"Roberto Rodriguez" General Hospital
Moron, Ciego de Avila, Cuba

Neurological Surgery Department

Surgical treatment in spontaneous intracerebral haemorrhage. Our results.

Angel J. Lacerda MD PhD, Daisy Abreu MD, Julio A. Díaz MD, Sandro Perez MD, Julio C Martin MD, Daiyan Martin MD.

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Introduction:

Spontaneous intracerebral haemorrhage (SICH) represents one of the most severe subtypes of stroke. However, and despite a high incidence, medical treatment is almost limited to life support and to control intracranial hypertension and indications of surgical treatment are poorly defined. Emergent surgical evacuation or hemicraniectomy should be considered for patients with large (>3 cm) cerebellar hemorrhages, and in those with large lobar hemorrhages, significant mass effect, and a deteriorating neurological exam.

At the time the first American Heart Association (AHA) guidelines for the management of spontaneous ICH were published in 1999, only 4 small randomized surgical trials of acute ICH existed. 6 years later, 15 pilot and larger randomized medical and surgical trials for ICH/intraventricular hemorrhage (IVH) had been completed or were ongoing providing great hope for new and effective treatments for patients with ICH, included in the 2nd American Heart Association (AHA) guidelines for the management of spontaneous ICH (2007).

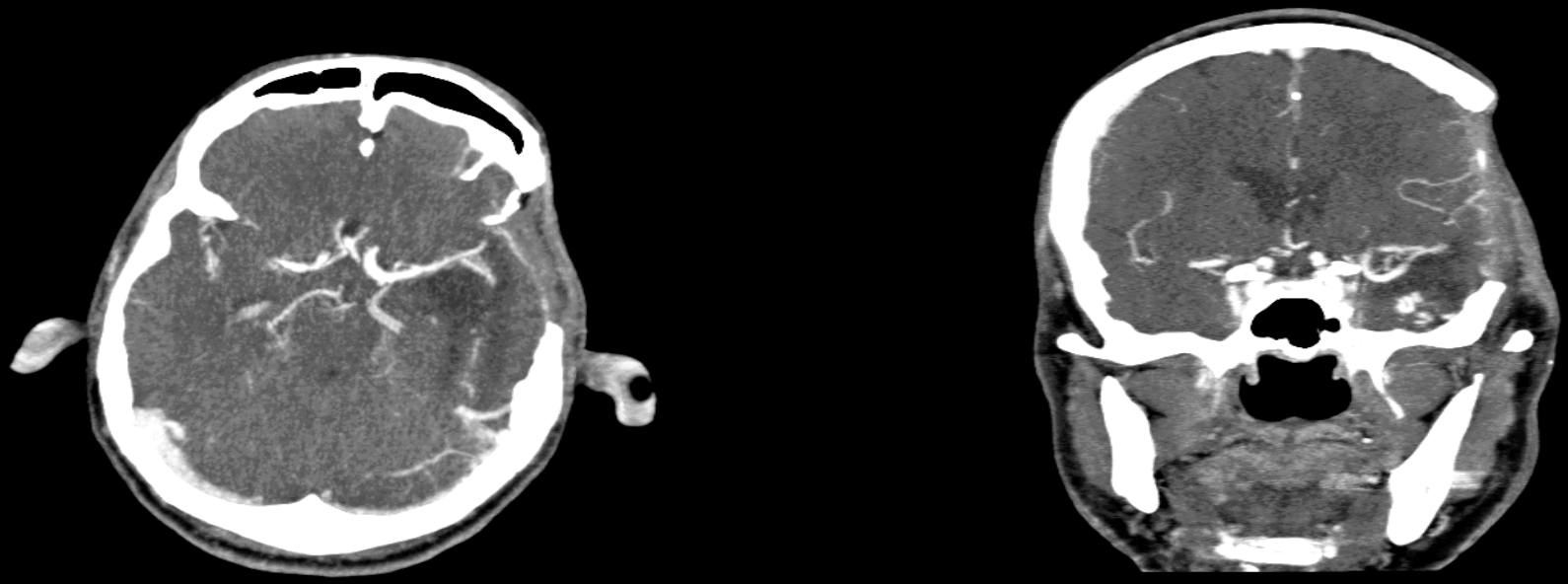
The aim of this study was to know the surgical results in our hospital in patients with lobar spontaneous intracerebral haemorrhages.

Method:

We have carried out a descriptive study with 44 patients surgically treated from 2000 to 2009 and admitted in intensive care unit with spontaneous lobar intracerebral haemorrhages. Patients were classified by Kanaya system in admission.

