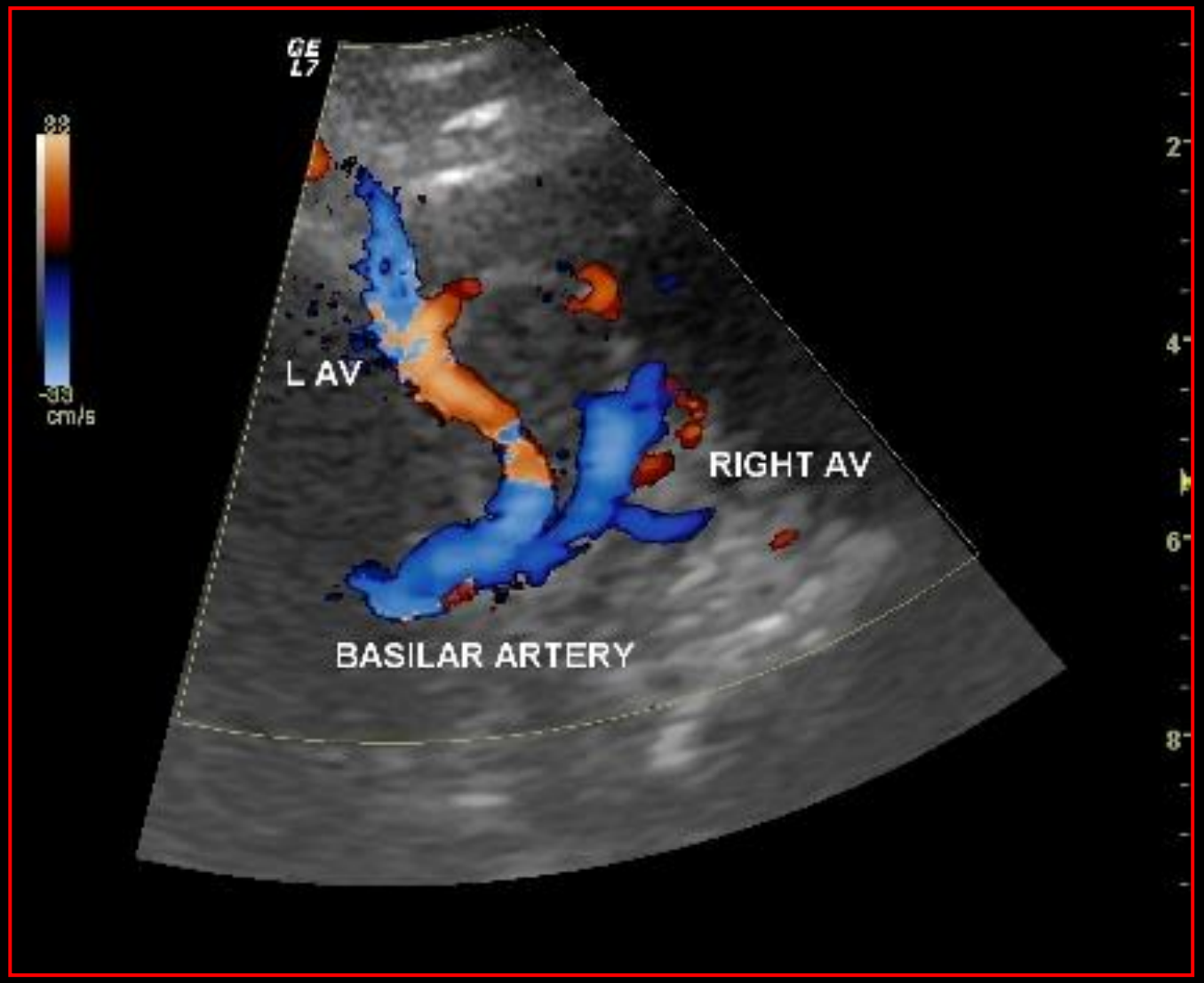
Assenza segmento ACA_1

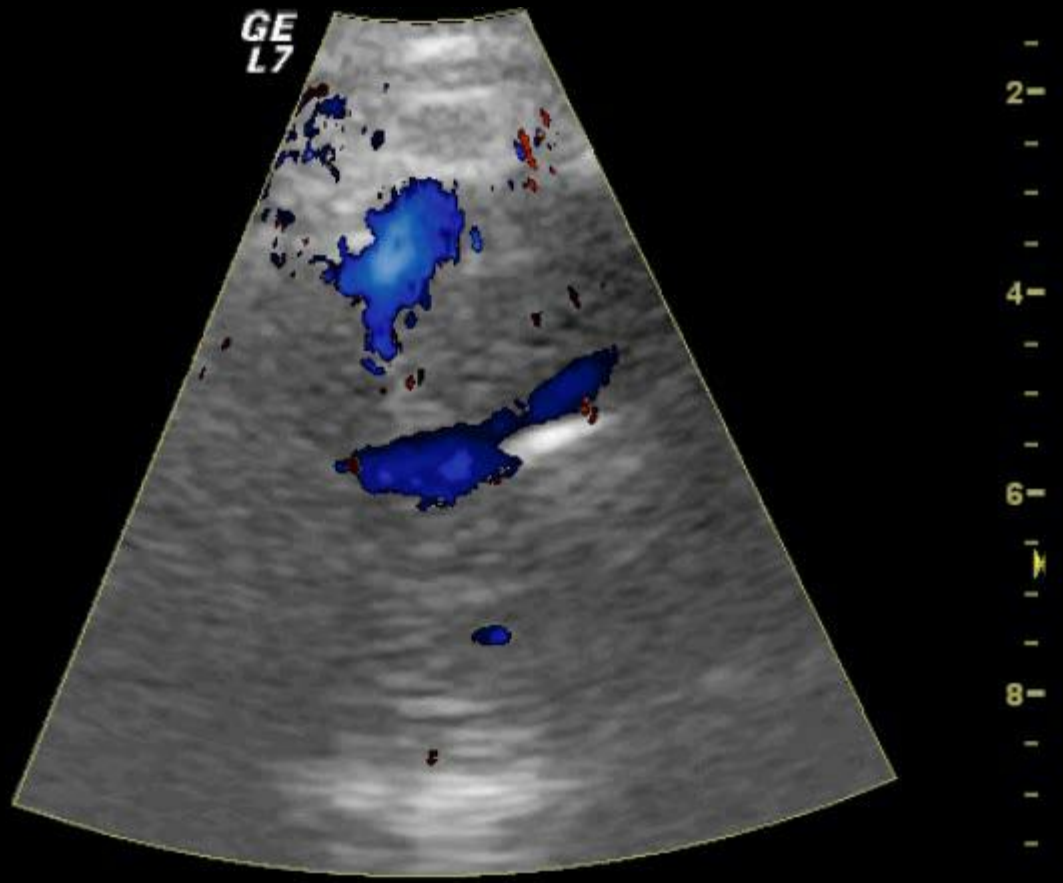


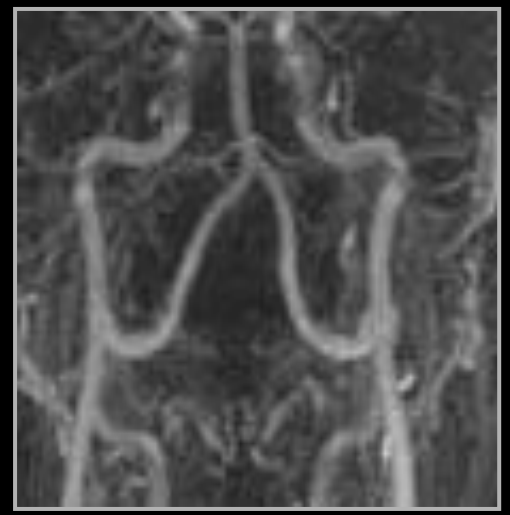
ANOMALIE DI DECORSO E VARIANTI ANATOMICHE

