

Traumatologia cranica
Aneurismi intracranici

NEURO UPDATE TORINO

9-10 marzo 2017



Aneurismi rotti: il parere del neuroradiologo Interventista

S. Mangiafico
Interventistica Neuro-Vascolare
AOU Careggi
Firenze

Aneurismi cerebrali emorragici

Trattamento endovascolare

- **Quando ?**

Tutte le volte che il trattamento endovascolare è possibile

- **Perché ?**

Perché il trattamento endovascolare degli aneurismi si associa ad generalmente ad un outcome clinico simile o migliore rispetto alla chirurgia

Perché a parità di condizioni anatomo-cliniche ha minore invasità

Perché i vantaggi della terapia endovascolare sono superiori ai suoi stessi limiti (ricanalizzazione a distanza e ritrattamento e rebleeding)

Via chirurgica e Via endovascolare

principi di trattamento

Chirurgia

- Esclusione dell'aneurisma mediante chiusura dall'esterno del colletto dell'aneurisma
- **Guarigione immediata per PRIMA INTENZIONE**

Endovascolare

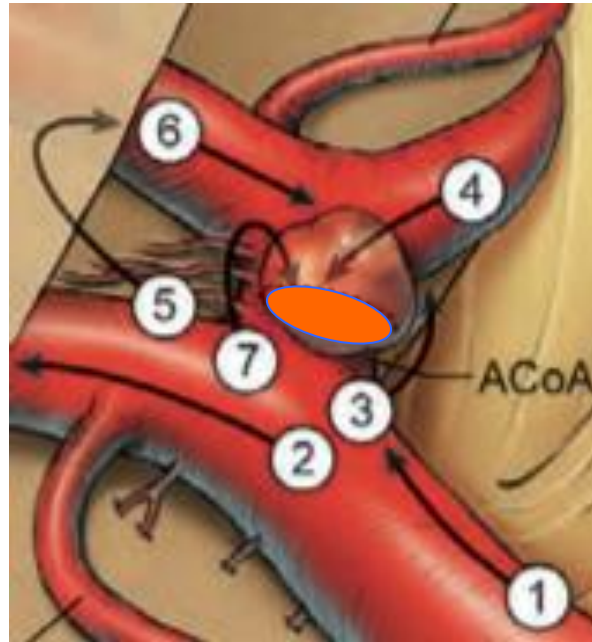
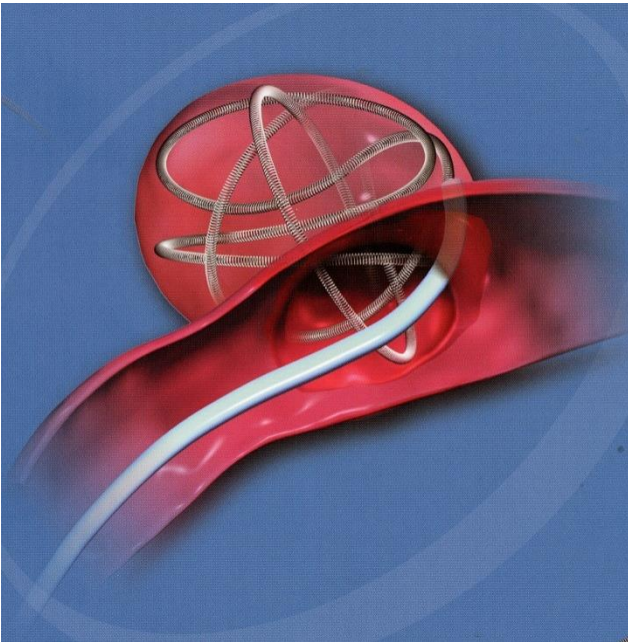
- Esclusione emodinamica immediata della sacca (Coil 30% WEB)
- Organizzazione fibrotica del trombo endoaneurismale (1 m) l'endotelizzazione del colletto (3-6 mesi) avvengono nel tempo
.GUARIGIONE per SECONDA INTENZIONE

- Per il chirurgo il colletto è la prosecuzione virtuale della parete dell'arteria, dove va posizionata la clip



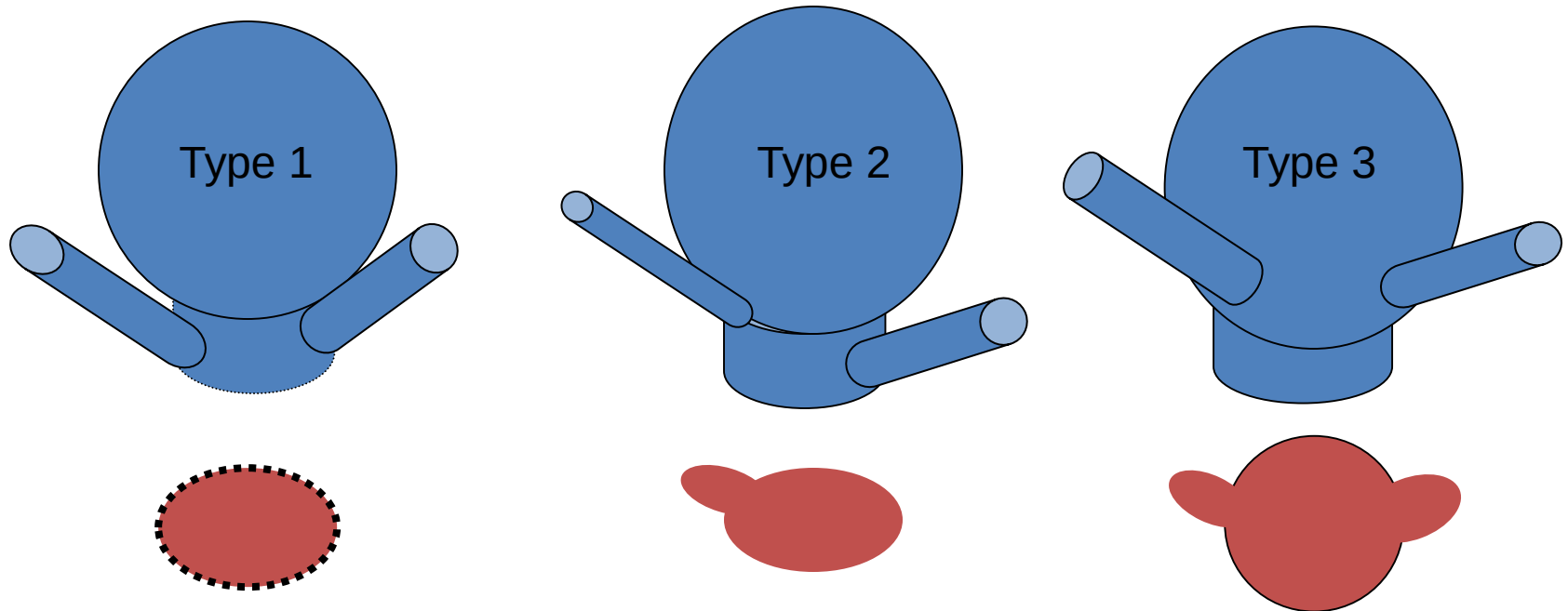
Il concetto di colletto

Per l'interventista il colletto è un buco nella parete dell'arteria dal quale possono originare rami di biforcazione, **ha due dimensioni**



Area del colletto: origine delle branche di biforcazione

L' origine di eventuali branche di biforcazione va inclusa nell' area di colletto



Origine indipendente dei rami di biforcazione dal colletto aneurismatico

Un ramo di biforcazione origina direttamente dal colletto, l' altro no

Entrambi i rami di biforcazione originano dal colletto aneurismatico

Confronto clip coil

- Medicine Based on the Evidence (EBM)
 - RCT : Finnish study ,ISAT, BRAT
(metanalisi)

limitazioni dell'Evidenza

- Randomization for ruptured aneurysm only if the treatment (by clipping or by coiling) was uncertain. **Bias of selection**
- principal outcome : the difference in mortality and poor outcome
-
- **Major limitations for the endovascular treatment in large aneurysm (> 1 cm max diam), or bifurcational ones**
- **Further evolution of endovascular technique**

Death and poor outcome

Including only trials

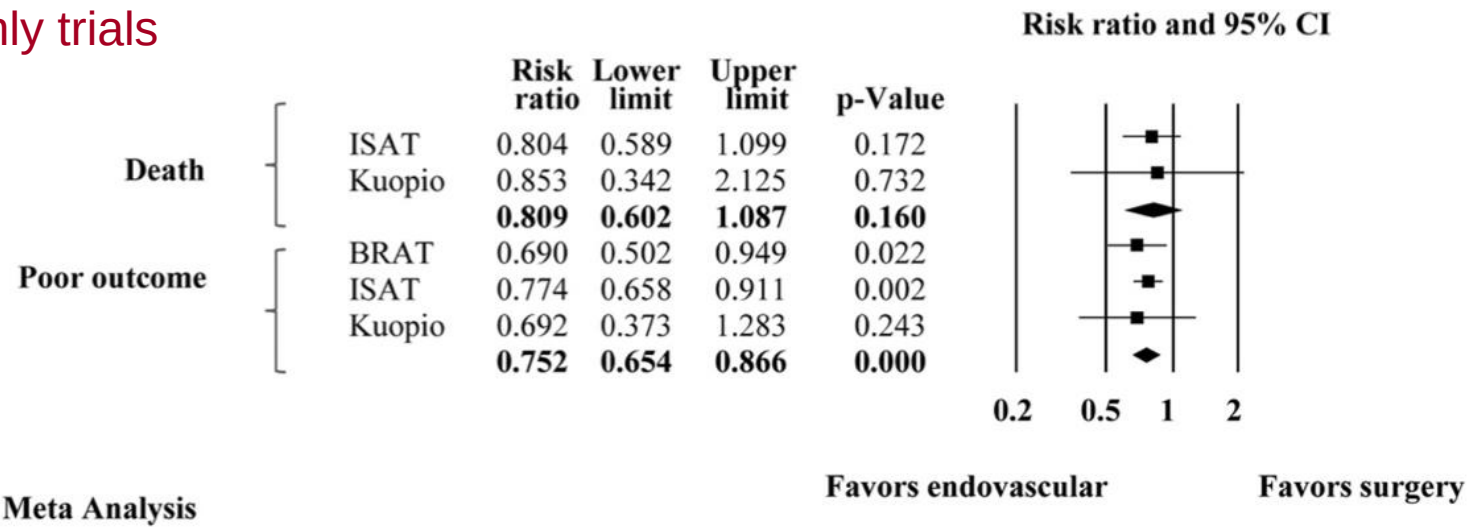


FIG 1. Meta-analysis of death and rate of poor functional outcome at 1 year.

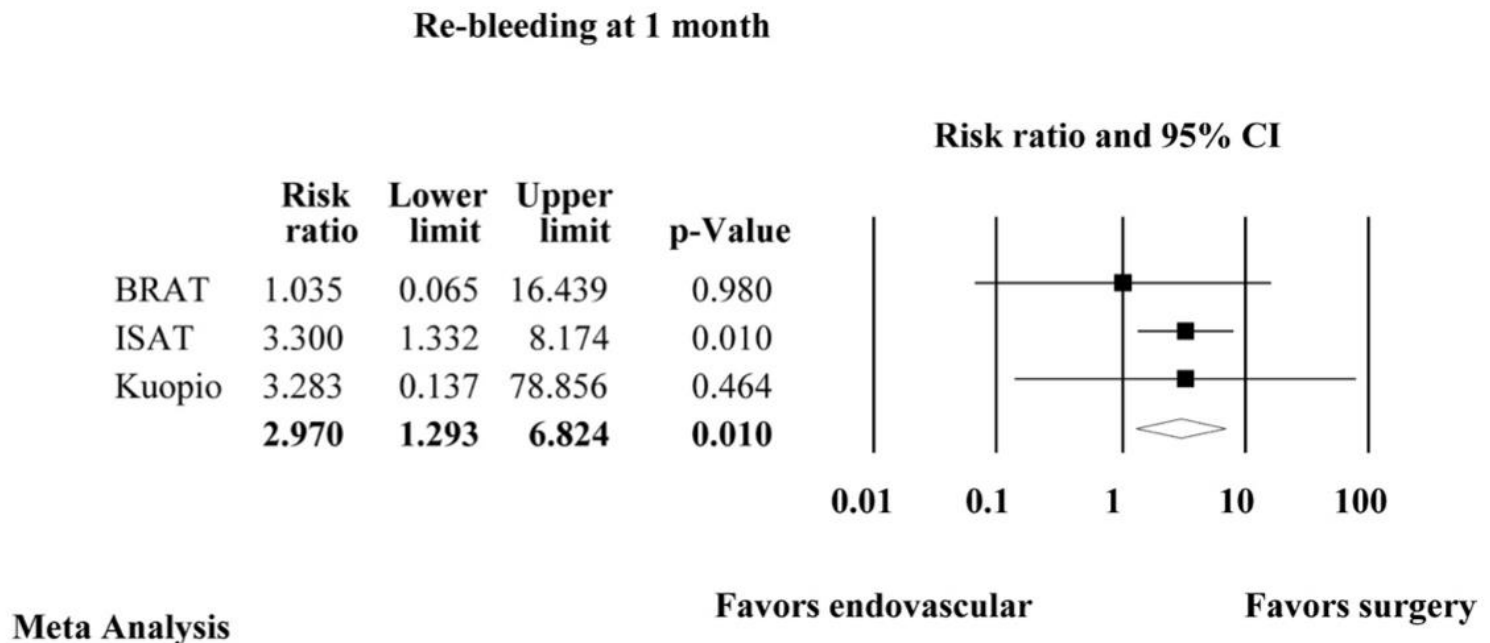


Table 2: Clinical outcome at 1 year (intent-to-treat analysis)

	Kuopio	ISAT	BRAT
Outcome assessment 1 year	Single neurosurgeon	Postal questionnaire filled out by patients	Research nurse
Definition poor outcome	GOS	mRS 3–6	mRS 3–6
<u>Poor outcome</u>			
Endovascular	12/52 (23%)	250/1063 (23.5%)	46/198 (23%)
Surgery	19/57 (33%)	326/1055 (30.9%)	69/205 (34%)
<u>Death</u>			
Endovascular	7/52 (13%)	85/1063 (8.0%)	NA
Surgery	9/57 (16%)	105/1055 (9.9%)	NA
<u>Rebleeding</u>			
Endovascular			
Day 1–30	1	20	1 ^a
Day 31–365	0	6	0
>1 year	0	10	0
Surgery			
Day 1–30	0	6	1
Day 31–365	0	4	0
>1 year	0	3*	0
One-year follow-up complete			
Endovascular	100% ^b	1063/1073 (99%)	198/233 (85%)
Surgery		1055/1070 (98.6%)	205/238 (86%)

Un aneurisma acutamente rotto non risanguina se

Early rebleeding

- A fine procedura l' aneurisma è emodinamicamente escluso (Occlusione Completa o subtotale , adeguata)
- Non intercorrono fattori che ostacolano la rapida trombosi della sacca (entro 72 h) o la riorganizzazione – fibrosi – del coagulo (entro 1 mese)

Late rebleeding

- Non intervengono fattori che portano ad un rapido rimodellamento delle coil con estesa ricanalizzazione (fenomeni flusso-relati o collagenopatie) o se viene controllato a distanza e ritrattato

EMB

In sintesi

In the literature the endovascular treatment of **ruptured** intracranial aneurysms is significantly associated with:

- Better clinical outcome in short and long term
- Lower mortality in long term
- Higher rebleeding rate in short and long term
- Lower incidence of vasospasm
- Lower complete occlusion rate at DSA follow-up

e.. quindi ?

per la chirurgia né vittoria né sconfitta

**per la terapia endovascolare
vittoria solo ai punti**

Surgical/Endovascular Management Recommendations

3. Determination of aneurysm treatment, as judged by both experienced cerebrovascular surgeons and endovascular specialists, should be a multi-disciplinary decision based on patient and aneurysm characteristics (Class I, Level of Evidence C).

Revised

4. For patients with ruptured aneurysms judged to be technically amenable to both endovascular coiling and neurosurgical clipping, endovascular coiling should be considered (Class I, Level of Evidence B).

Revised

- Evidence of the Medicine
(Pratica clinica)

coil o clip ?

Condizione di parità di indicazioni

Analisi per sottogruppi

Casi in cui c'è un sicuro
Vantaggio della terapia
endovascolare

Casi in cui c'è un sicuro
Vantaggio della chirurgia

Casi in cui
endovascolare e chirurgia
Sono pari

Coil o clip ?

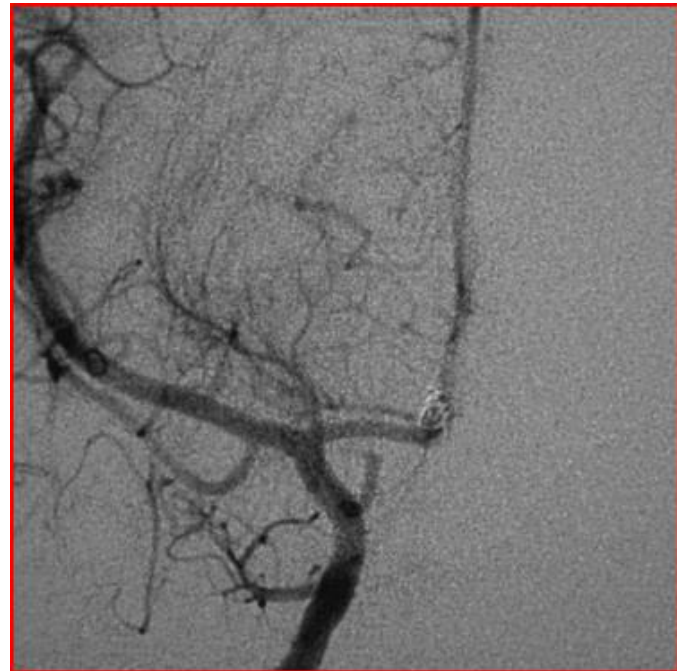
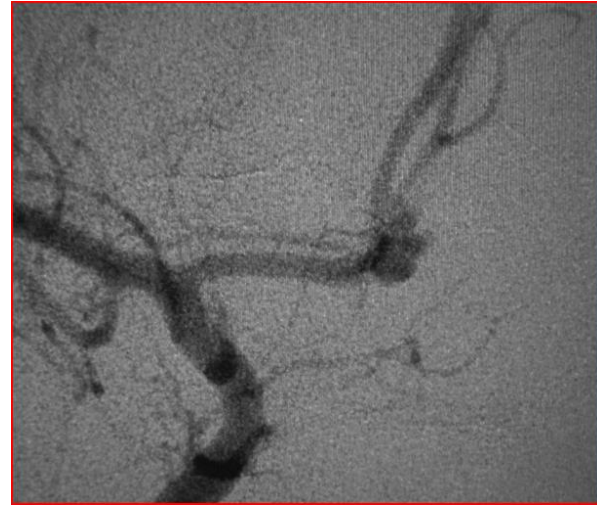
fattori che determinano la scelta

1 *complessità del paziente*

- Età
- Grado clinico (HH)
- Comorbidity
- Sanguinamento ripetuto
- Entità dell'Emorragia



ESA



Età > 50 aa è preferibile l'intervento endovascolare ?

Mitchell et al. Could late rebleeding overturn the superiority of cranial aneurysm coil embolization over clip ligation seen in the International Subarachnoid Aneurysm Trial? J. Neurosurg. 2008

TABLE 1

Age-specific outcomes for clip ligation and coil embolization of ruptured aneurysms in the ISAT

Age Group (yrs)	Coil Embolization		Clip Ligation	
	No. w/ Poor Outcomes	Poor Out- come Rate*	No. w/ Poor Outcomes	Poor Out- come Rate*
<40	34 of 186	18.3% (12.4, 24.2)	35 of 174	20.1% (13.2, 27.0)
40–49	57 of 266	21.4% (15.8, 27.1)	67 of 261	25.7% (19.5, 31.8)
50–59	71 of 352	20.2% (15.3, 24.7)	121 of 362	33.4% (27.3, 39.5)
60–69	54 of 198	27.3% (20.2, 34.3)	72 of 194	37.1% (28.4, 45.9)
≥70	34 of 61	55.7% (37.7, 73.8)	31 of 64	48.4% (31.3, 65.3)

* Calculated according to the Poisson distribution method. Numbers in parentheses represent the 95% confidence limits.

Coil o clip ?

2) Complessità dell' aneurisma

Aneurisma

Morfologia semplice

- colletto < 3 mm
- Dimensioni < 1cm
- Aneurismi laterali
- Arterie di biforcazione facilmente dissociabili dal colletto

Morfologia complessa

- coletto > 3 cm
- Dimensioni > 1 cm
- Arterie di biforcazione emergenti dalla sacca

Chirurgia

Endovascolare

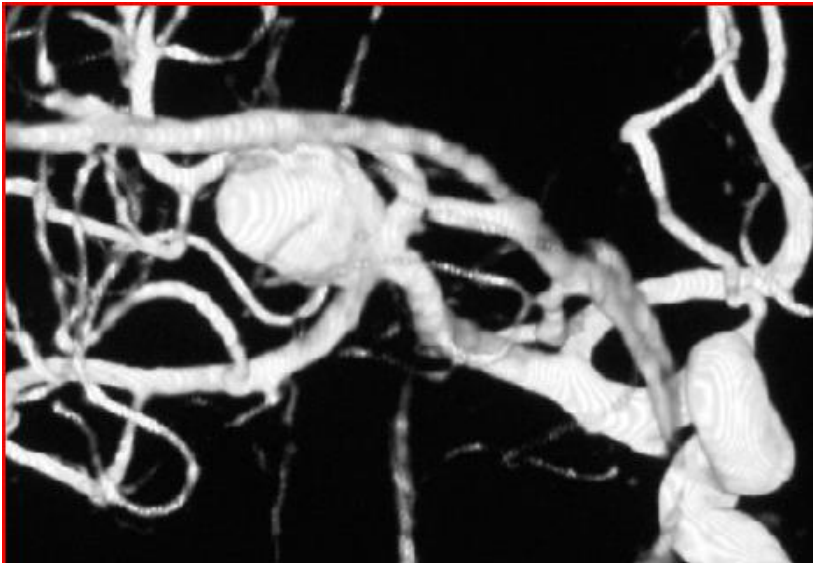
++	• Disposizione	++
++	• Dimensione del colletto	+++
+++	• Dimensioni della sacca	++
++	• Rapporto Sacca/Colletto	++
++	• Blebs	+
++	• Lobatura basale	++
+++	• Arterie emergenti dalla sacca	++
+++	• Trombosi e Calcificazione	+
++	• Configurazione	++
++	• Difficoltà di accesso	++
++	• Localizzazione	+
+++	• Fallimento di precedenti terapie	++

Lateral Aneurysm

2 types of Bifurcation aneurysms

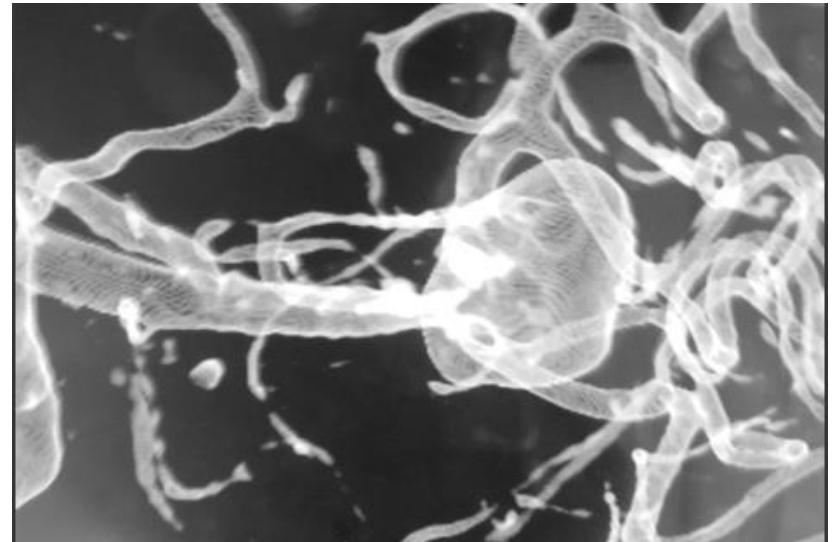
«Free Neck aneurysm»

- The limit of the sac/neck complex is well recognised, the aneurysm is projected outside the plan of the bifurcation
- Both bifurcational branches are not involved within the basal part of the sac, but these are free

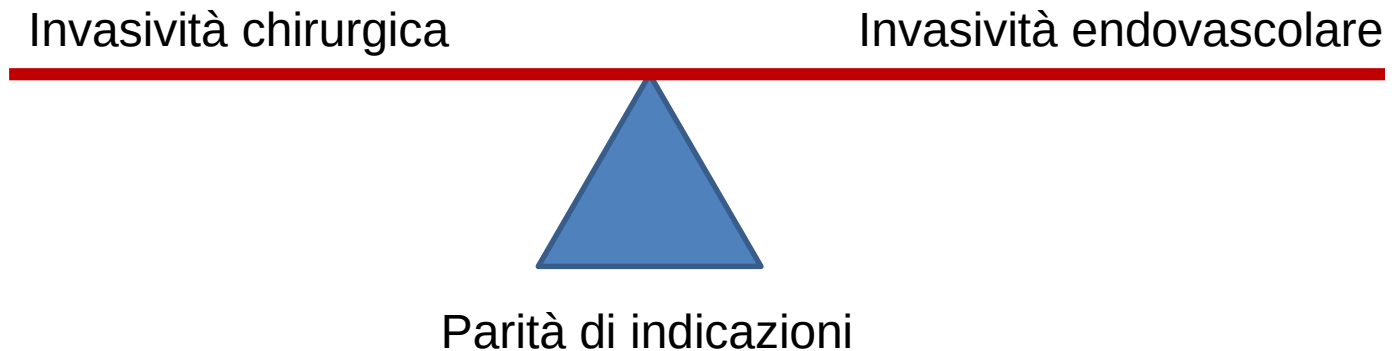


«Engaged neck aneurysm»