The diagnosis was obtained in all patients by simple emergent CT scan in emergency room.

CT-angiography or conventional angiography was not routinely performed, it was reserved for patients in whom secondary causes of ICH were suspected, such as aneurysms, cortical vein or dural sinus malformations, arteriovenous malformations, Vasculitis or others.



CT-angiography

Standardized protocol for medical therapy:

Medical management of SICH included the following measures:

- Permanent airway control looking for a rapid sequence intubation if it is needed.
- The induction agents used were propofol and midazolan.
- Isotonic fluid resuscitation and vasopressors were indicated for patients in shock.
- Dextrose-containing solutions were avoided as hyperglycemia may be detrimental to the injured brain.

- *The mean arterial blood pressure was maintaining between 90-100 mmHg to reduce the risk of hematoma expansion and to keep and maintain cerebral perfusion pressure.*

Management of Intracranial hypertension

Elevation of the head 20º.

- *Sedation with analgesics and sedative.*
- *CSF drainage.*
- *Intravenous administration of manitol in intermittent boluses (0,25g / kg / dosis / 4 hours).*
- *Controlled mild hyperventilation (PaCO2: 30-35 mmHg).*
- *Muscle relaxation if indicated and.*
- *Barbiturate therapy if it is needed.*

The surgical criteria:

1. Patient age under 60 years old.
2. Progressive neurological status and conscious decreasing.
3. GCS over 4 point at the surgical time.
4. Clot volume between 20-60 cm^3 calculated by elipsoid method in CT scans (AxBxC/2) a derived formula from the calculation of the volume of the sphere.
5. CT scan showing midline shift over 5 mm and
6. Cerebellar hemorrhage over 3 cms of diameter.

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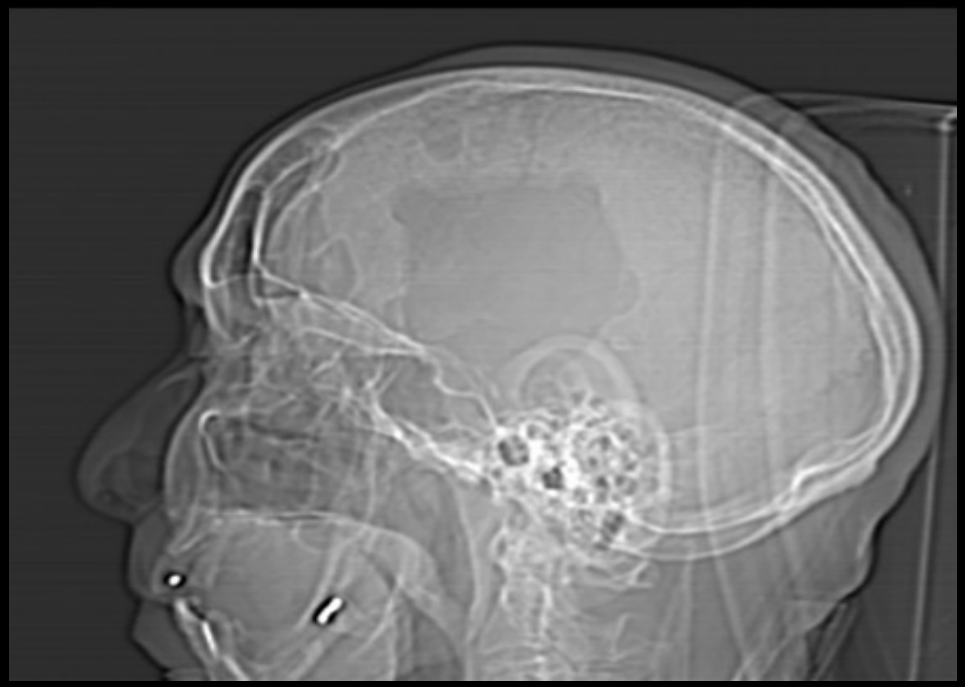
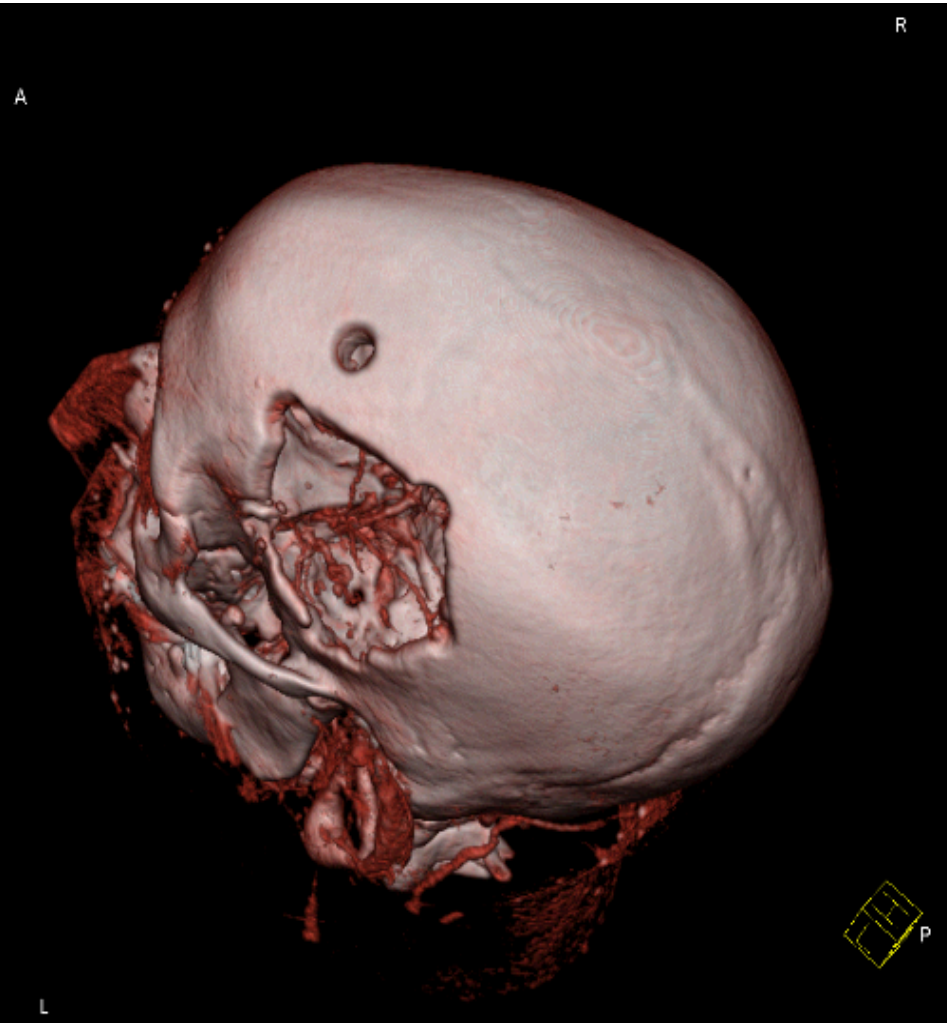
Surgical procedure:

- *Craniotomy was the most used intervention for the surgical management of SICH in patients without brain edema and midline shift under 5 mm.*
- *Decompressive craniectomy was used in patients with deteriorate neurological status, midline shift over 5 mm, with symptom and sign of cerebral herniation, brain edema associated.*
- *The ICP monitoring was performed by external strain gauge pressure transduction technology.*



Simple X Rays



3D CT scan reconstruction

Data collection:

The following patient data were collected: date of the hemorrhage, age of the patient, neurological status at admission (GCS score and Kanaya system), pupillary response, initial and sequential CT scan results, data of medical ICP therapy, surgical procedures and complications. Outcome was scored using the Modified Rankin Scale for results.

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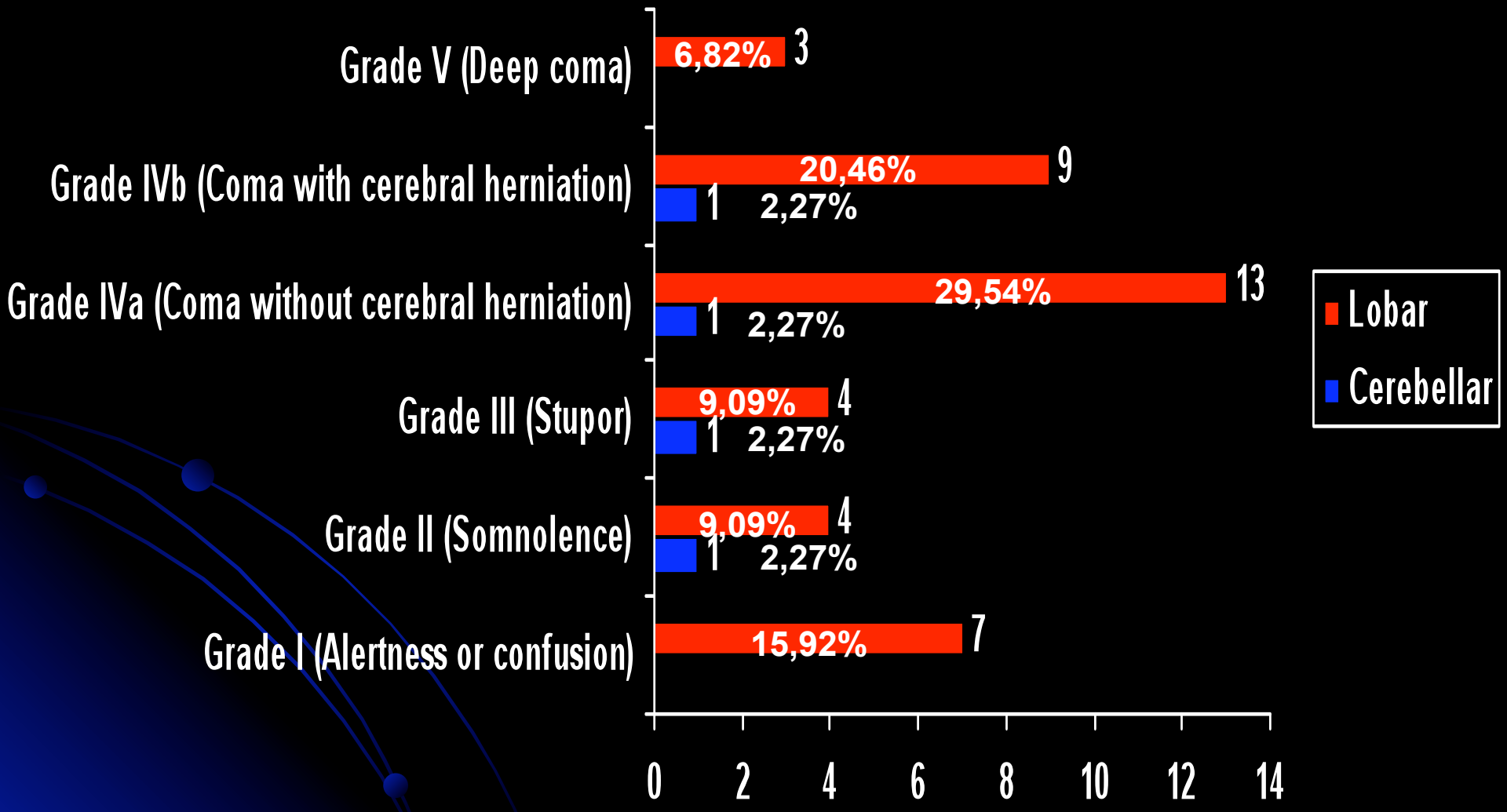
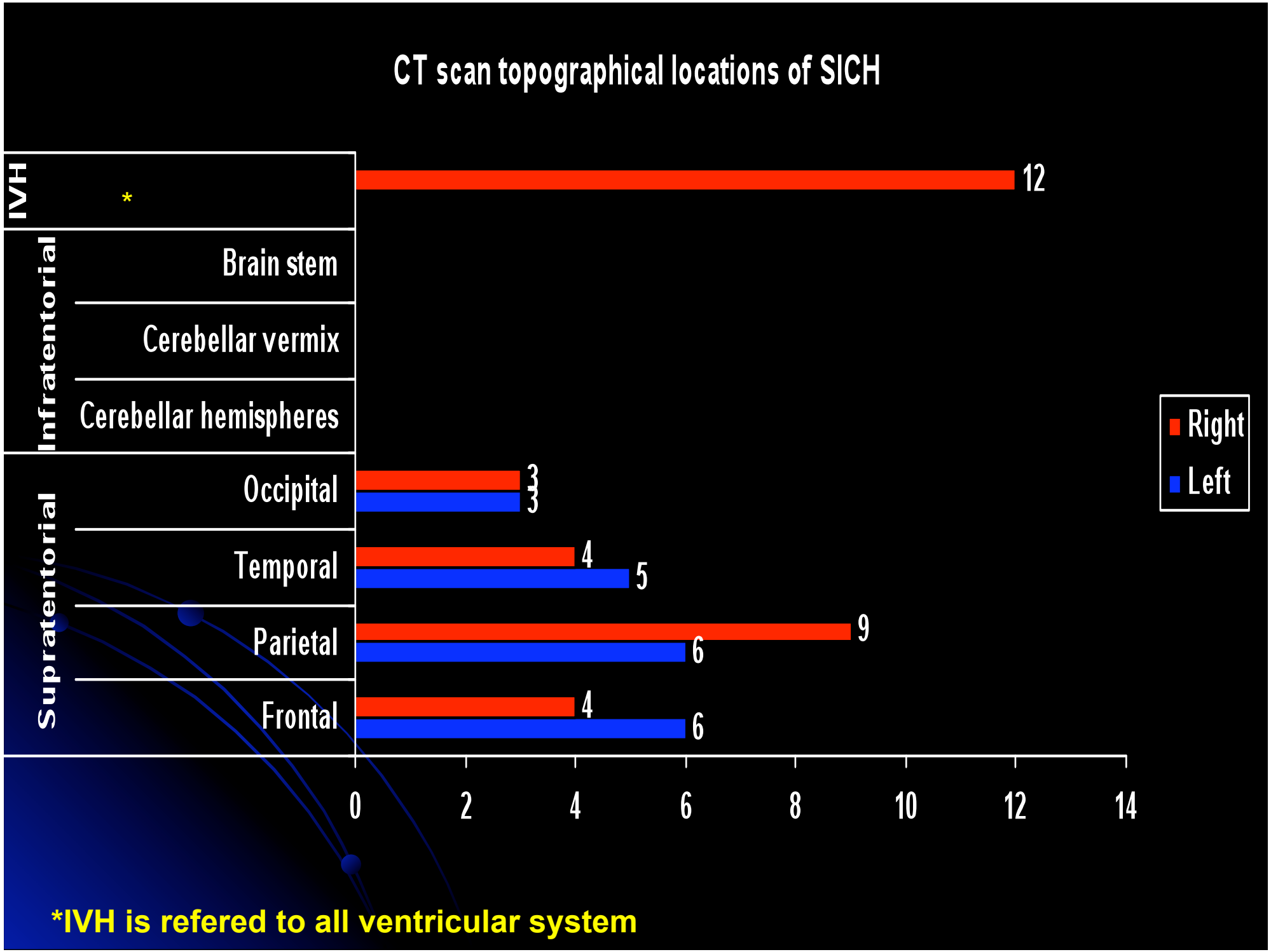
Statistical analysis:

A data base was created using SPSS system, version 11,5. The Chi-Square test was used to tabulates the variables into categories and compares the observed and expected frequencies in each category. Values of less than 0,05 was deemed significant.

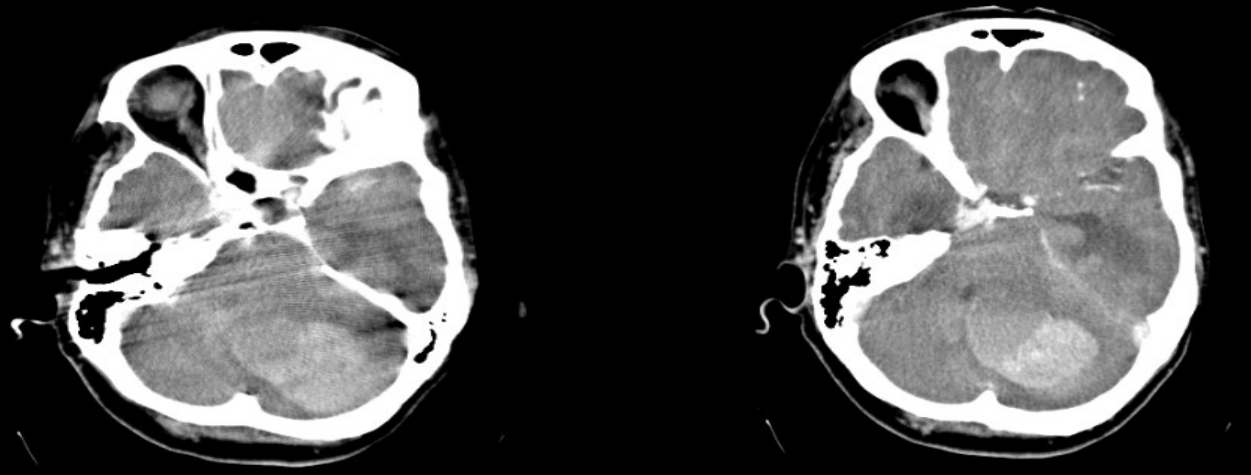

RESULTS

Relation between Kanaya´s neurological grading system and topographical locations of SICH

