



Focus Neuroradiologico

# Aneurismi cerebrali

Incidenza, storia naturale e clinica



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# Aneurismi cerebrali

The evolution of imaging techniques and their increased use in clinical practice have led to a higher detection rate of unruptured intracranial aneurysms.

The diagnosis of an unruptured intracranial aneurysm is a source of significant stress to the patient.

# Aneurismi cerebrali

Intracranial saccular aneurysms are acquired vascular abnormalities that cause outpouching of the arterial wall.

They are often located at the bifurcation of the arteries of the Circle of Willis and less frequently in the posterior circulation.

# Incidenza

The prevalence of intracranial saccular aneurysms is 1-2% in healthy population and account for about 80-85% of non-traumatic subarachnoid hemorrhages.

Autopsy studies indicate prevalence in the adult population between 1% and 5%.

50% to 80% of all aneurysms do not rupture during the course of a person's lifetime.

# Incidenza

Of patients with cerebral aneurysms, 20 to 30% have multiple aneurysms.

Unruptured intracranial aneurysms are more common in women with a 3 : 1 ratio of women to men.

# Incidenza

**Intracranial saccular aneurysms are sporadically acquired lesions.**

**However,** a rare familial form has been associated with few clinical conditions:

- autosomal dominant polycystic kidney disease,
- Marfan's syndrome,
- Ehlers-Danlos syndrome type IV,
- fibromuscular dysplasia,
- moyamoya disease,
- sickle cell disease,
- arteriovenous malformations

# Incidenza

**Intracranial saccular aneurysms are sporadically acquired lesions.**

**However,** an important risk factor for aneurysm is a family history.

Patients with 1 affected family member have approximately a 4% risk of having an aneurysm, whereas patients with 2 or more affected first-degree family members have a 8%–10% risk of having an aneurysm.

# Incidenza

**Intracranial saccular aneurysms are sporadically acquired lesions.**

## **However**

Current guidelines recommend screening with intracranial MR-Angiography for people with two immediate relatives with intracranial aneurysms and for all patients with autosomal dominant polycystic kidney disease.



# Storia naturale

The modifiable factors that may increase the risk for aneurysmal SAH include:

- smoking,
- alcohol use,
- hypertension

Hypertension and smoking-induced vascular changes are involved in the process by which aneurysms form, grow, and rupture.

The most common histologic finding is a decrease in the tunica media causing structural defects.

# Storia naturale

Subarachnoid hemorrhage is more common in women than in men (2 : 1) with the peak incidence occurring in persons 50 to 60 years old.

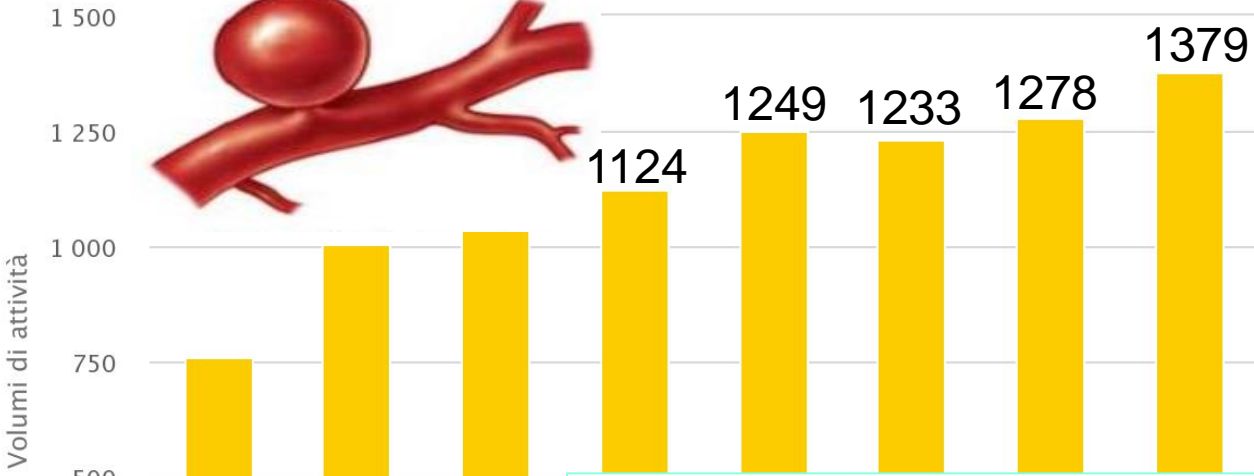
The fatality rate for SAH is 30%–40%, and as high as 3 in 5 of those who survive SAH may be functionally dependent.

Aneurysmal SAH occurs at an estimated rate of 6 to 8 per 100,000 population in Italy.

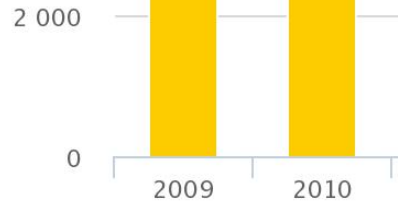
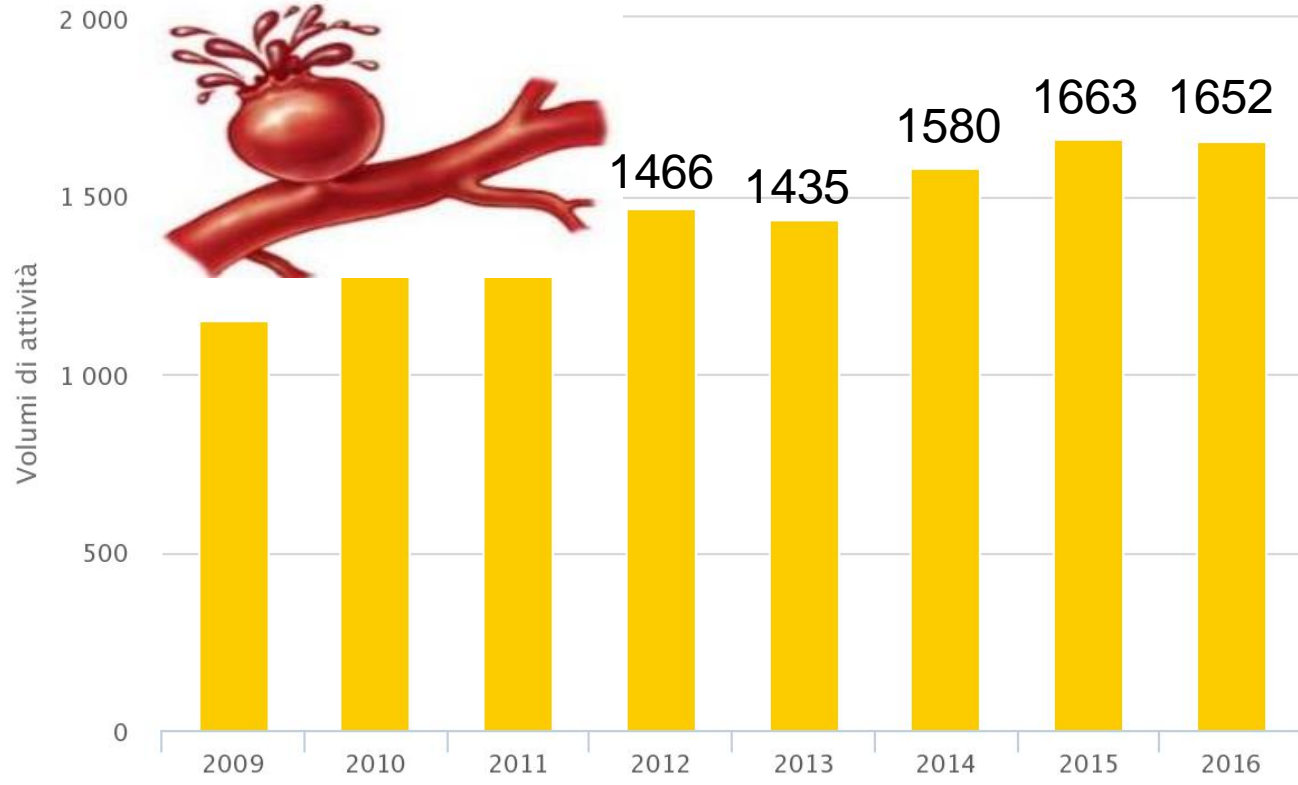
This translates into approximately 4,800 SAH per year. Thus, most aneurysm do not rupture.