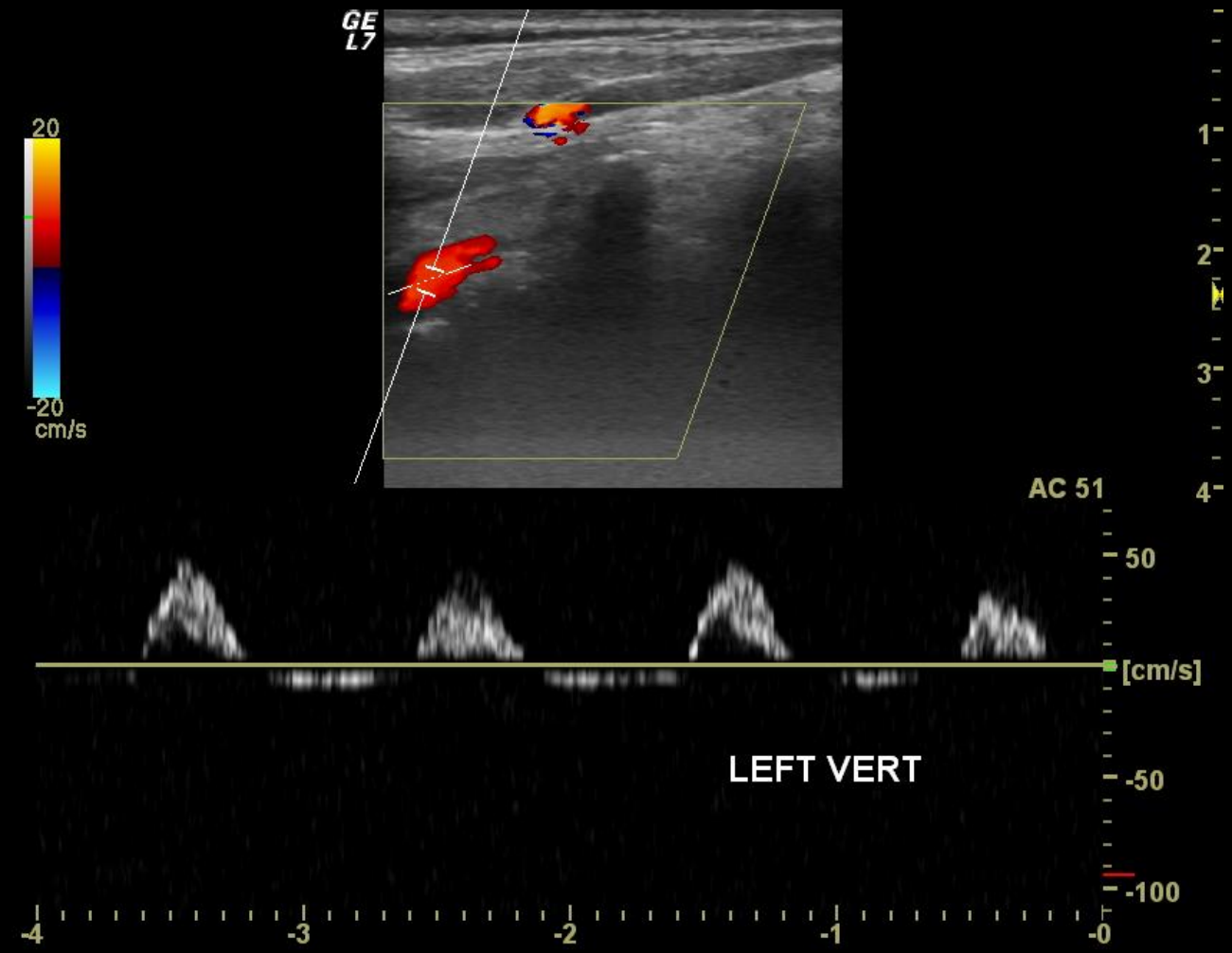
Tortuosità ACP

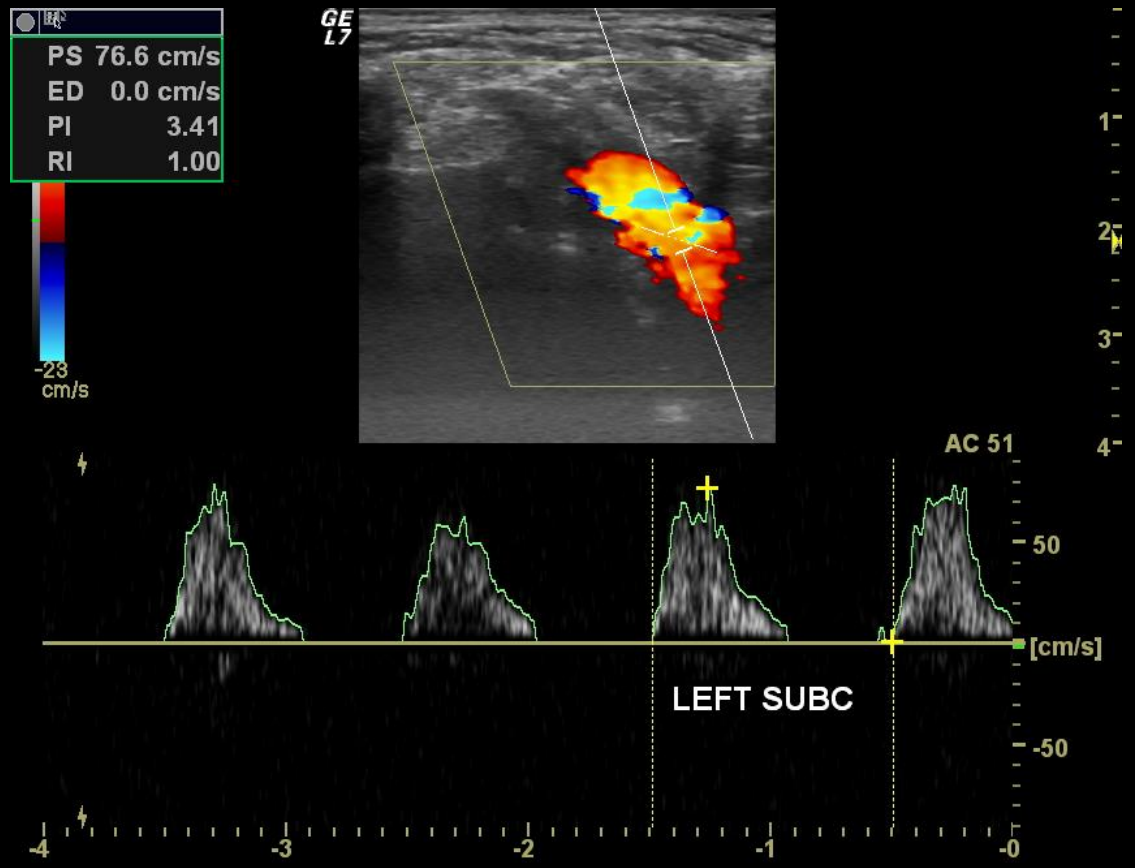


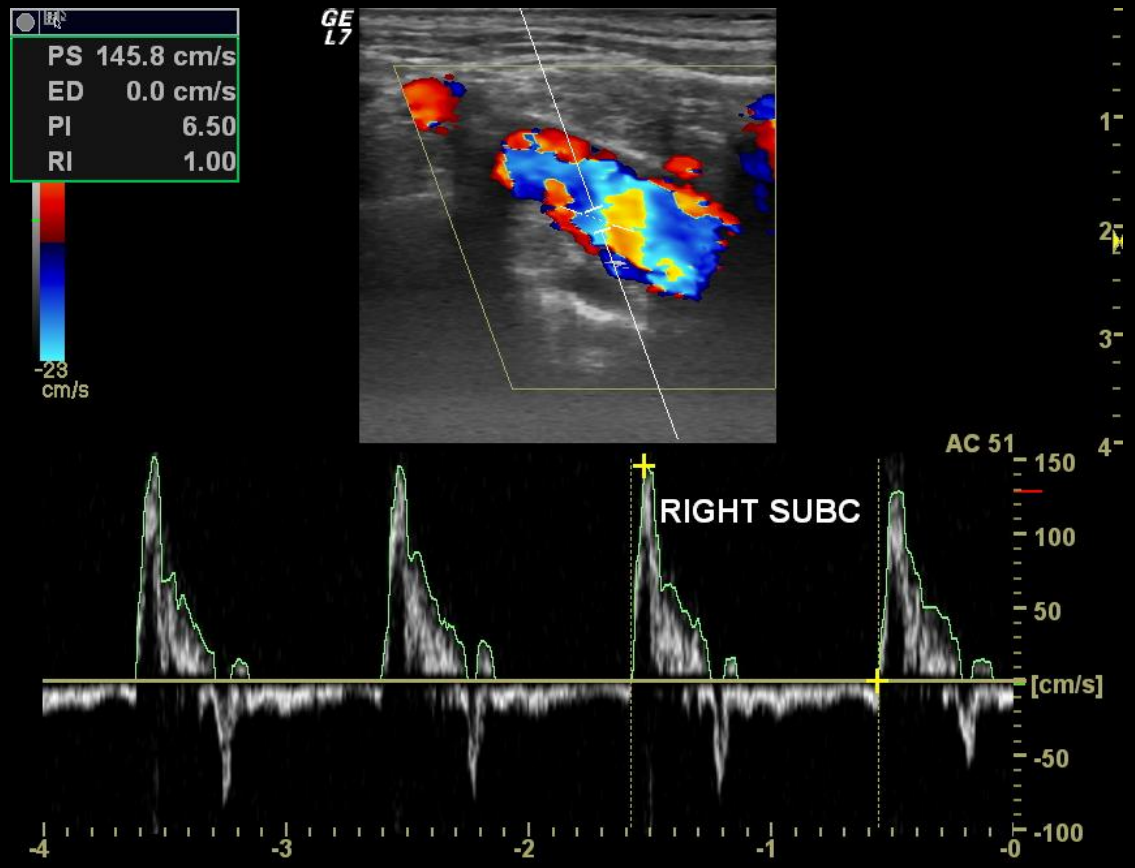

GE
L7
22
-33
cm/s
L AV
RIGHT AV
BASILAR ARTERY
2
4
6
8


GE
L7
18
-18
cm/s
2
4
6
8



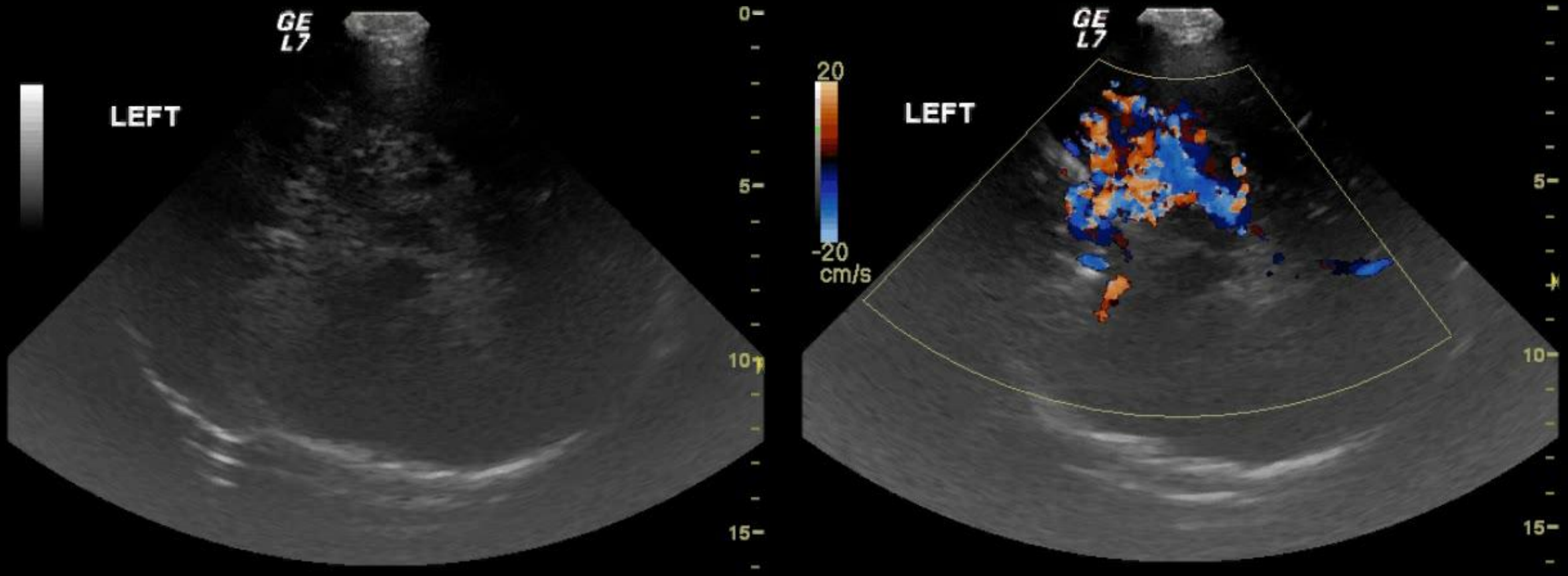

GE
L7
20
-20
cm/s
1
2
3
4
AC 51
50
[cm/s]
-50
-100
LEFT VERT
-4
-3
-2
-1
-0

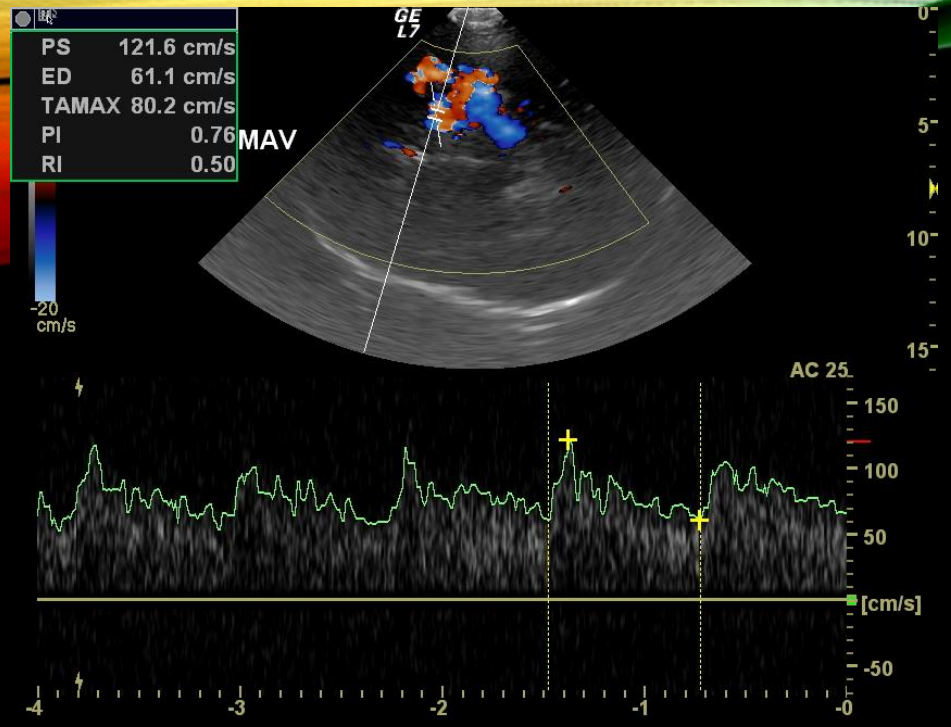

PS 76.6 cm/s
ED 0.0 cm/s
PI 3.41
RI 1.00
-23
cm/s
GE
L7
AC 51
50
[cm/s]
-50
LEFT SUBC
-4
-3
-2
-1
-0

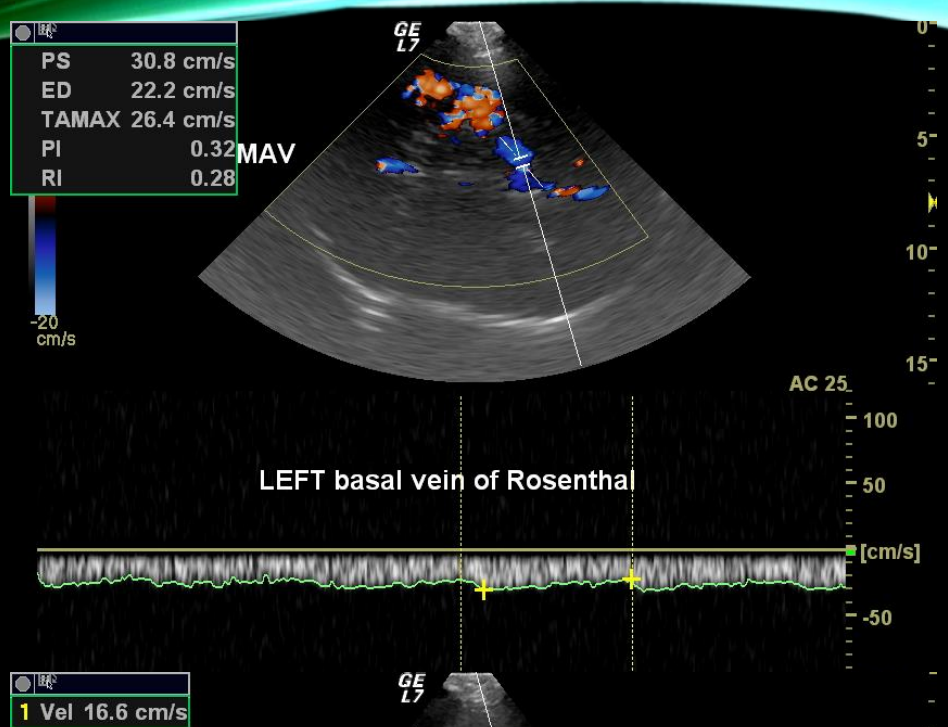

PS 145.8 cm/s
ED 0.0 cm/s
PI 6.50
RI 1.00
-23
cm/s
GE
L7
AC 51
150
100
50
[cm/s]
-50
-100
RIGHT SUBC
-4
-3
-2
-1
-0

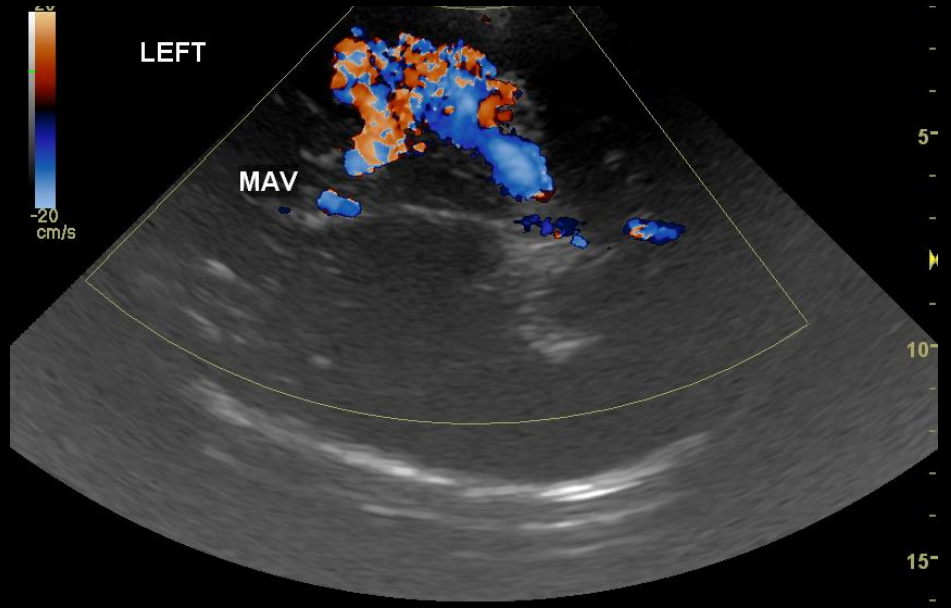
Episodio critico parziale
(sensazione di calore addominale irradiato al collo seguita da clonie all'emisoma di destra)