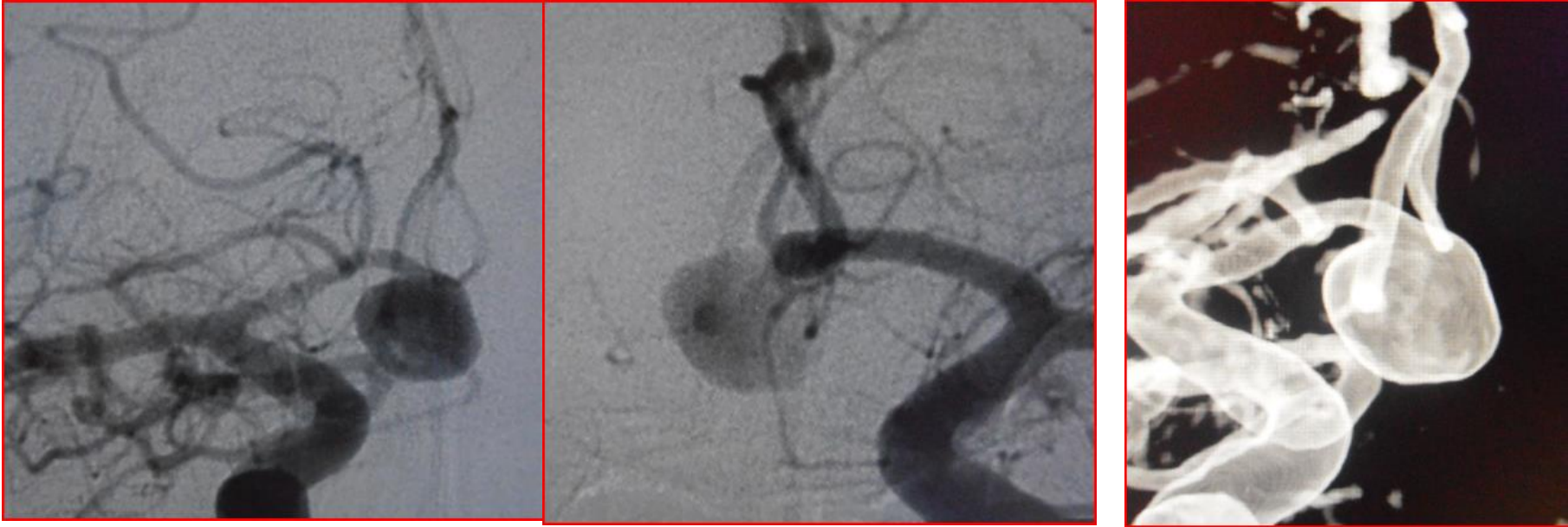
- Limit of the sac/neck complex is not well recognised, the aneurysm is overlapped with the bifurcation
- One or more bifurcational branches are involved within the basal part of the sac



A parità di condizioni cliniche di operabilità
la scelta dell'intervento dipende dalla
complessità dell'aneurisma
ovvero dalla difficoltà dell'intervento chirurgico
rispetto all'intervento vascolare e viceversa



aneurisma operato



L'origine di arterie di biforcazione ad emergenza dalla sacca è ancora oggi la maggiore limitazione all'intervento endovascolare

Grado clinico (stato di sofferenza cerebrale)

- HH1-2

- HH 3-4

Aneurismi elegibili
per chirurgia e embolizzazione

Embolizzazione

Intervento endovascolare

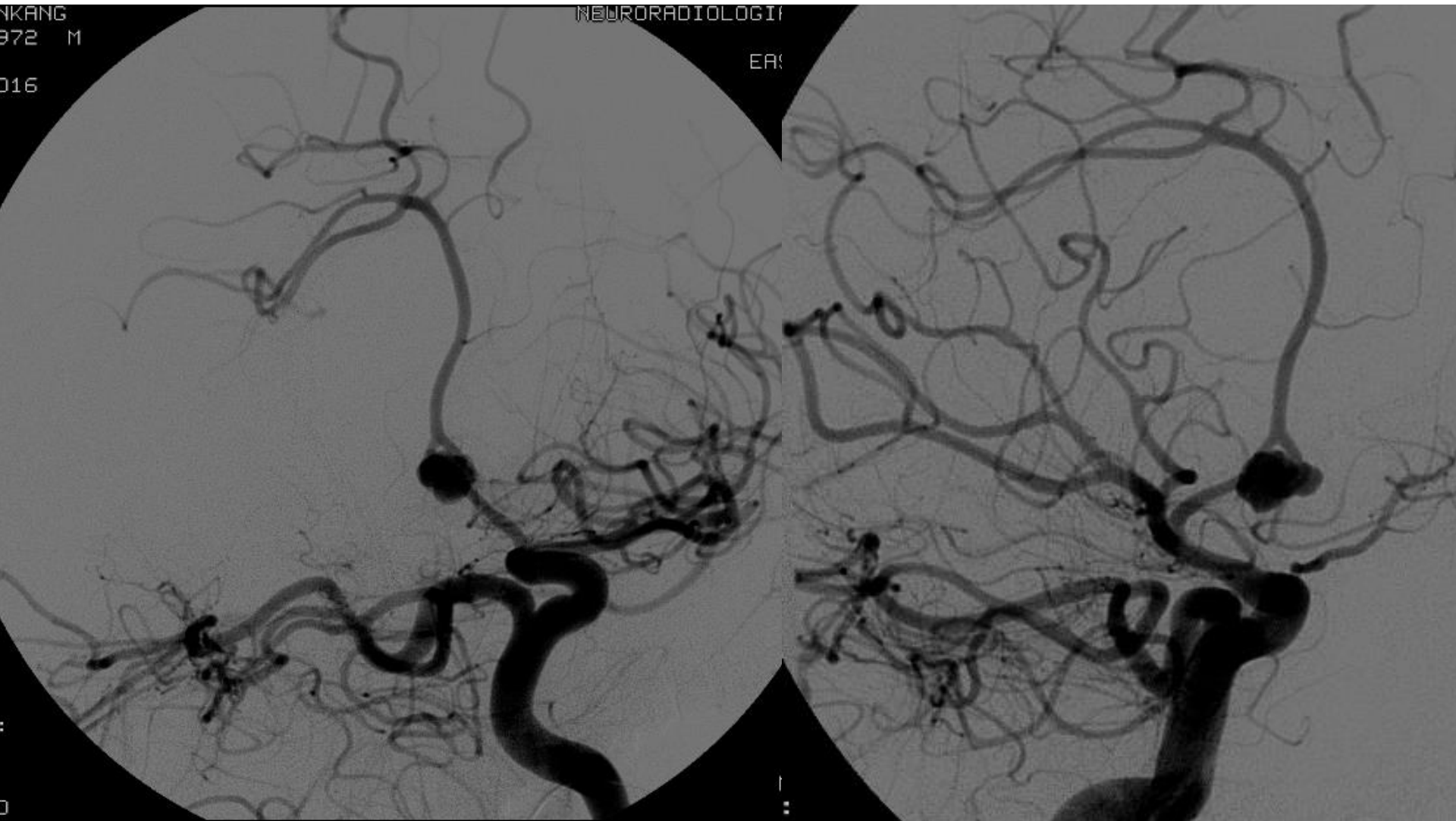
Grado clinico alto (HH4-5)

**aneurismi di medie dimensioni < 12 mm
chirurgia e endovascolare possibili**

Indicazione endovascolare se possibile

**Il razionale : ridurre l'invasività dell'accesso
All'aneurisma (manipolazione in condizione
di sofferenza cerebrale marcata)**

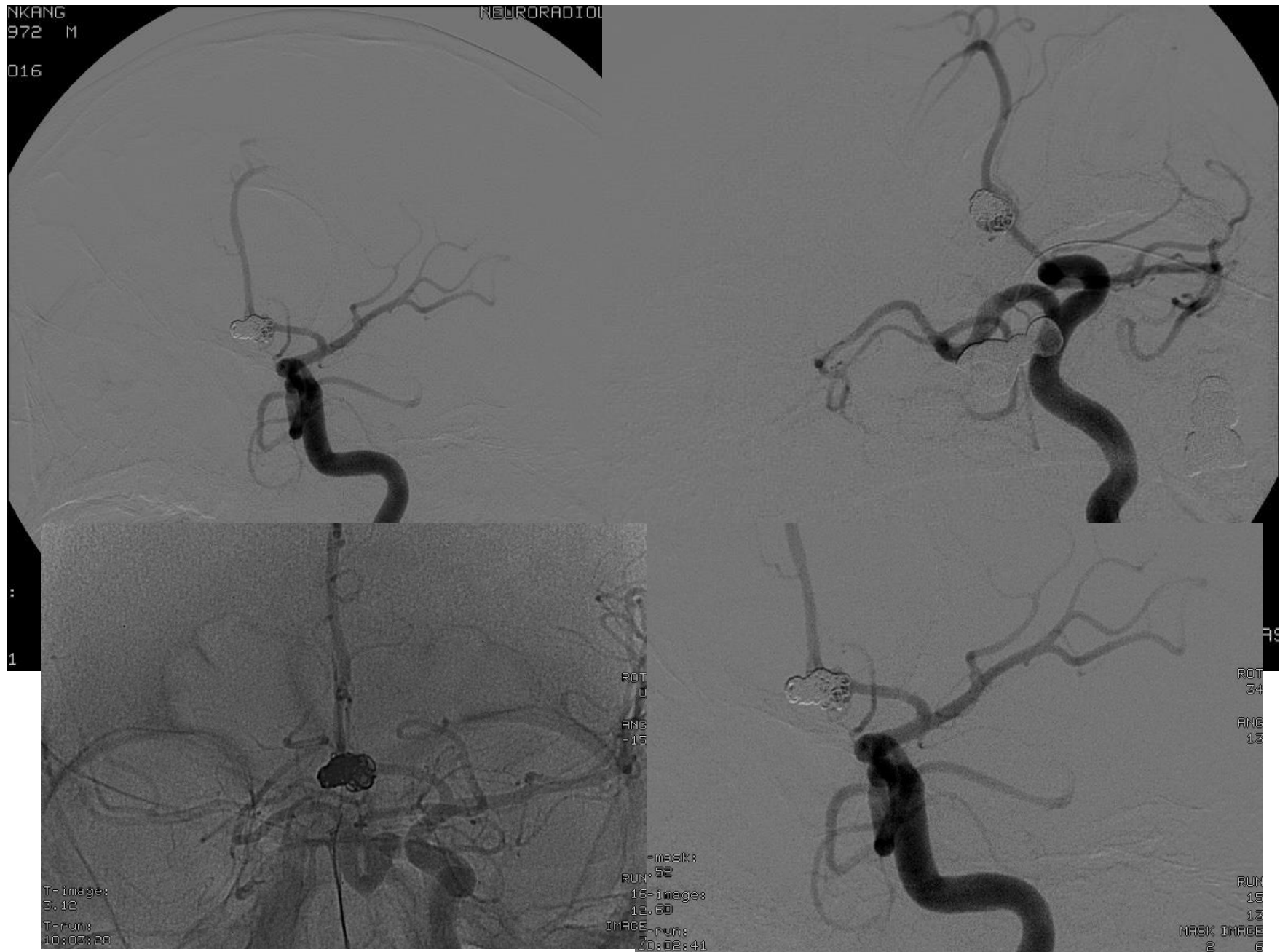
- Z.J. 45 yo
- FISCHER 4
- CRISI EPILETTICA INTUBATO



COILING 'CLIMBING' TECHNIQUE

NKANG
972 M
016

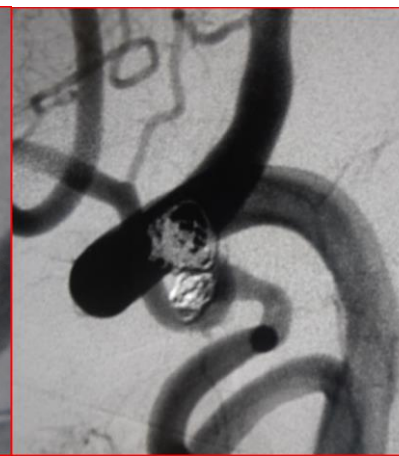
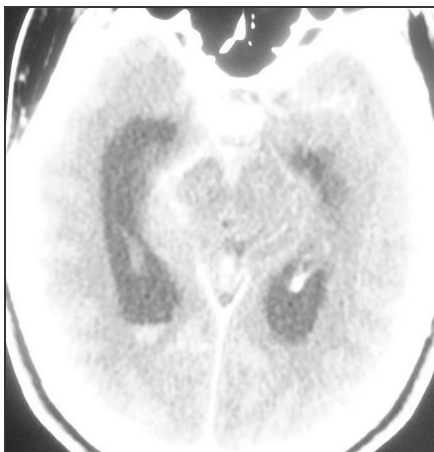
NEURORADIOLO



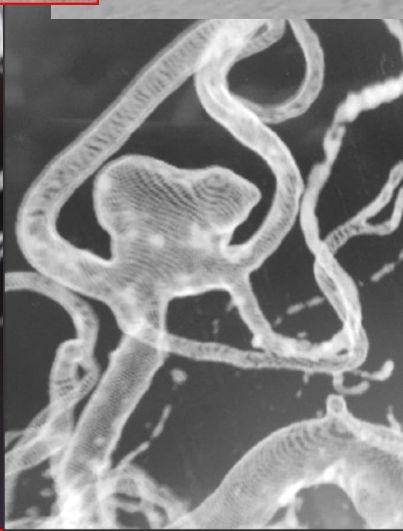
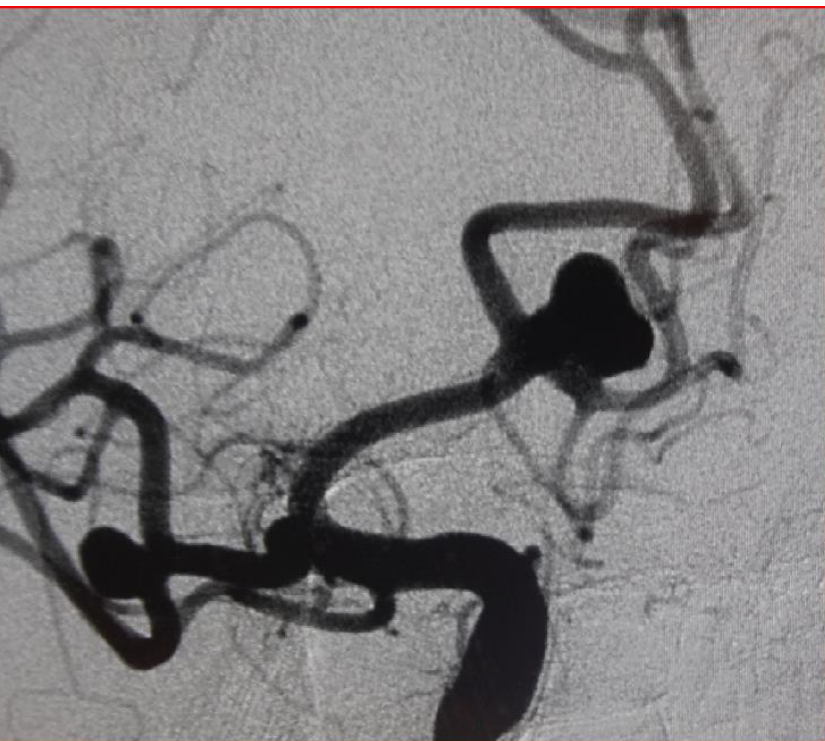
TC 2 MESI

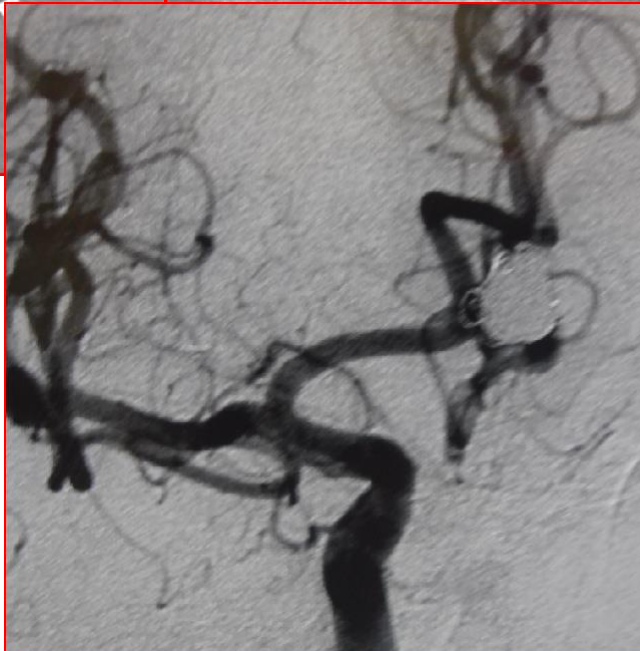
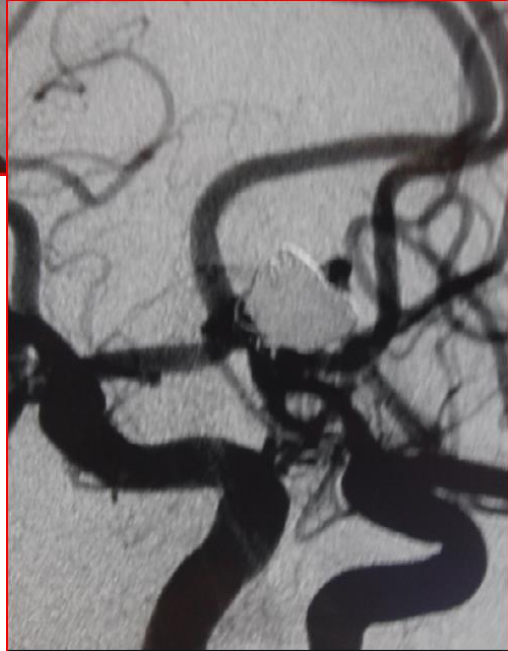
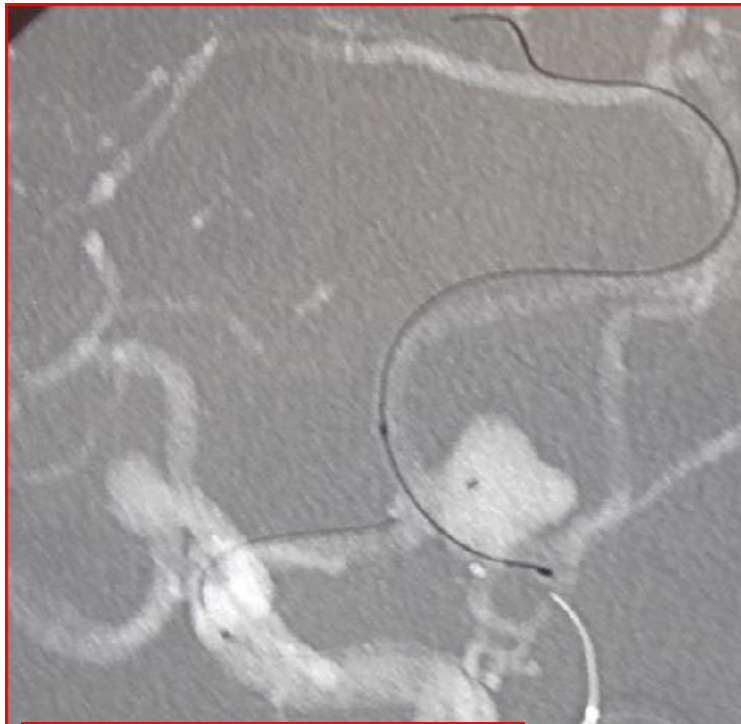


Ripetuti e
ravvicinati
sanguinamenti
pz intubata

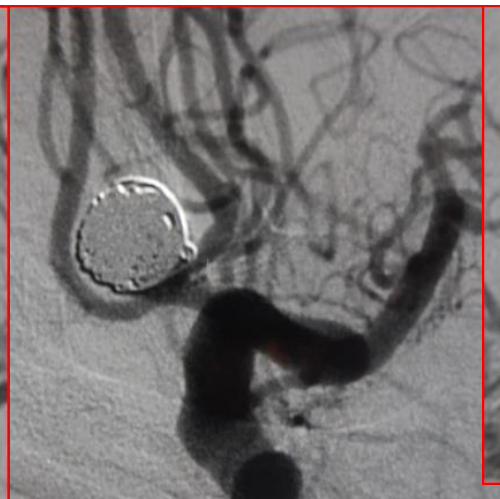
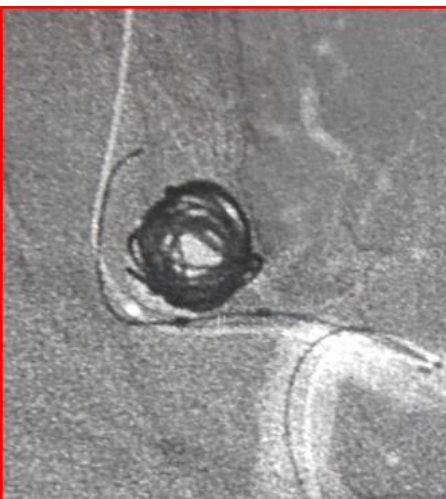
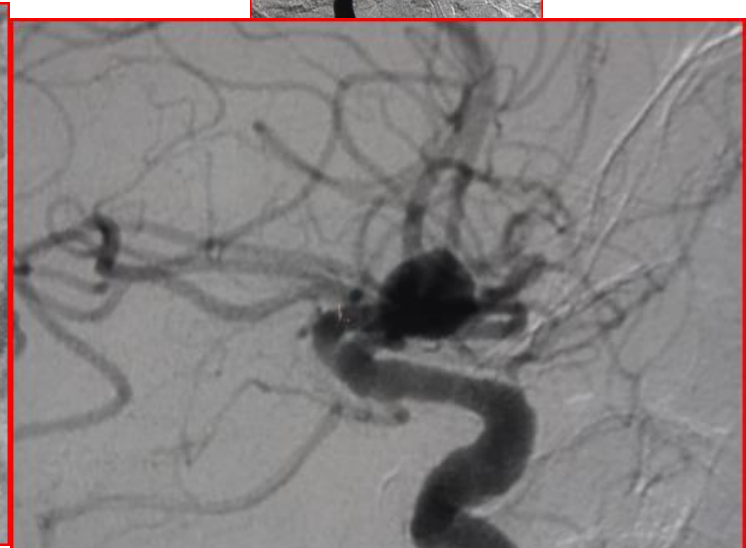
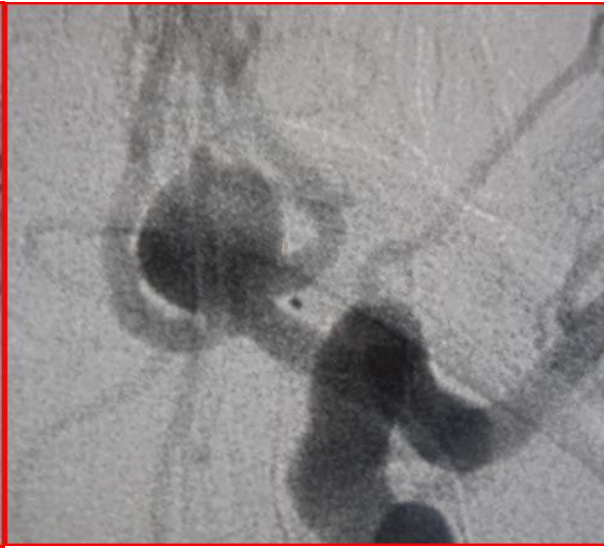
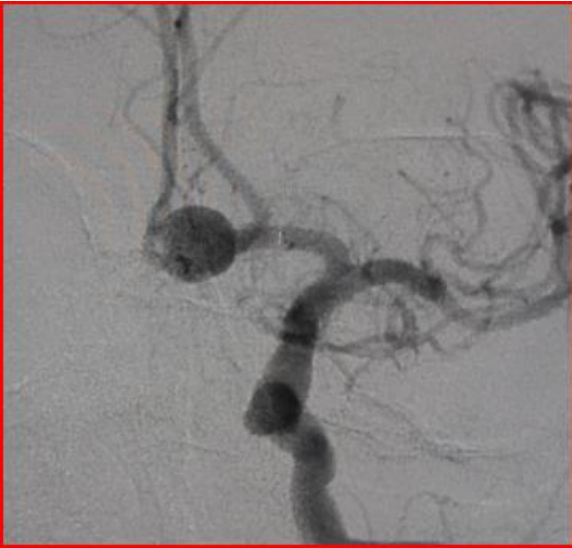
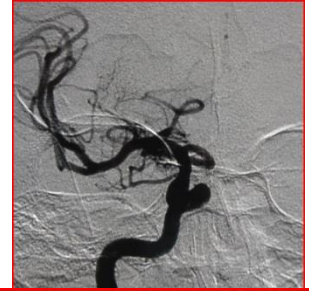


