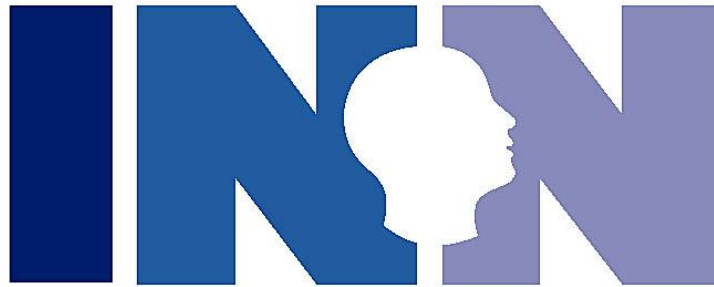


Endovascular Management of Pediatric AVMs



**Hyman-Newman
Institute for
Neurology and
Neurosurgery**

**Ichan School of
Medicine at**

Mount Sinai HCS NY NY

Alex Berenstein MD

TEAM

- Pediatric Anesthesia
- Neonatal Intensive Care
- Pediatric Intensive Care
- Pediatric Cardiology
- Pediatric Neurosurgery
- Pediatric Neurology
- *“Pediatric” Endovascular Surgery*
- Nursing
- Technicians

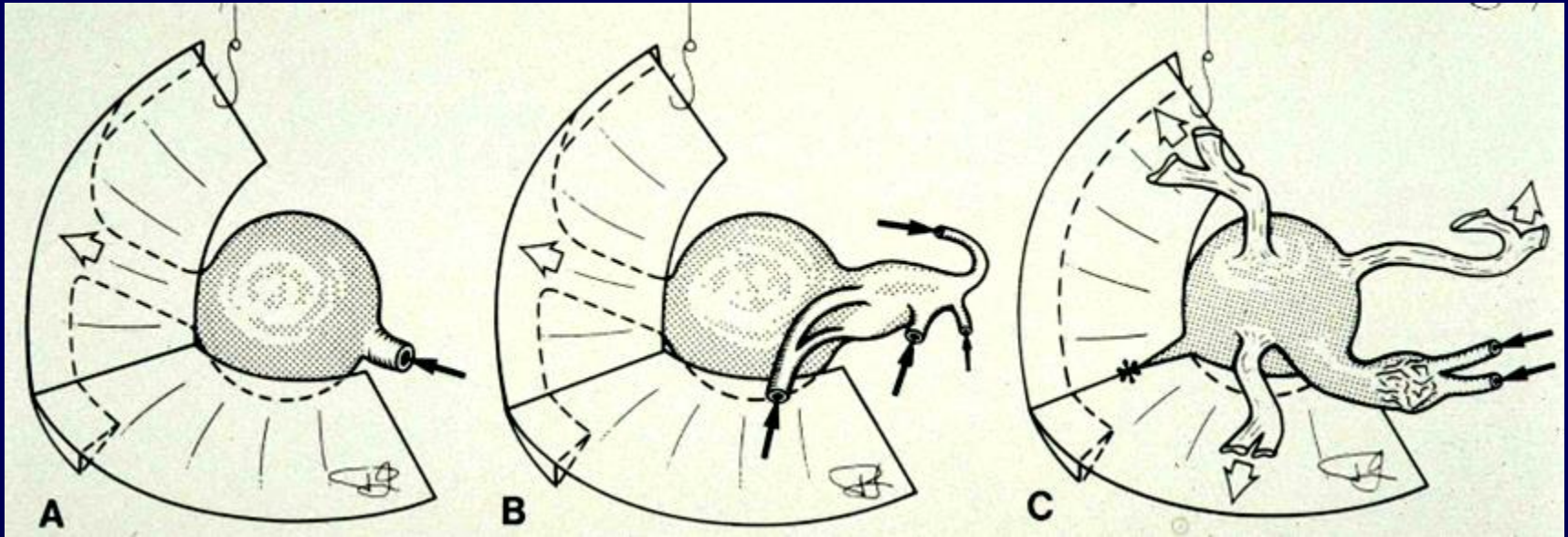
Potential conflict of interest

Consulting, grant support and/or shareholder

- **Blockade Medical**
- **MicroVentions**
- **Mivineuro Medical**
- **Valor Medical**
- **Siemens**
- **Scientia Vascular**
- **Sequent Medical**

VGAM vs. VGAD

(Lasjaunias/Berenstein)



VGAM (Mural)

VGAM (Choroidal)

VGAD (Pial AVM)

Pediatric IC

Endovascular Approach

- Trans-umbilical approach
- US puncture femoral
- 4F Introducer sheath
- Transvenous AVF

Pediatric IC

Endovascular Approach

Microcatheters

- **Flow guided**
Magic
- **Detachable tip**
Apollo
Sonic
- **Double lumen**
Balloon

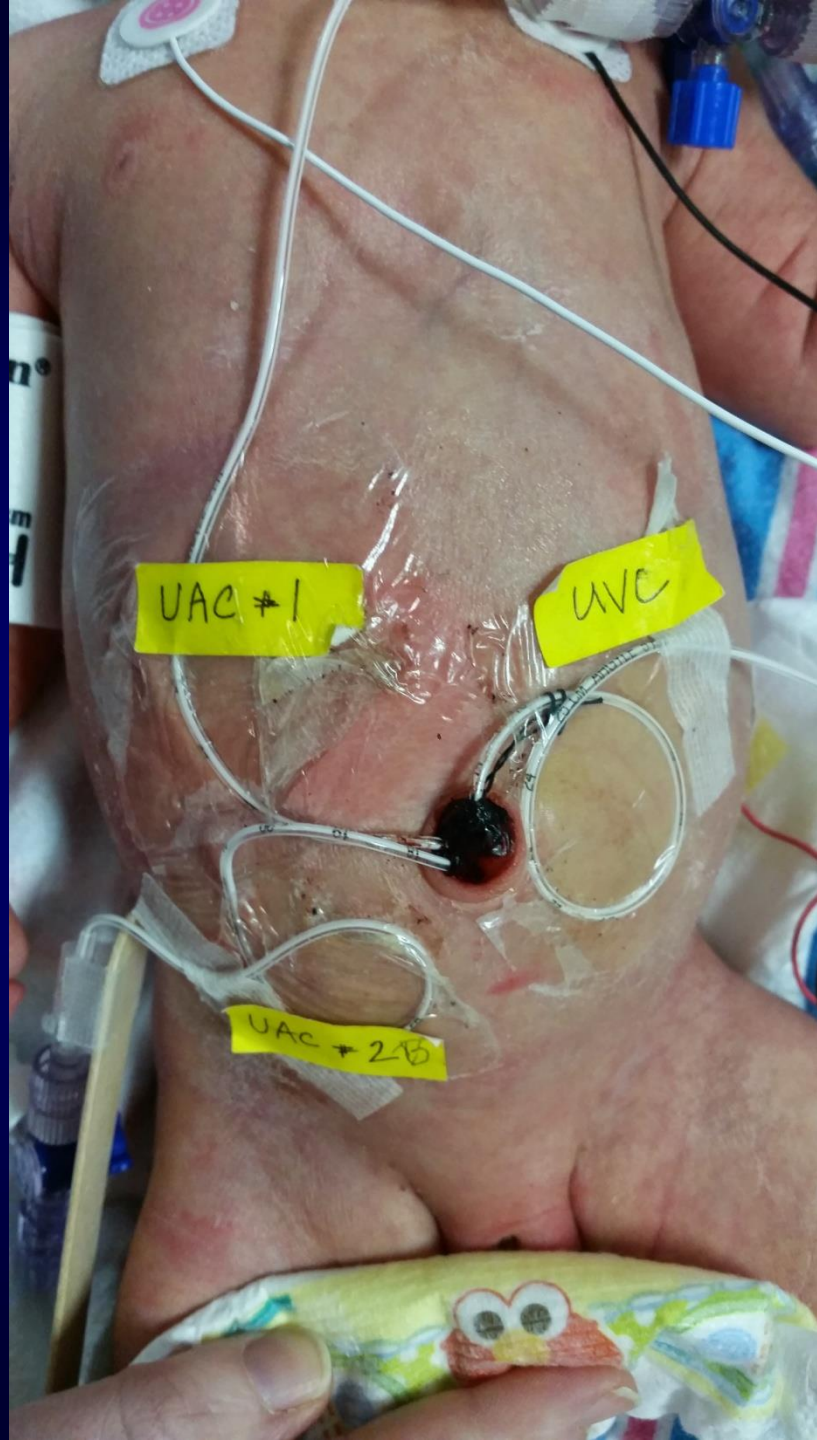
Spector

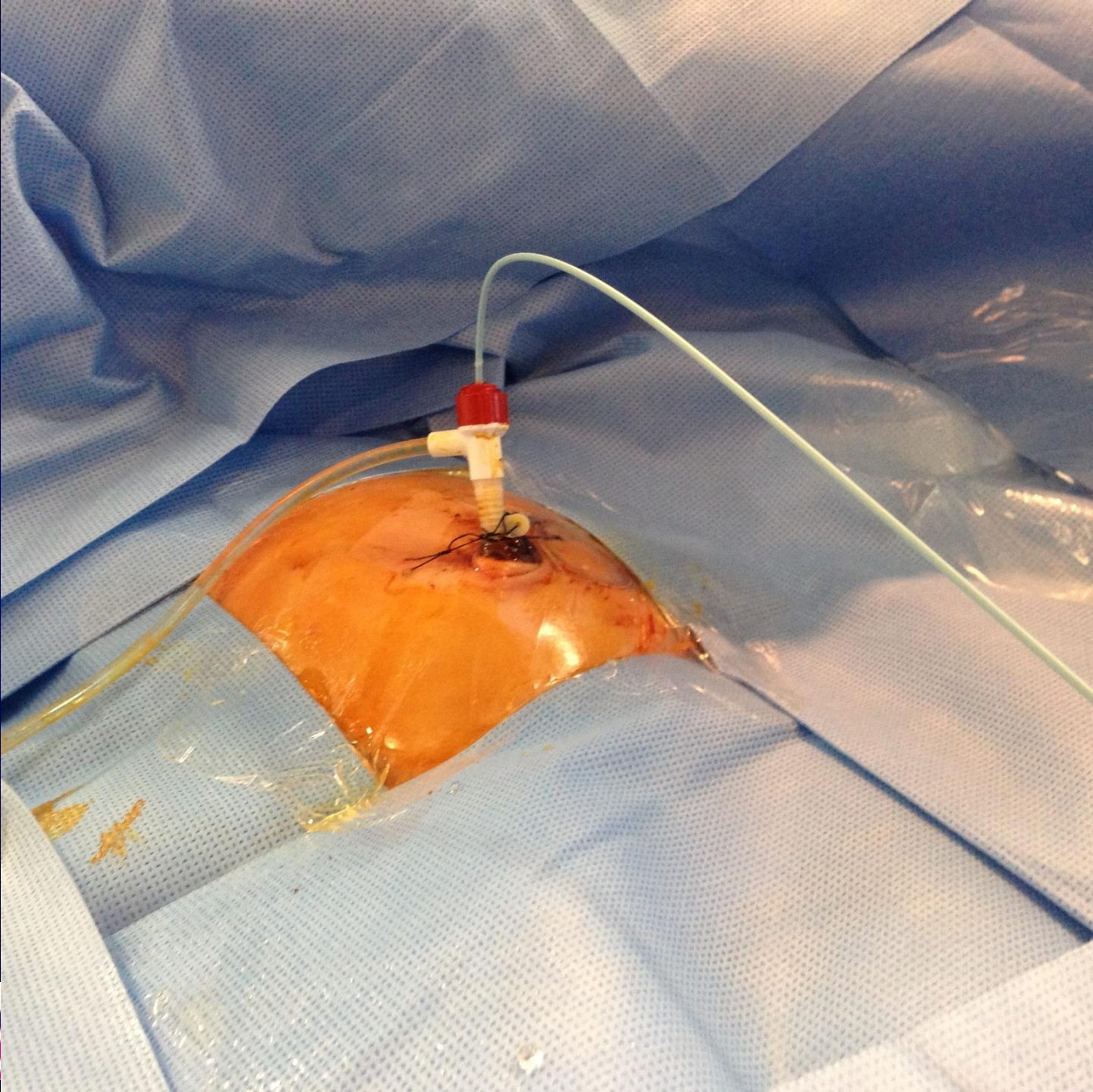


Liquid Embolics

- N-Butyl-Cyanoacrylate 50-90%NBCA/Ethiodol + 1gr Tantalum
- Onyx
- PHIL

Hypotension (systolic 40-50 mmHg).



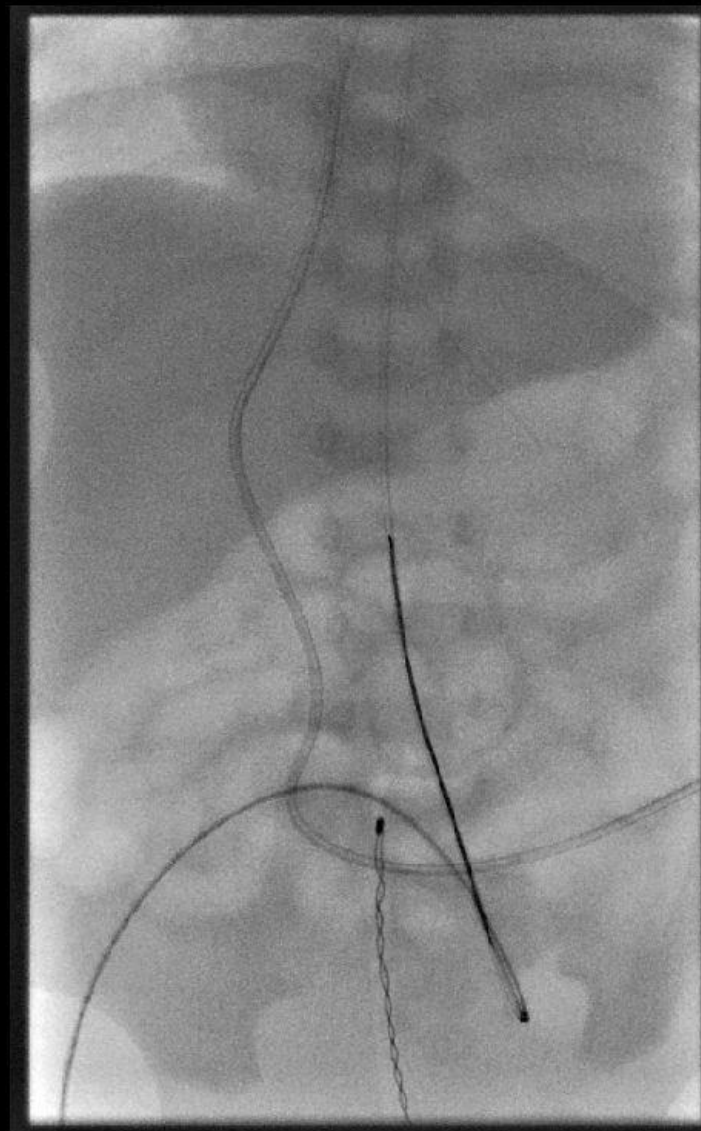


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H

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AXIOM-Artis
VC21B 140128
Perf.: BERENSTEIN, A
Ref.: Paley, Charles
HFS
R////

R



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KV 65
mA 35
D 35
0° / 0°



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DDO 35%

SM

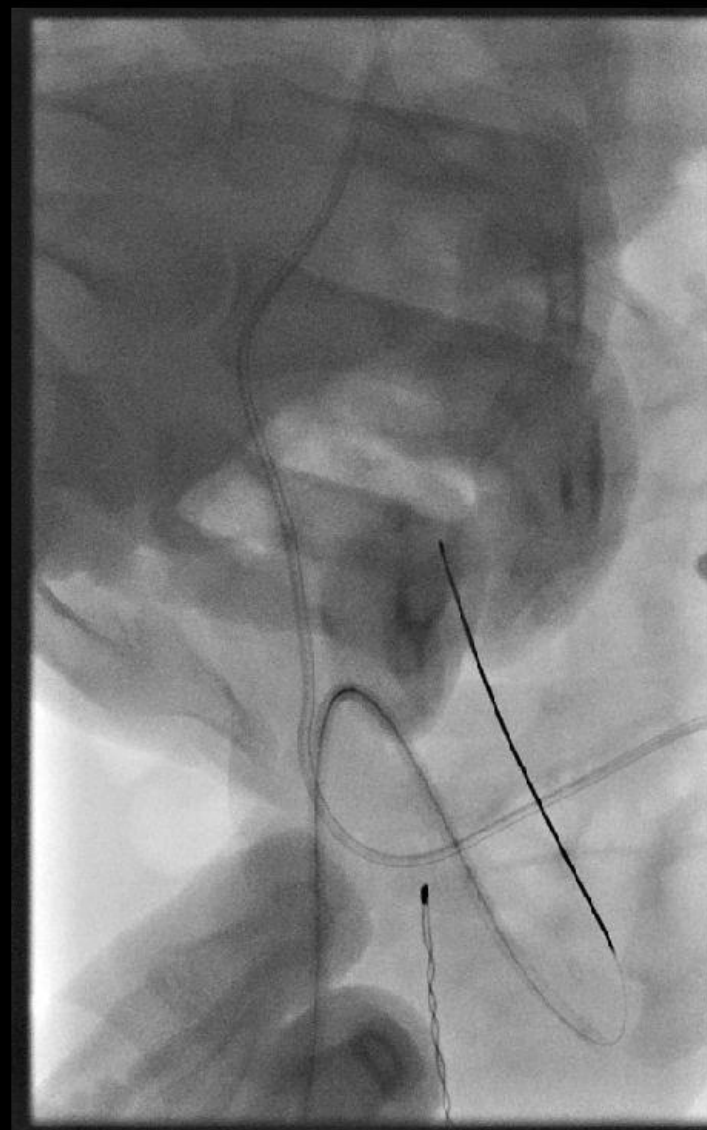
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VC21B 140128
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Ref.: Paley, Charles
HFS
R////

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0° / 0°



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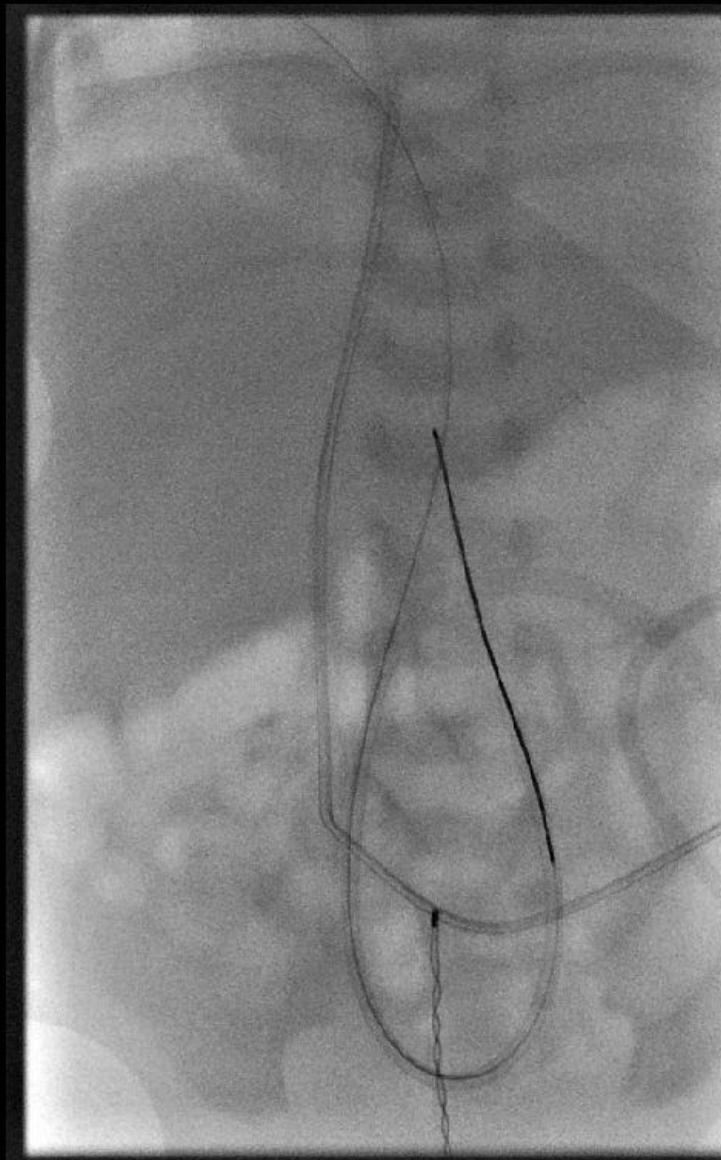
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VC21B 140128
Perf.: BERENSTEIN, A
Ref.: Paley, Charles
HFS
R////

R



FL Neuro
cm 32
A
kV 65
mA 44
D 39
0° / 0°



SM

1024 X 1024
EE 0%
DDO 35%

WW 4095 [W 4095]
WC 2047 [C 2047]

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ROOSEVELT HOSPITAL
AXIOM-Artis
VC21B 140128
Perf.: BERENSTEIN, A
Ref.: Paley, Charles
HFS
R////

R



FL Neuro
cm 32
A
KV 65
mA 44
D 37
0° / 0°



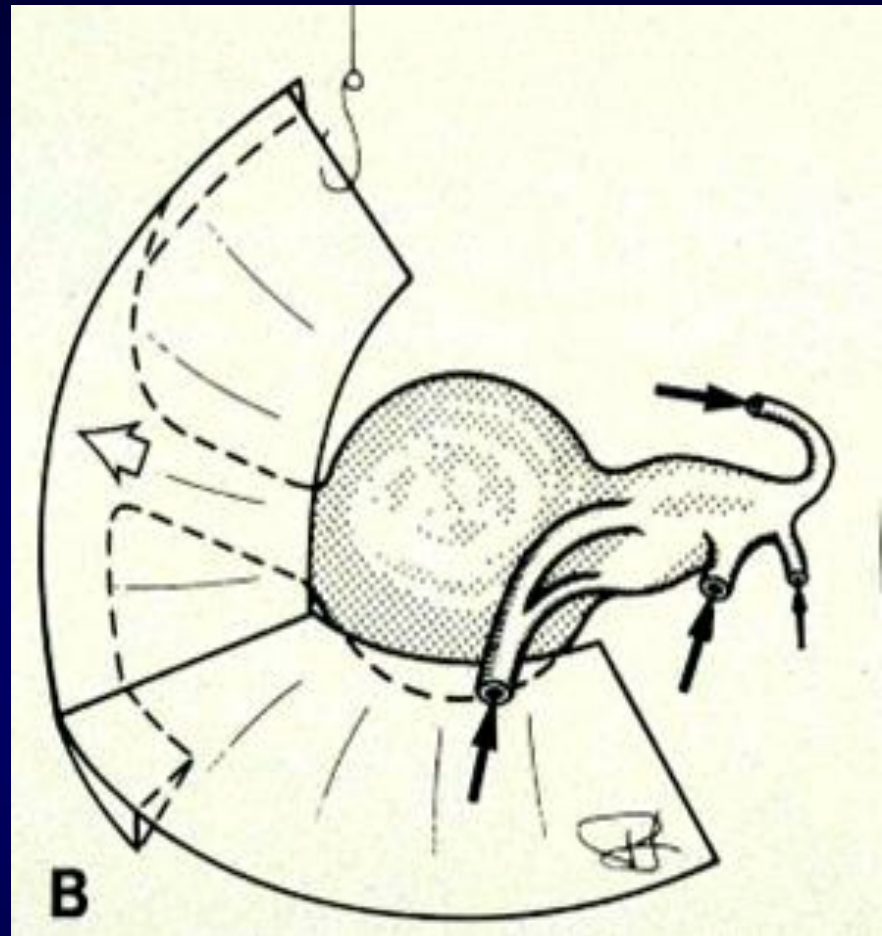
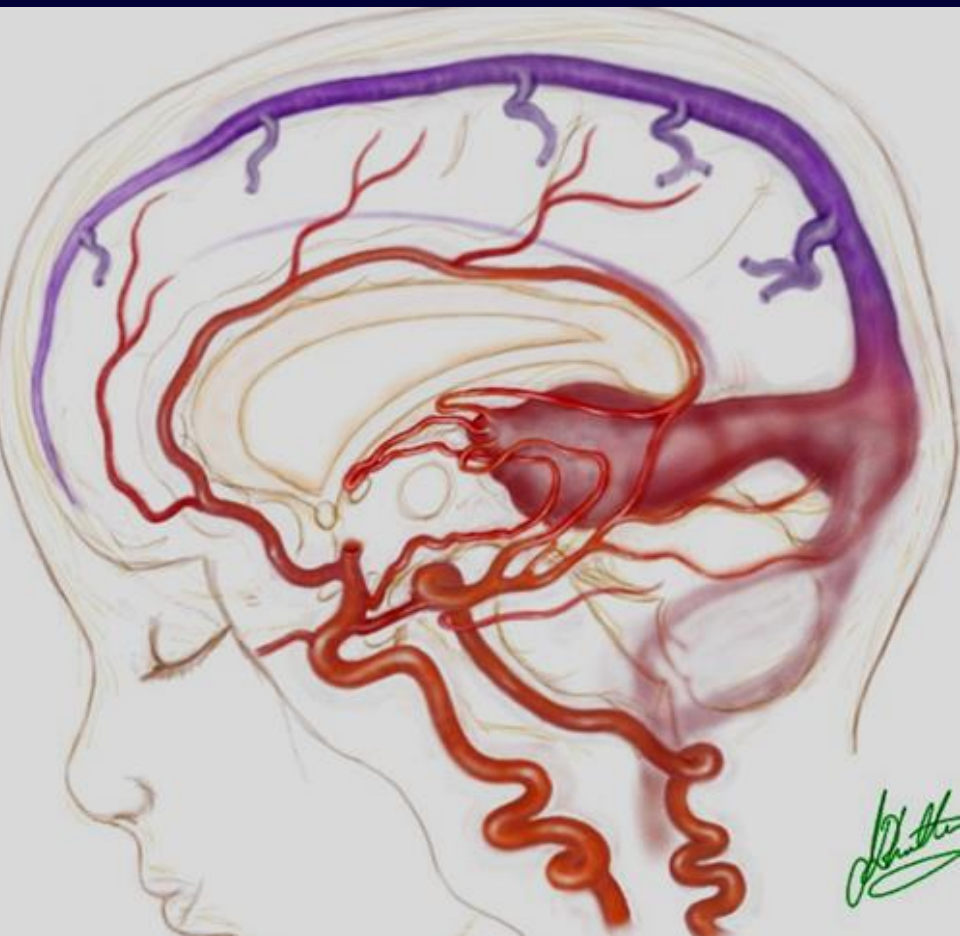
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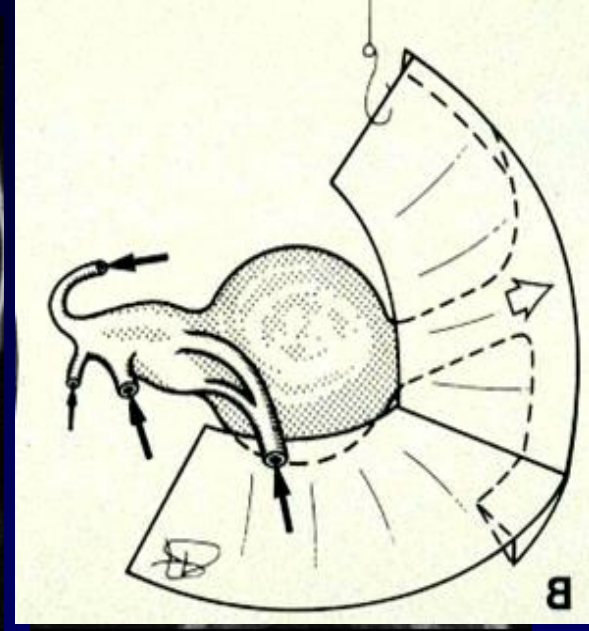
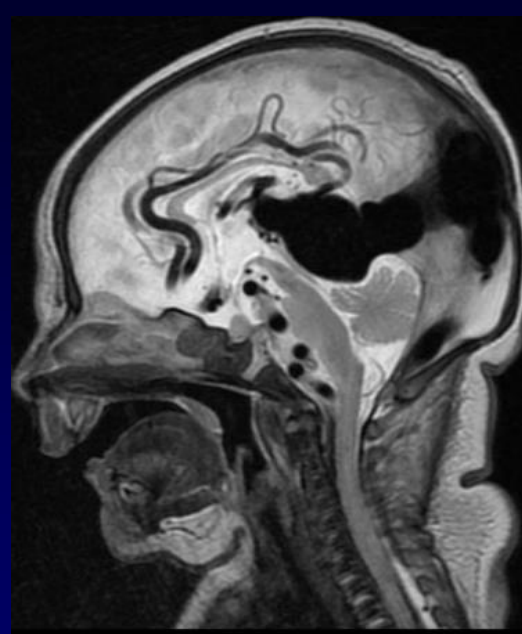
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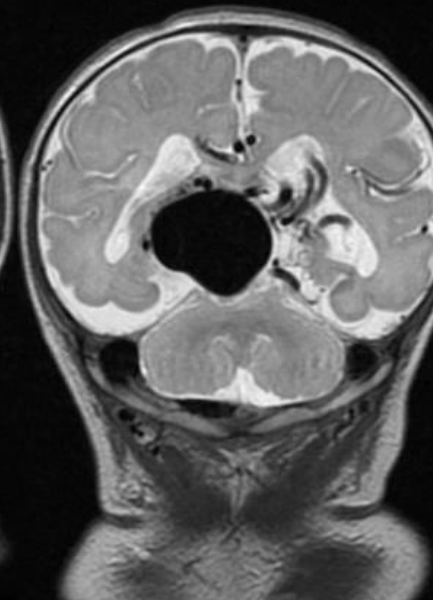
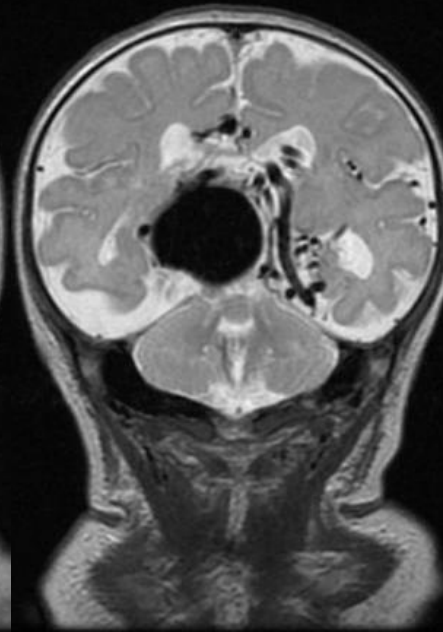
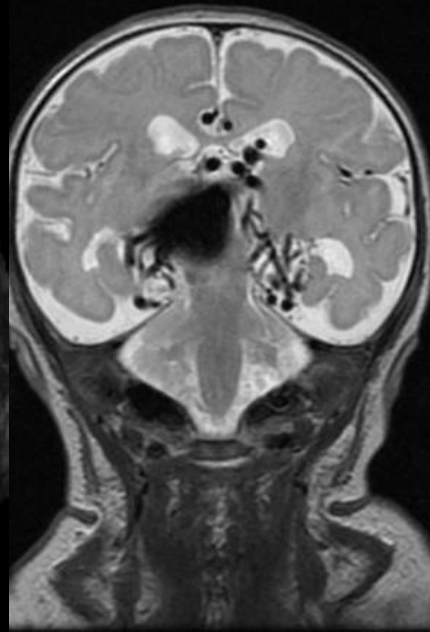
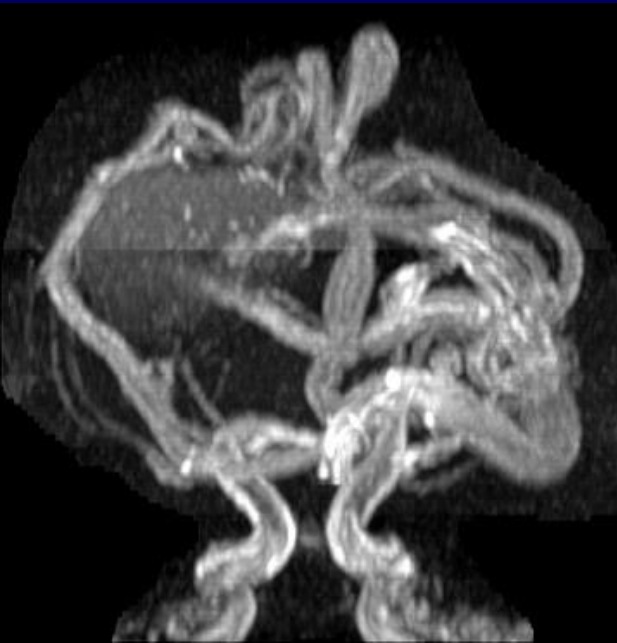
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SM



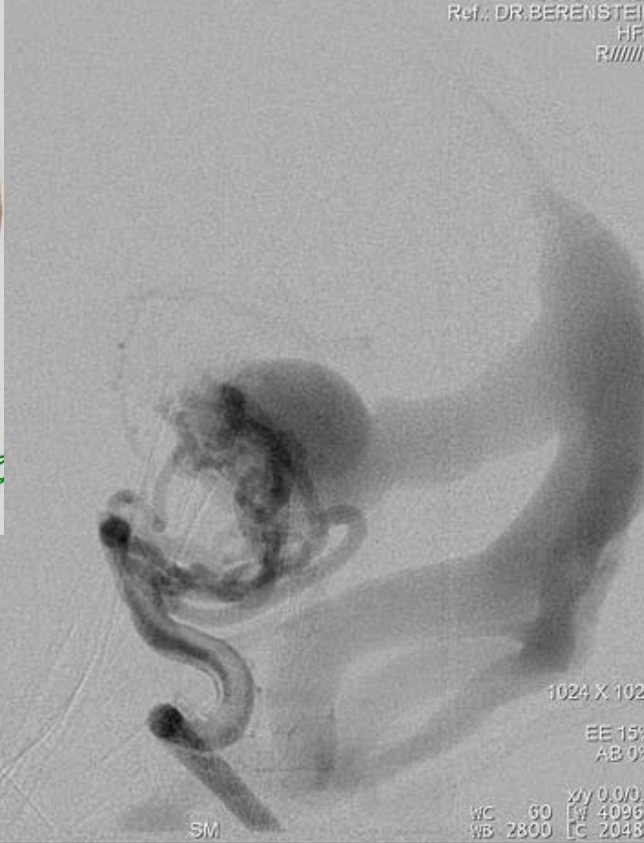
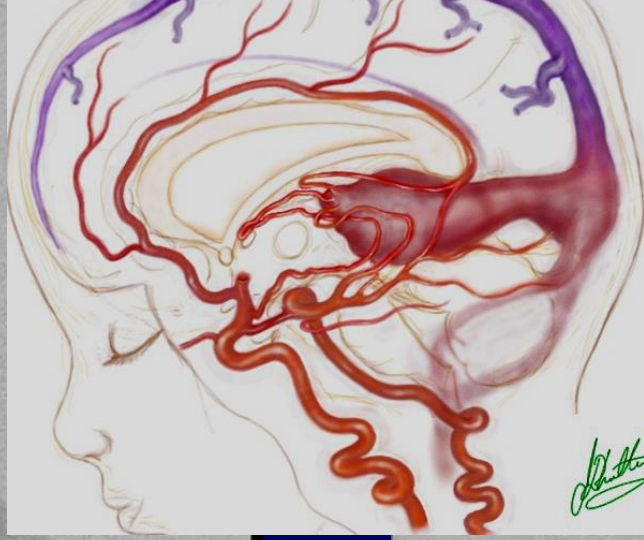


No Role for “diagnostic angiography”

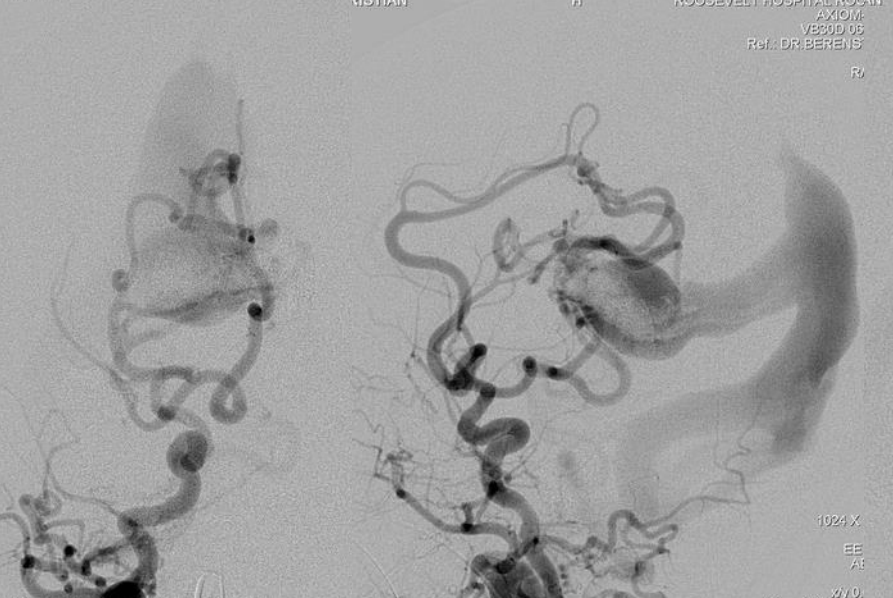


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53 sec

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HF
R////

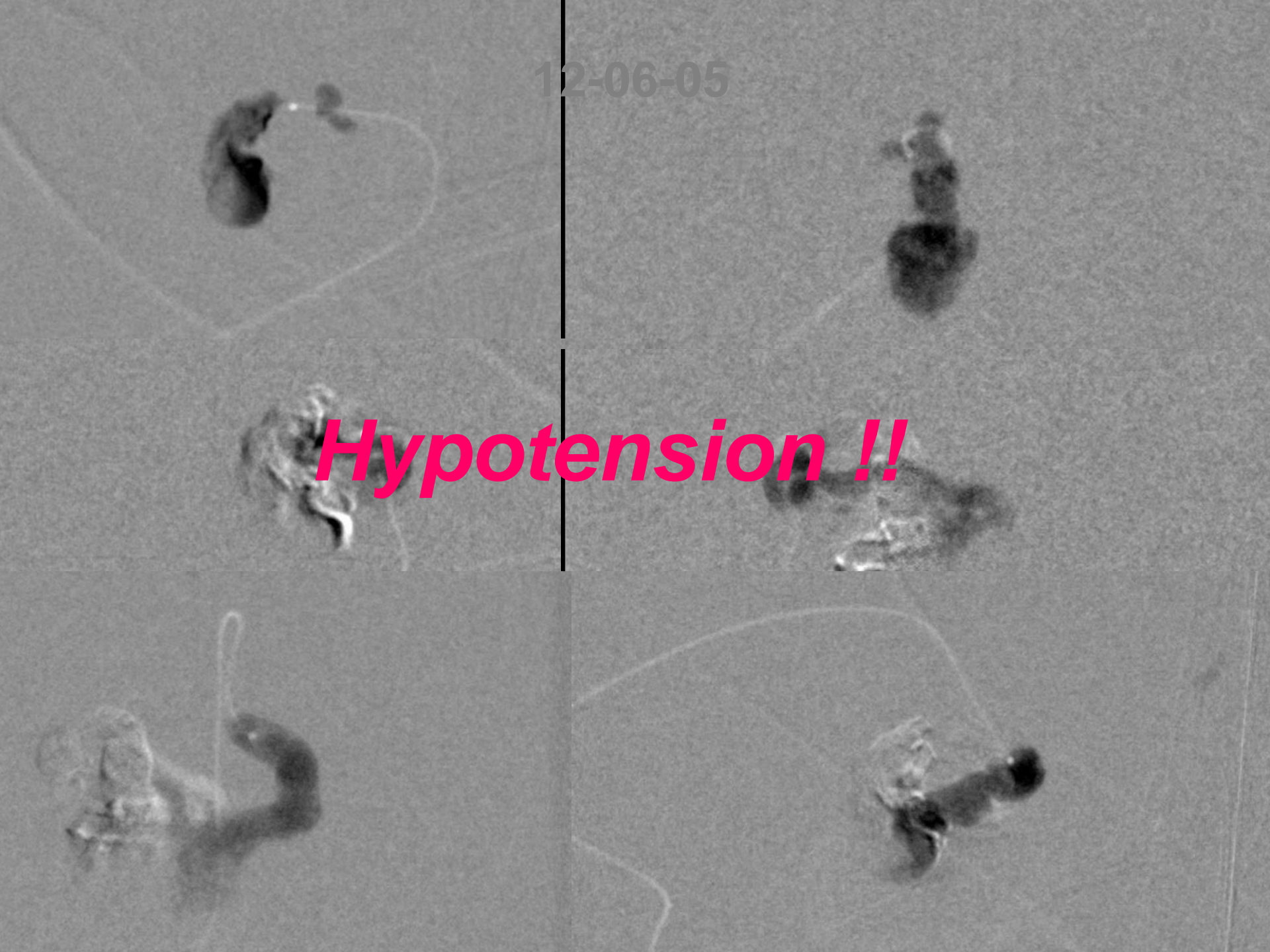


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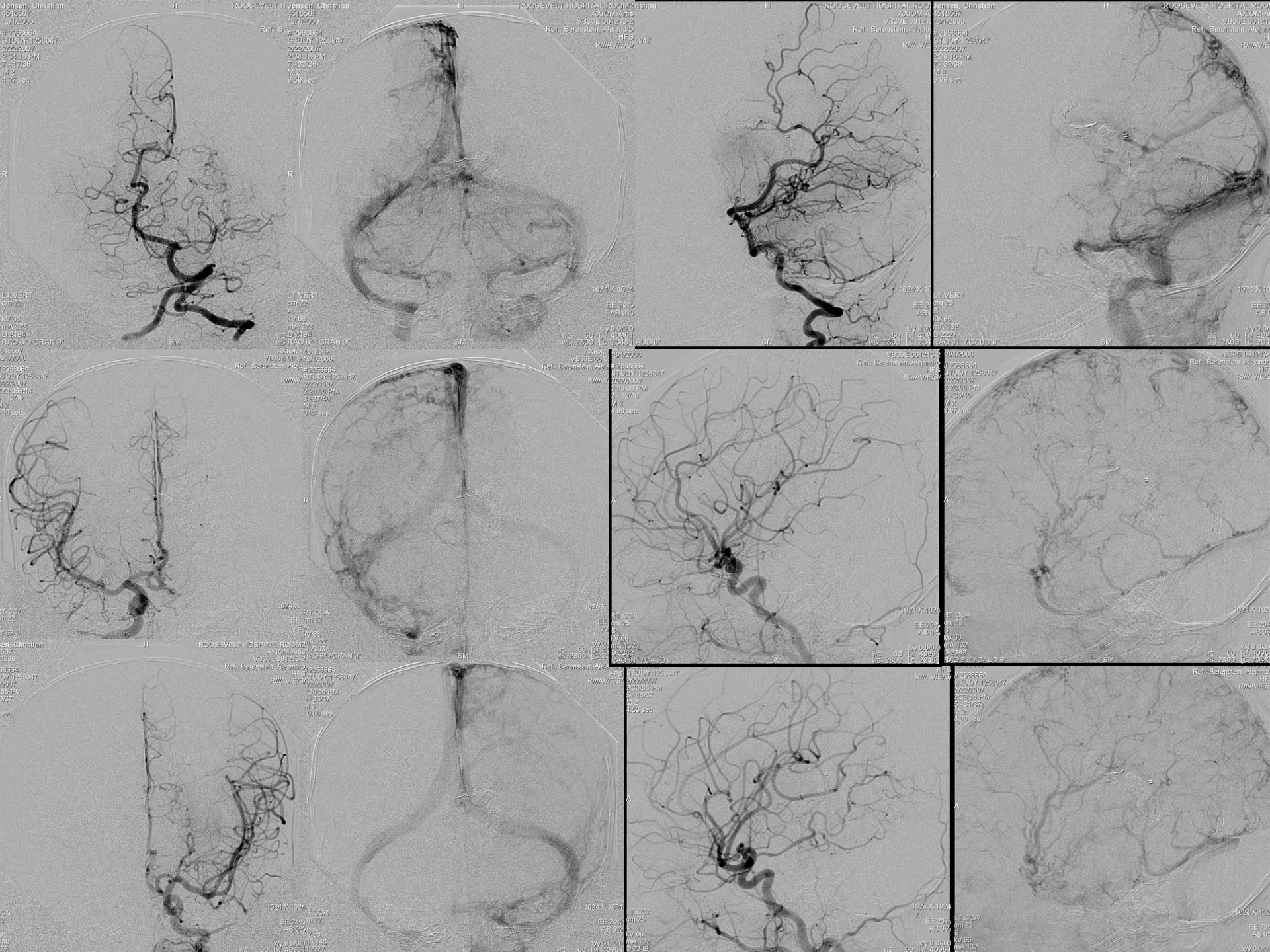


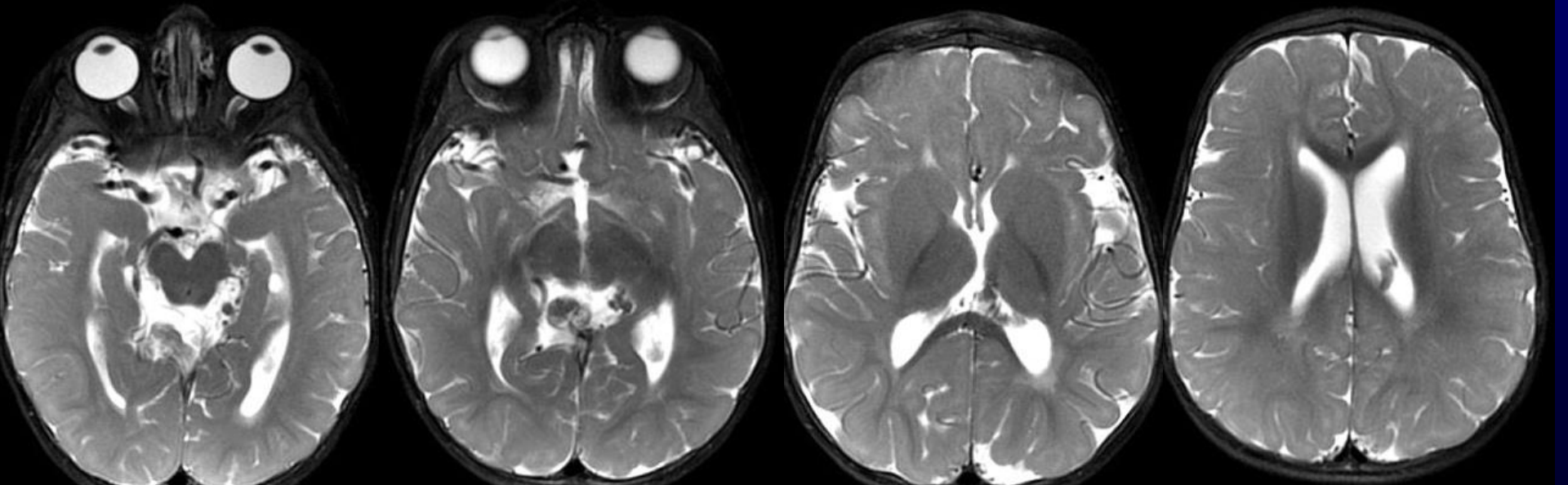
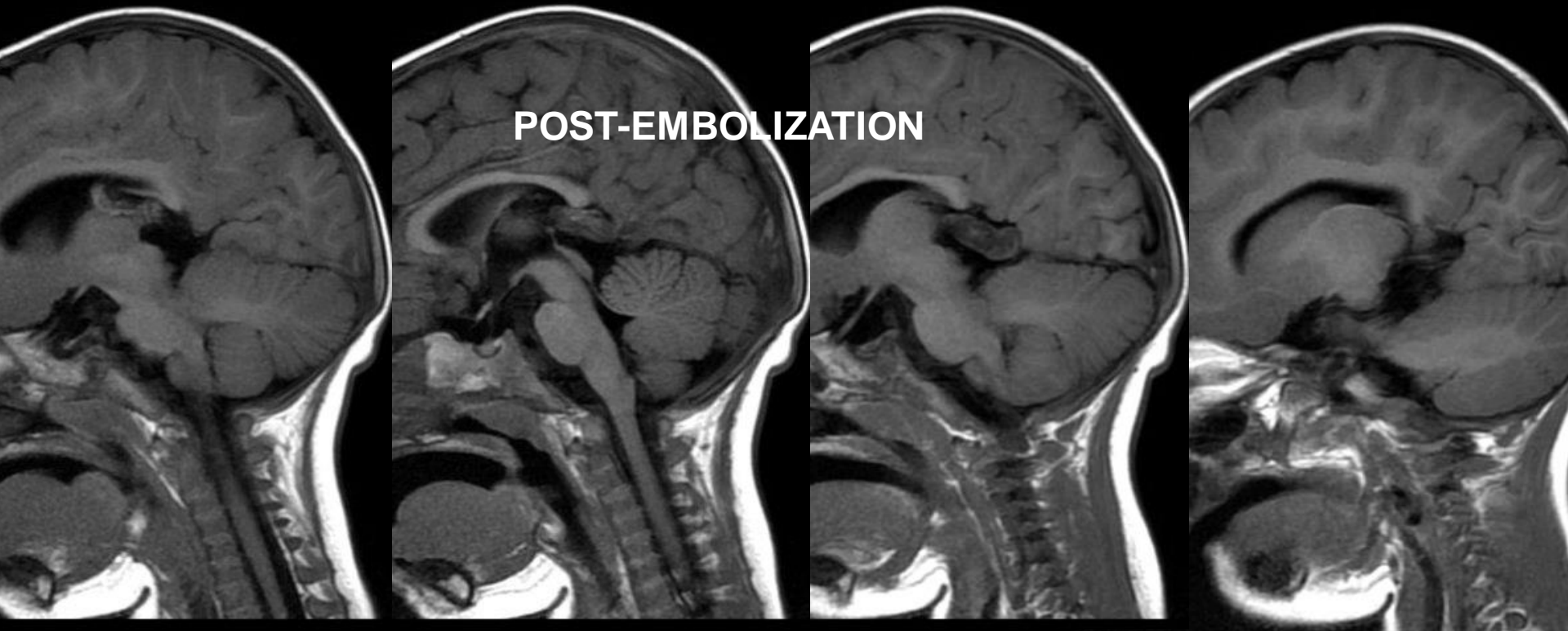
12-06-05

Hypotension !!