## Aneurisma cerebrale NON rotto: volume di ricoveri

nica



## Aneurisma cerebrale rotto: volume di ricoveri



This translates in  
Thus, most aneu

## Incidenza, storia naturale e clinica

# Storia naturale

### Predictive factors:

- Patient related (age, clinical conditions, ...)
- Location
- Size
- Morphology

The risk of rupture increased with size, with significant increase for aneurysms 7 mm or larger.

Other risk factors for rupture included location on the anterior or posterior communicating artery and presence of a daughter sac.

# Storia naturale

**Findings from many retrospective studies have suggested that rupture risk is reduced in patients taking aspirin!**

Unclear if benefit of aspirin use in patients presenting with an unruptured intracranial aneurysm outweighs the potential risks.

# Storia naturale

## Aspirin!

In a study of 747 consecutive patients presenting at a single hospital, the rate of hemorrhage was higher among those not taking aspirin (40%) than among those taking aspirin (28%), overall morbidity and mortality outcome of those experiencing subarachnoid hemorrhage was not affected by aspirin use.

Brown RD, The Lancet Neurol. 2014

In an analysis of data from the ISUIA untreated cohort, patients who used aspirin most frequently had the lowest risk of aneurysm rupture during follow-up.

# Storia naturale

## Aspirin!

Neither long-term aspirin nor anticoagulant use were associated with differential mortality or complication rates after SAH.

Aspirin use was associated with a shorter hospital stay and lower rates of non-routine discharge.

# Storia naturale

## Anti-coagulants!

Little is known about the safety of long-term anticoagulation

42 patients with 48 aneurysms on anticoagulation.

The risk of aneurysm rupture is not increased in patients receiving systemic anticoagulation. However, these results should be interpreted with caution given the small sample size in this study and the need for a prospective study to confirm these findings.



# Storia naturale

**ISUIA did not show that a family history was predictive of hemorrhage in a regression analysis.**

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The rupture rate in this cohort (548 pts) was 17 times higher than that for patients with an unruptured intracranial aneurysm in ISUIA after matching for aneurysm size and location. However, the small number of ruptures and large 95% CI precluded definitive conclusions.

# Storia naturale

## Rerupture risk

Aneurysms presenting with subarachnoid hemorrhage tend to bleed again at a rate of 9% within the first 72 hours after the initial episode.

## Worning leak

Therefore, patients with known intracranial aneurysms presenting with cranial-nerve palsies or brain-stem dysfunction should be evaluated and treated promptly because of the increased risk of rupture.

# Storia naturale

## Criteri

### Morfologici

- Sede
- Diametri
- Forma
- Proiezione
- AR
- SR
- Fluido-dinamica
- Genetica
- .....

### Clinici

- Sintomatici
- Asintomatici
- Precedente trattamento
- MAV
- Multipli
- Precedente ESA
- Terapie concomitanti
- Patologie concomitanti
- .....

Incidenza, storia naturale e clinica

# Storia naturale

## PHASE score

Predictors selected based on a systematic review of and pooled analysis from 8382 participants in 6 prospective cohort studies with subarachnoid hemorrhage as outcome.

## UIAT score

An international multidisciplinary (neurosurgery, neuroradiology, neurology, clinical epidemiology) group of 69 specialists developed and validated the UIATS model using a Delphi consensus. It's based on 5 points Lickert scale.

# An

## PHASES aneurysm risk score

### (P) Population

- North American, European (other than Japanese)
- Finnish

### (H) Hypertension

- No
- Yes

### (A) Age

- <70 years
- ≥70 years

### (S) Size of aneurysm

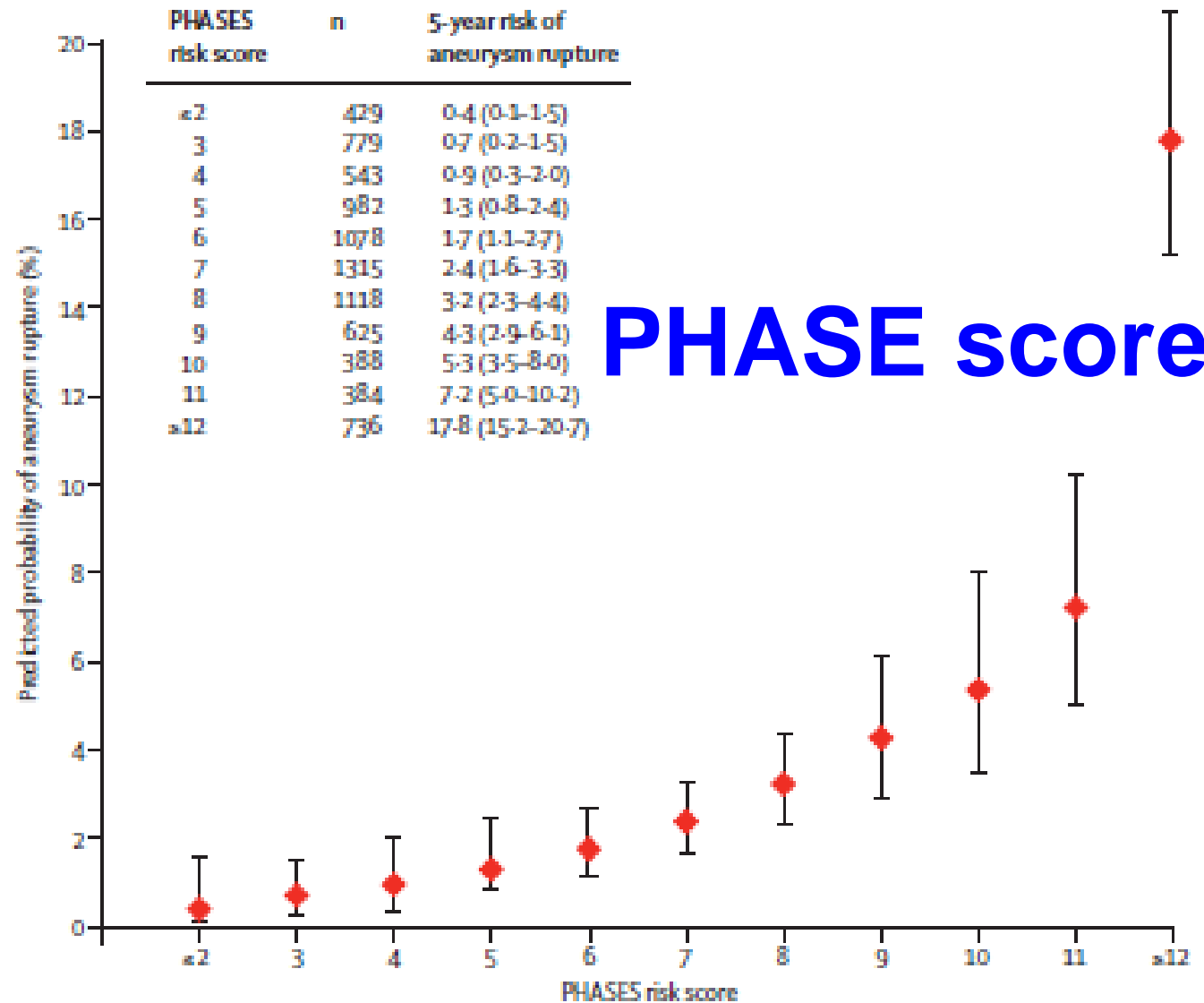
- <7.0 mm
- 7.0-9.9 mm
- 10.0-19.9 mm
- ≥20 mm