M, 70 y.o., sudden loss of consciousness, CT scan showing SAH
Arrived under intubation at (HH4) AngioSuite (within 12 hours)

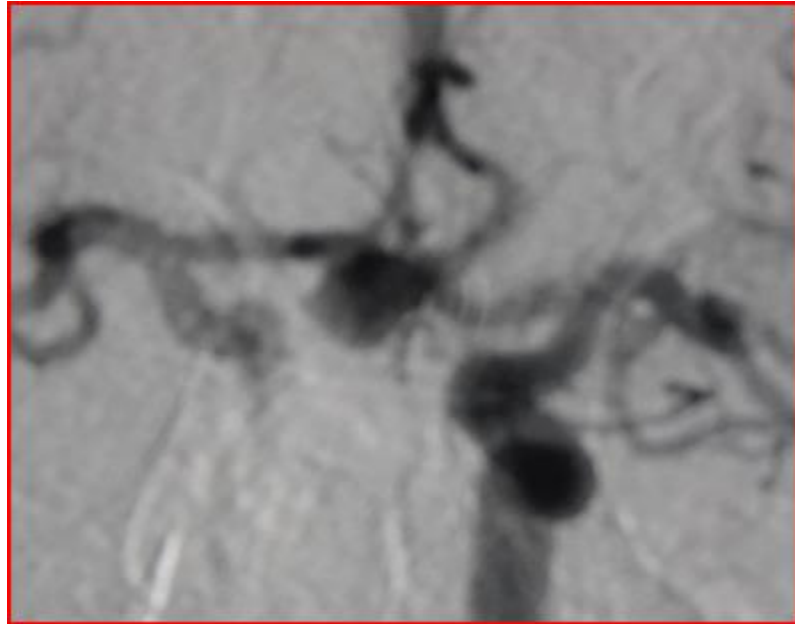


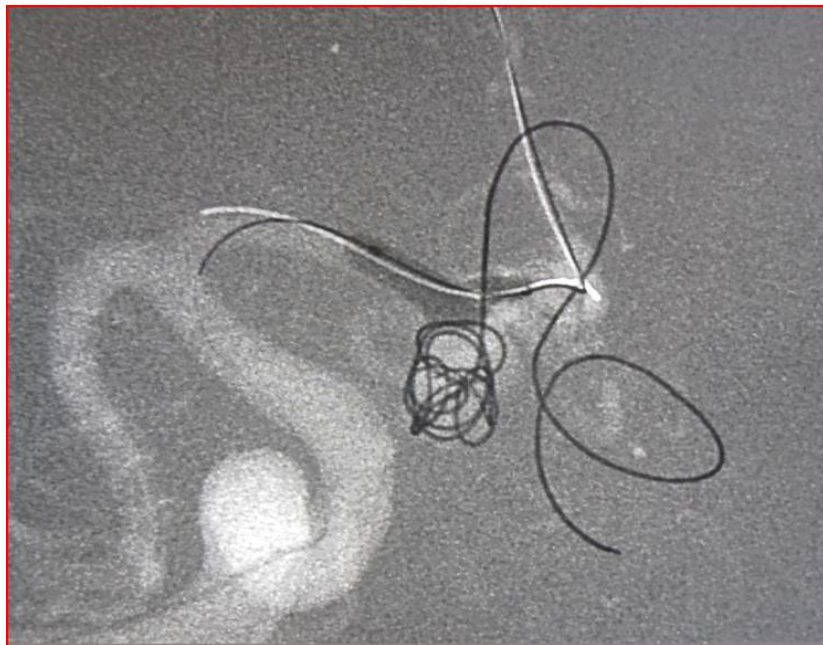


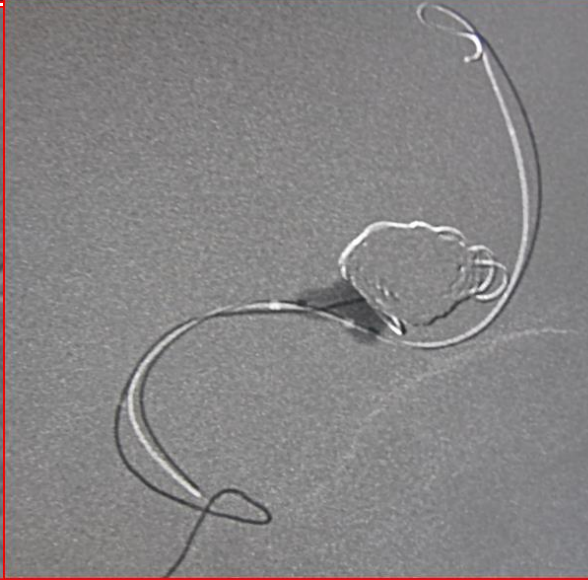
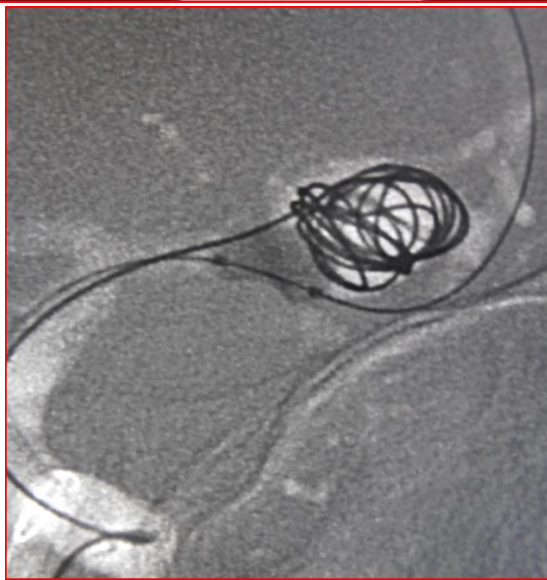
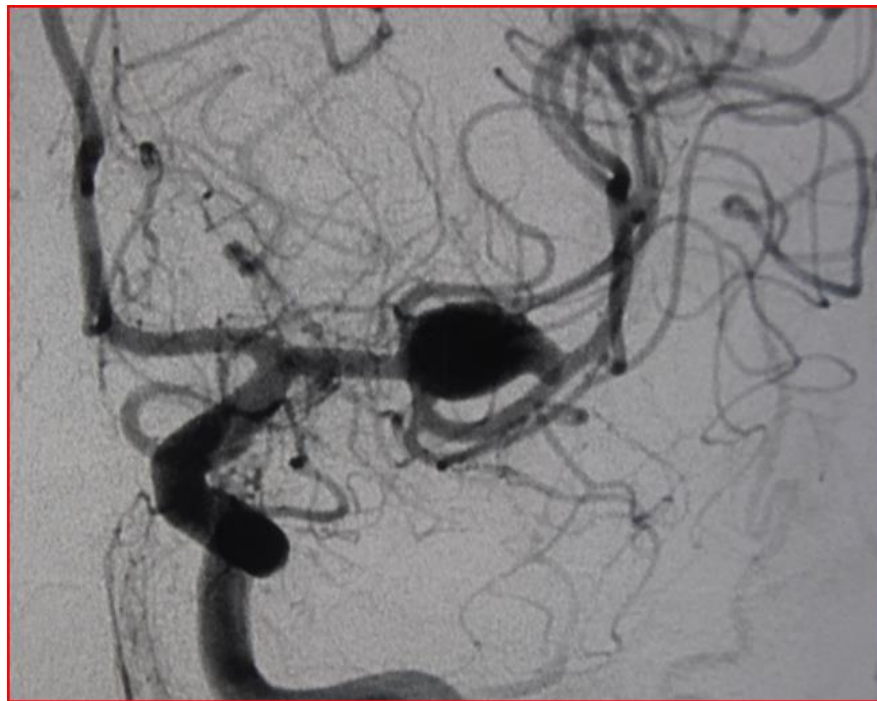
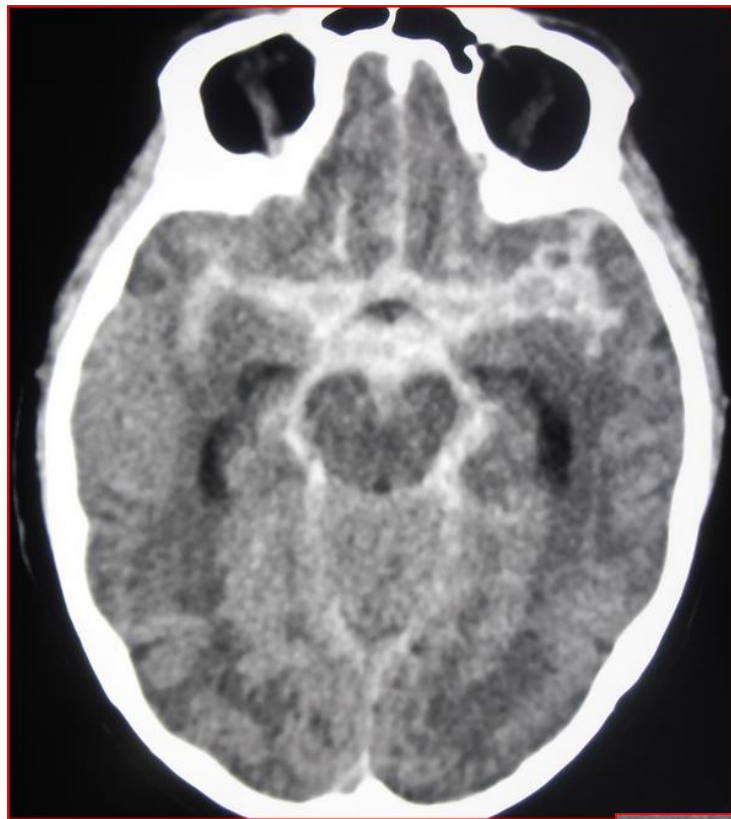
67 aa Pz intubato CGS 10 (HH4)



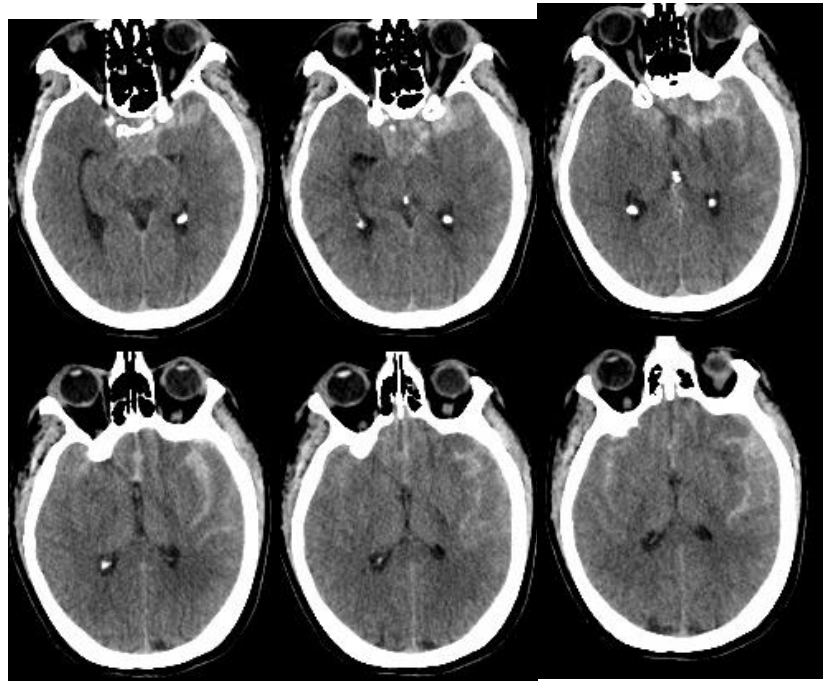
HH 4 Fisher 3

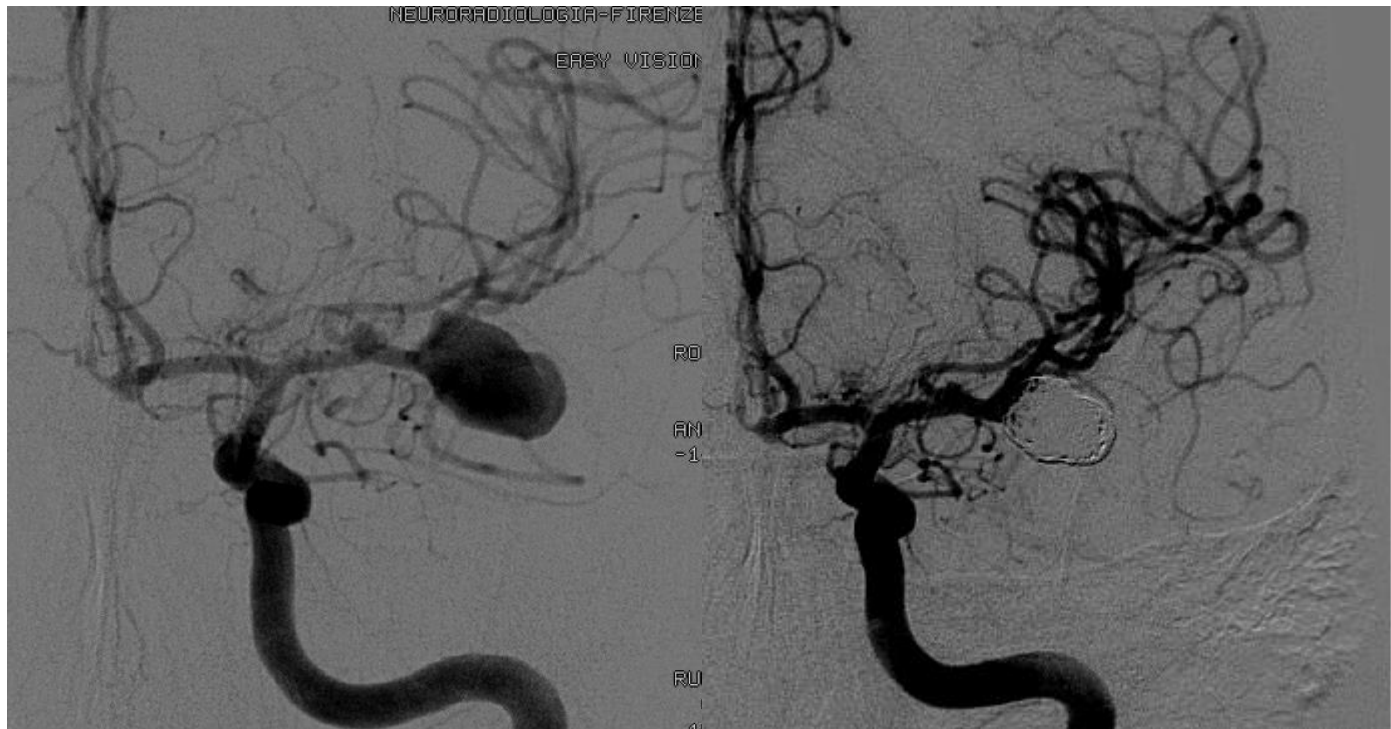






- 43aa M
- ESA FISCHER 4
- GCS 5

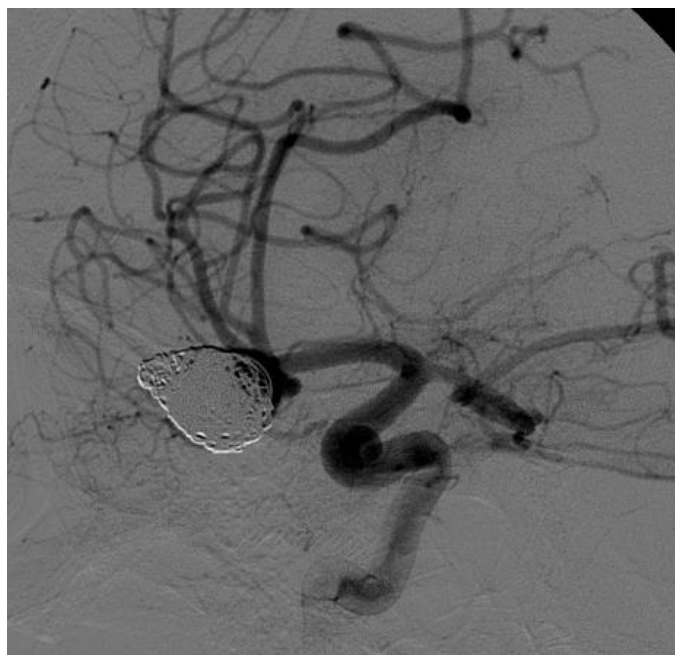
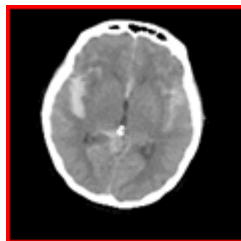






65 aa F

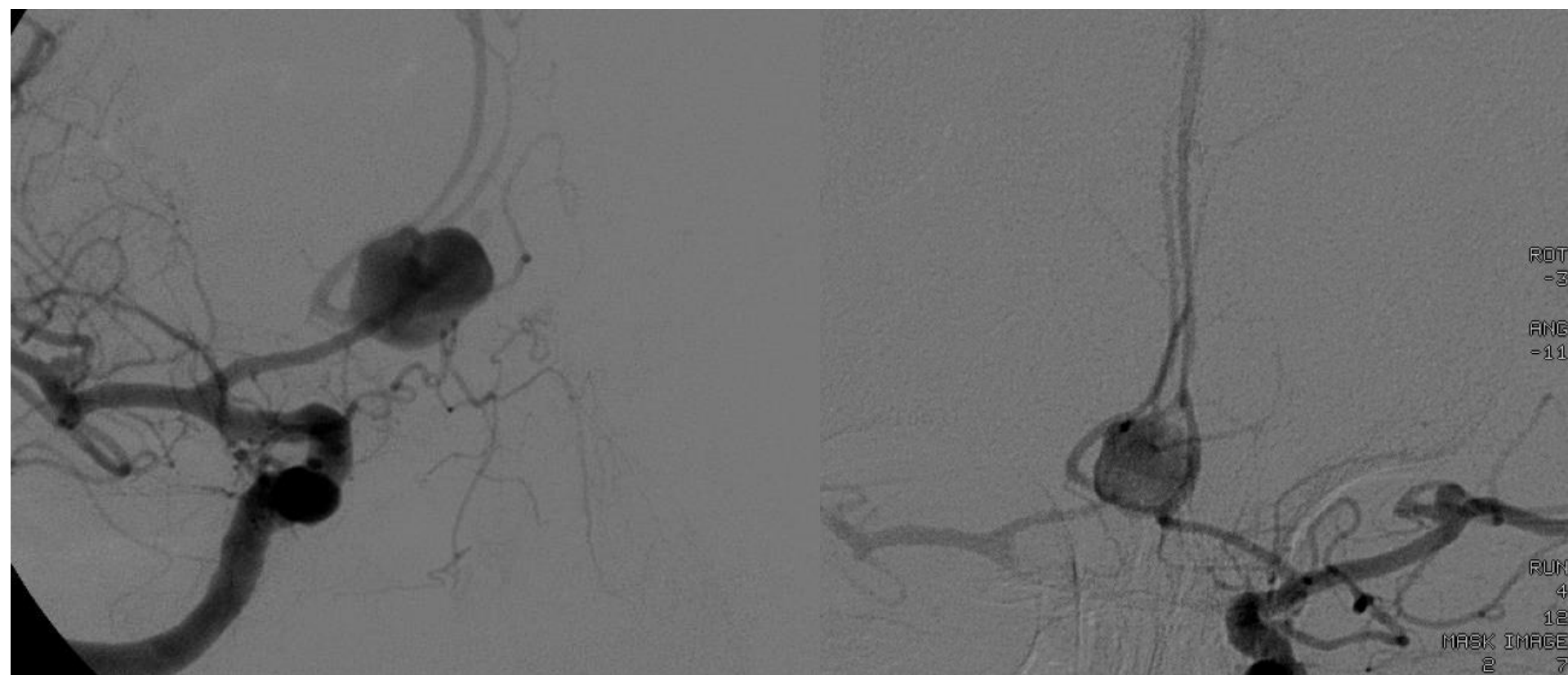
- ESA FISHER 4
- INTUBATA
- GCS 7

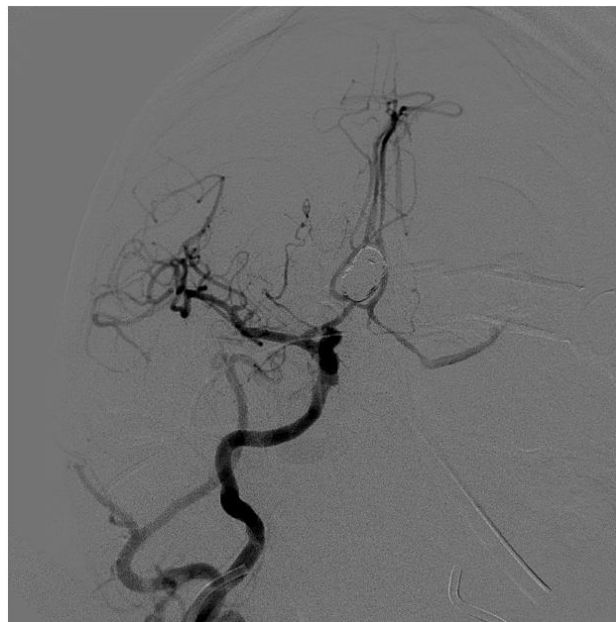




MF

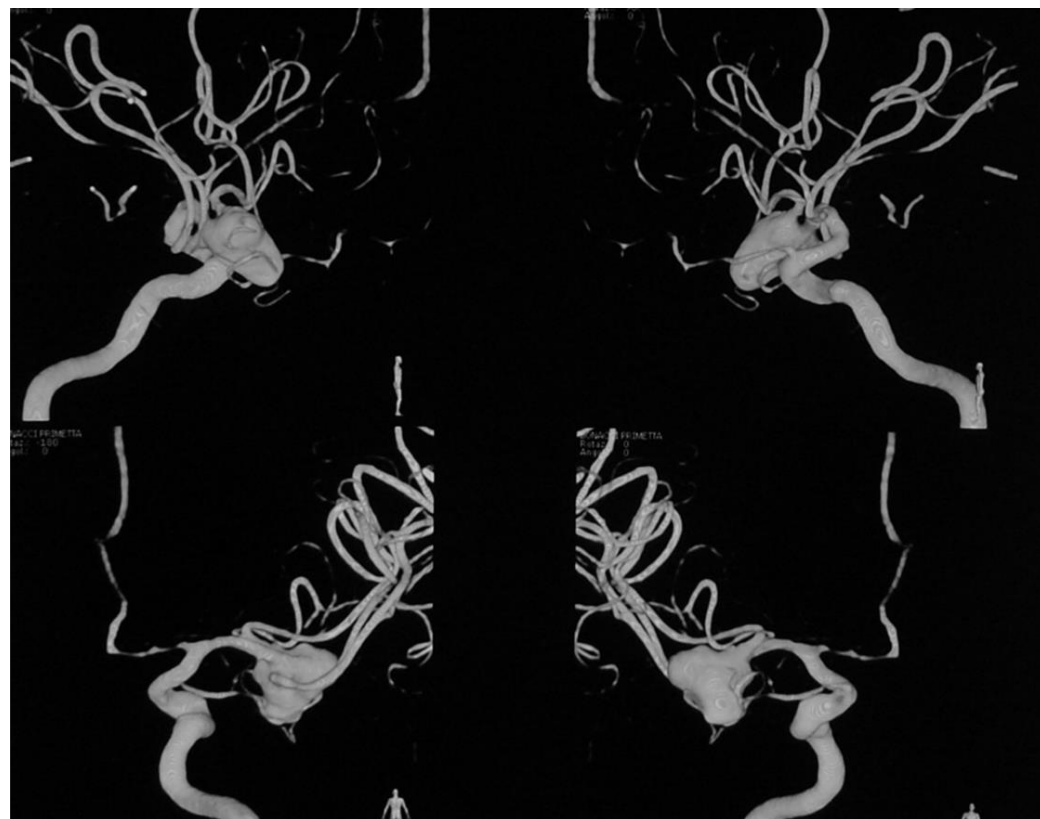
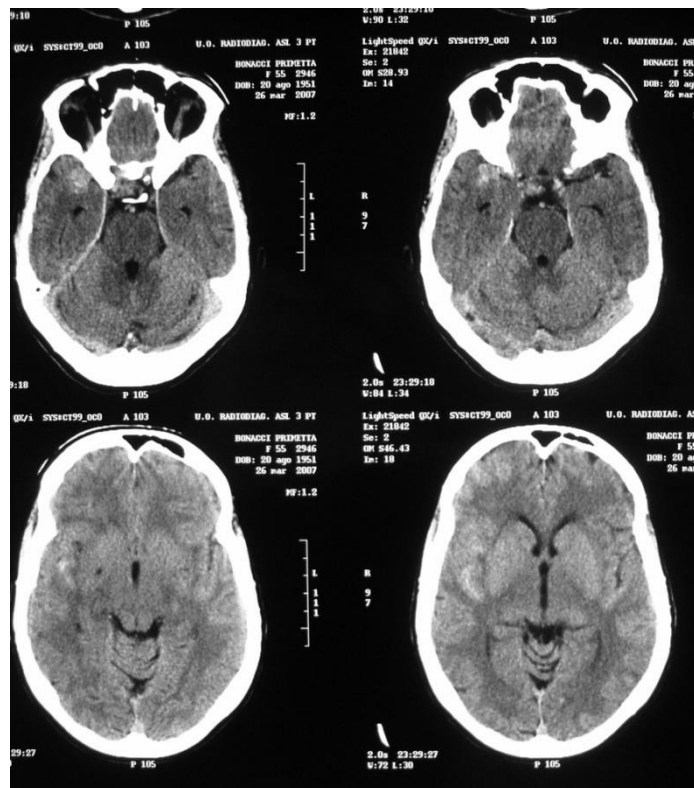
- G.D.G F, 85 aa
- ESA FISCHER 4
- GCS 5