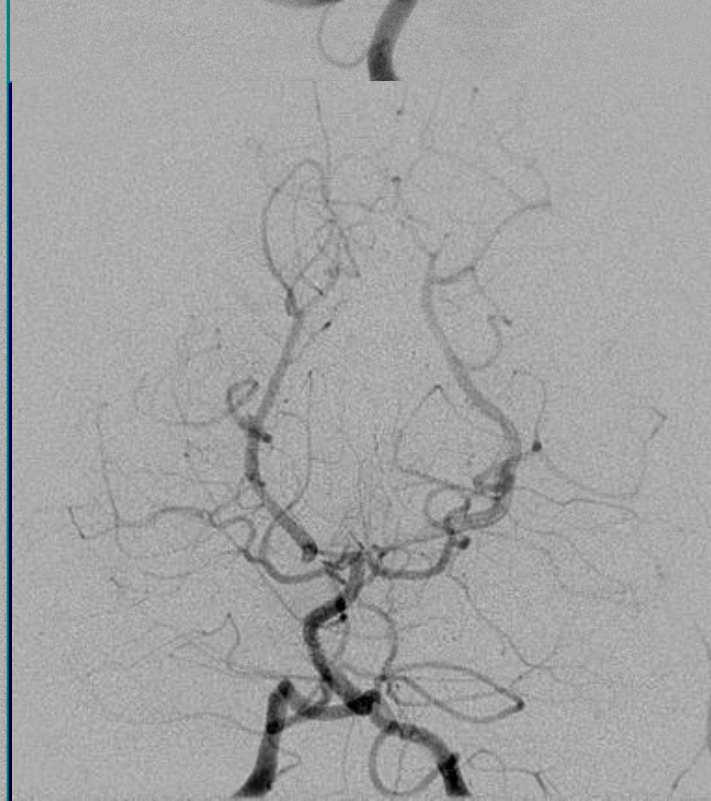
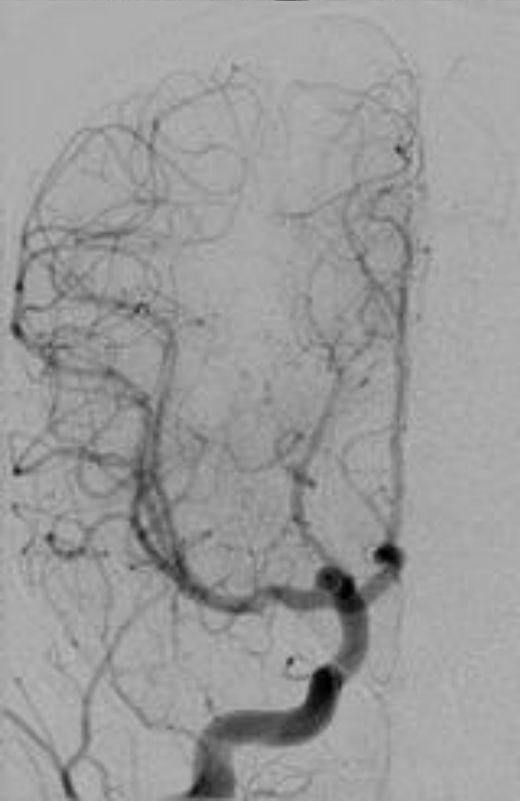






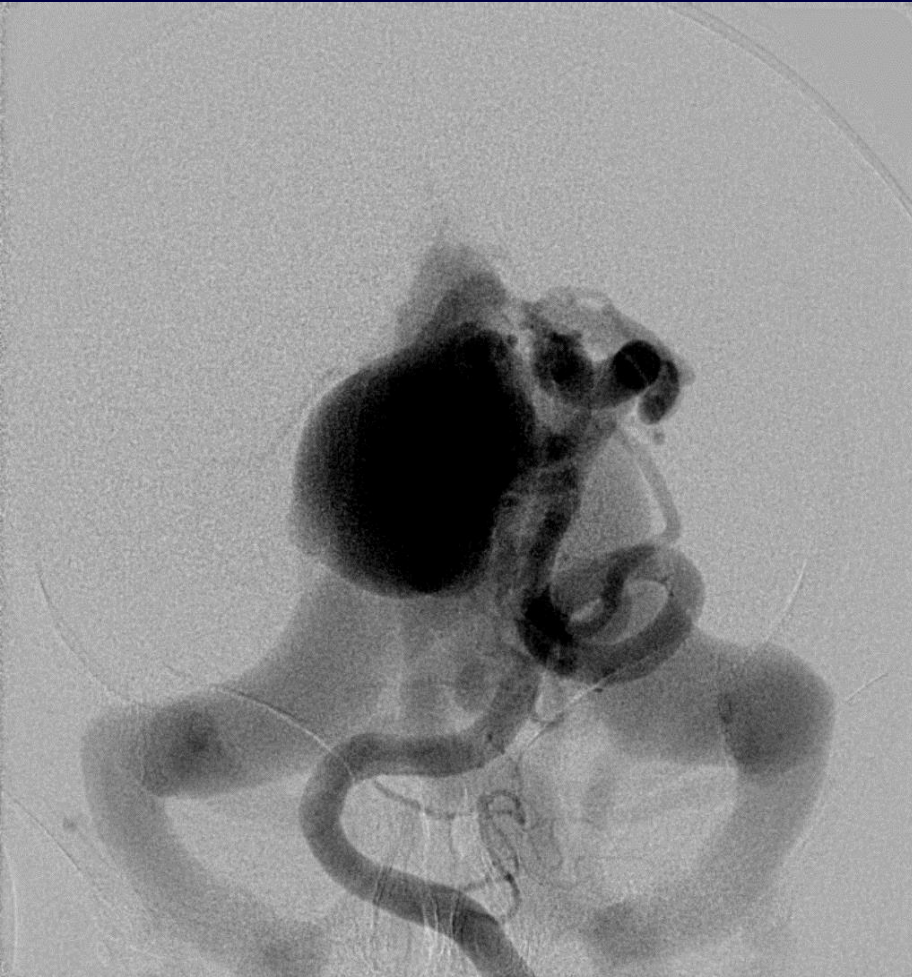


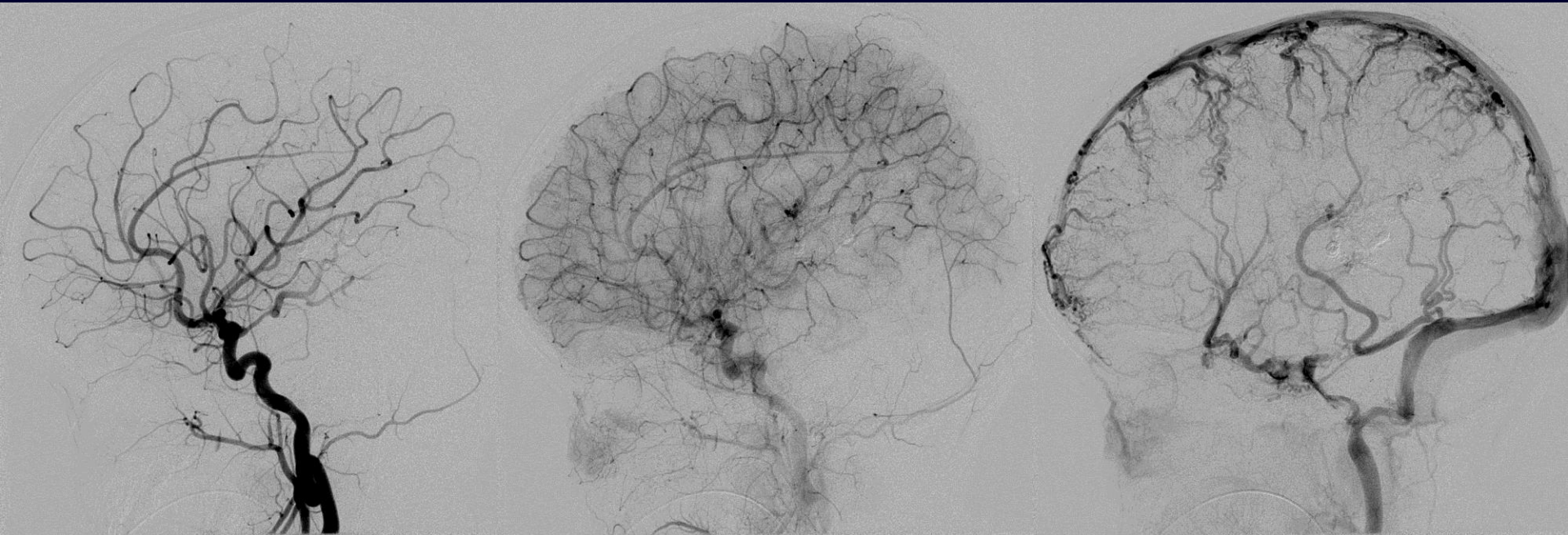
before 1st procedure



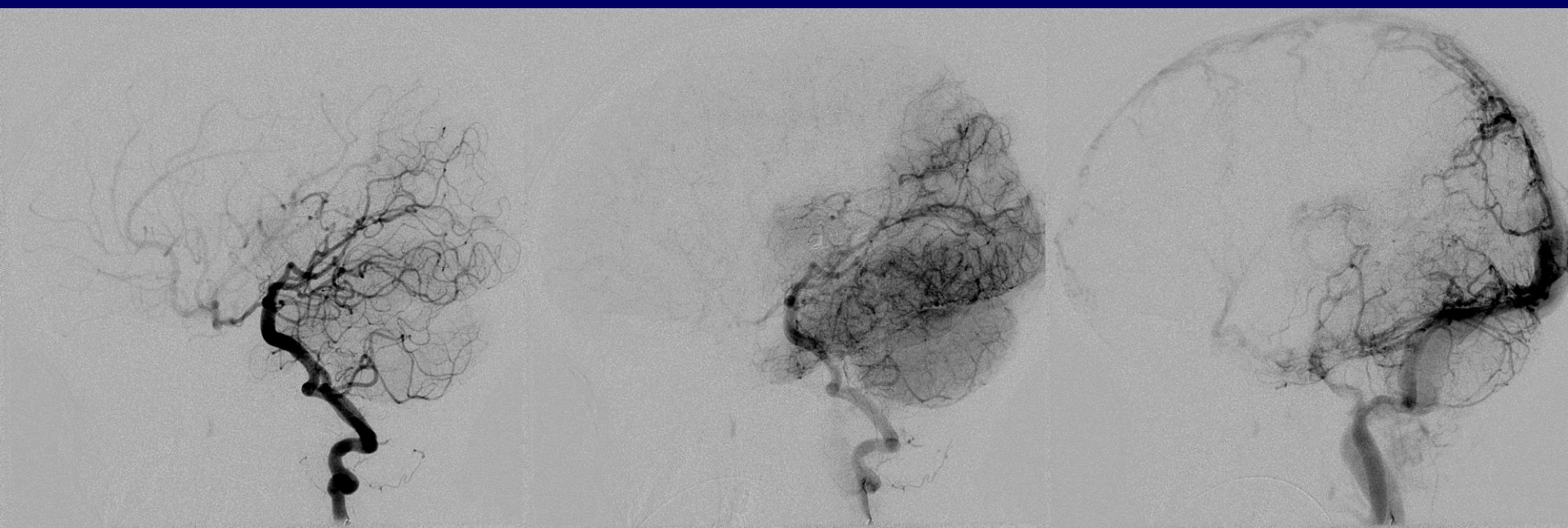
Final after 4 embolizations

Day 3 of life



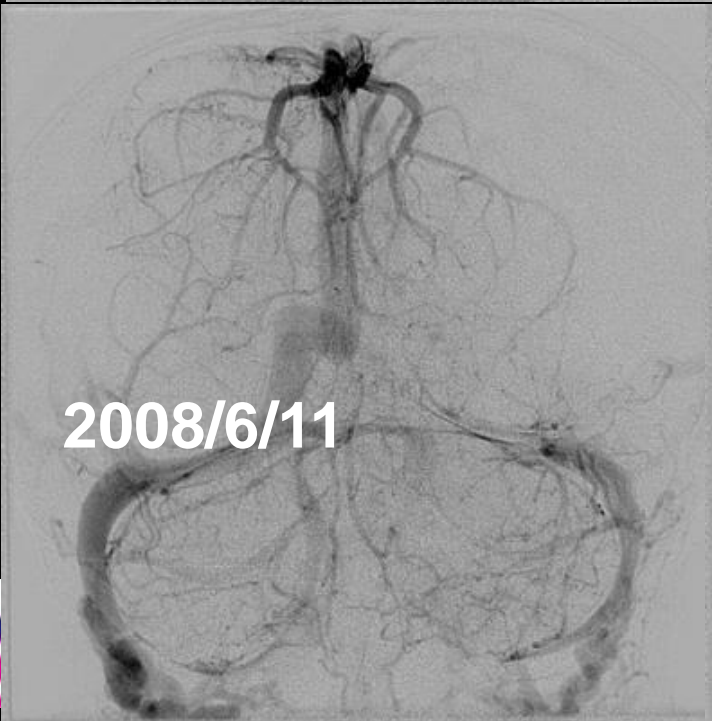
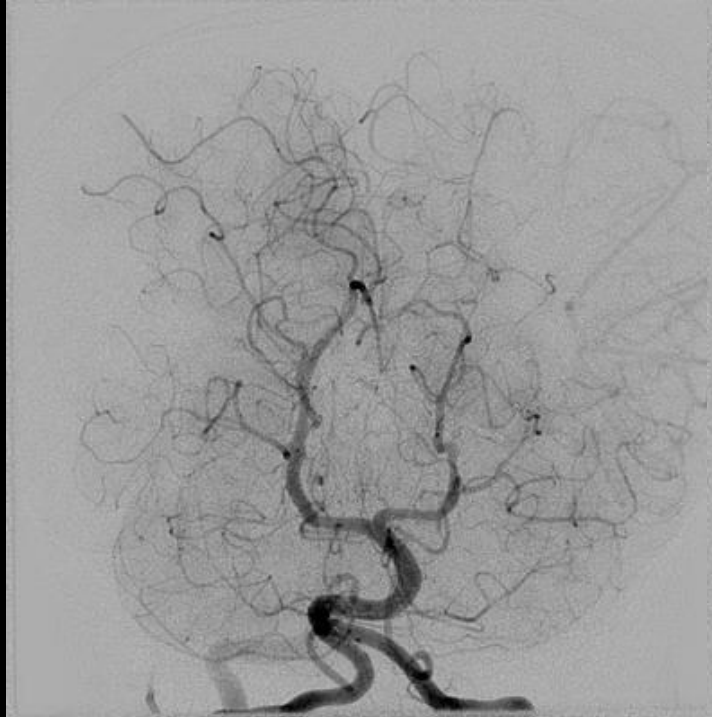


16 months

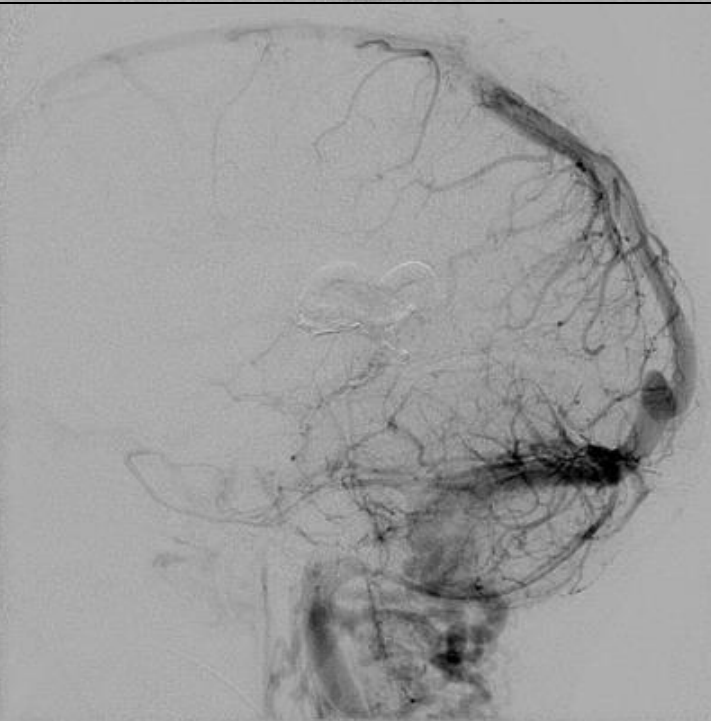


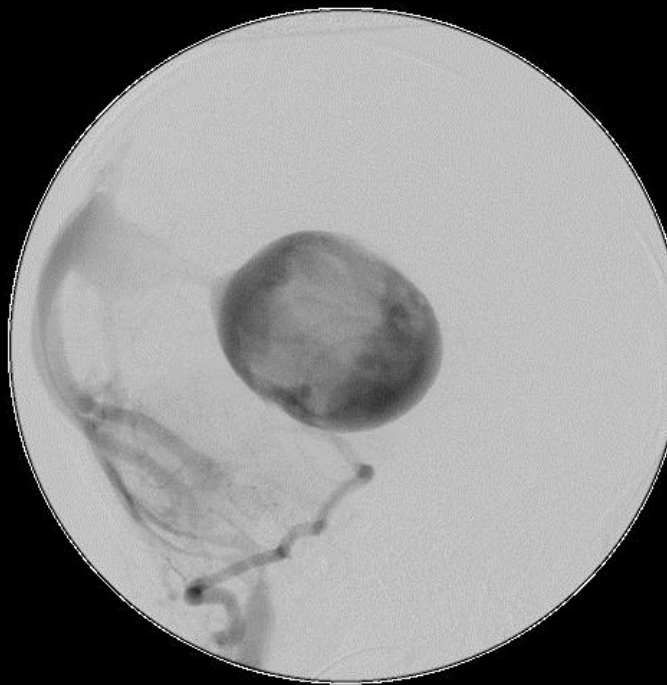
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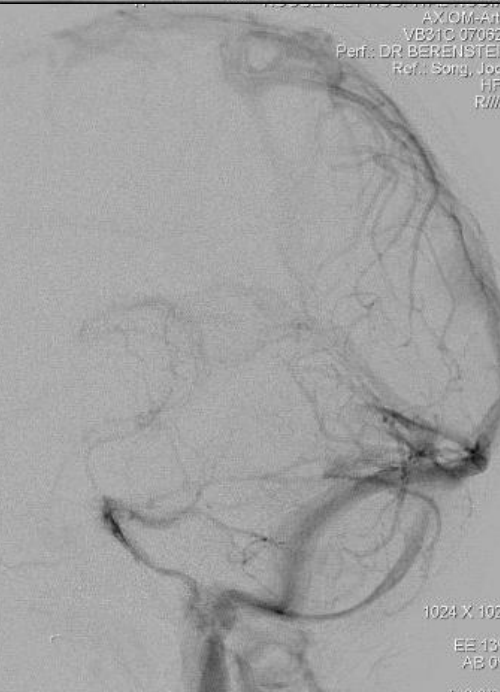
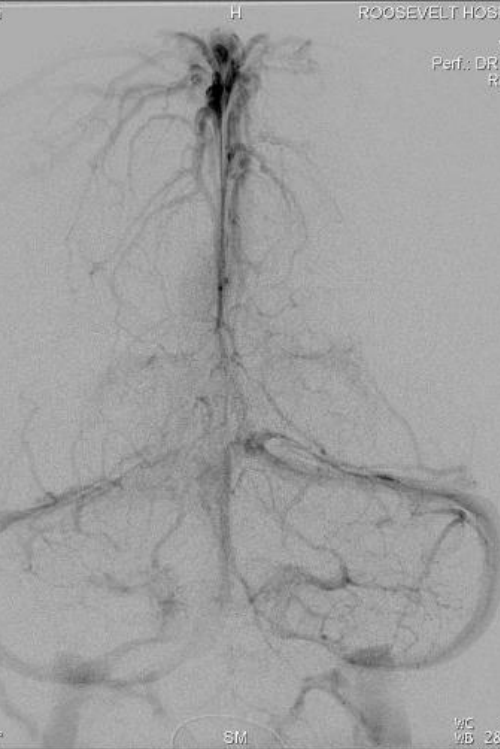
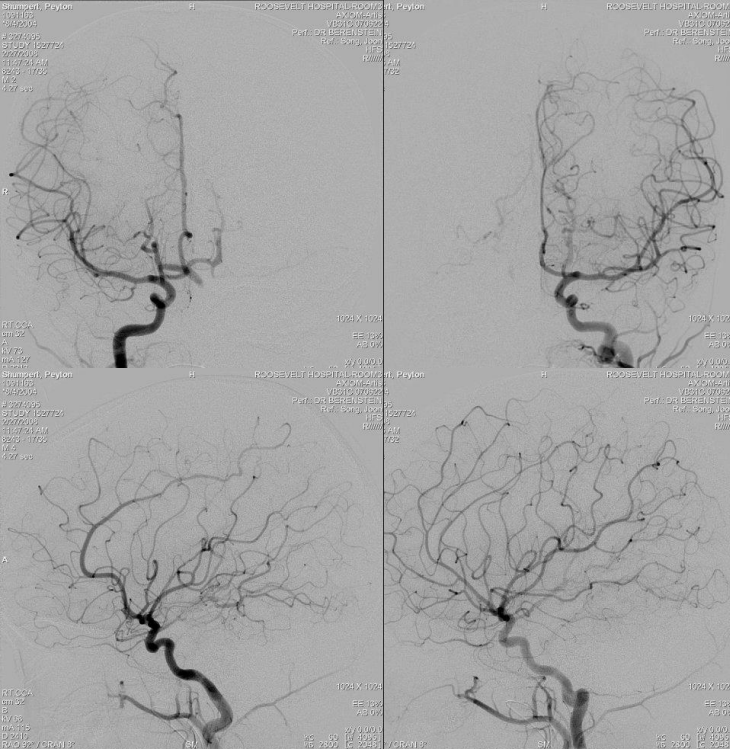




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AXIOM-ARTIS
VB31C 070622
Perf.: DR BERENSTEIN
Ref.: Song, Joon
HFS
R////

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A
107.74
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D 2386
LAO 1° / CRAN 10°

2/27/2008

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ROOSEVELT HOSPITAL ROOM 3
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Perf.: DR BERENSTEIN
Ref.: Song, Joon
HFS
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ROOSEVELT HOSPITAL ROOM 3
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ROOSEVELT HOSPITAL ROOM 3
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Ref.: Song, Joon
HFS
R////

LT VERT
cm 32
B
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1024 X 1024
EE 13%
AB 0%

1024 X 1024
EE 13%
AB 0%

1024 X 1024
EE 13%
AB 0%

Transvenous



Se 11/7/2007
Se 1:19:18 PM
3 IMA 11/1



1024 X 1024

EE 0%

DDO 0%

PHILIPS INTEGRIS



L ICA
cm 22.0

kV 73
mA 85

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*10/12/2006

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Se 11/7/2007
Se 1:19:18 PM
3 IMA 13/1

Se 11/7/2007
Se 1:19:18 PM
3 IMA 12/1



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EE 0%

DDO 0%

PHILIPS INTEGRIS



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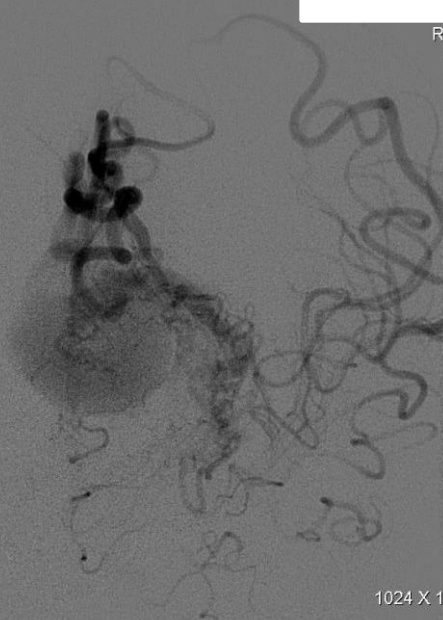
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mA 123

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Se 11/7/2007
Se 1:19:18 PM
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R////

R////



1024 X 1024

EE 0%

DDO 0%

L ICA
cm 30.0

kV 65

L ICA
cm 22.0

kV 73
mA 85

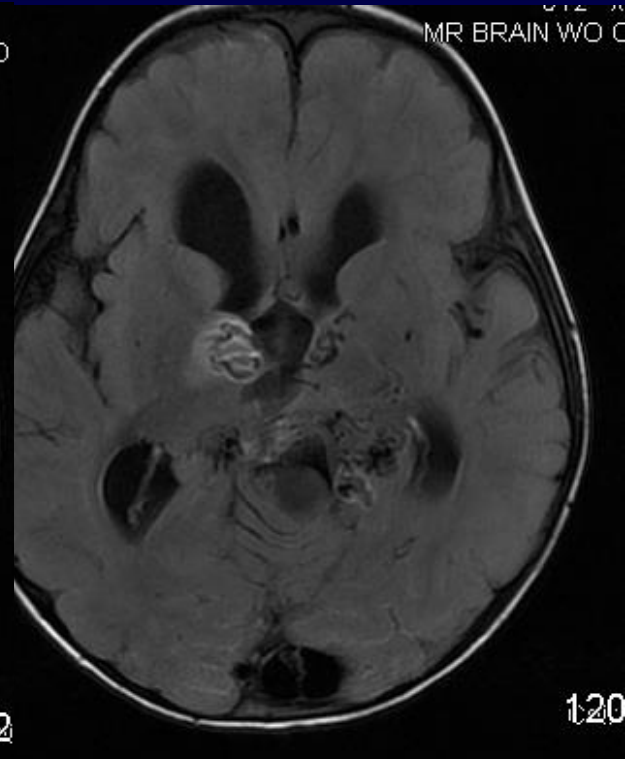
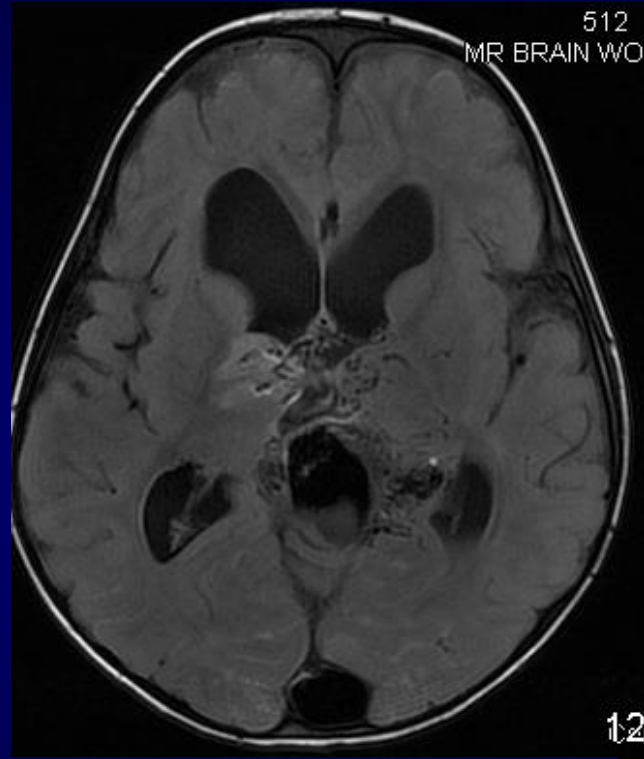
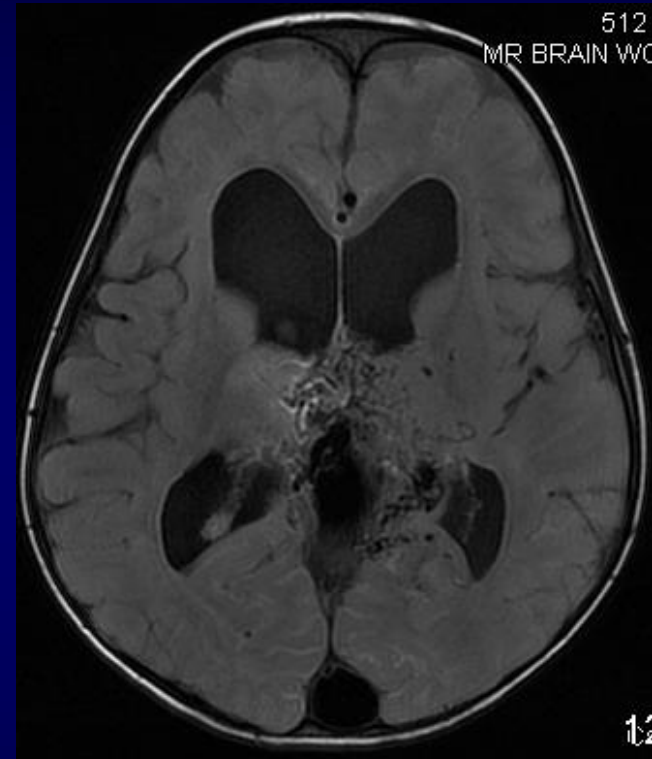


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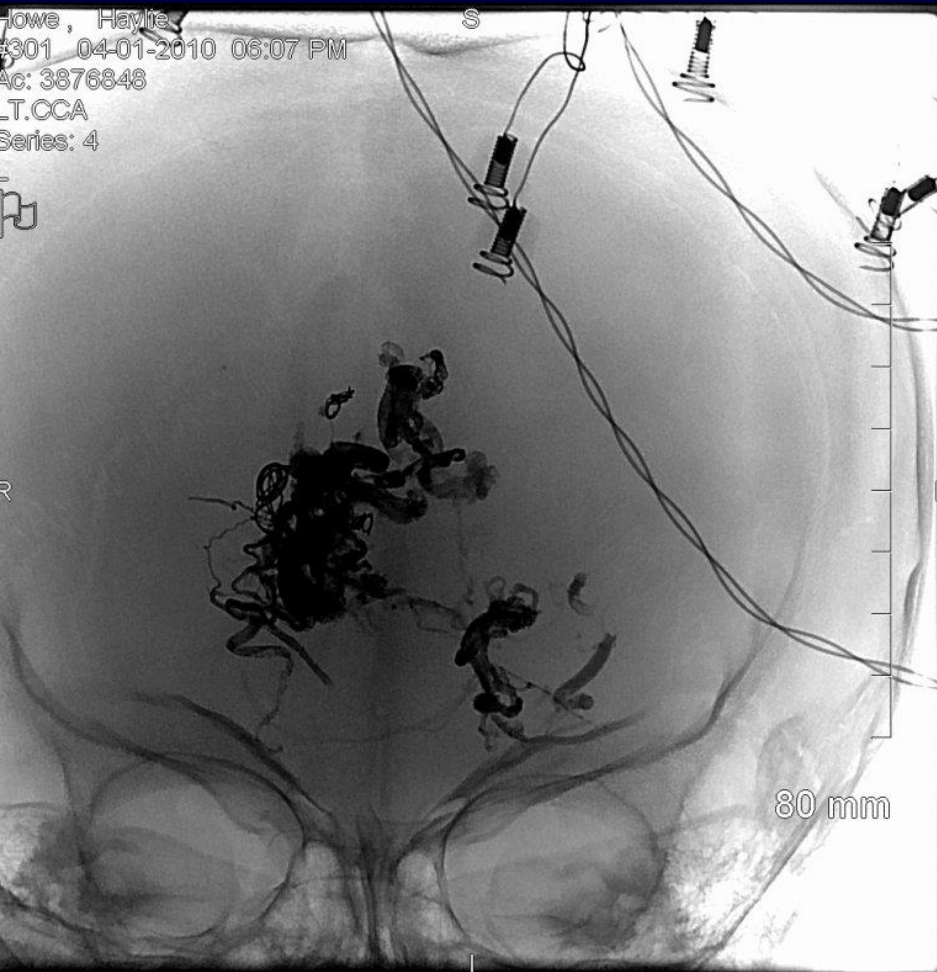
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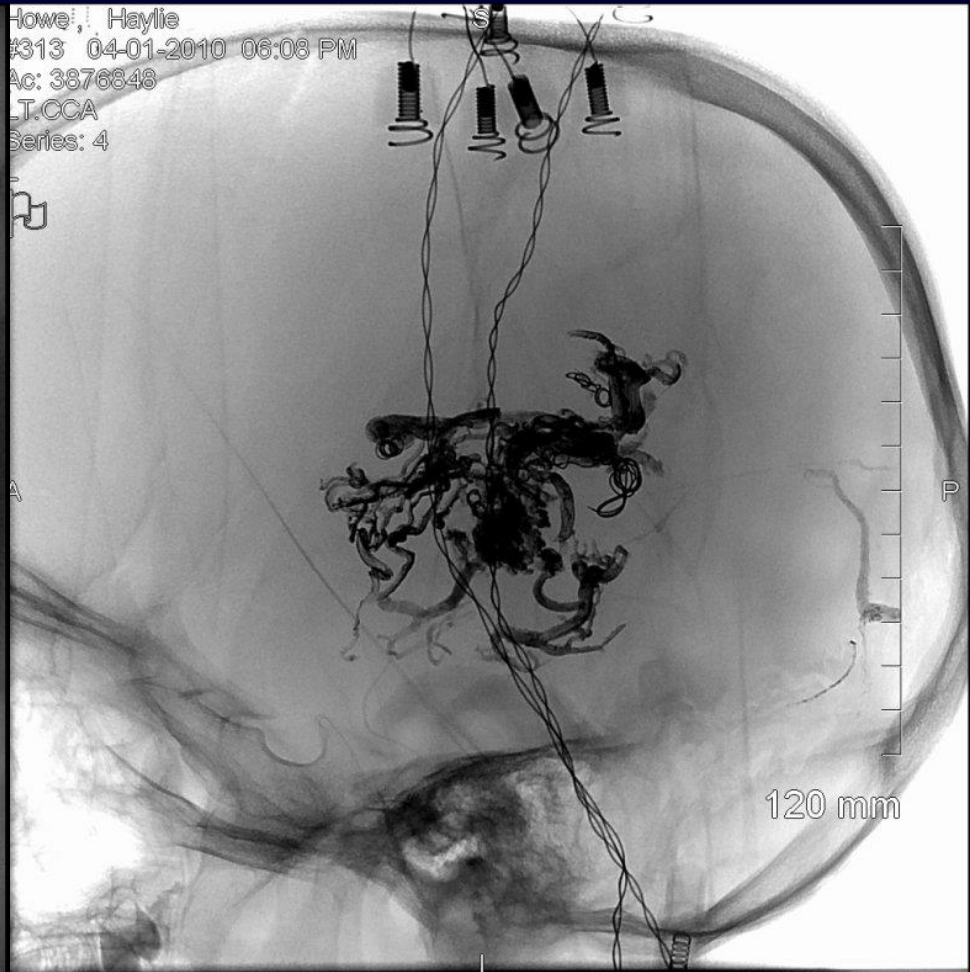




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LT.CCA
Series: 4



Howe, Haylie
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Ac: 3876848
LT.CCA
Series: 4



Howe, Haylie
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Ac: 3876848
LT.CCA
Series: 4



R

S

5-3-10



80 mm

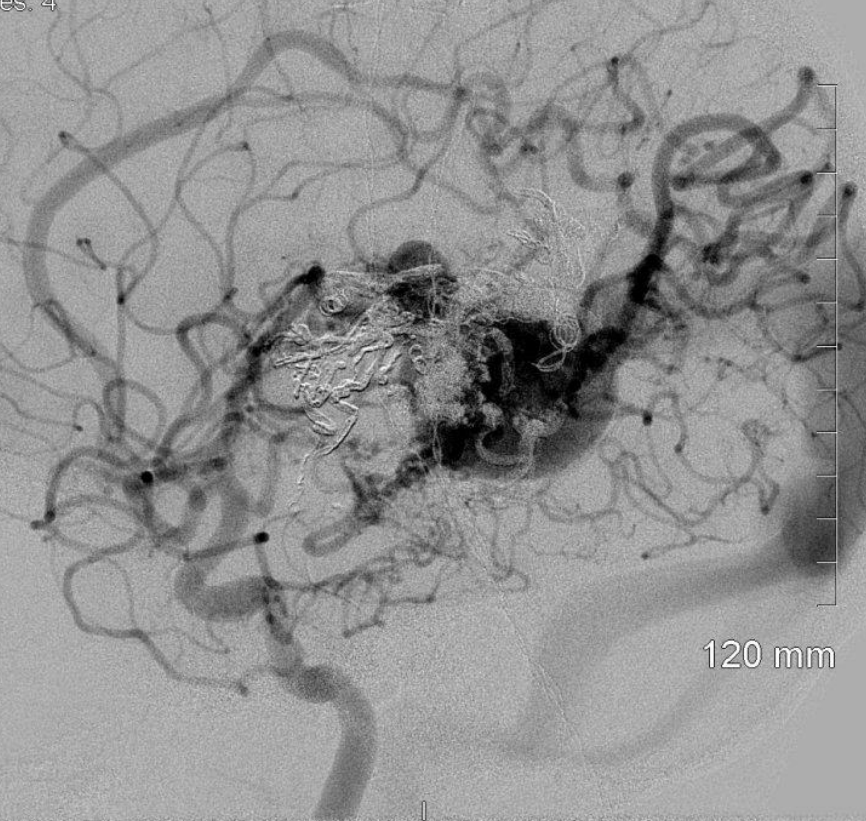
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LT.CCA
Series: 4



L

A

S



120 mm

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LT.VERT
Series: 7
L

Howe, Haylie
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Ac: 3676348
LT.VERT
Series: 7
L

Howe, Haylie
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Ac: 3676348
LT.VERT
Series: 7
L

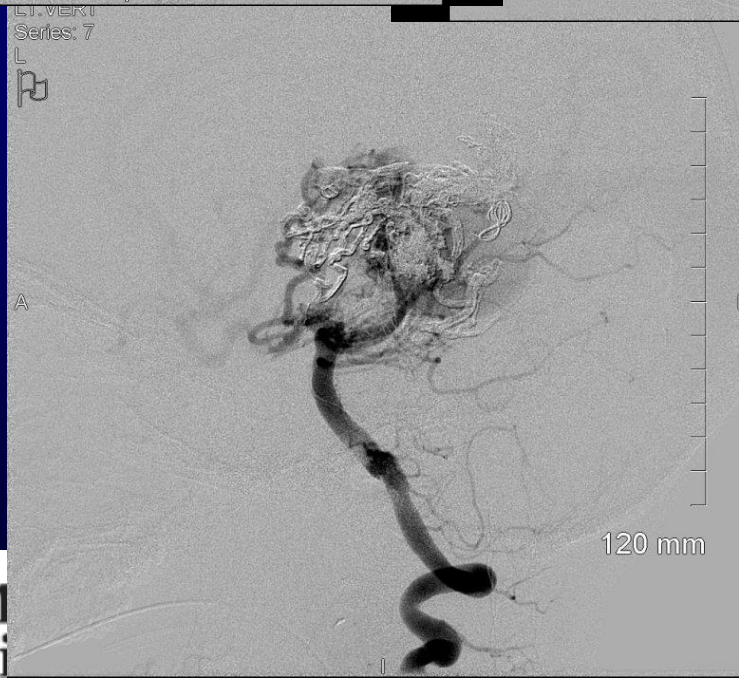
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5-3-10



LT.VERT
Series: 7
L



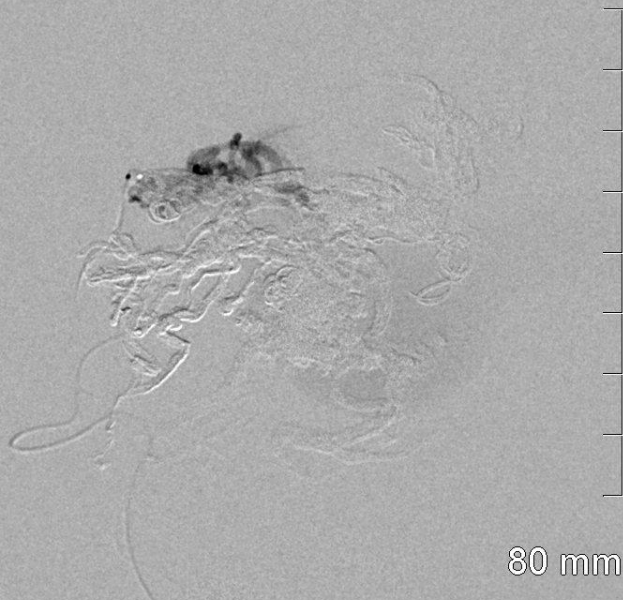
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Acc: 3901443
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A



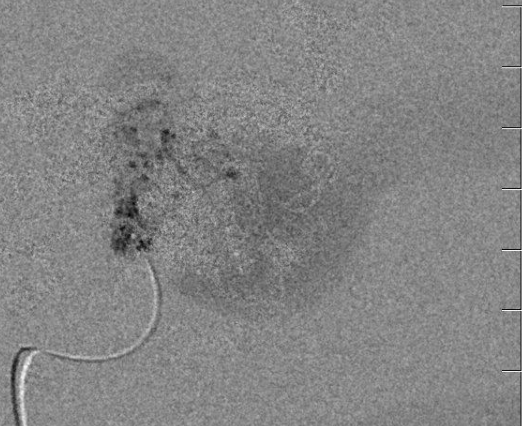
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S

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LT.PCA 7
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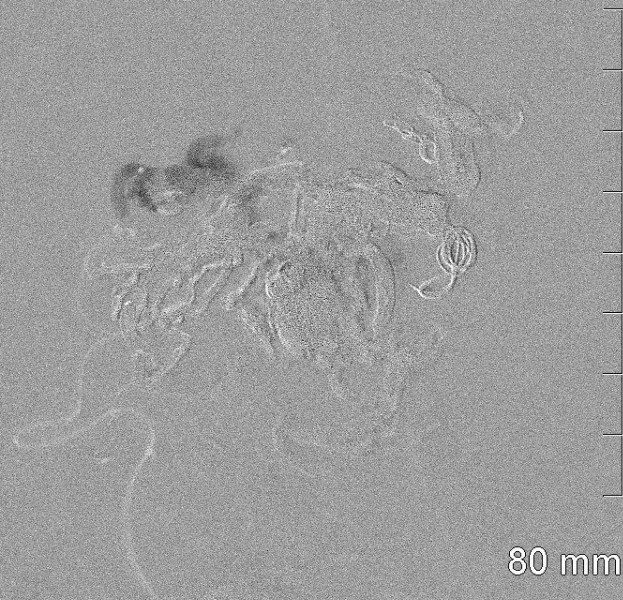
P A

5-3-10

Acc: 3901443
RM + Neuro
Series: 11



P A



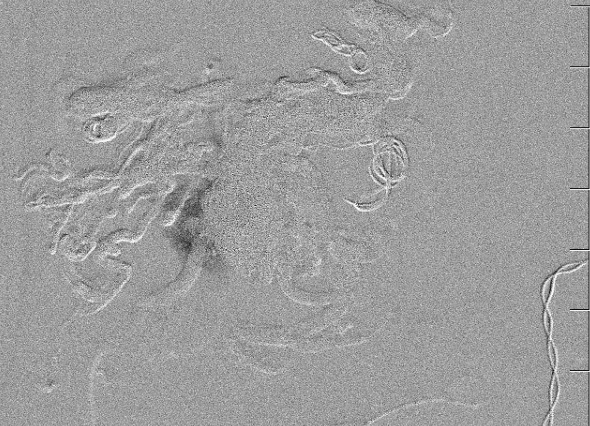
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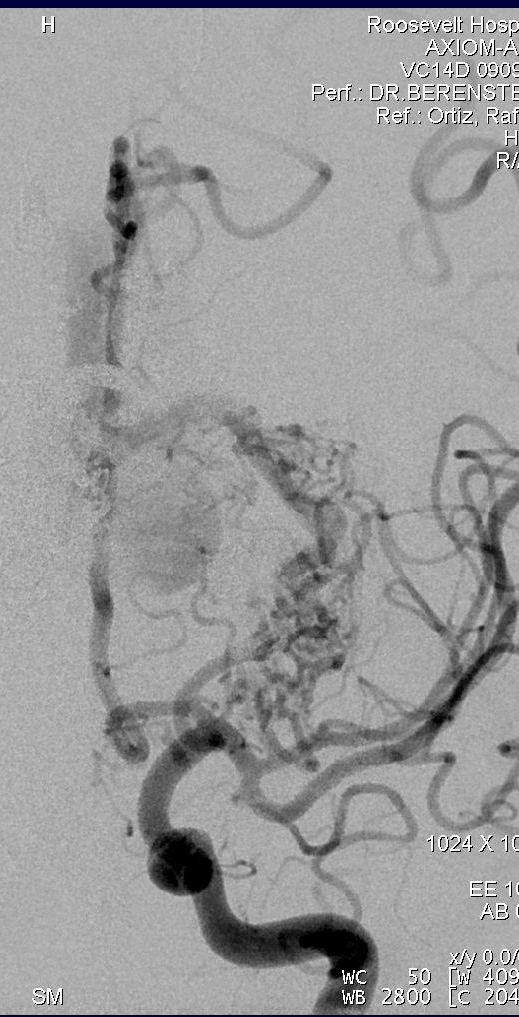
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RM + Neuro
Series: 22



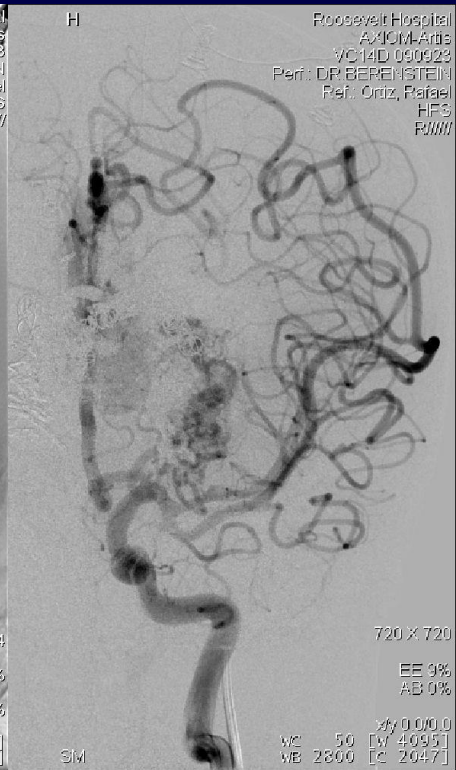
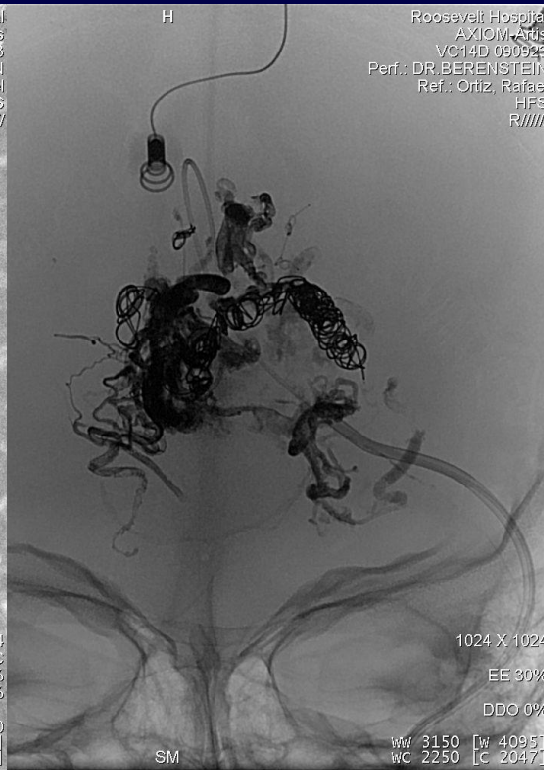
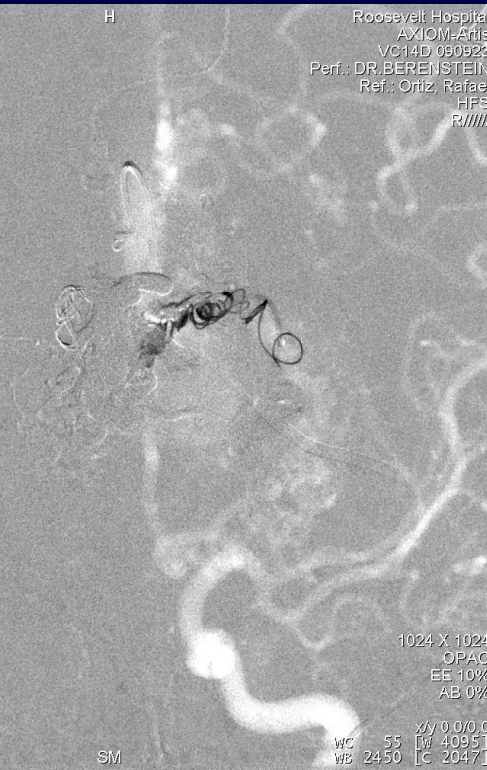
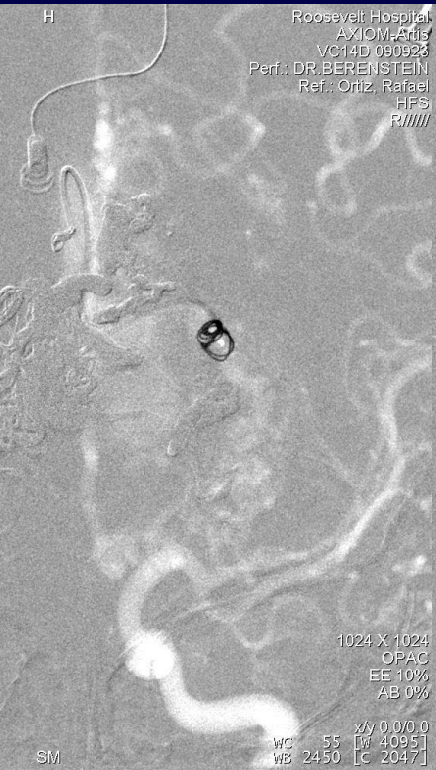
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P



5-3-10



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3/2/2011
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23 - 14/31
M 4
3.47 sec

AXIOM-Artis 4677071
VC14H 100914 *10/12/2008
Perf.: DR. ORTIZ
Ref.: Ortiz, Rafael
HFS
R/////
4129794
STUDY 45871883
3/2/2011
1:58:47 PM
23 - 20/31
M 4
5.07 sec

AXIOM-Artis 4677071
VC14H 100914
Perf.: DR. ORTIZ
Ref.: Ortiz, Rafael
HFS
R/////
4129794
STUDY 45871883
3/2/2011
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23 - 20/31
M 4
5.07 sec

R

R

LT.VERT PE 2
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KV 67
mA 195
D 1082
LAO 3° / CRAN 27°
STUDY 45871883
3/2/2011
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M 5
3.73 sec

1024 X 1024
EE 0%
AB 0%
KV 67
mA 195
D 1082
LAO 3° [W 4095]
WB 2047 [C 2047]
Ref.: Ortiz, Rafael
HFS
R/////
3-02-11

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A
KV 67
mA 195
D 1082
LAO 3° / CRAN 27°
STUDY 45871883
3/2/2011
1:58:47 PM
23 - 22/31
M 5
5.60 sec

1024 X 1024
EE 0%
AB 0%
KV 67
mA 195
D 1082
LAO 3° [W 4095]
WB 2047 [C 2047]
Ref.: Ortiz, Rafael
HFS
R/////
4129794
STUDY 45871883
3/2/2011
1:58:47 PM
23 - 22/31
M 5
5.60 sec

A

A

LT.VERT PE 2
cm 22
B
KV 67

1024 X 1024
EE 0%
AB 0%
KV 67

LT.VERT PE 2
cm 22
B
KV 67

1024 X 1024
EE 0%
AB 0%
KV 67



4677071
*10/12/2008
4307025
STUDY 47255104
9/29/2011
2:54:50 PM
32 - 15/33
M 2
3.73 sec

AXIOM-47071
VC14H-100914008
Perf: NIIMI
Ref: Ortiz, Rafael
STUDY 47255104
9/29/2011
2:50 PM
23/33
3.73 sec

AXIOM-Artis
VC14H-100914
Perf: NIIMI
Ref: Ortiz, Rafael
HFS
R/IIII

9-29-11

R

LT VERT CL #23
cm 32
A
KV 68
mA 183
D 778
LAO 2° / CRAN 10°

1024 X 1024
VERT CL #23
EE 32
AB
AA
xy 0.0 183
WC 4095 Df 4078
WB 2047 [c 200 2° / CRAN 10°

1024 X 1024
EE 0%
AB 0%
xy 0.0/0.0
WC 4095 [Df 4085]
WB 2047 [c 2047]

Roosevelt Hospital
AYIOM-Artis
VC14H-100914008
Perf: NIIMI
Ref: Ortiz, Rafael
HFS
R/IIII
M
3

Roosevelt Hospital
AYIOM-Artis
VC14H-100914008
Perf: NIIMI
Ref: Ortiz, Rafael
HFS
R/IIII
M
3

Roosevelt Hospital
AYIOM-Artis
VC14H-100914008
Perf: NIIMI
Ref: Ortiz, Rafael
HFS
R/IIII
M
3

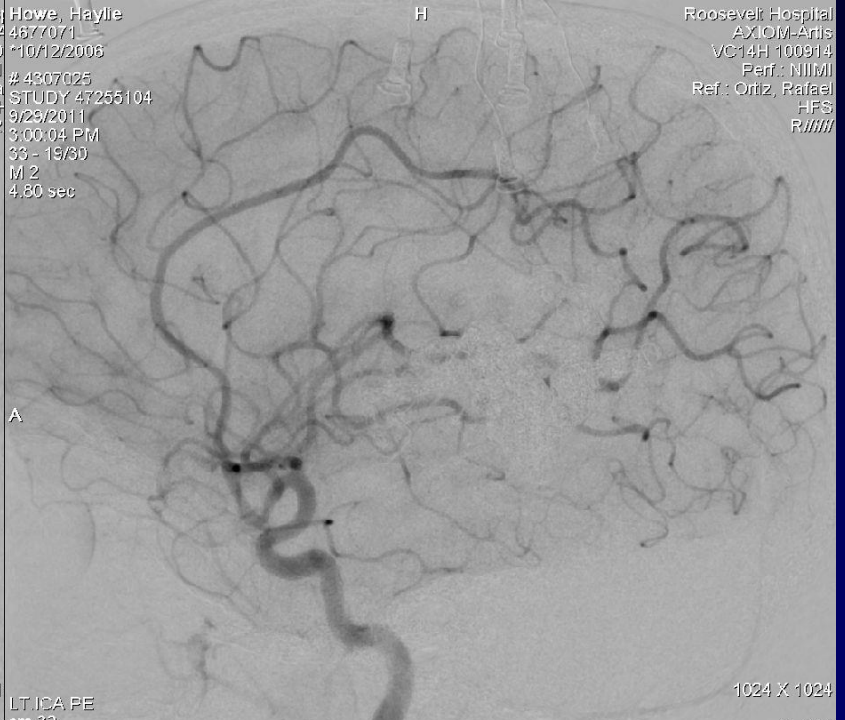
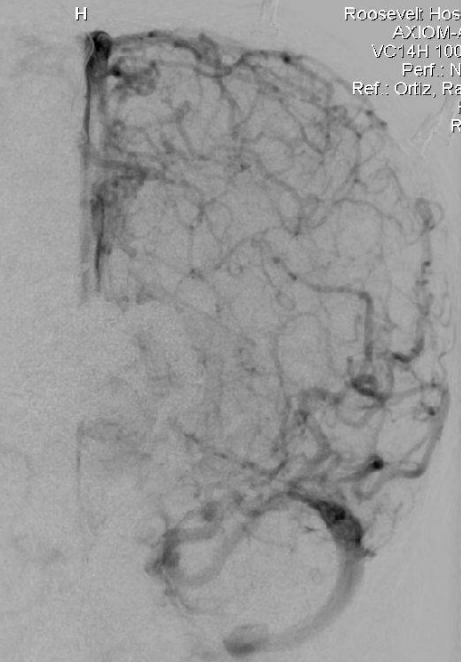
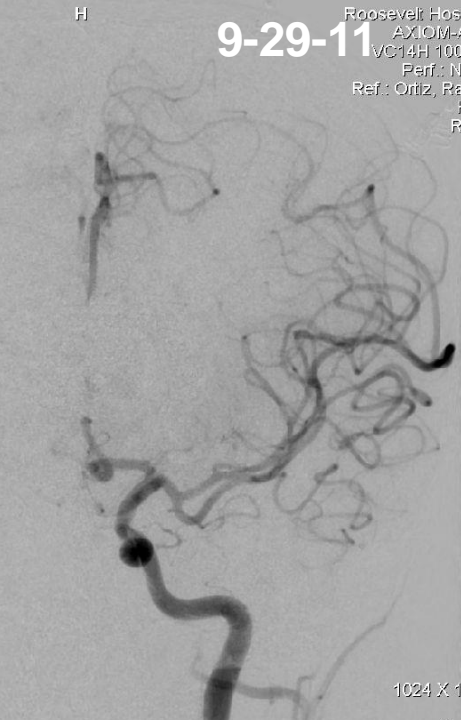
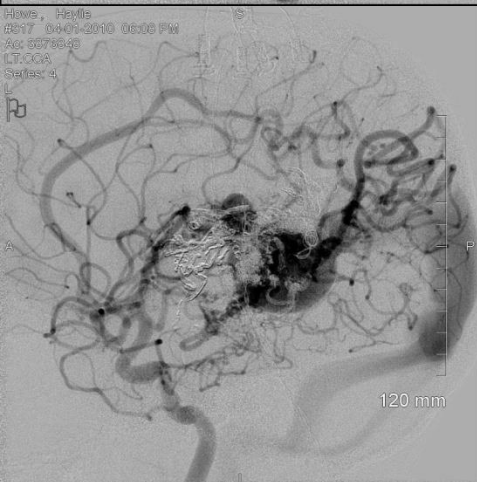
aylie
008
5
7255104
M
3