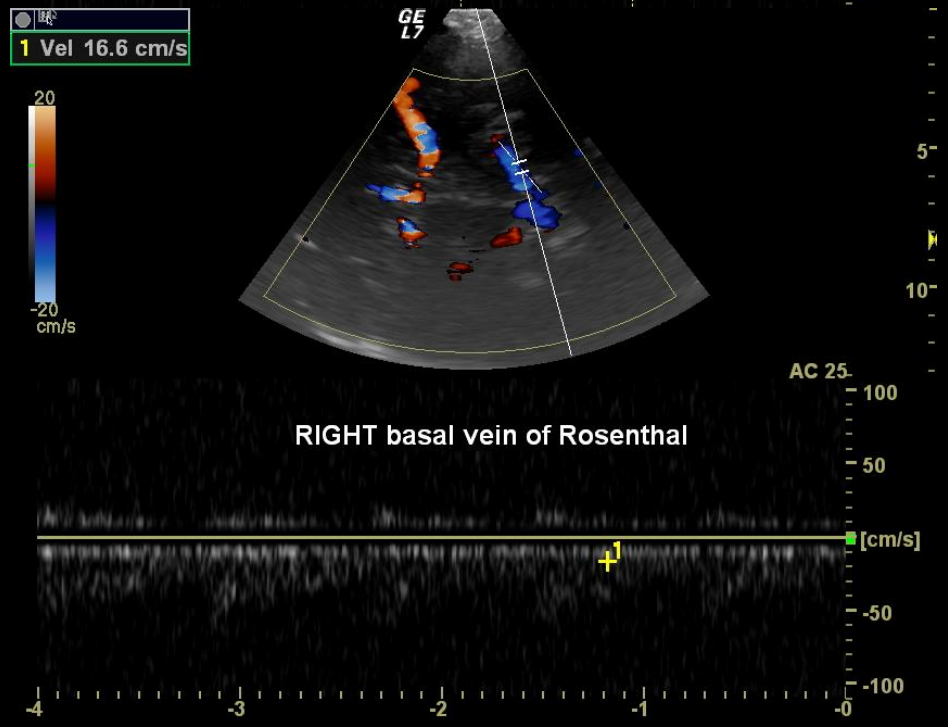
Emiparesi ed emiipoestesia destra


GE
L7
LEFT
0
5
10
15
20
-20
cm/s
GE
L7
LEFT
5
10
15

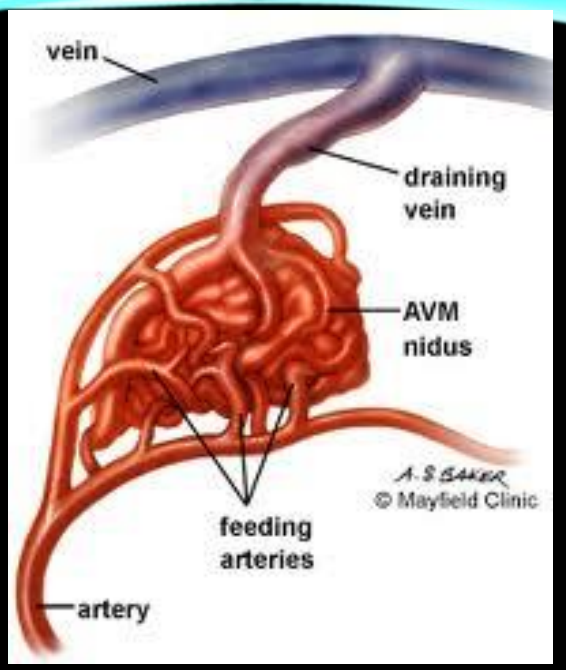

PS 121.6 cm/s
ED 61.1 cm/s
TAMAX 80.2 cm/s
PI 0.76
RI 0.50
MAV
GE L7
-20 cm/s
AC 25
150
100
50
[cm/s]
-50
-4
-3
-2
-1
-0

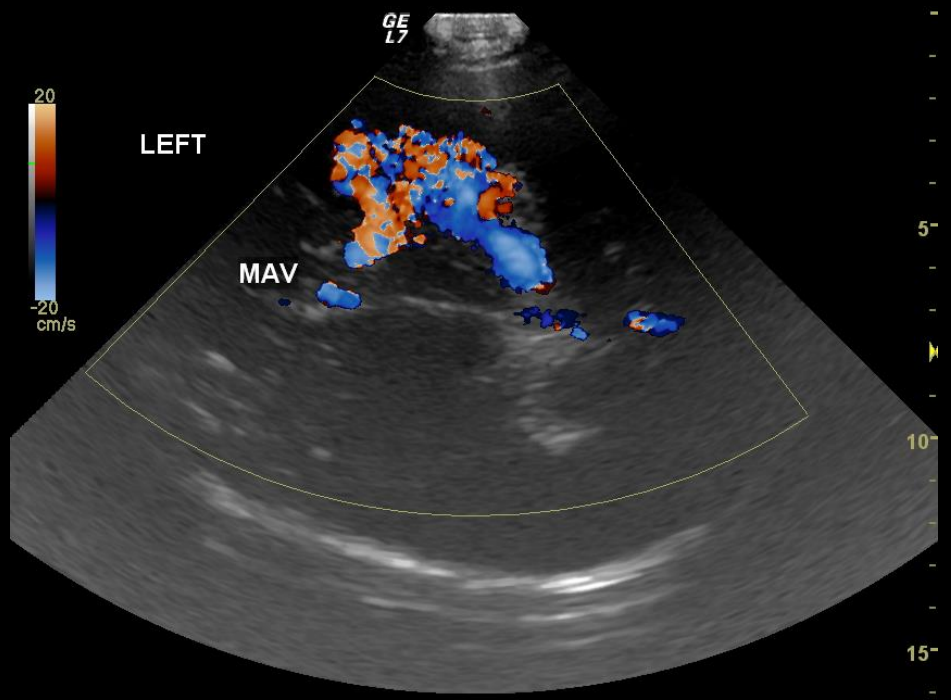

PS 30.8 cm/s
ED 22.2 cm/s
TAMAX 26.4 cm/s
PI 0.32
RI 0.28
MAV
GE L7
-20 cm/s
AC 25
100
50
[cm/s]
-50
LEFT basal vein of Rosenthal

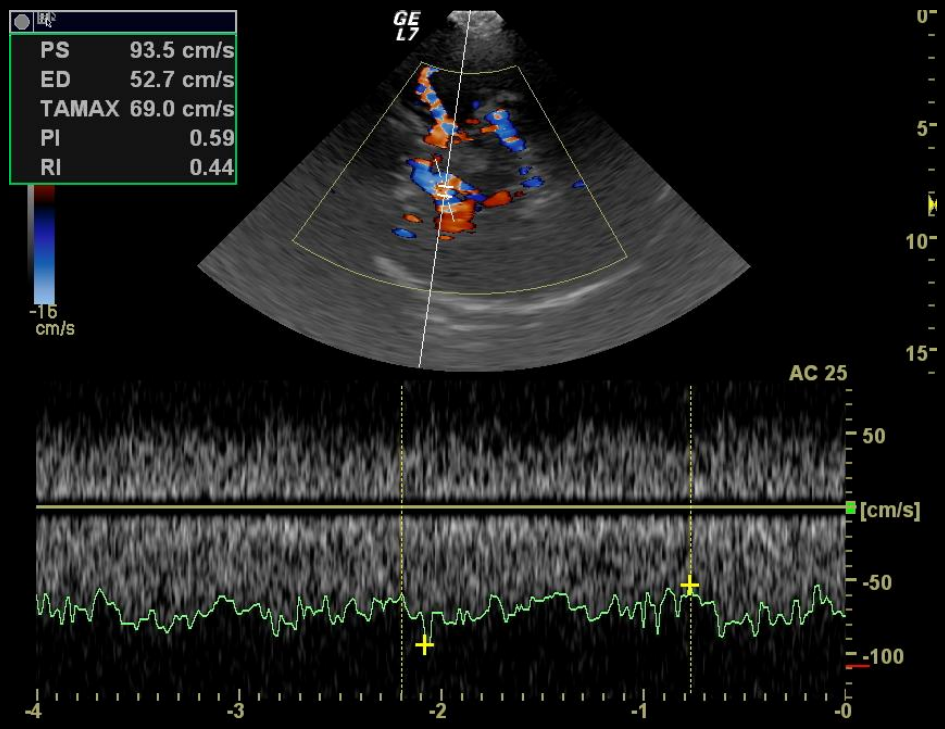

LEFT
MAV
-20 cm/s

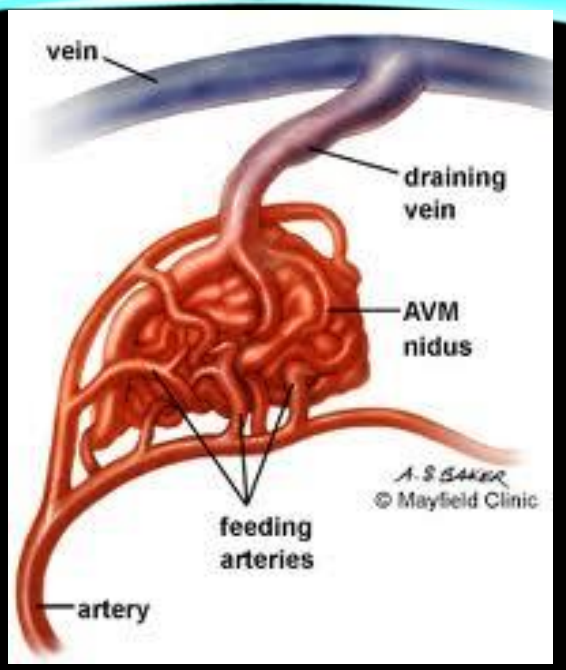

1 Vel 16.6 cm/s
GE L7
20
-20 cm/s
AC 25
100
50
[cm/s]
-50
-100
RIGHT basal vein of Rosenthal
-4
-3
-2
-1
-0

- Elevata velocità di flusso sisto-diastolico
- Alti valori di velocità media
- Bassi valori di PI ed RI





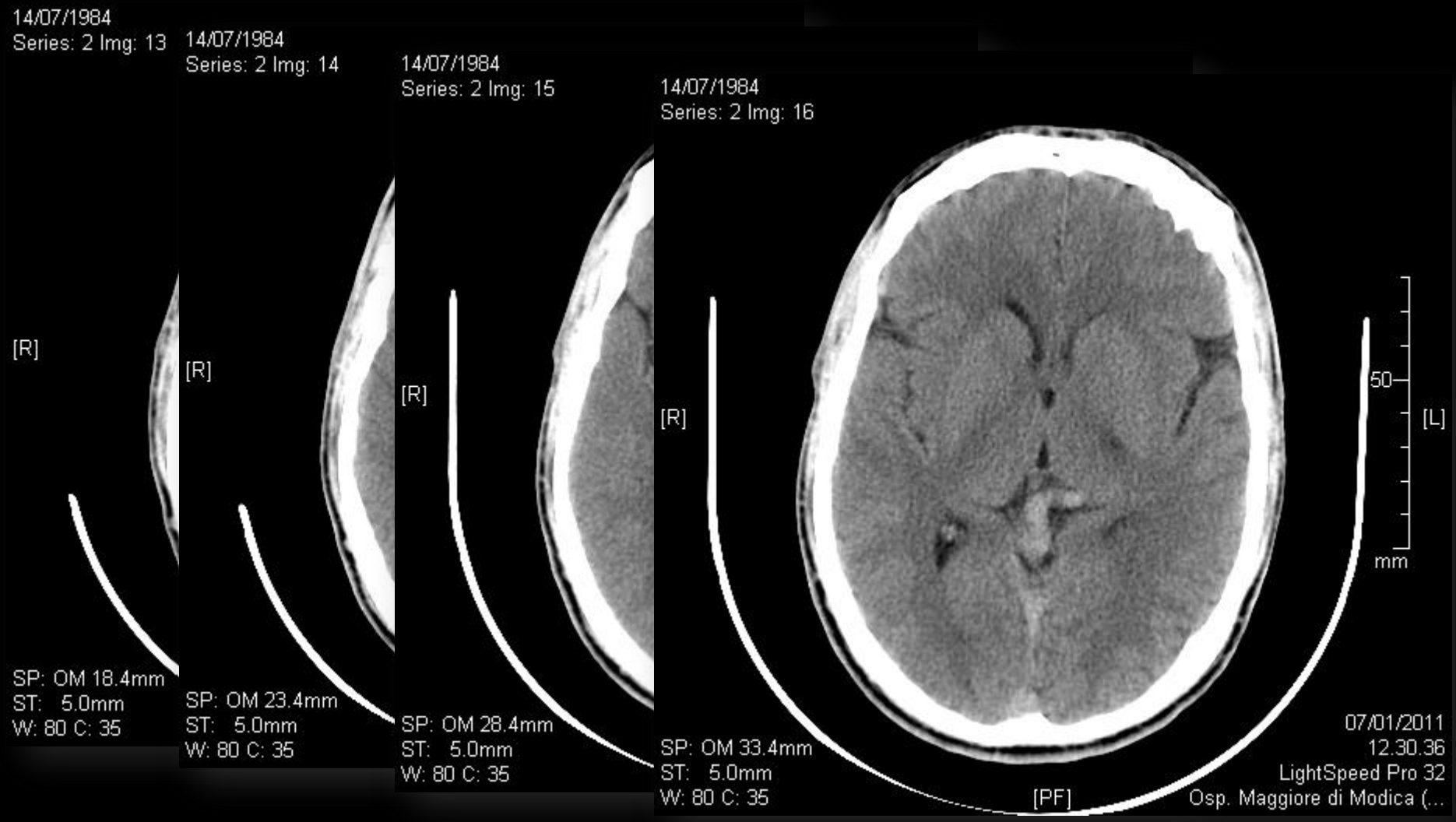




I quadri clinici possono essere spiegati come:

1. Effetto massa dovuto alla formazione stessa
2. Fenomeni di furto vascolare intercorrenti
3. Trombosi locale regionale

Malformazione artero-venosa in regione temporale e peri-mesencefalica sinistra.
Area di ipodensità a livello del braccio posteriore della capsula interna sinistra.



J Neurointerv Surg. 2014 Oct;6(8):e40.

Delayed ischemic stroke following spontaneous thrombosis of an arteriovenous malformation.

Shah AH[1], Haussen DC[1], Snelling BM[1], Heros RC[1], Yavagal DR[2].

Spontaneous obliteration of an arteriovenous malformation (SOAVM) is a rare event that is not completely understood. Less than 100 cases of SOAVMs have been reported in the literature. We present a unique case of a middle-aged patient with spontaneous obliteration of a cerebral arteriovenous malformation (AVM) who developed an ischemic stroke due to thrombosis of the stagnant proximal segment of the inferior branch of the middle cerebral artery feeder. Although the pathophysiology is not well understood, the arterial feeder hemodynamic changes post SOAVM may behave similarly to what occurs in rare cases after surgical resection of AVMs. Our case raises the hypothesis that stagnation of flow in spontaneous AVM obliteration may lead to delayed ischemic stroke in the territory of the feeding artery.