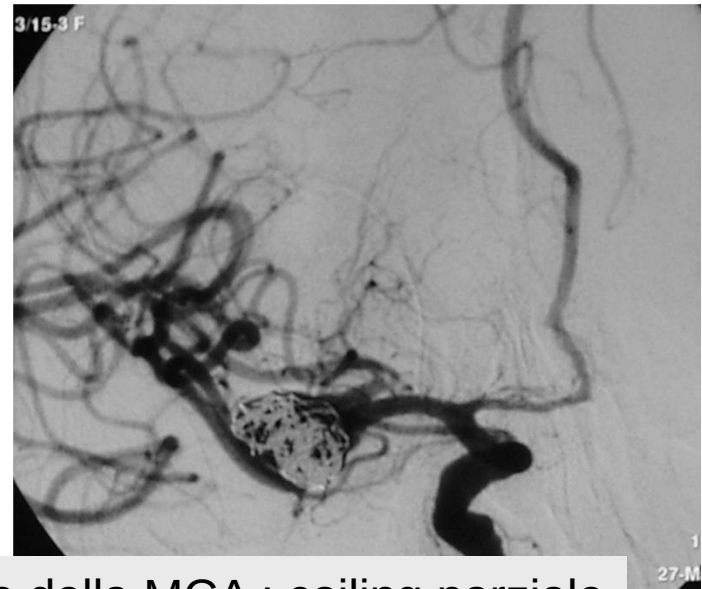
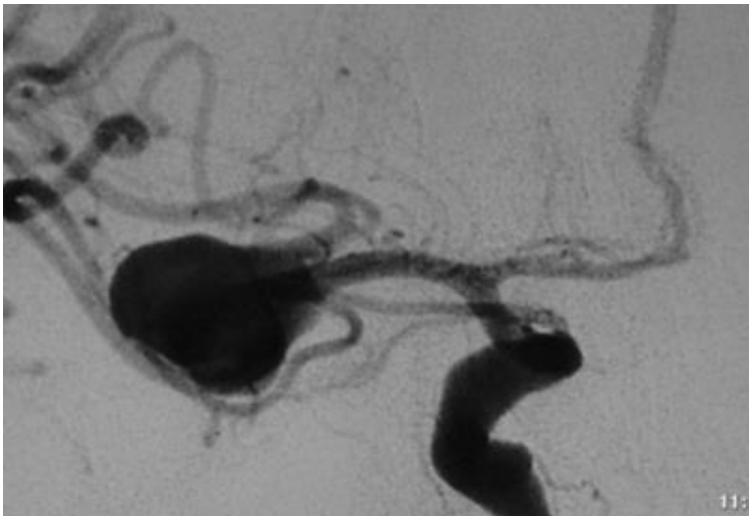




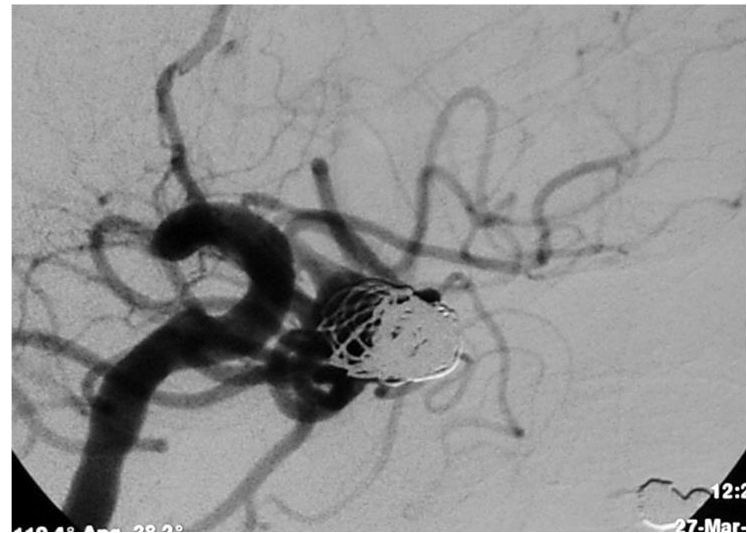
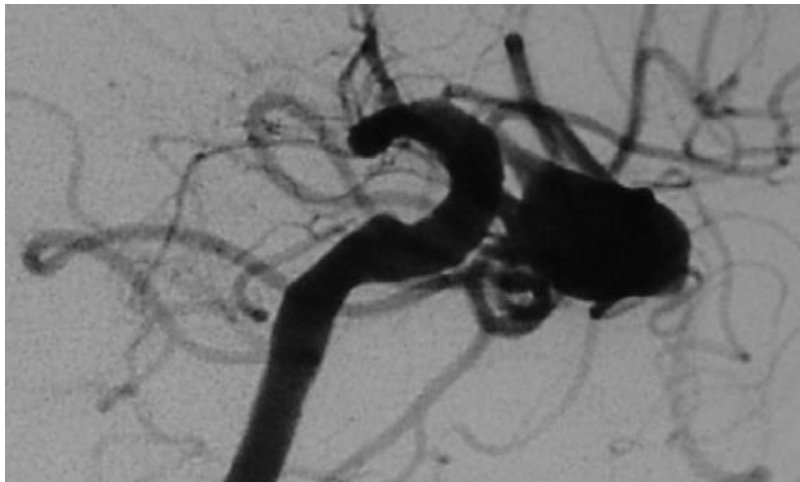
- Aneurismi very large (> 1.2 cm) e giganti

**Alti tassi di esclusioni incomplete e
ricanalizzazioni
Trattamento in due tempi**

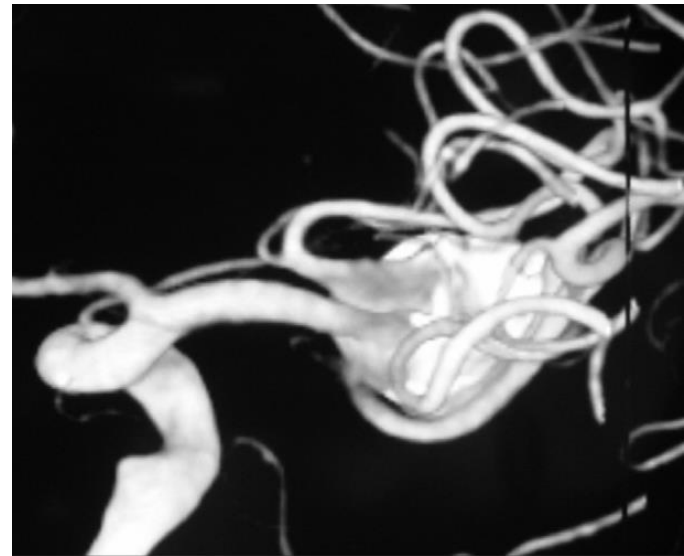
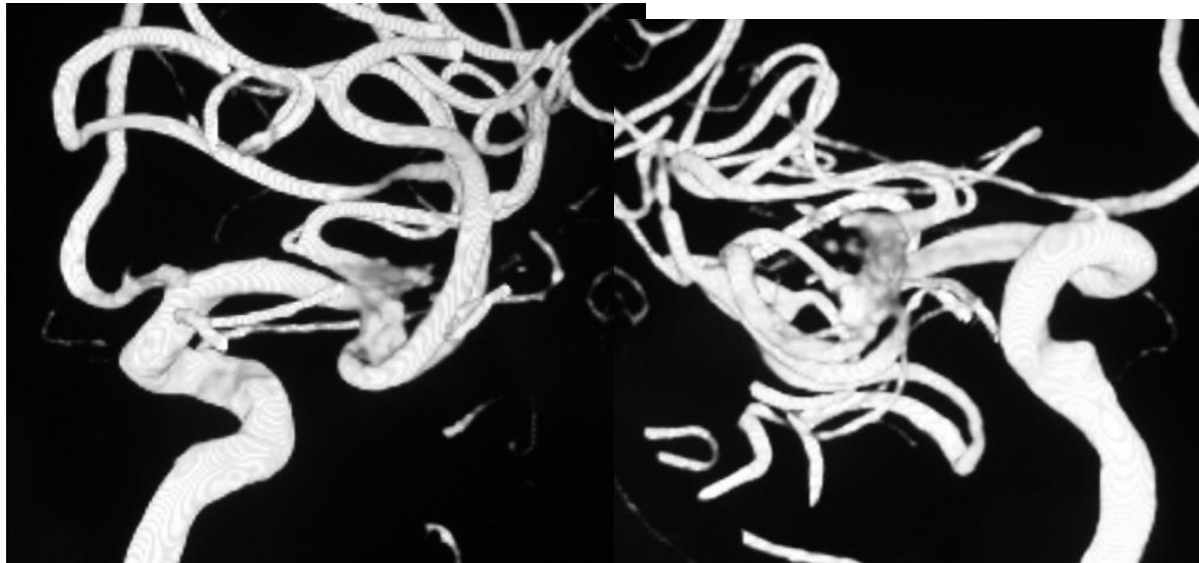
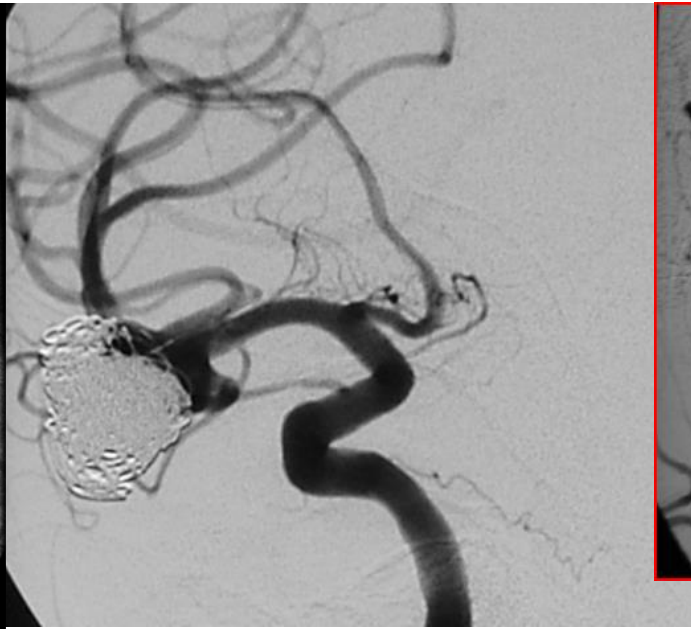




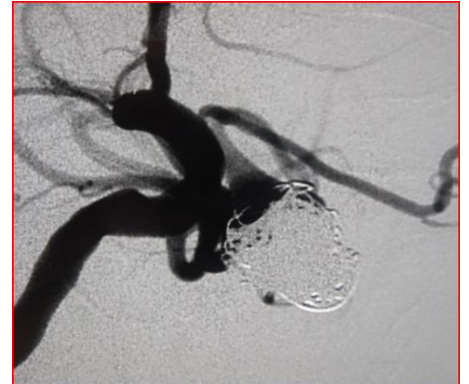
Aneurisma emorragico della MCA : coiling parziale



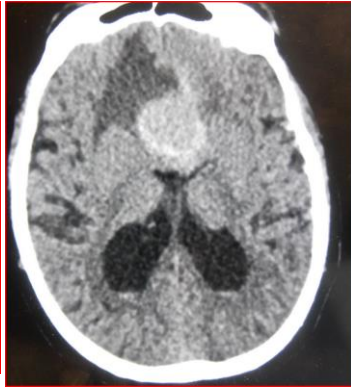
II procedura



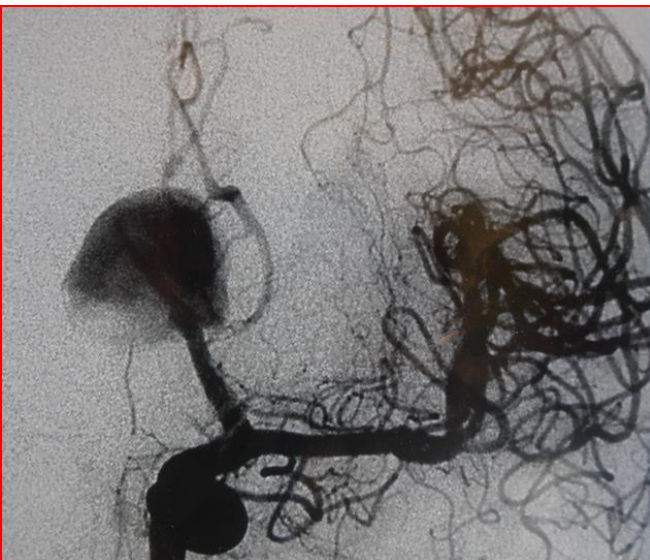
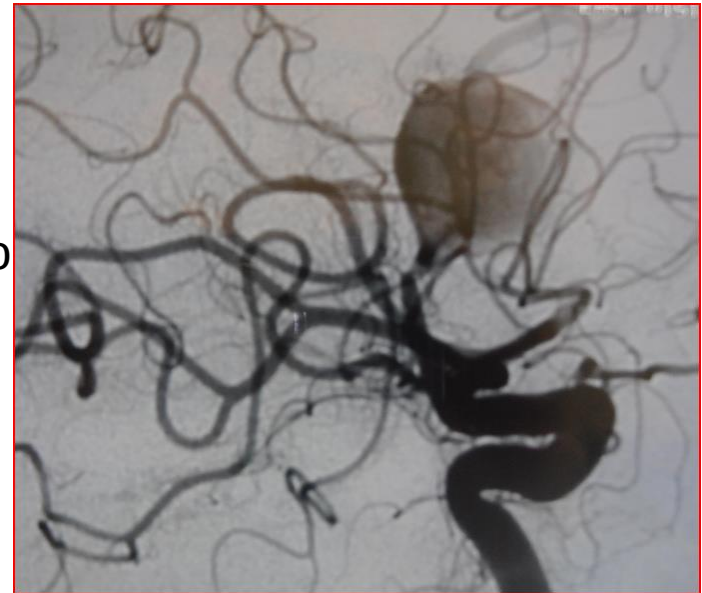
B.P: (63 aa) controllo a distanza

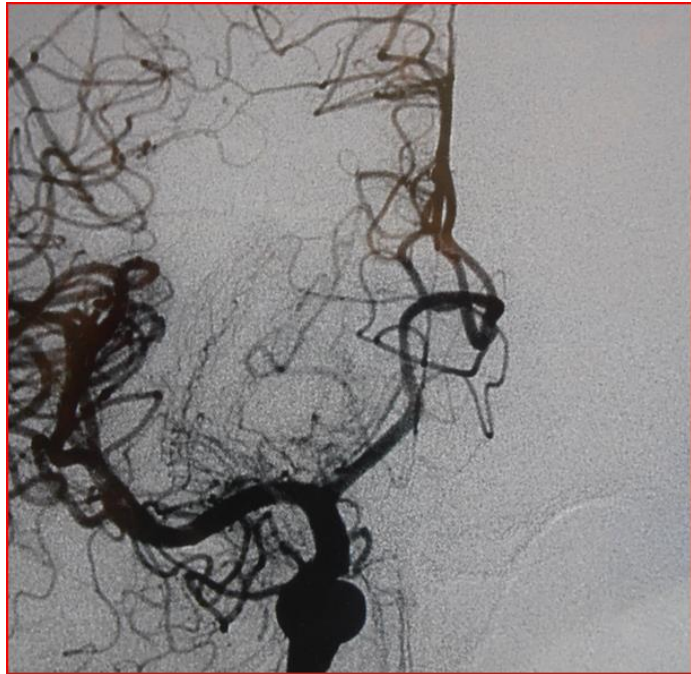


Controllo a distanza :2011 (5 aa dopo esa)

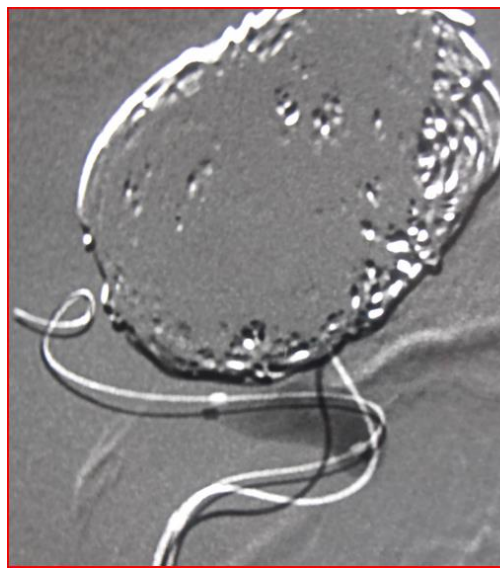


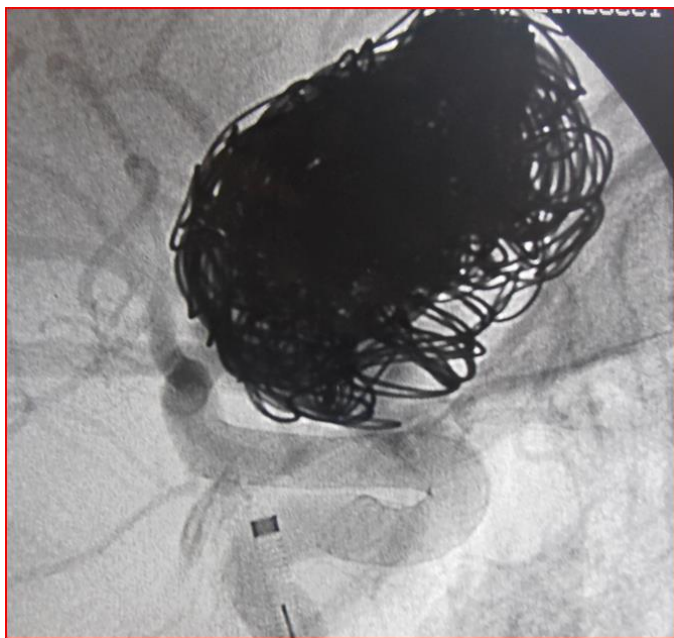
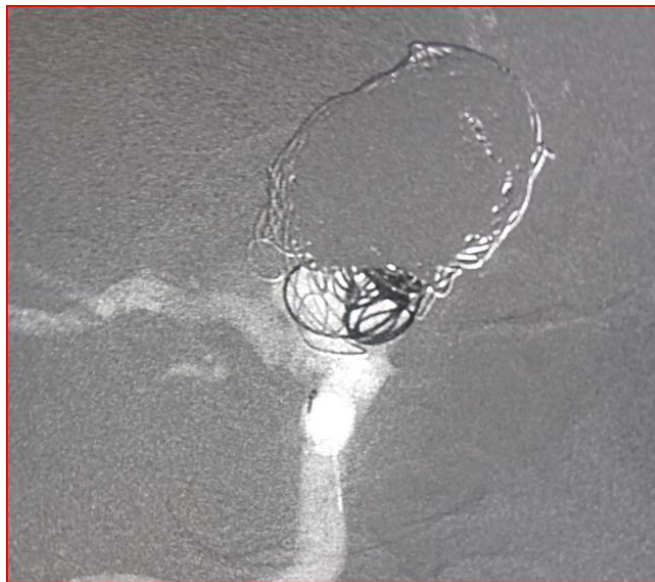
GCS 9
Fisher 3
Pz intubato





Controllo dopo 3 mesi





Grado clinico HH1-2
Grado Clinico HH3
parità di condizioni
Per Embolizzazione e NCH

aneurismi di medie dimensioni < 1,2 cm
chirurgia e endovascolare possibili

Indicazione endovascolare
se viene garantita l'occlusione completa
o adeguata dell'aneurisma (residuo di colletto)

Free neck Aneurysm

In alternativa Intervento chirurgico

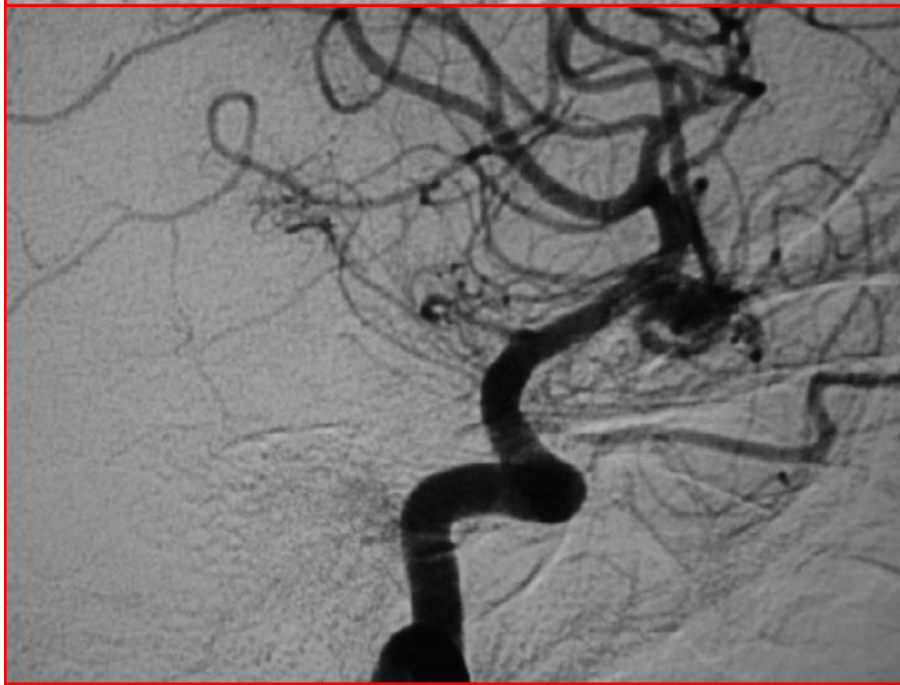
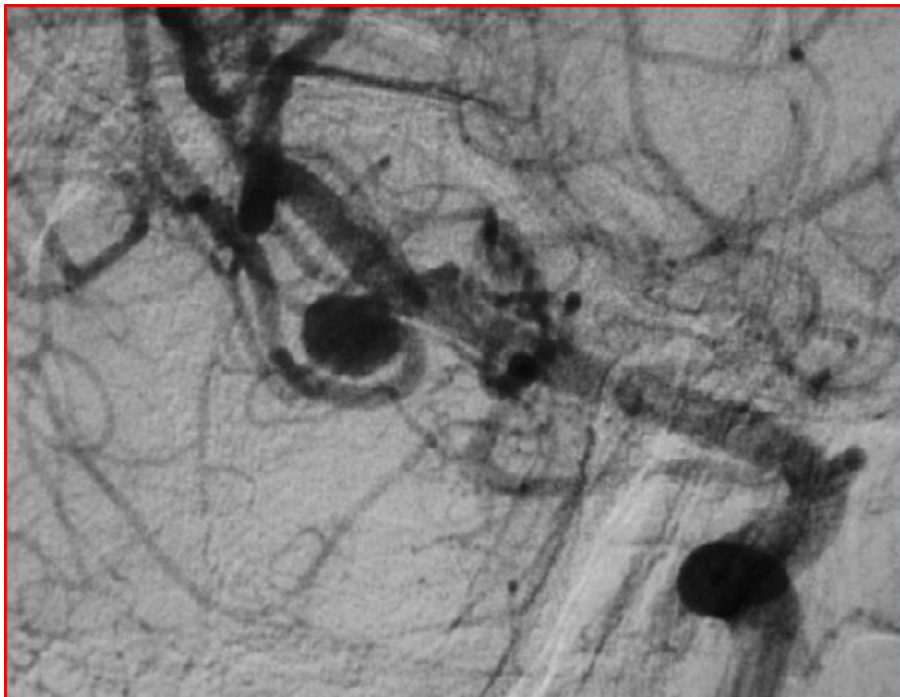
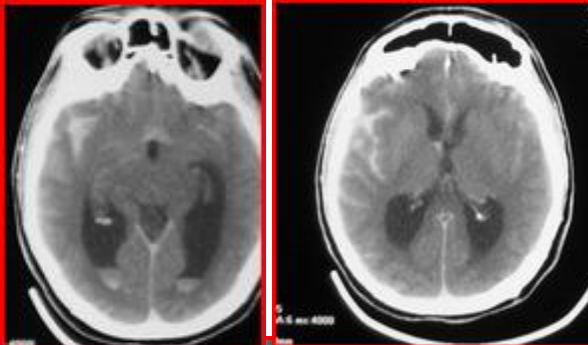
Engaged neck aneurysm