CL #23

1024 X 1024
CL #23
EE 0%

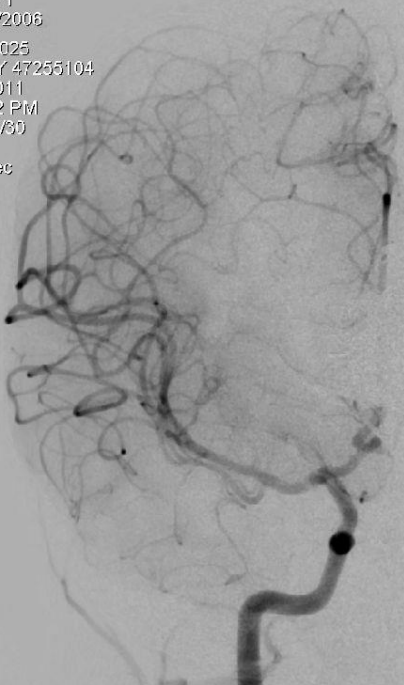
1024 X 1024
CL #23
EE 0%

1024 X 1024
EE 0%



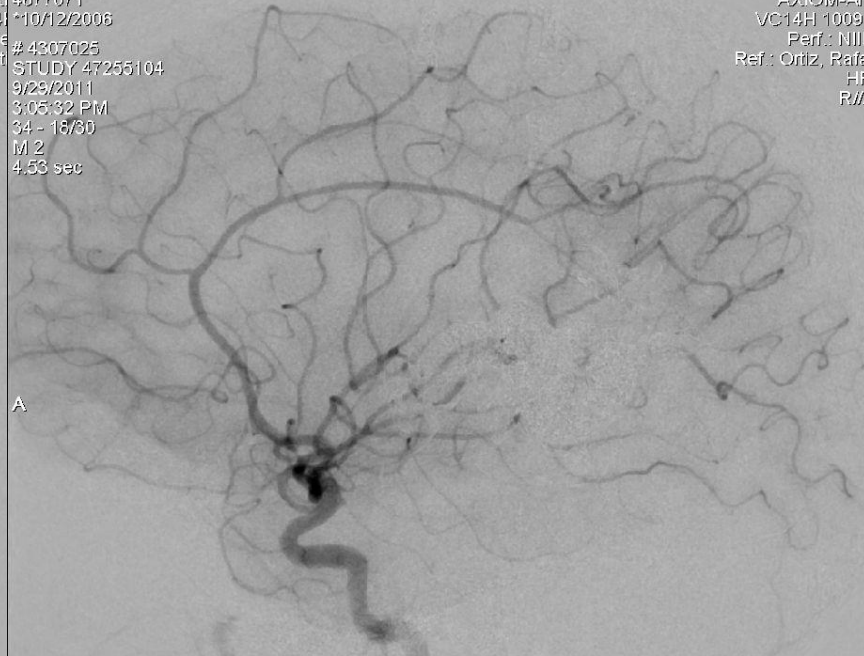
Howe, Haylie
4677071
*10/12/2006
4307025
STUDY 47255104
9/29/2011
3:05:32 PM
34 - 17/30
M 2
4.27 sec

R



Roosevelt
AXI 4677071
VC14H *10/12/2006
Pa
4307025
STUDY 47255104
9/29/2011
3:05:32 PM
34 - 18/30
M 2
4.53 sec

A



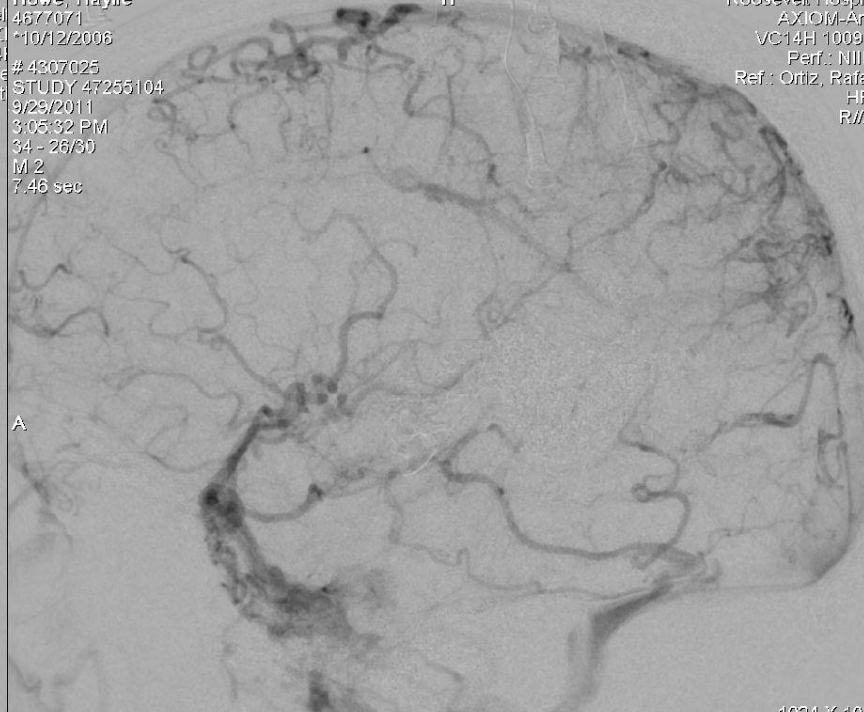
Howe, Haylie
4677071
*10/12/2006
4307025
STUDY 47255104
9/29/2011
3:05:32 PM
34 - 27/30
M 2
7.99 sec

R



Roosevelt
AXI 4677071
VC14H *10/12/2006
Pa
4307025
STUDY 47255104
9/29/2011
3:05:32 PM
34 - 26/30
M 2
7.46 sec

A



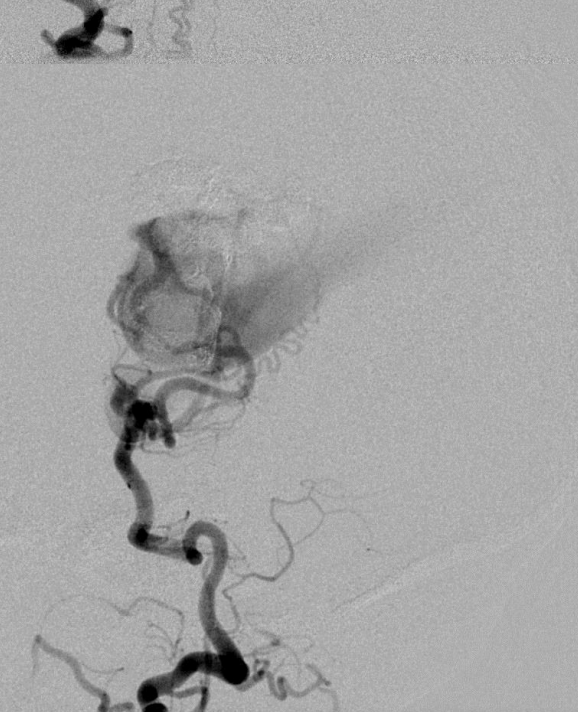
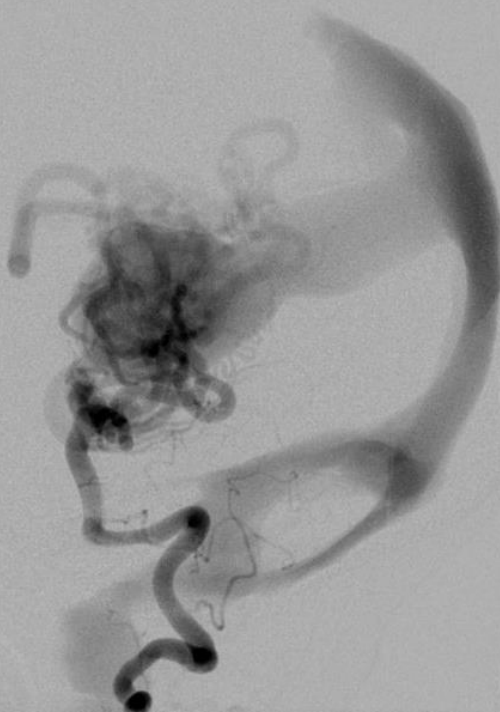
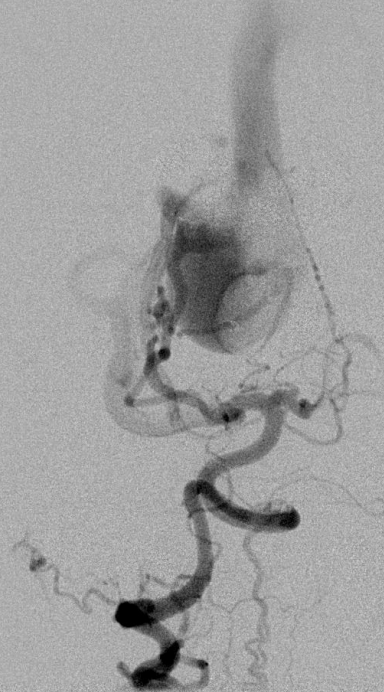
Roosevelt Hospital
AXIOM-Artis
VC14H 100814
Perf.: NIMM
Ref.: Ortiz, Rafael
HFS
R/11/11

Roosevelt Hospital
AXIOM-Artis
VC14H 100814
Perf.: NIMM
Ref.: Ortiz, Rafael
HFS
R/11/11

PRE-EMBO



POST-EMBO



12-07-05



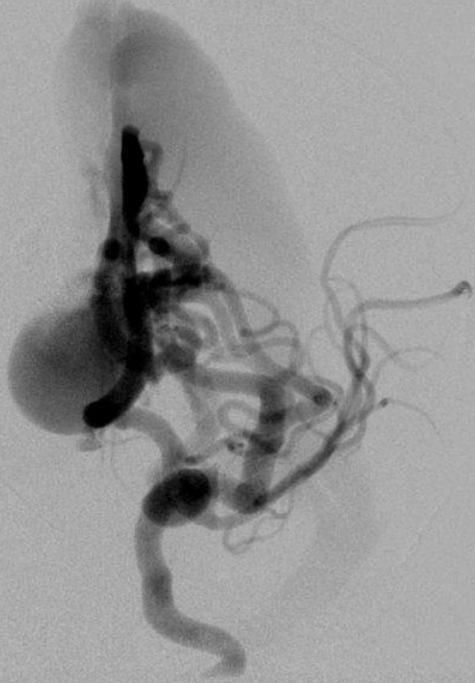
12-07-05



PRE-EMBO

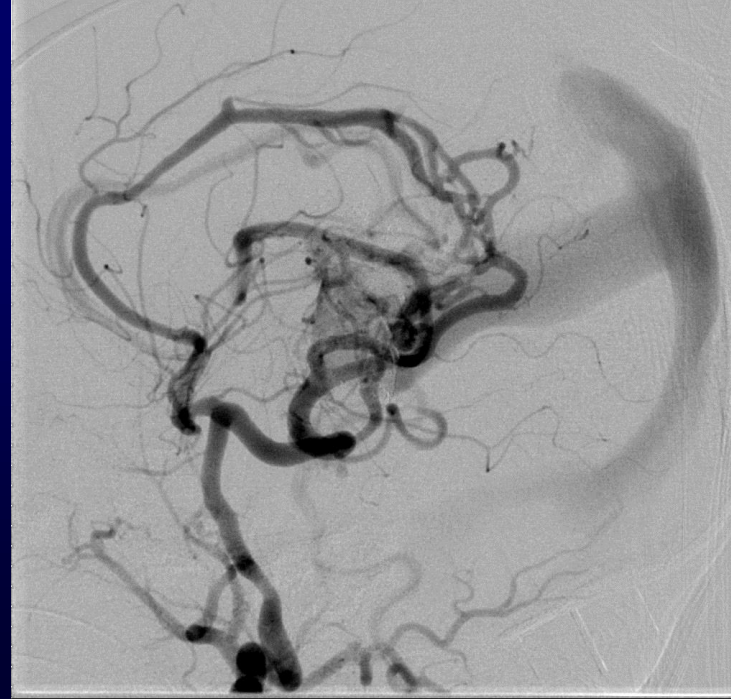
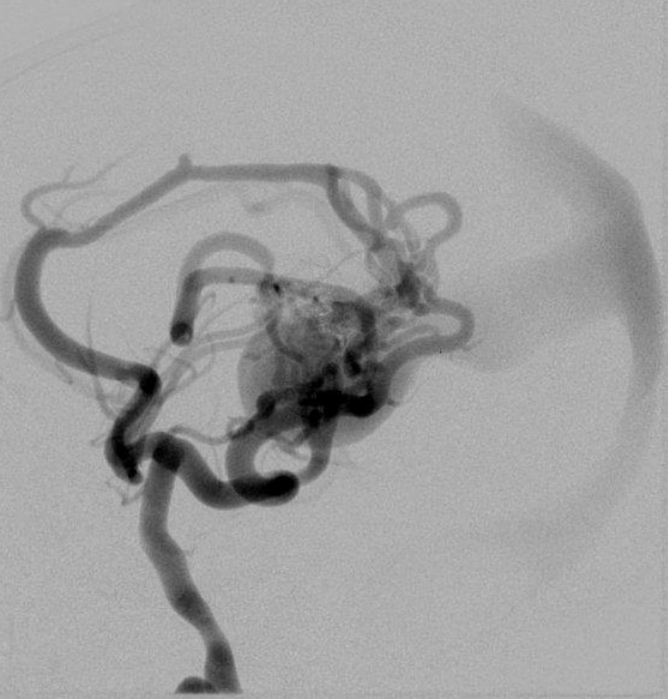


PRE-EMBO



12-07-05

POST-EMBO

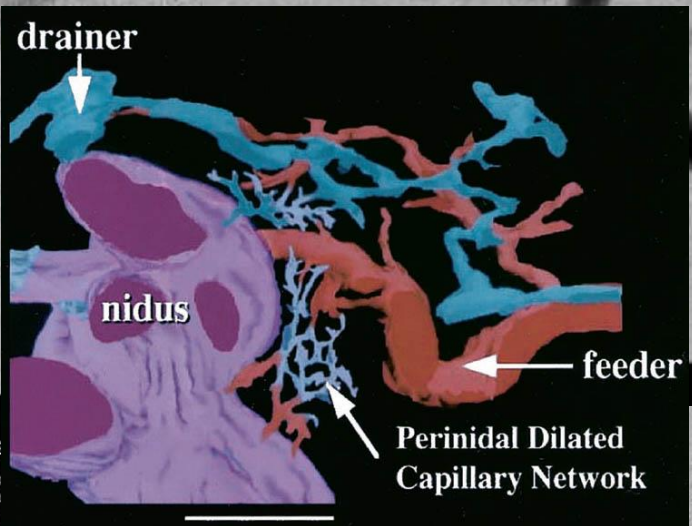
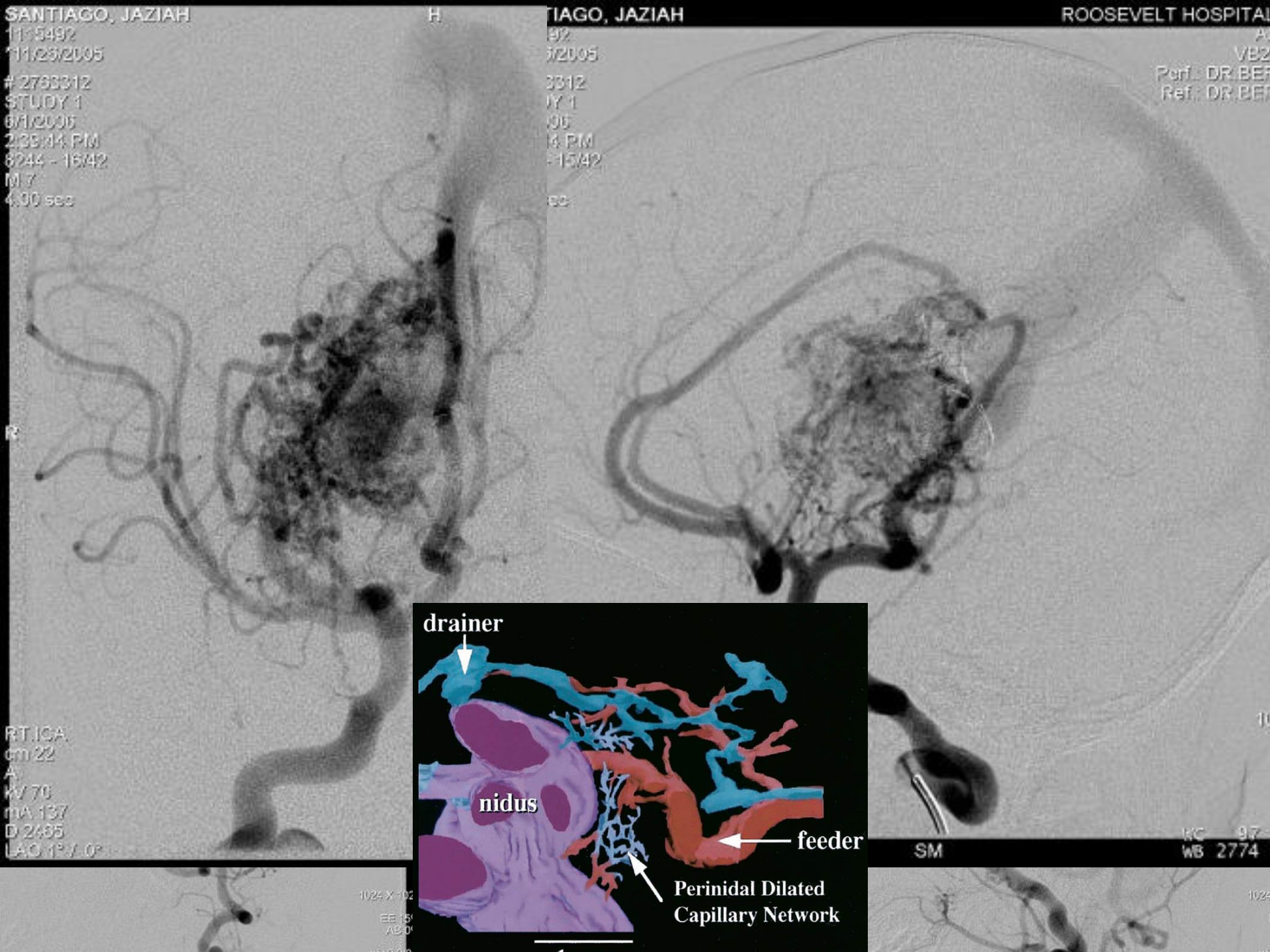


SANTIAGO, JAZIAH
11:5492
11/23/2005
2733312
STUDY 1
6/1/2005
2:28:14 PM
8244 - 15/42
M 7
4.00 sec

H
TIAGO, JAZIAH
92
7/2005
3312
1Y 1
05
14 PM
-15/42
02

ROOSEVELT HOSPITAL
A
VB2
Perf. DR. BEF
Ref. DR. BEF

RT ICA
cm 22
A
KV 70
mA 137
D 2485
LAC 1°/0°



1024 X 102
EE 15
AS 0

WC 97
WB 2774

1024

Santiago, Jaziah, E.
1115487
111232005
#3077618
STUDY 1355863
7/6/2007
12:40:36 PM
8749 - 1317
M3
5:22 sec

ROOSEVELT HOSPITAL-ROOM3
AXIOM-ARTIS
VB3: B 07/04/2007
Perf: DR. SONO
Ref: Berenstein, Alejandro
HFS
FWW

Santiago, Jaziah, E.
1115487
111232005
#3077618
STUDY 1355863
762007
12:41:12 PM
12506 - 7017
K2
1:00 sec

ROOSEVELT HOSPITAL-ROOM3
AXIOM-ARTIS
VB3: B 07/04/2007
Perf: DR. SONO
Ref: Berenstein, Alejandro
HFS
FWW

RT, ACA 1
SM 22
E
KV 37
MA 140
D 2504
RAO 92° / 0°

7/6/2007

W 0000
MC 1.80
WB 2400

725 X 725
E2 (RM)
VB108
W 0000
MC 1.80
WB 2400

Santiago, Jaziah, E.
1115487
111232005
#3077618
STUDY 1355863
762007
11:12:11 PM
8249 - 23363
K1

ROOSEVELT HOSPITAL-ROOM3
AXIOM-ARTIS
VB3: B 07/04/2007
Perf: DR. SONO
Ref: Berenstein, Alejandro
HFS
FWW

Santiago, Jaziah, E.
1115487
111232005
#3077618
STUDY 1355863
762007
11:12:11 PM
8249 - 23363
K1

ROOSEVELT HOSPITAL-ROOM3
AXIOM-ARTIS
VB3: B 07/04/2007
Perf: DR. SONO
Ref: Berenstein, Alejandro
HFS
FWW

Perf: new
sm 11
E
KV 33
MA 51
D 2504

725 X 725
E2 (RM)
VB108
W 0000
MC 1.80
WB 2400

725 X 725
E2 (RM)
VB108
W 0000
MC 1.80
WB 2400



Serizaga, Jaziah, E.
111597
7/10/2007
#2007018
STUDY 195863
762307
12:10 PM
15746 - 1120
63
3.72 sec

ROOSEVELT HOSPITAL ROOM
S-1564ms
VESIE074242
Paw: DR. SCARF
Paw: Bernstein, Ajayoko
FES
PWW

Serizaga, Jaziah, E.
111597
7/10/2007
#2007018
STUDY 195863
762307
12:10 PM
15746 - 1120
63
3.72 sec

ROOSEVELT HOSPITAL ROOM
S-1564ms
VESIE074242
Paw: DR. SCARF
Paw: Bernstein, Ajayoko
FES
PWW

7/6/2007

PT. POVA
cm 10
E
R772
M5 171
E1235
Paw: SCARF
S-1564ms
VESIE074242
Paw: DR. SCARF
Paw: Bernstein, Ajayoko
FES
PWW

ROOSEVELT HOSPITAL ROOM
S-1564ms
VESIE074242
Paw: DR. SCARF
Paw: Bernstein, Ajayoko
FES
PWW

726 x 726
cm 10
E
R772
M5 171
E1235
Paw: SCARF
S-1564ms
VESIE074242
Paw: DR. SCARF
Paw: Bernstein, Ajayoko
FES
PWW

ROOSEVELT HOSPITAL ROOM
S-1564ms
VESIE074242
Paw: DR. SCARF
Paw: Bernstein, Ajayoko
FES
PWW

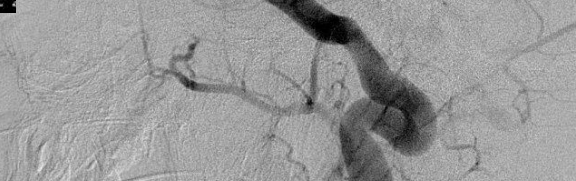
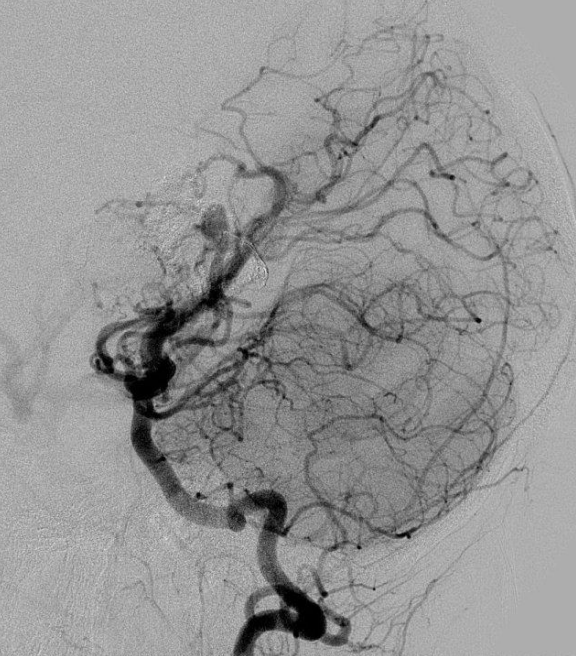
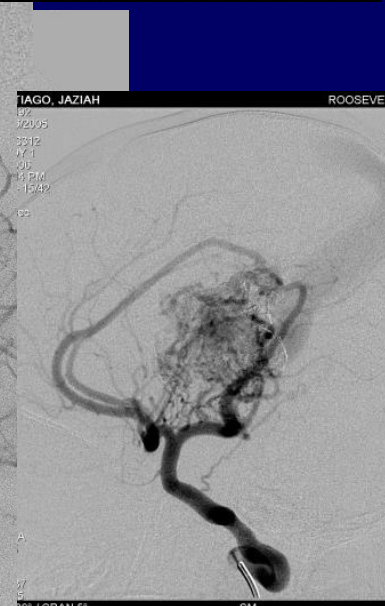
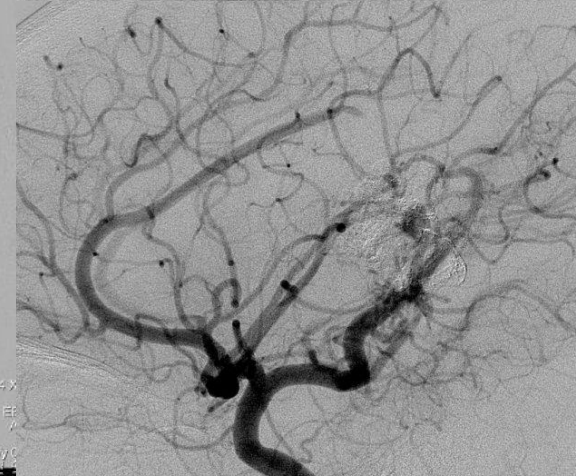
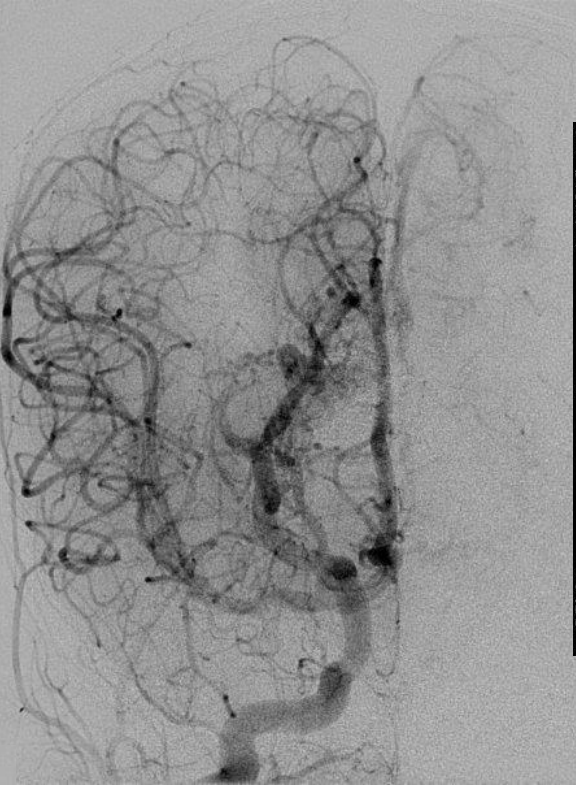
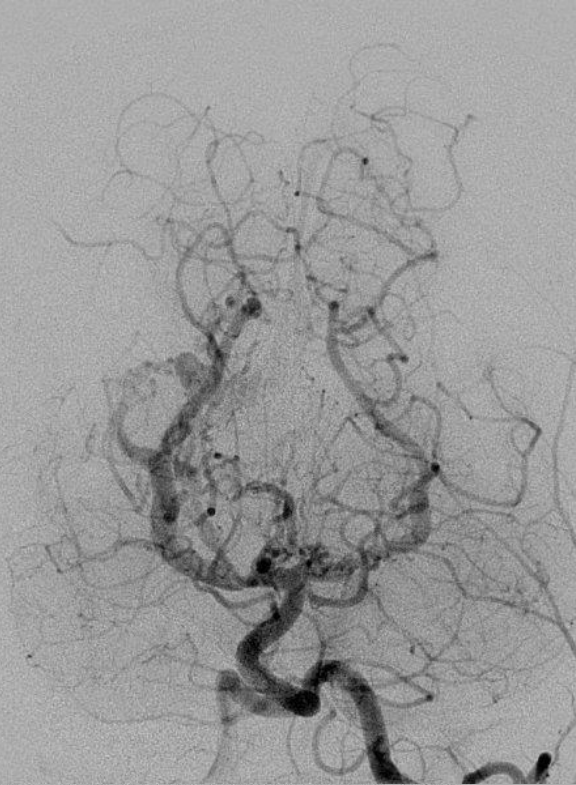
MERC 12
cm 11
E
R772
M5 171
E1235
Paw: SCARF
S-1564ms
VESIE074242
Paw: DR. SCARF
Paw: Bernstein, Ajayoko
FES
PWW

ROOSEVELT HOSPITAL ROOM
S-1564ms
VESIE074242
Paw: DR. SCARF
Paw: Bernstein, Ajayoko
FES
PWW

726 x 726
cm 11
E
R772
M5 171
E1235
Paw: SCARF
S-1564ms
VESIE074242
Paw: DR. SCARF
Paw: Bernstein, Ajayoko
FES
PWW

ROOSEVELT HOSPITAL ROOM
S-1564ms
VESIE074242
Paw: DR. SCARF
Paw: Bernstein, Ajayoko
FES
PWW





IAH H ROOSEVELT HOSPIT
VI
Puff DR B
Ref: DR B

SM KC 5
WB 280

SANTIAGO, JAZIAH
11/29/2005
272312
STUDY 1
01/20/05
08:14:14M
3742 - 1542
M 7
4.00 sec

RTICA
cm 22
7
M 70
M 137
D 2486
1/20/05

IAHO, JAZIAH ROOSEVELT

11/29/05
272312
STUDY 1
01/20/05
08:14:14M
3742 - 1542

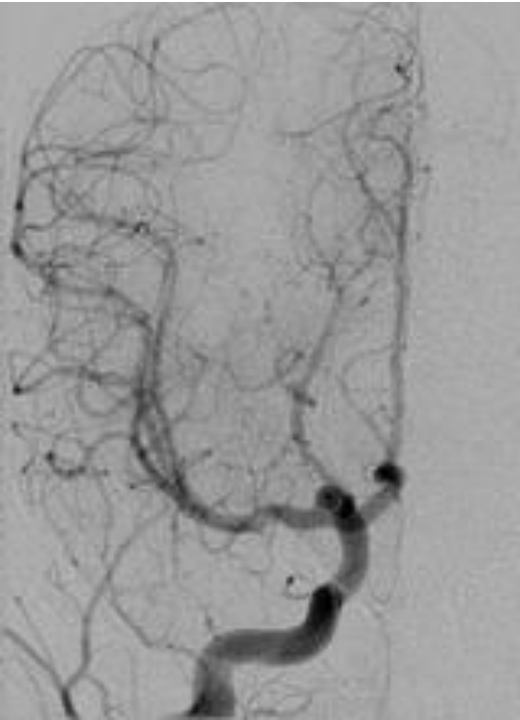
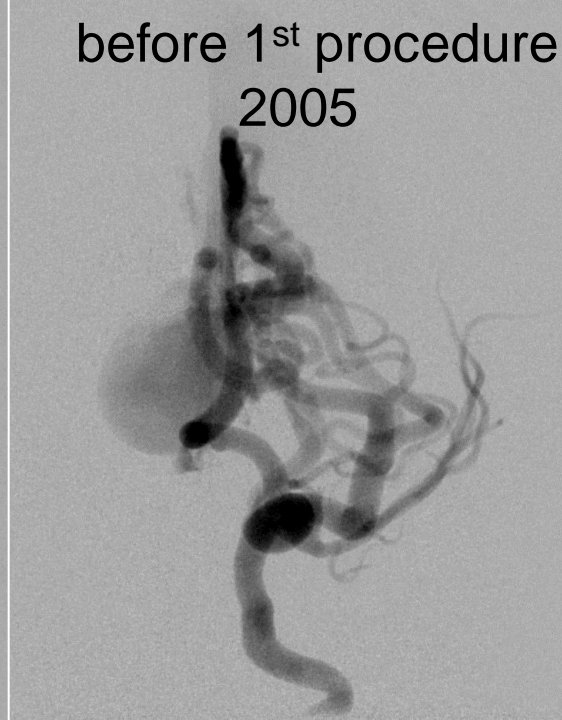
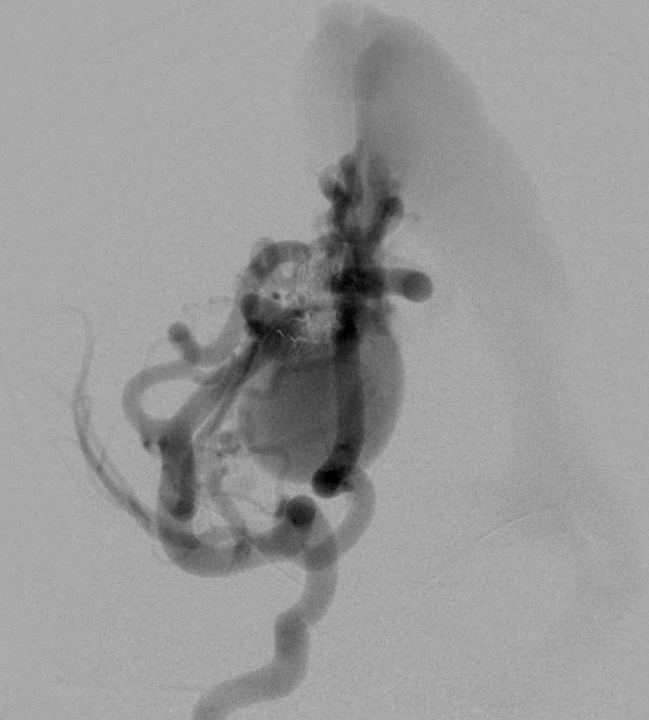
1024 X
FE 7
KC 60
WB 2800

SM KC 60
WB 2800 [C 2

1024 X
FE 7
KC 60
WB 2800

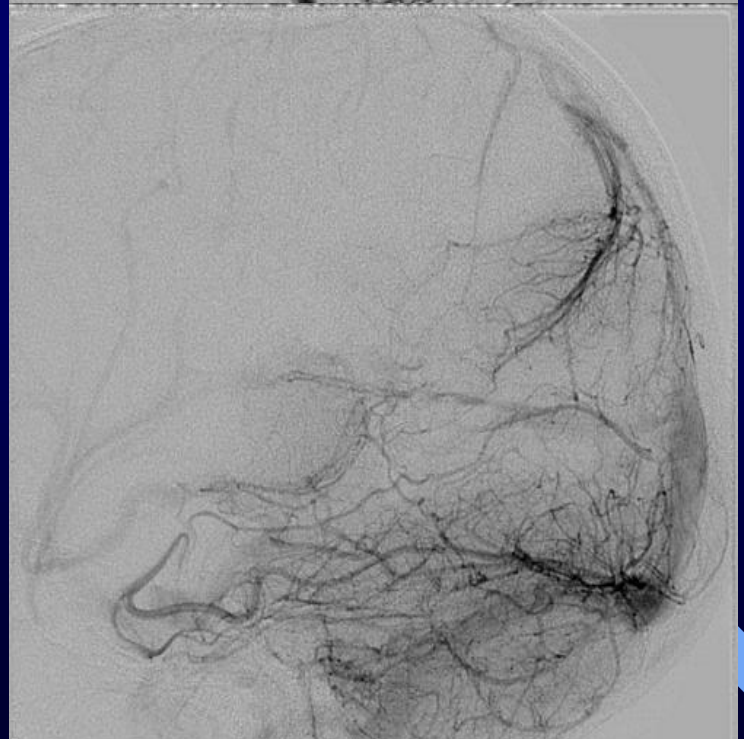
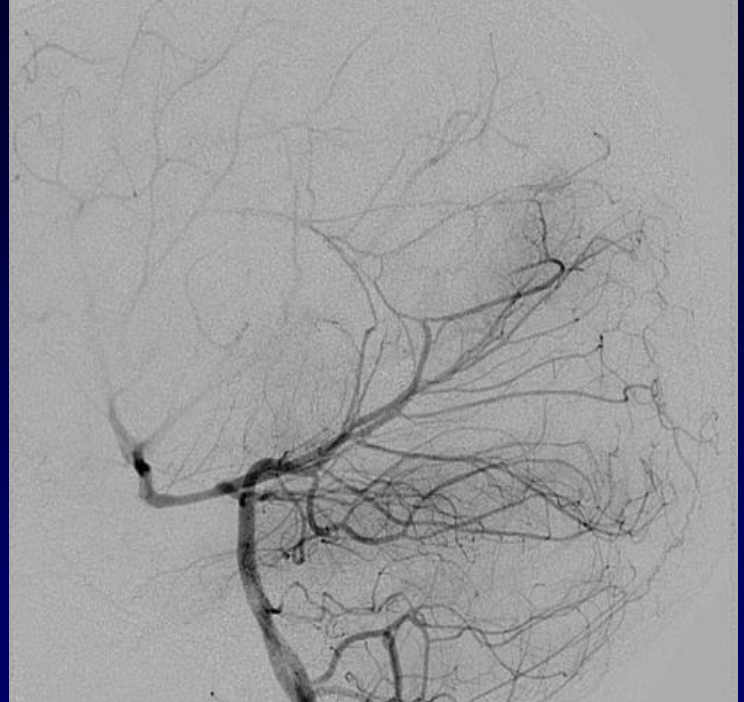
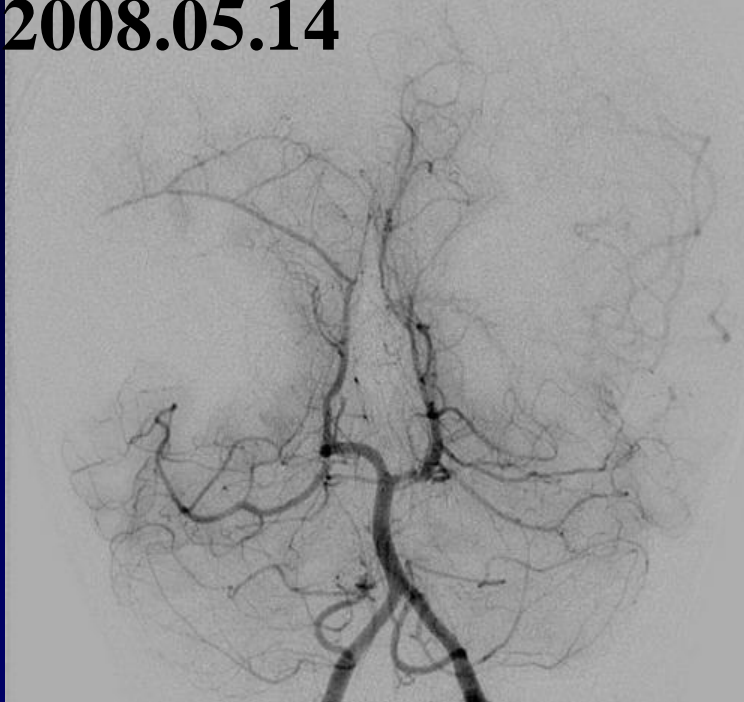
SM 39° / CRAN 5°







2008.05.14

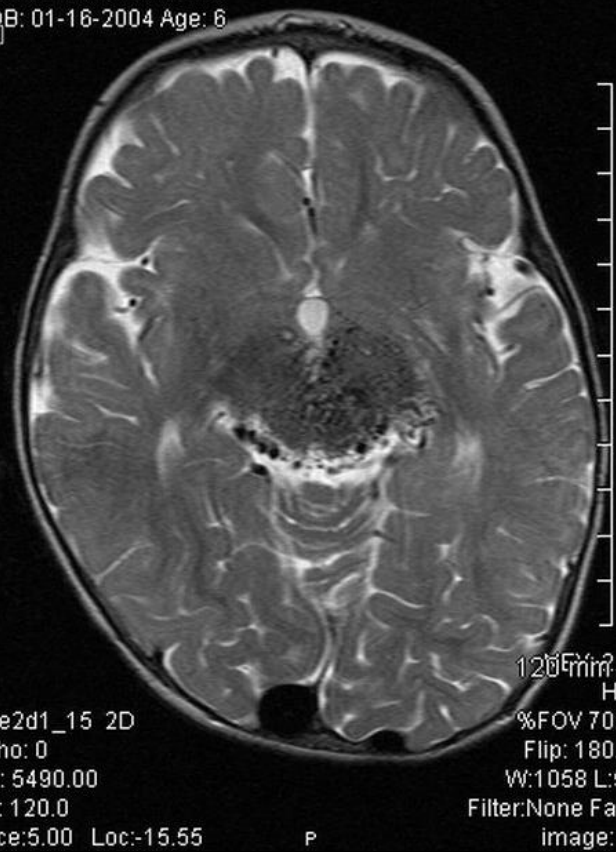


Morgan
102382
02079
005 03:21 PM
BRAIN*ROUTINE
01-16-2004 Age: 6

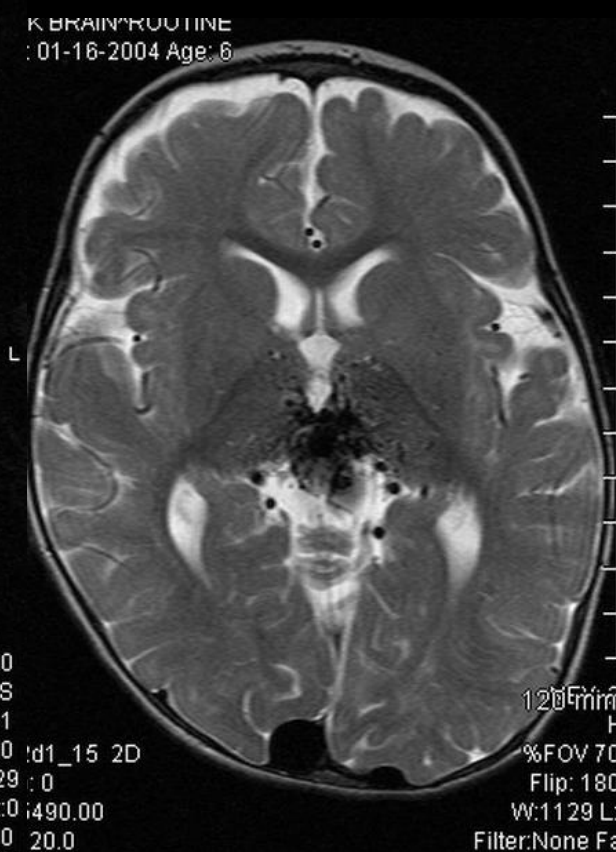
COOK'S CHILDREN'S MEDICAL CENT COOK BRAIN*ROUTINE
Symphony MRC23 01-16-2004 Age: 6



512 x 448 x
NEX: 2
120 min
%FOV 87 *tse2d1_15 2D
Flip: 90 Echo: 0
W: 773 L: TR: 5490.00
Filter: None Fa TE: 120.0
image: Slice: 5.00 Loc: -15.55



120 min
HFS
%FOV 70.31
Flip: 180.00 tse2d1_15 2D
W: 1058 L: 529
Filter: None Fact: 0
image: 10 20.0
Slice: 5.00 Loc: -9.80

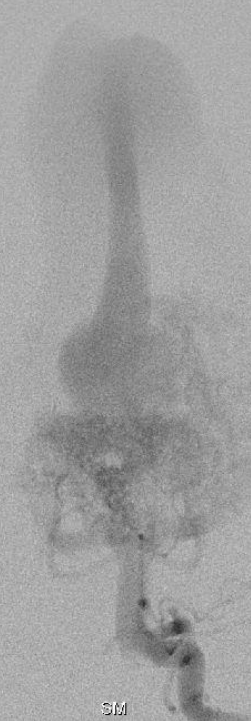


120 min
H
%FOV 70
Flip: 180
W: 1129 L:
Filter: None Fa
image:

2459088
STUDY 1
4/1/2005
12:39:00 PM
8241 - 19/38
M 4
4.00 sec

Perf.: DR. BERENSTEIN
Ref.: Berenstein, Alpa
2459088
STUDY 1
4/1/2005
12:39:00 PM
8241 - 19/38
M 4
4.80 sec

Perf.: DR. BERENSTEIN
Ref.: Berenstein, Alpa
2459088
STUDY 1
4/1/2005
12:39:00 PM
8241 - 19/38
M 4
4.80 sec



R

LT VERT
cm 22
A
KV 71
mA 149
D 3730
RAO 3° / CRAN 17°

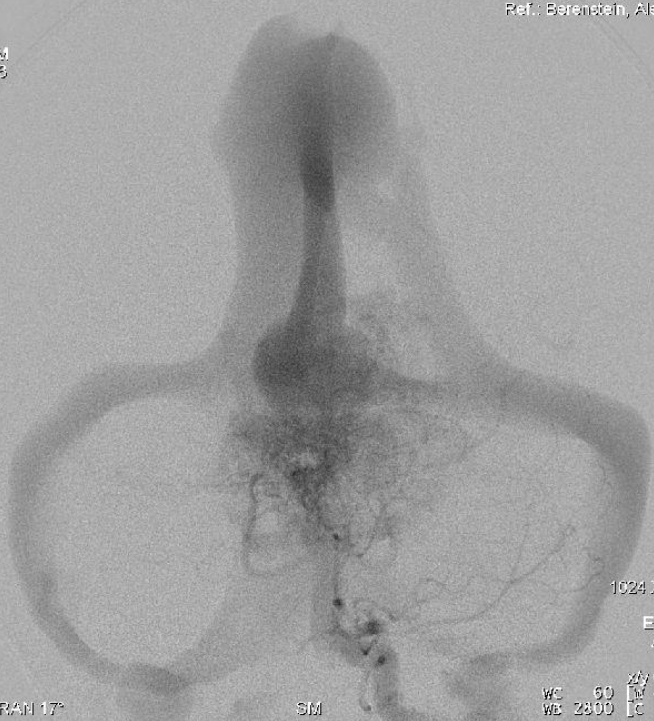
SM



R

LT VERT
cm 22
A
KV 71
mA 149
D 3730
RAO 3° / CRAN 17°

SM



1024 X 1024

EE 15
AB 0

WE 69
WE 2800
zfy 0.075
TC 4096
IC 2048

SM

VR22D 041
Perf.: DR. BERENSTEIN
Ref.: Berenstein, Alpa

VR22D 042
Perf.: DR. BERENSTEIN
Ref.: Berenstein, Alpa

VR22D 0412
Perf.: DR. BERENSTEIN
Ref.: Berenstein, Alpa

CRAN 17°

M

38

F

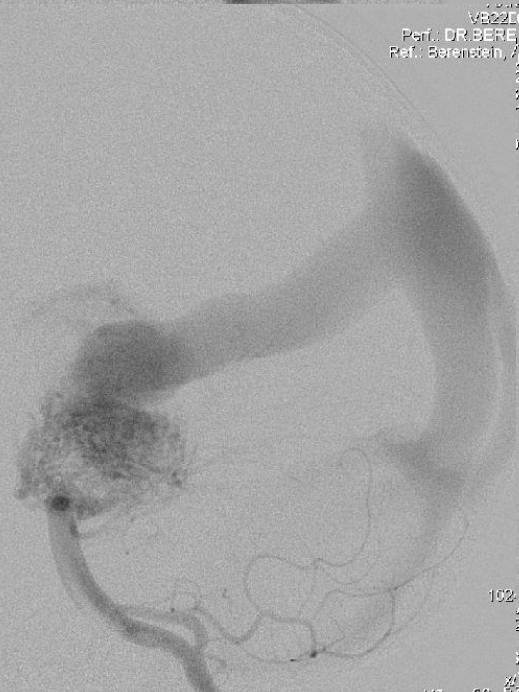
1 sec



1024 X 1

EE -
AB

zfy 0.0



1024 X 1

VERT
25

zfy 0.0



1024 X 1024

EE 15
AB 0

zfy 0.075

LACY, MORGAN
1102382
*1/16/2004
2459066
STUDY 1
4/1/2005
12:44:15 PM
3 - 18/36
M 3
4.00 sec

ROOSEVELT HOSPITAL ROOM2
AXIOM-ARTIS
VB22D 041220
BERENSTEIN
HFS
/com/III/ER/

LACY, MORGAN
1102382
*1/16/2004
2459066
STUDY 1
4/1/2005
12:44:15 PM
3 - 18/36
M 5
4.56 sec

ROOSEVELT HOSPITAL ROOM2
AXIOM-ARTIS
VB22D 041220
BERENSTEIN
HFS
/com/III/ER/

RT CCA
cm 22
A
KV 74
mA 144
D 3882
LAO 2° / CRAN 12°

1024
EE 15%
AB 0%
x/y 0.0/0.0
WC 47 [W 4096]
WB 2798 [C 2048]

RT CCA
cm 20
B
KV 70
mA 141
D 3707
RAO 84° / CRAN 1°

1024
EE 15%
AB 0%
x/y 0.0/0.0
WC 60 [W 4096]
WB 2800 [C 2048]

LACY, MORGAN
1102382
*1/16/2004
2459066
STUDY 1
4/1/2005
12:48:56 PM
4 - 18/41
M 3
4.00 sec

ROOSEVELT HOSPITAL ROOM2
AXIOM-ARTIS
VB22D 041220
BERENSTEIN
HFS
/com/III/ER/

LACY, MORGAN
1102382
*1/16/2004
2459066
STUDY 1
4/1/2005
12:48:56 PM
4 - 18/41
M 5
4.00 sec

ROOSEVELT HOSPITAL ROOM2
AXIOM-ARTIS
VB22D 041220
BERENSTEIN
HFS
/com/III/ER/

LT CCA
cm 22
A
KV 74
mA 143
D 3639
LAO 2° / CRAN 12°

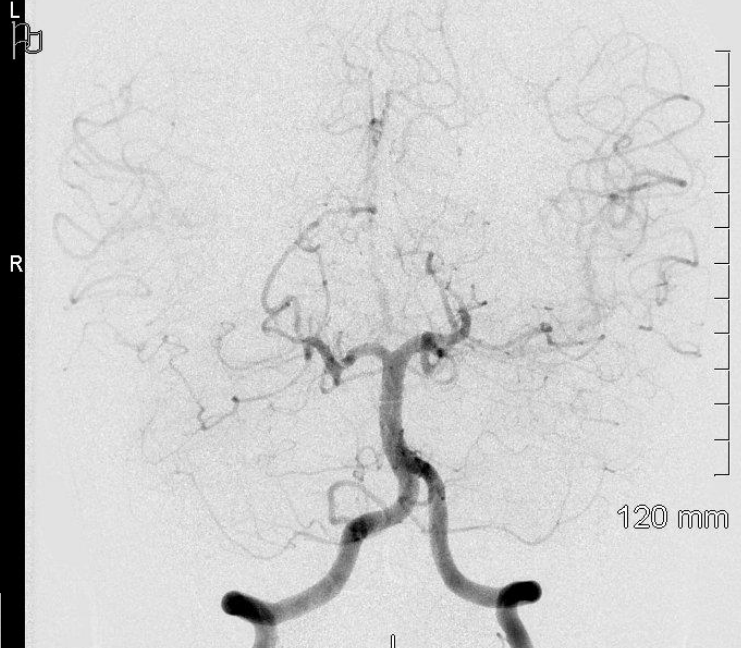
1024
EE 15%
AB 0%
x/y 0.0/0.0
WC 60 [W 4096]
WB 2800 [C 2048]

RT CCA
cm 25
B
KV 70
mA 141
D 3707
RAO 84° / CRAN 1°

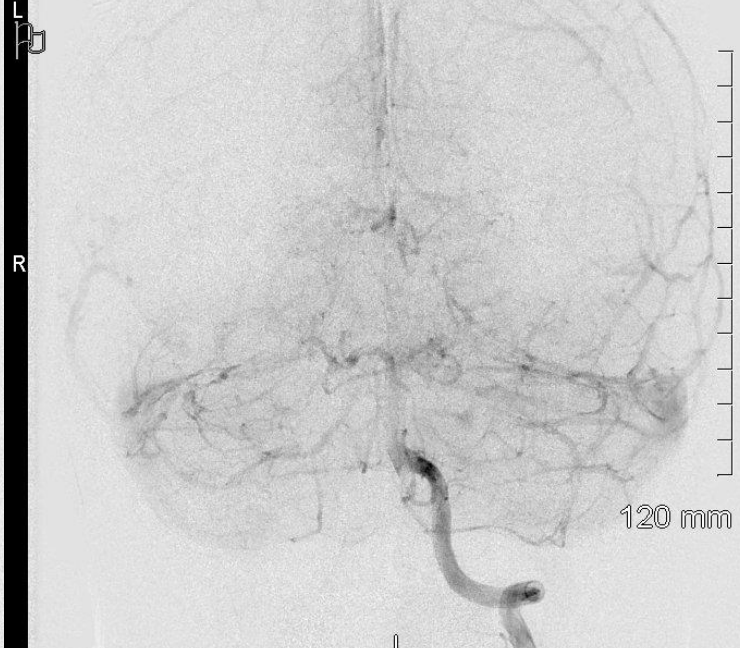
1024
EE 15%
AB 0%
x/y 0.0/0.0
WC 60 [W 4096]
WB 2800 [C 2048]