### (E) Earlier SAH from another aneurysm

- No
- Yes

### (S) Site of aneurysm

- ICA 0
- MCA 2
- ACA/Pcom/posterior 4





# Aneurismi non rotti

Meno di 65 aa



Più di 70 aa

## Aneur. inf. a 7 mm

- Osserv. in assenza di fatt. rischio + controllo PA e no fumo;
- Coil<sup>+</sup>/Clip: in caso di storia di ESA, sintomi, lobatura, sede Pcom e ACA

## Aneur. inf. a 7 mm

- Osserv. in assenza di fatt. rischio + controllo PA e no fumo;
- Coil<sup>+</sup>/Clip: in caso di storia di ESA, sintomi, lobatura, sede Pcom e ACA

## Aneur. magg. a 7 mm

- Coil o Clip in base a sede, morfologia e comorbidità

## Aneur. 7 – 12 mm

- Circ. anter: osserv. in assenza di fatt. rischio, controllo PA e no fumo
- Circ. post.: Coil<sup>+</sup>/Clip in base a sede, morfologia e comorbidità

## Aneur. magg. a 12 mm

- Coil o Clip in base a sede, morfologia e comorbidità

# Clinica

Incidental findings for complaints unrelated to the aneurysm or detected for related symptoms.

## Compressions:

MCA: hemiparesis, visual field defect, or seizure,

Post.Com-Basilar: third cranial nerve palsy, brainstem compr.

Cavernous sinus: cavernous sinus syndrome;

Other cranial nerves can be involved, including trochlear and abducens nerves and the first division of the trigeminal nerve.

**Embolus** from the aneurysmal sac causing transient ischemic attack or cerebral infarction.

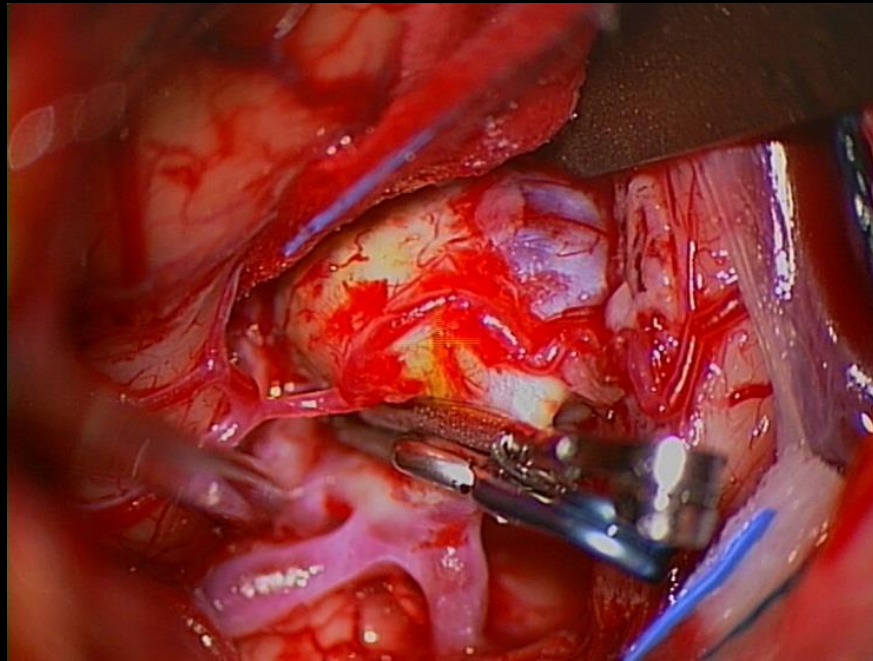


# Aneurismi

- Dimensioni
- Sede
- Morfologia
- ...



**Non tutti gli  
aneurismi sono  
uguali!**



Additional miscellaneous aneurysm locations not shown: 3.5%

# Aneurismi intracranici

## 1. Sacciformi (berry aneurysm)

- Degenerativi e “congeniti”
- Post-traumatici
- Microbici - Oncotici – Drug-related
- Flow-related (MAV)
- Associati a vasculopatie

## 2. Fusiformi / dolico-ectasici

## 3. Dissettivi

Pericallosal artery, 4%

Anterior communicating artery, 30%

Internal carotid artery bifurcation, 7.5%

Middle cerebral artery, 20%

Posterior communicating artery, 25%

Basilar bp, 7%

Posterior inferior cerebellar artery, 3%

**Incidenza, storia naturale e clinica**

# Storia naturale

- **Trattamento**
- **Follow-up**
- **Oblio**

**sotto il tasso di storia naturale**

**risoluzione del problema**

# Aneurismi non rotti

***E' accettabile eseguire l'occlusione di un aneurisma non rotto/incidentale se si ha un tasso di complicanze inferiore alla storia naturale!***

## **Long-term follow-up of unruptured intracranial aneurysms repaired in California**

944 cases (36.5%) were treated with endovascular coiling, 1565 cases (60.5%) were surgically clipped, 76 both.

Perioperative (30-day) mortality was 1.1% in patients with coiled aneurysms compared with 2.3% in those with clipped aneurysms ( $p = 0.048$ ).

# Aneurismi non rotti

## Long-term follow-up of unruptured intracranial aneurysms repaired in California

944 cases (36.5%) were treated with endovascular coiling, 1565 cases (60.5%) were surgically clipped, 76 both. median follow-up was 7 years (range 4-12 years).

- At the last follow-up, 153 patients (16.2%) in the coiled group had died compared with 244 (15.6%) in the clipped group ( $p = 0.693$ ).
- The incidence of intracranial hemorrhage was similar in the two treatment groups (5.9% clipped vs 4.8% coiled,  $p = 0.276$ ).
- 193 patients (20.4%) with coiled aneurysms underwent additional hospitalizations for aneurysm repair procedures compared with only 136 patients (8.7%) with clipped aneurysms ( $p < 0.001$ ).
- Cumulative hospital costs per patient for admissions involving aneurysm repair procedures were greater in the clipped group (median cost \$98,260 vs \$81,620,  $p < 0.001$ ) through the follow-up.

Incidenza, storia naturale e clinica

# Storia naturale

## ISUIA

Probabilità di rottura a 5 anni (storia naturale)

	<7mm		7-12mm	13-24mm	>25mm
<b>Cavernosi</b>	0%	0%	0%	3%	6.4%
<b>IC/AC/MC</b>	0%	1.5%	2.6%	14.5%	49%
<b>Poster./P.Com</b>	2.5%	3.4%	14.5%	18.4%	50%

Diagnosi eseguita nel periodo 1991 – 1998, età media 55 anni, follow up medio 4.5 anni