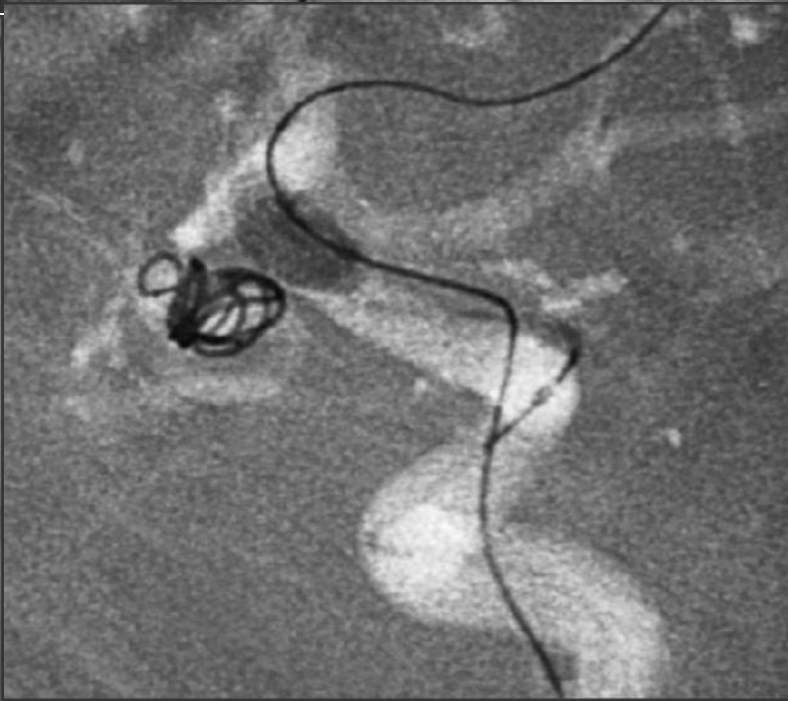
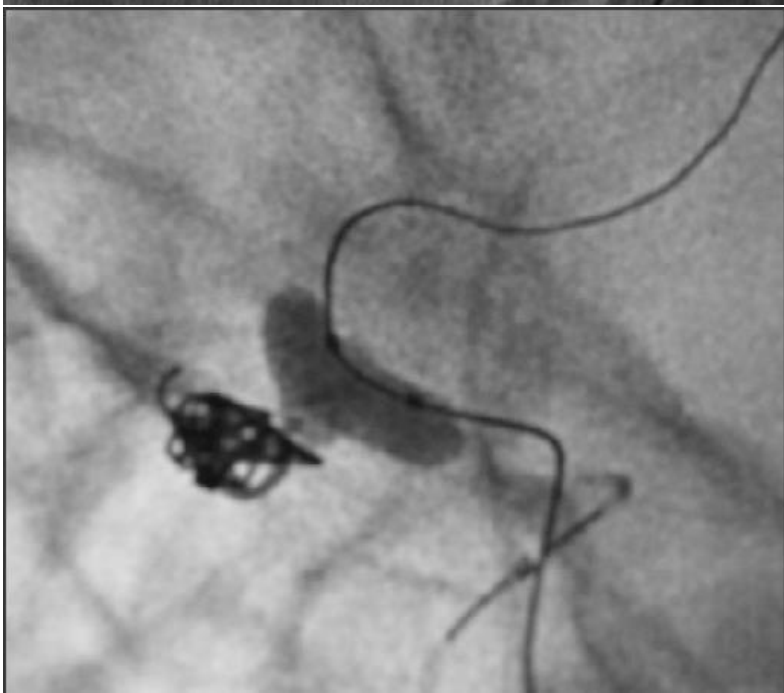
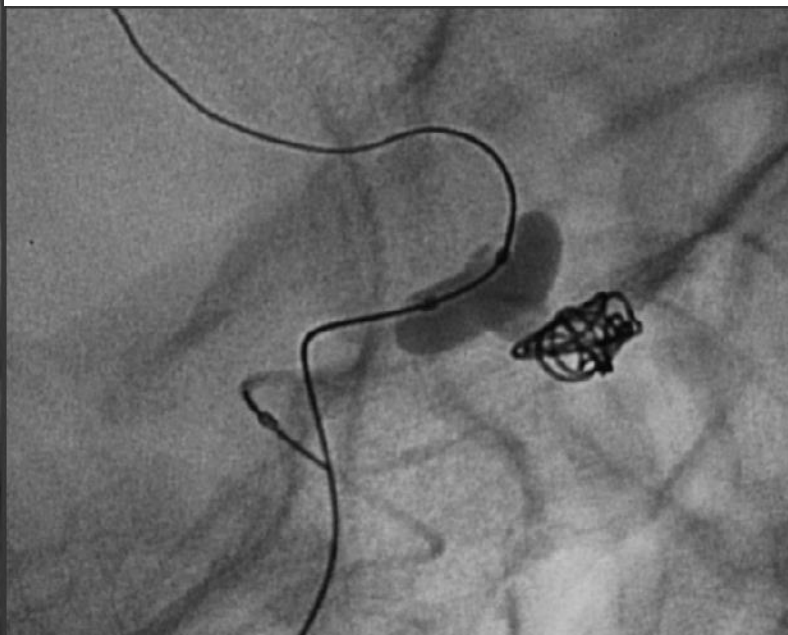
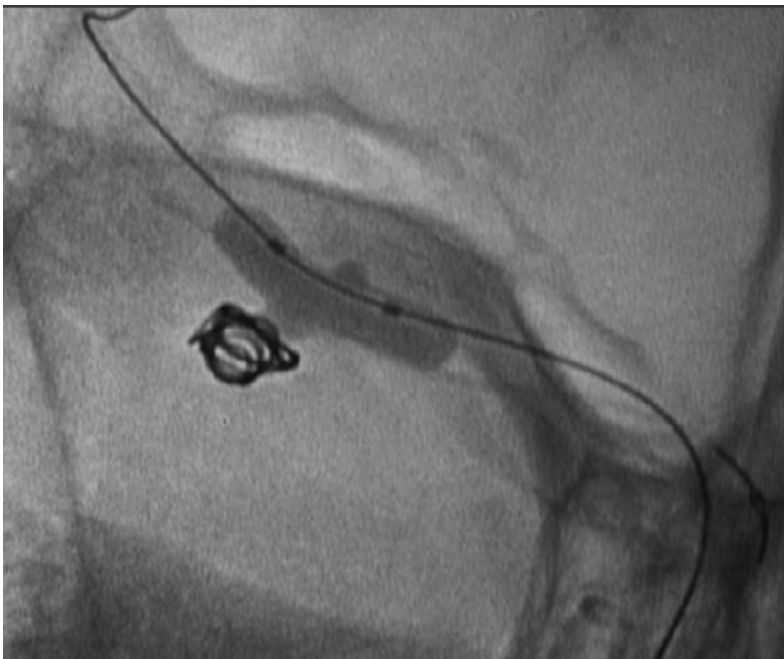
Nei gradi clinici intermedi(HH 3
è indicato l'intervento endovascolare

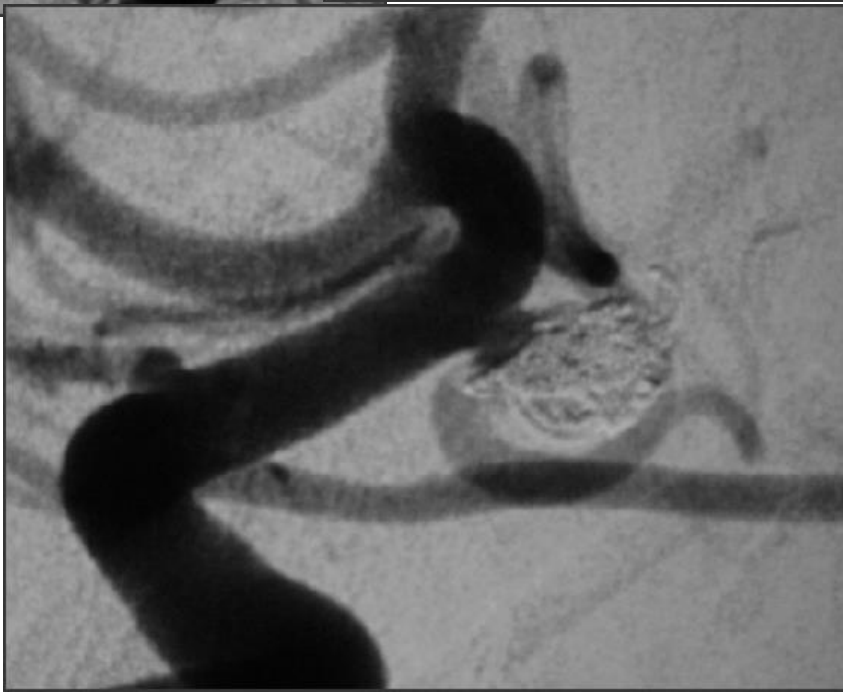
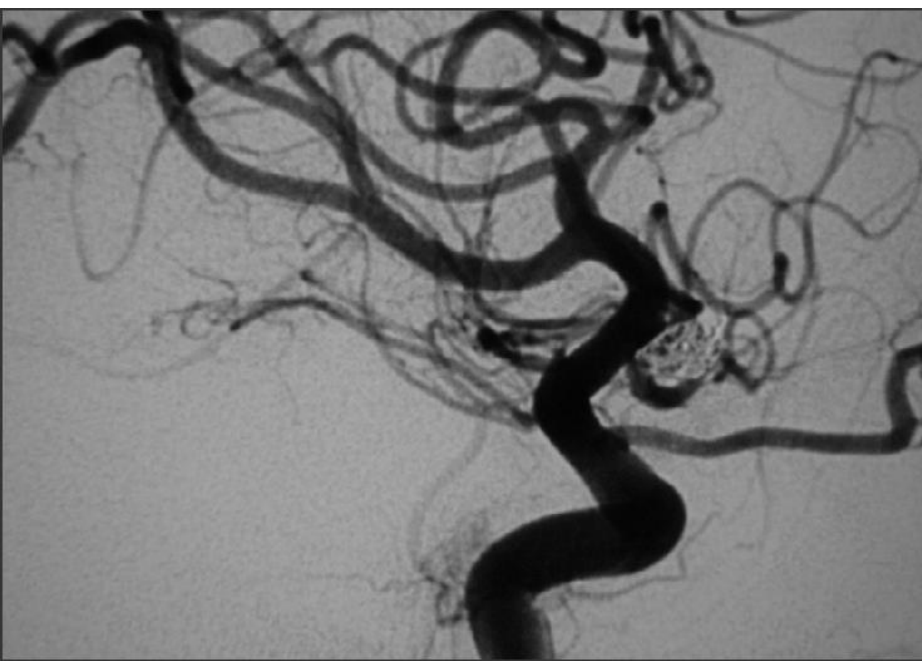
% good outcome	Treatment	Study
57 %	Coiling	Pereira et al. Neurocrit.Care 2007
34%	Surgery	Shirao et al. Cerebrovasc.Dis. 2010
53%	Coiling	Taylor et al. Neurocrit.Care, 2010

WFNS IV-V: no candidates for clipping

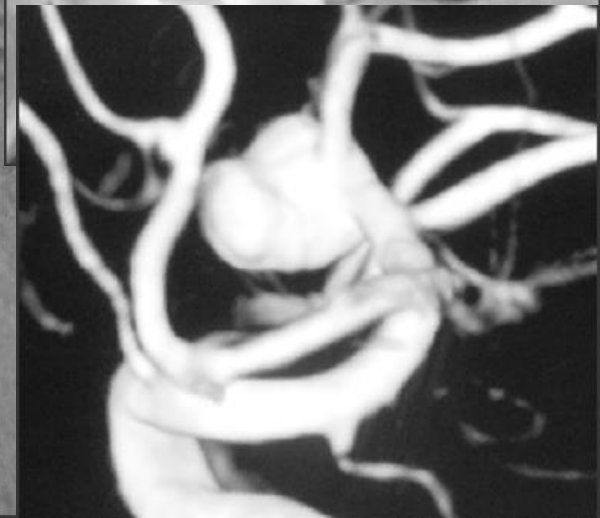
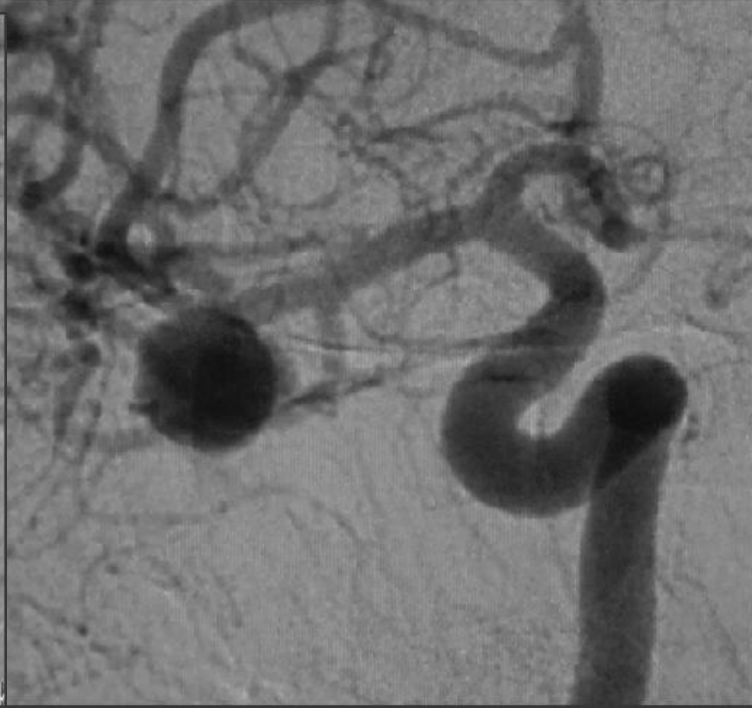
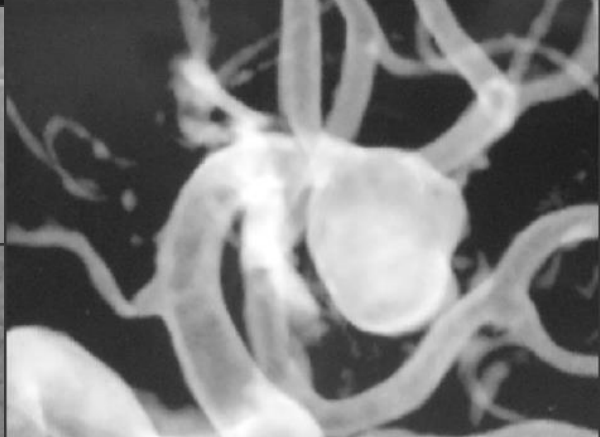
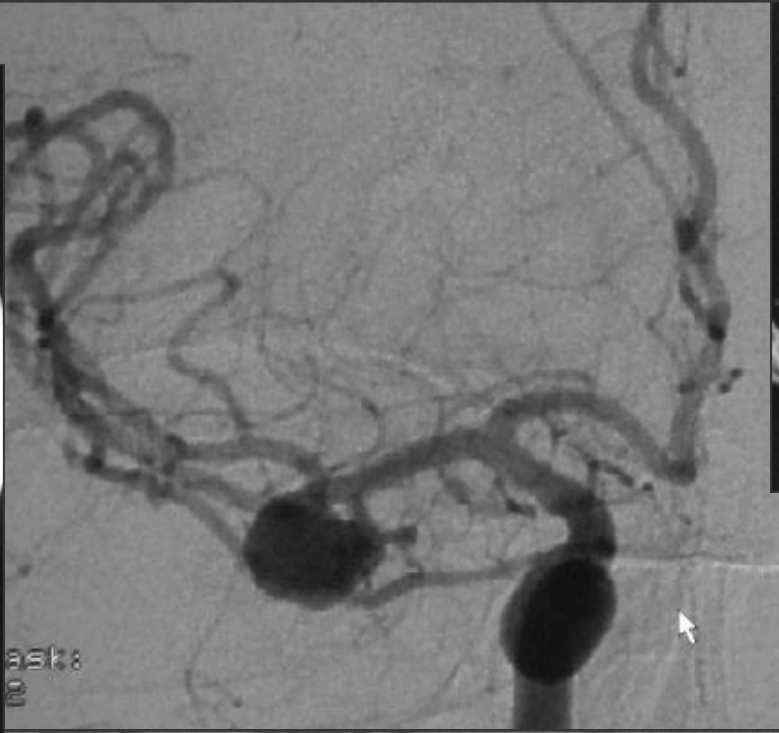
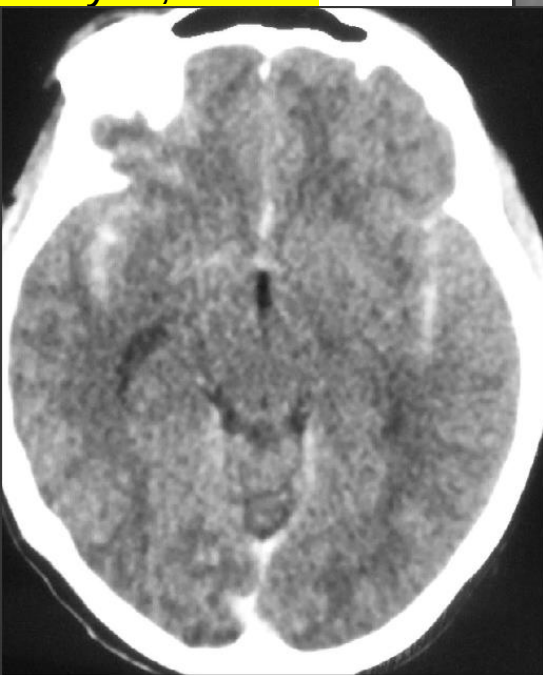
HH 3

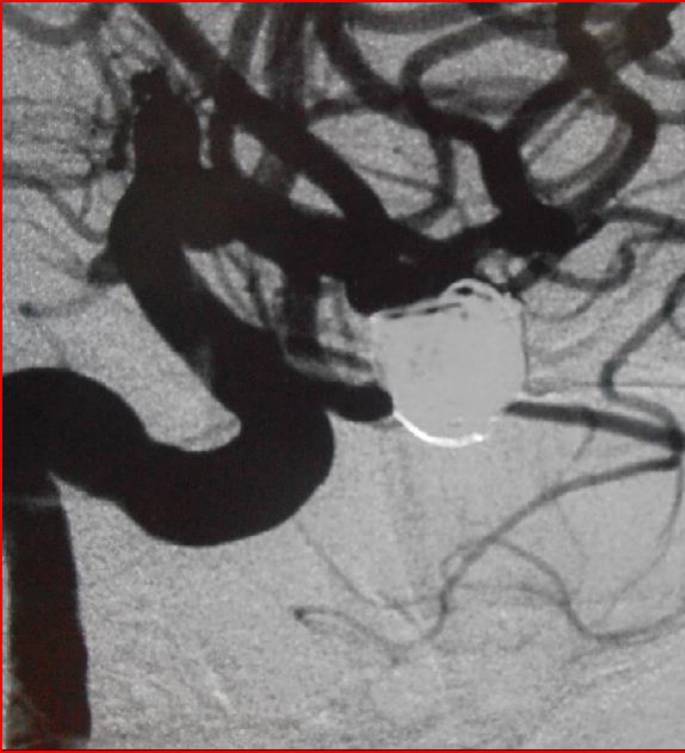
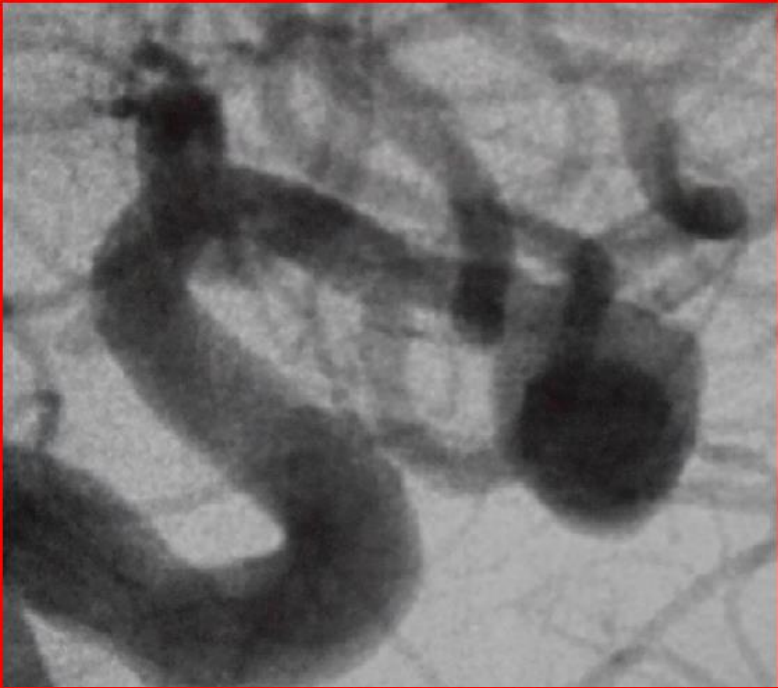






29 y.o., HH 3





HH1-3

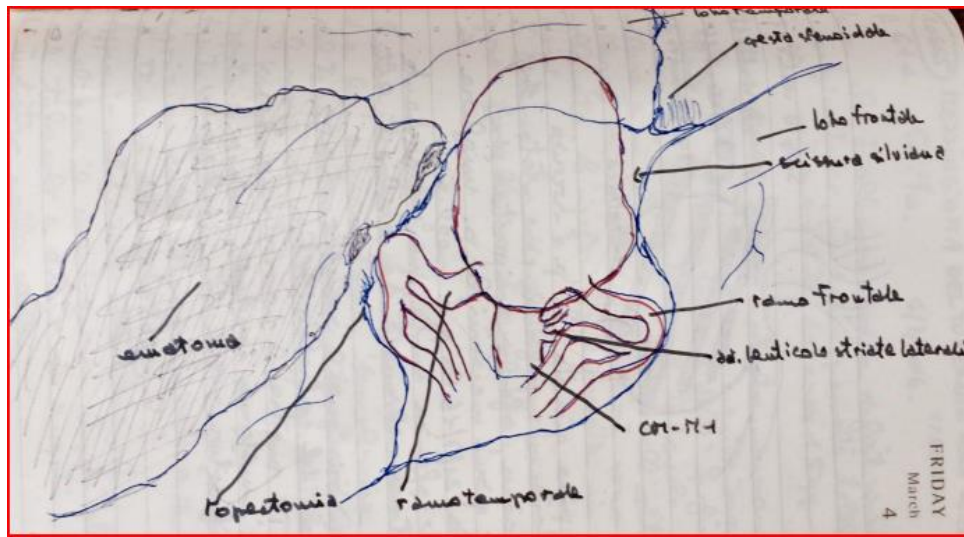
Aneurismi Large > 1.2 cm max)