Ac. 98000;
LT.VERT PE
Series: 17



Ac. 98000;
LT.VERT PE
Series: 17



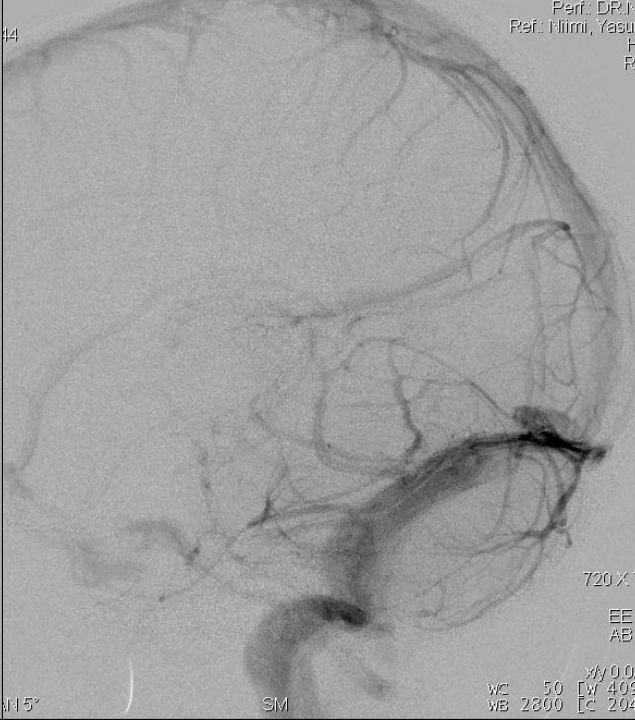
jen
1444
M

0
Ref: 2181444
0
AM
4

7-15-10

Perf: DR.NIMI
Ref: Nirmi, Yasunari
HFS
F/1111

Roosevelt Hosp
AXIOM-A
VC14D 090
Perf: DR.N
Ref: Nirmi, Yasu
F
R



CRAN 5°

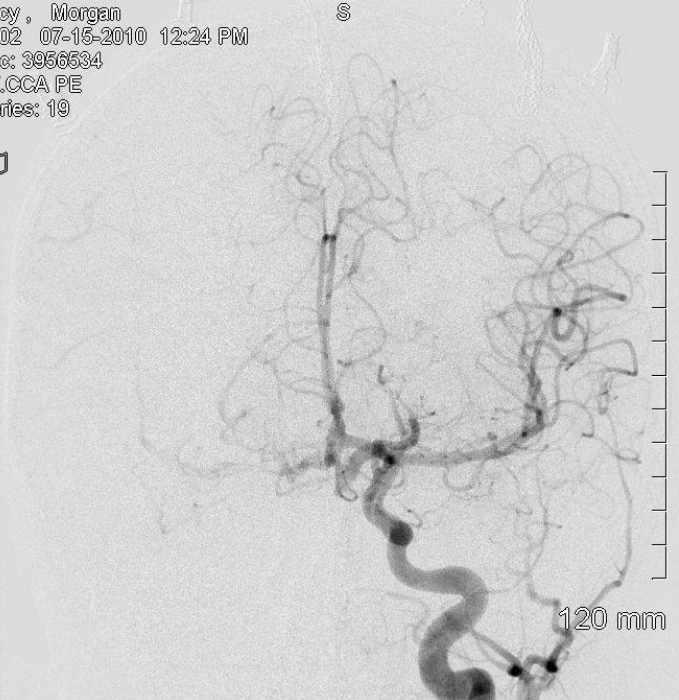
SM WC 5 WB 280 /CRAN 5°

SM WC 50 WB 2800 [C 2047]

SM WC 50 WB 2800 [C 2047]

SM WC 50 WB 2800 [C 2047]

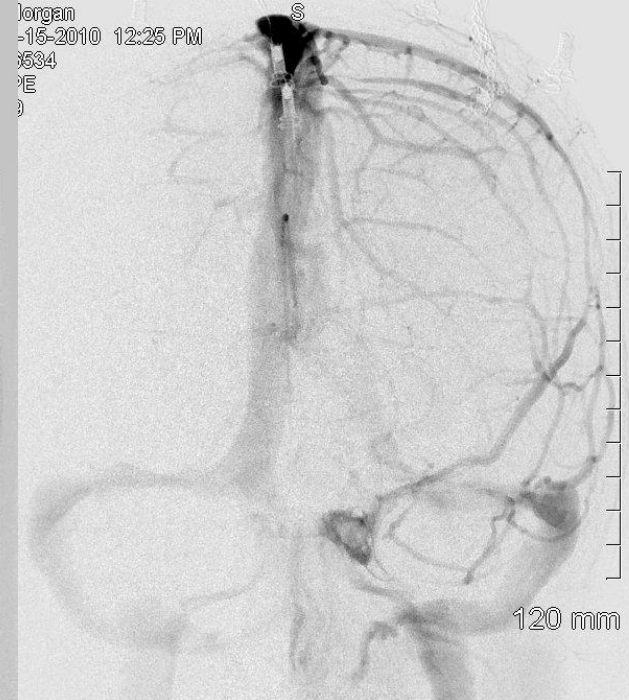
Lacy, Morgan
07-15-2010 12:24 PM
Acc: 3956534
LT.CCA PE
Series: 19



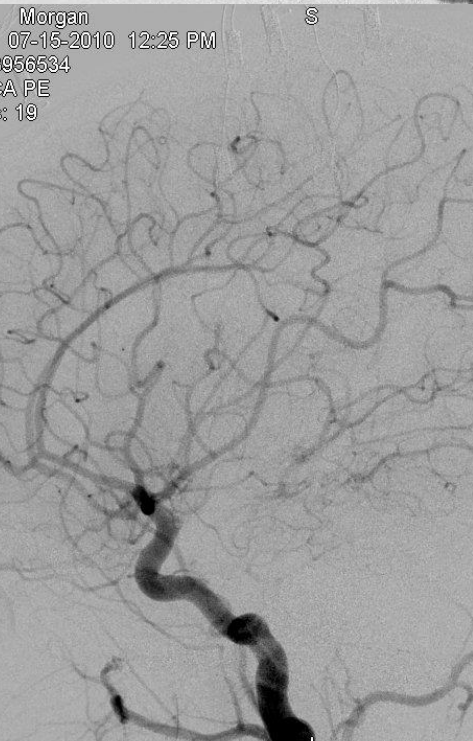
Lacy, Morgan
07-15-2010 12:24 PM
Acc: 3956534
Series: 19



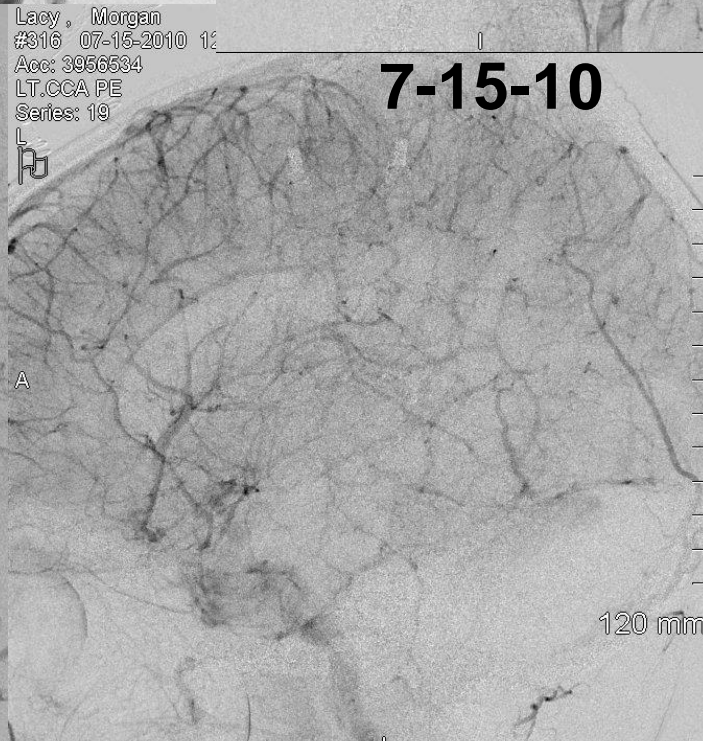
Lacy, Morgan
07-15-2010 12:25 PM
Acc: 3956534
LT.CCA PE
Series: 19



Lacy, Morgan
07-15-2010 12:25 PM
Acc: 3956534
LT.CCA PE
Series: 19

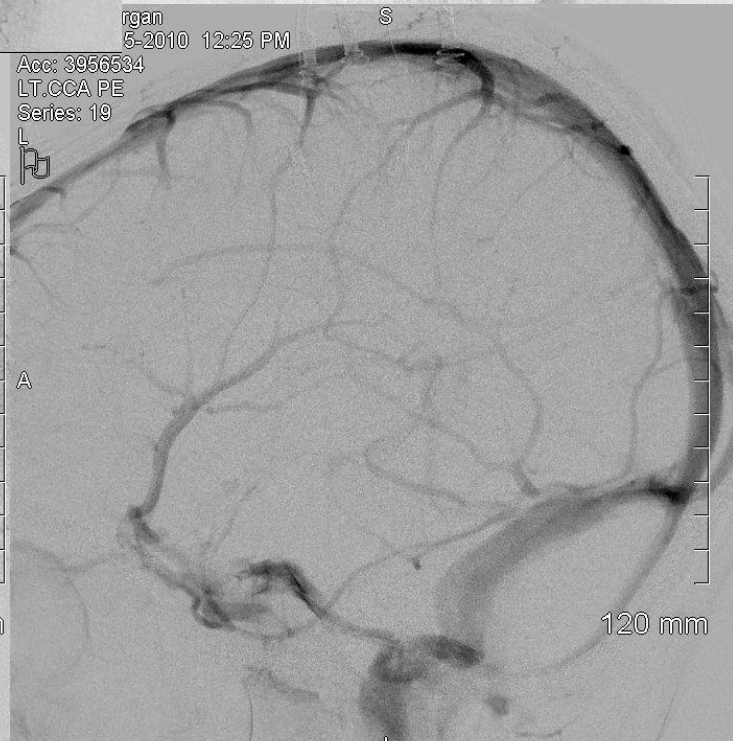


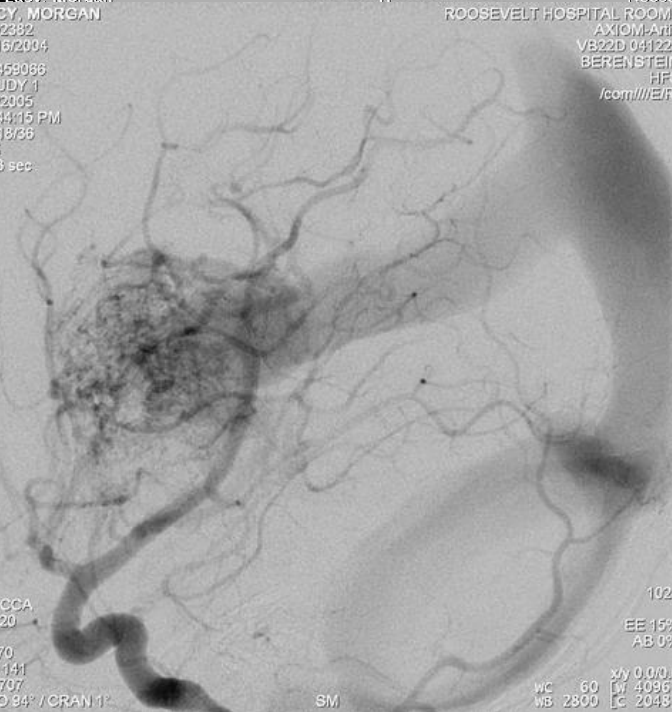
Lacy, Morgan
07-15-2010 12:25 PM
Acc: 3956534
LT.CCA PE
Series: 19



7-15-10

Lacy, Morgan
07-15-2010 12:25 PM
Acc: 3956534
LT.CCA PE
Series: 19





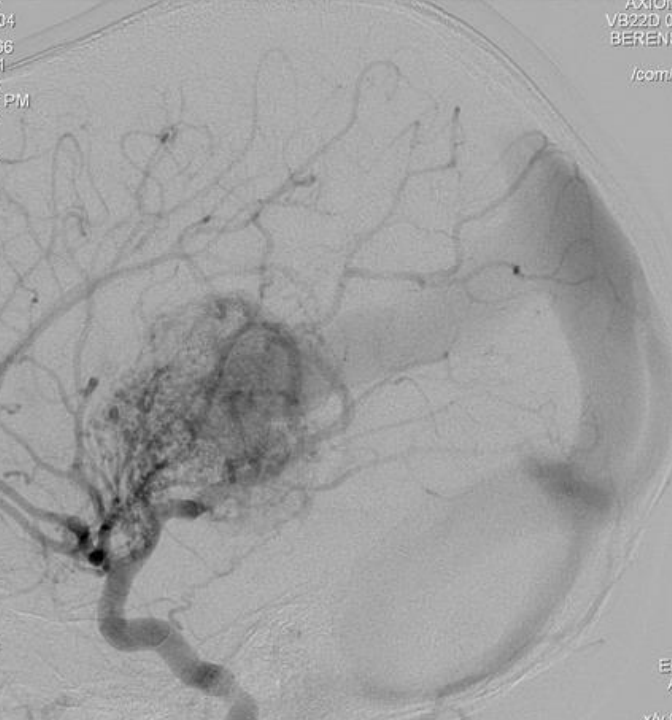
LACY MORGAN
2382
6/2004
159086
JDY 1
2005
4:15 PM
18/36
3 sec

ROOSEVELT HOSPITAL ROOM 2 X101M-
AXIOM-ARTIS 31F 090
VB22D 041220 RENST
BERENSTEIN, Alejandro
HFS
icom/III/ER/ R

CCA
20
70
141
797
0 34 /CRANI 1

1024
EE 15% 024 X 1
AB 0%

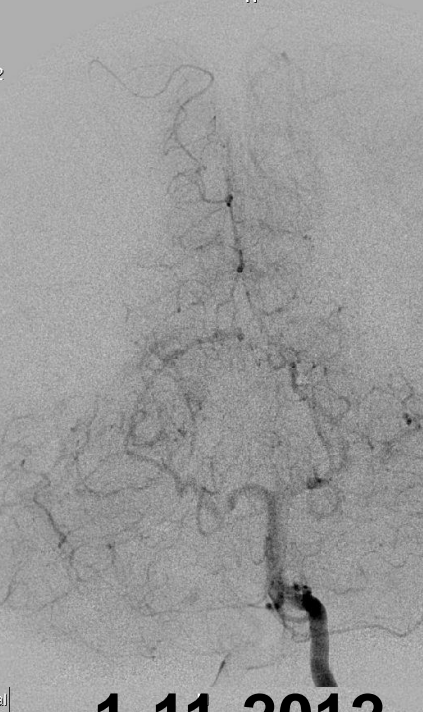
EE -
AB
WC 60 [W 4096] ref Hospital
WB 2800 [C 2048]
AXIOM X101M-Artis
VB22D 041 F 090317
BERENSTEIN, Alejandro
HFS
icom/III/ER/ R/III



04
06
1
PM

24 X 1024

1 EE 13%
AB 0%
EE 1
AB
WC 60 [W 4096]
WB 2800 [C 2048]



LACY MORGAN
1102492
11/16/2004
2459086
STUDY 1
4/1/2005
12:39:00 PM
8241 - 16/36
M 4
4:00 sec

R

1-11-2012

LT VERT
cm 22
A
KV 71
mA 149
Ref.: D 3730
RAO 3° /CRANI 17°
159086
JDY 1
2005
3:00 PM
1 - 18/36
1 sec



10

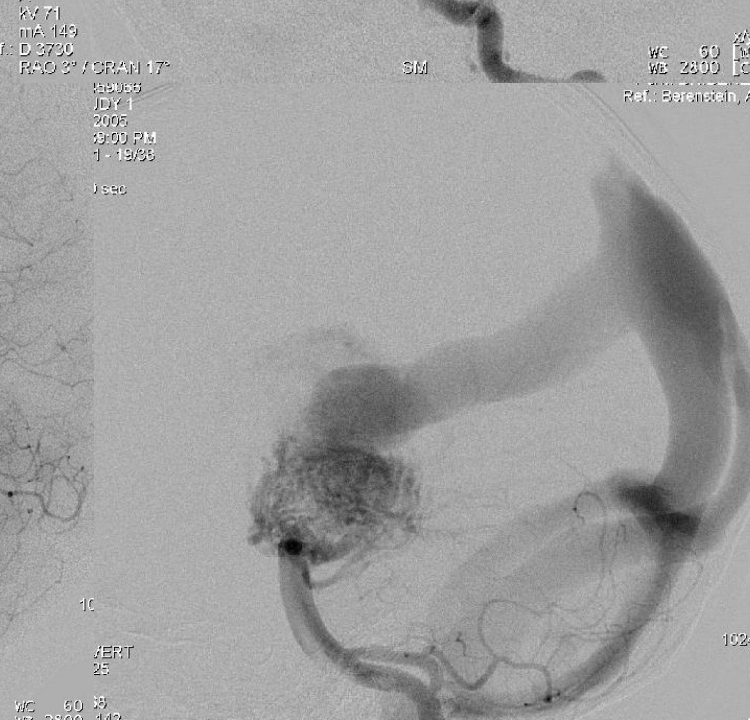
VERT
25

WC 60 [W 4096]
WB 2800 [C 2048]

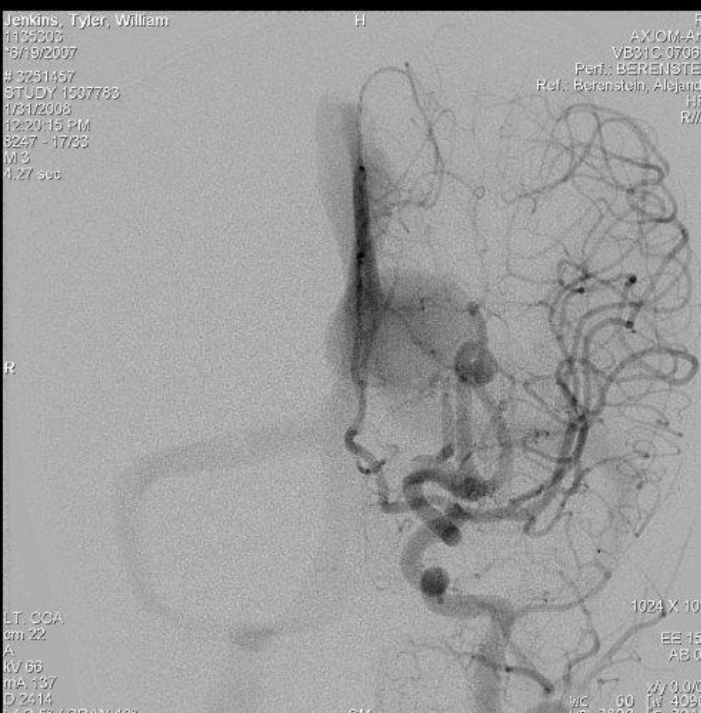
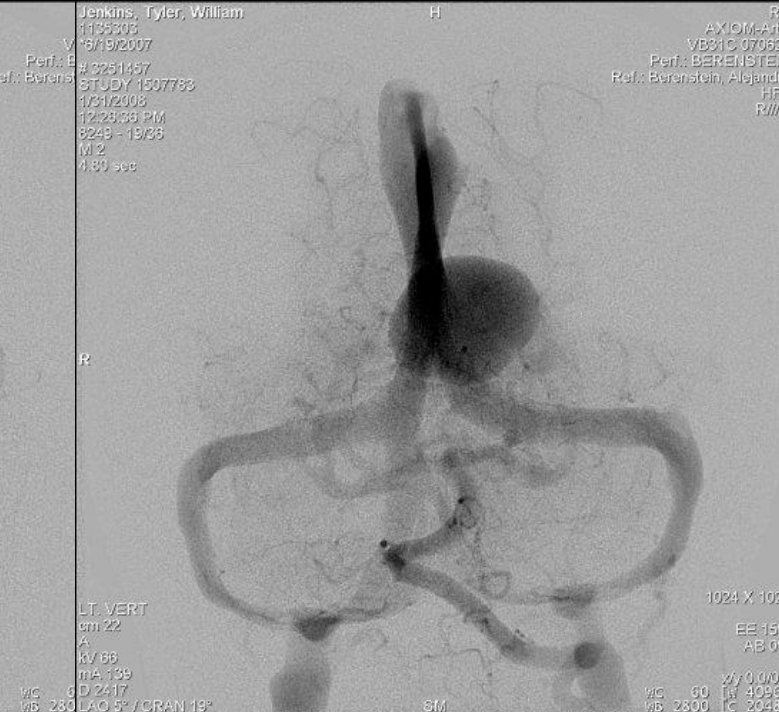
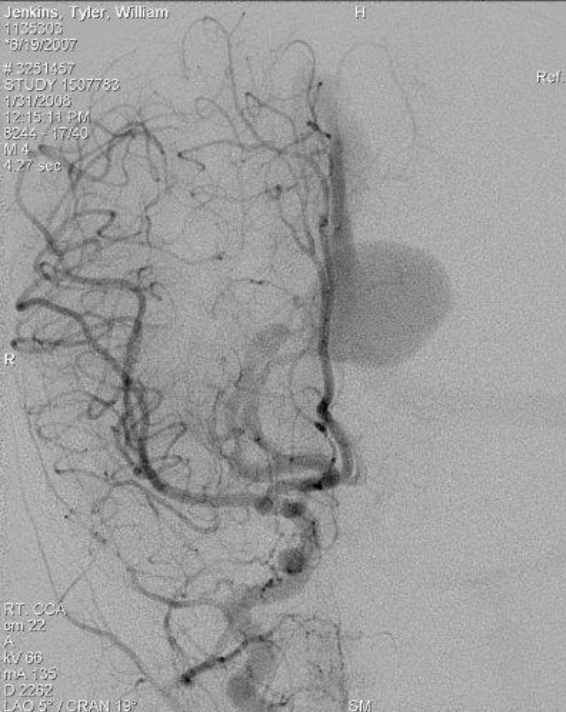


ROOSEVELT HOSPITAL ROOM 2 X101M-
AXIOM-ARTIS 31F 090
VB22D 041220 RENST
BERENSTEIN, Alejandro
HFS
icom/III/ER/ R

WC 60 [W 4096]
WB 2800 [C 2048]
Ref.: Berenstein, A

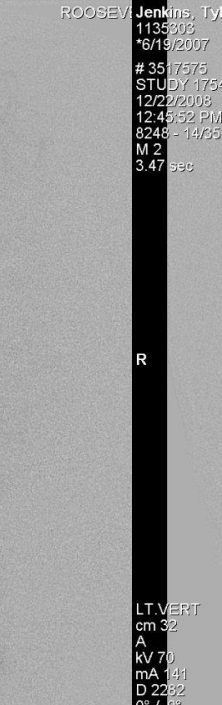


1024

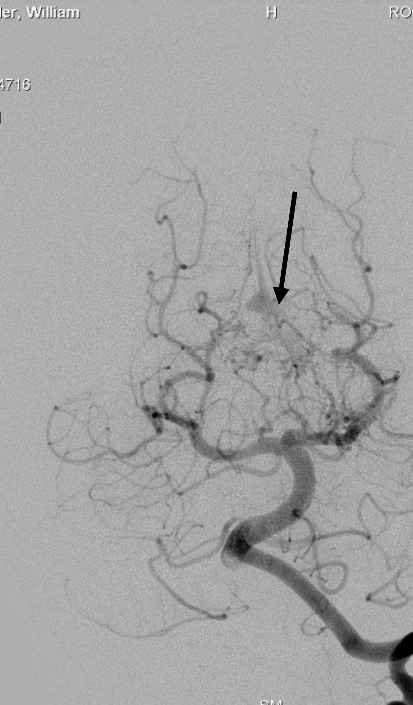




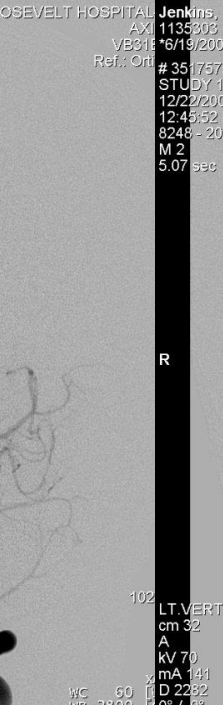
T.CCA.
m 32
/ 69
A 142
2252
er, William



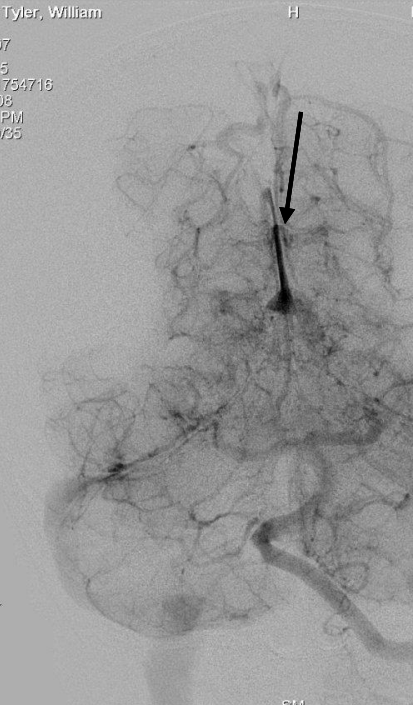
LT.VERT
cm 32
A
KV 70
mA 141
D 2252
0° / 0°



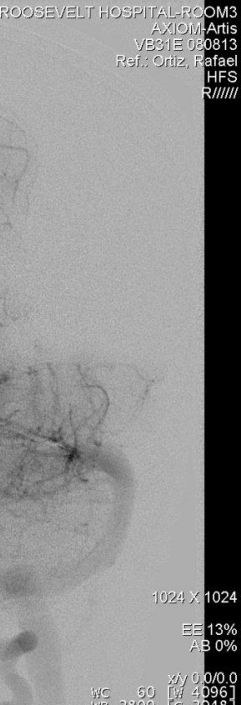
102
LT.VERT
cm 32
A
KV 70
mA 141
D 2252
0° / 0°



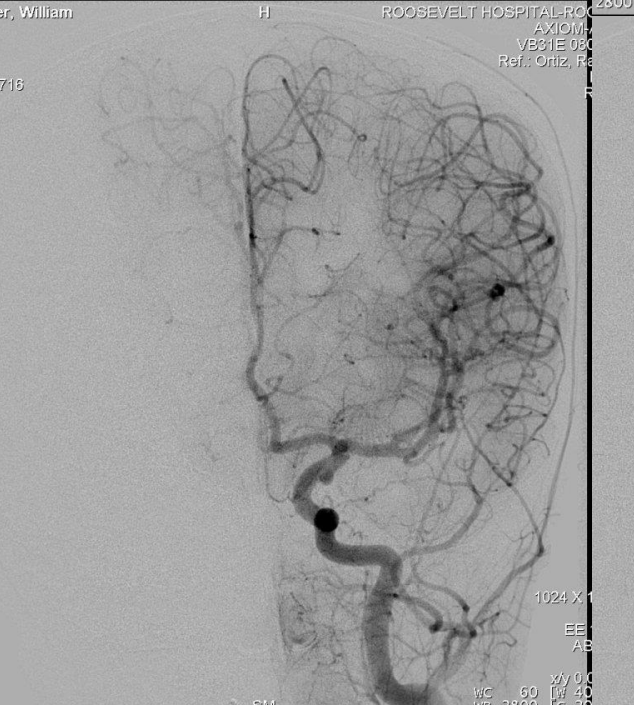
102
LT.VERT
cm 32
A
KV 70
mA 141
D 2252
0° / 0°



1024 X 1024
EE 13%
AB 0%
xy 0.0/0.0
WC 60 [W 4096]
WB 2800 [C 2048]



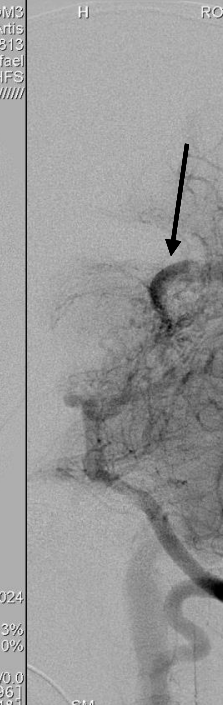
1024 X 1024
EE 13%
AB 0%
xy 0.0/0.0
WC 60 [W 4096]
WB 2800 [C 2048]



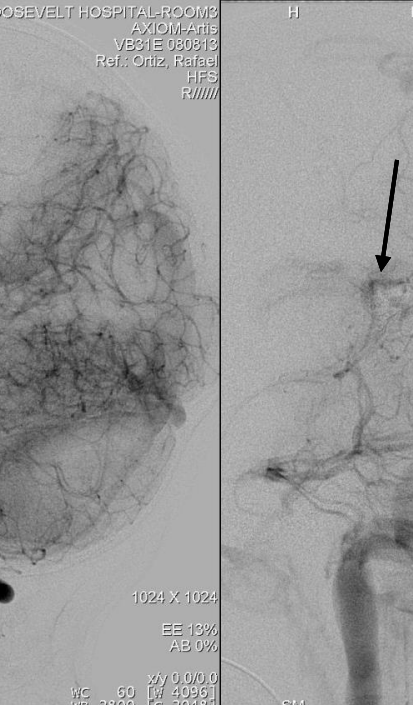
1024 X 1024
EE 13%
AB 0%
xy 0.0/0.0
WC 60 [W 4096]
WB 2800 [C 2048]



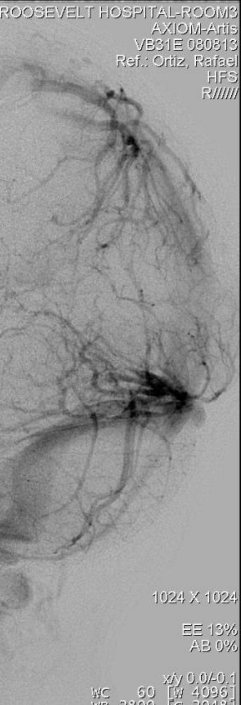
1024 X 1024
EE 13%
AB 0%
xy 0.0/0.0
WC 60 [W 4096]
WB 2800 [C 2048]



1024 X 1024
EE 13%
AB 0%
xy 0.0/0.0
WC 60 [W 4096]
WB 2800 [C 2048]



1024 X 1024
EE 13%
AB 0%
xy 0.0/0.0
WC 60 [W 4096]
WB 2800 [C 2048]



1024 X 1024
EE 13%
AB 0%
xy 0.0/0.1
WC 60 [W 4096]
WB 2800 [C 2048]

VG Between January 2004 and December 2011 n= 80

Results

- Control of CHF 11/14 NB
- Total occlusion 43 (53.7%)
- >90% 21 (26.5%)
- In Rx 7 (8.7%)
- Death 5 (6.2%)
- Lost to F/U 4 (5.0)

78%

80.2%

VG Complications/Neuroevents

INN 17/80pts (21.2%)

No clinical manifestation

10 (12.5%)

- 3 Hemorrhage CT (asymptomatic)
- 1 Coil Migration, No Sequale
- 1 Venous Embolization, No Sequale
- 2 Arterial Embolization, No Sequale
- 1 Status Epilepticus
- 2 Subdural post shunting

With clinical manifestation

7(8.7%) M&M

- 4 +
- 1 + from Cardiac Failure
- 2 Infarction

VG Between January 2004 and December, 2011 n= 80

Developmental Milestones

• Achieving	49 (61.2%)	80%
• Mild motor delay	9 (11.2%)	
• Mild cognitive delay	6 (7.5%)	15%
• Global delay	7 (8.7%)	
• Lost to F/U	4 (5%)	
• Death	5 (6.2%)	

New Born VG 25

Developmental Milestones

• Achieving Rx in NB	6/14 (43%)	
• Mild motor/cog delay	3/14 (21%)	64%
• Global delay	2/14 (14%)	35%
• Death	3/14 (21%)	
• Untreated in NB		
Achieving normal	11/25	
TOTAL Normal	17/25	68%

VG Conclusions

- Modern Endovascular Therapy has radically improved the outcome of this otherwise lethal disease.
- Further improvements can be expected in multidisciplinary centers with enough experience
- This very challenging newborns must be treated in very specialized centers for best outcome. The **“see one, do one, teach one”** should be avoided.

Other Pial AVFs and AVMs

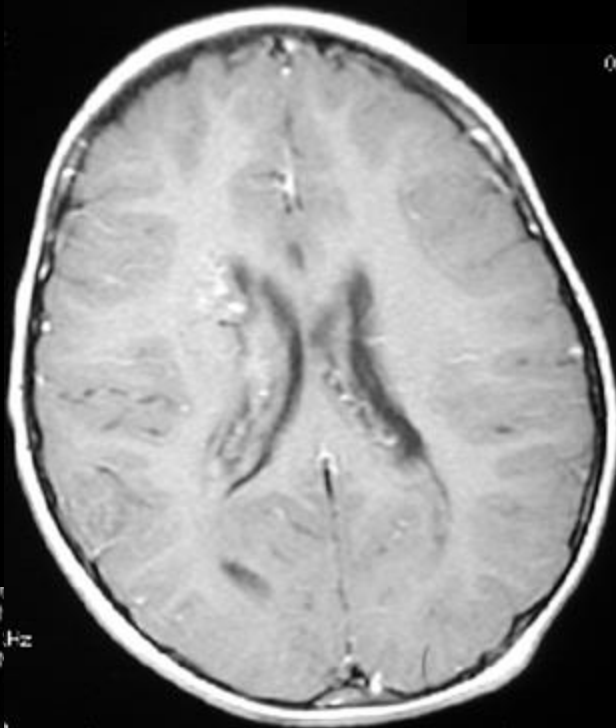
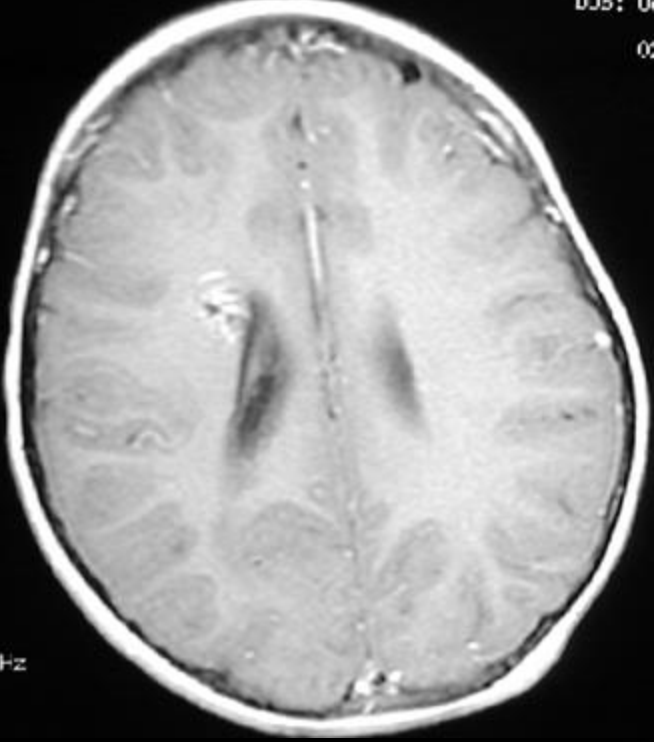
DOB: 01
02

YS#GEMSON

ASL

Car

11/20/2003



01
/01
/1 15.8kHz

21x21/2
hr/1.5sp
2:56



STUDY 1
29-Jan-2004
10:20:41

BERENSTEIN^ALEJANDRO^MD
HFS



cm 17
mA 228

SM

1024

W 4096
C 2048

STUDY 1
29-Jan-2004
10:20:41

BERENSTEIN^ALEJAN



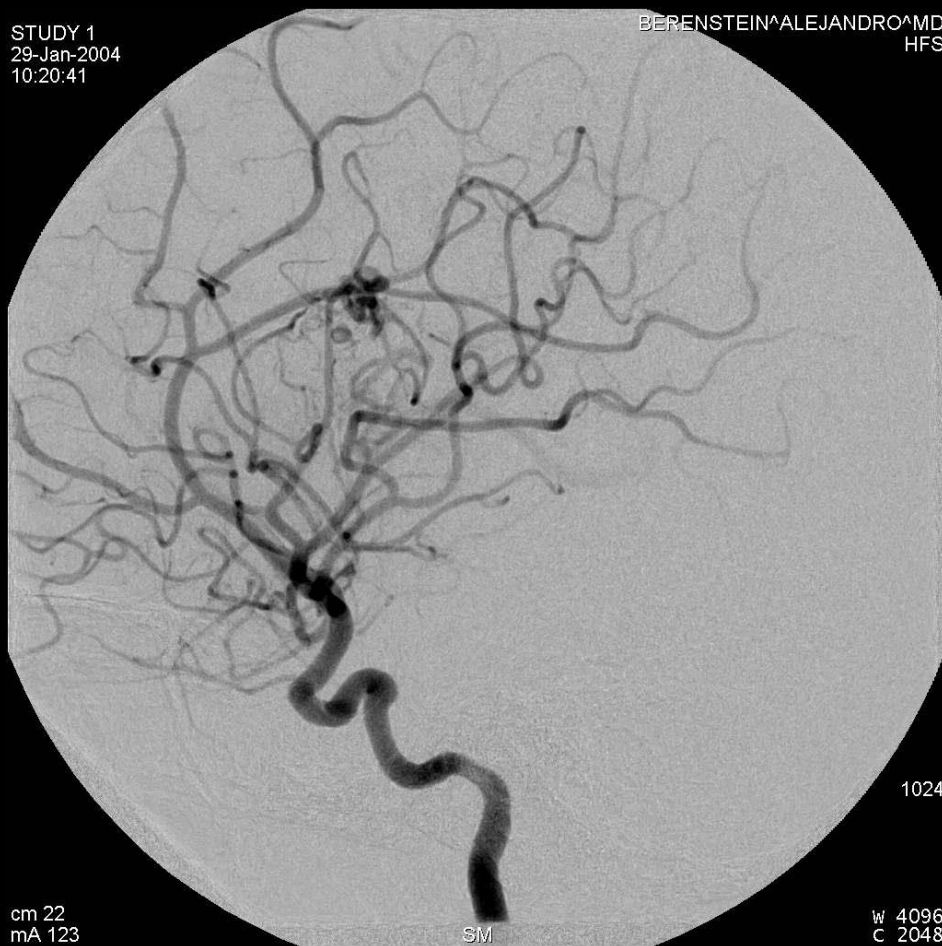
cm 17
mA 228

SM



STUDY 1
29-Jan-2004
10:20:41

BERENSTEIN^ALEJANDRO^MD
HFS



cm 22
mA 123

SM

1024

W 4096
C 2048

STUDY 1
29-Jan-2004
10:20:41

BERENSTEIN^ALEJAN



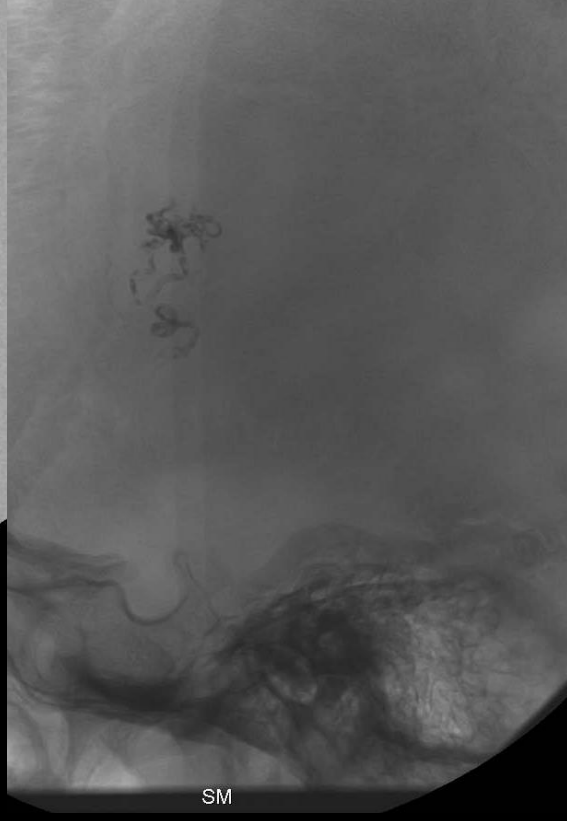
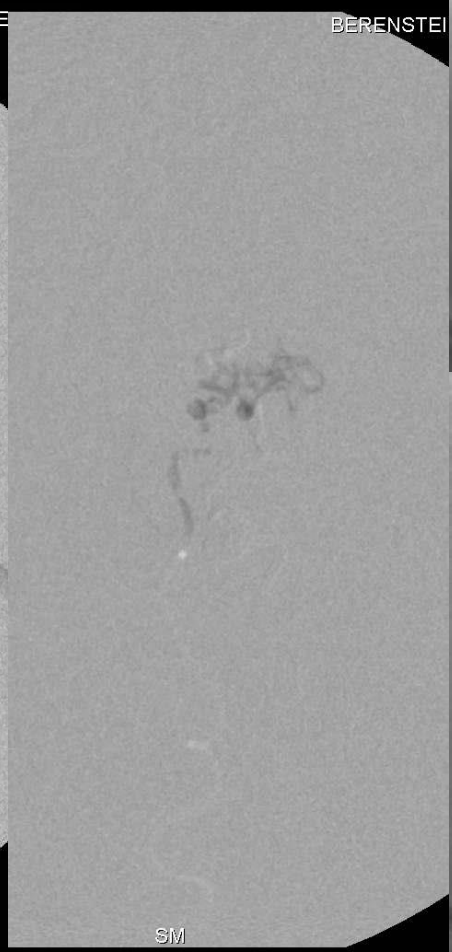
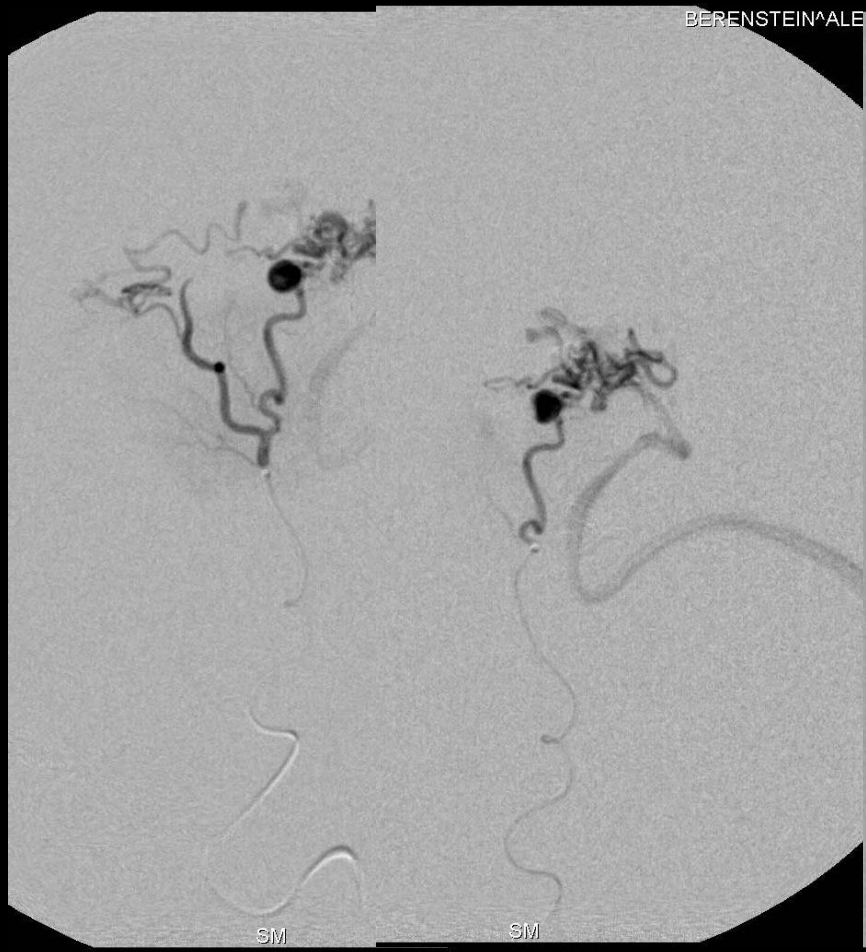
cm 22
mA 123

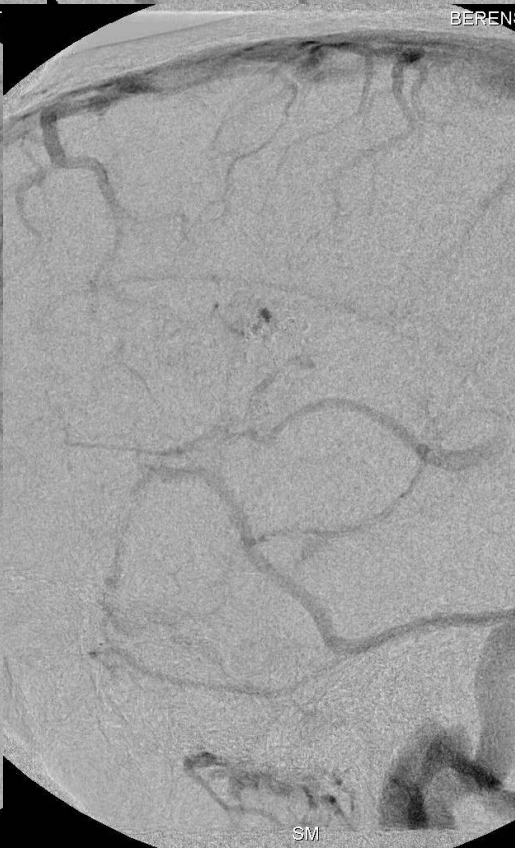
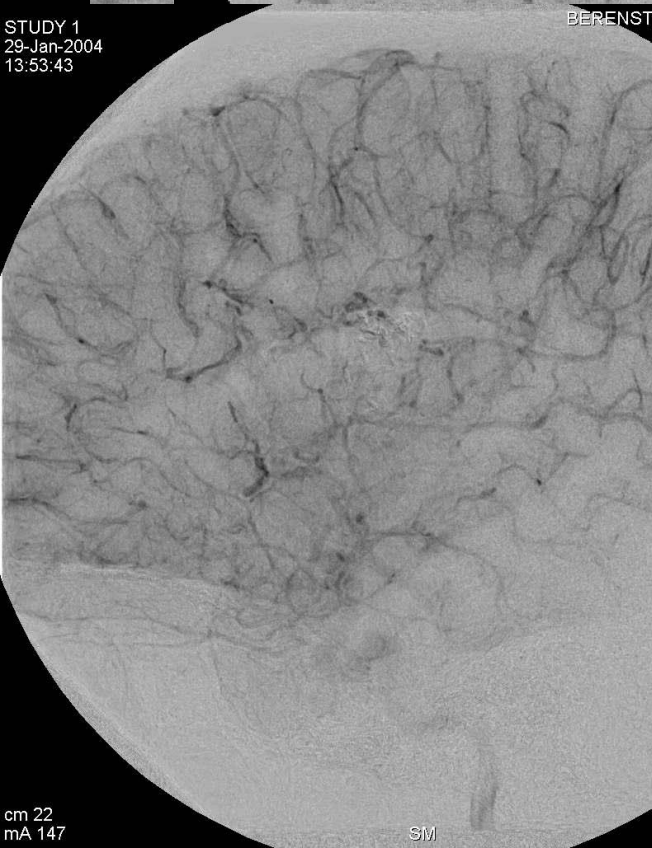
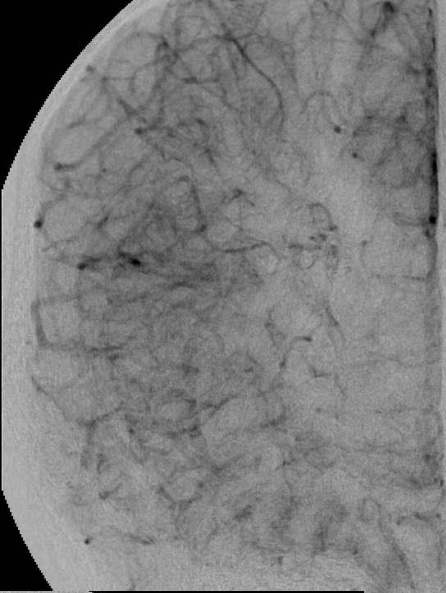
SM



BERENSTEIN^ALE

BERENSTEI





STUDY 1
29-Jan-2004
13:53:43

BERENSTEIN^ALEJAN

STUDY 1
29-Jan-2004
13:53:43

BERENST

BEREN

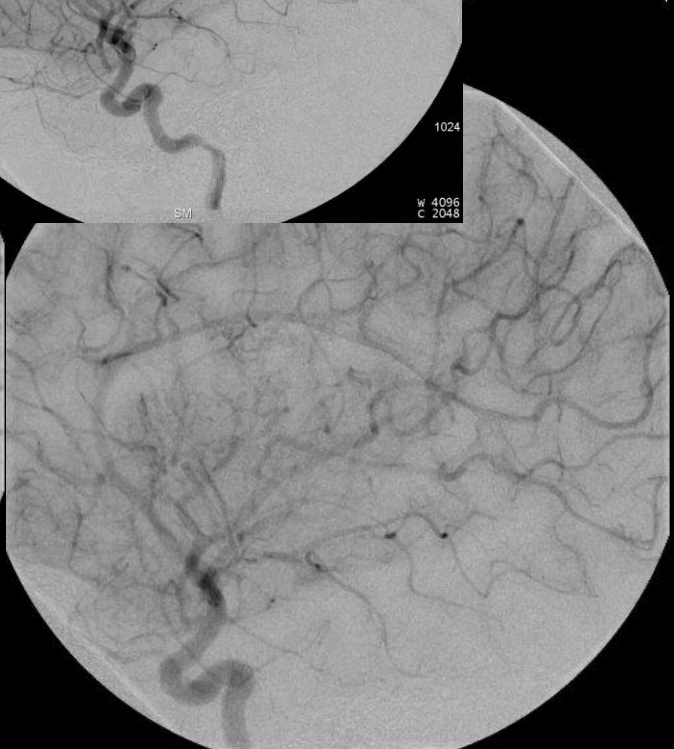
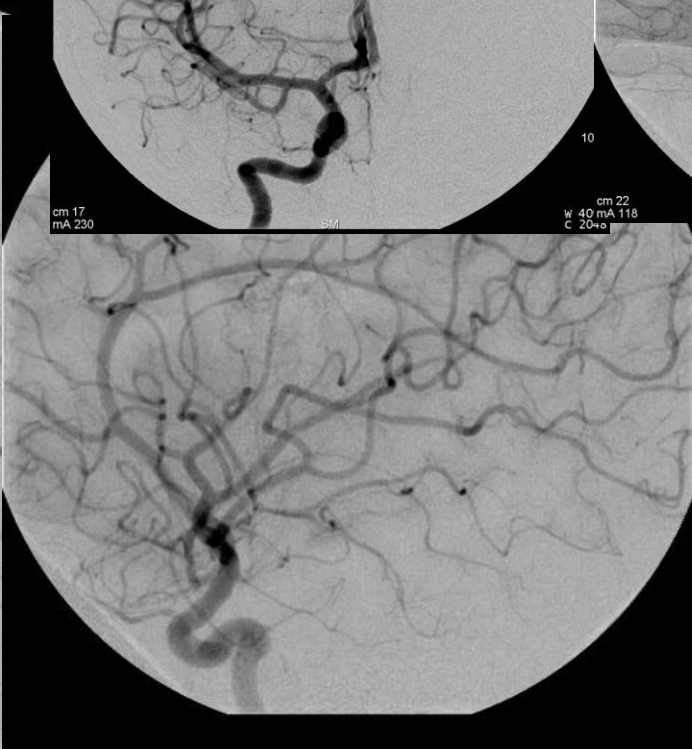
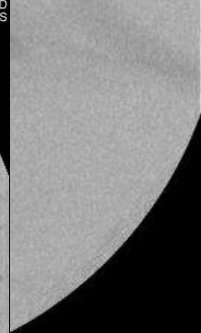
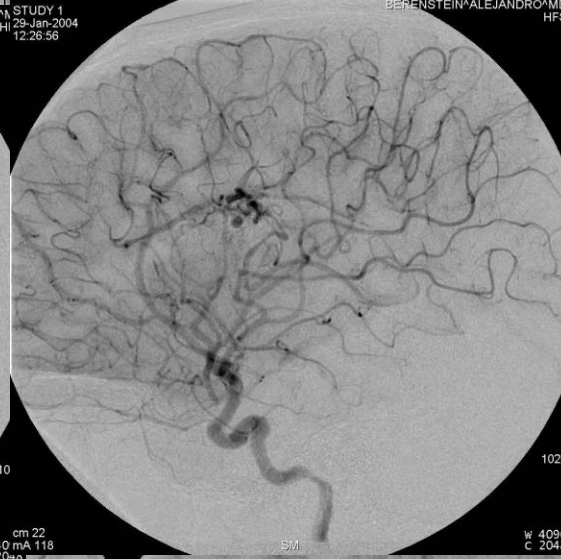
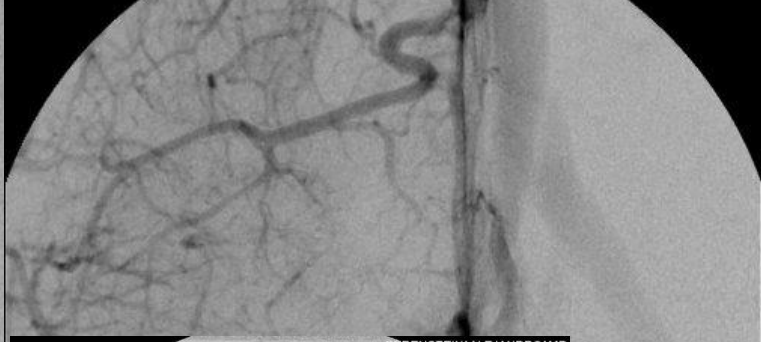
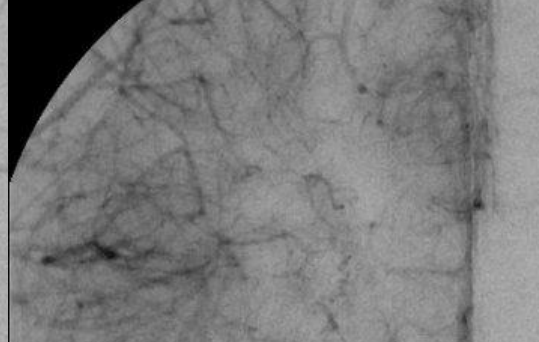
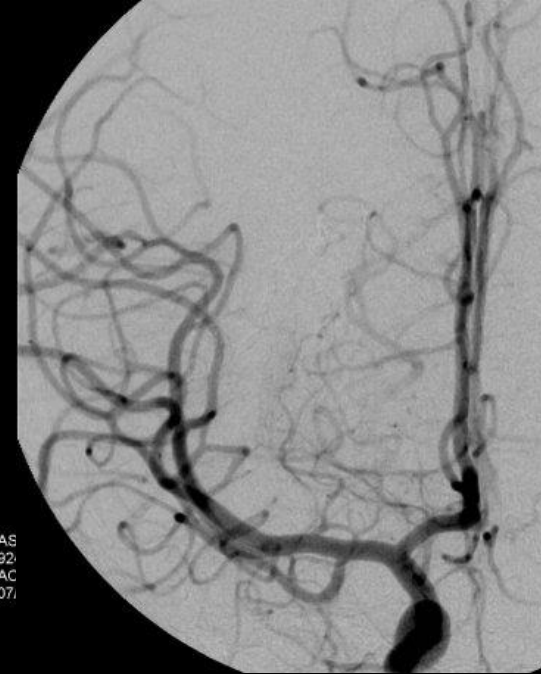
cm 22
mA 147