**Incidenza, storia naturale e clinica**

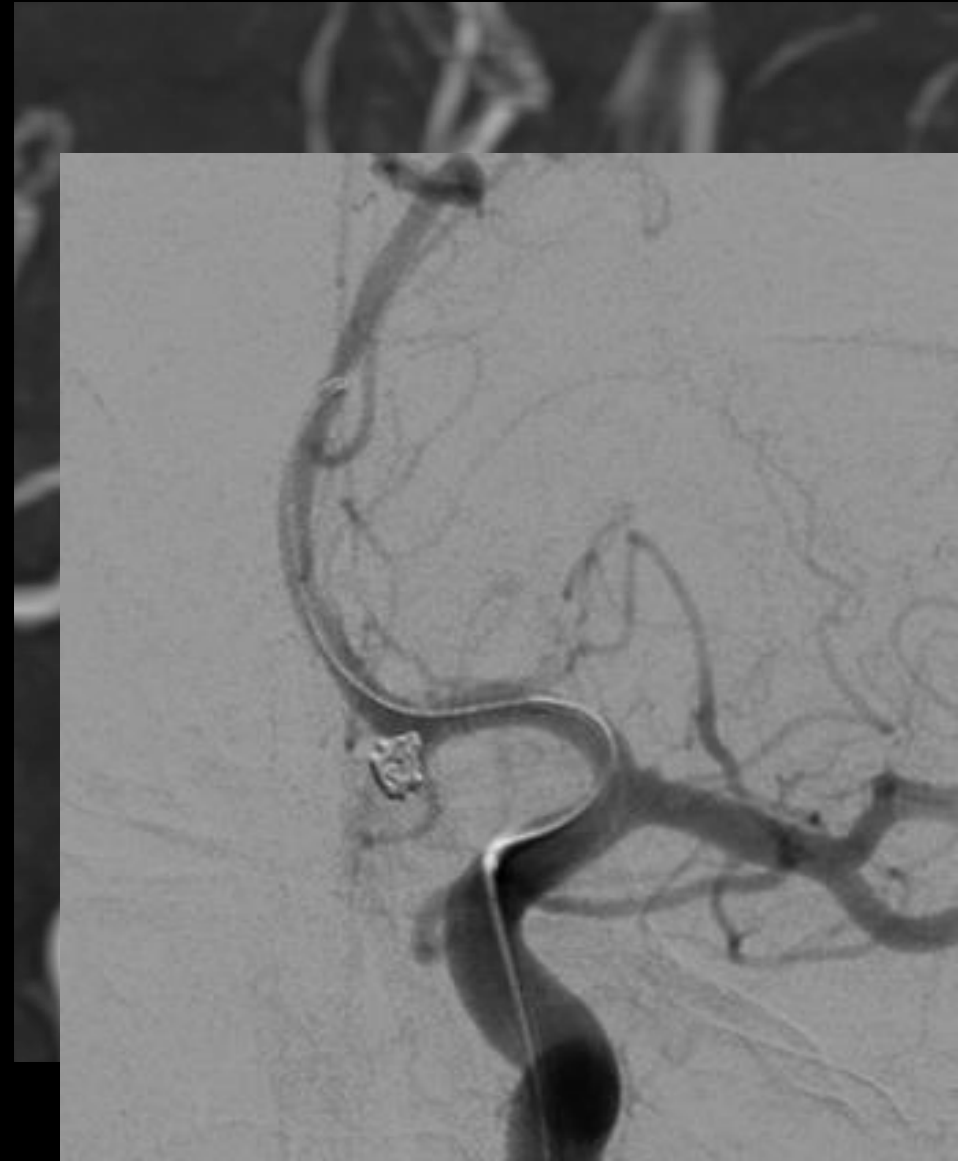
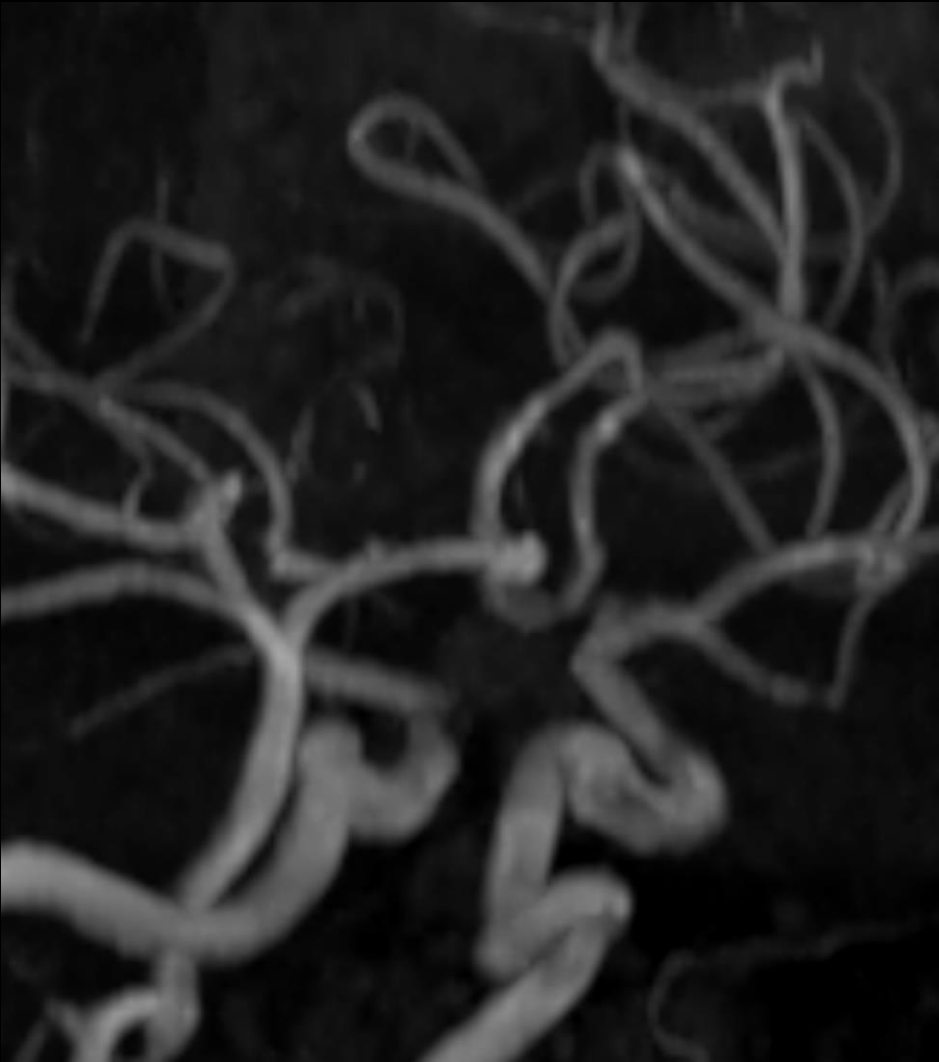
# **Aneurismi non rotti**

## **Discriminanti**

- **Paziente (età, ...fattore U)**
- **Dimensione**
- **Sede / anatomia**
- **Forma**
- **Tecnica/Esperienza**