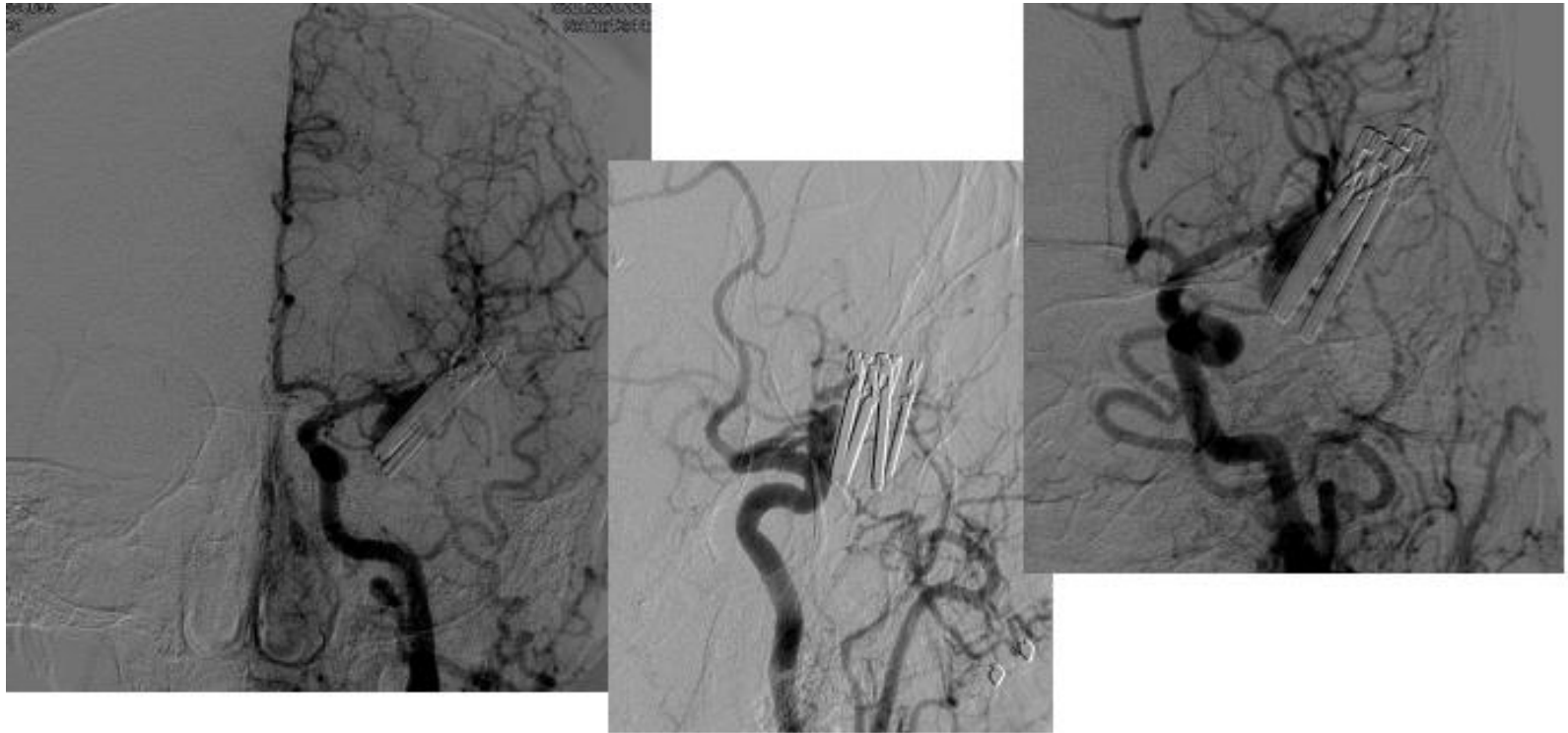
Parità tra chirurgia ed embolizzazione

All'ingresso in PS

- Stato confusionale
- Afasia
- Ipostenia emilato destro
- NIHSS 4
- Elevata P/A

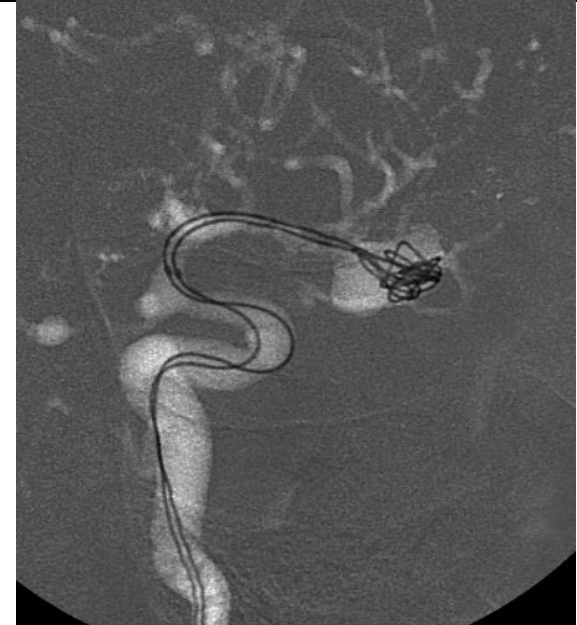
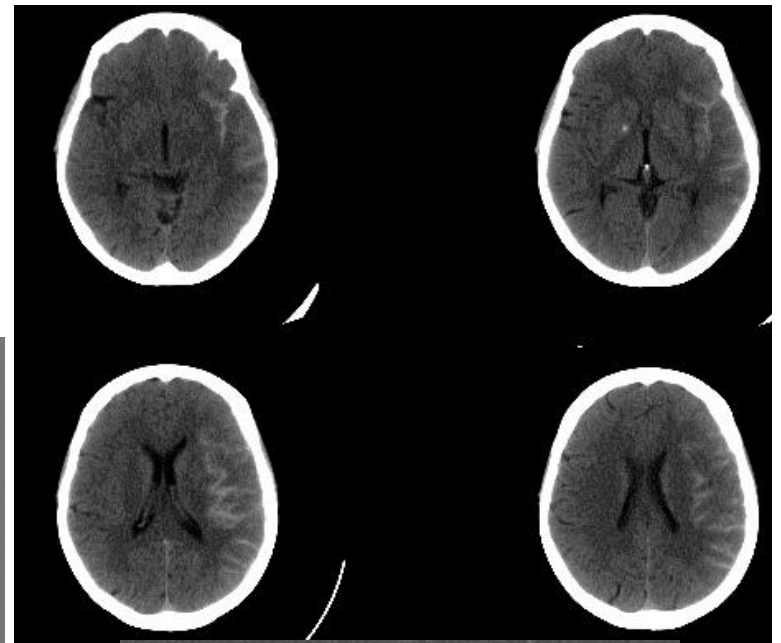
TC : ematoma intraparenchimale temporo-parietale sinistro





Controllo a un mese, lieve disfasia e modesta ipostenia destra

- 49 aa
- CRISI EPILETTICA GENERALIZZATA
- ESA FISHER 2

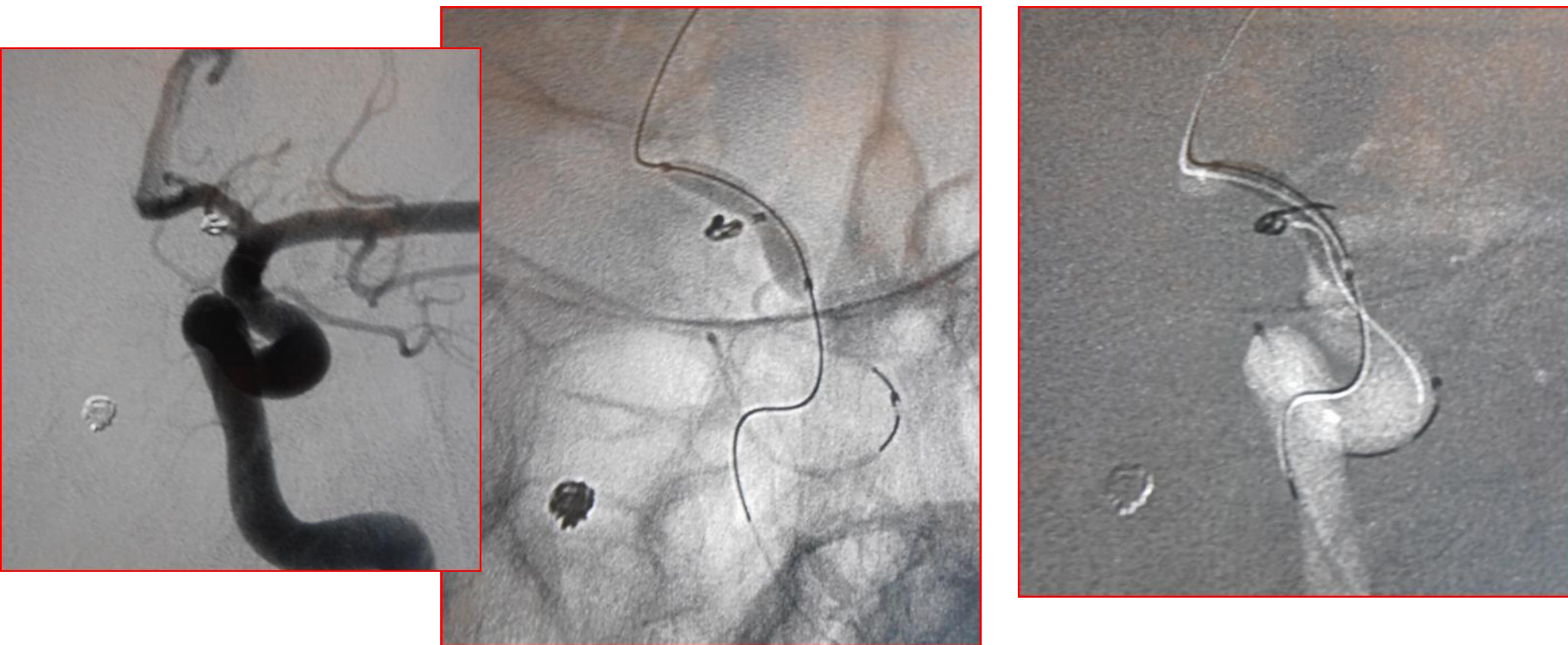


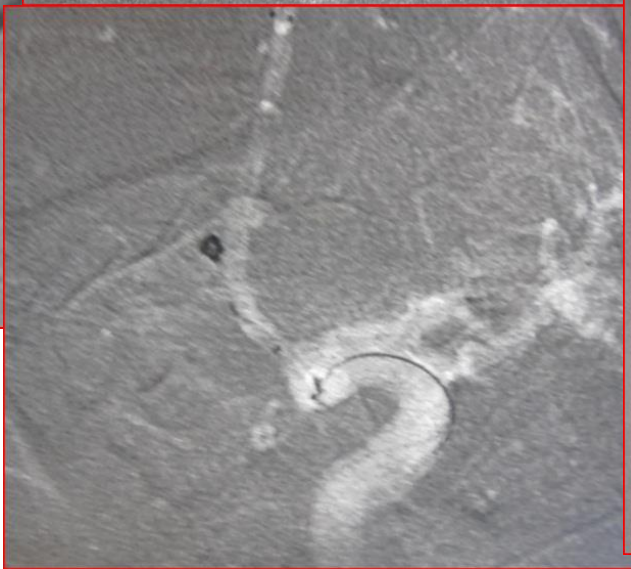
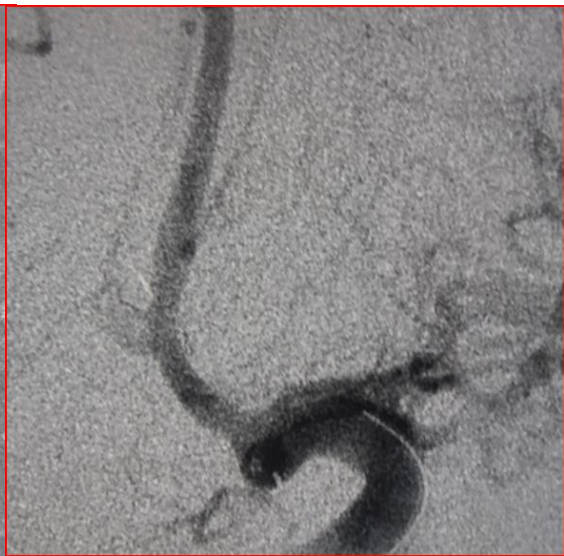
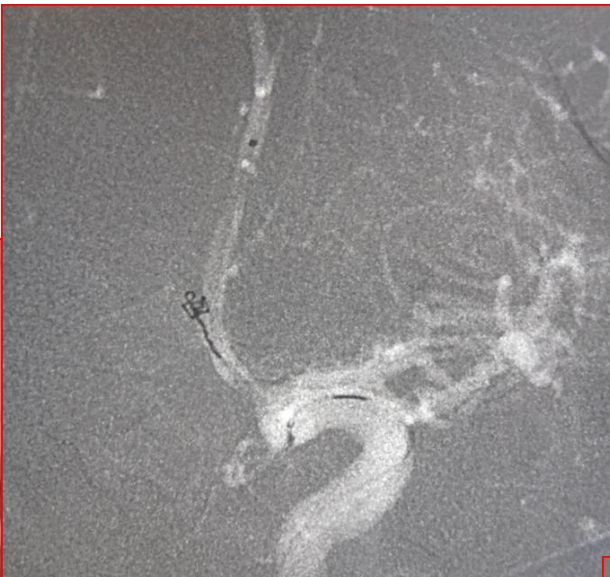


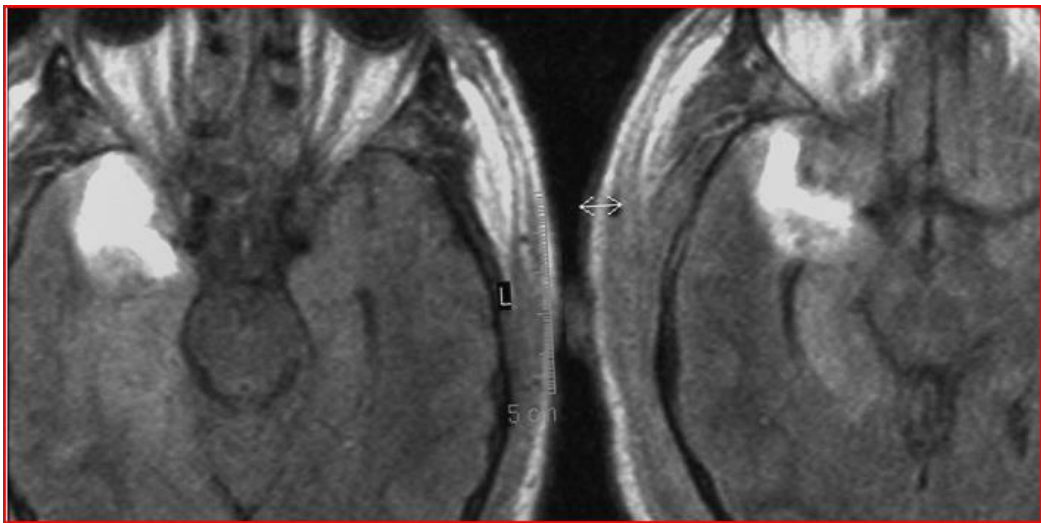
Controllo ed eventuale stent assisted coiling del residuo
(ricostruzione della biforcazione)

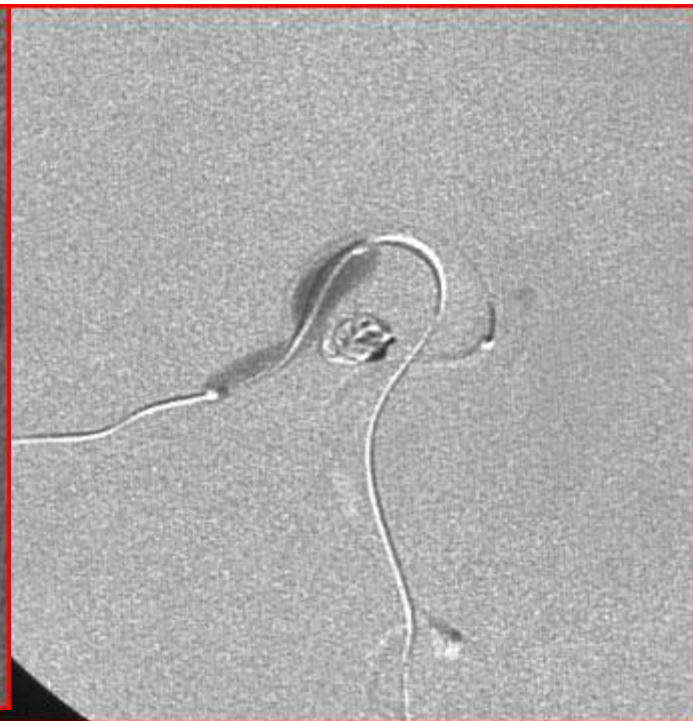
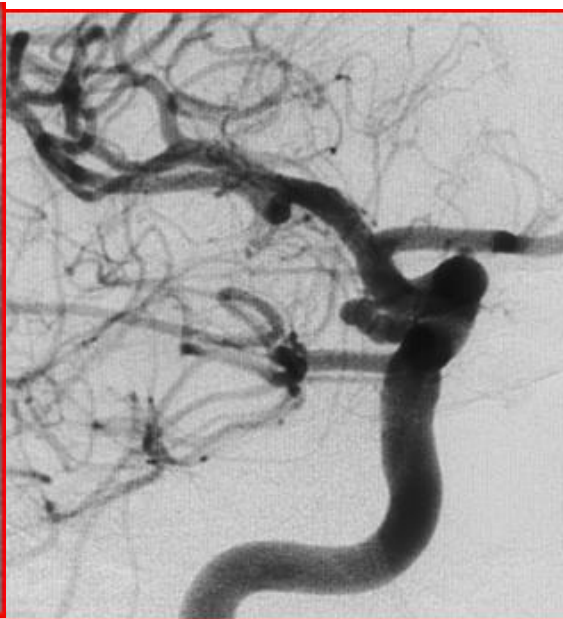
Aneurismi molto piccoli
< 3mm

Esa diffusa , GCS 9 , Fisher 3









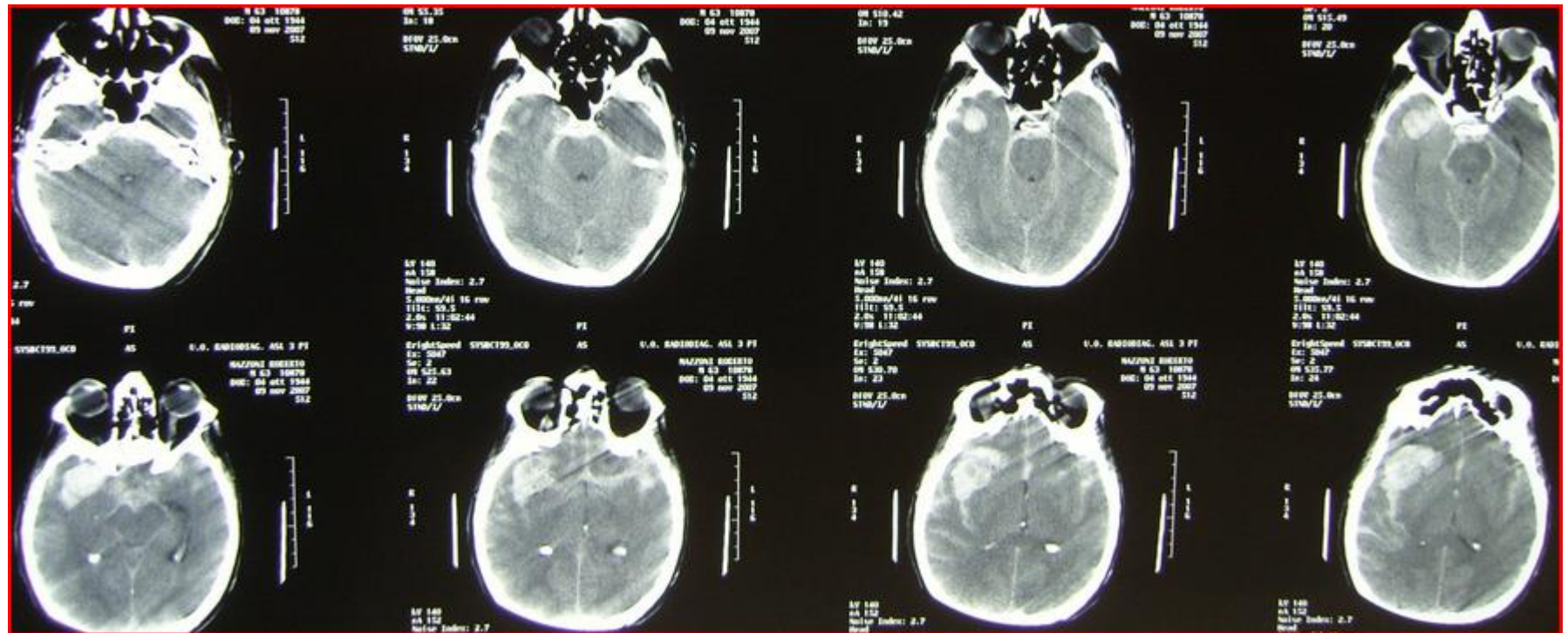
Ematoma cerebrale

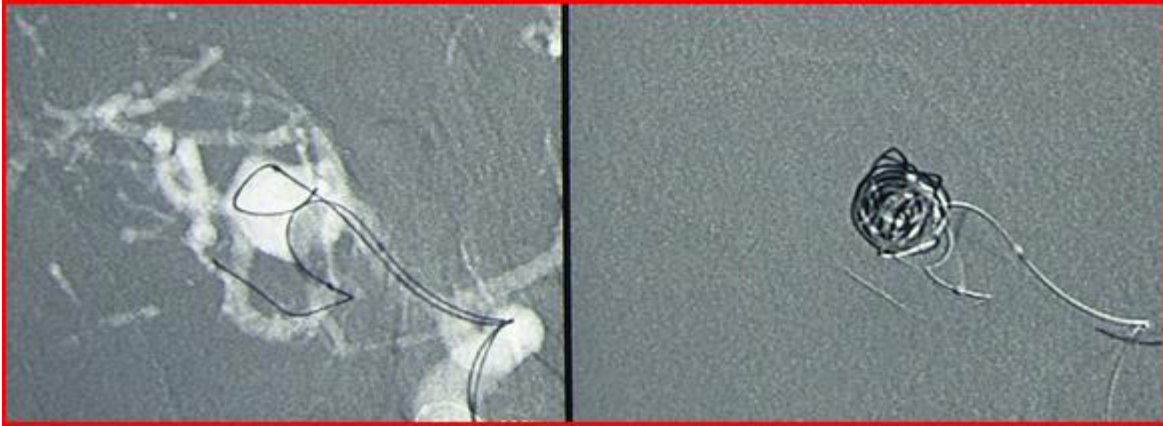
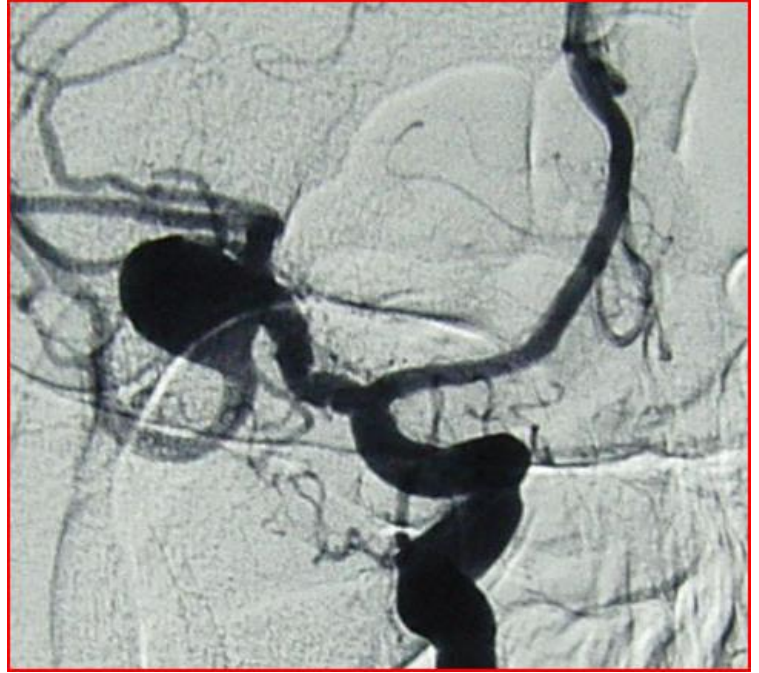
- Ematomi di piccole dimensioni
- Condizioni cliniche stabili
- Life threatening hematoma

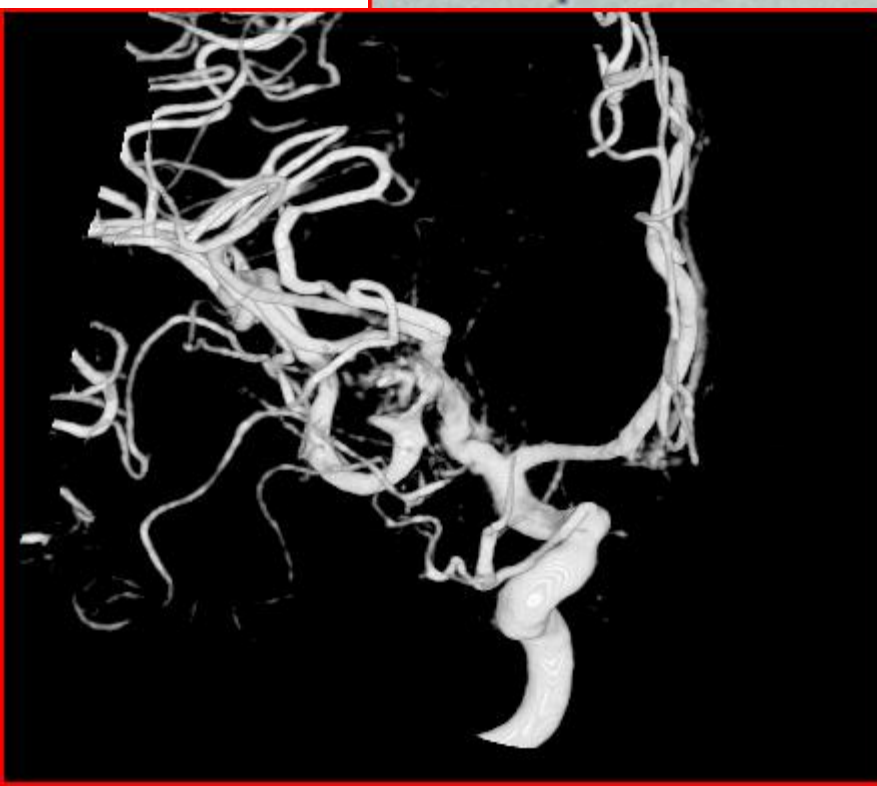


Vantaggio del trattamento endovascolare :

- Trattamento immediato (ultra early) contestuale alla fase diagnostica
- Chiusura dell' aneurisma in 1 ora dalla fine dell' esame angiografico
- (tempo del trasferimento , posizionamento e craniotomia)
- Intervento chirurgico facilitato rispetto alla evacuazione dell' ematoma + clipping di aneurisma
- Meno trauma sul cervello (teso ed edemigeno)







Vasospasmo cerebrale

A.M.