Intracranial arterial and arteriovenous malformations presenting with infarction. Lausanne Stroke Registry study*

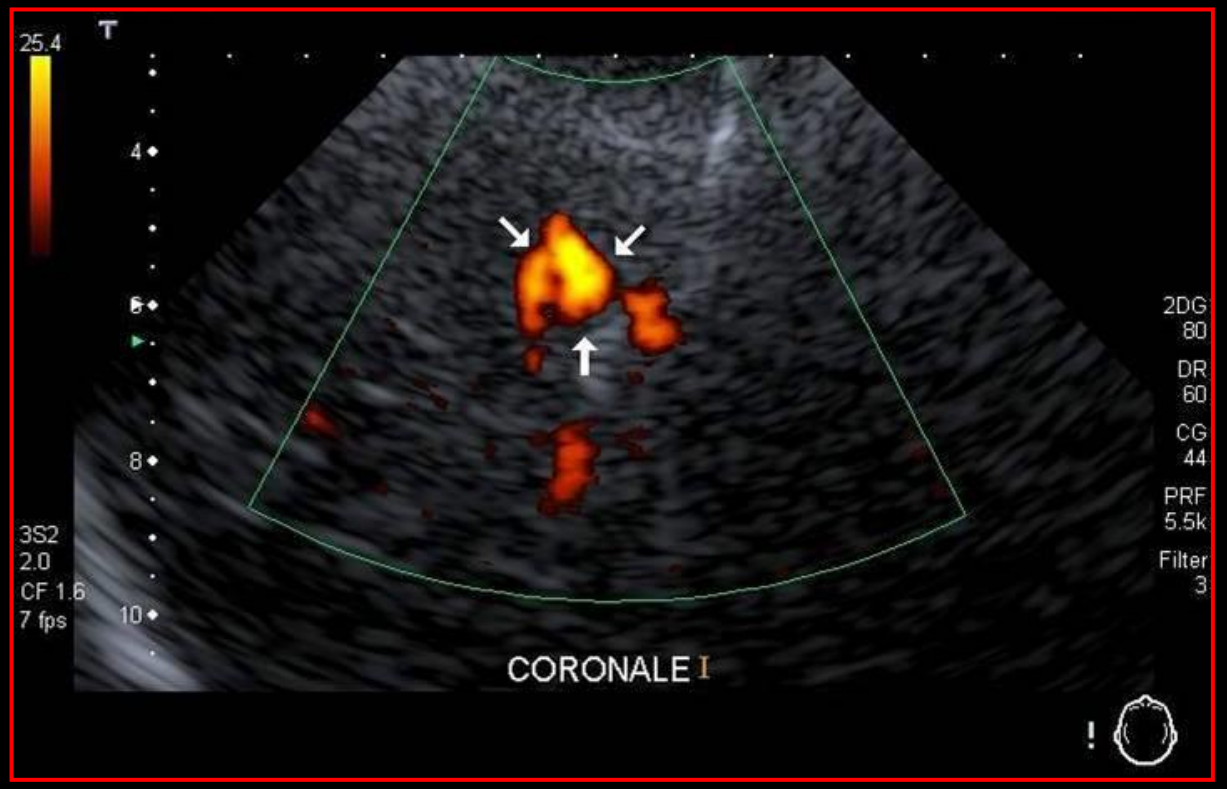
European Journal of Neurology 2005, **12:** 93–102

R. Herzig[a], J. Bogousslavsky[a], P. Maeder[b], M. Maeder-Ingvar[a], M. Reichhart[a], L. A. Urbano[a] and B. Leemann[a]

[a]*Department of Neurology and* [b]*Department of Neuroradiology, Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland*

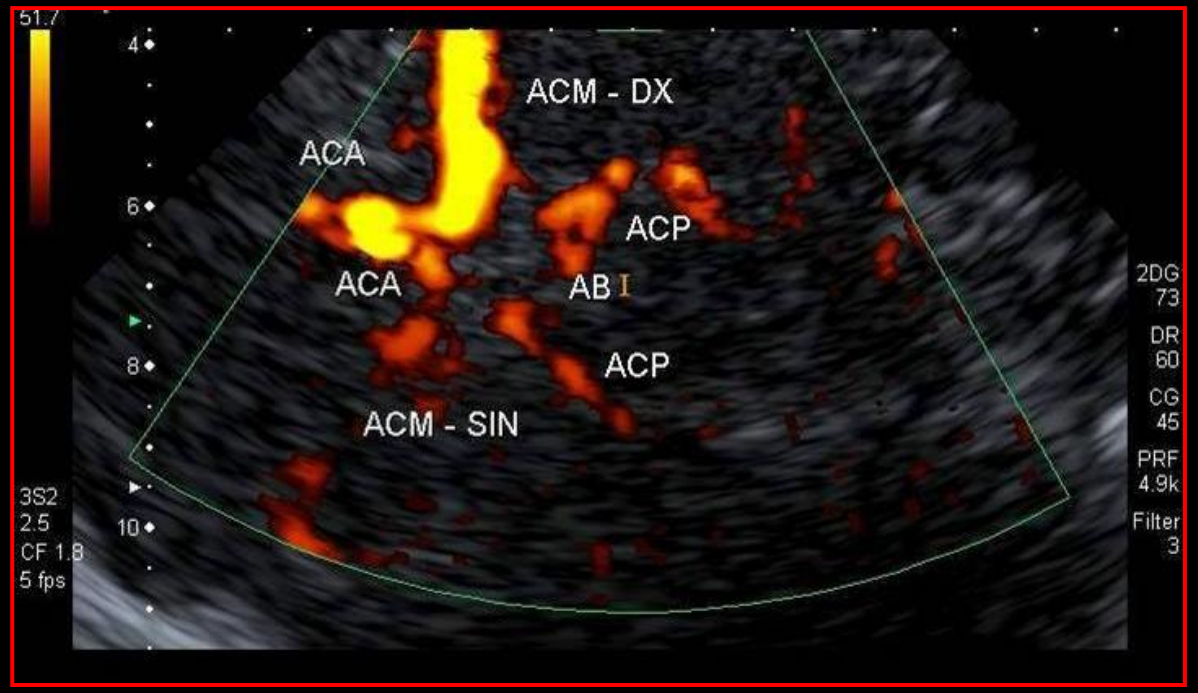
Cerebral aneurysms (mainly saccular) and arteriovenous malformations (AVMs) are well-known sources of subarachnoid, intraventricular, and intracerebral hemorrhage. However, they can also manifest as other clinical symptoms or remain clinically asymptomatic (Brown and Wiebers, 1998; Regli and de Tribolet, 1998). Brain aneurysms and AVMs can also be associated with cerebral infarction. In cerebral AVMs, ischemia of the surrounding tissue can result from vascular steal (Yasargil, 1987; Batjer *et al*., 1988; Regli

Aneurismi

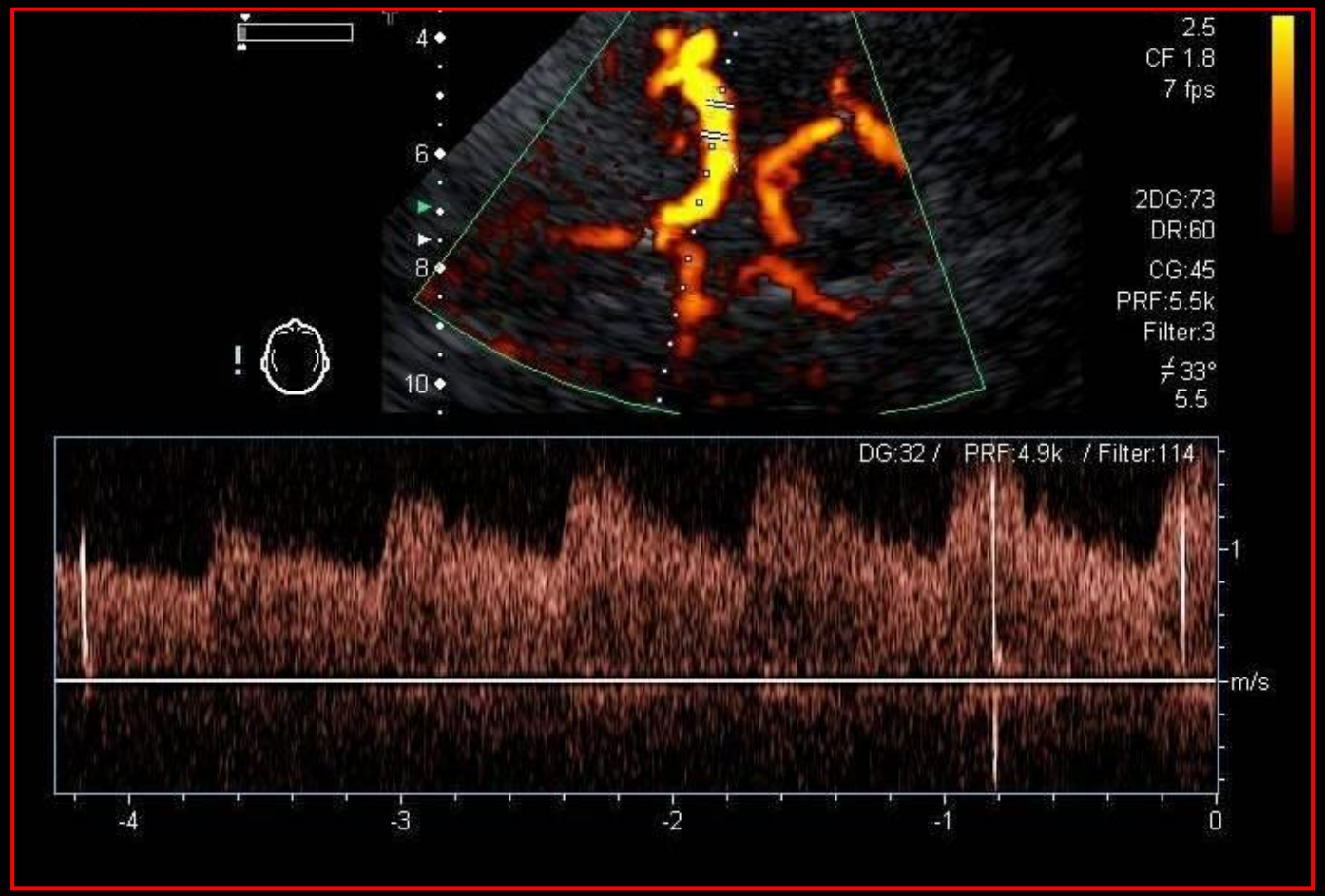

25.4
4
6
8
10
3S2
2.0
CF 1.6
7 fps
2DG
80
DR
60
CG
44
PRF
5.5k
Filter
3
CORONALE I

ESA

V_{max}: > 120 cm/s



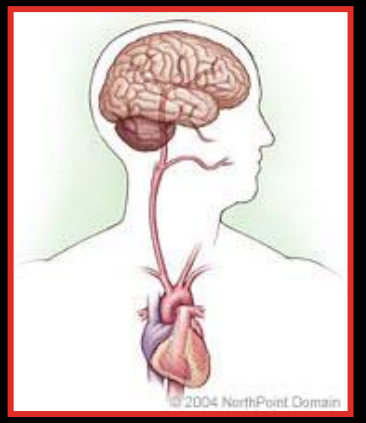
HIGH INTENSITY TRANSIENT SIGNALS (HITS)

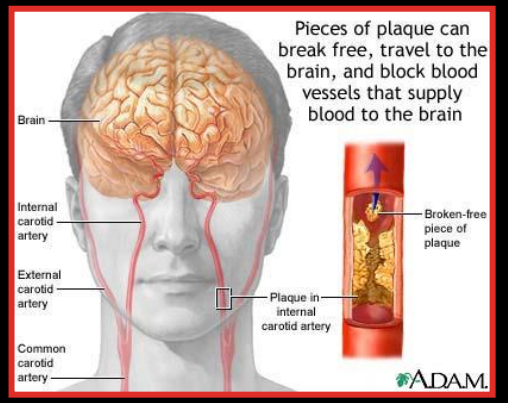


SEGNALI MICROEMBOLICI - MES -

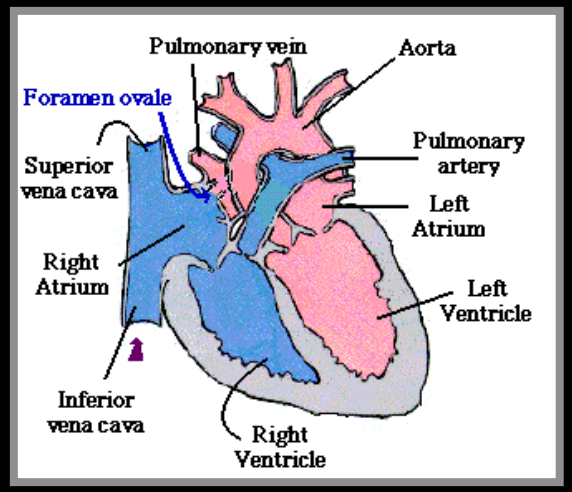
- Durata < 300 msec
- Ampiezza > 3-7 dB
- Unidirezionalità
- Suono tipico
- Registrazione per 30'-60'

(Consensus Commitee, 1995-1998)

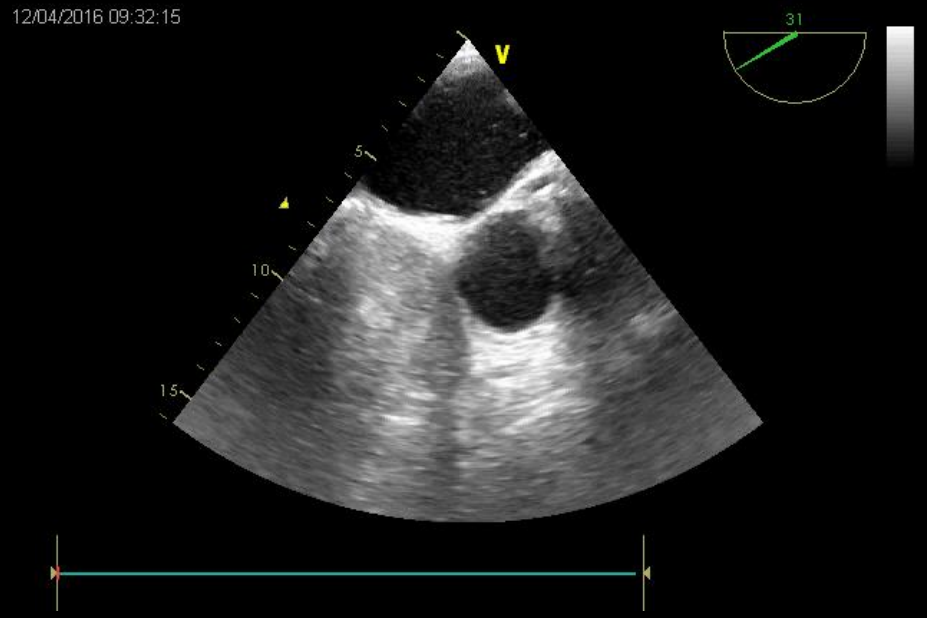


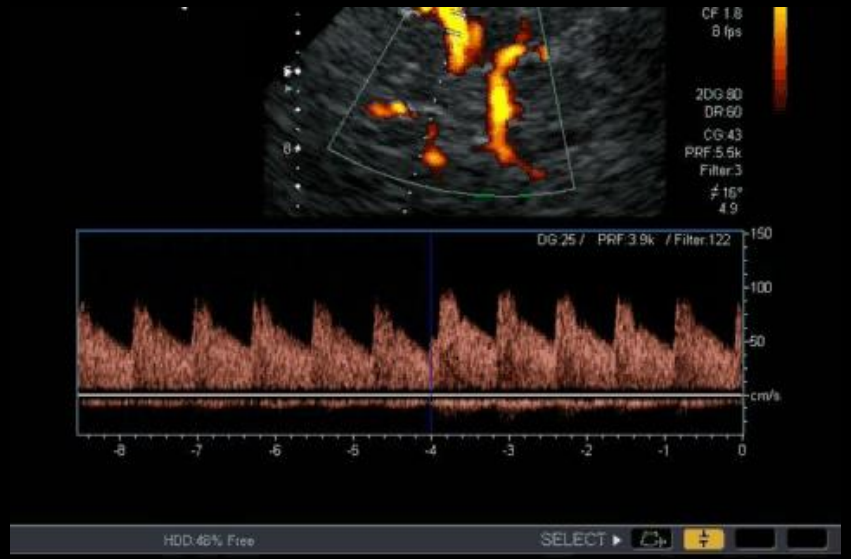


PERVIETA' DEL FORAME OVALE (PFO)