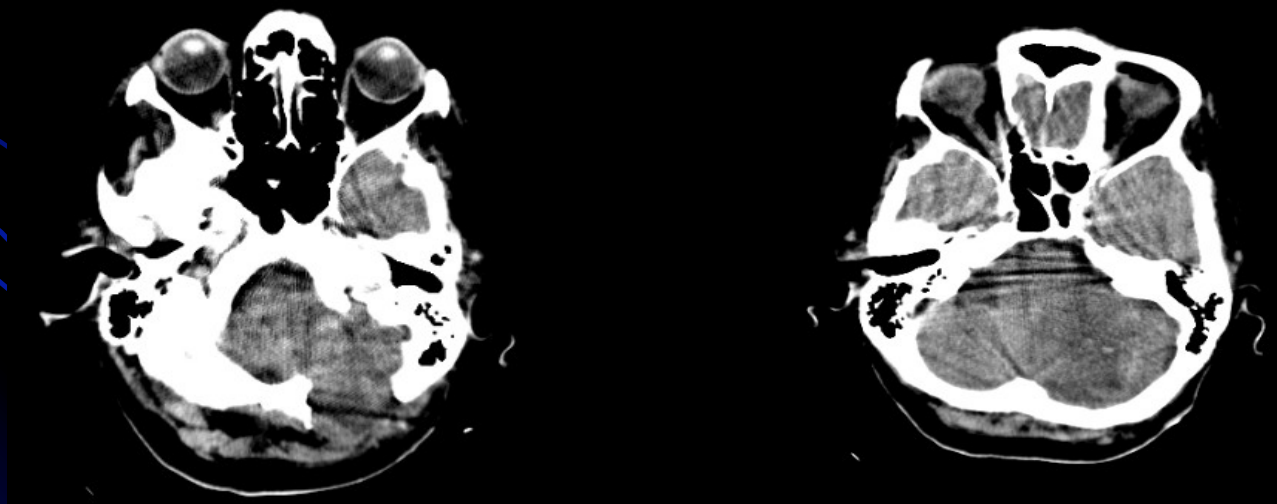



CT scan topographical locations of SICH
IVH
*
12
Infratentorial
Brain stem
Cerebellar vermix
Cerebellar hemispheres
Supratentorial
Occipital
3
3
Temporal
4
5
Parietal
9
6
Frontal
4
6
Right
Left
0
2
4
6
8
10
12
14
*IVH is refered to all ventricular system

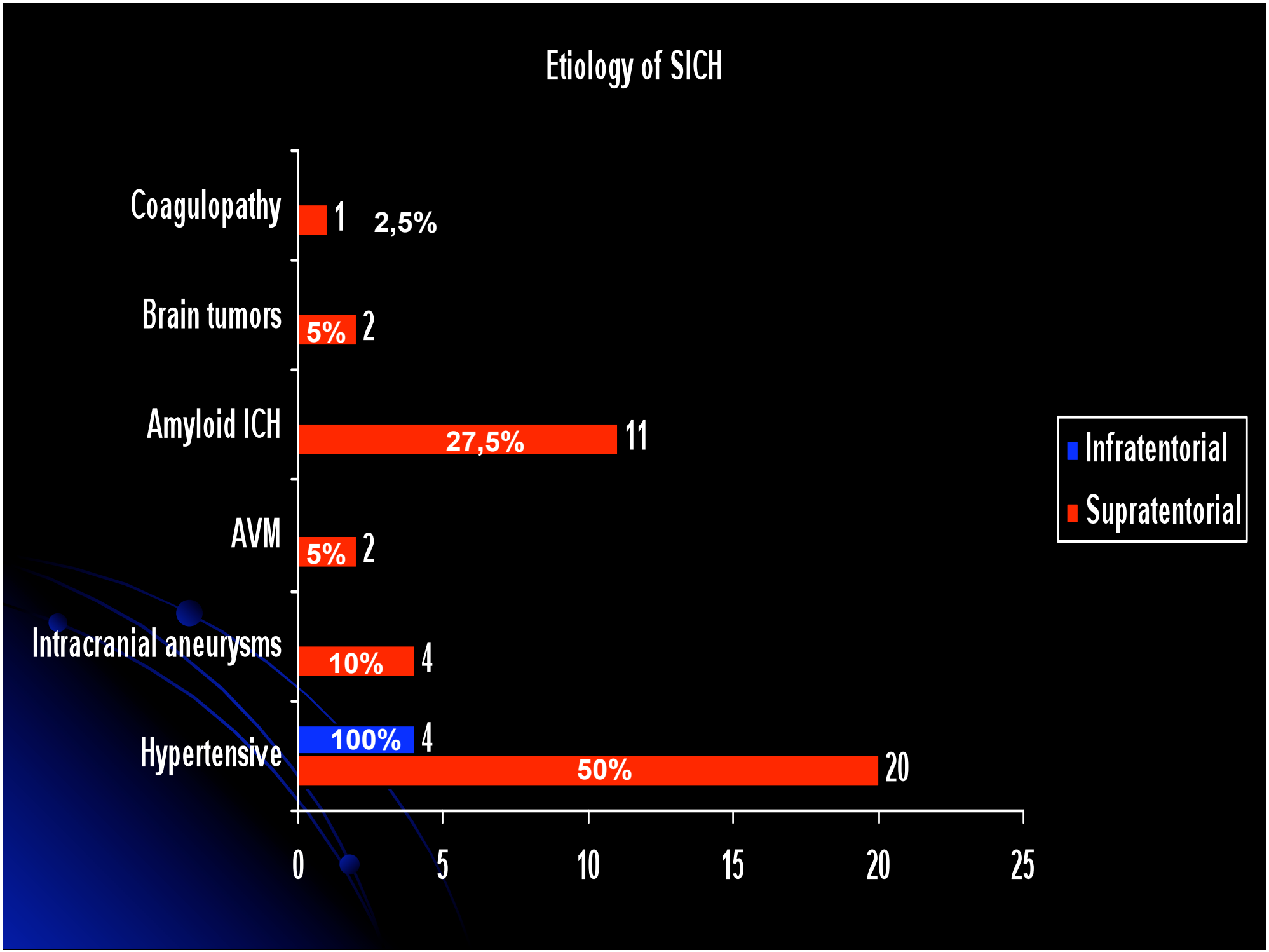
Cerebellar Hemorrhage:



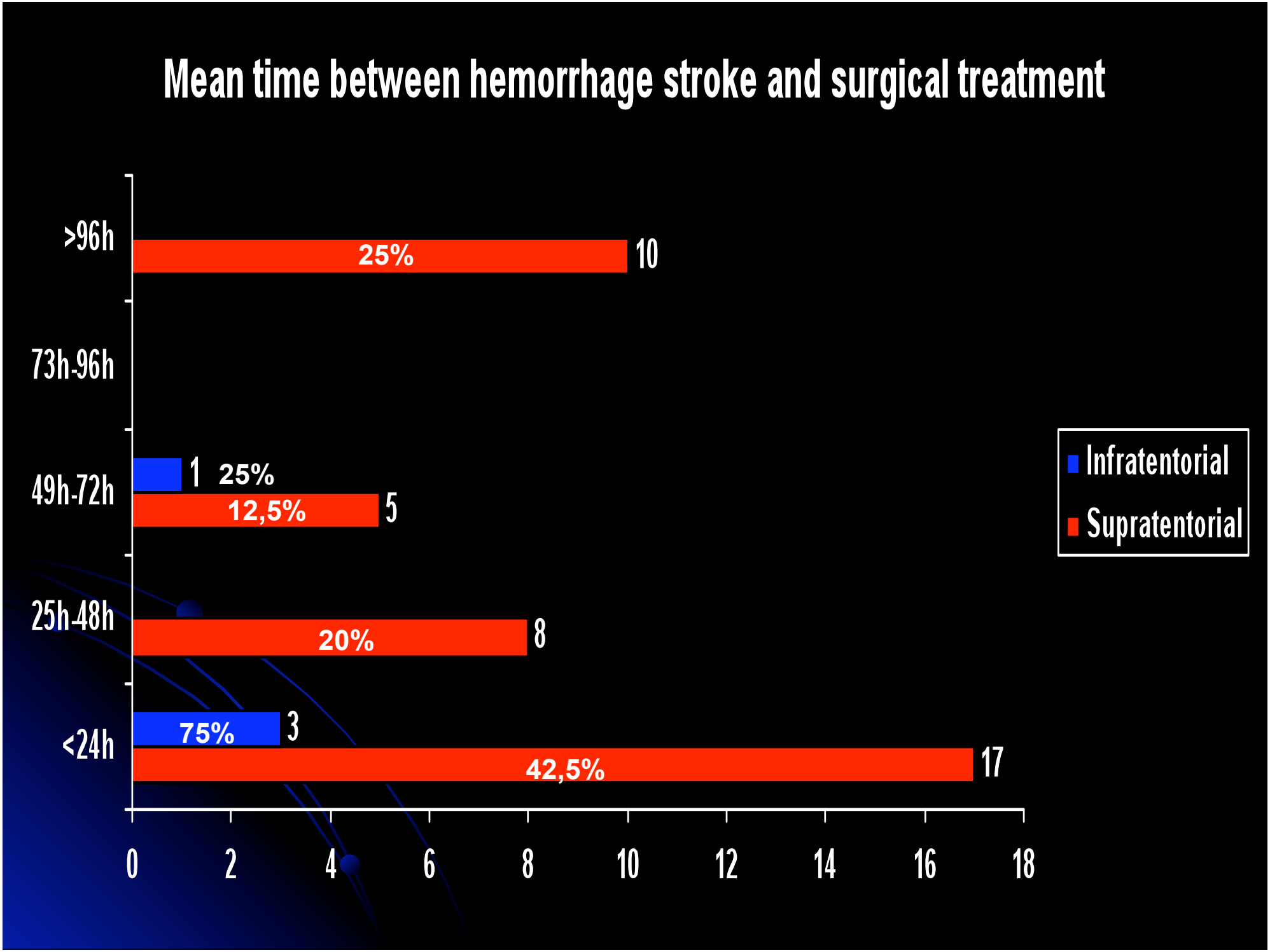
Initial CT scan serie