SM

cm 22
mA 147

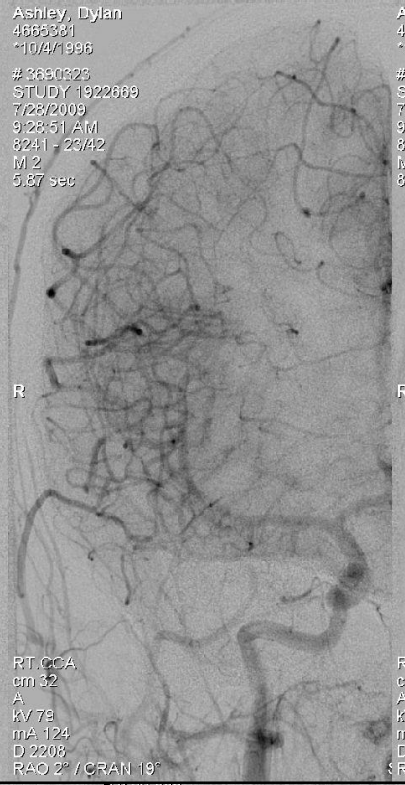
SM

SM

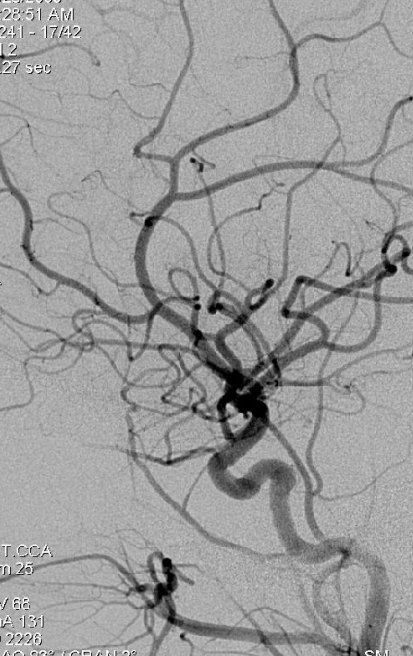
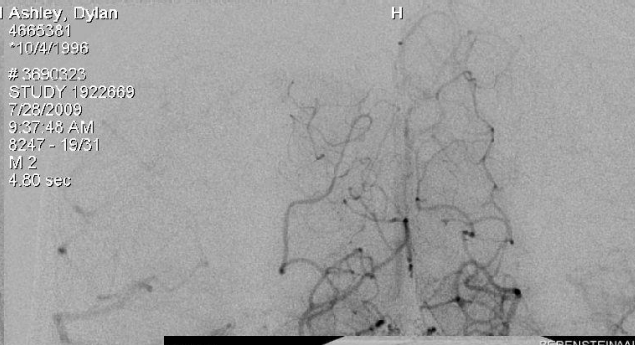
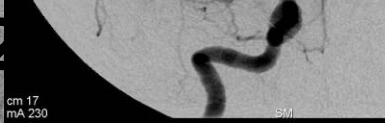




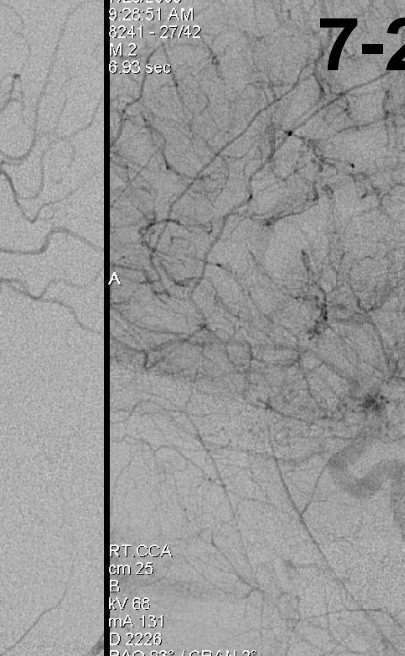
RT.CCA
cm 32
A
KV 79
mA 124
D 2208
RAO 2° / CRAN 19°



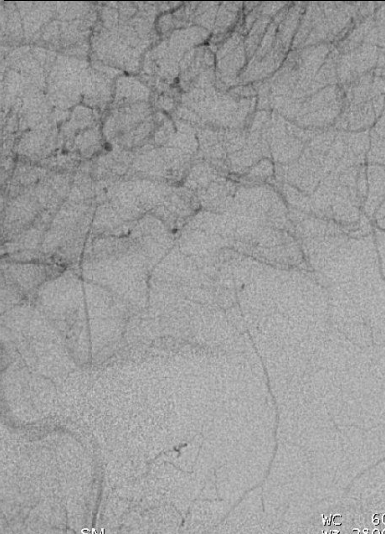
RT.CCA
cm 32
A
KV 79
mA 124
D 2208
RAO 2° / CRAN 19°



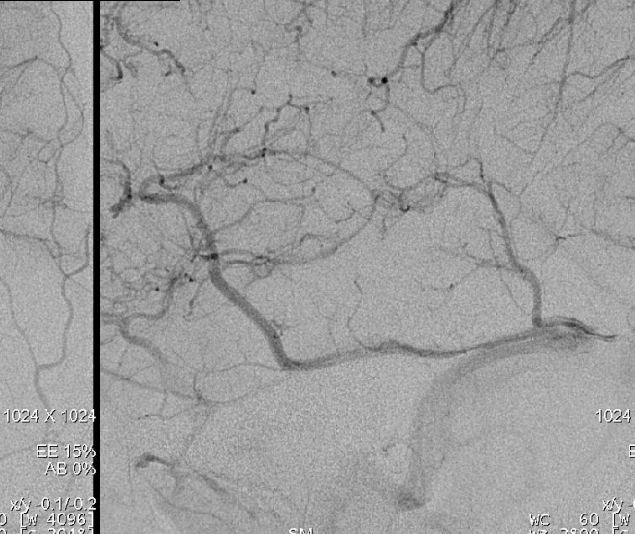
RT.CCA
cm 25
A
KV 88
mA 131
D 2228
RAO 2° / CRAN 19°



RT.CCA
cm 25
A
KV 88
mA 131
D 2228
RAO 2° / CRAN 19°



RT.CCA
cm 17
mA 230



cm 22
W 40 mA 118
C 20

7-2

1024 X 1024
EE 15%
AB 0%
xy 0.1/0.2
WC 80 LW 4096
W 3840 H 3840

L. ICA
24-May-01
11:11:17
Scene: 4
W-B: 650
W-C: 60
X: 0.1
Y: 0.0

L. LAT LS #4
24-May-01
12:30:30
Scene: 13
W-B: 650
W-C: 60
X: 0.0
Y: 0.4

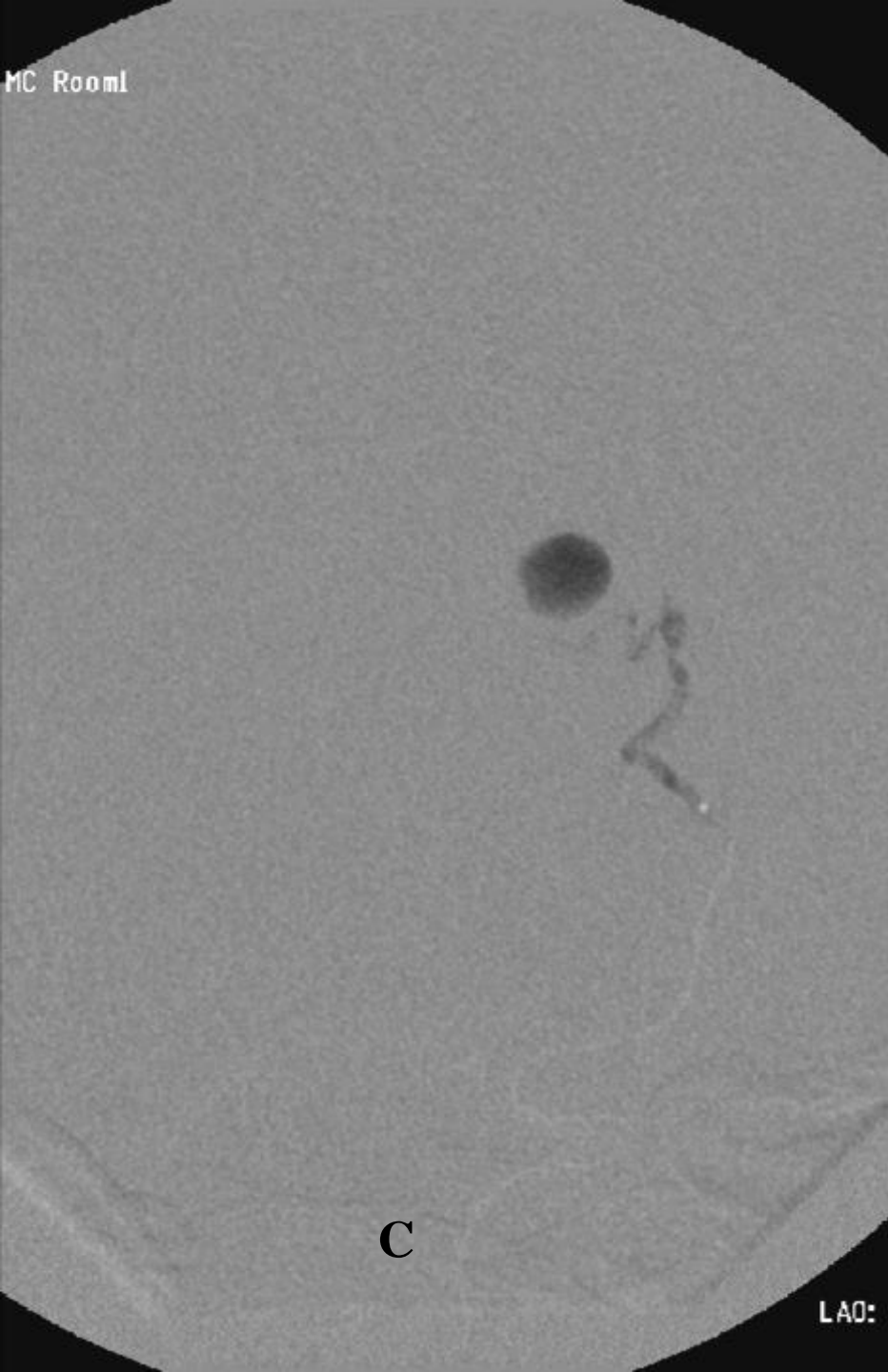


LAO: 0 CRAN: 12



LAO: 2 CRAN: 38

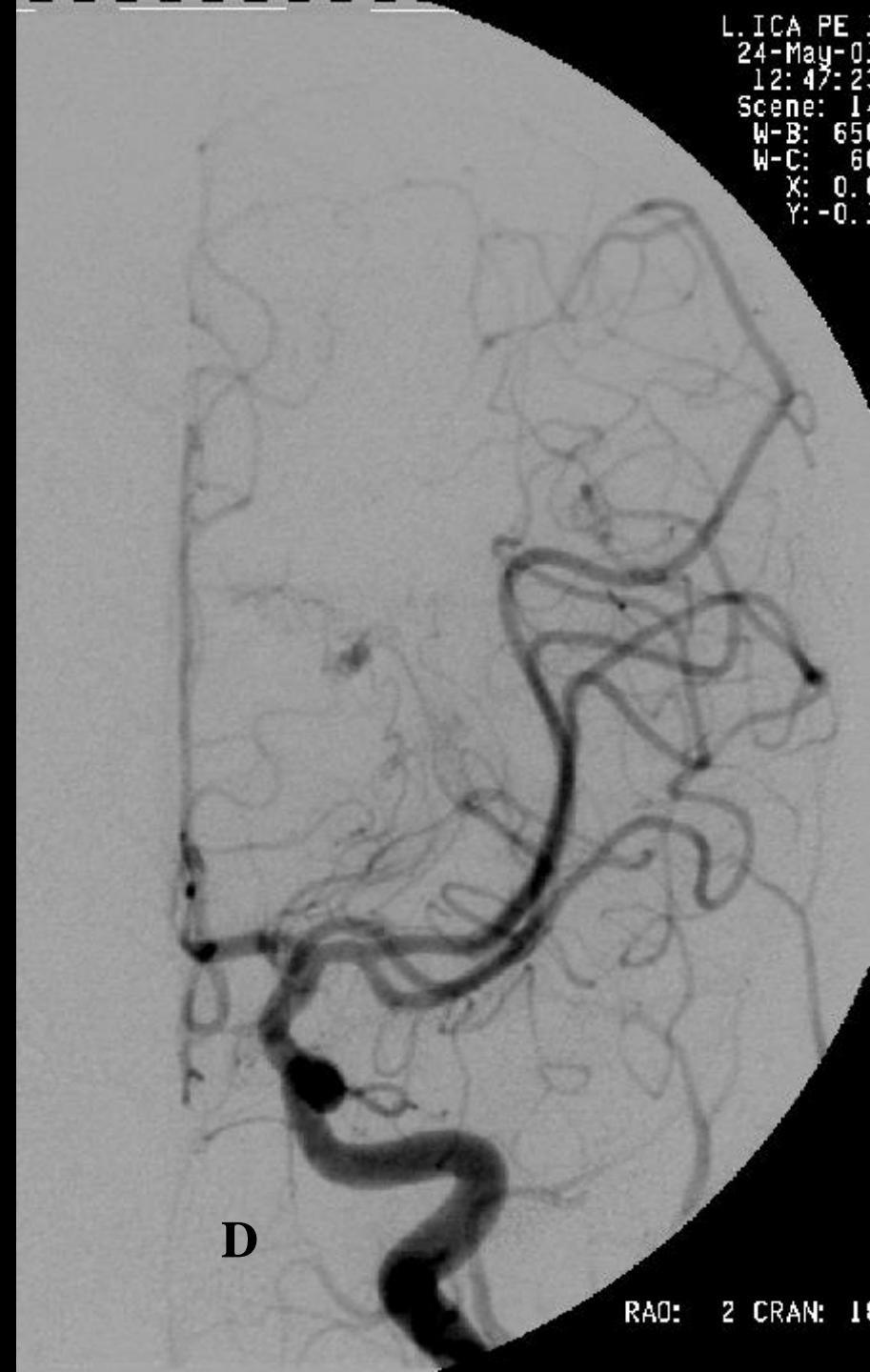
MC Room1



C

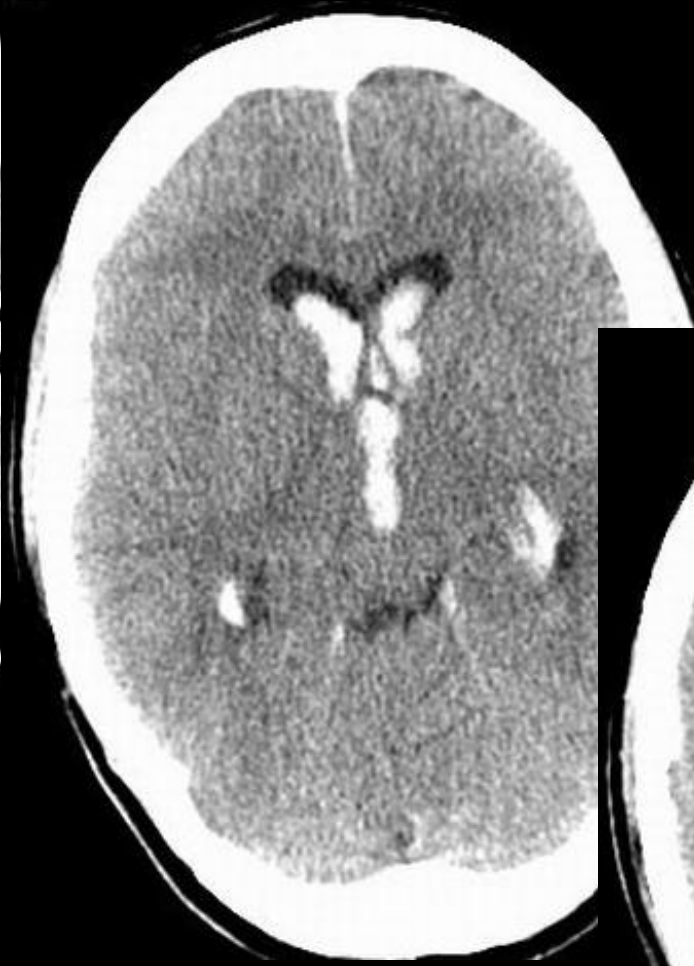
LAO:

L. ICA PE
24-May-0
12:47:2
Scene: 1
W-B: 65
W-C: 6
X: 0.1
Y: -0.1



D

RAO: 2 CRAN: 1



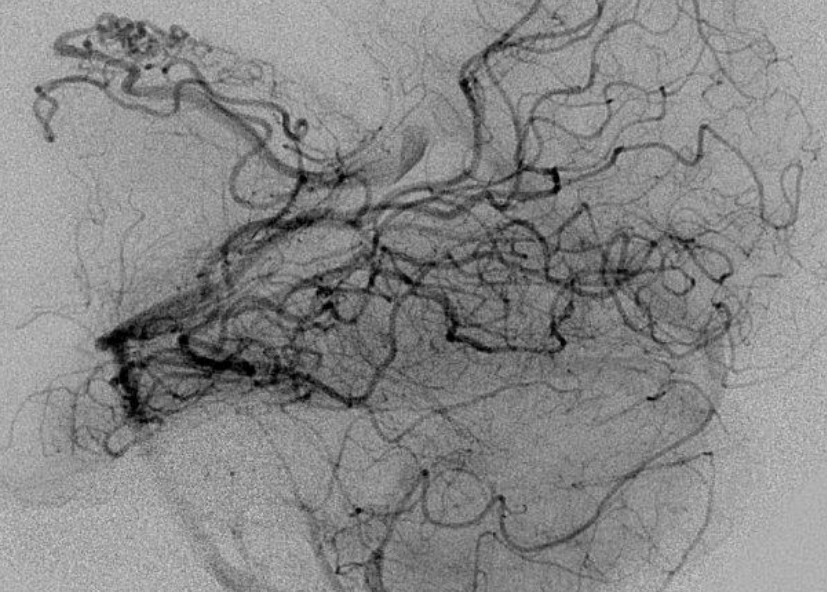
01127
DY 1826081
/2009
8:21 AM
7 - 21/40

sec

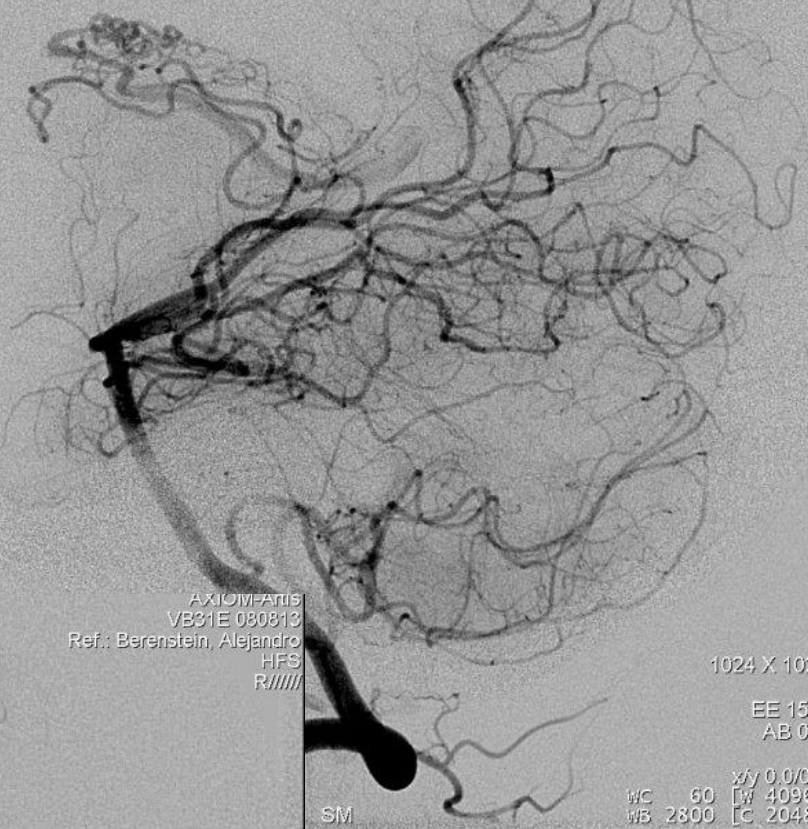
Ref.: Berenstein, Alejandro
HFS
R////

3591227
STUDY 1826081
3/27/2009
10:46:21 AM
12337 - 18/40
M 2
4.53 sec

Ref.: Berenstein, Alejandro
HF
R////



A



AXIOM-ARIS
VB31E 080813
Ref.: Berenstein, Alejandro
HFS
R////

1024 X 1024

EE 15%
AB 0%

xy 0.0/0.0
WC 60 [W 4096
WB 2800 [C 2048

#6457121
*12/26/1972
3591227
STUDY 1826081
3/27/2009
10:49:43 AM
12593 - 19/34
M 3
4.80 sec

ERT
2
0
133
35
100° / 0°

SM

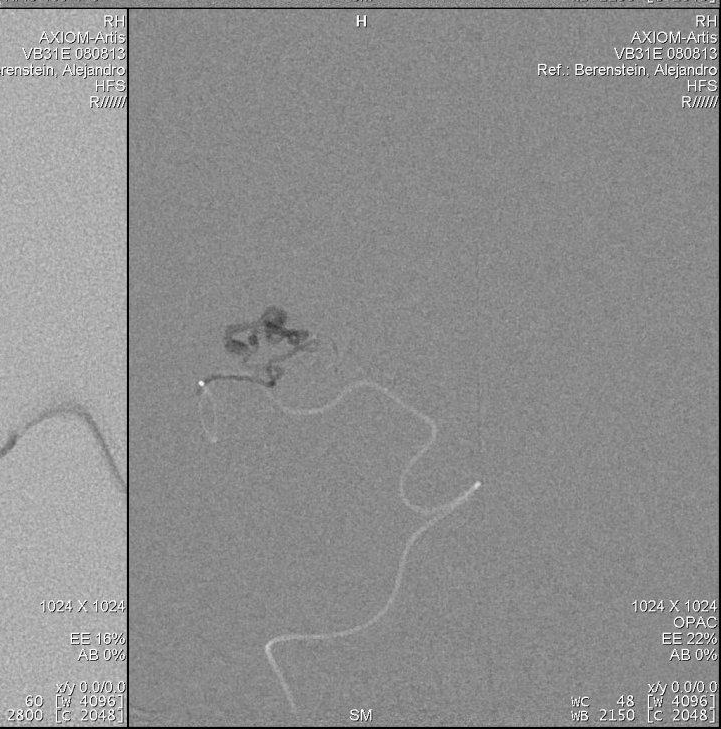
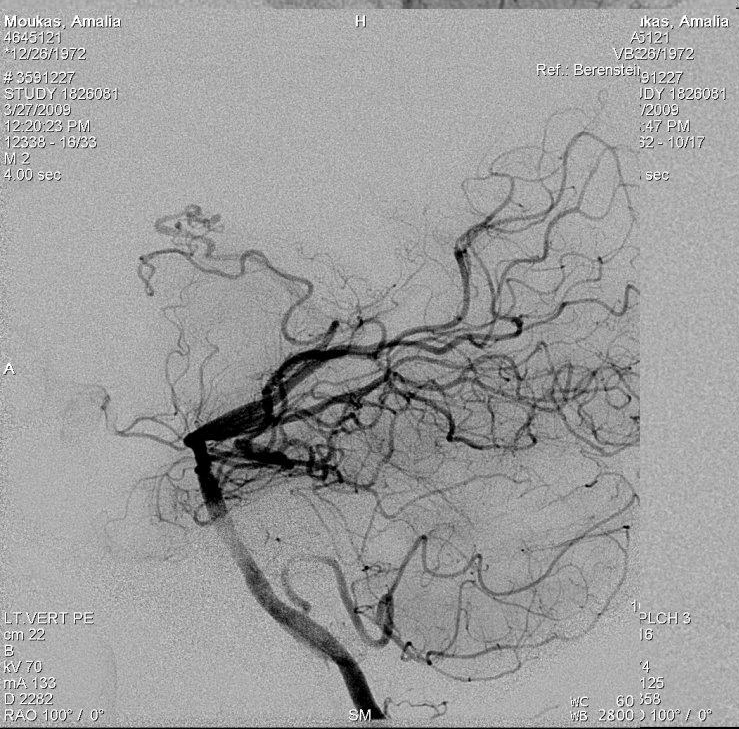
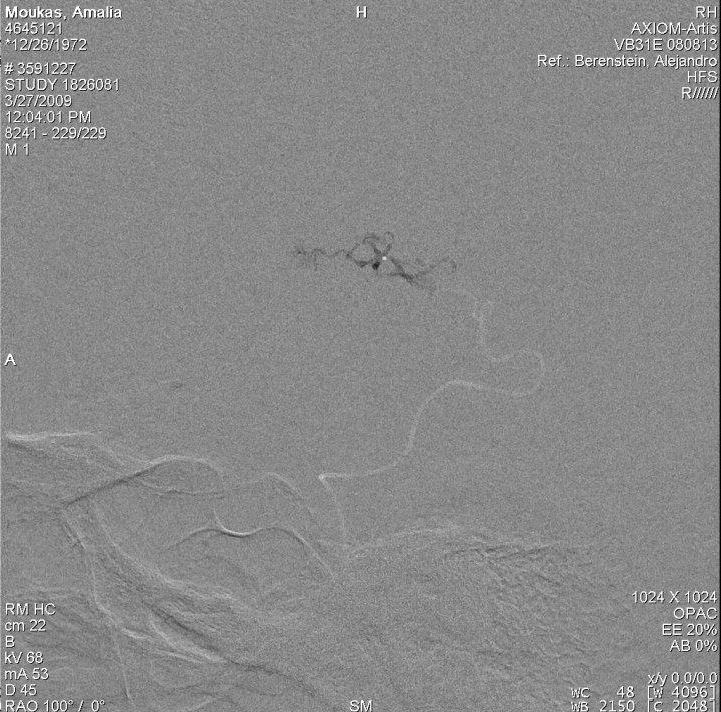
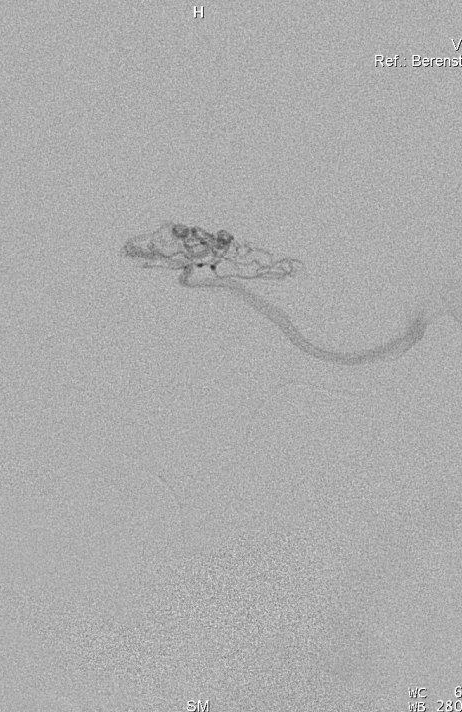
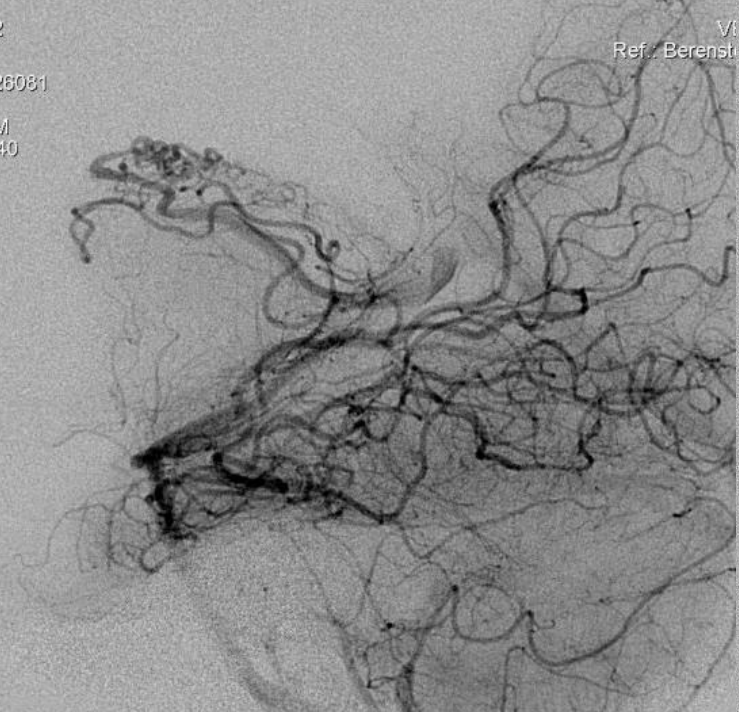
SM

R

LT VERT

1024 X 1024





18031

M
40

Moukas, Amalia
4645121
*12/26/1972
3591227
STUDY 1826081
3/27/2009
12:20:23 PM
12538 - 15/33
M 2
4.00 sec

A

LT VERT PE
cm 22
B
KV 70
mA 133
D 2282
RAO 100° / 0°

Ref.: Berenst

Moukas, Amalia
4645121
*12/26/1972
3591227
STUDY 1826081
3/27/2009
12:20:23 PM
12538 - 15/33
M 2
4.00 sec

1 PLOCH 3
16
4
125
WC 80 [w 4096]
WB 2800 [c 2048]

H

SM

H

SM

Ref.: Berenst
3591227
STUDY 1826081
3/27/2009
12:04:01 PM
8241 - 229/229
M 1

A

RM HC
cm 22
B
KV 68
mA 53
D 45
WB 280 RAO 100° / 0°

1024 X 1024
EE 18%
AB 0%
xy 0.0/0.0
WC 80 [w 4096]
WB 2800 [c 2048]

RH

SM

H

SM

H

SM

Ref.: Berenst
3591227
STUDY 1826081
3/27/2009
12:04:01 PM
8241 - 229/229
M 1

1024 X 1024
OPAC
EE 20%
AB 0%
xy 0.0/0.0
WC 48 [w 4096]
WB 2150 [c 2048]

Ref.: Berenst
3591227
STUDY 1826081
3/27/2009
12:04:01 PM
8241 - 229/229
M 1

1024 X 1024
OPAC
EE 22%
AB 0%
xy 0.0/0.0
WC 48 [w 4096]
WB 2150 [c 2048]

RH
AXIOM-Artis
VB31 E 080813
HFS
R////

RH
AXIOM-Artis
VB31 E 080813
HFS
R////

RH
AXIOM-Artis
VB31 E 080813
HFS
R////

3591227
STUDY 1828081
R/ 3/27/2009
1:18:54 PM
14130 - 16/46
M 2
4.00 sec

Ref.: Berenstein, Alejan

3591227
STUDY 1828081
R/ 3/27/2009
1:18:54 PM
14130 - 22/46
M 2
5.60 sec

Ref.: Berenstein, Alejandro
HFS
R/IIII

A

A

STUDY 1828081
3/27/2009
1:18:54 PM
14130 - 29/46
M 2
7.47 sec

STUDY 1828081
R/ 3/27/2009
1:18:54 PM
14130 - 36/46
M 2
9.86 sec

HFS
R/IIII

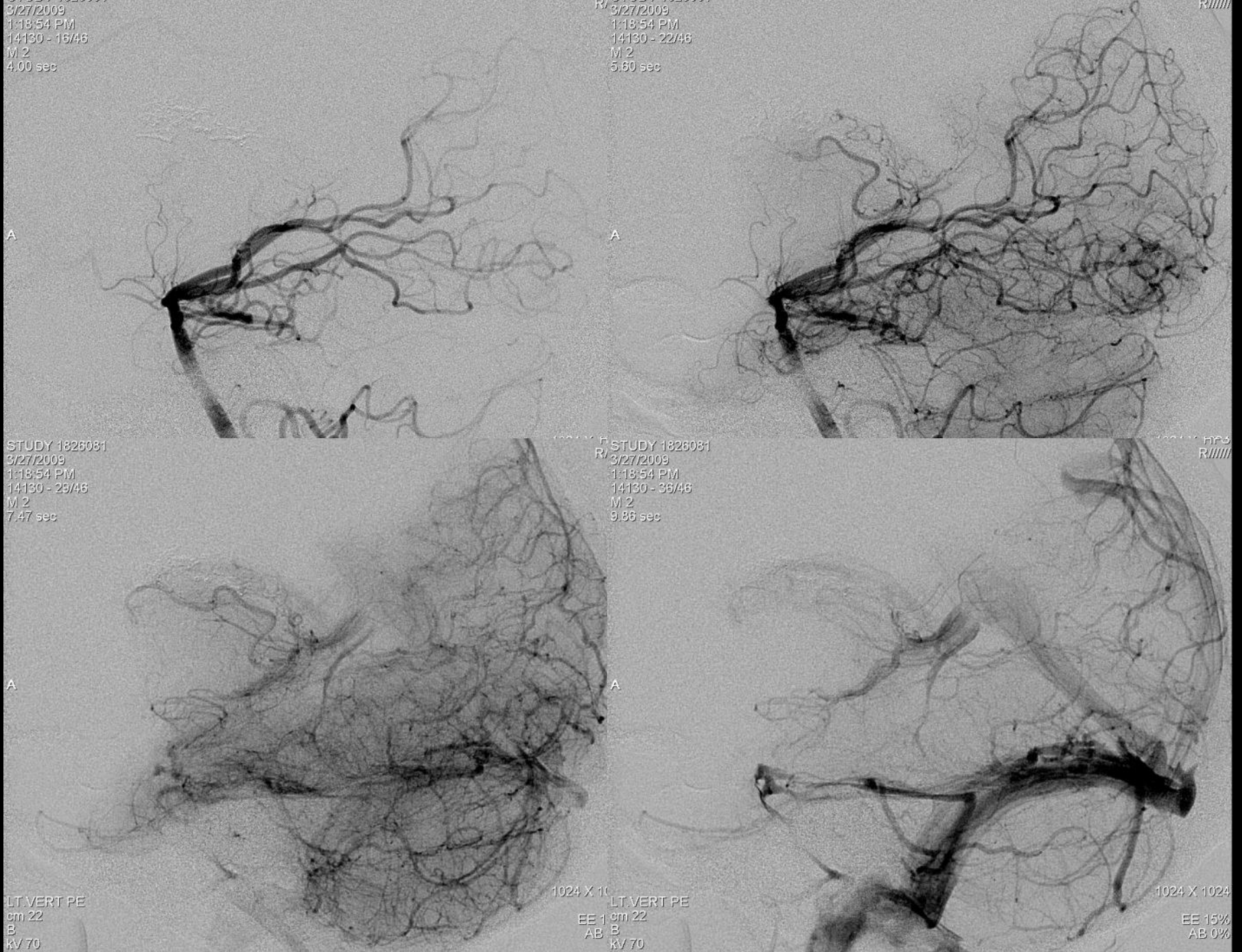
A

A

LT. VERT PE
cm 22
B
KV 70

1024 X 1024
LT. VERT PE
cm 22
EE 1
AB B
KV 70

1024 X 1024
EE 15%
AB 0%



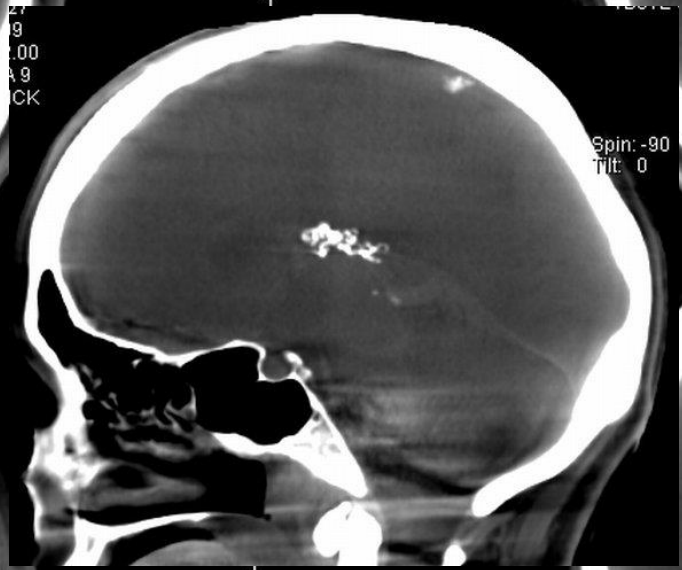
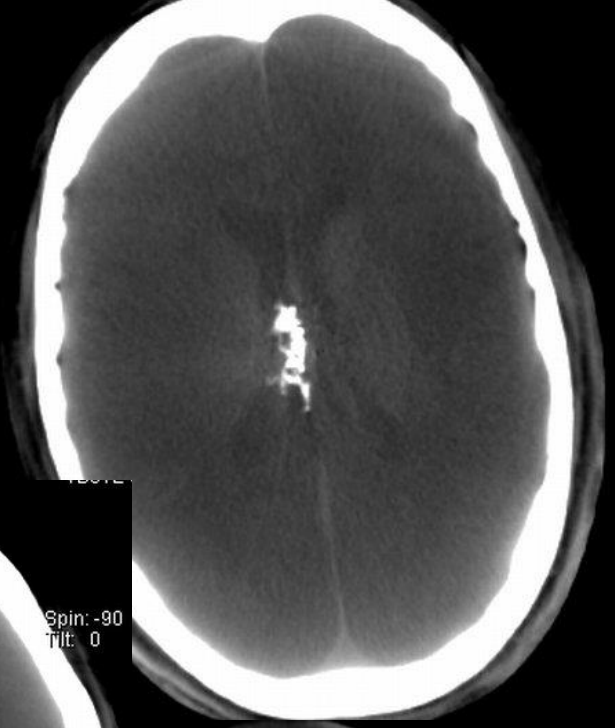
009
52.00
MA 10
HICK

H-SP-CR

13:21:52.00
1003 IMA 12
MPR THICK
SP 1.0

Spin: 0
Tilt: -90

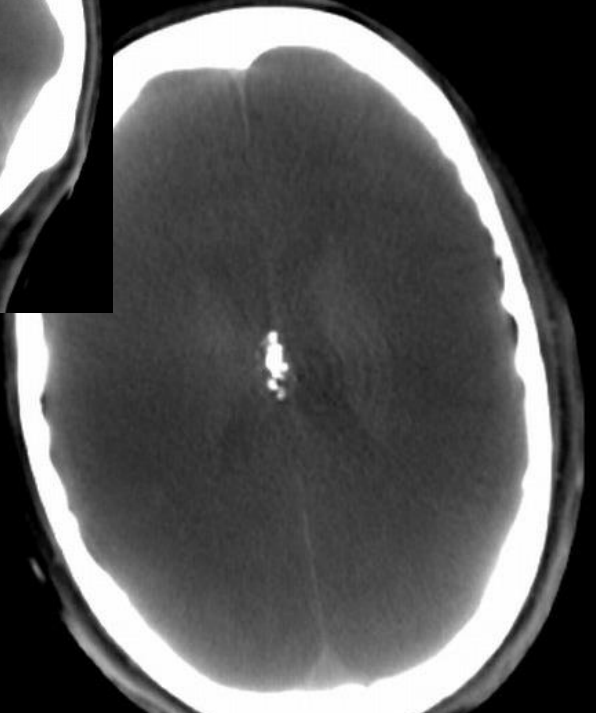
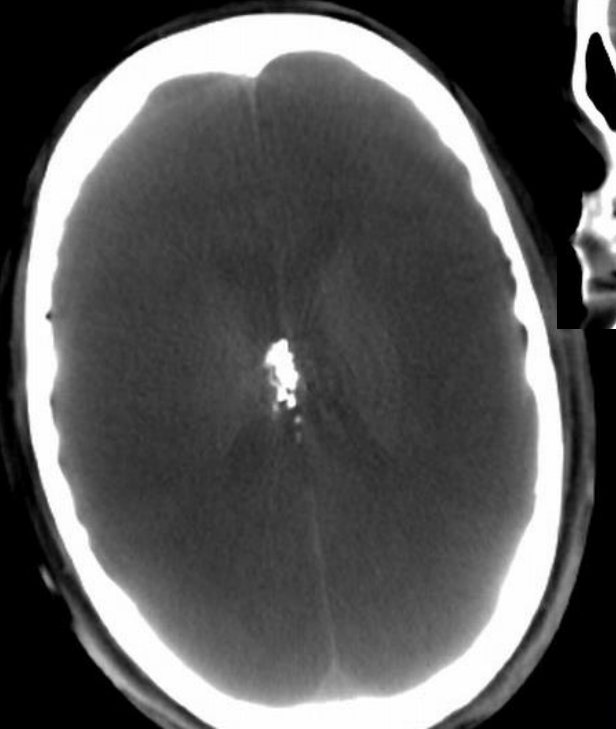
Spin: 0
Tilt: -90



Spin: -90
Tilt: 0

27
99
2.00
A 13
ICK

F
H-



Spin: 0
Tilt: -90

R

10cm

KV 90

F

F

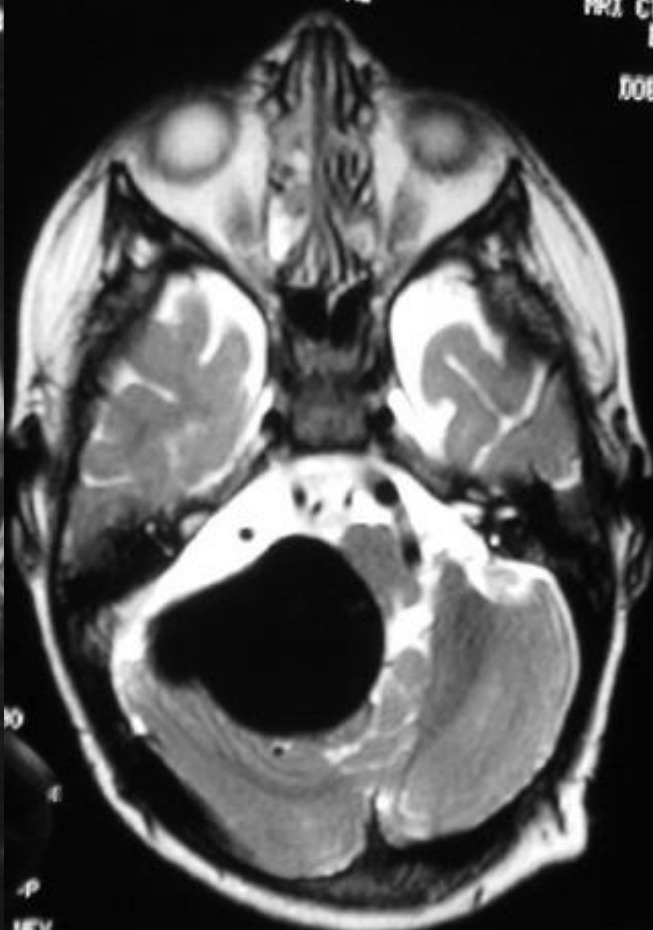
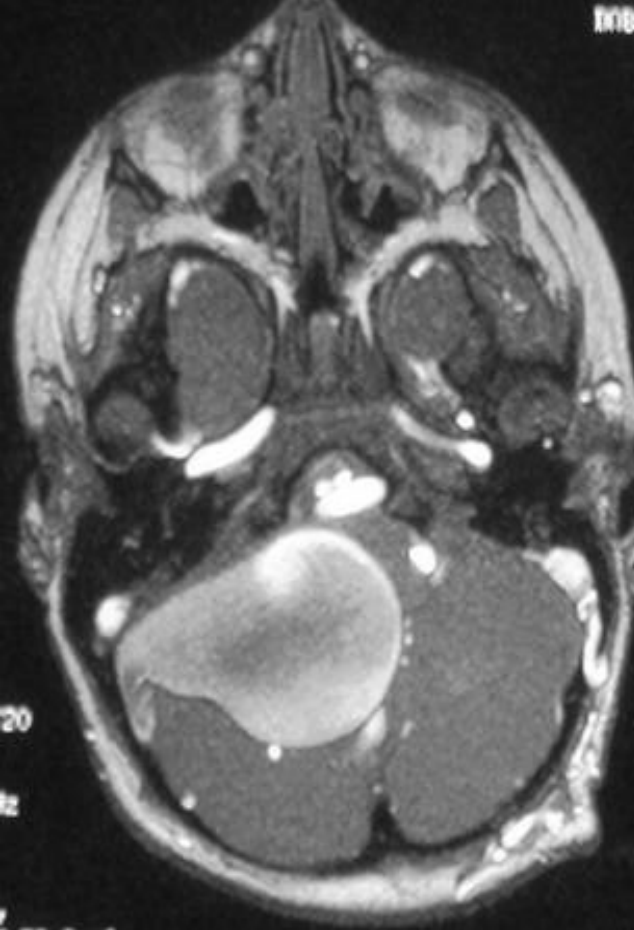
Hereditary Vascular Malformations

- Hereditary CM (CM): **5q13-15 (CMC1)**
 - 16 Parkes-Weber Syn, 17 AVM (7 cerebral) / 101 pts
- Cerebral Cavernous M (CCM): **7q11-22 (CCM1), 7p13-35 (CCM2), 3q25.2-27 (CCM3)**
- HHT: **9q33-34 (HHT1): 12q11-14 (HHT2)**
- Venous M (VM): **9p21 (VMCM1)**
- Glomuvenous M (GVM): **1p21-22 (VMGLOM)**
- Primary congenital lymphoedema: **5q34-35**
- **RASA1**

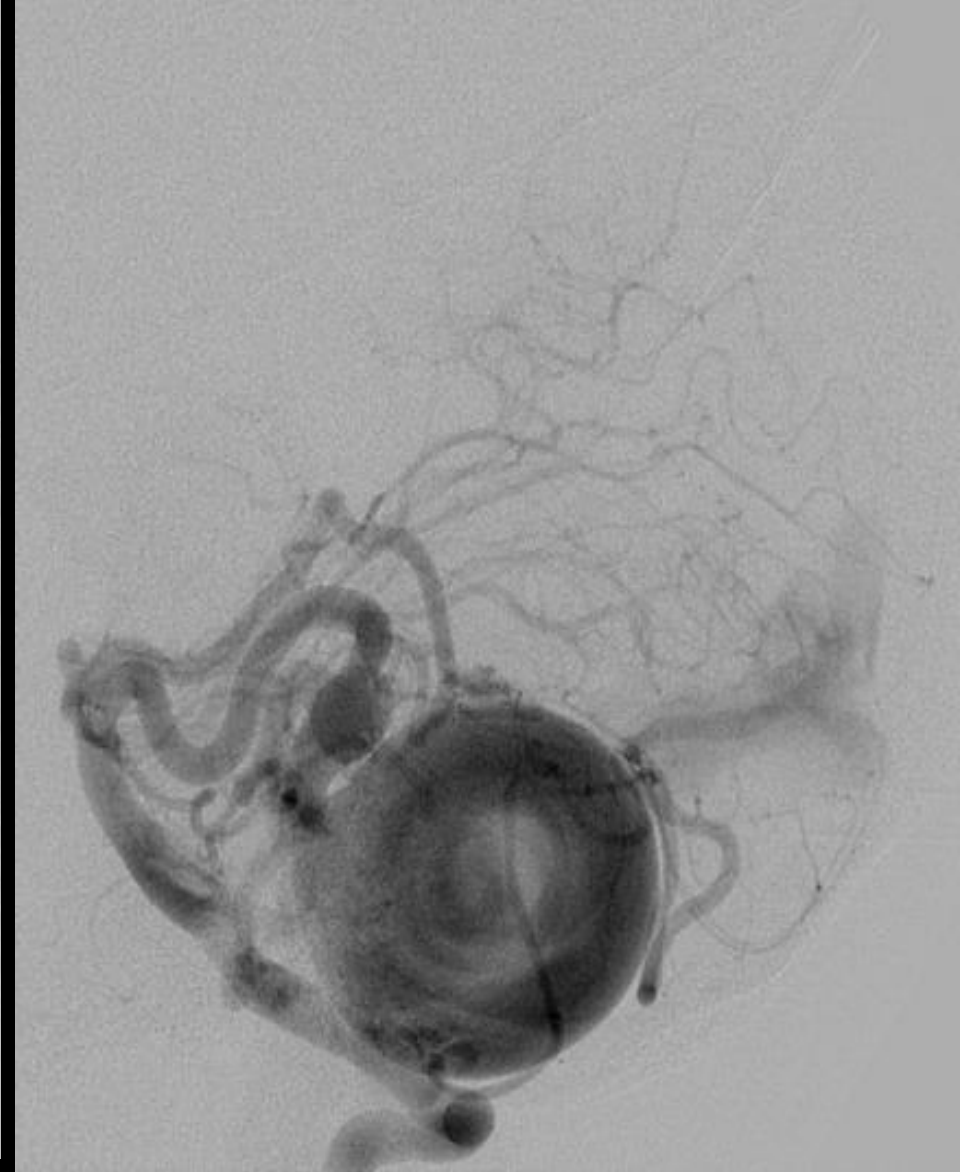
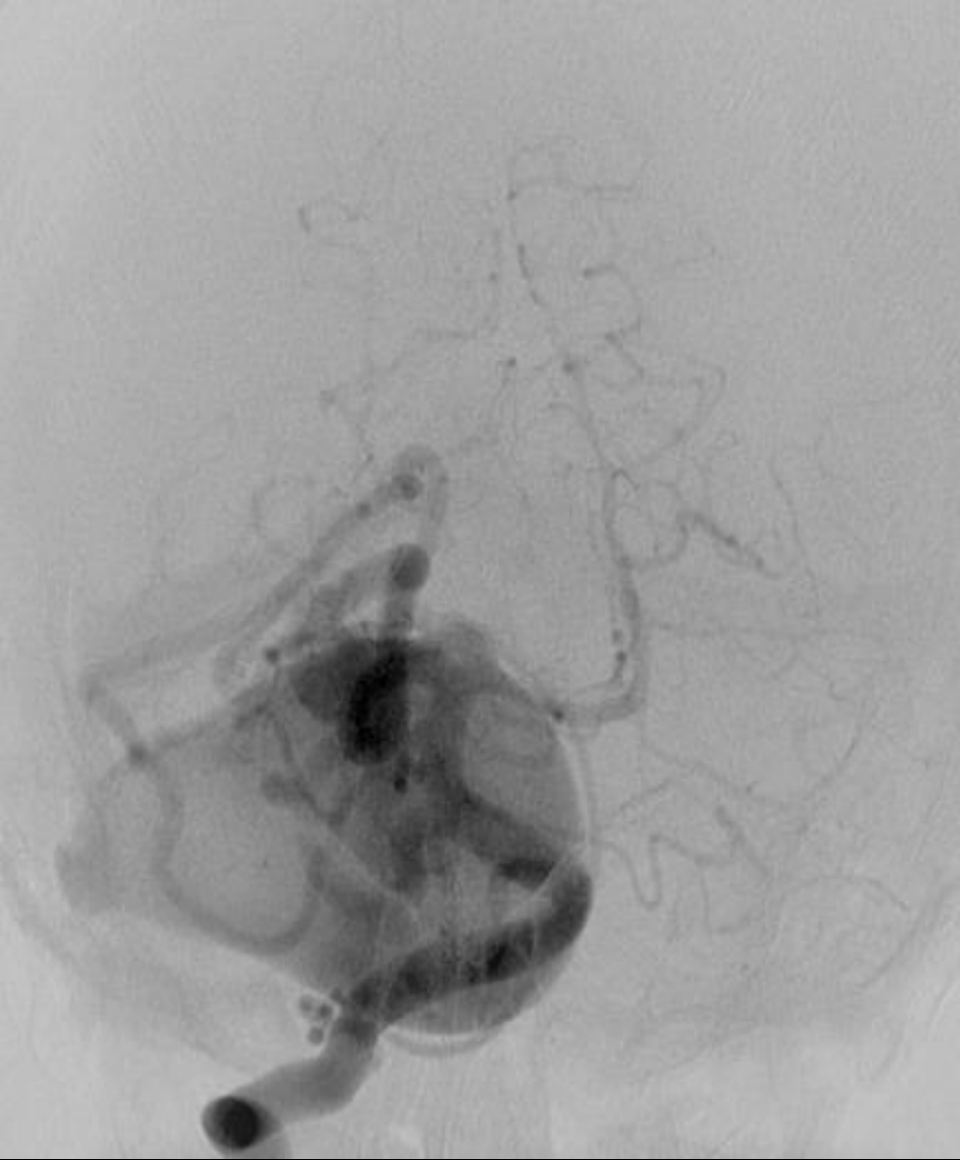