Mezzo di contrasto gassoso
Bubble test





JCSM
Journal of Clinical Sleep Medicine

Journal of Clinical Sleep Medicine, Vol. 8, No. 4, 2012

PFO and Right-to-Left Shunting in Patients with Obstructive Sleep Apnea

Marina Guchlerner, M.D.[1]; Peter Kardos, M.D.[2]; Eva Liss-Koch, M.D.[2]; Jennifer Franke, M.D.[1]; Nina Wunderlich, M.D.[1]; Stefan Bertog, M.D.[1]; Horst Sievert, M.D.[1]

[1]CardioVascular Center Frankfurt, Sankt Katharinen, Frankfurt, Germany; [2]Gemeinschaftspraxis und Zentrum für Pneumologie, Allergologie & Schlafmedizin, Klinik Maingau, Frankfurt, Germany

PFO and Right-to-Left Shunting in Patients with Obstructive Sleep Apnea

Results: RLS was detected in 72 of 100 patients (72%). Thirty-four out of these 72 patients (47%) had a shunt grade I or II; 15 (21%) had a shunt Grade III or IV; and 23 (32%) had a large shunt (Grade V or V+). In 47 of 72 patients (65%), a right-to-left shunt was detectable at rest without Valsalva maneuver.

Ann Intern Med. 2007 Jan 2;146(1):34-44.

Narrative review: reversible cerebral vasoconstriction syndromes.

Calabrese LH[1], Dodick DW, Schwedt TJ, Singhal AB.

Comprendono un gruppo di condizioni differenti, tutte caratterizzate da restringimento multifocale reversibile delle arterie cerebrali, caratterizzate da improvviso, severo mal di testa con o senza deficit neurologici associati.

Georgian Med News. 2014 Mar;(228):28-36.

Reversible cerebral vasoconstriction syndrome and migraine: sonography study.

Alpaidze M[1], Beridze M[2].

- [1]DEKA University Clinic, Tbilisi, Georgia;
- [2]DEKA University Clinic, Tbilisi, Georgia.

RCVS resolves within 3 months.

Diagnosis requires cerebral or magnetic resonance angiography (MRA) confirmation and ultrasound monitoring.

Reversible cerebral vasoconstriction syndrome and migraine: sonography study.

Difference of ultrasound data between RCVS and migraine.

Group I- 27 PATIENTS WITH RCVS

Group II-34 PATIENTS- MIGRAINE IN ANAMNESIS, WITH 1-2 ATTACKS MONTHLY

Control group -15 HEALTHY PERSONS

Reversible cerebral vasoconstriction syndrome and migraine: sonography study.

The mean maximum (MM)
V(MCA) 127,5 ± 22.8 cm/sec
V(ACA) 115.7 ± 18.4 cm/sec
V(BA) 74.7 ± 20.1 cm/sec
Lindegaard Index (LI) - 3.1 ± 0.5

MCA was involved in 62.9%,
ACA in 51.8%,
PCA in 37%
BAS in 40.7%

Group I- 27 PATIENTS WITH RCVS

MRA revealed segmental cerebral artery vasoconstriction

Reversible cerebral vasoconstriction syndrome and migraine: sonography study.

In the majority (61.7%) of this group revealed increased MM V in several cerebral arteries with different combination of involving vessels.

The mean maximum (MM)	
V (MCA)	118,4 ± 26.7 cm/sec
V(ACA)	105.8 ± 17.6 cm/sec
V(BA)	74.5 ± 18.1 cm/sec
Lindegaard Index (LI)	- 2,9 ± 0.7

Group II-34 PATIENTS- MIGRAINE IN ANAMNESIS, WITH 1-2 ATTACKS MONTHLY

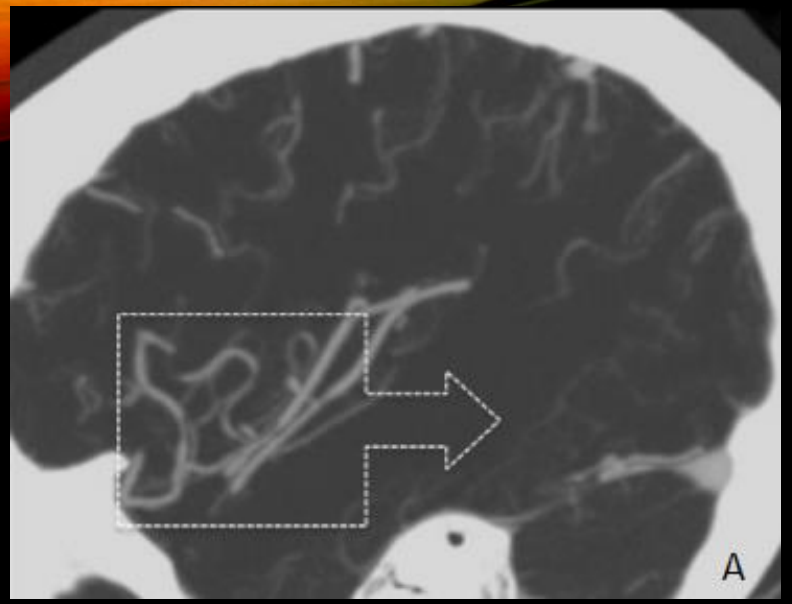
Reversible cerebral vasoconstriction syndrome and migraine: sonography study.

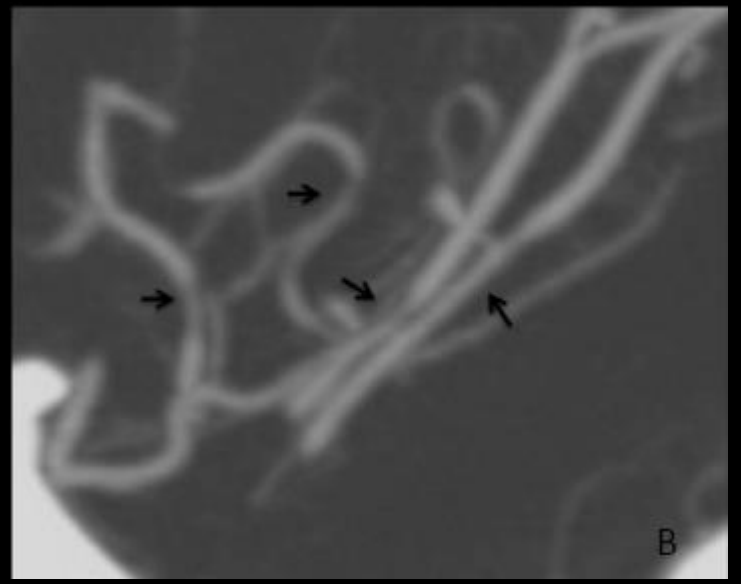
V (MCA) (63.2 ± 9.5 cm/sec)
Lindegaard Index (LI) - (2.1 ± 0.2), $p<0.001$

control group -15 HEALTHY PERSONS

Reversible cerebral vasoconstriction syndrome and migraine: sonography study.

Obtained data showed **no significant difference** regarding the vasospasm degree between typical RCVS and migraine, **whereas** revealed that vasospasm in migraine is more determined to posterior circulation but in **RCVS vasospasm has the more diffuse character**.





A: CTA image showing multiple segmental vasoconstrictions along the right middle cerebral artery (MCA) branches. B: Magnified view of A with arrows pointing at arterial constrictions. C: MRA shows multiple small segmental vasoconstrictions along both posterior cerebral arteries.

Case Reports in Neurology

Case Rep Neurol 2016;8:161–171

DOI: 10.1159/000447626
Published online: July 29, 2016

The Need for a Rational Approach to Vasoconstrictive Syndromes: Transcranial Doppler and Calcium Channel Blockade in Reversible Cerebral Vasoconstriction Syndrome

Elisabeth B. Marsh[a] Wendy C. Ziai[b] Rafael H. Llinas[a]

[a]Department of Neurology, The Johns Hopkins University School of Medicine, Baltimore, Md., USA; [b]Department of Neurocritical Care, The Johns Hopkins University School of Medicine, Baltimore, Md., USA

The Need for a Rational Approach to Vasoconstrictive Syndromes: Transcranial Doppler and Calcium Channel Blockade in Reversible Cerebral Vasoconstriction Syndrome

Reversible cerebral vasoconstriction syndrome (RCVS) typically affects young patients and left untreated can result in hemorrhage or ischemic stroke.

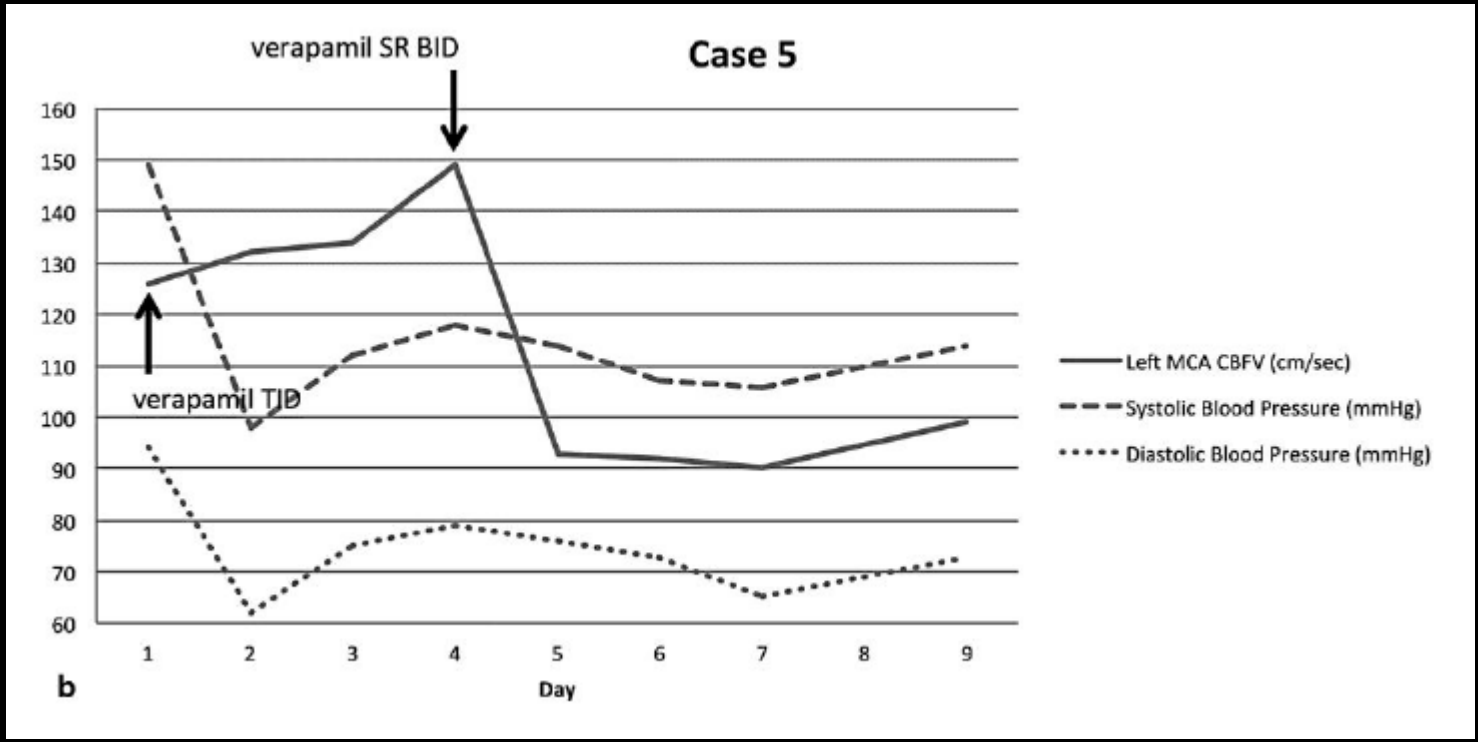
The Need for a Rational Approach to Vasoconstrictive Syndromes: Transcranial Doppler and Calcium Channel Blockade in Reversible Cerebral Vasoconstriction Syndrome

A small cohort of seven patients presenting with thunderclap headache whose vascular imaging was consistent with RCVS