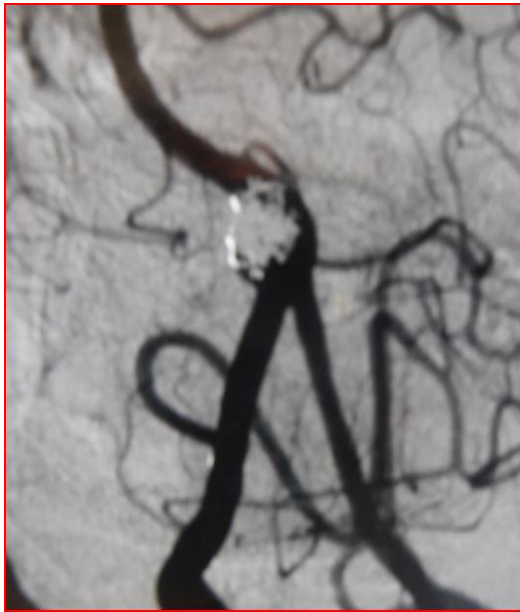
Pre-embolizzazione

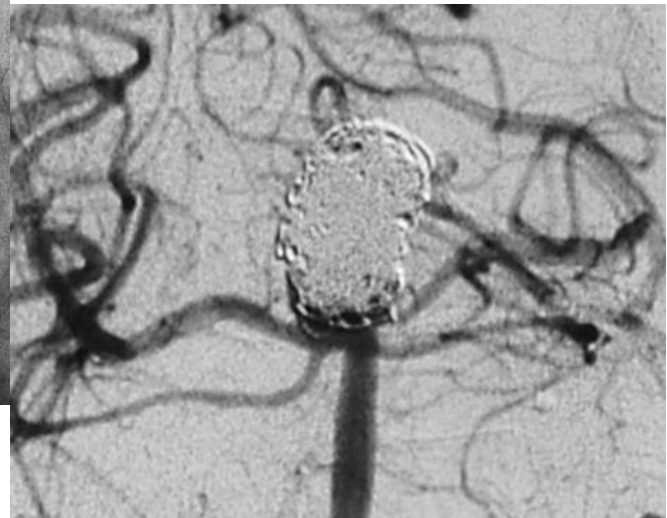
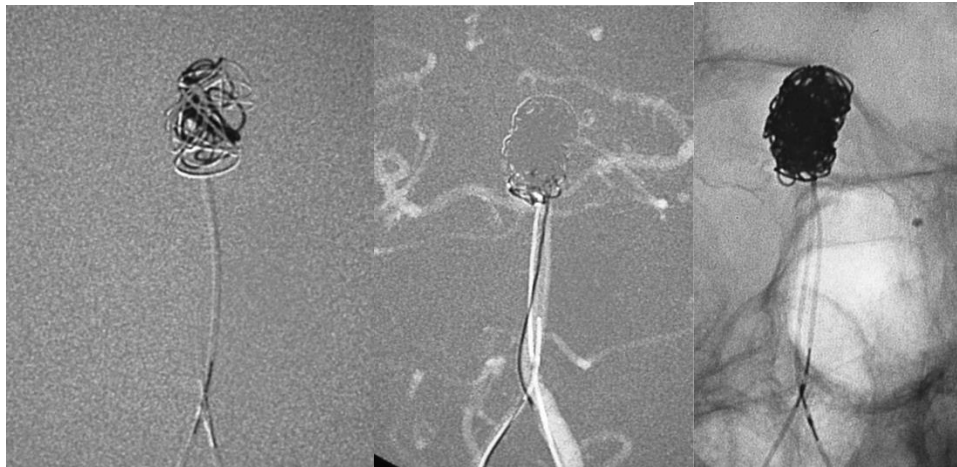
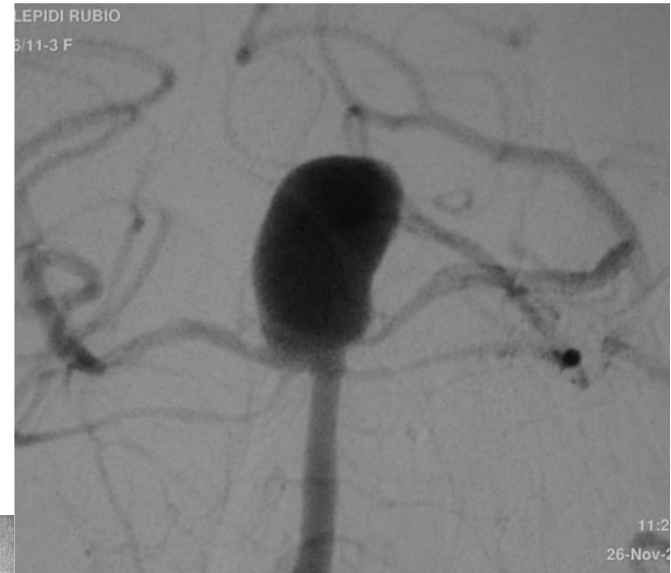
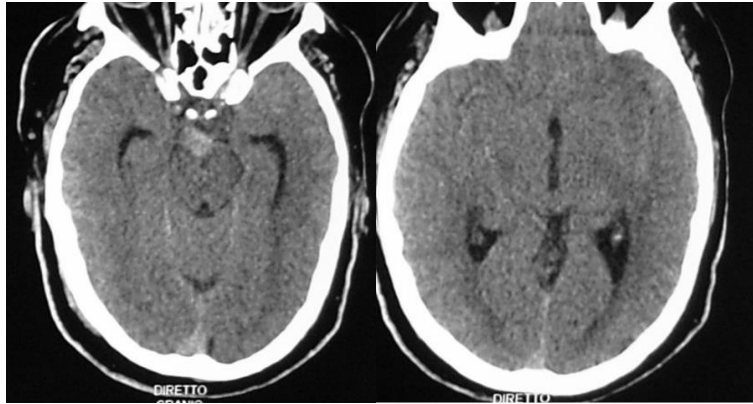


Post-embolizzazione
Post papaverina I.A.

- Aneurismi dell'apice basilare e dell'asse basilare

Gli aneurismi dell'asse basilare sono considerati
“ elettivamente endovascolari



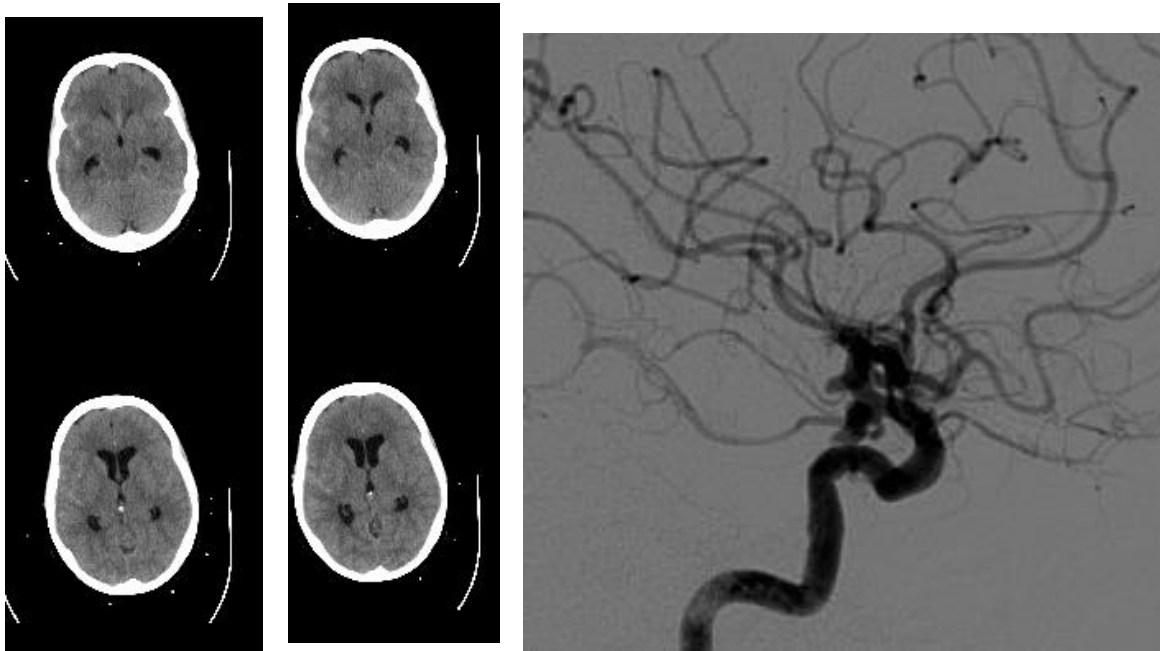


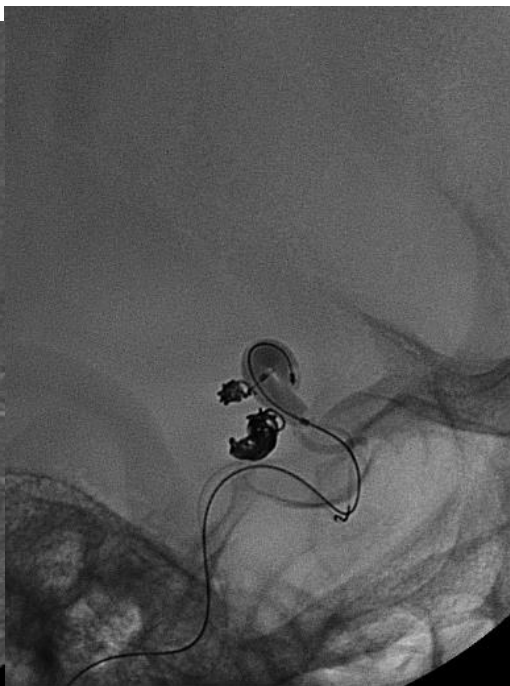
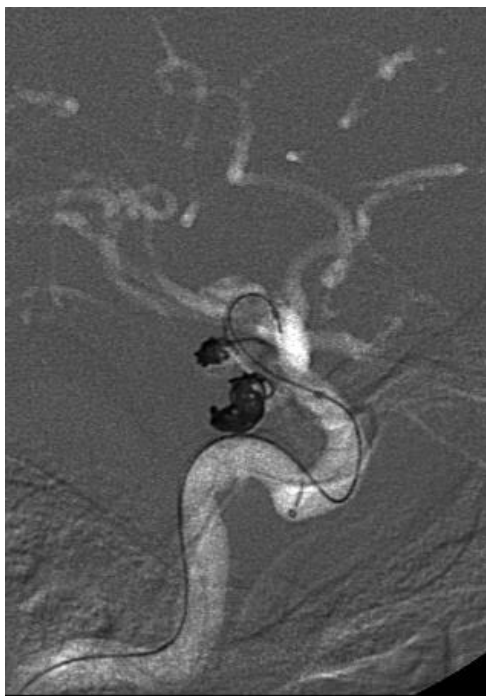
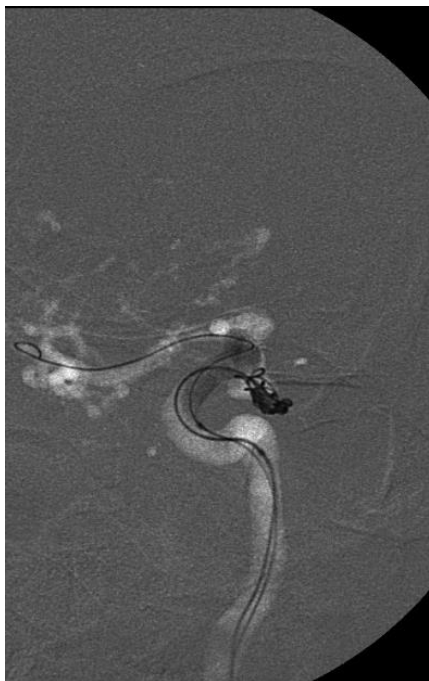
Aneurismi multipli

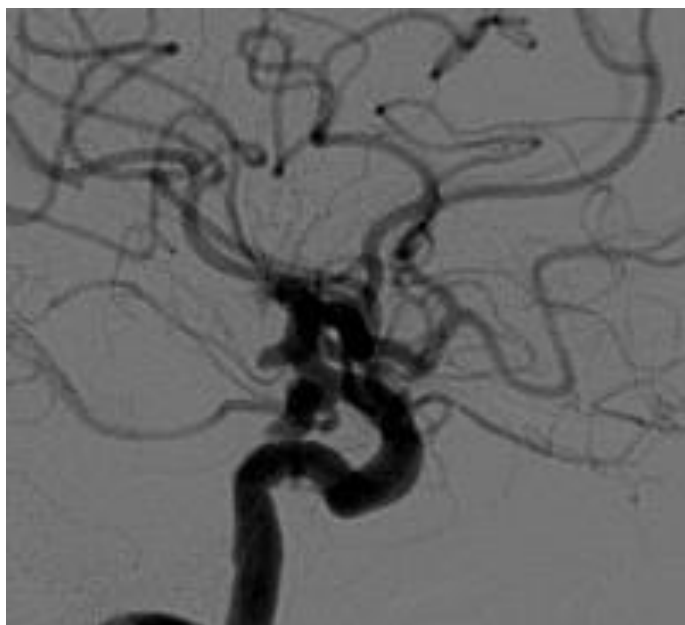
- Stesso Asse Vascolare
- Assi vascolari diversi
- aneurismi a grappolo)

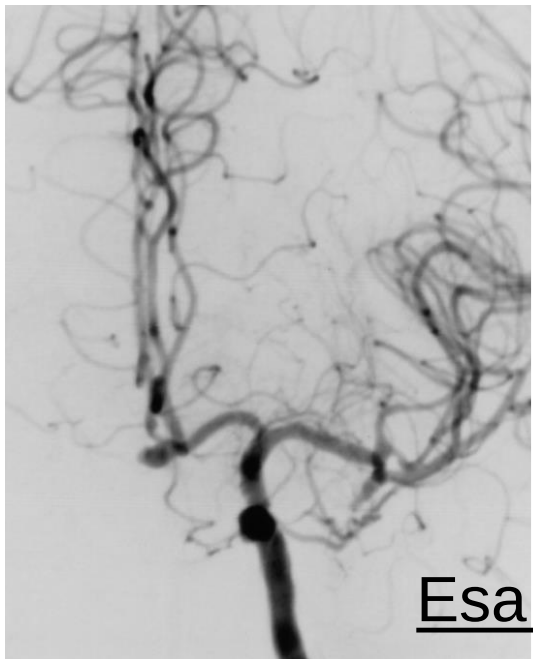
Stesso asse vascolare

- B.T.S 52 yo
- ESA FISCHER 2
- GCS 13

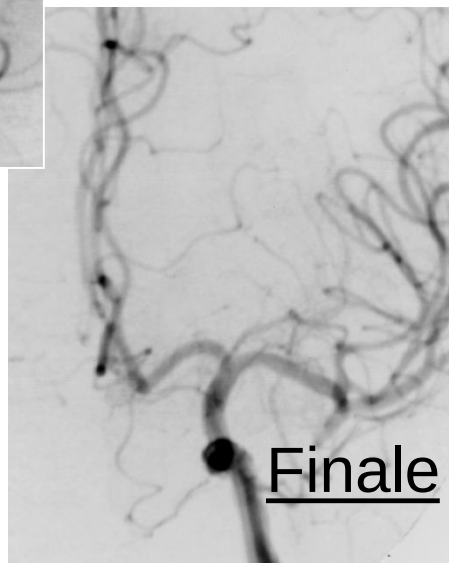
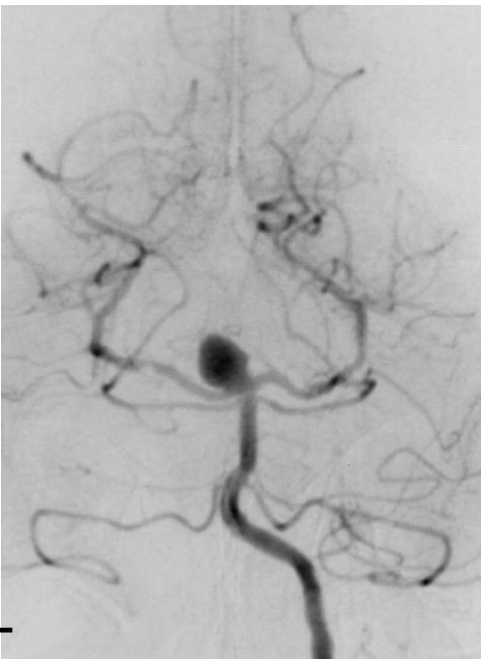




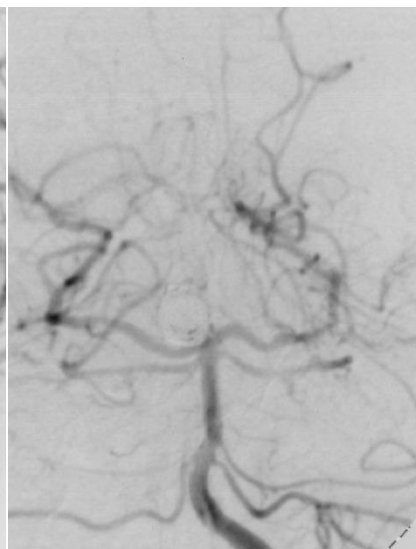




Esa



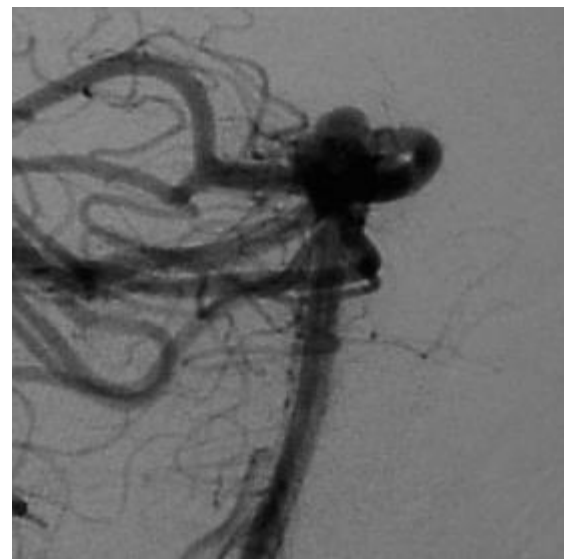
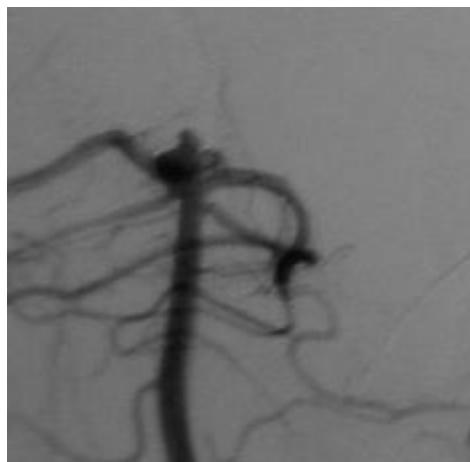
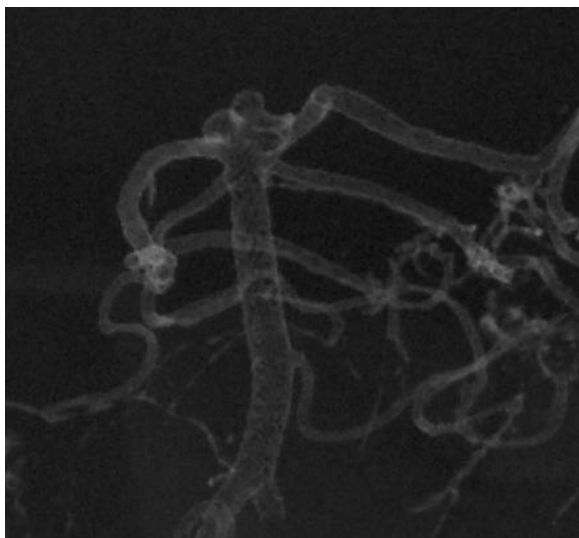
Finale

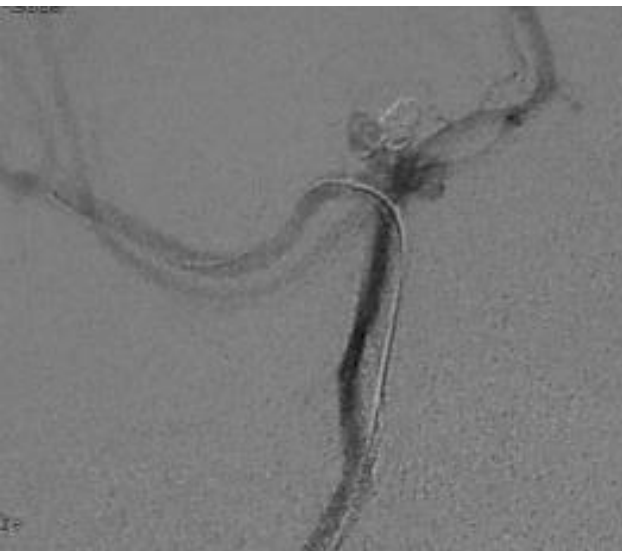
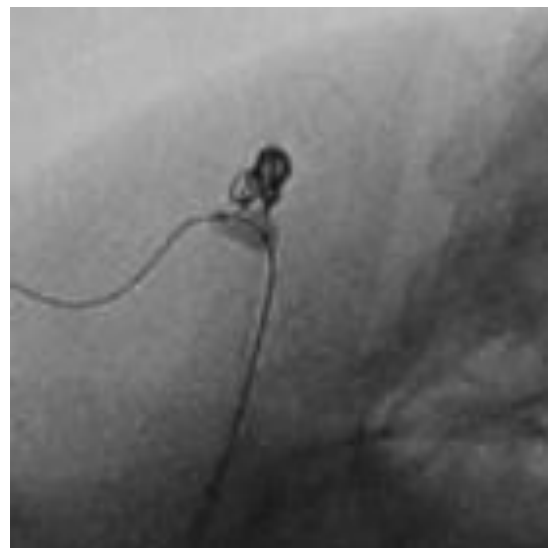
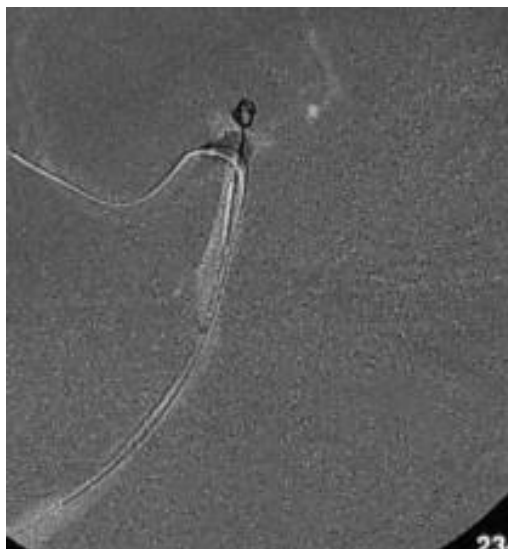
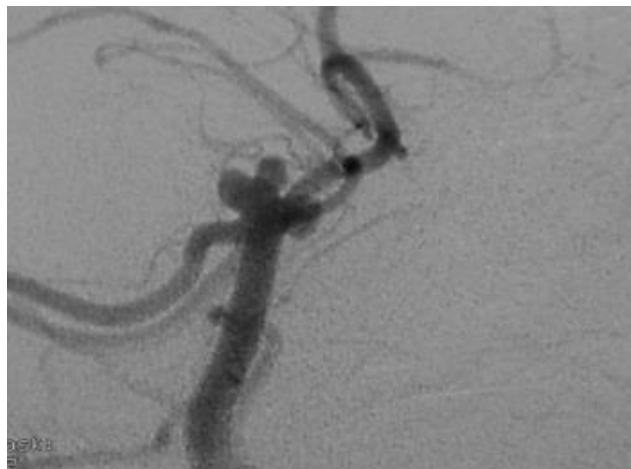