**5 yo male with a large head. Family h/o
brain AVM**



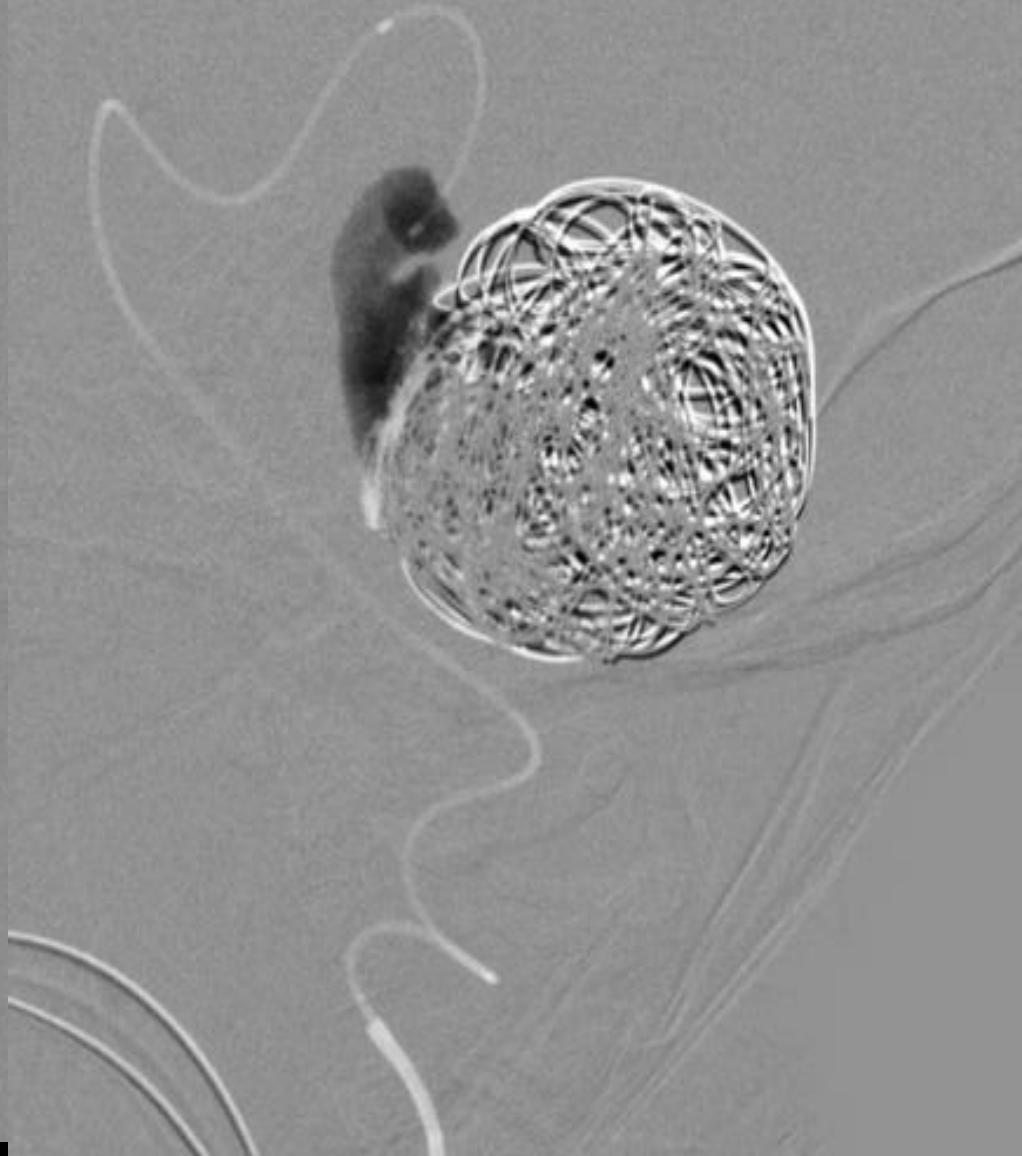
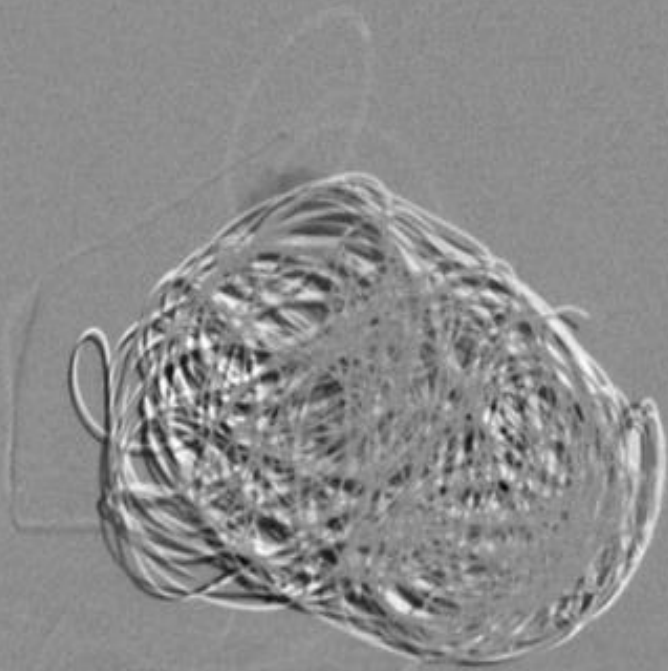


T1f1ar/90
TR:2018
TE:7.9/EF
EC:1/1 3102Hz
TI:750
HEAD



3/28/05

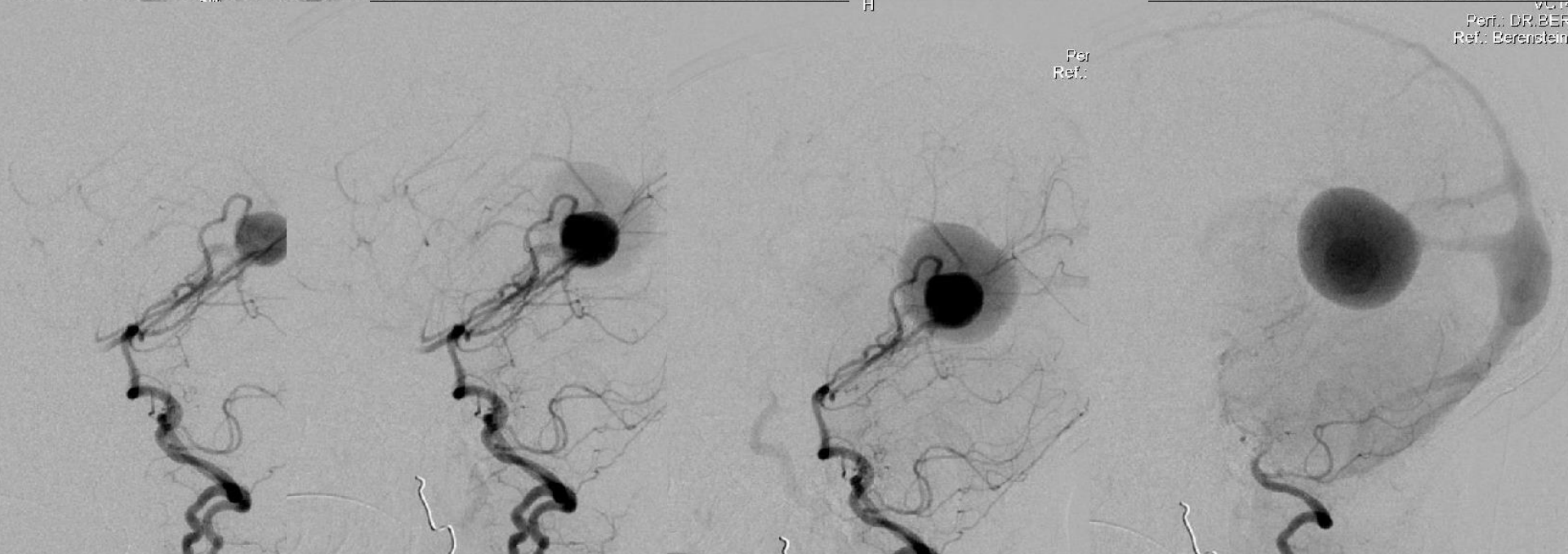
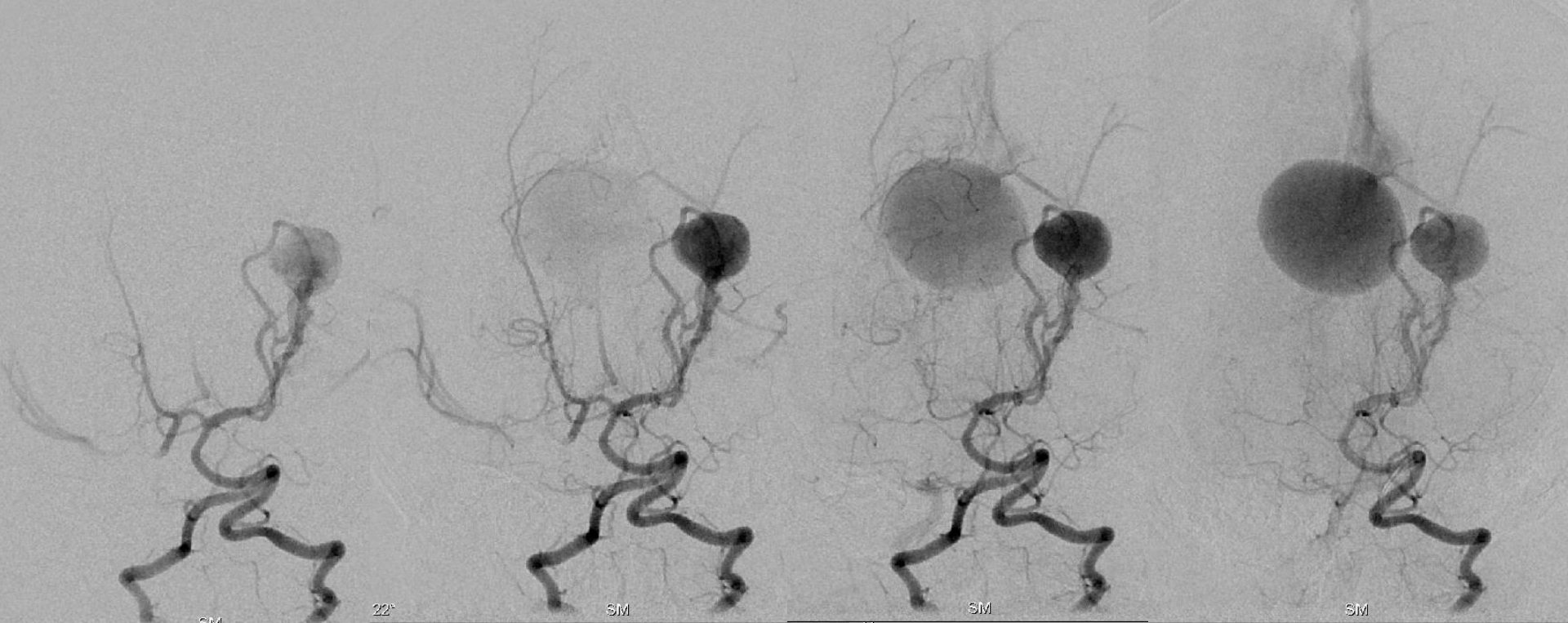




4/18/05







VOLUME
Prof. DR. BER
Ref.: Berenstein

2.93 sec

A

FISTULA 1
cm 22
B
KV 60
mA 174
D 1243
RAO 90° / 0°

1024 X 1024

EE 10%
AB 0%

WC 50 [W 4095]
WB 2800 [C 2047]

12 - 9/19
M 2
2.40 sec

4.53 sec

A

FISTULA 1
cm 22
B
KV 60
mA 174
D 1243
RAO 90° / 0°

1024 X 1024

EE 10%
AB 0%

WC 50 [W 4095]
WB 2800 [C 2047]

12 - 12/19
M 2
3.99 sec

R

FISTULA 1
cm 16

1024 X 1024

EE 11%

2.40 sec

R

FISTULA 1
cm 16

1024 X 1024

EE 11%

3.99 sec

Adler, Miriam
4703093
VC #3/17/2010
#3957473
STUDY 2162712
7/16/2010
4:58:58 PM
28 - 3/22

H

Roosevelt Hospital
Adler, Miriam
4703093
VC #3/17/2010
Perf.: DR. BERENSTEIN
Ref.: Berenstein

Adler, Miriam
4703093
VC #3/17/2010
#3957473
STUDY 2162712
7/16/2010
4:58:58 PM
28 - 3/22

H

Roosevelt Hospital
Adler, Miriam
4703093
VC #3/17/2010
#3957473
STUDY 2162712
7/16/2010
4:58:58 PM
28 - 3/22

M + Neuro
116
88
A 42
66
AO 90° / 0°

SM

0.83 sec

A

FISTULA 3/BLC
cm 16
B
KV 63
mA 174
D 1234
WC 34
WB 2450
RAO 90° / 0°

SM

1024 X 1024

EE 33%

DLG 0%

WW 2000 TW 4095
WC 1400 TC 2047



Adler, Miriam
4705093
*3/17/2010

H

Roosevelt Hospital
AXIOM-Artis
VC14D 090923
Perf.: DR. BERENSTEIN
Ref.: Berenstein, Alejandro
HFS
R////

3957473
STUDY 2182712
7/16/2010
5:03:08 PM
30 - 195/357
M 1
12.93 sec



A

RM + Neuro
cm 16
B
KV 68
mA 42
D 56
RAO 90° / 0°

1024 X 1024

EE 18%
AB 0%

xy 0.0/0.0

WC 34 [W 4095]
WB 2450 [C 2047]

SM

Adler, Miriam
4705093
*3/17/2010

H

Roosevelt Hospital
AXIOM-Artis
VC14D 090923
Perf.: DR. BERENSTEIN
Ref.: Berenstein, Alejandro
HFS
R////

3957473
STUDY 2182712
7/16/2010
5:03:06 PM
30 - 240/357
M 1
15.93 sec



A

RM + Neuro
cm 16
B
kV 68
mA 42
D 56
RAO 90° / 0°

1024 X 1024

EE 18%
AB 0%

SM

xy 0.0/0.0
WC 34 [W 4095]
WB 2450 [C 2047]

Adler, Miriam
4705093
*3/17/2010

H

Roosevelt Hospital
AXIOM-Artis
VC14D 090923
Perf.: DR. BERENSTEIN
Ref.: Berenstein, Alejandro
HFS
R////

3957473
STUDY 2182712
7/16/2010
5:03:08 PM
30 - 297/357
M 1
19.73 sec



A

RM + Neuro
cm 16
B
kV 68
mA 42
D 56
RAO 90° / 0°

1024 X 1024

EE 18%
AB 0%

xy 0.0/0.0

WC 34 [W 4095]
WB 2450 [C 2047]

SM

Adler, Miriam
4705093
*3/17/2010

H

Roosevelt Hospital
AXIOM-Artis
VC14D 090923
Perf.: DR. BERENSTEIN
Ref.: Berenstein, Alejandro
HFS
R////

3957473
STUDY 2182712
7/16/2010
5:03:08 PM
30 - 348/357
M 1
23.13 sec

A

RM + Neuro
cm 16
B
kV 68
mA 42
D 56
RAO 90° / 0°

SM

1024 X 1024
EE 18%
AB 0%
xy 0.0/0.0
WC 34 [W 4095]
WB 2450 [C 2047]

Adler, Miriam
4705093
*3/17/2010

3957473
STUDY 2182712
7/16/2010
5:04:23 PM
31 - 18/18
M 1

H

Roosevelt Hospital
AXIOM-Artis
VC14D 090923
Perf.: DR. BERENSTEIN
Ref.: Berenstein, Alejandro
HFS
R////

A

RM + Neuro
cm 16
B
kV 68
mA 42
D 56
RAO 90° / 0°

1024 X 1024
QPAC
EE 18%
AB 0%

xy 0.0/0.0
WC 34 [W 4095]
WB 2450 [C 2047]

SM

H

Roose

H

Roosevelt

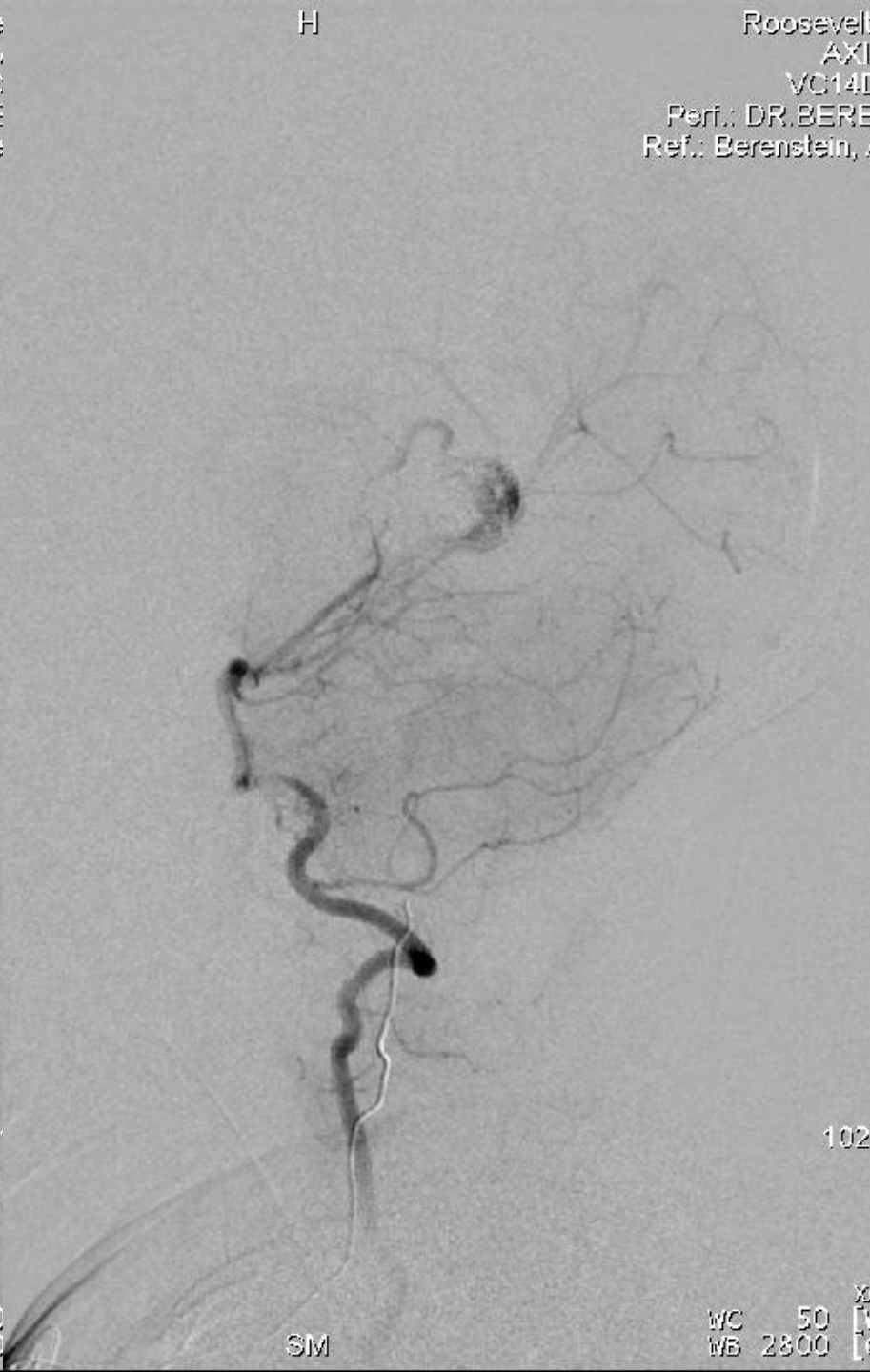
VC
Perf.: DR.BE
Ref.: Berenste

AXI
VC14D
Perf.: DR.BERE
Ref.: Berenstein, A



SM

WC 50
WB 2800



SM

WC 50
WB 2800

102

X
T

STUDY 46228770
5/16/2011
1:47:18 PM
2 - 16/35
M 3
4.00 sec

Ref.: Berenstein, Alejandro
HFS
RHHH

R

LT VERT
cm 22
A
KV 67
4192433
*3/17/2010
STUDY 46228770
5/16/2011
1:47:18 PM
2 - 16/35
M 2
4.88 sec

1024 X 1024

EE 0%
AB 0%

CALMETEUS
VC14H 100814
Perf.: BERENSTEIN, A
Ref.: Berenstein, Alejandro
HFS
RHHH

STUDY 46228770
5/16/2011
1:47:18 PM
2 - 22/35
M 3
5.60 sec

Ref.: Berenstein, Alejandro
HFS
RHHH

R

LT VERT
cm 22
A
KV 67
4192433
*3/17/2010
STUDY 46228770
5/16/2011
1:47:18 PM
2 - 26/35
M 2
6.67 sec

1024 X 1024

EE 0%
AB 0%

CALMETEUS
VC14H 100814
Perf.: BERENSTEIN, A
Ref.: Berenstein, Alejandro
HFS
RHHH

A

LT VERT
cm 32
B
KV 65
mA 178
D 774
RAO 90° / 0°

1024 X 1024

EE 0%
AB 0%

xy 0.070.0
WC 4095 W 4095
WB 2047 C 2047

SM

A

LT VERT
cm 32
B
KV 65
mA 178
D 774
RAO 90° / 0°

1024 X 1024

EE 0%
AB 0%

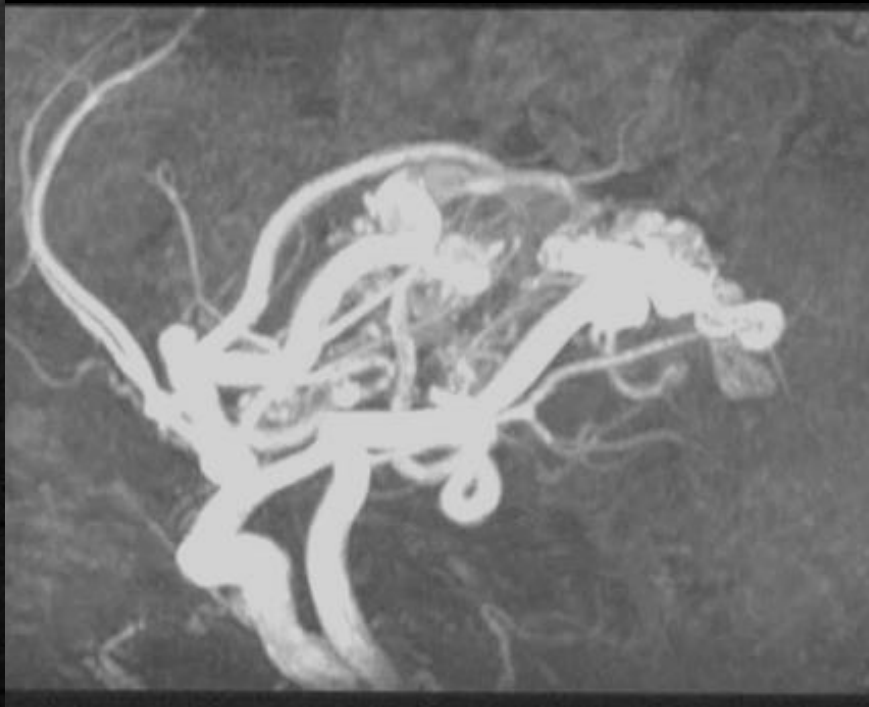
xy 0.070.0
WC 4095 W 4095
WB 2047 C 2047

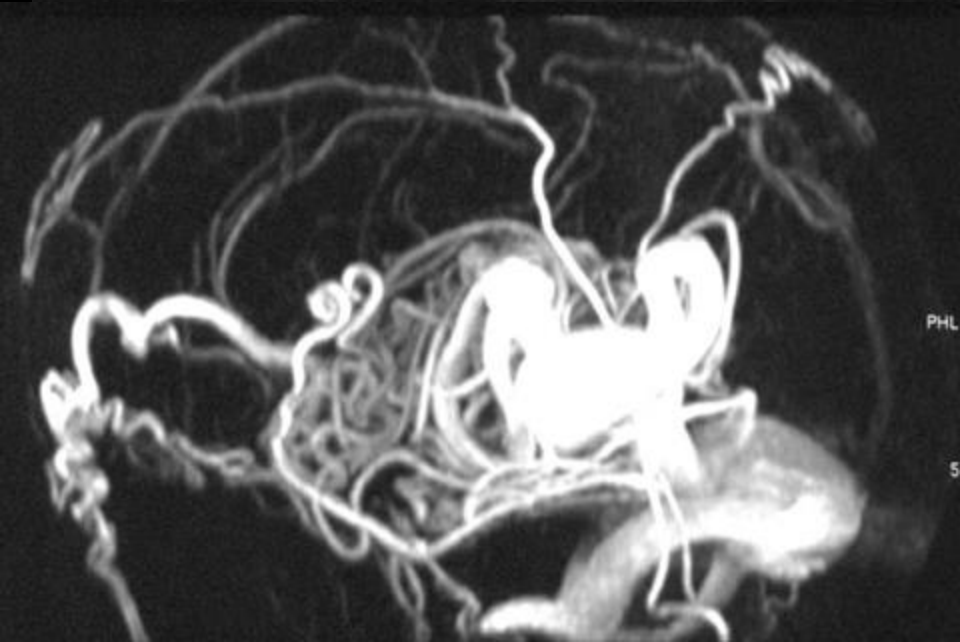
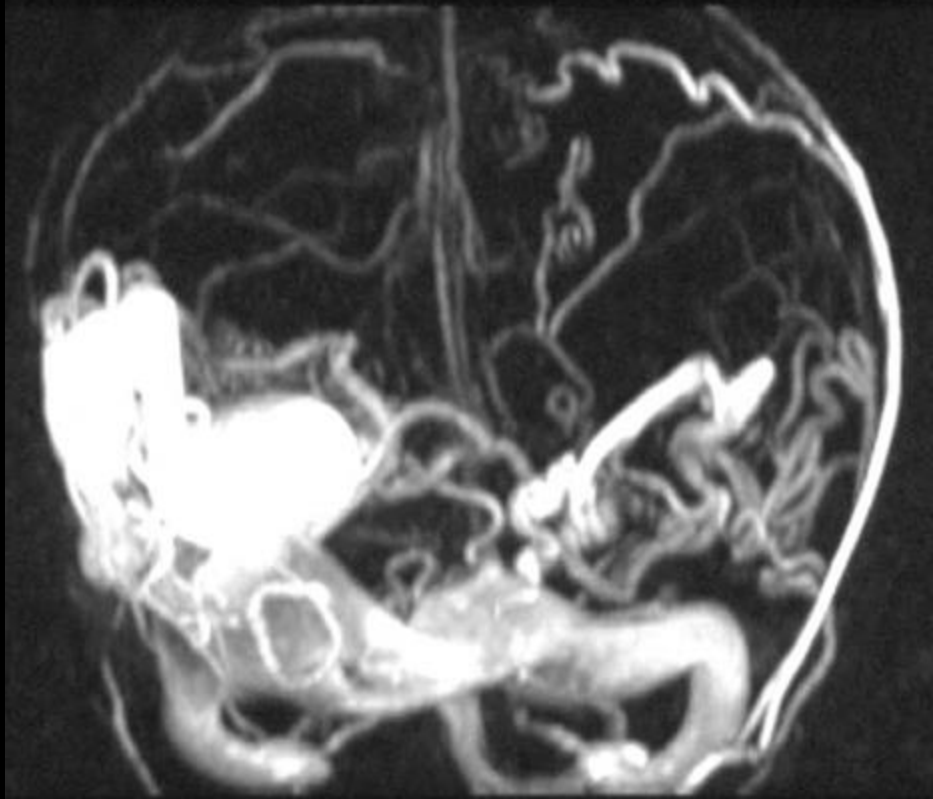
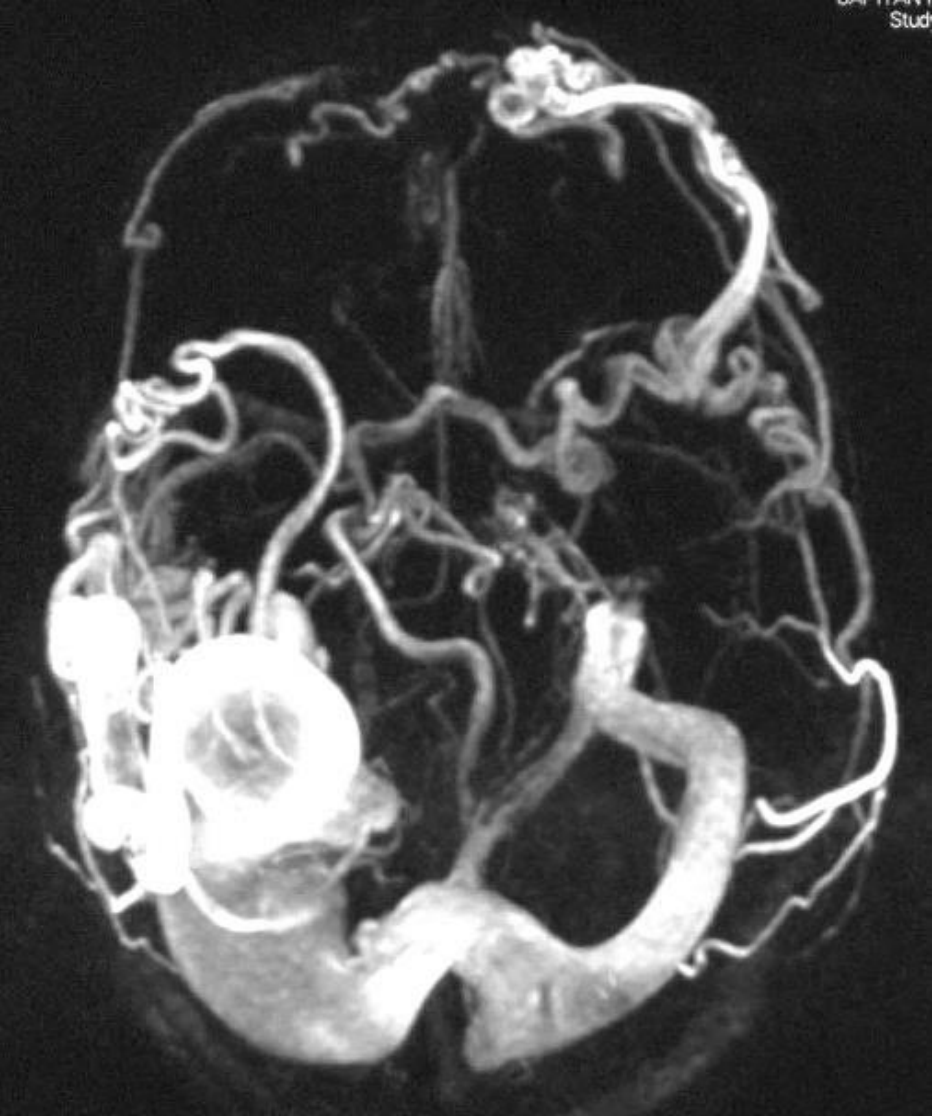
SM

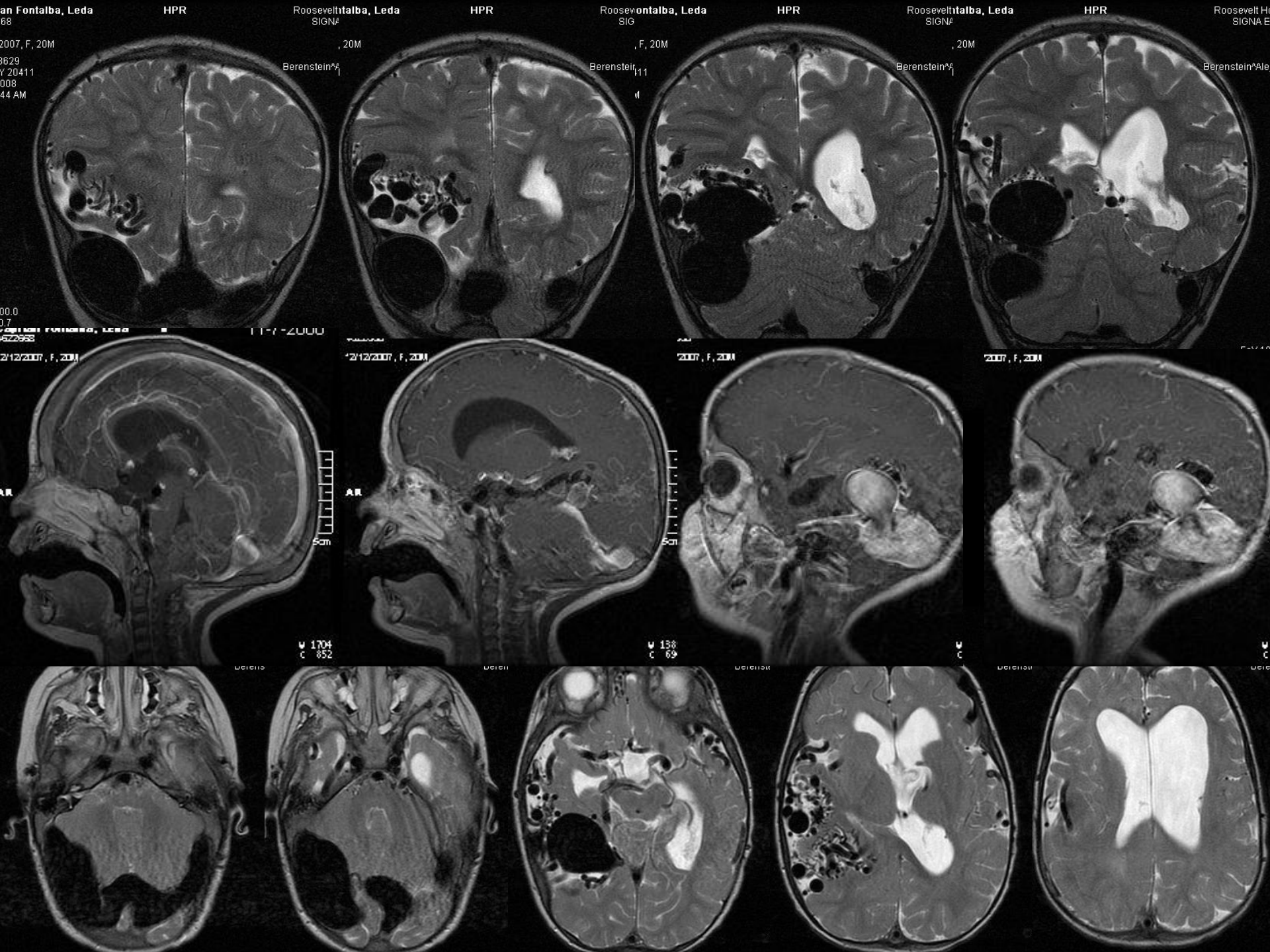


9-3-2008

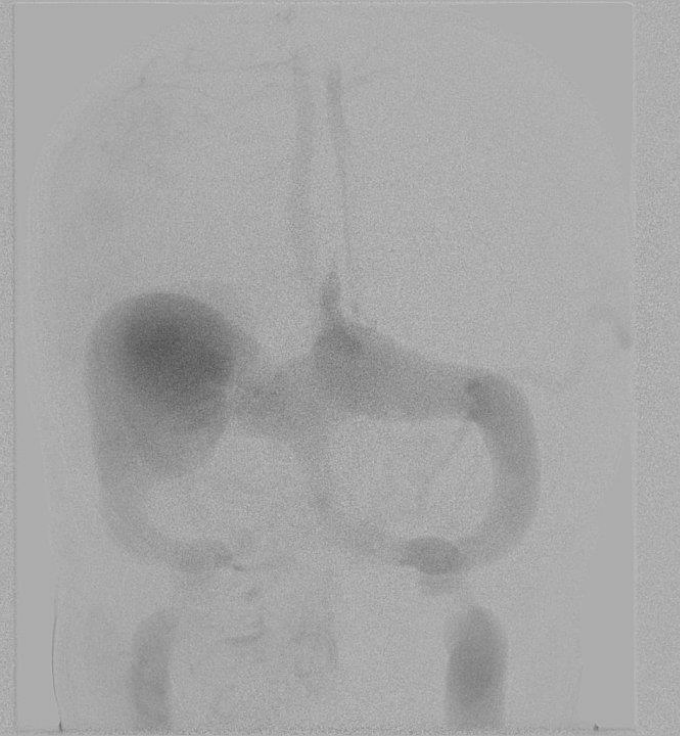
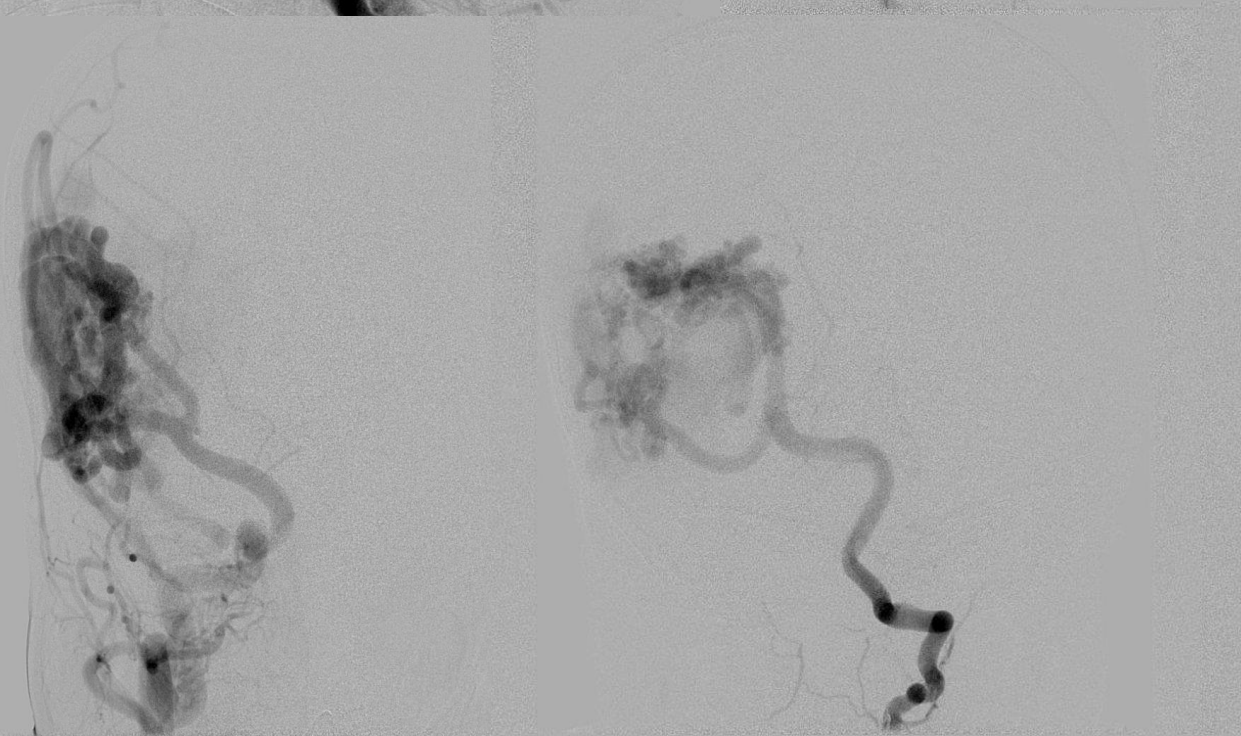
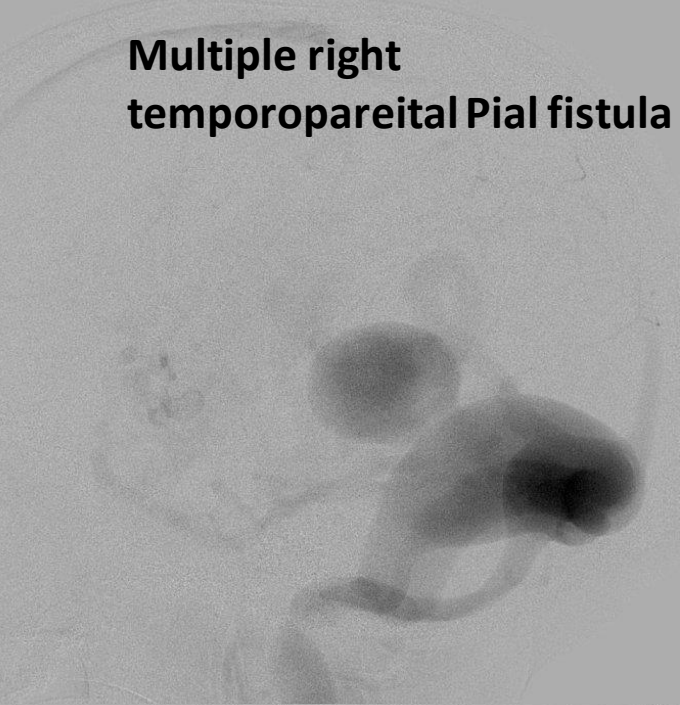
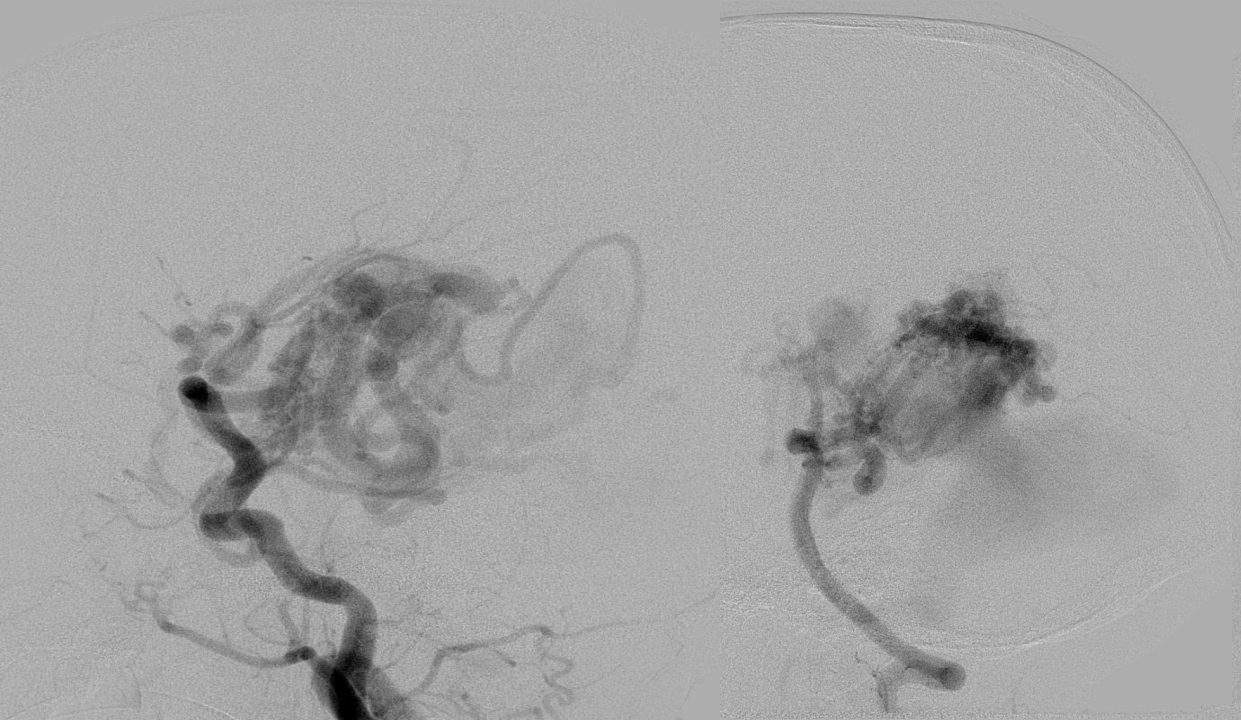


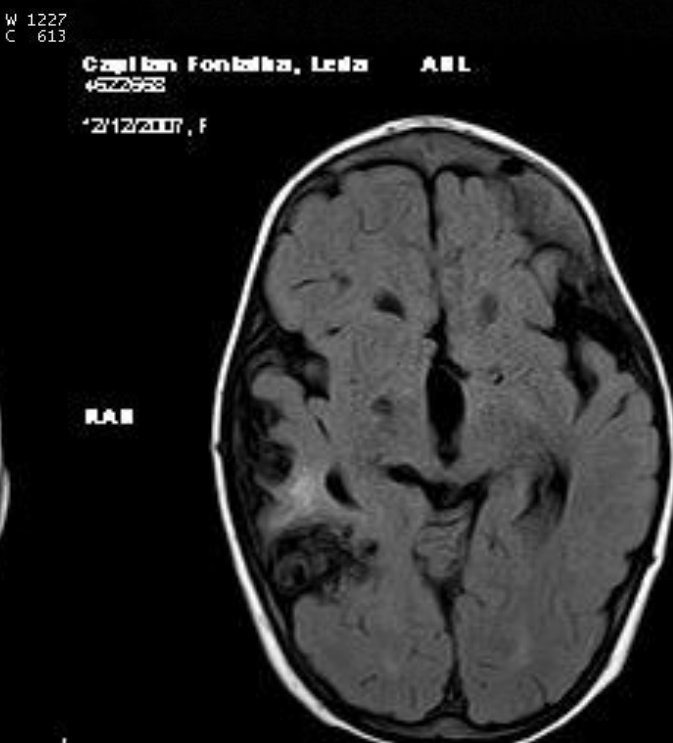
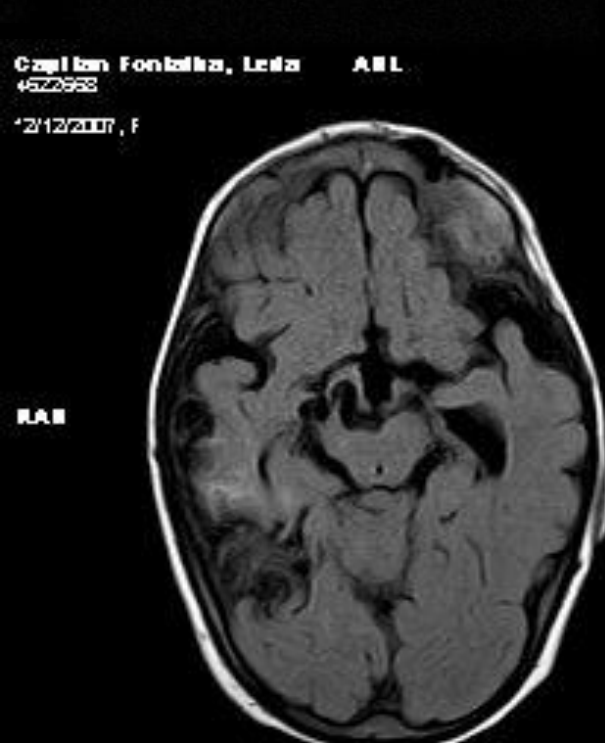
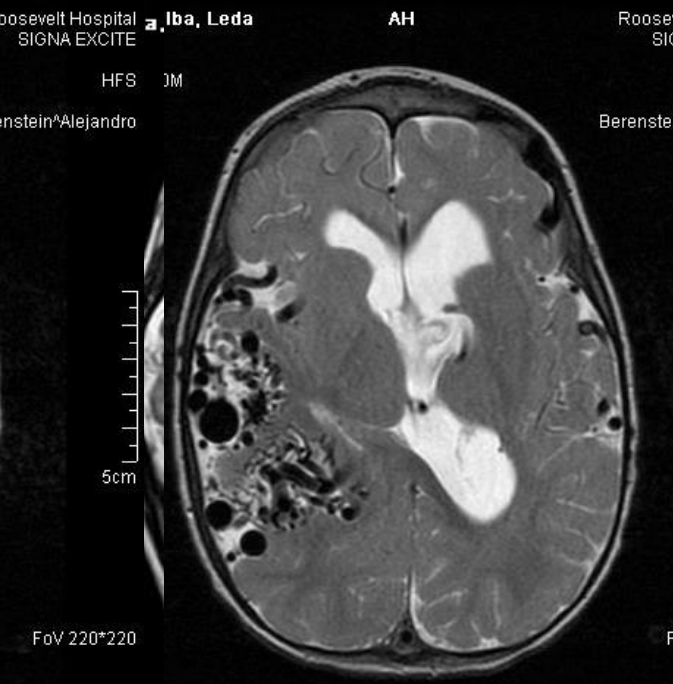
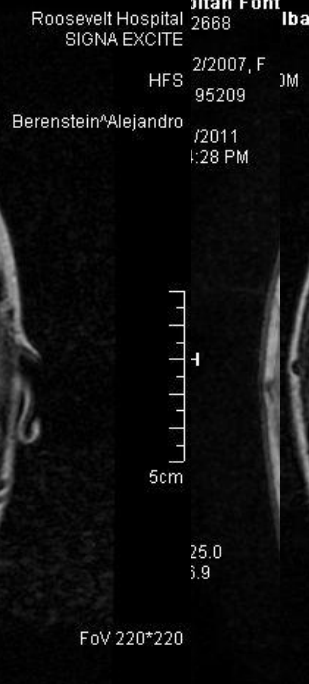