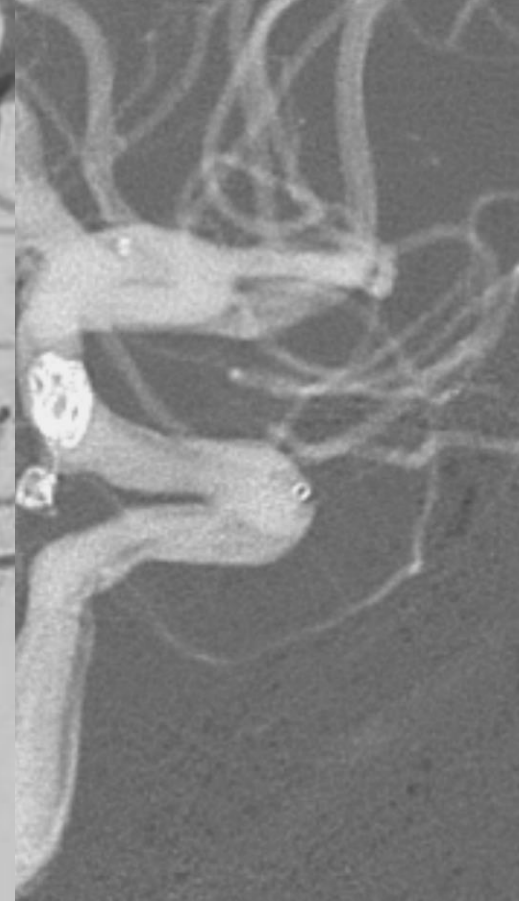
Incidenza, storia naturale e clinica

# Aneurismi non rotti





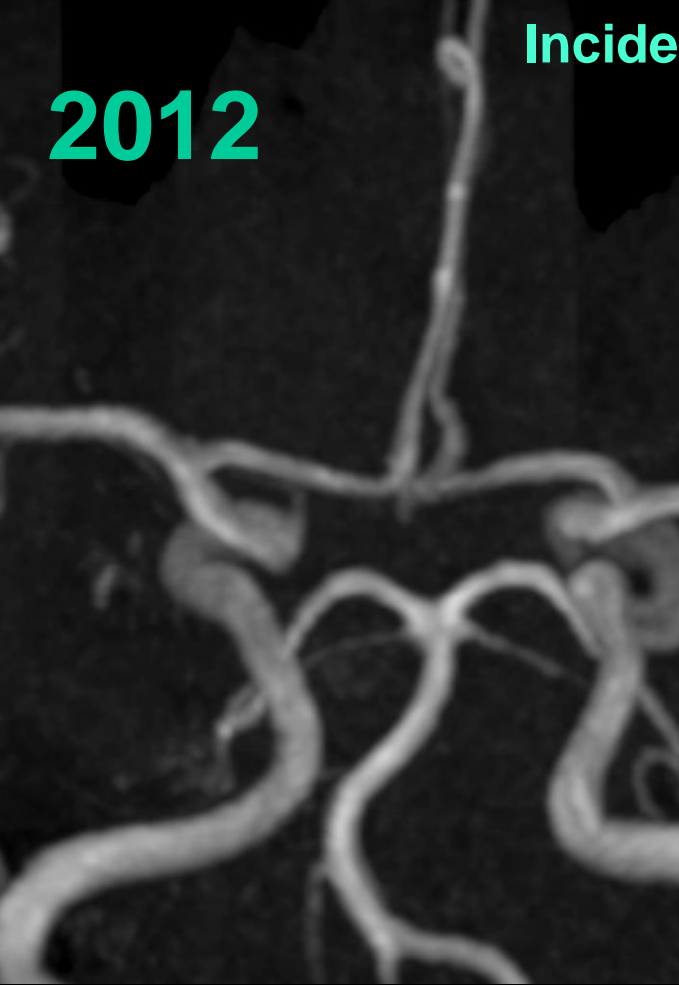
# Incidenza, storia naturale e clinica



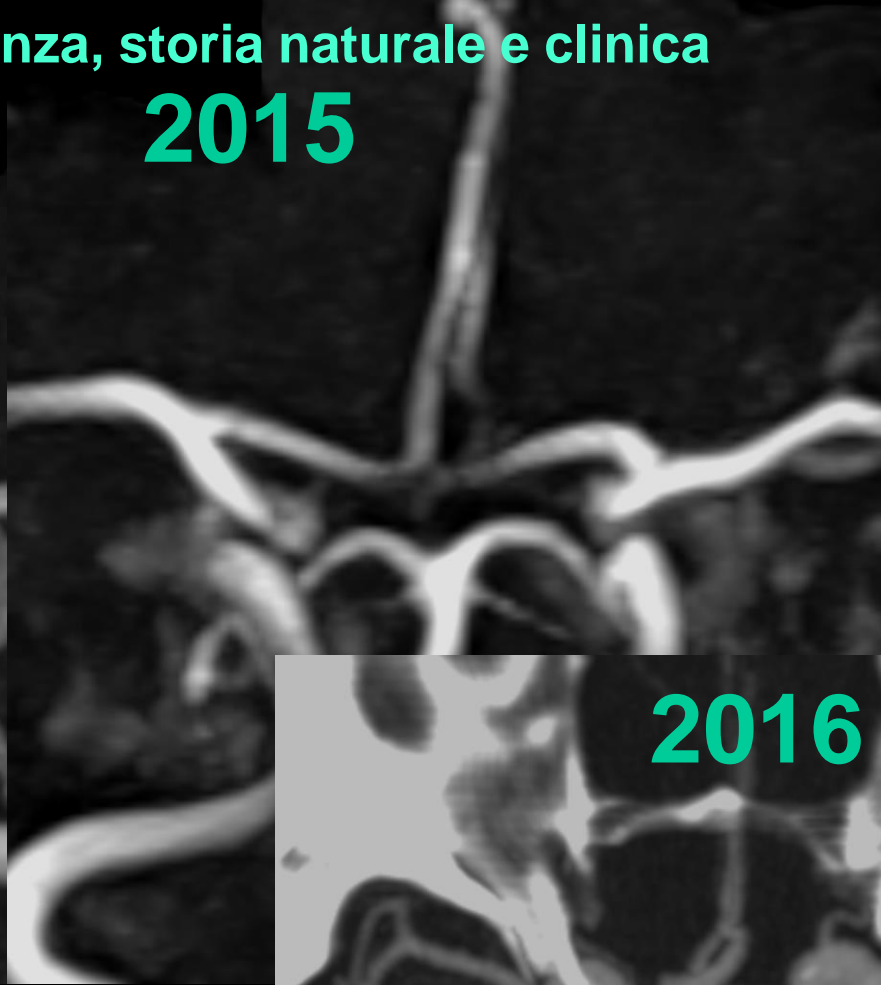