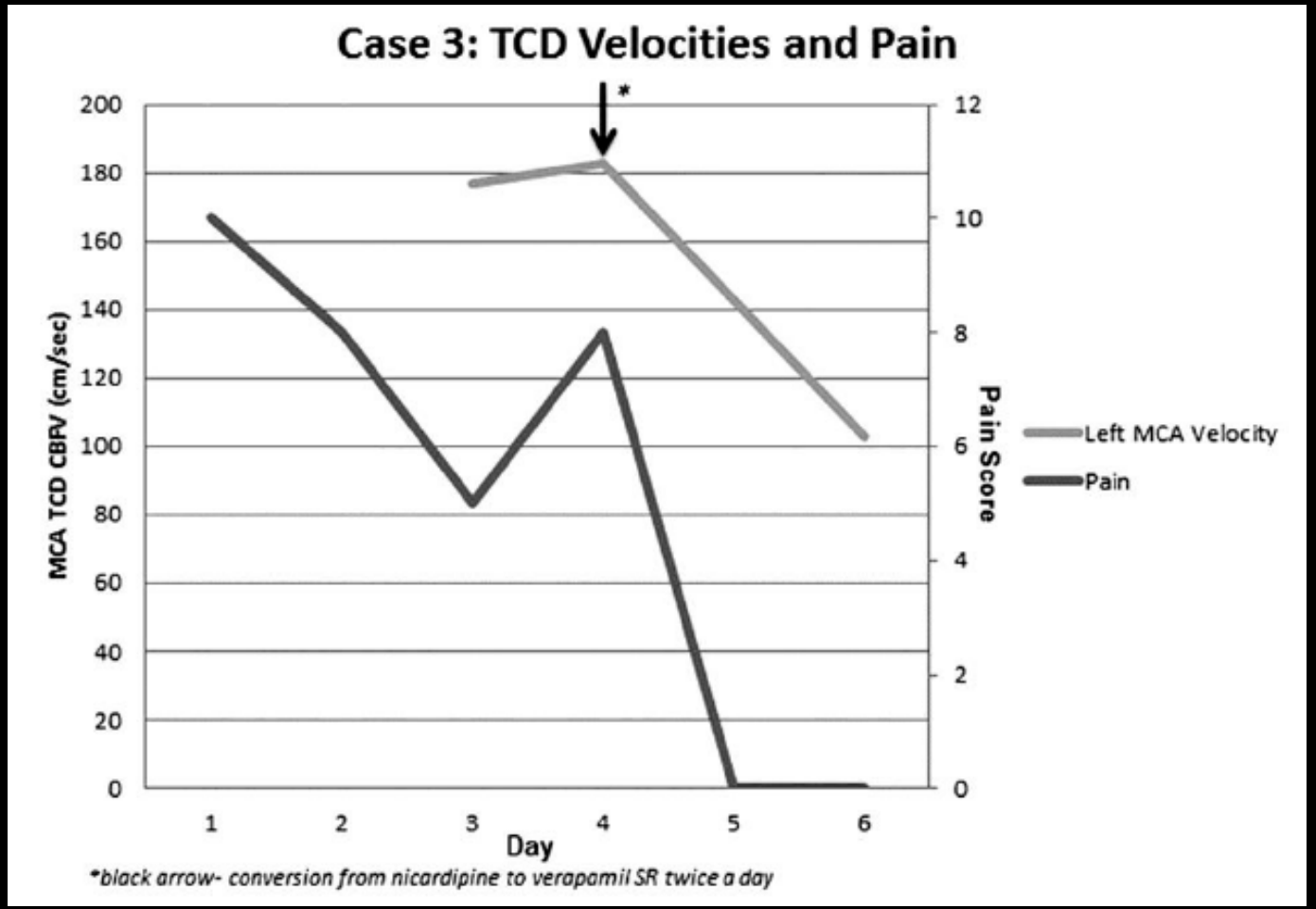
All were treated with calcium channel blockade and monitored with TCD performed every 1–2 days

The Need for a Rational Approach to Vasoconstrictive Syndromes: Transcranial Doppler and Calcium Channel Blockade in Reversible Cerebral Vasoconstriction Syndrome

TCD was able to detect improvement in velocities in the acute setting that correlated well with initiation of calcium channel blockade.



The Need for a Rational Approach to Vasoconstrictive Syndromes: Transcranial Doppler and Calcium Channel Blockade in Reversible Cerebral Vasoconstriction Syndrome



R I Med J (2013). 2016 Sep 1;99(9):38-41.

Transcranial Doppler Ultrasonography As a Non-Invasive Tool for Diagnosis and Monitoring of Reversible Cerebral Vasoconstriction Syndrome.

Levin JH[1], Benavides J[2], Caddick C[2], Laurie K[2], Wilterdink J[3], Yaghi S[4], Silver B[3], Khan M[5].

- [1]Neurophysiology Fellow, Rhode Island Hospital; Instructor in Neurology, The Warren Alpert Medical School of Brown University.
- [2]Cerebrovascular Laboratory, Rhode Island Hospital, Providence, RI.
- [3]Department of Neurology, Alpert Medical School of Brown University; Cerebrovascular Laboratory, Rhode Island Hospital, Providence, RI.
- [4]Department of Neurology, Alpert Medical School of Brown University, Providence, RI.
- [5]Department of Neurology, Alpert Medical School of Brown University; Cerebrovascular Laboratory, Rhode Island Hospital, Providence, RI; Neuroscience Institute (Division of Neurology), Spectrum Health, Michigan State University.

We sought to determine the reliability of TCD for diagnosis and monitoring of RCVS.

Transcranial Doppler Ultrasonography As a Non-Invasive Tool for Diagnosis and Monitoring of Reversible Cerebral Vasoconstriction Syndrome.

The cohort consisted of fifteen patients (93% females; mean age 46.7 +/- 12.4 years); initial TCD evaluation was performed 10.9 +/- 6.6 (range 1-24) days after headache onset.

Transcranial Doppler Ultrasonography As a Non-Invasive Tool for Diagnosis and Monitoring of Reversible Cerebral Vasoconstriction Syndrome.

Fourteen patients (93.3%) had increased flow velocities by initial TCD in at least one major cerebral blood vessel (MCA, ACA, PCA, vertebral, basilar).

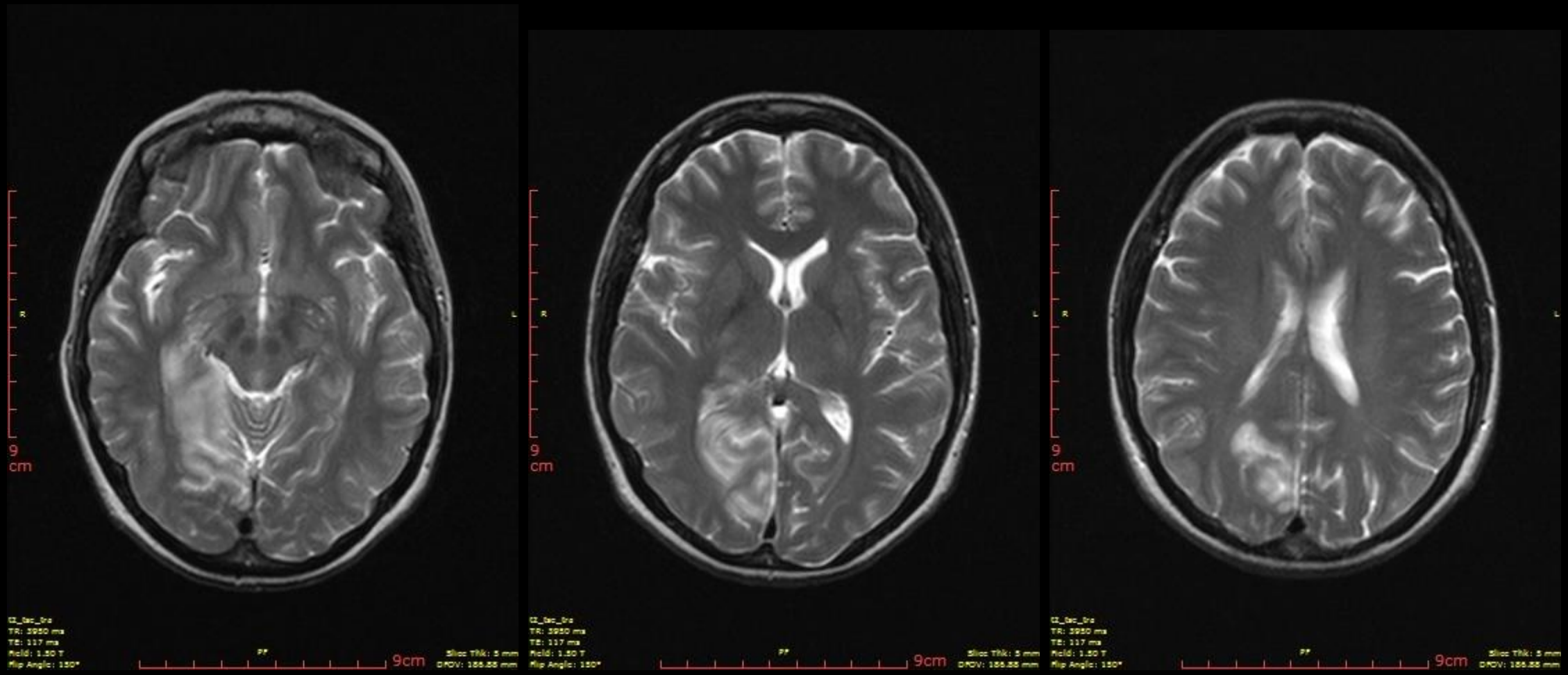
TCD flow velocities in the middle cerebral artery (Vmca) reached a mean peak of **163** cm/s, three to four weeks after the onset of thunderclap headache.

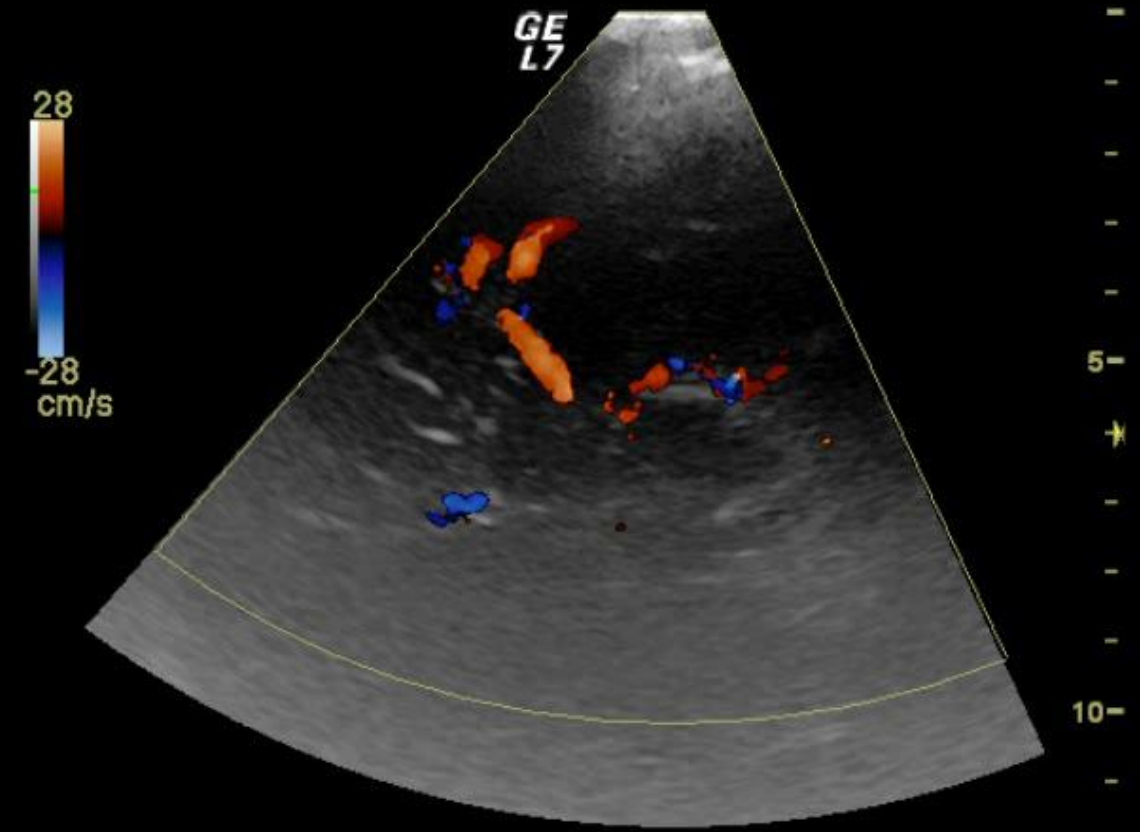
Transcranial Doppler Ultrasonography As a Non-Invasive Tool for Diagnosis and Monitoring of Reversible Cerebral Vasoconstriction Syndrome.

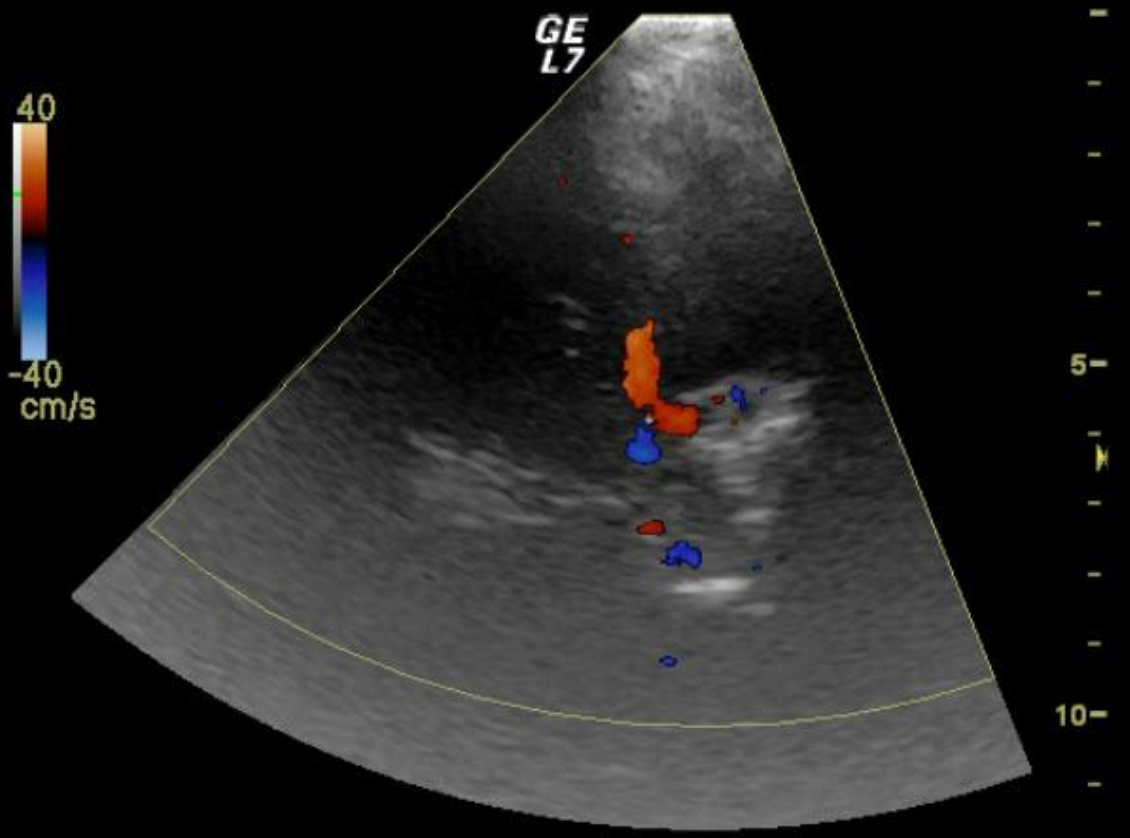
TCD is a non-invasive neuroimaging modality that may have potential for the initial diagnosis and subsequent monitoring of patients with suspected RCVS.
Larger studies will be needed to establish its utility.