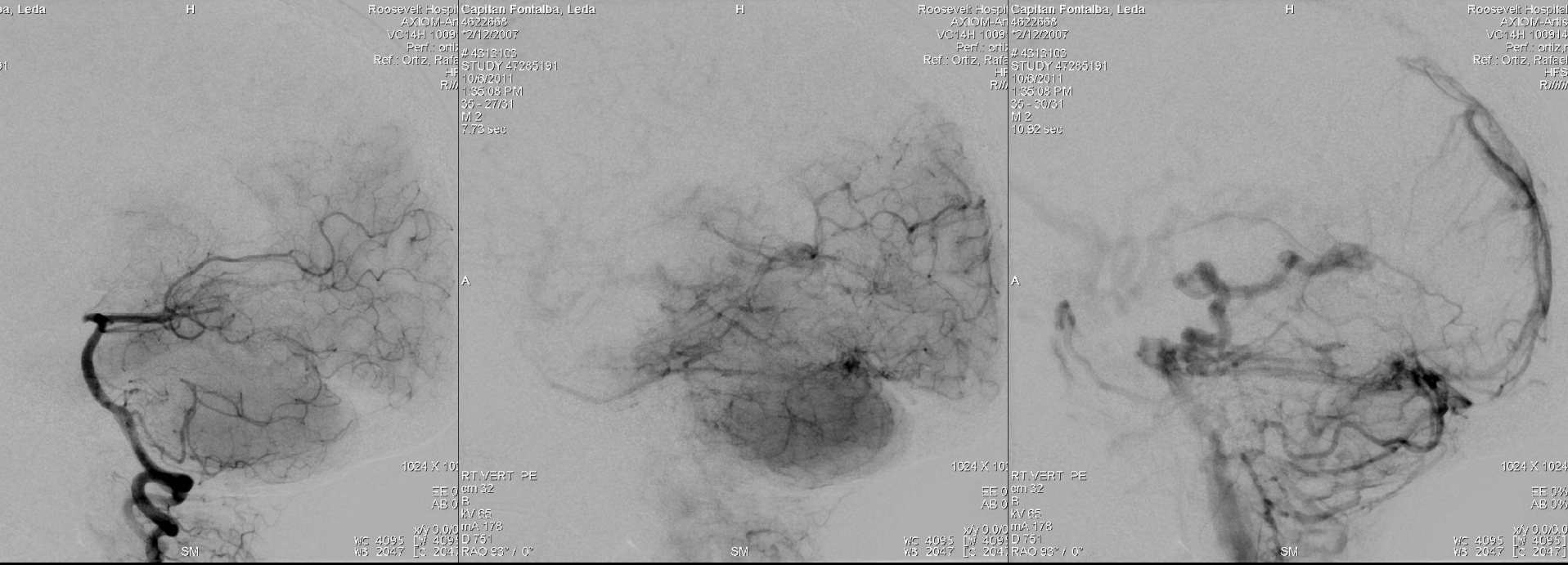


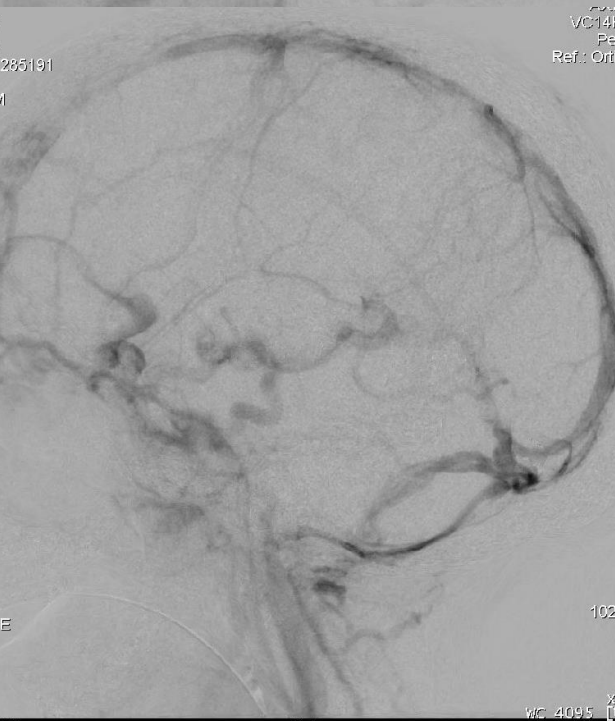
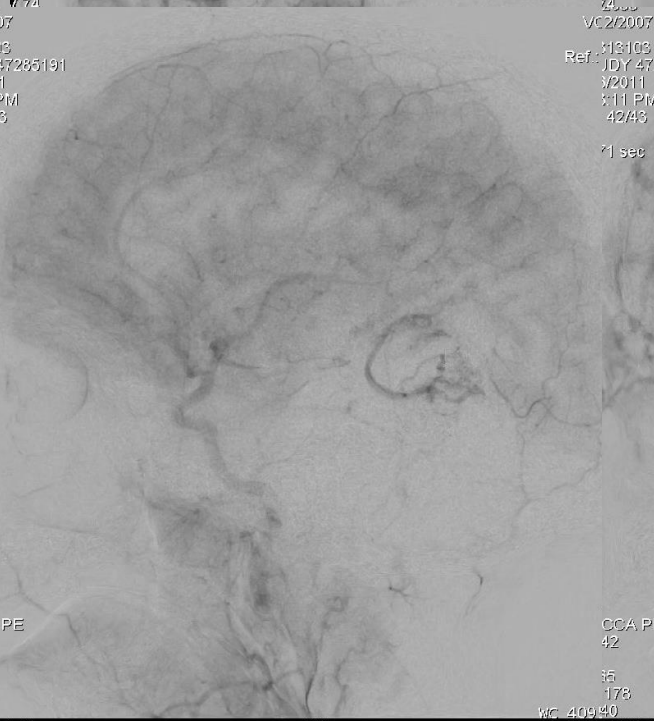
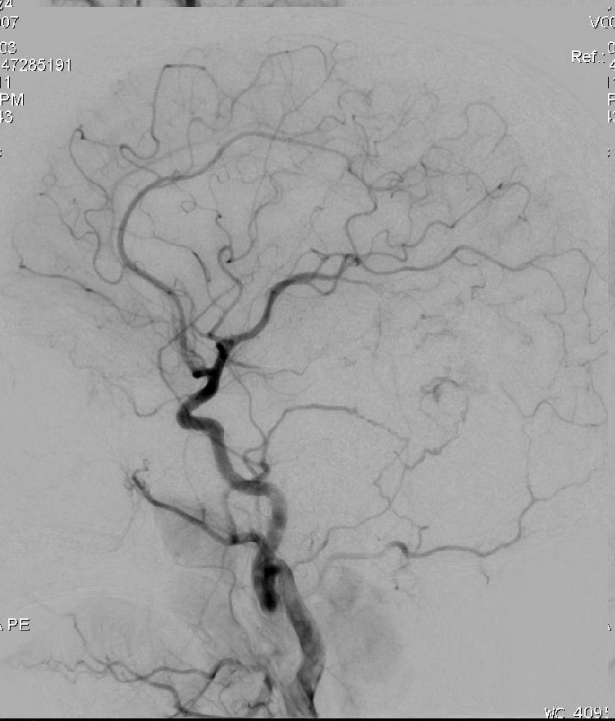
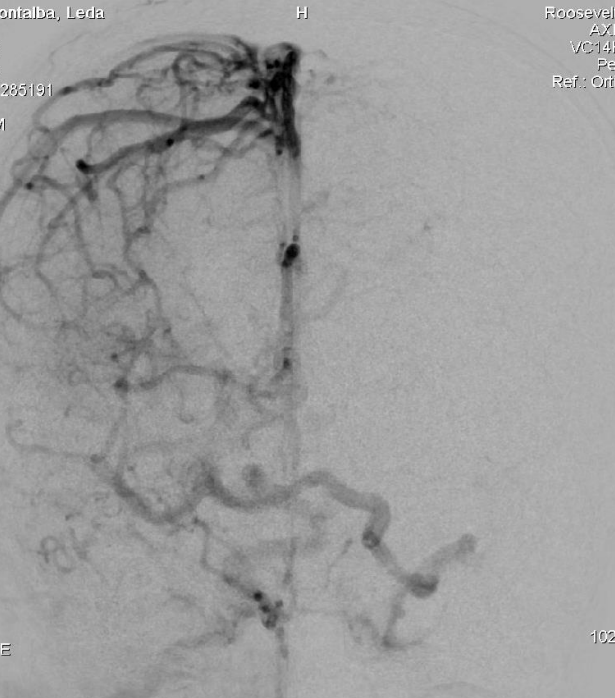
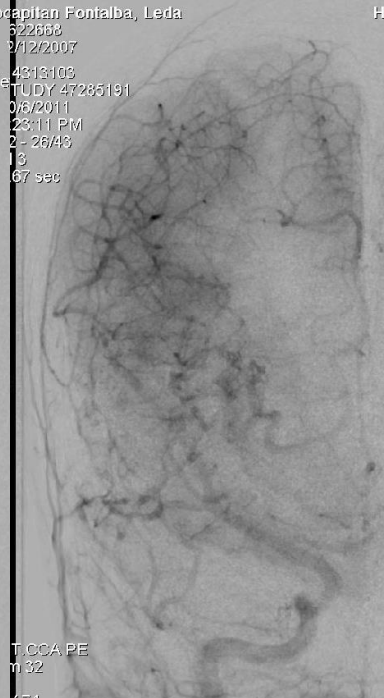
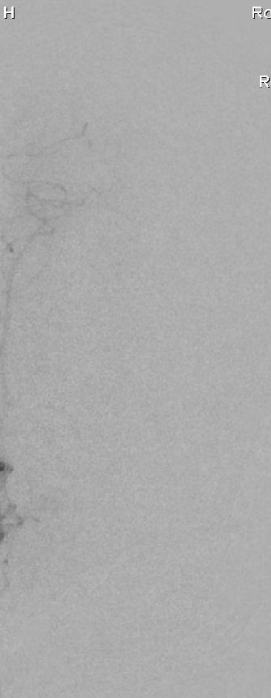
**Multiple right
temporoparietal Pial fistula**

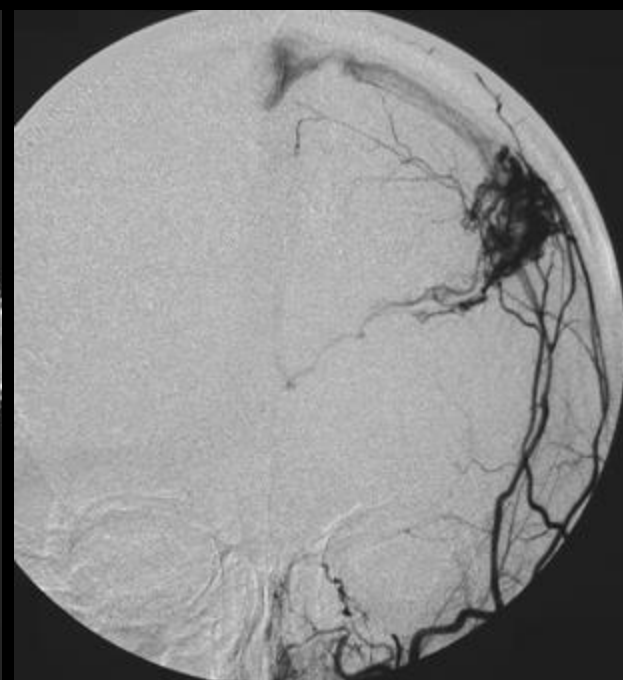
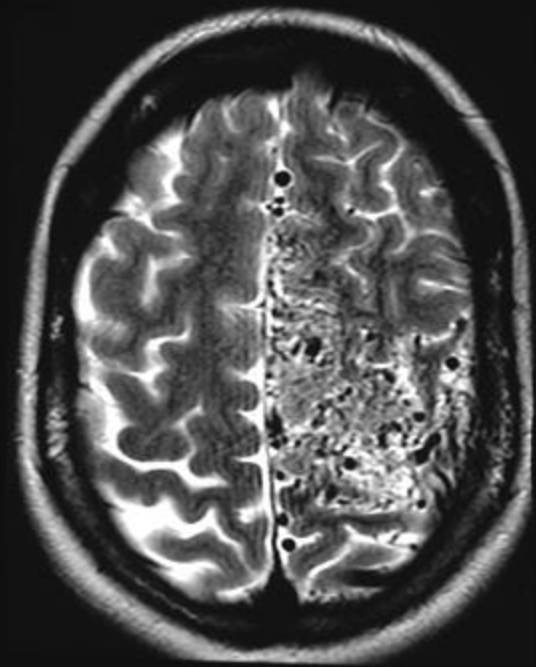
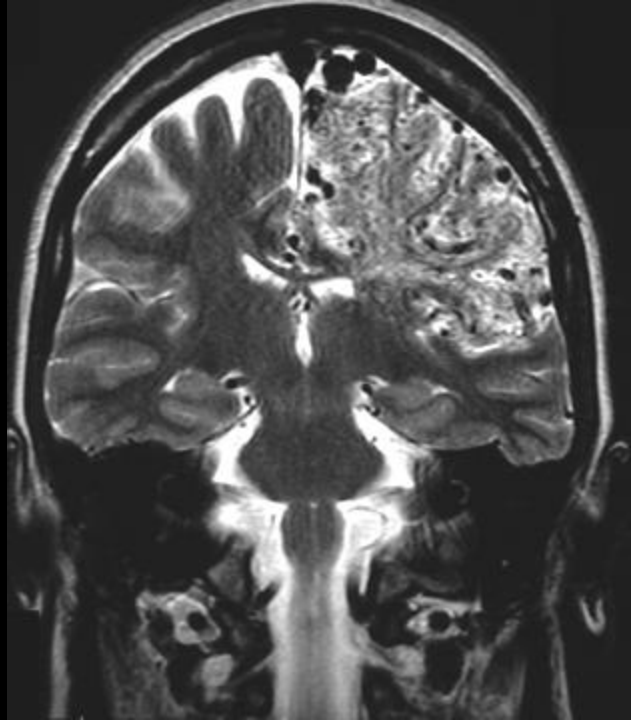


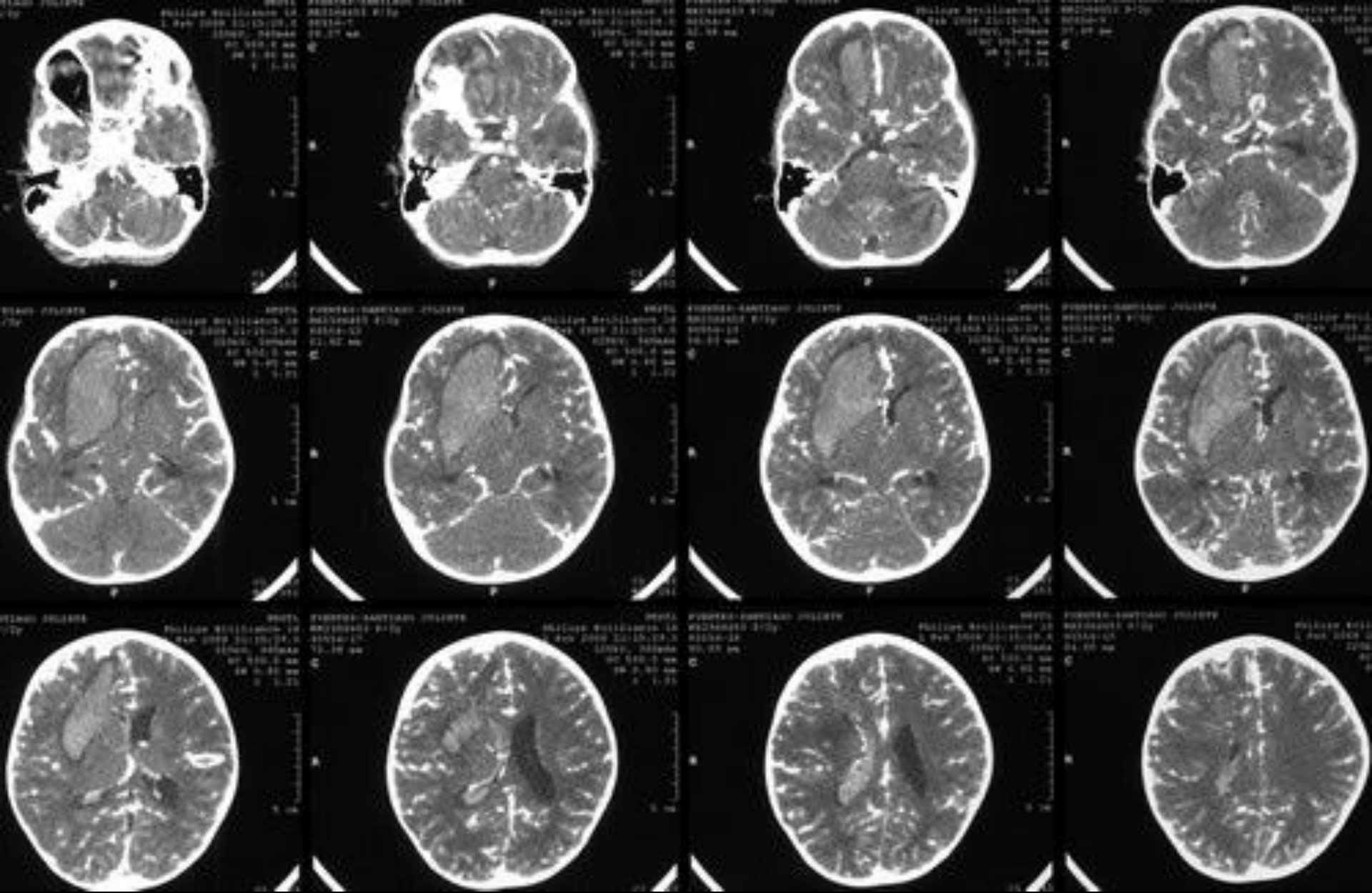


Capitan Fontalba, Leda 4822868 *2/12/2007 # 4818108 STUDY: 47286191 10/6/2011 1:35:08 PM 35 - 13/31 M 3 3.20 sec	H	Roosevelt Capitan Fontalba, Leda AX 4822868 VC14H *2/12/2007 Per: oriz Ref: Ori STUDY: 47286191 10/6/2011 1:35:08 PM 35 - 13/31 M 3 4.53 sec	H	Roosevelt Hospital Fontalba, Leda AXIOM-Aris VC14H 100914 Per: oriz.r Ref: Ortiz, Rafael 47286191 HFS 1/1/11	H	Roosevelt Hospital AXIOM-Aris VC14H 100914 Per: oriz.r Ref: Ortiz, Rafael HFS 1/1/11
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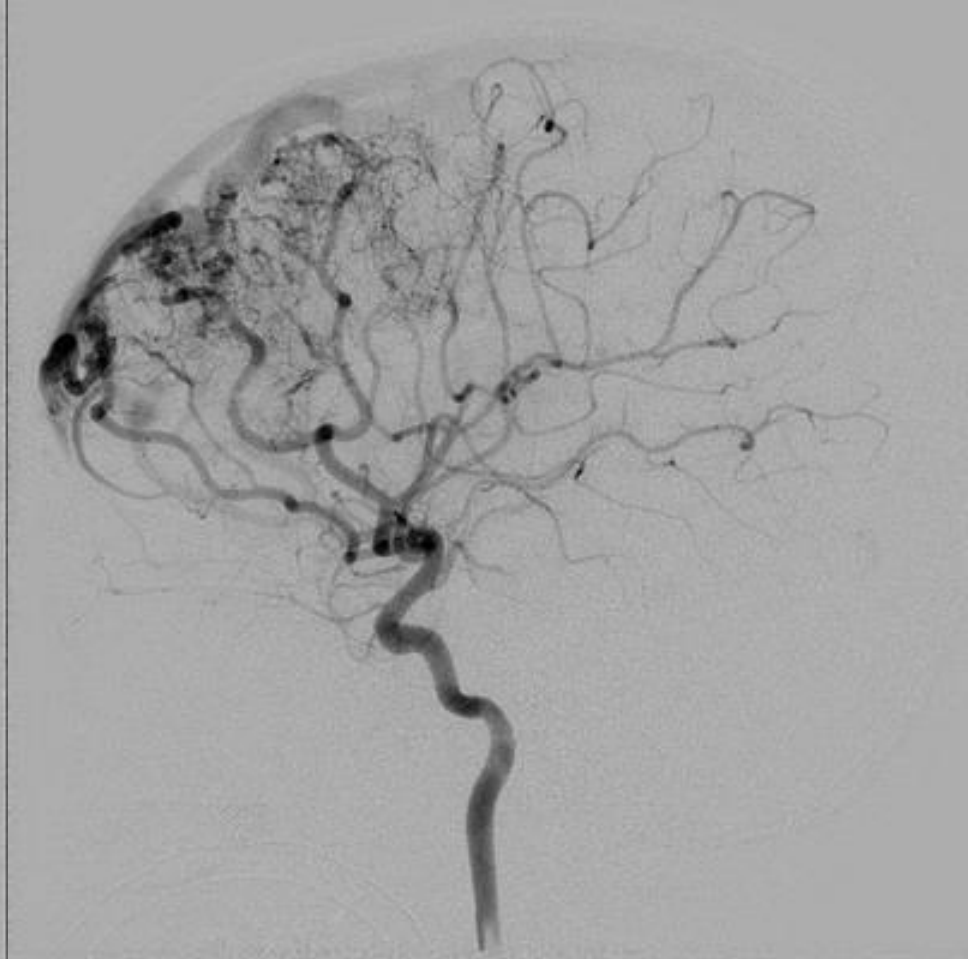
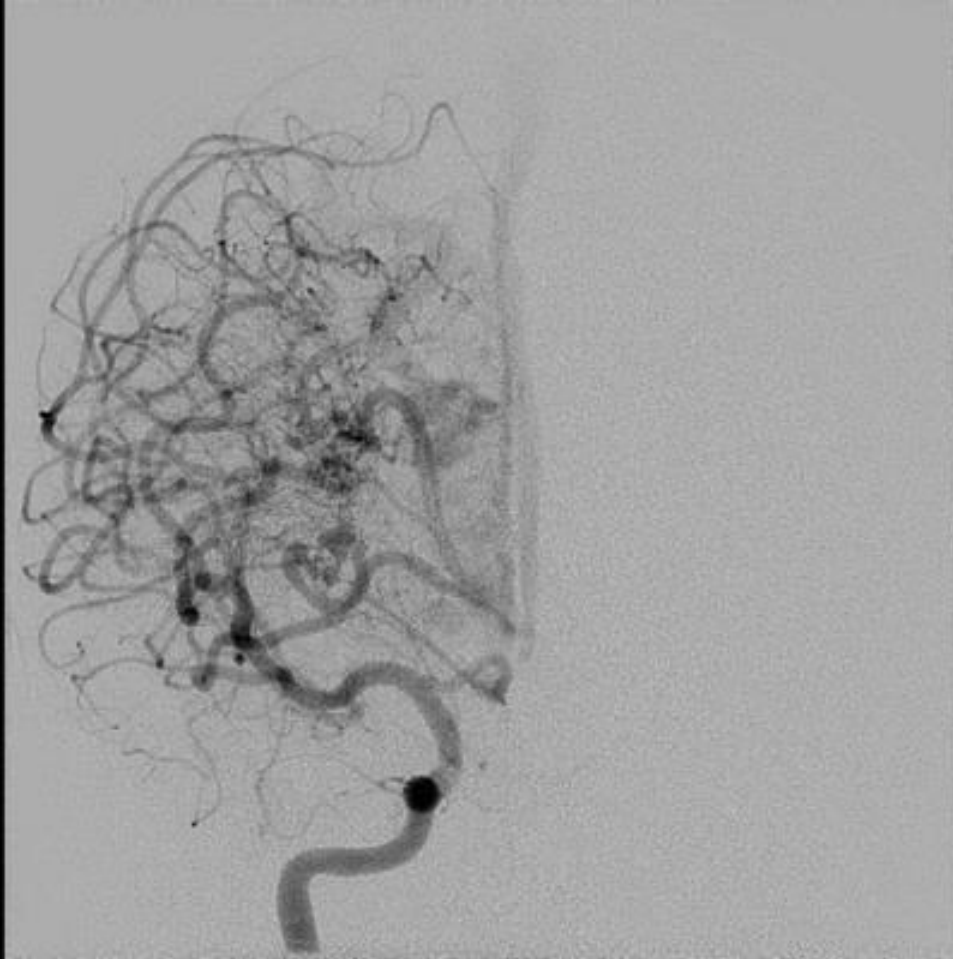




2008/02/01

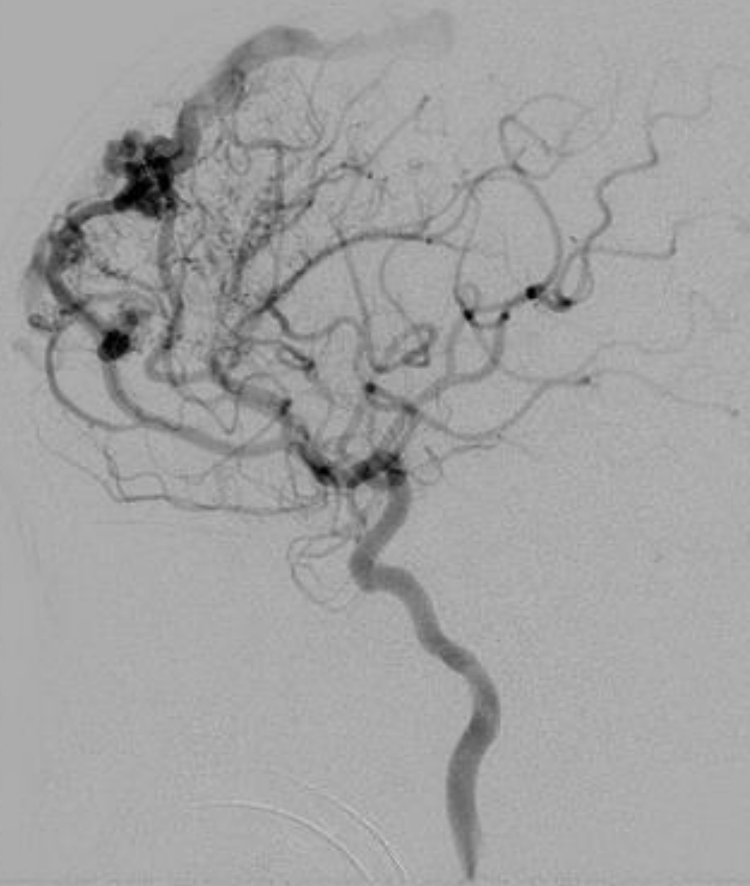
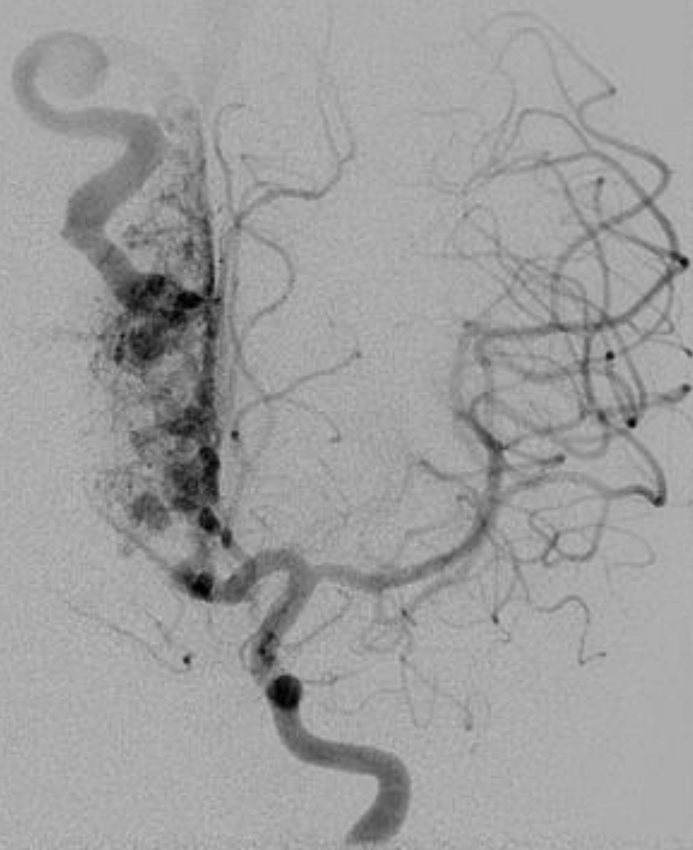
3 y.o. female presented with rt ICH





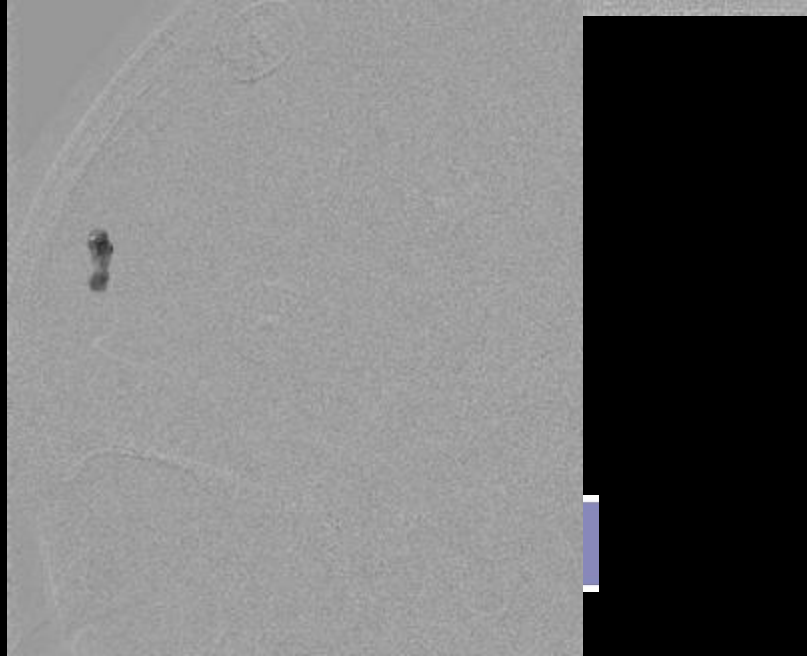
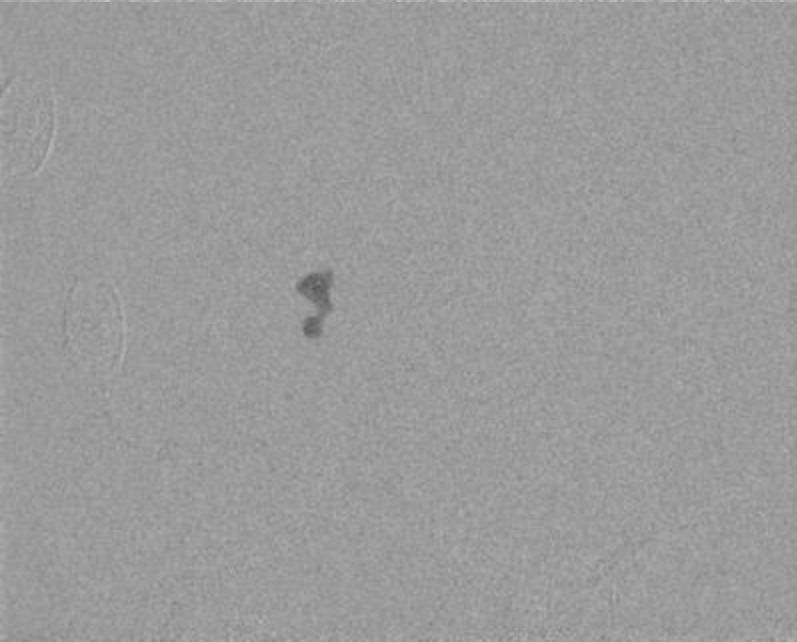
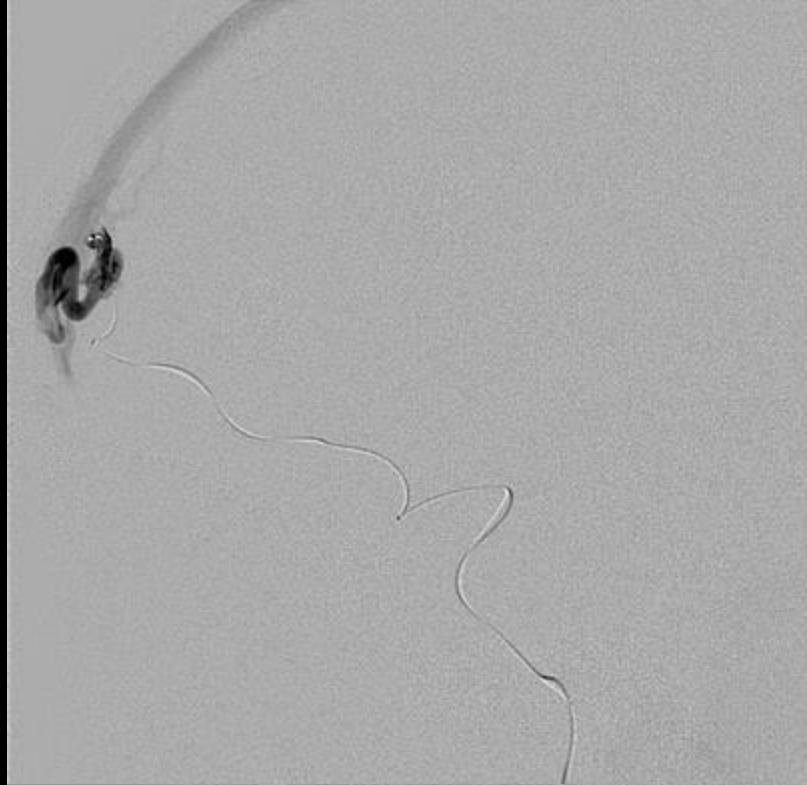
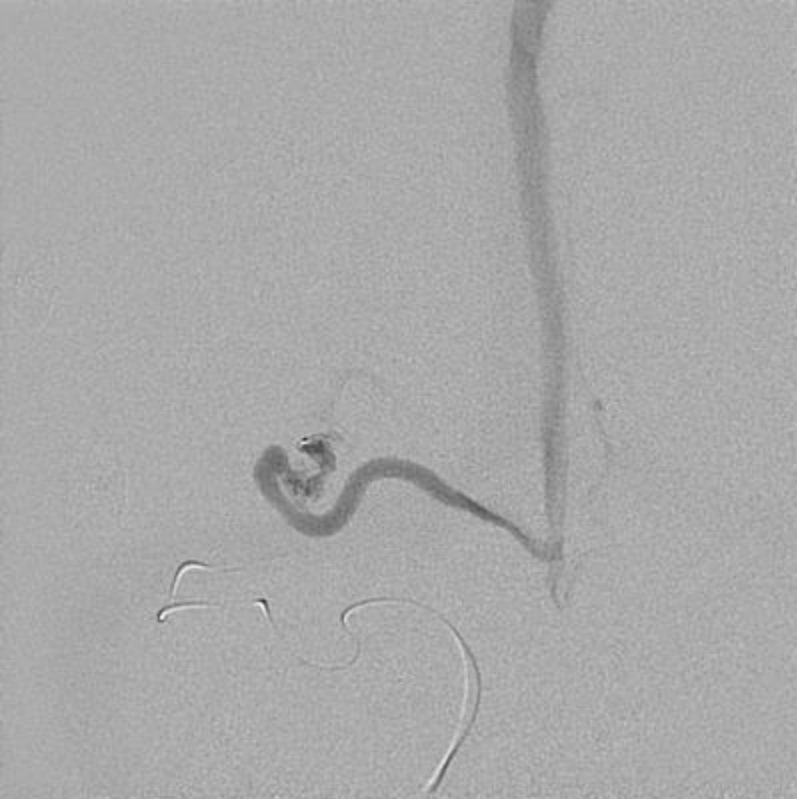
2008/07/24

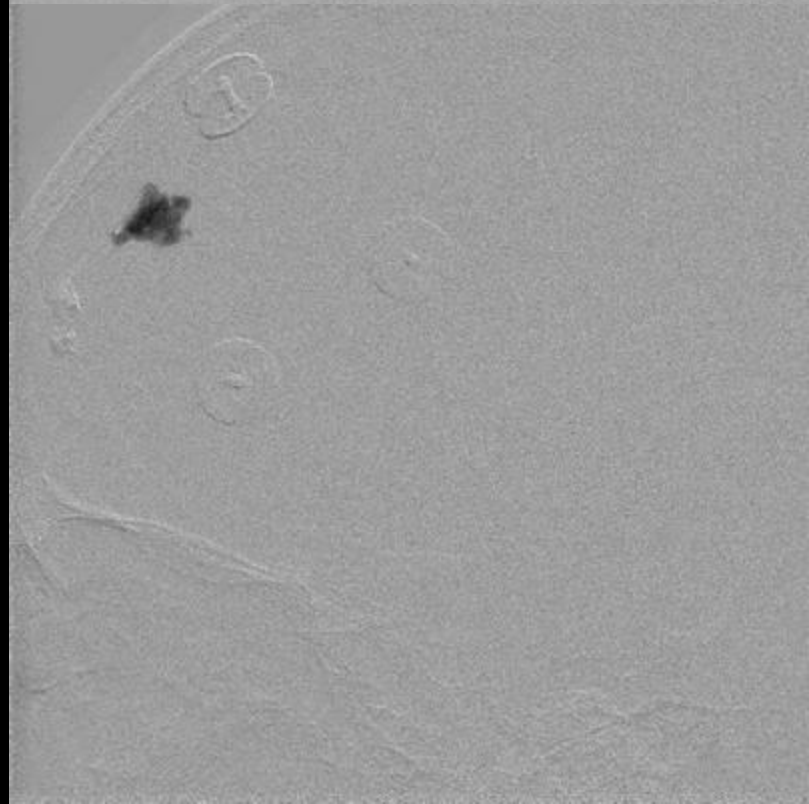
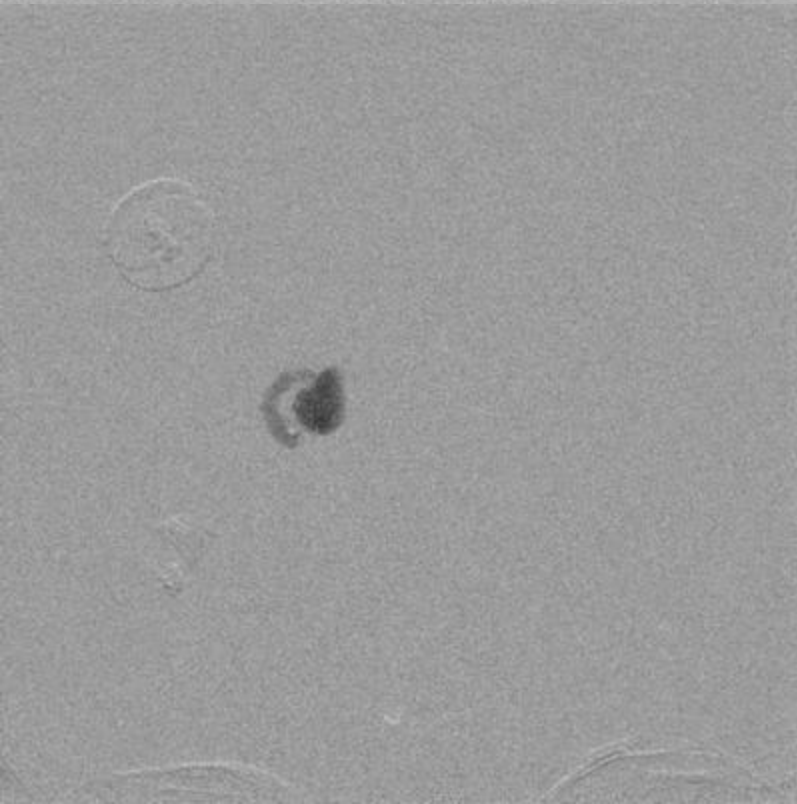
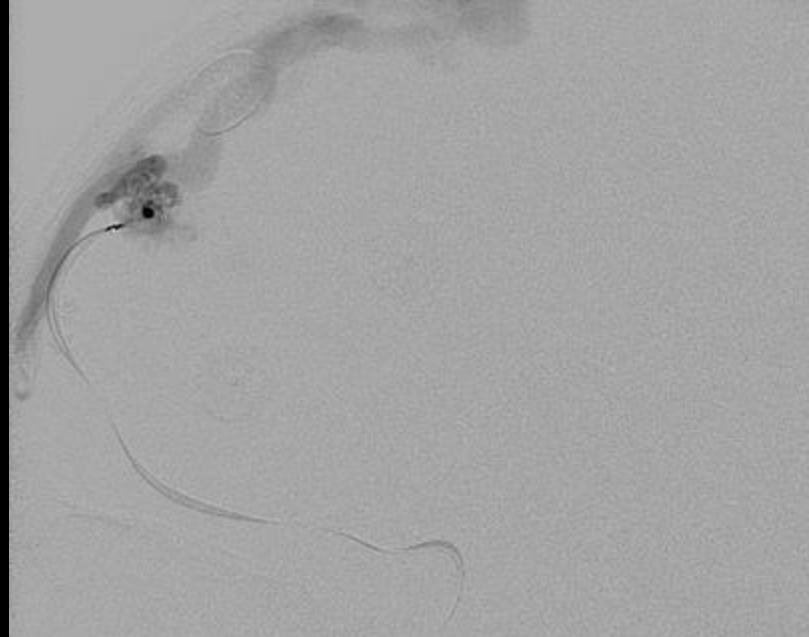


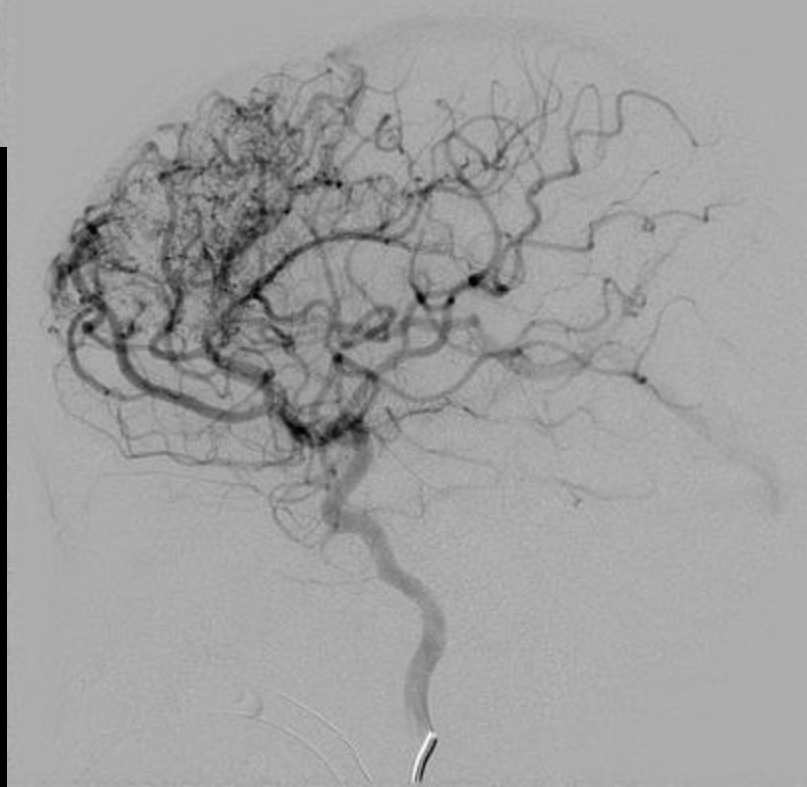
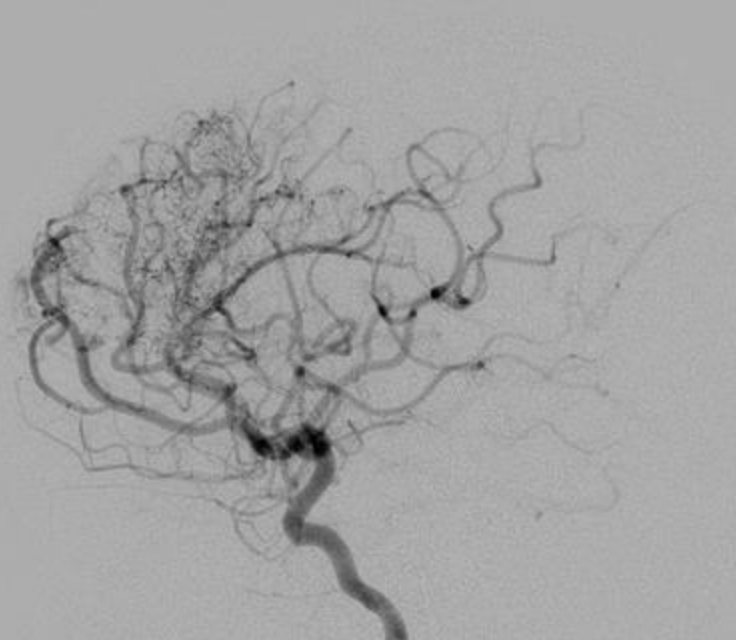
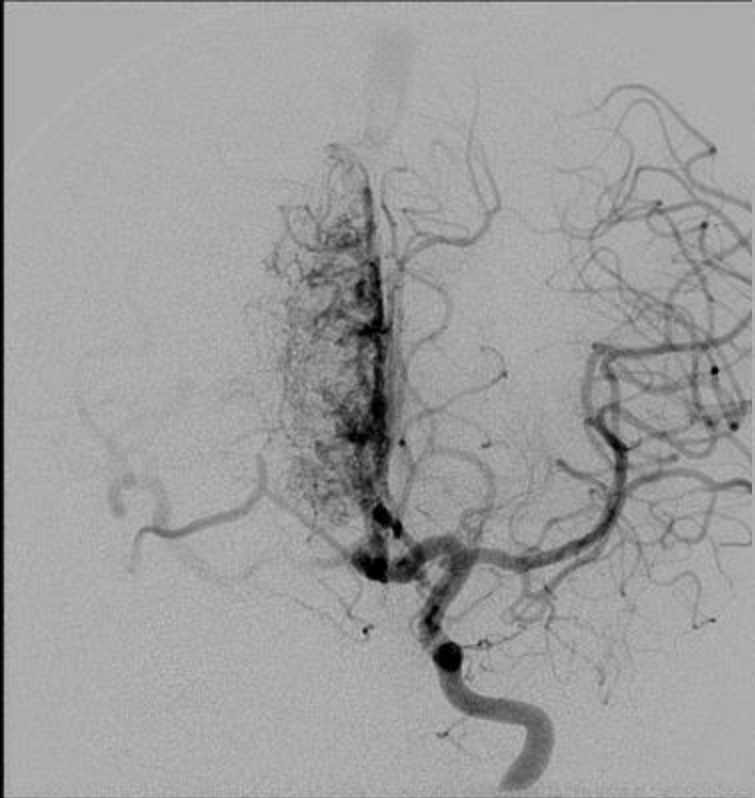


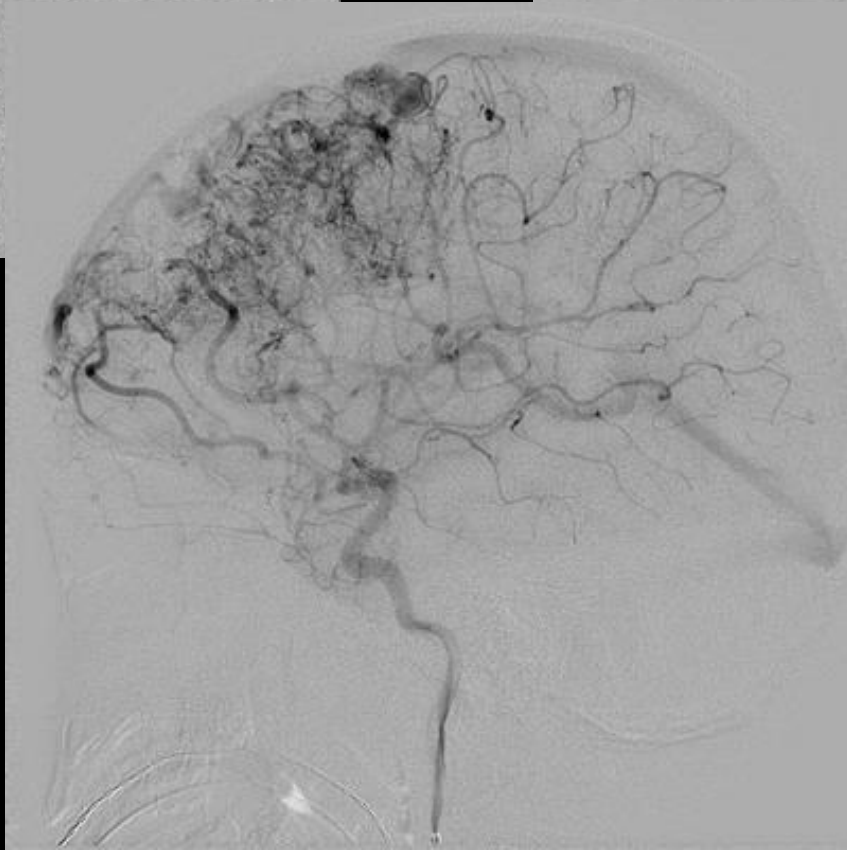
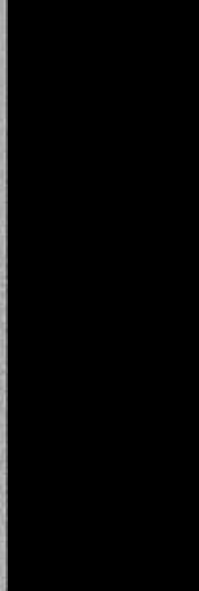
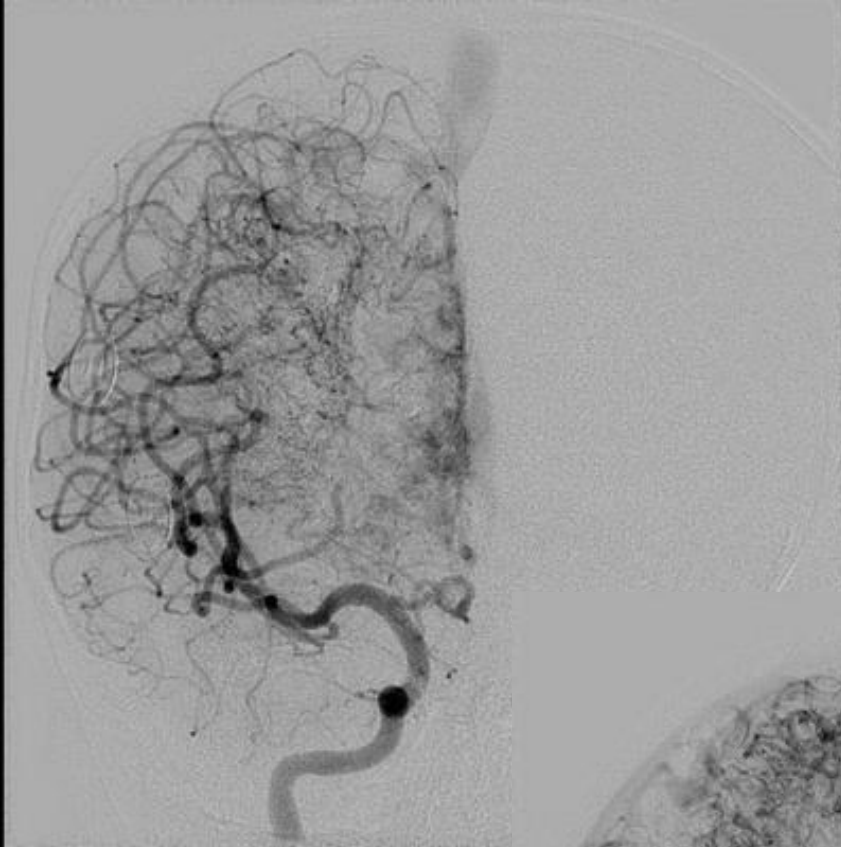
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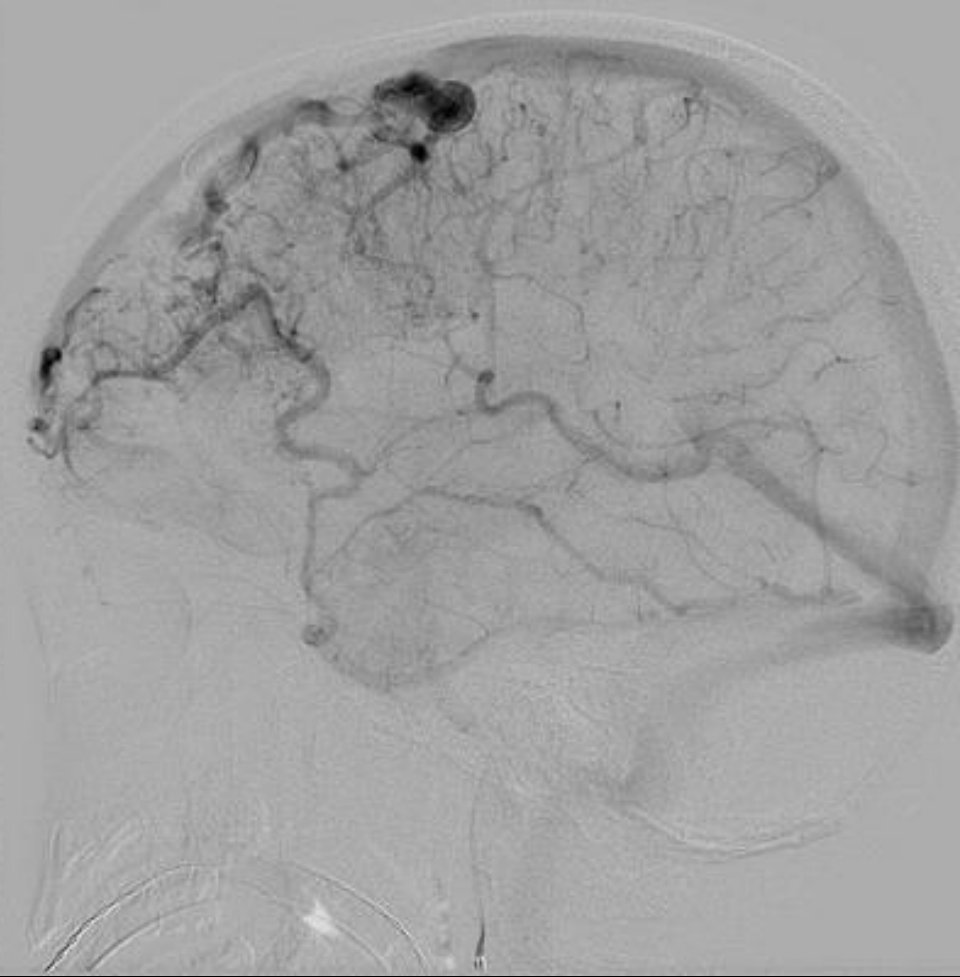
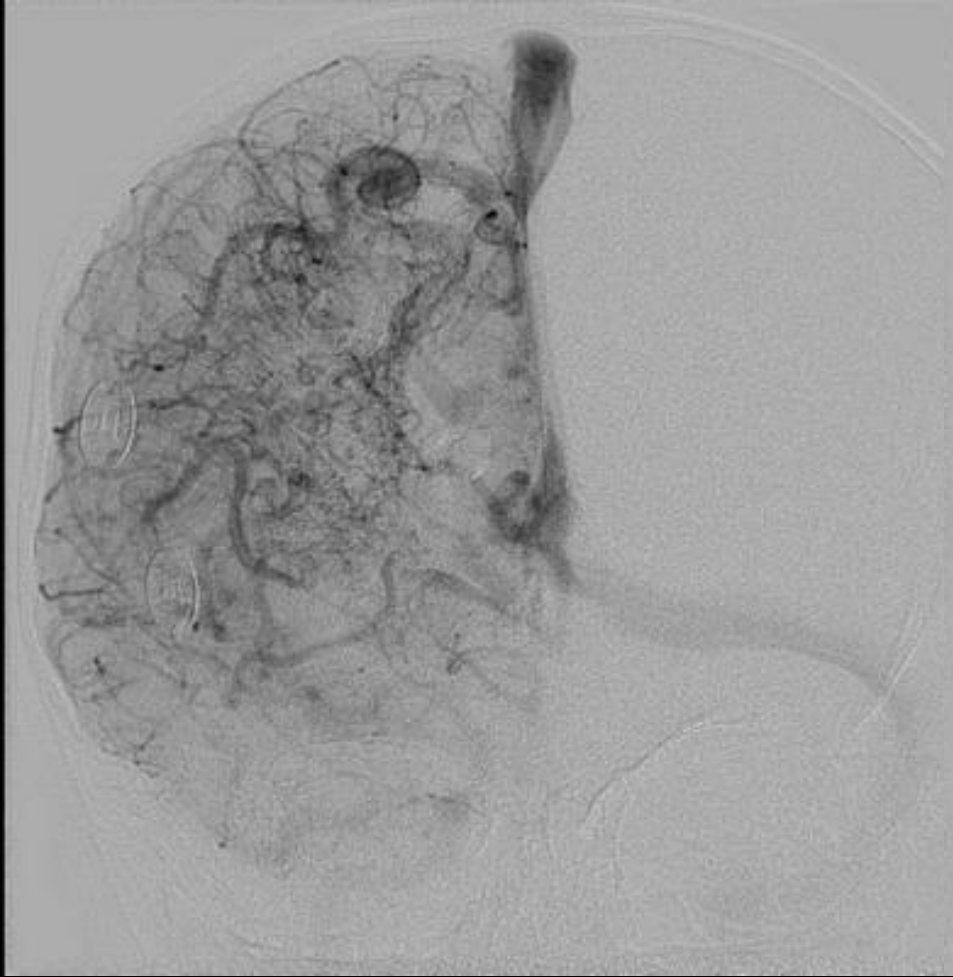