S.G. 68 aa

**Incidenza, storia naturale e clinica**

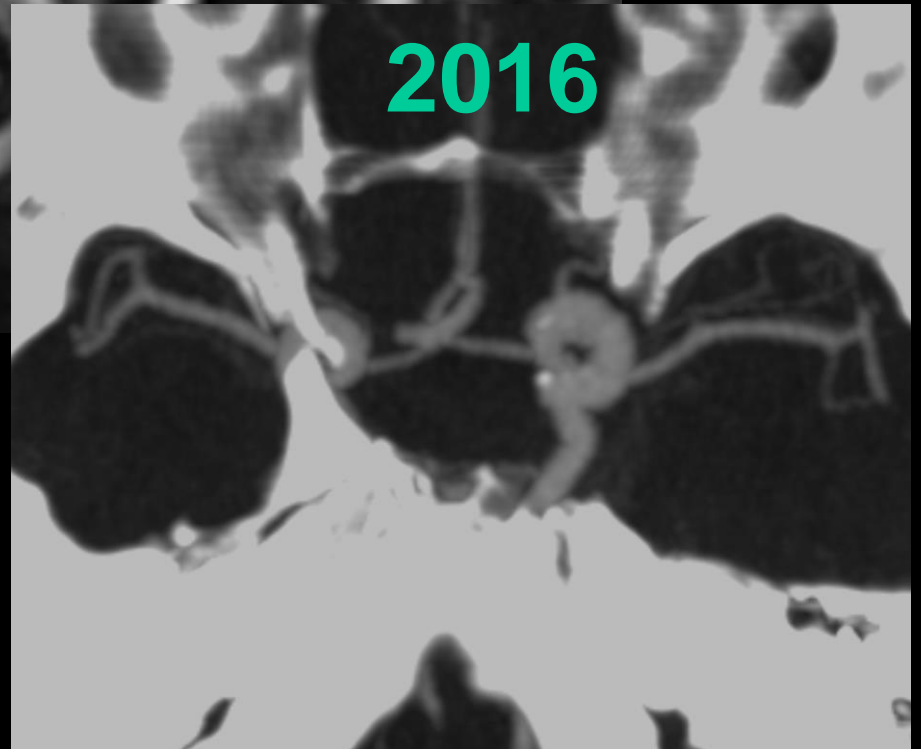
**2012**



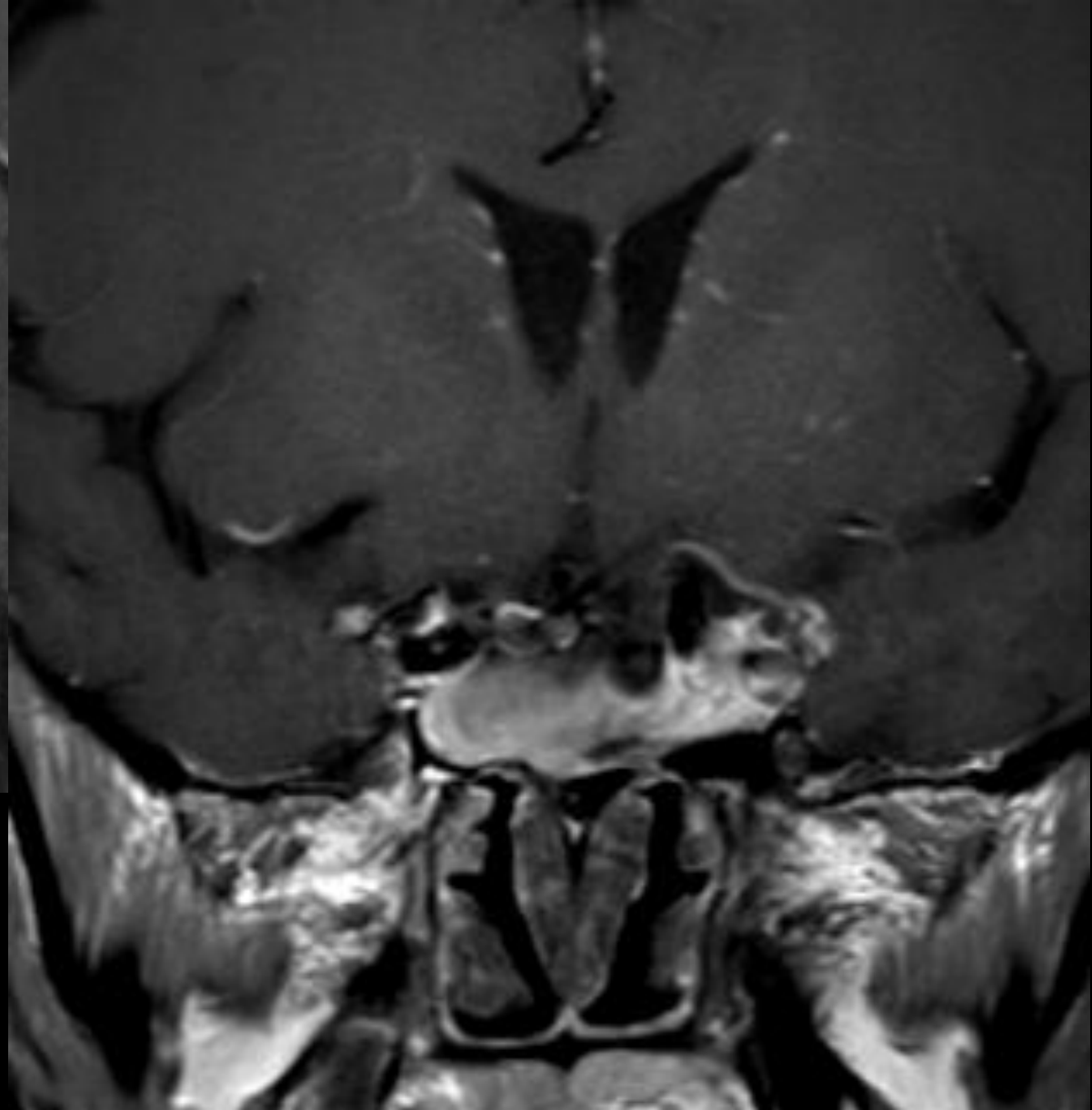
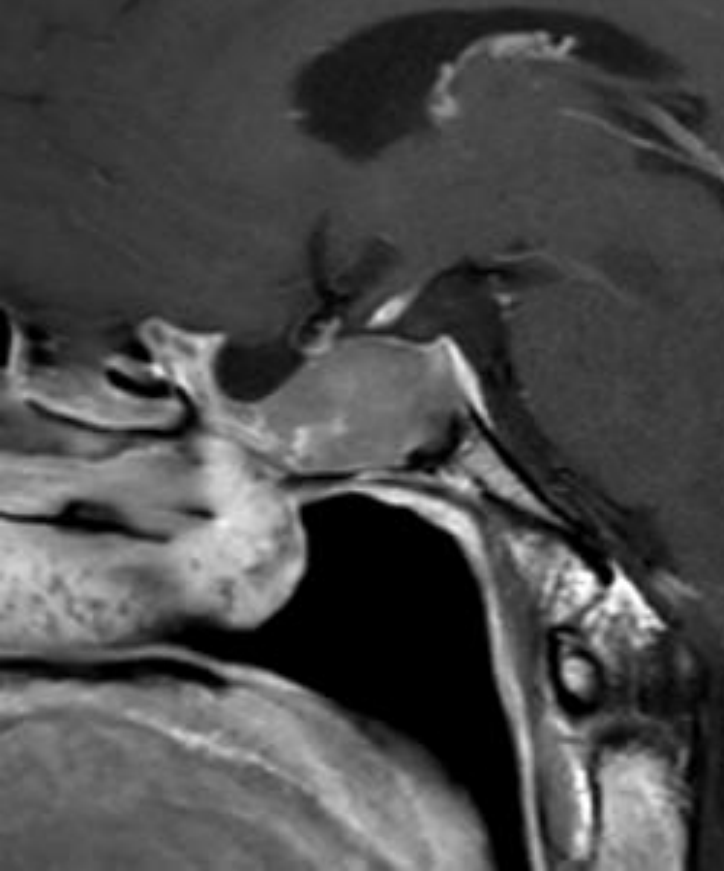
**2015**