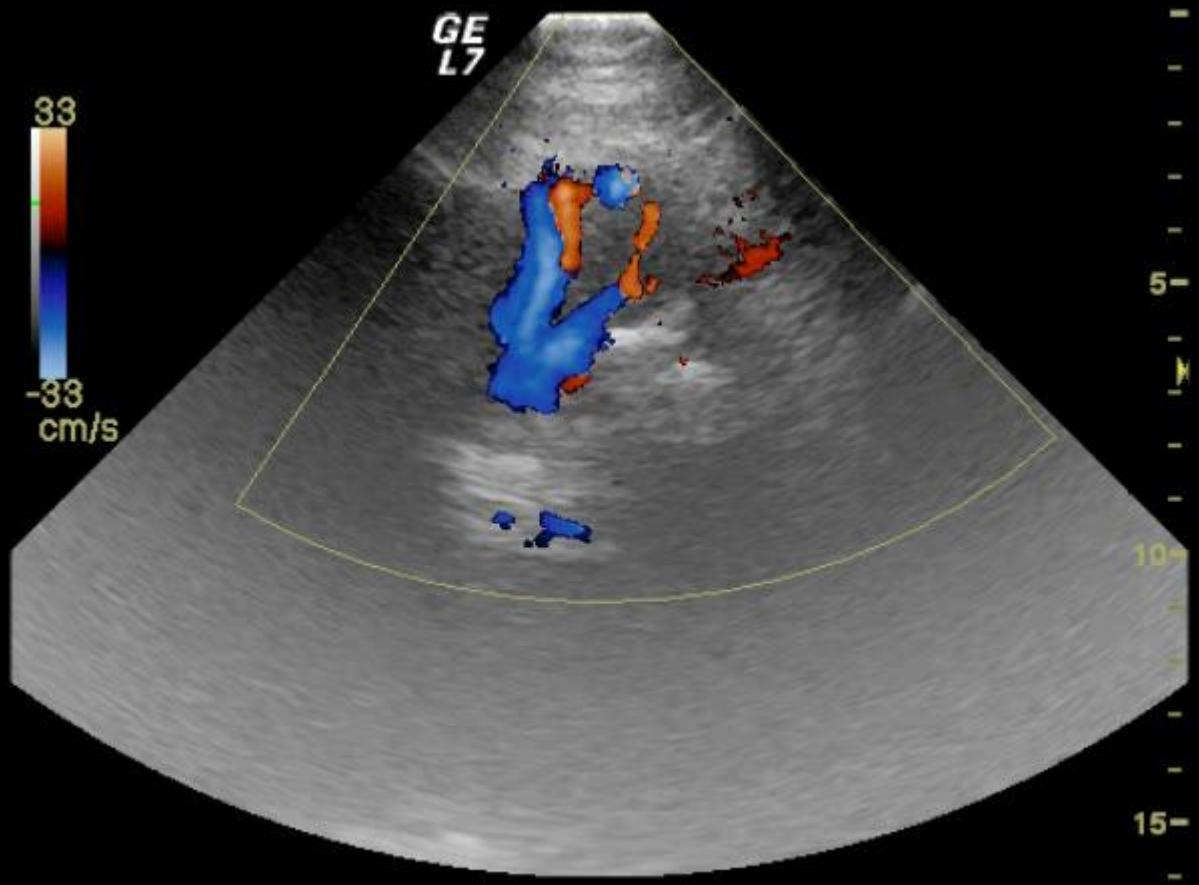
Transcranial Doppler Ultrasonography As a Non-Invasive Tool for Diagnosis and Monitoring of Reversible Cerebral Vasoconstriction Syndrome.