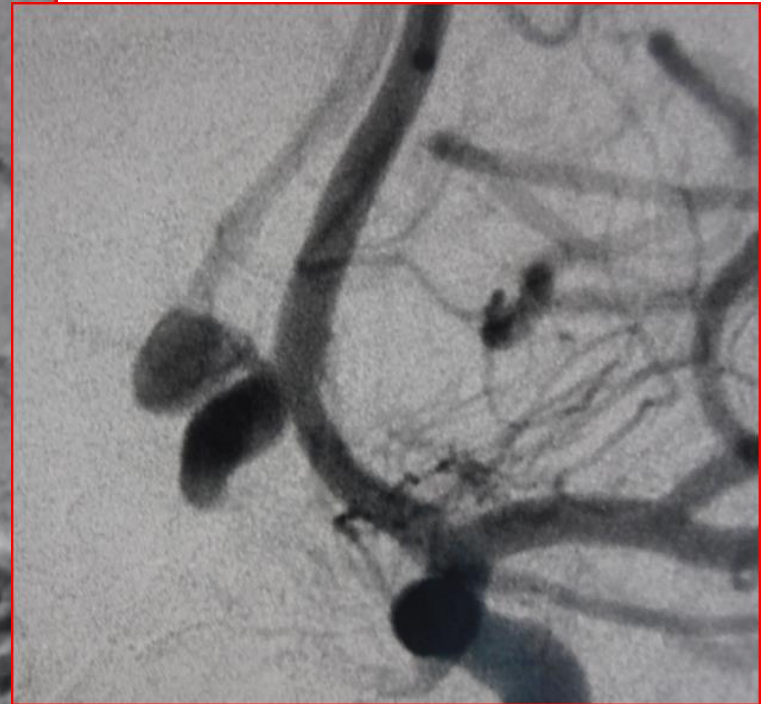
Aneurismi a grappolo



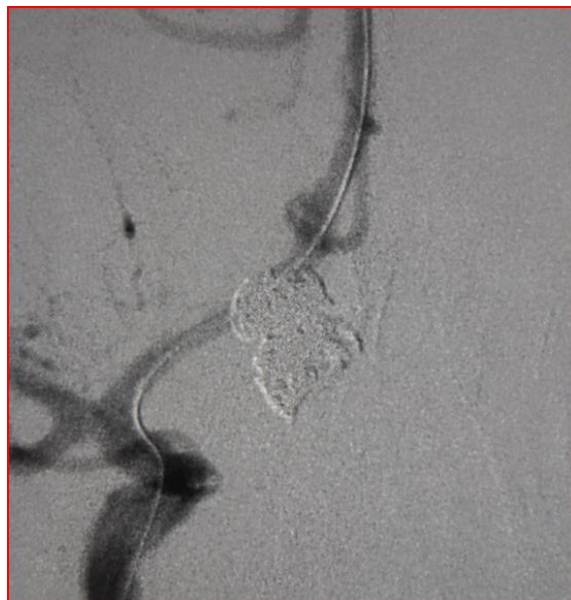
Esa, Fisher 2, HH2

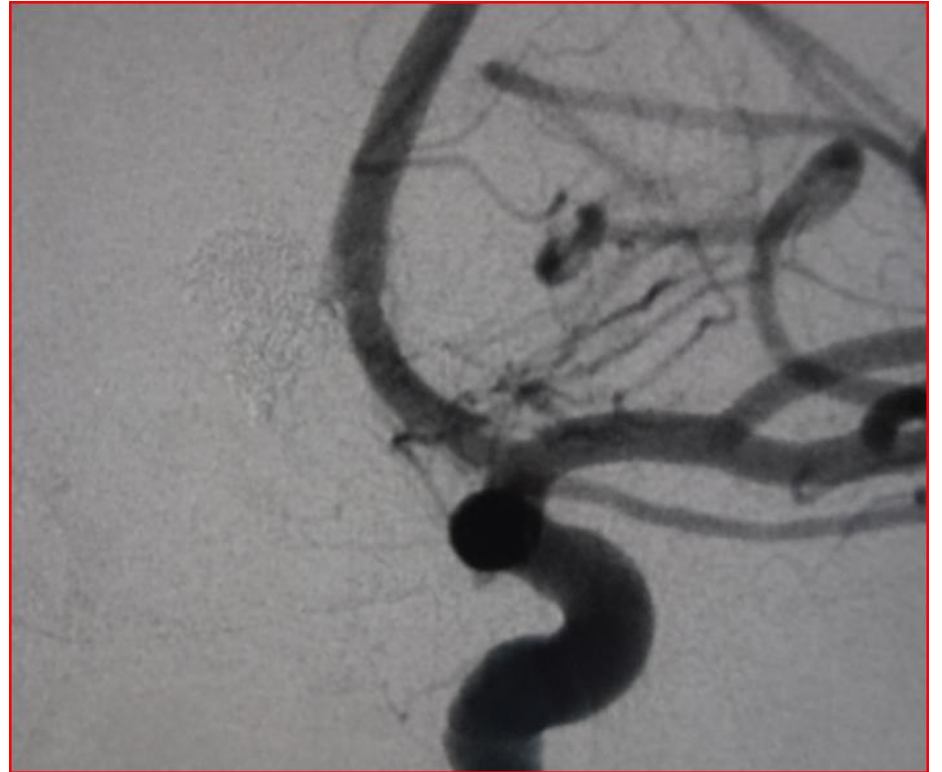
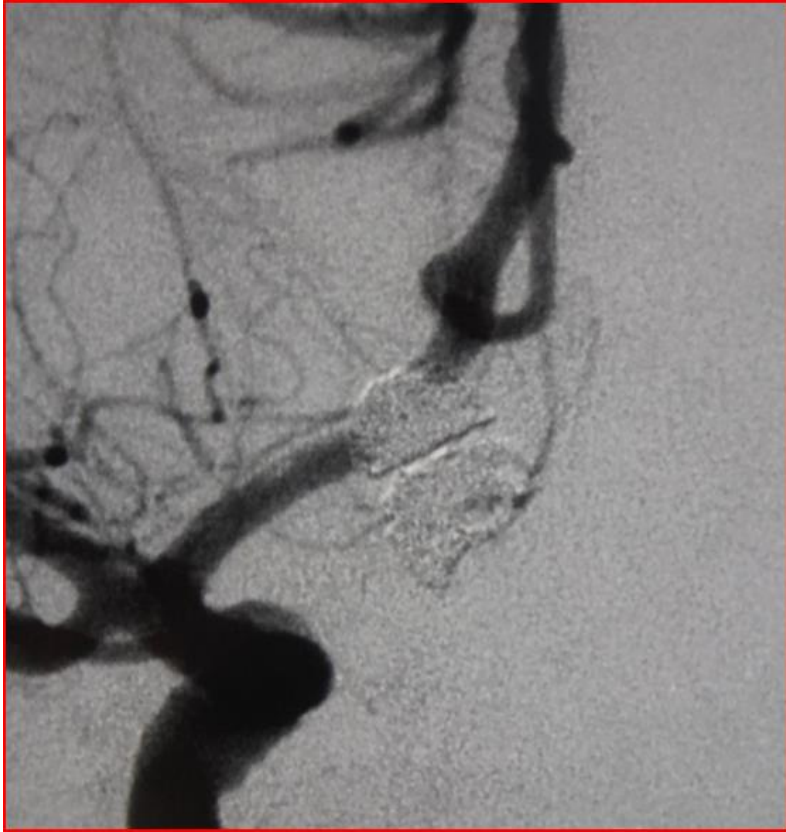






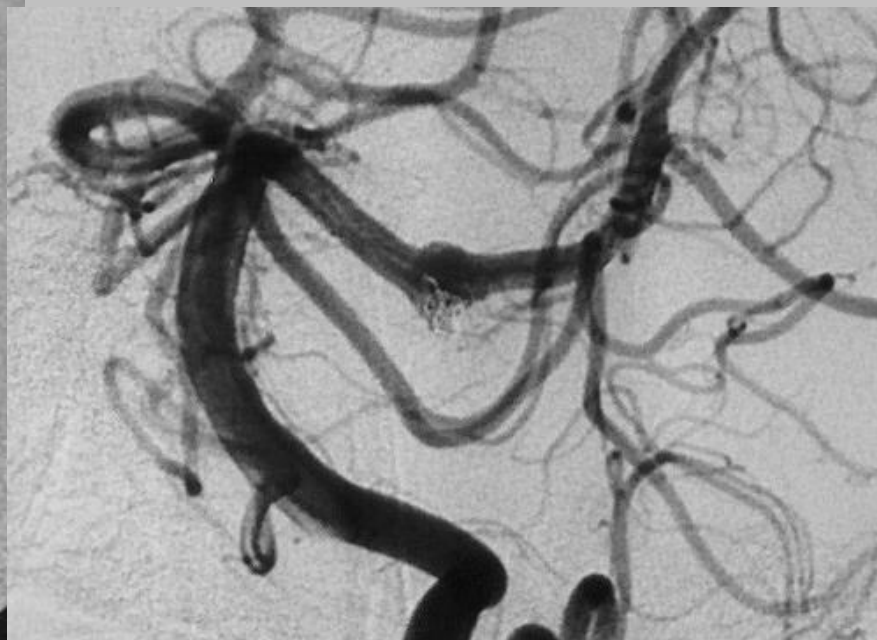
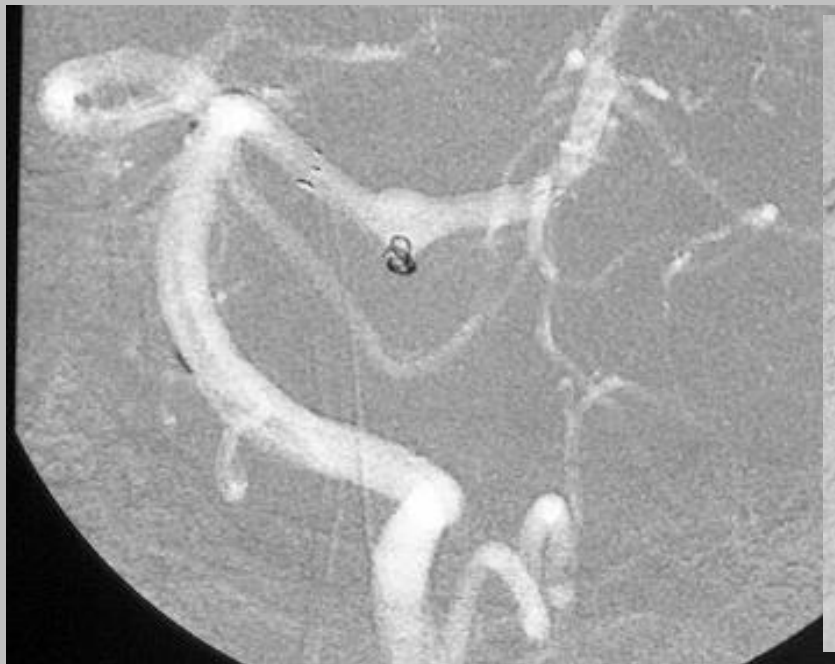
HH 4
iFisher 3



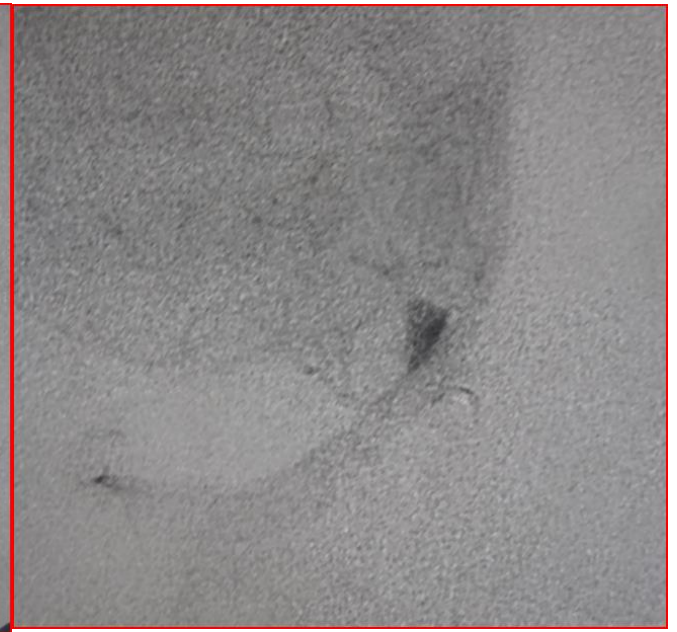
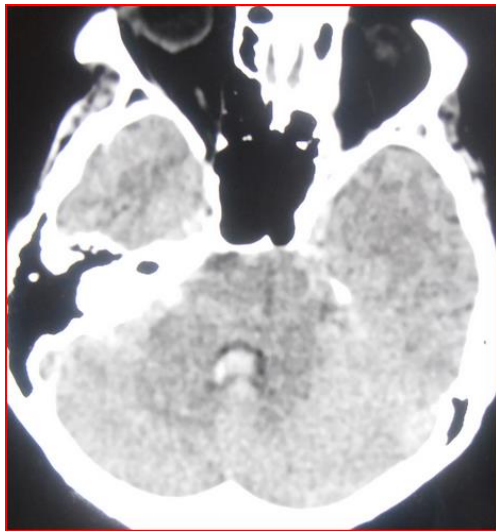


Aneurismi disseccanti e blister

- _stent e coil
- Flow diverter
-

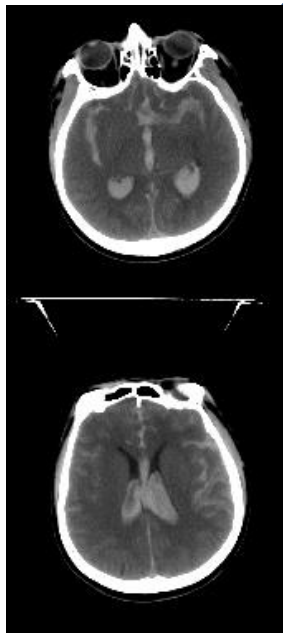


16.10.2014

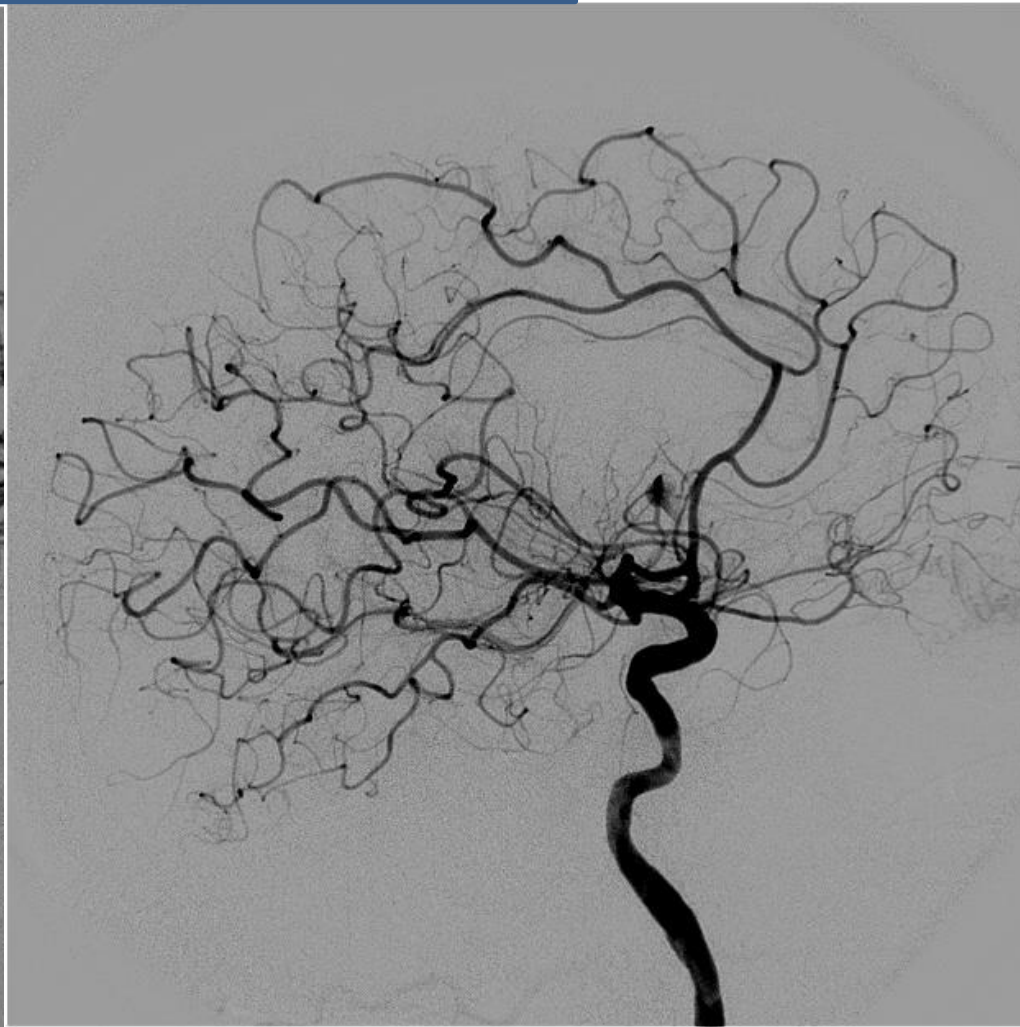


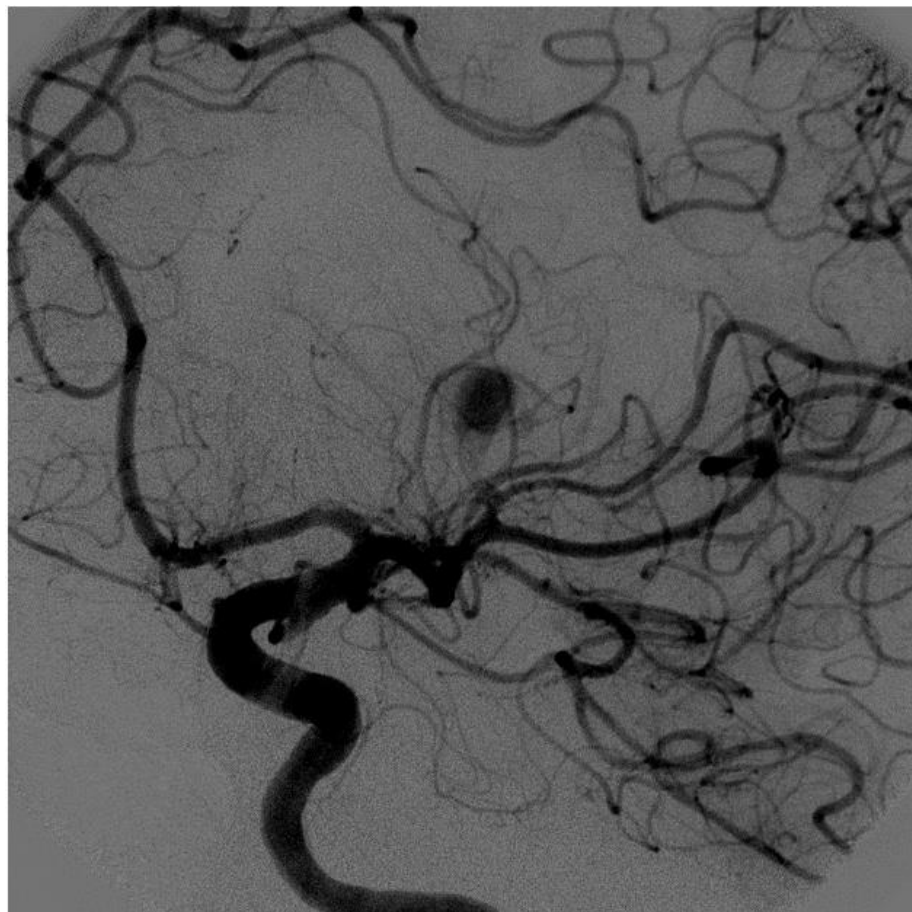
14.03.15



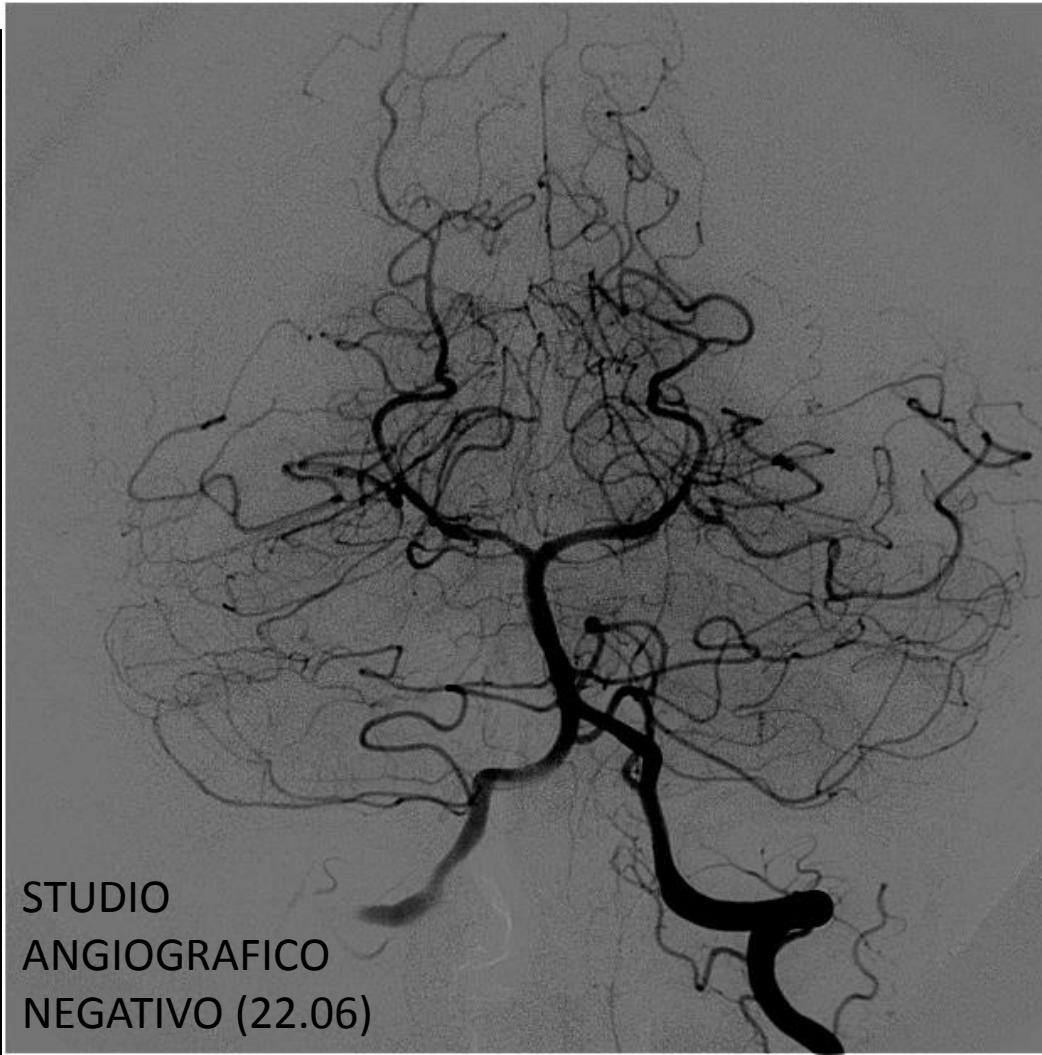


- M..S. 54 yo
- ESA FISCHER 4, HH5
- INSORGENZA IMPROVVISA EMIPLEGIA DESTRA
- GCS 6





- S..S. 67 yo
- ESA DELLE CISTERNE DELLA BASE
- GCS 15
- FUMATORE, IPERTESO





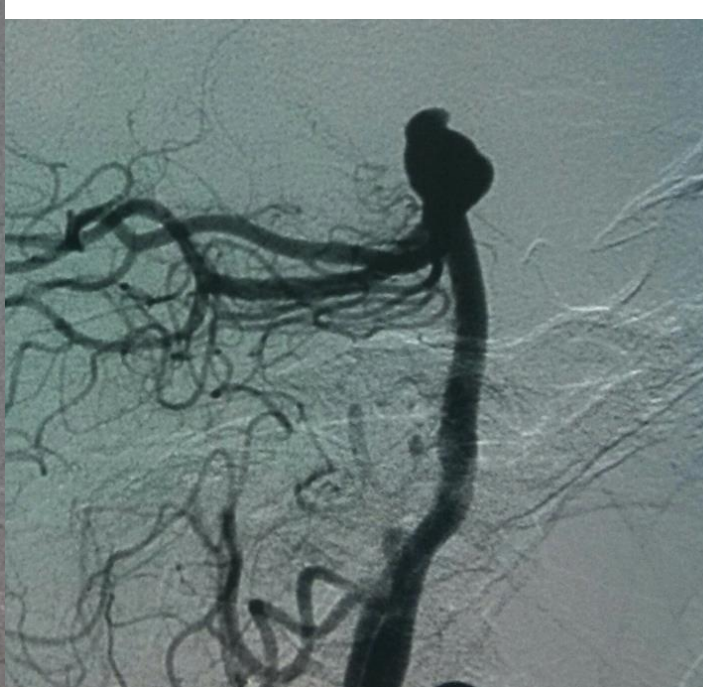
STUDIO ANGIOGRAFICO 14 giorni dopo (07.07)



@ 6 MESI

MASK 3
2

Nuovi device
nuovi problemi
(maggiore stabilità dell'occlusione ?)
(WEB)



Donna, 66 ann
HH2i



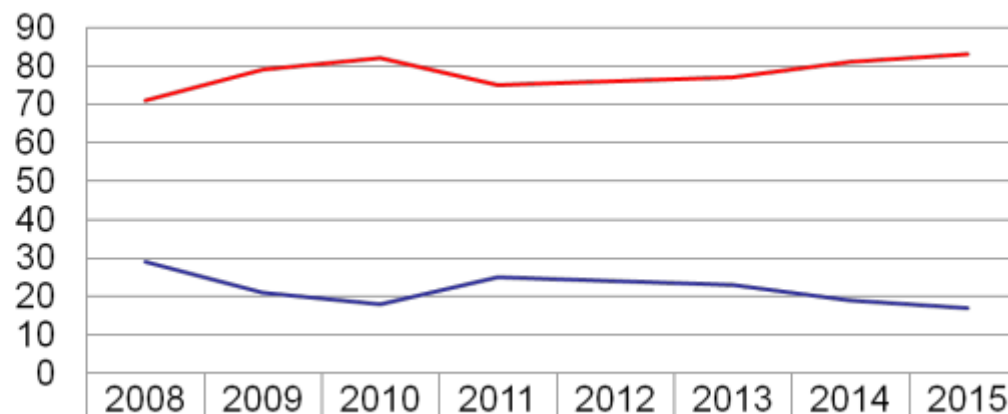
CONTROLLO A 1 MESE



la nostra esperienza



Azienda
Ospedaliero
Universitaria
Careggi



N° aneurismi **rotti**
trattati per via
endovascolare in
MEDIA 63/anno

N° aneurismi **rotti**
trattati
chirurgicamente in
MEDIA 18/anno



Traumatologia cranica
Aneurismi intracranici

NEURO UPDATE TORINO

9-10 marzo 2017



Aneurismi rotti: il parere del neuroradiologo Interventista

S. Mangiafico
Interventistica Neuro-Vascolare
AOU Careggi
Firenze