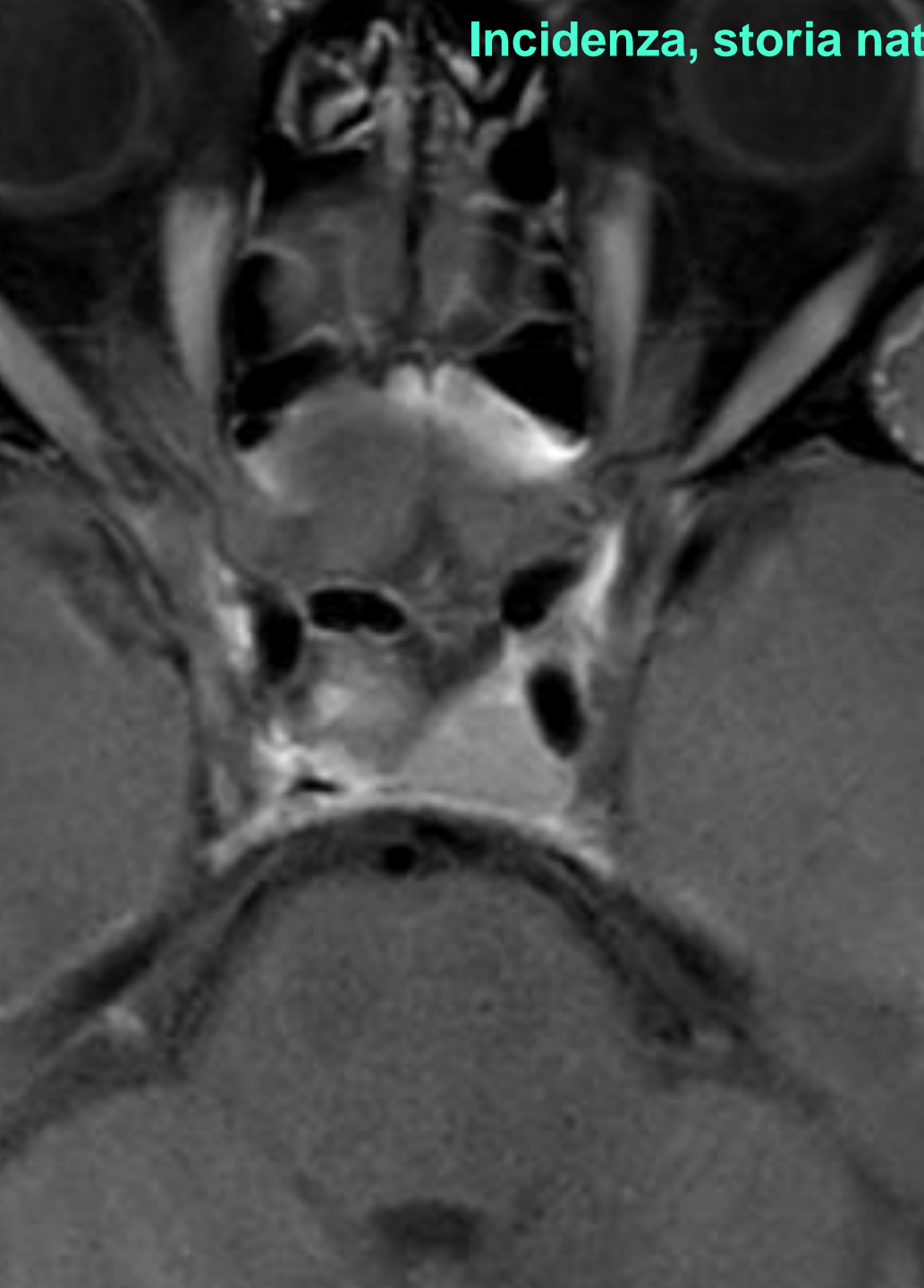
**2016**



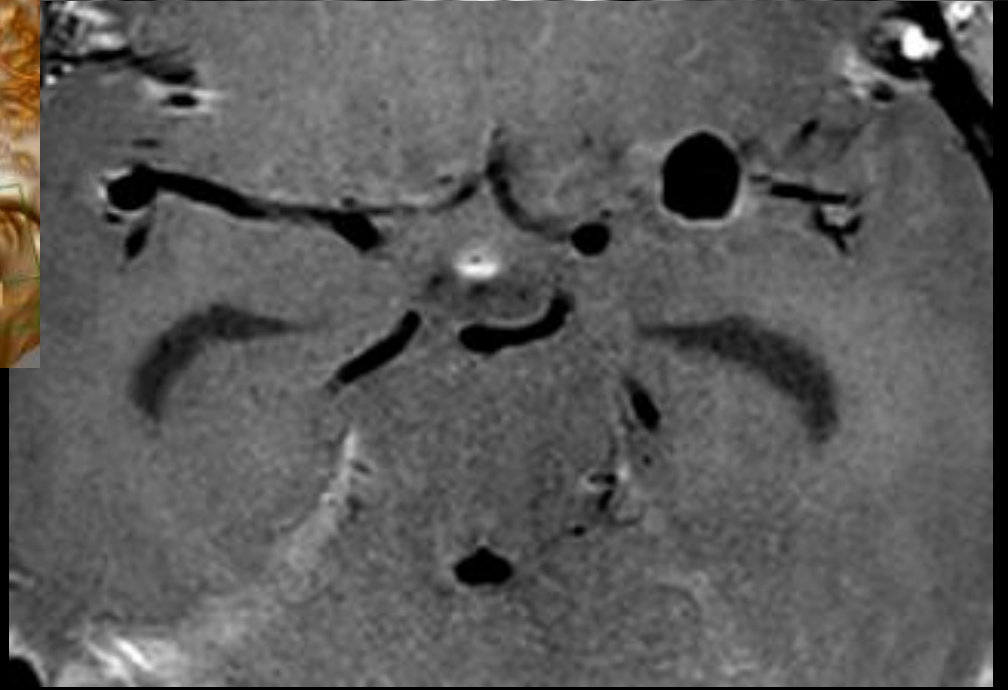
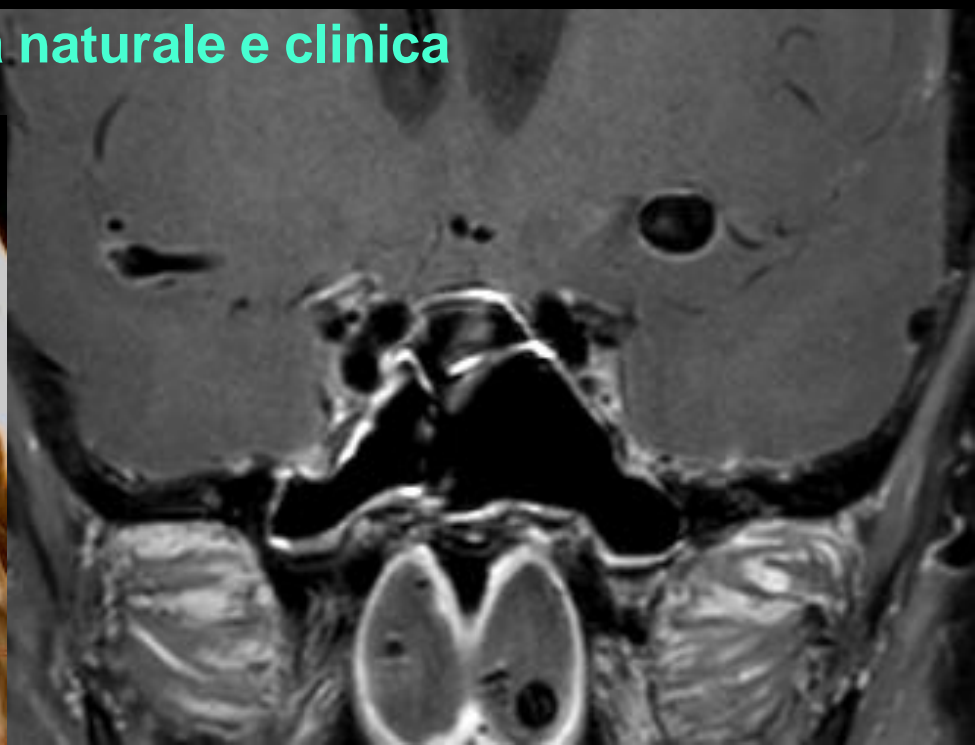
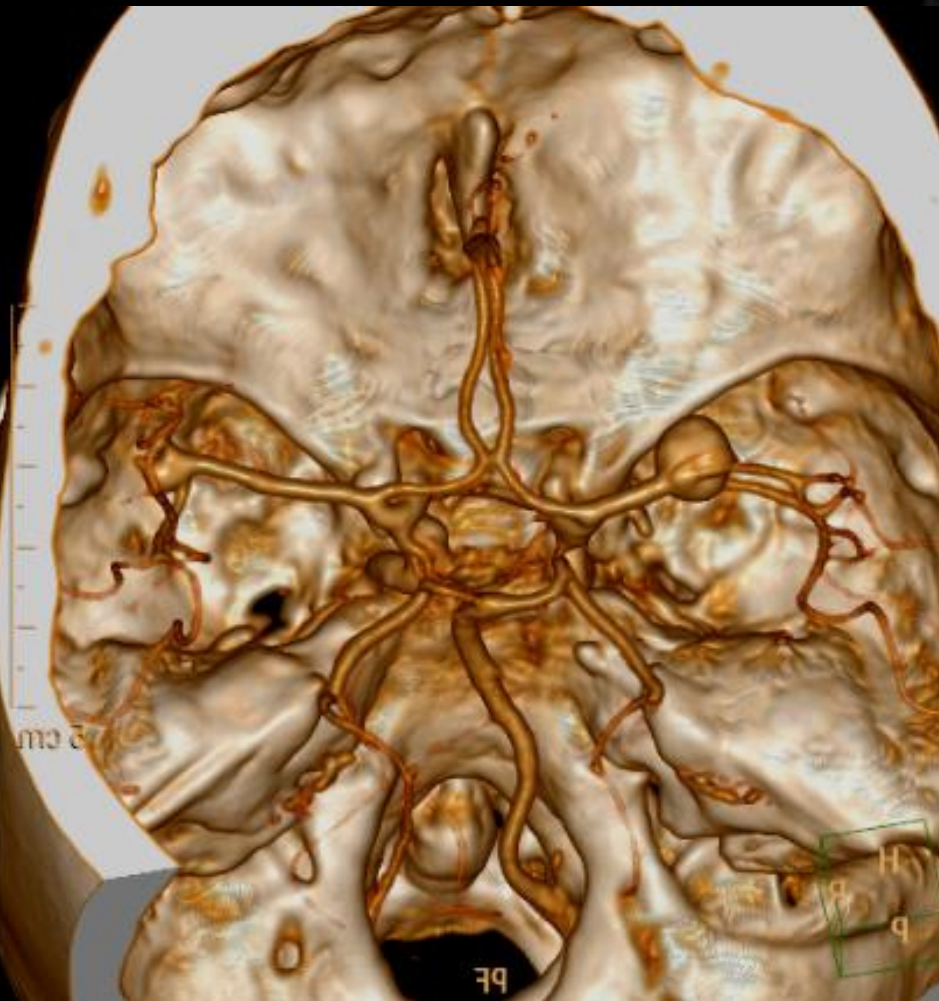
## Incidenza, storia naturale e clinica