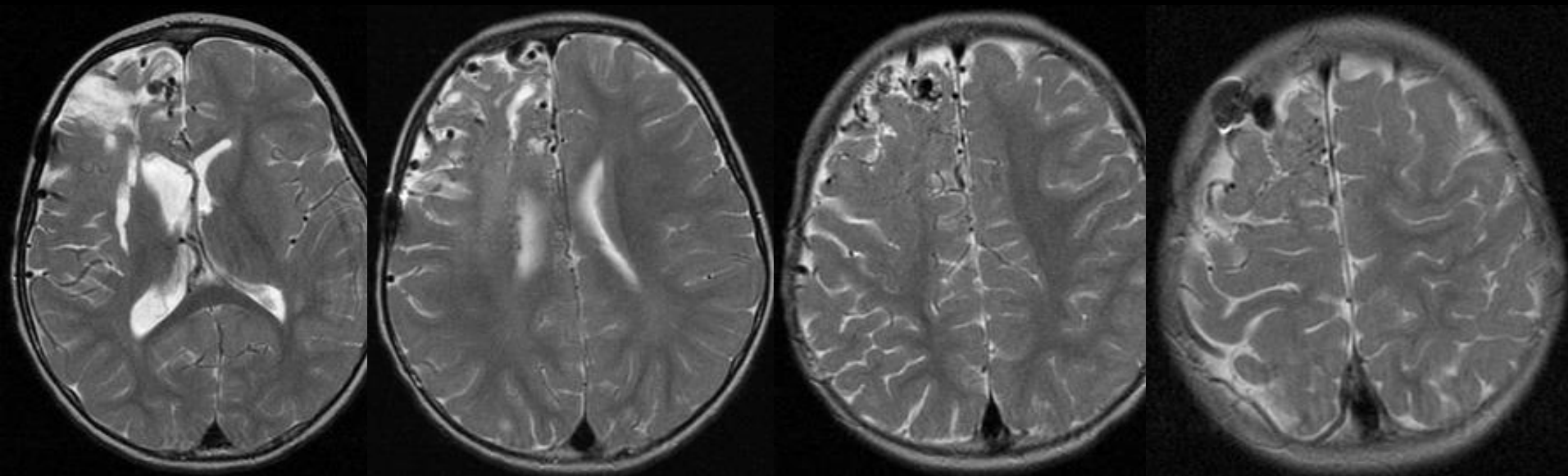




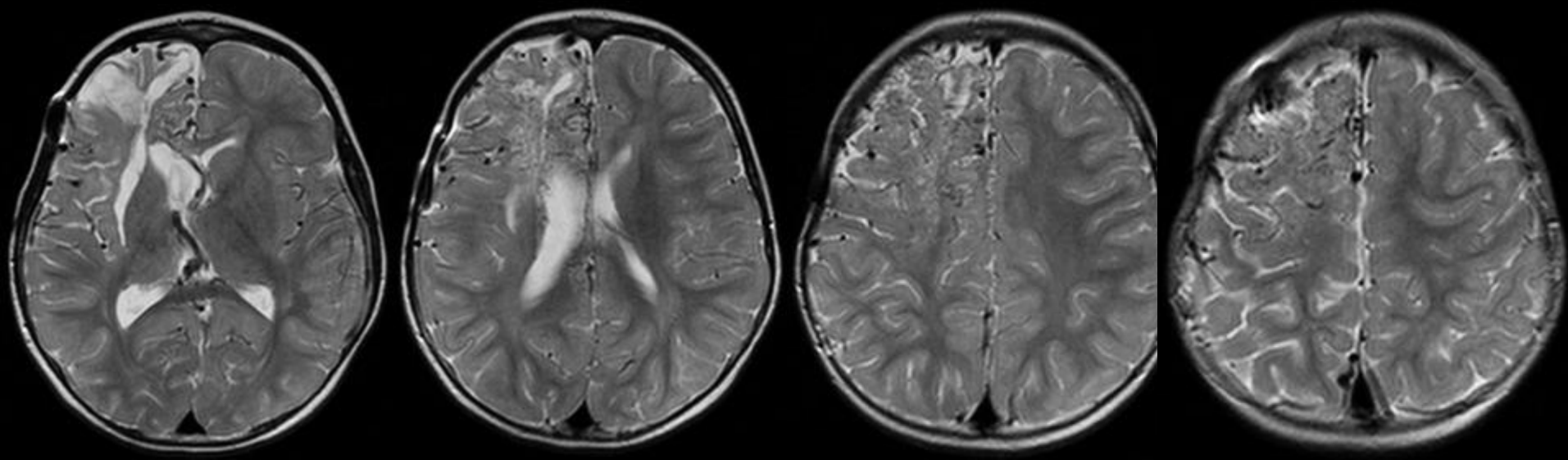


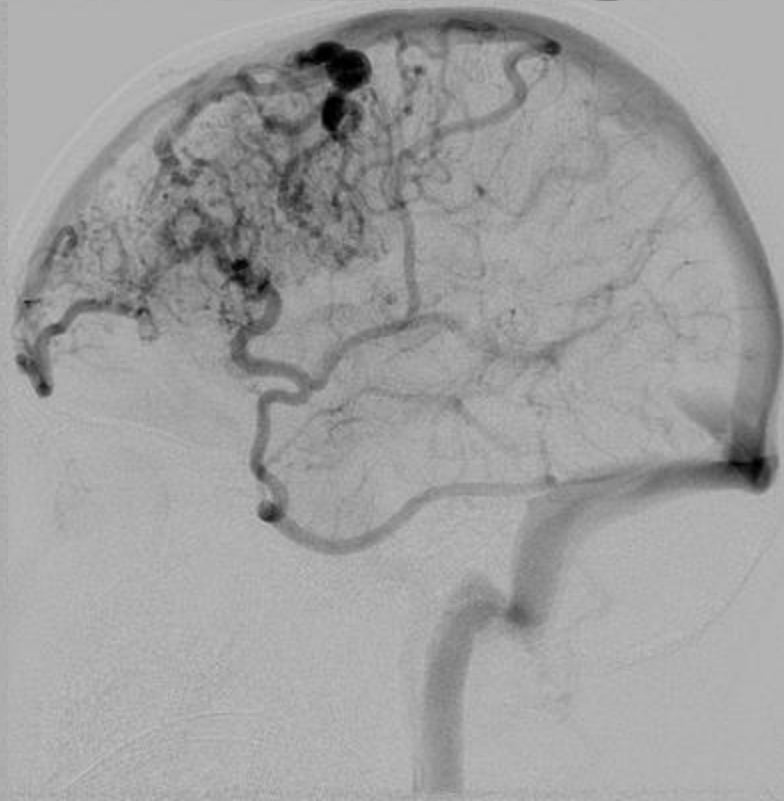
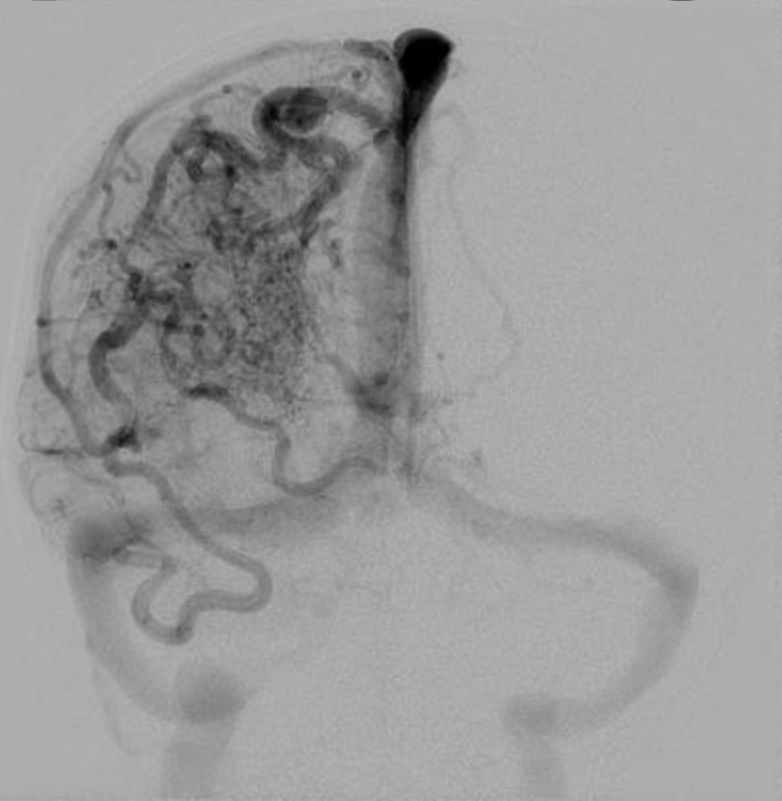
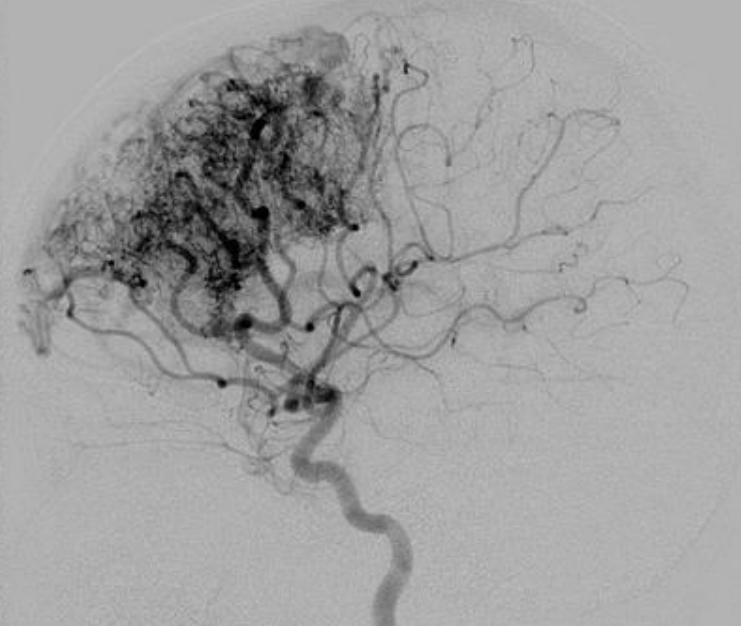
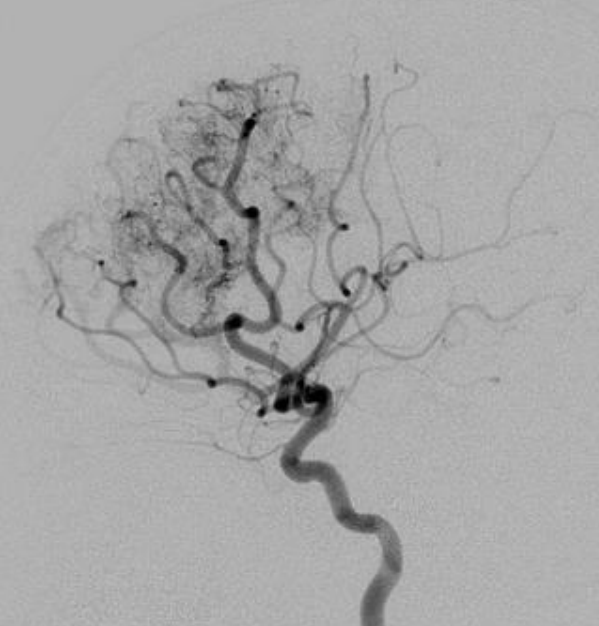
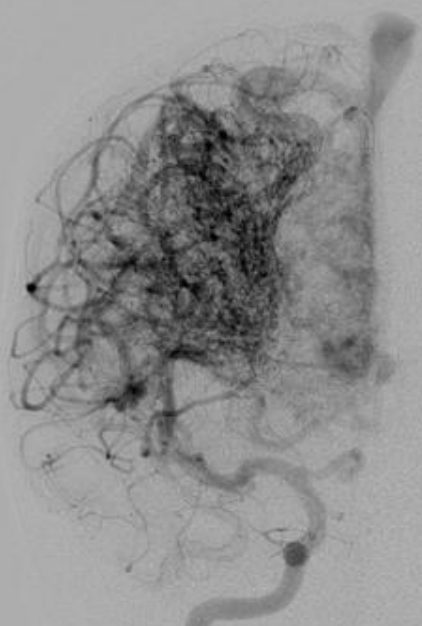


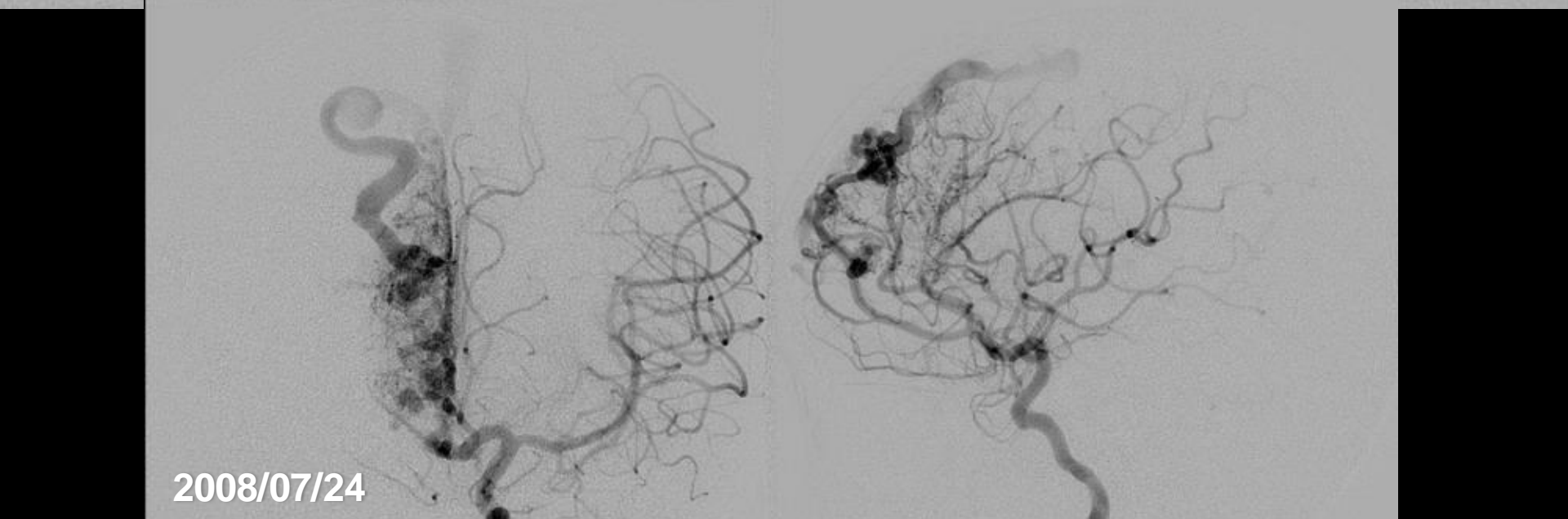
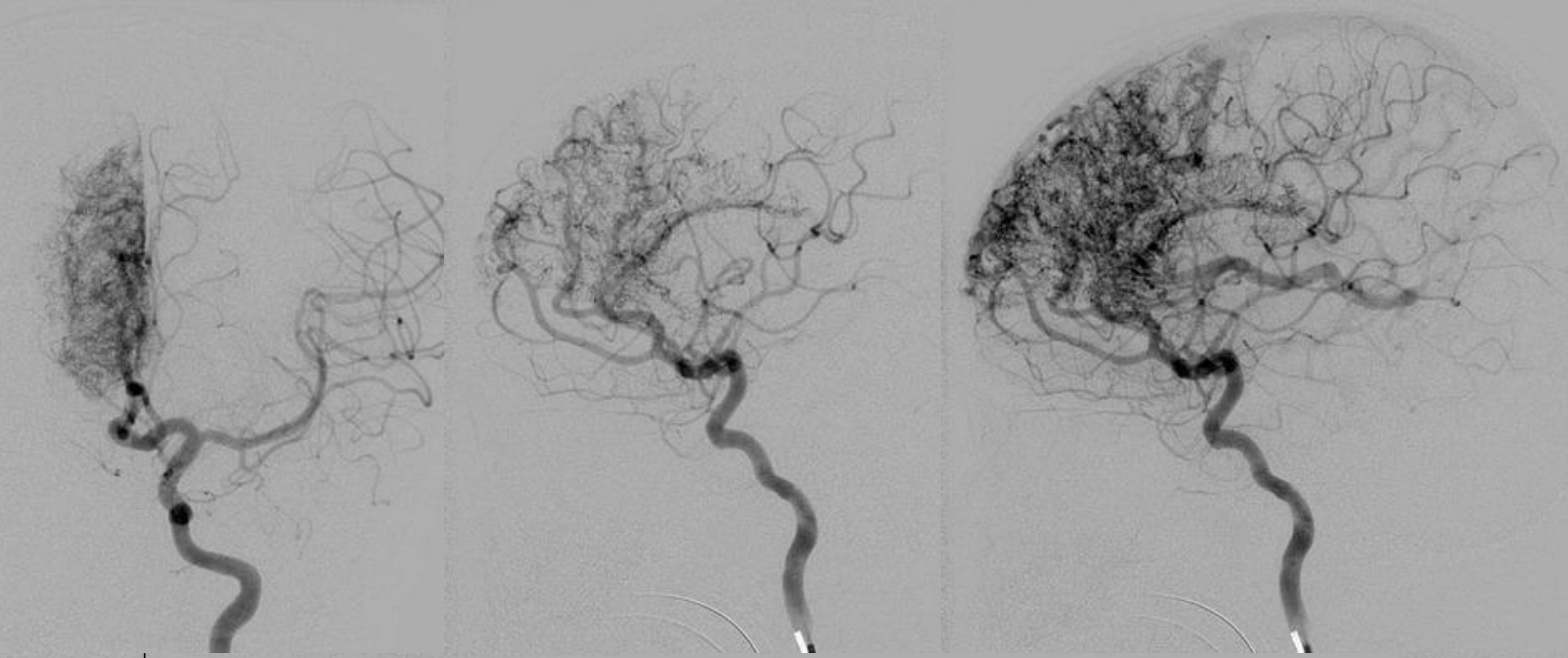
2008/07/24



2009/02/05

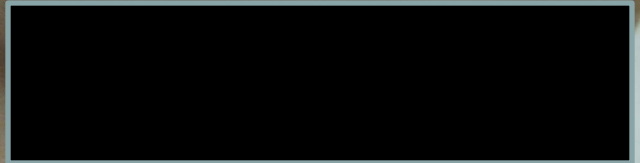






2008/07/24

RASA 1



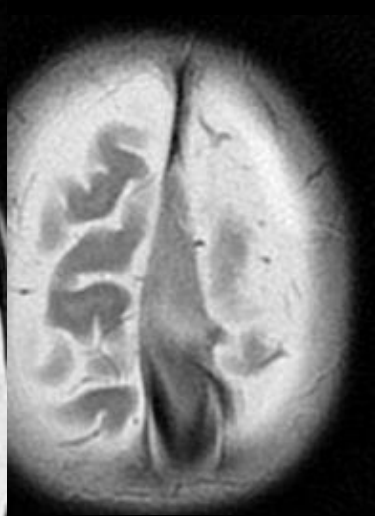
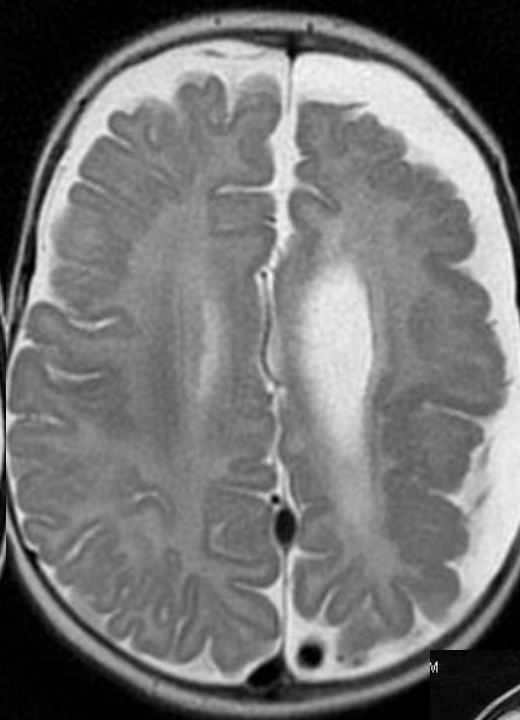
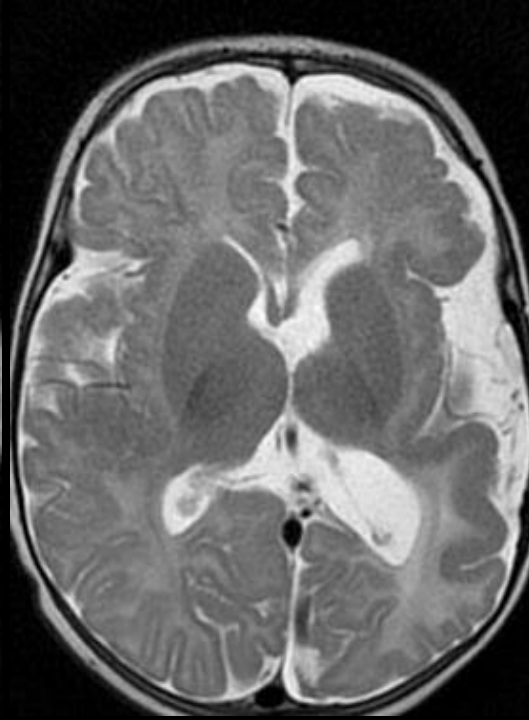
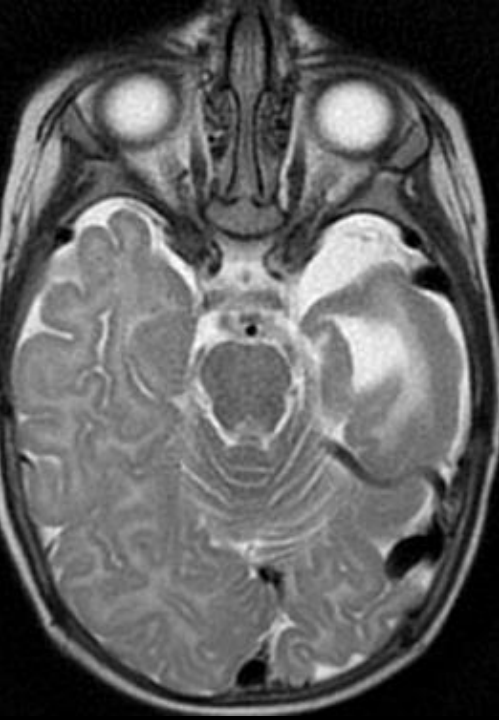
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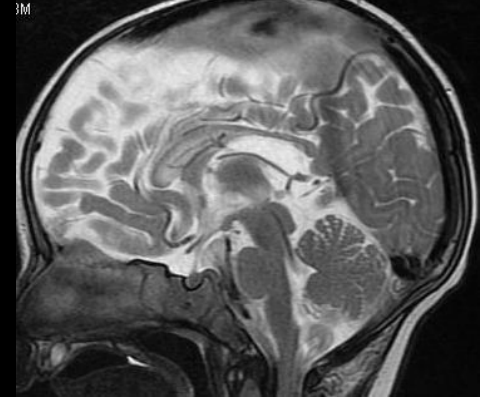
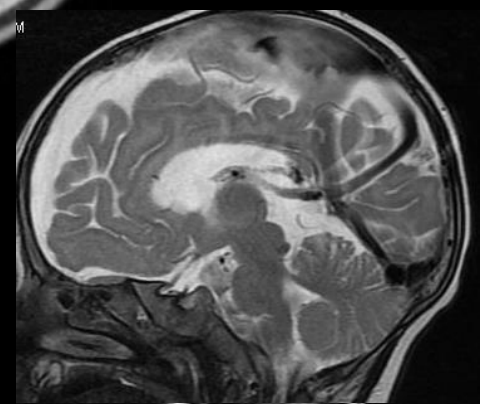
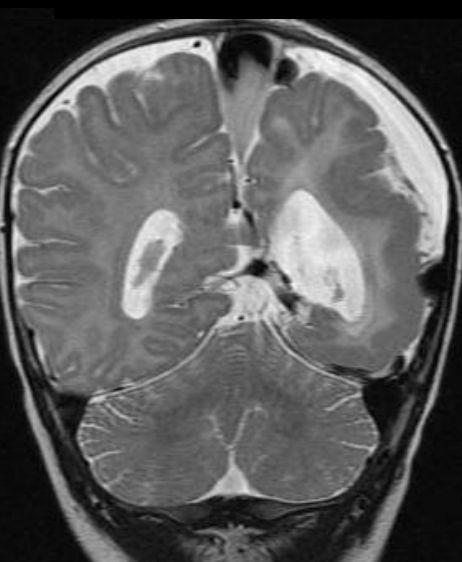
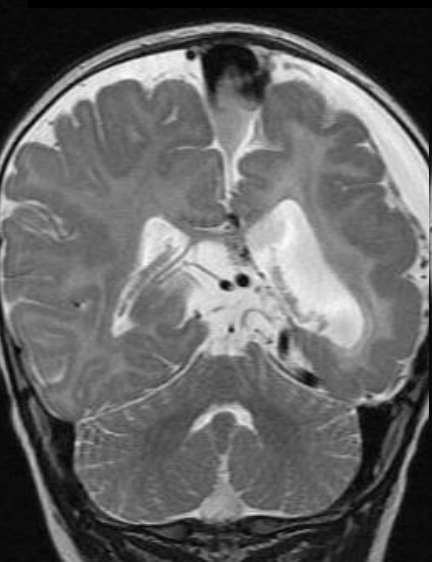
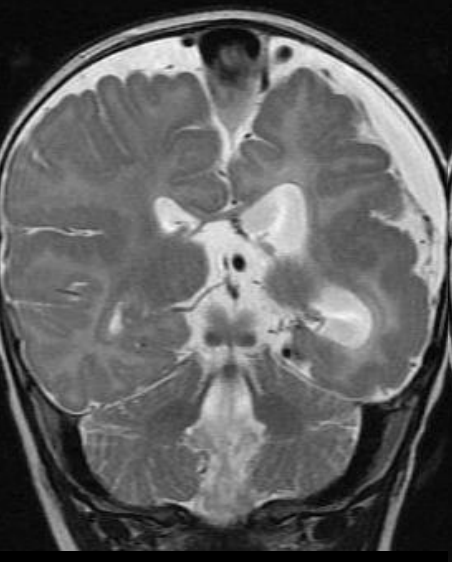
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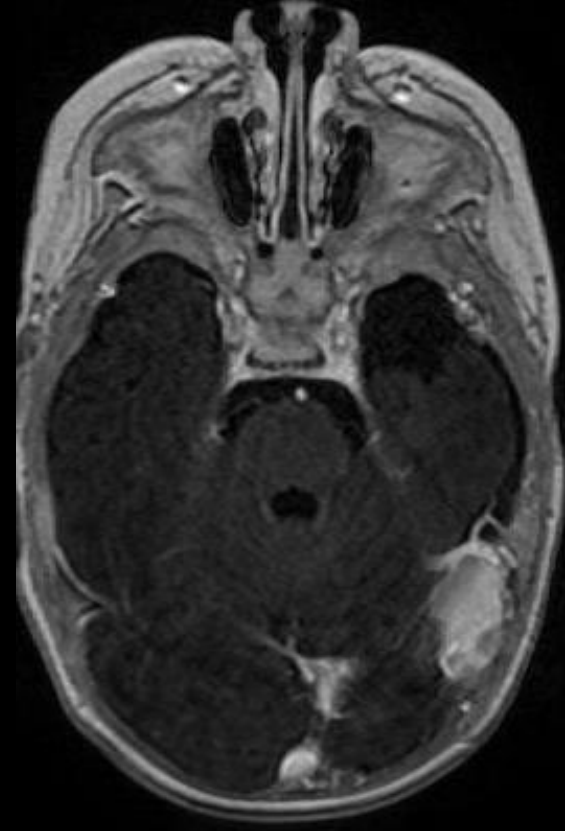
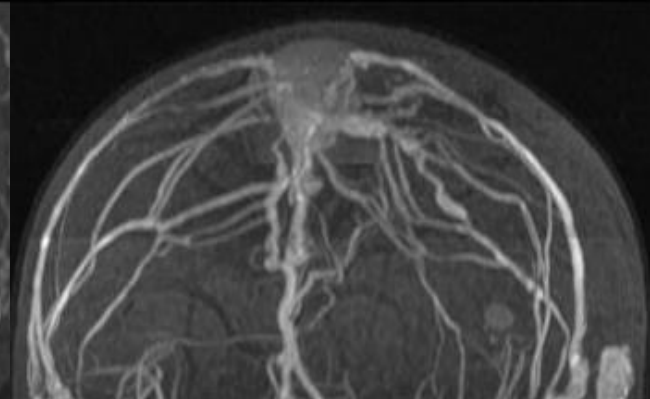
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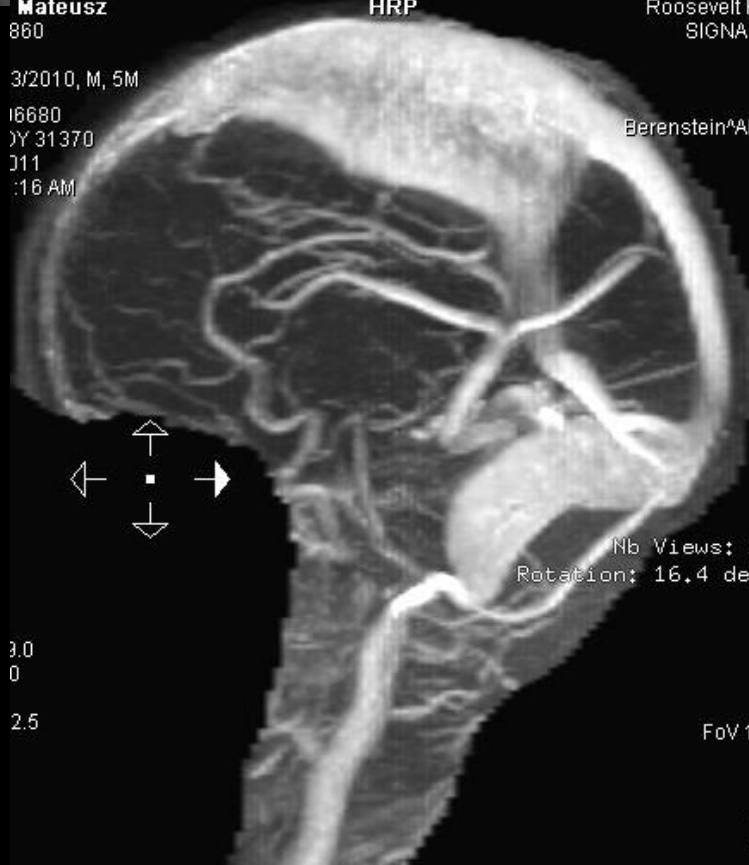




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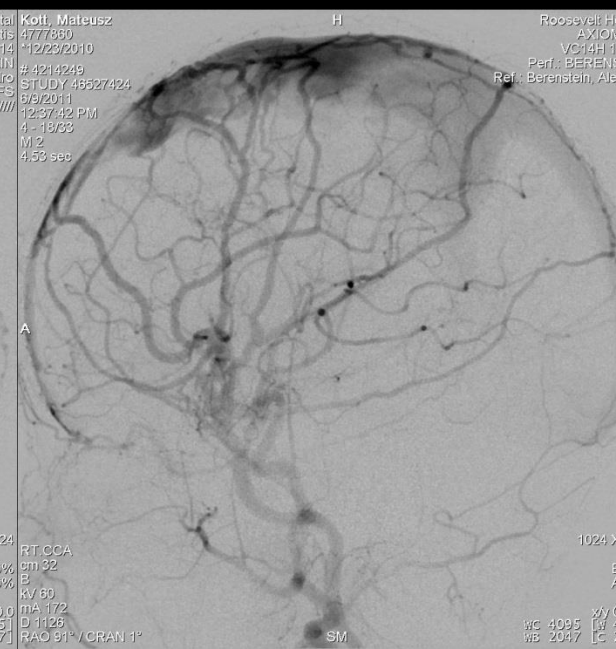
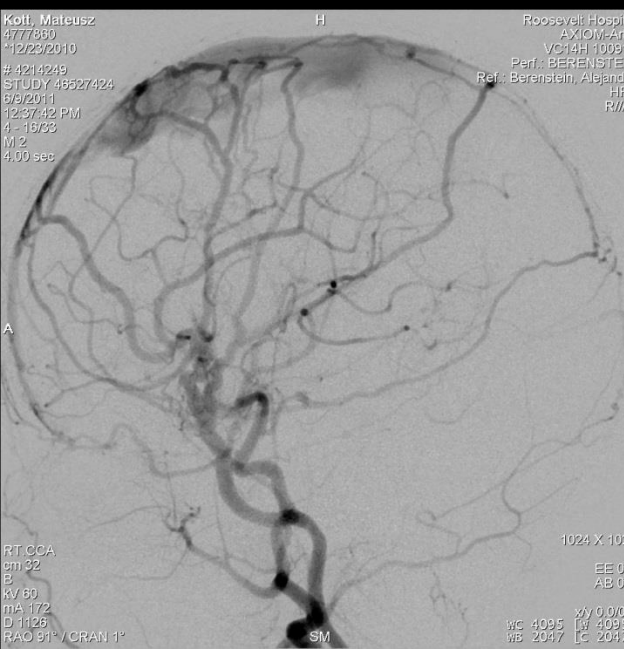
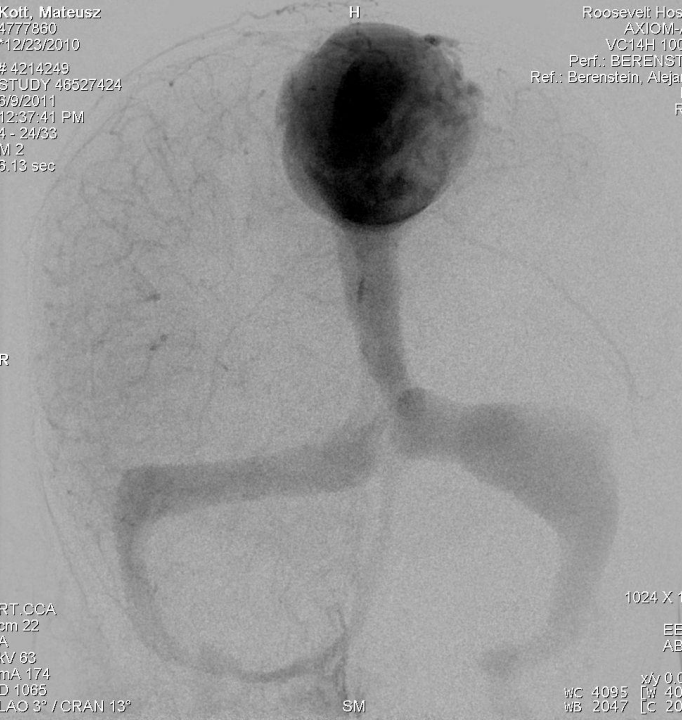
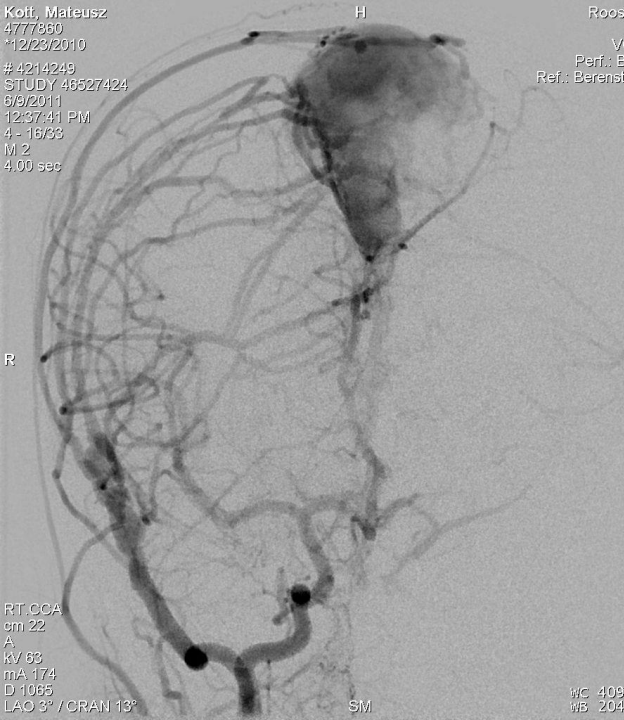
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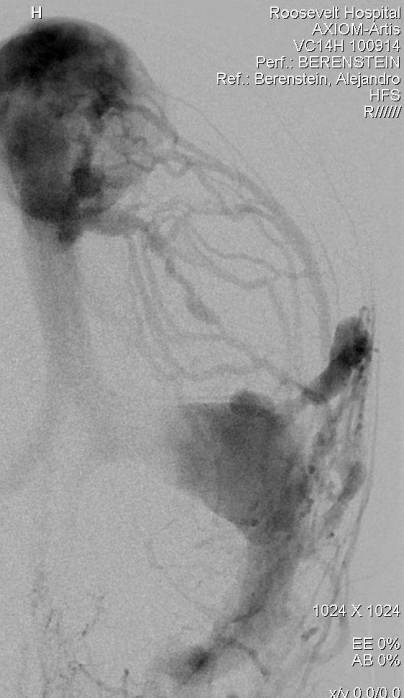
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Ref.: Berenstein, Alejandro
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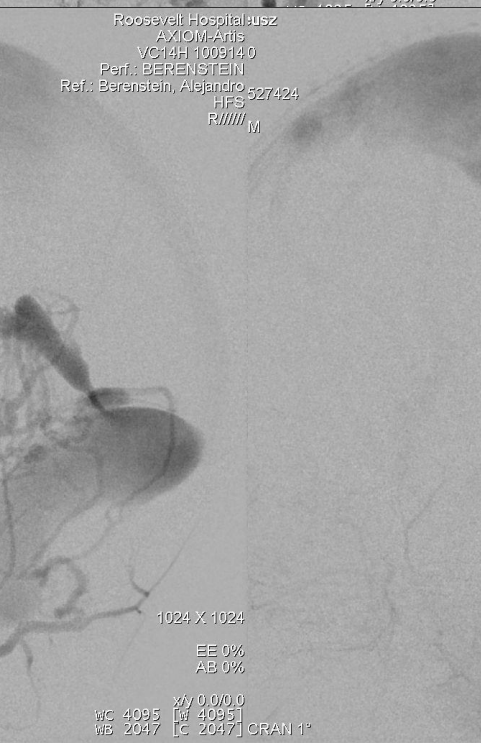
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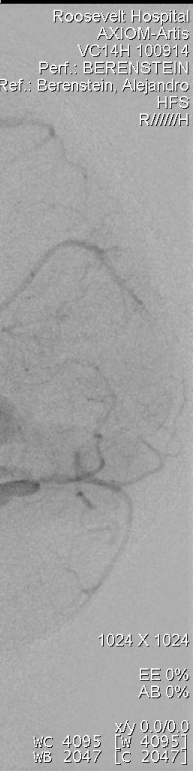
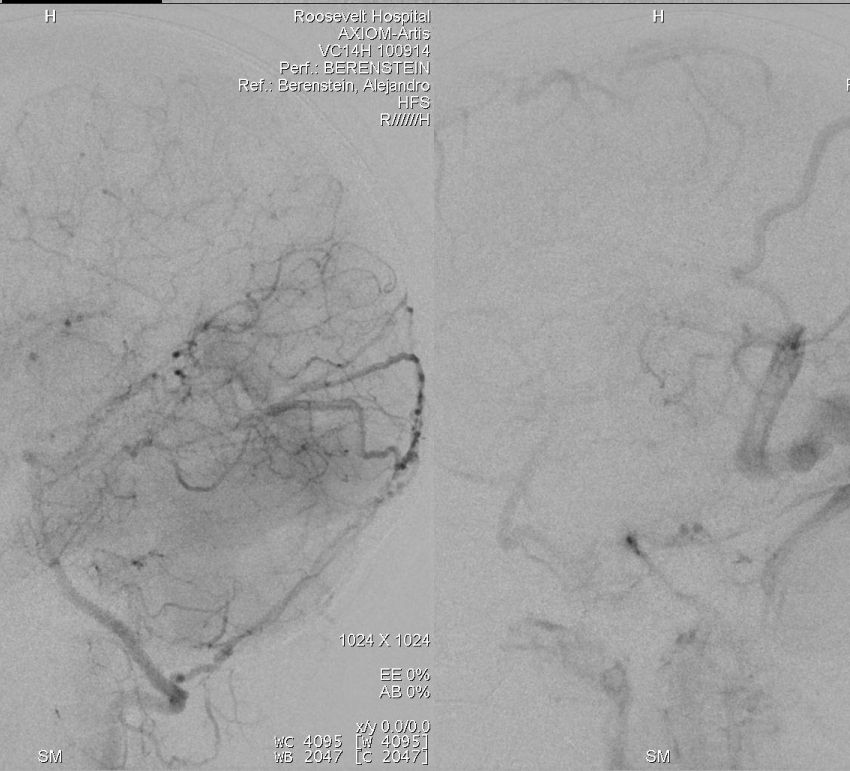
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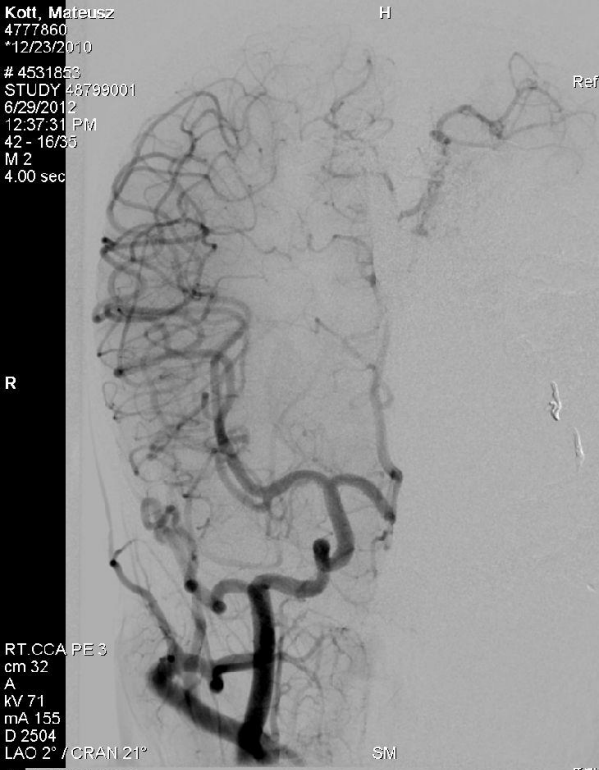


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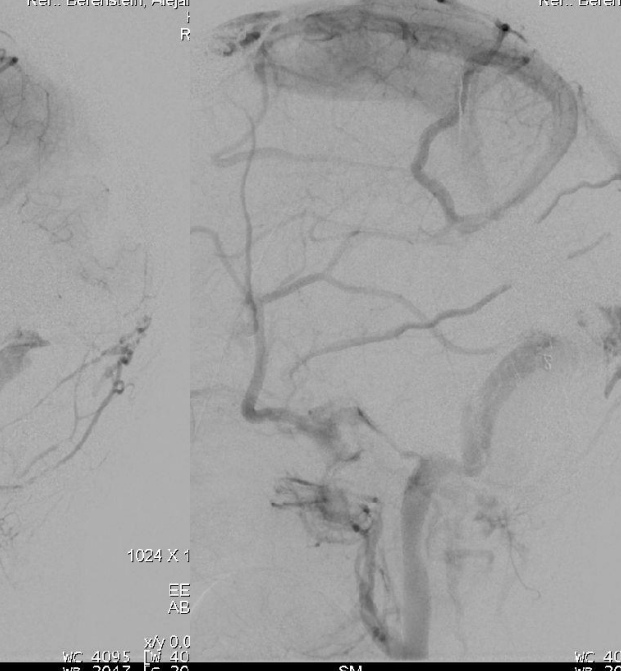
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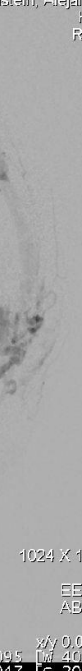
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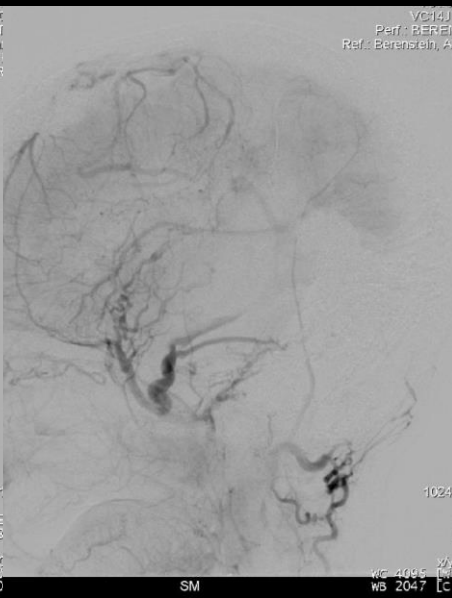
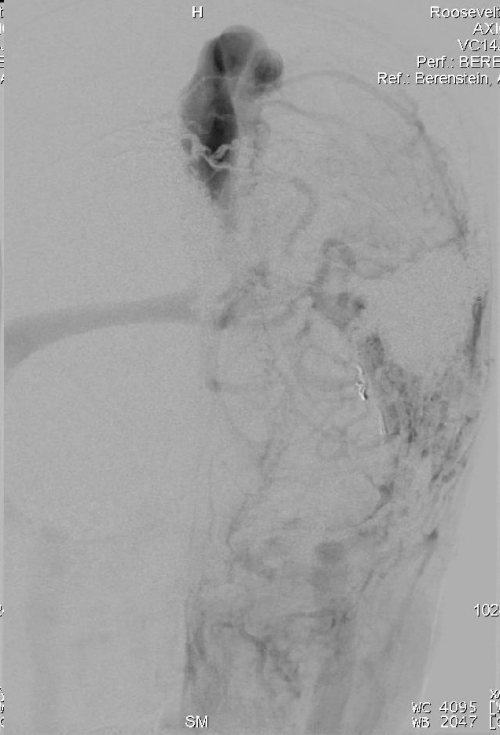
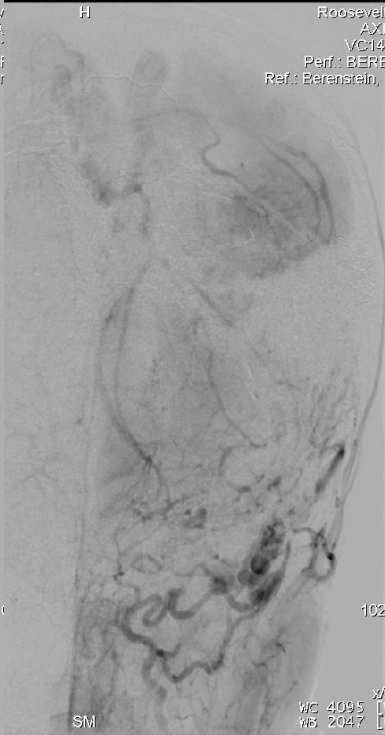
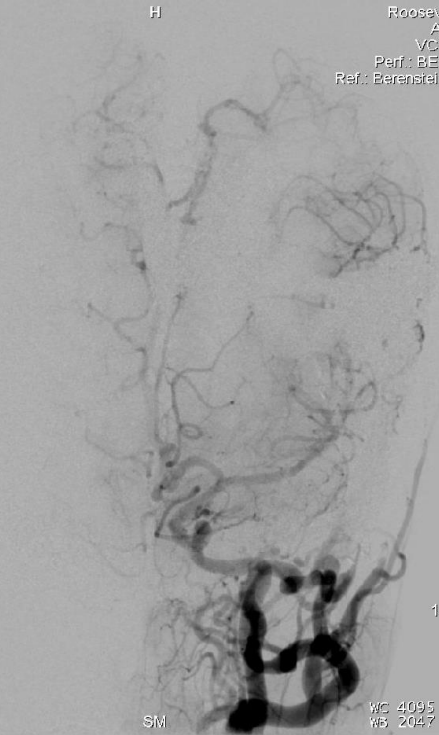
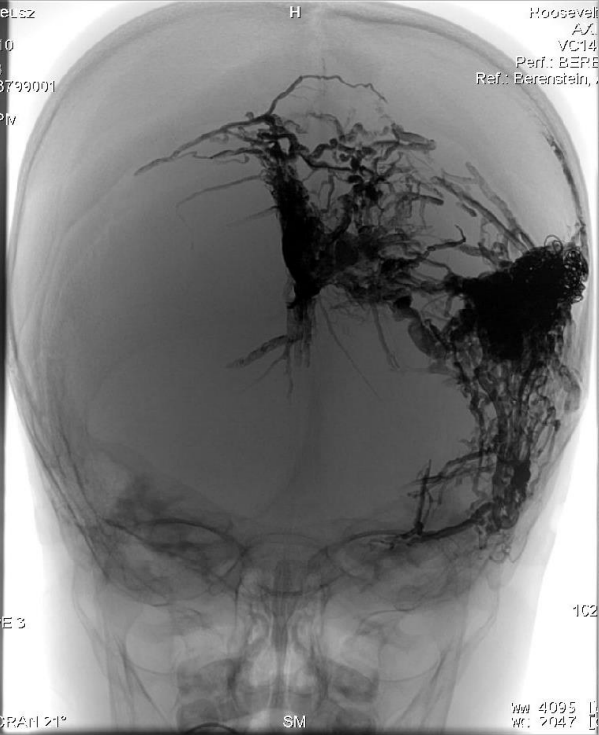


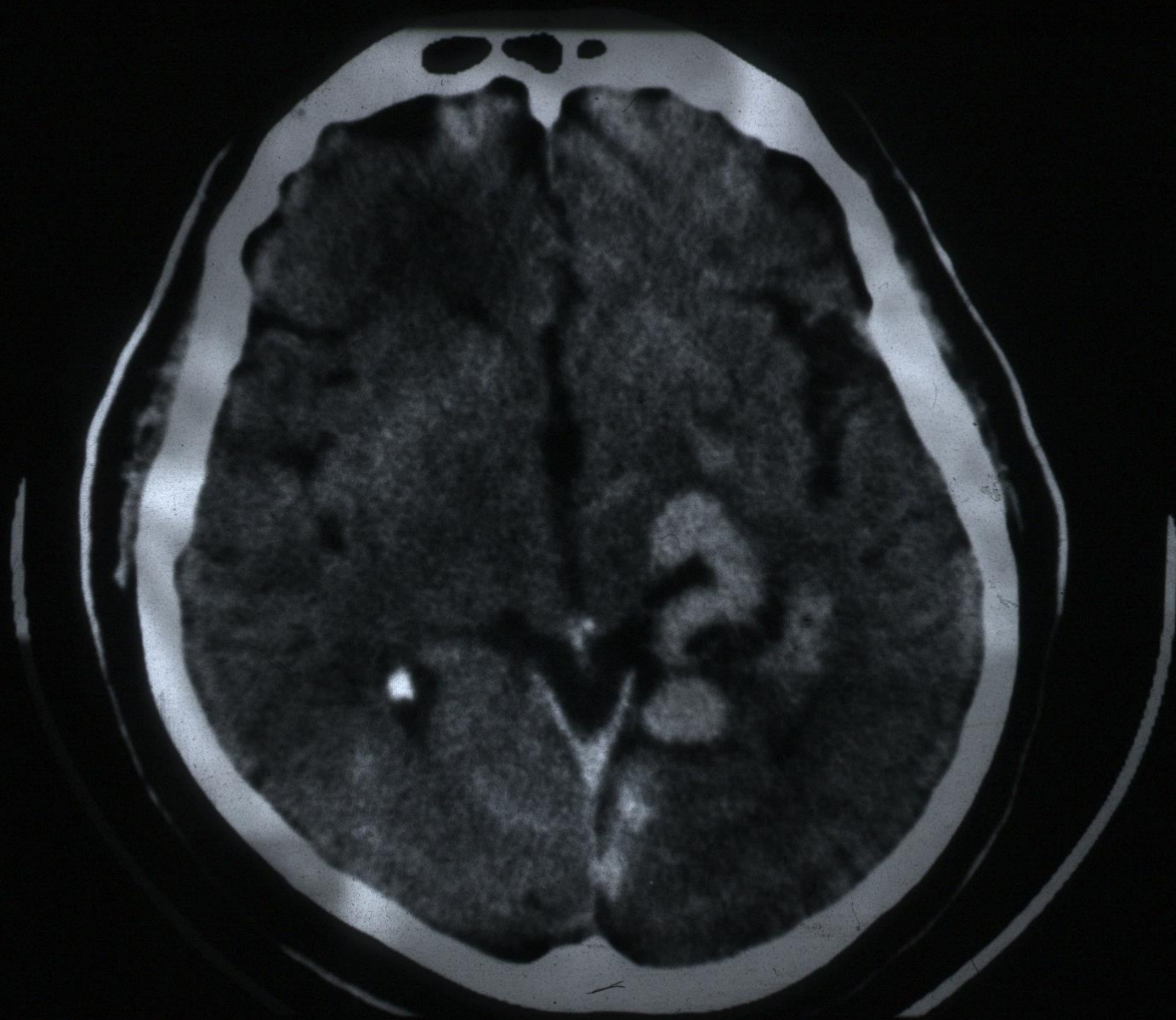
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Muchas Gracias!!!