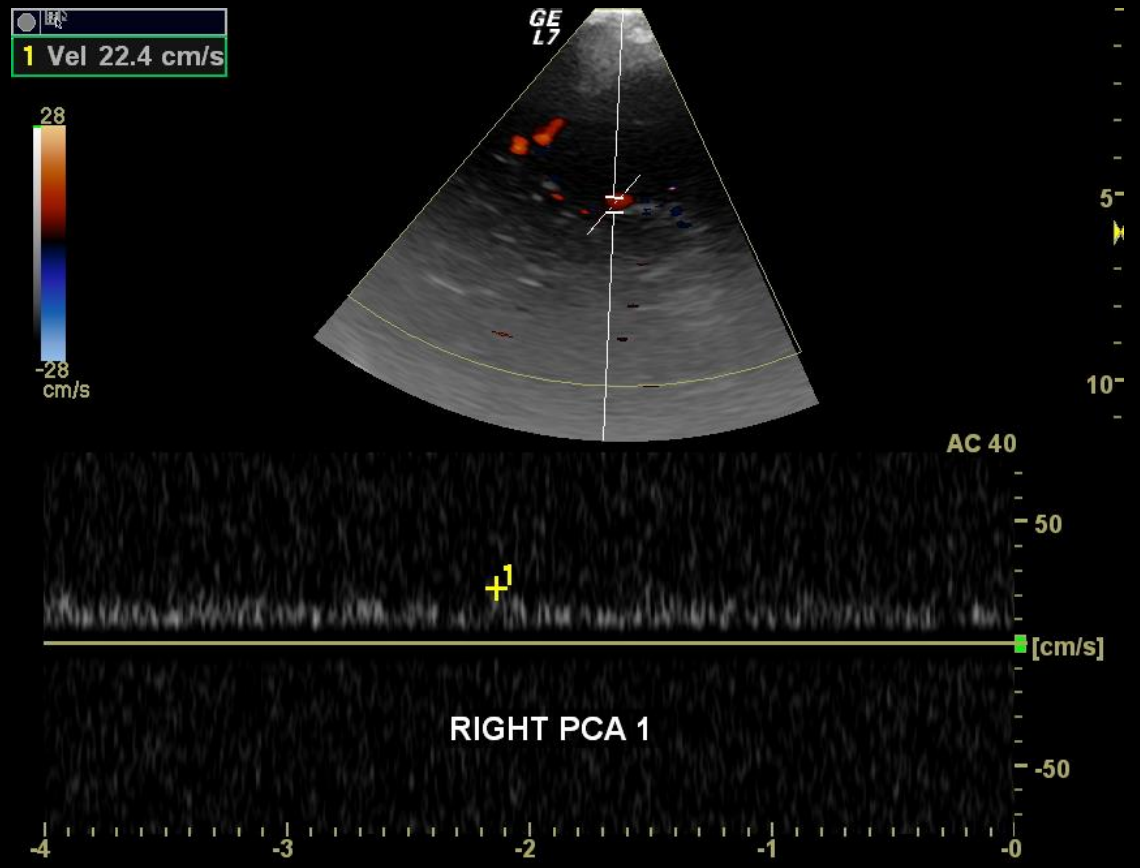
Gravida alla 31° settimana

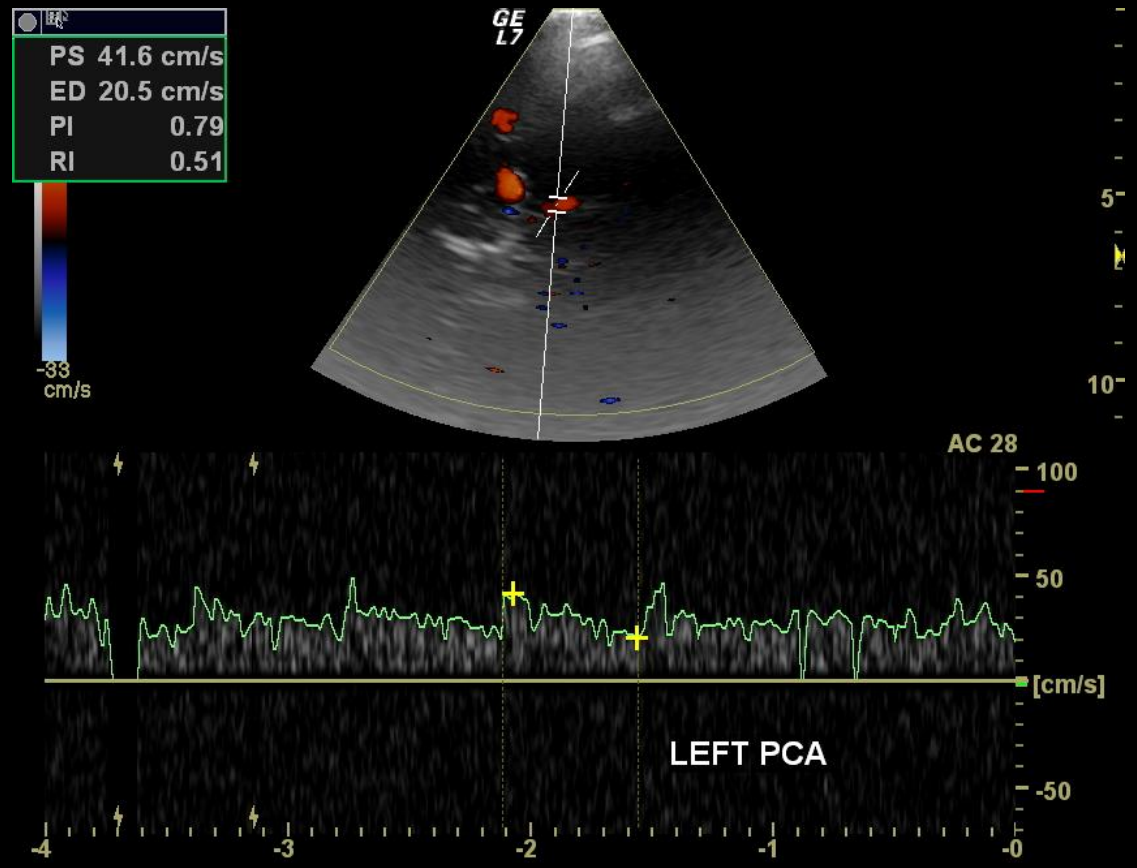


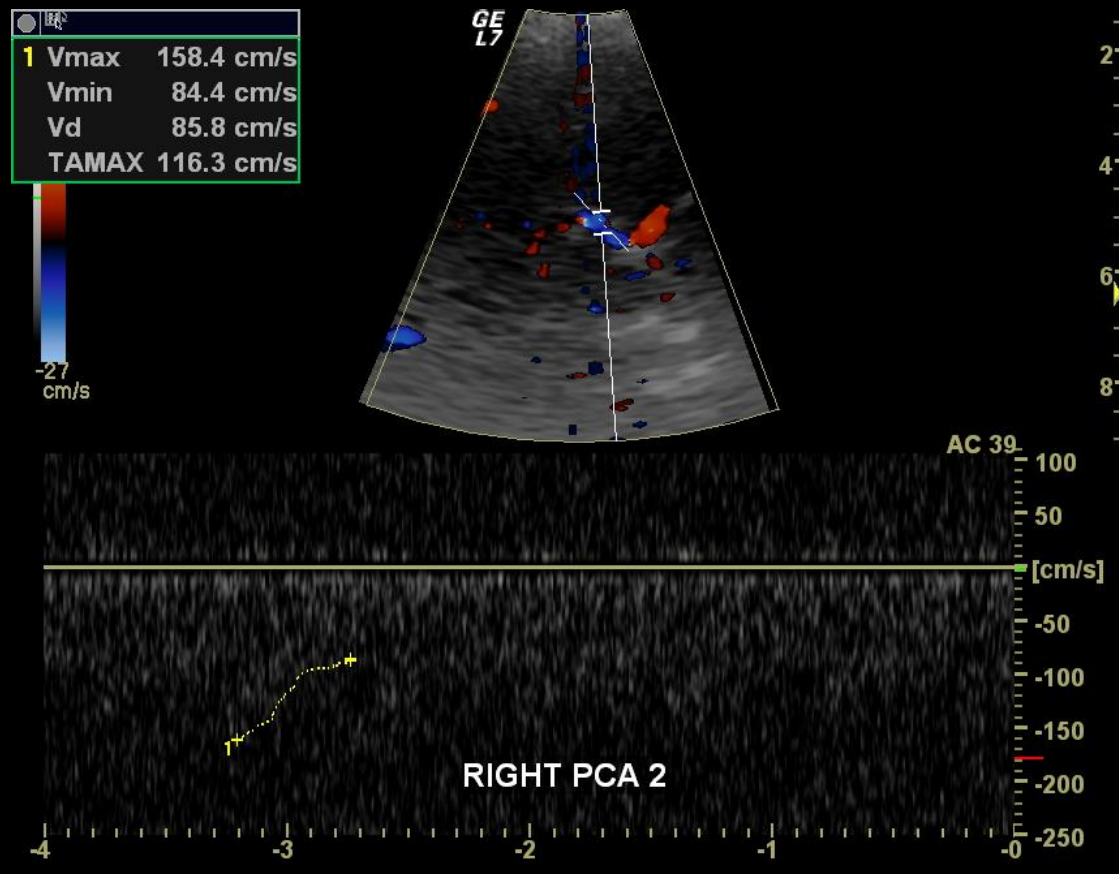

GE
L7
28
-28
cm/s
5
10

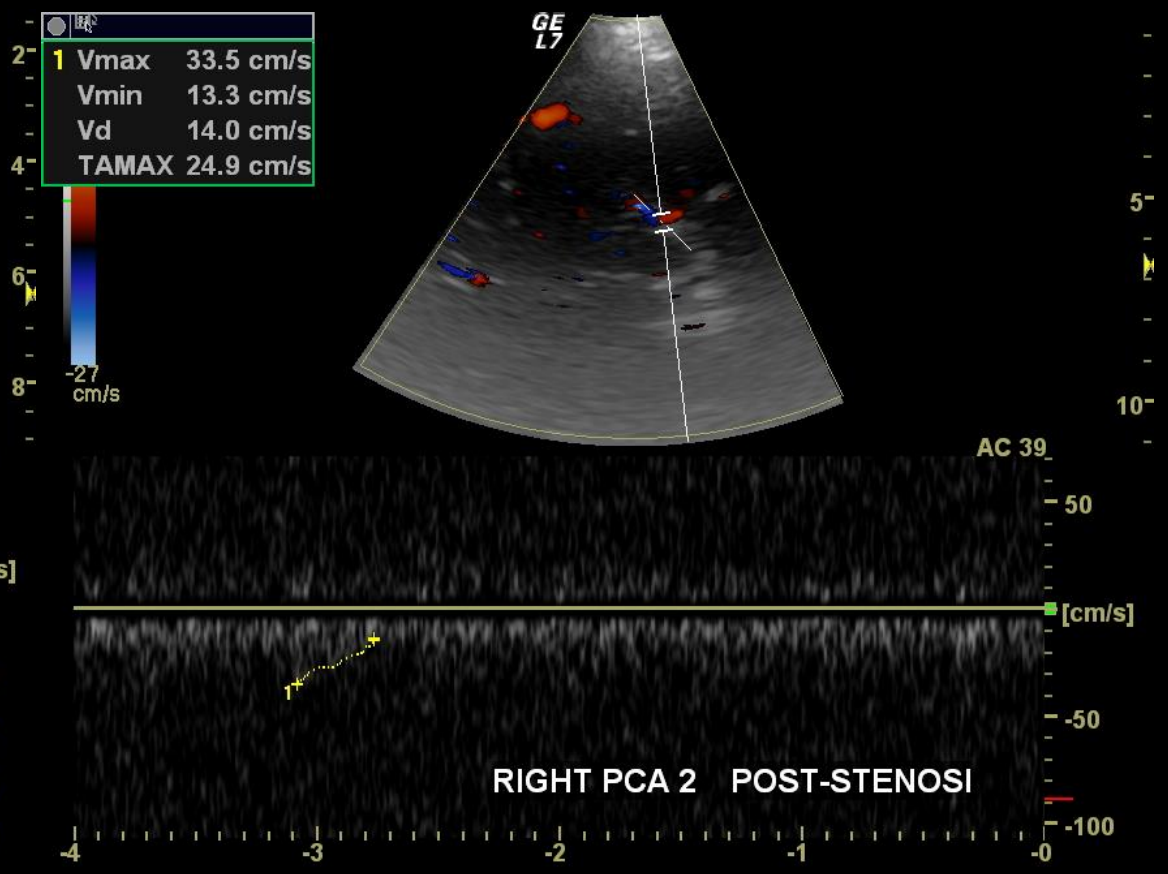

GE
L7
40
-40
cm/s
5
10

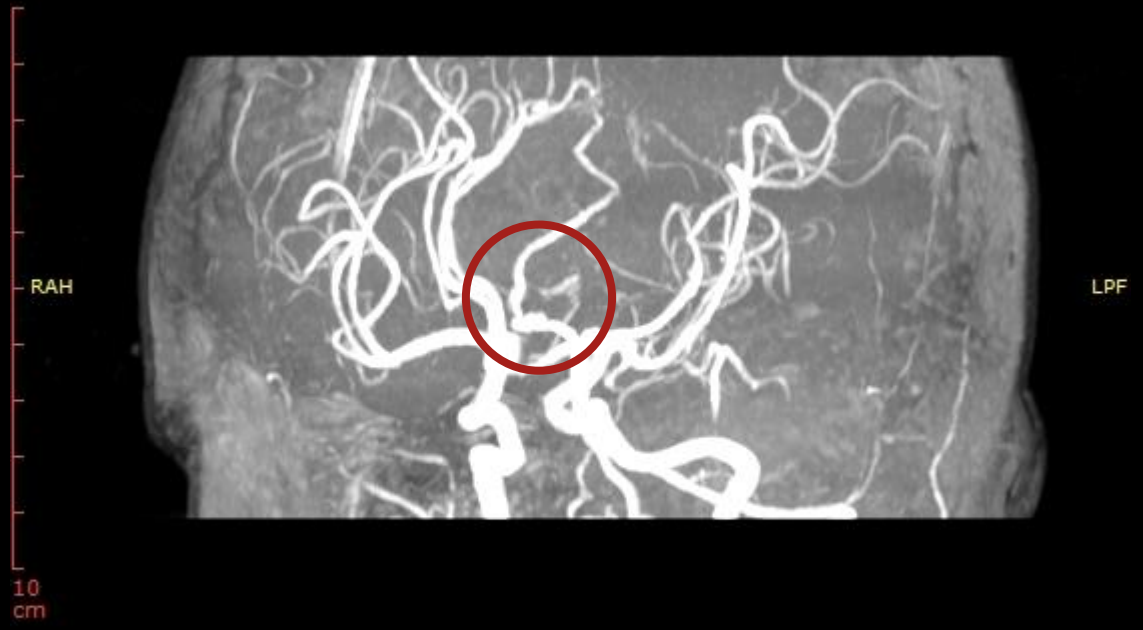

GE
L7
33
-33
cm/s
5
10
15

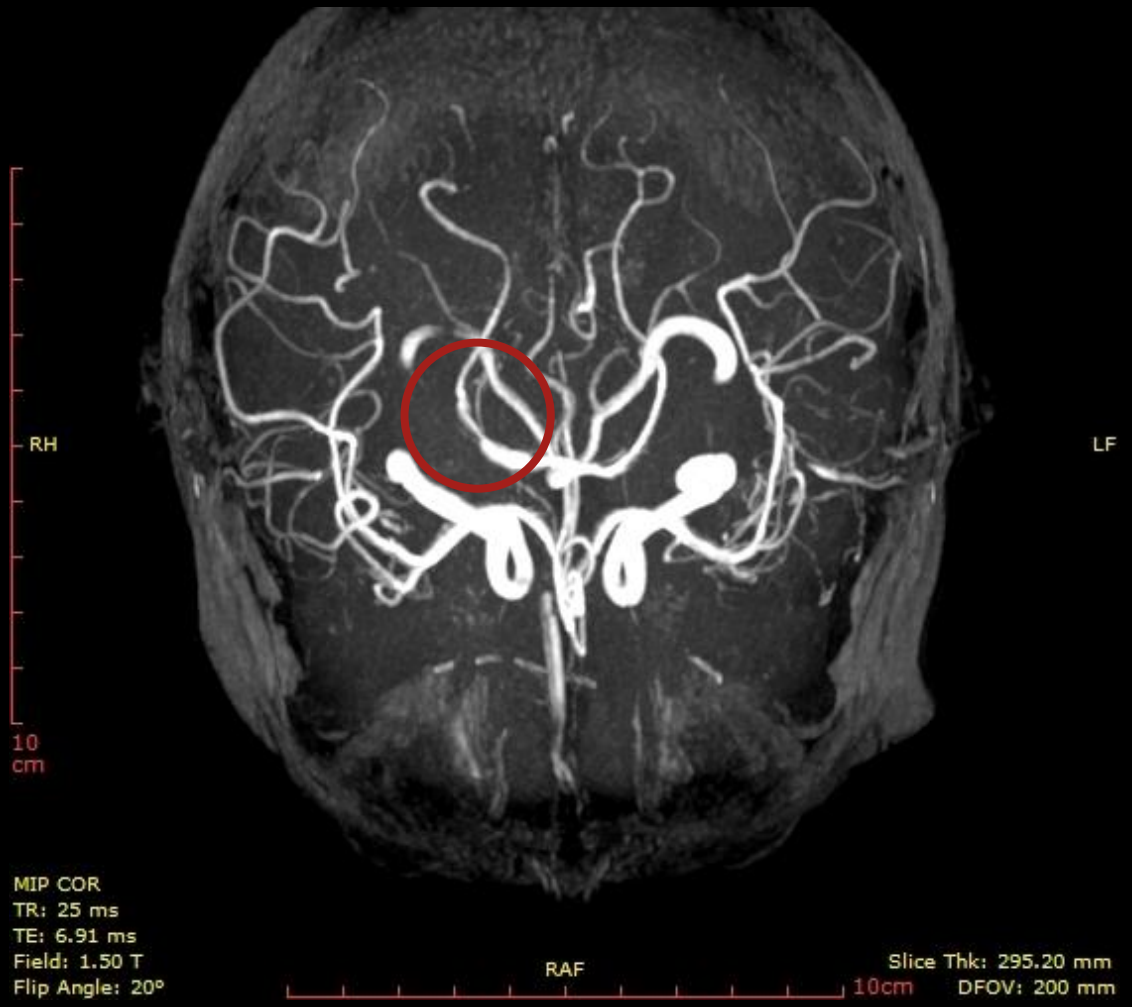

1 Vel 22.4 cm/s
28
-28
cm/s
GE
L7
5
10
AC 40
50
[cm/s]
-50
RIGHT PCA 1
-4
-3
-2
-1
-0

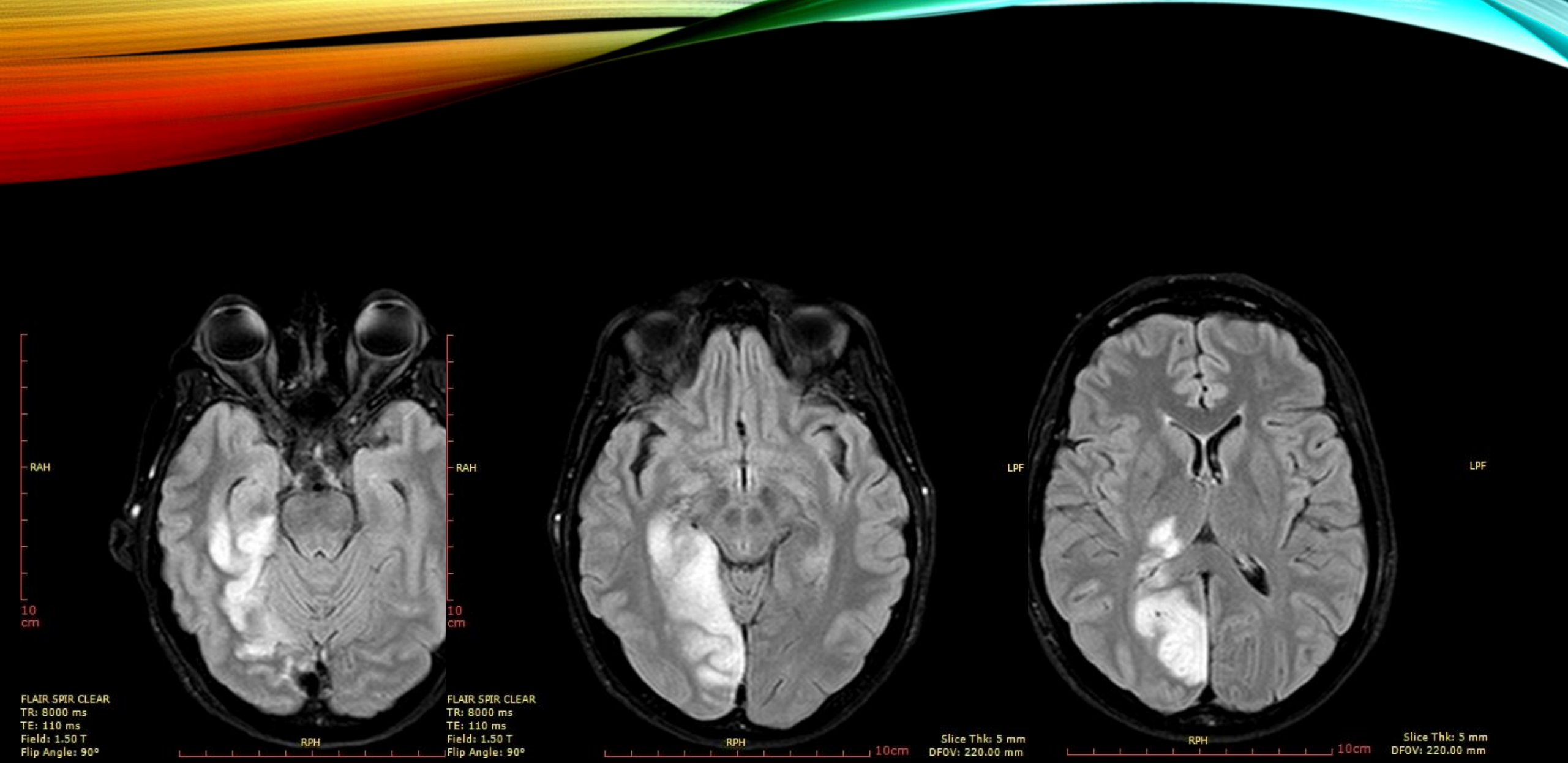

PS 41.6 cm/s
ED 20.5 cm/s
PI 0.79
RI 0.51
-33
cm/s
GE
L7
5
10
AC 28
100
50
[cm/s]
-50
LEFT PCA
-4
-3
-2
-1
-0


1 Vmax 158.4 cm/s
Vmin 84.4 cm/s
Vd 85.8 cm/s
TAMAX 116.3 cm/s
-27 cm/s
GE L7
AC 39
100
50
[cm/s]
-50
-100
-150
-200
-250
-4
-3
-2
-1
-0
RIGHT PCA 2


1 Vmax 33.5 cm/s
Vmin 13.3 cm/s
Vd 14.0 cm/s
TAMAX 24.9 cm/s
-27 cm/s
GE L7
AC 39
50
[cm/s]
-50
-100
-4
-3
-2
-1
-0
RIGHT PCA 2 POST-STENOSI


RAH
LPF
10
cm
MIP SAG
TR: 25 ms
TE: 6.91 ms
Field: 1.50 T
Flip Angle: 20°
RAF
10cm
Slice Thk: 295.20 mm
DFOV: 200 mm


RH
LF
10
cm
MIP COR
TR: 25 ms
TE: 6.91 ms
Field: 1.50 T
Flip Angle: 20°
RAF
10cm
Slice Thk: 295.20 mm
DFOV: 200 mm


RAH
10
cm
FLAIR SPIR CLEAR
TR: 8000 ms
TE: 110 ms
Field: 1.50 T
Flip Angle: 90°
RPH
RAH
10
cm
FLAIR SPIR CLEAR
TR: 8000 ms
TE: 110 ms
Field: 1.50 T
Flip Angle: 90°
RPH
10cm
Slice Thk: 5 mm
DFOV: 220.00 mm
LPF
RPH
10cm
Slice Thk: 5 mm
DFOV: 220.00 mm
LPF