# Incidenza, storia naturale e clinica



# Incidenza, storia naturale e clinica



**Incidenza, storia naturale e clinica**

# **Aneurismi non rotti**

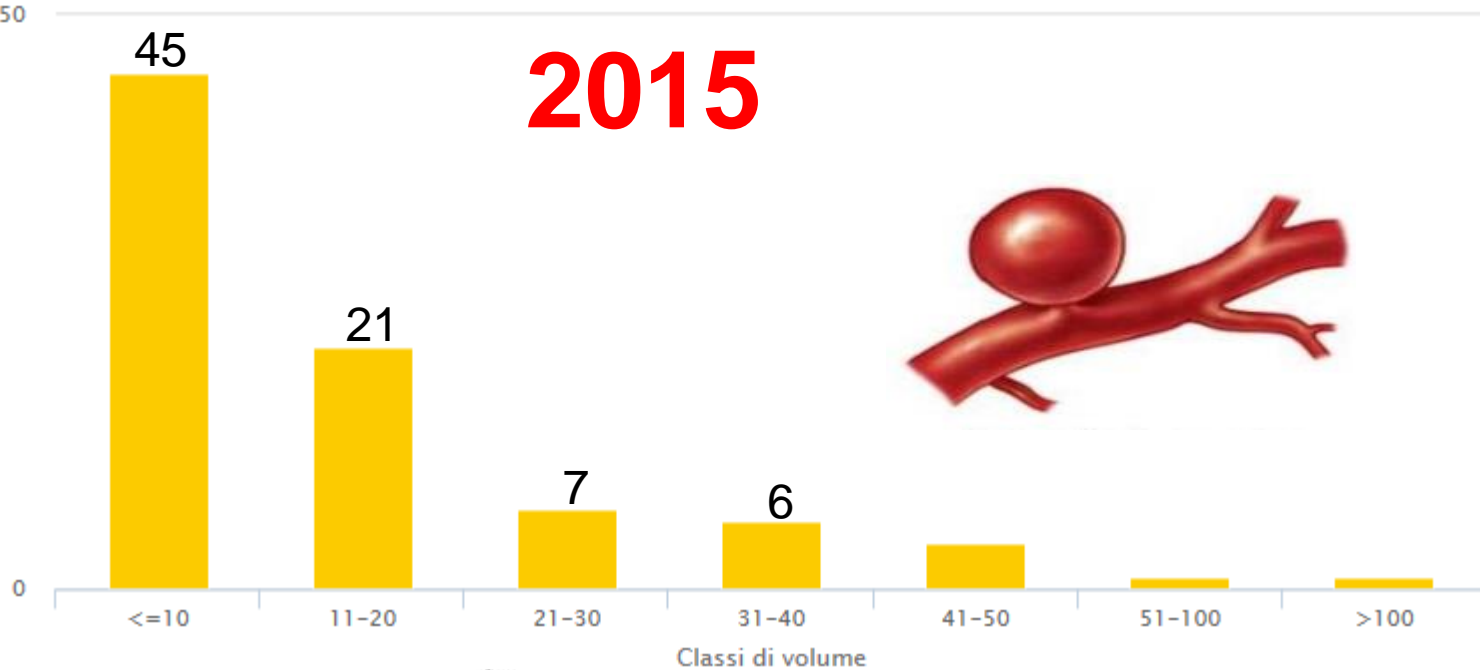
## **Cambio della storia naturale**

- **Tecnica di trattamento**
- **Capacità individuali**
- **Casistica**

# 2015

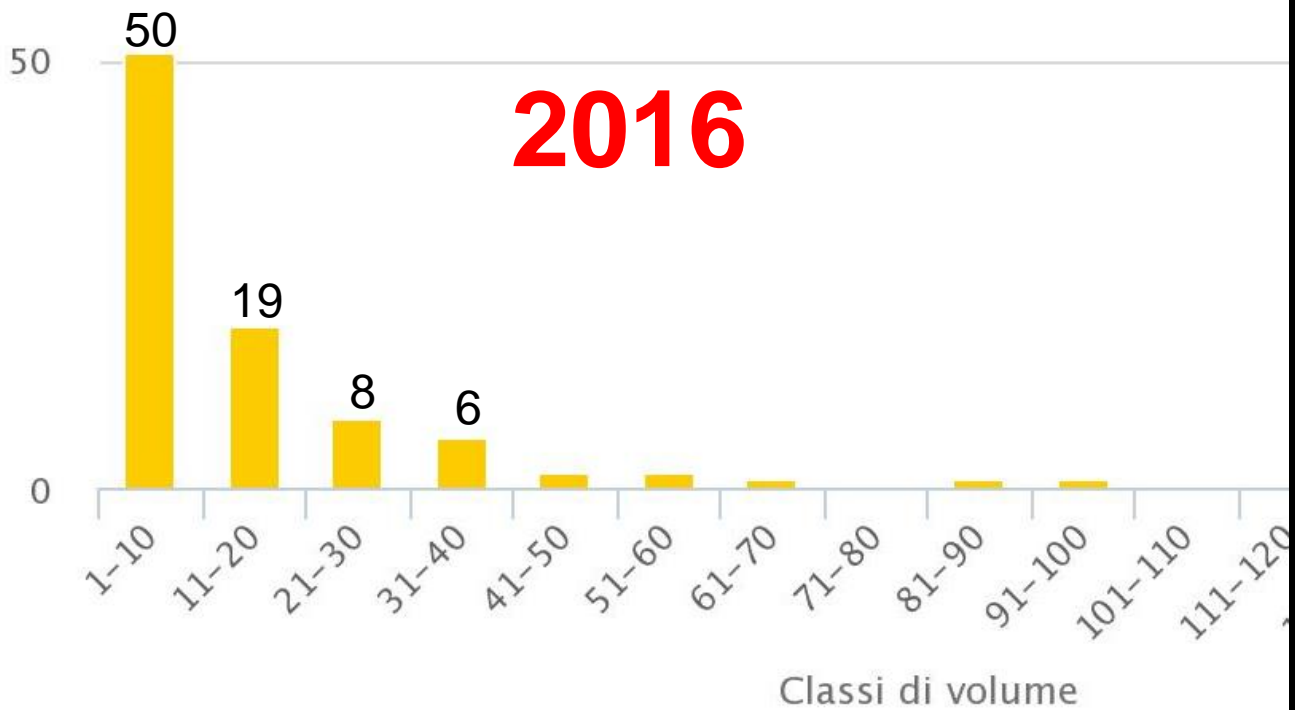


N° Structure



# 2016

N° Struttur



# **Aneurismi non rotti**

**Cambio della storia naturale**