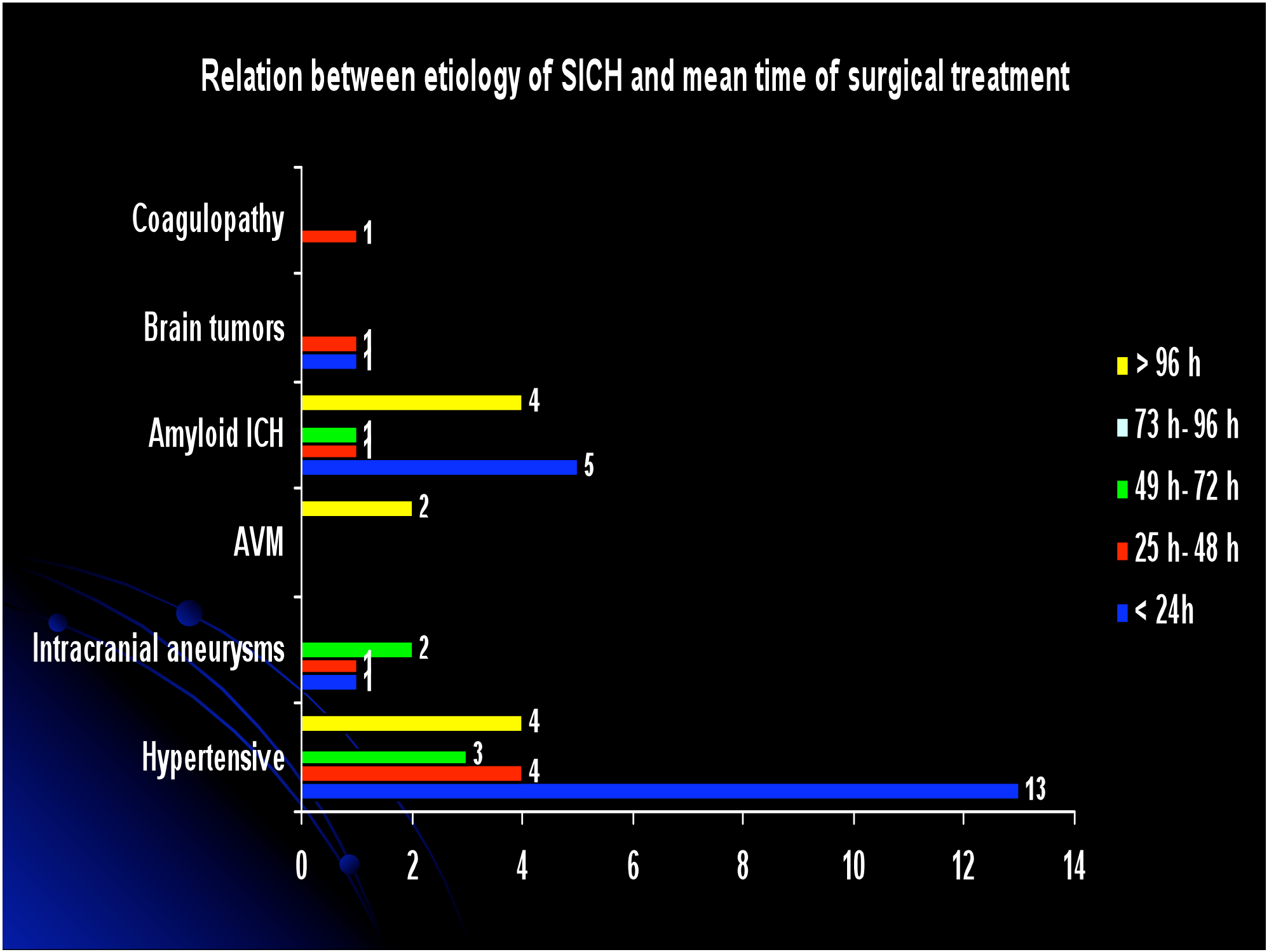


Post surgical CT scan serie seven days later

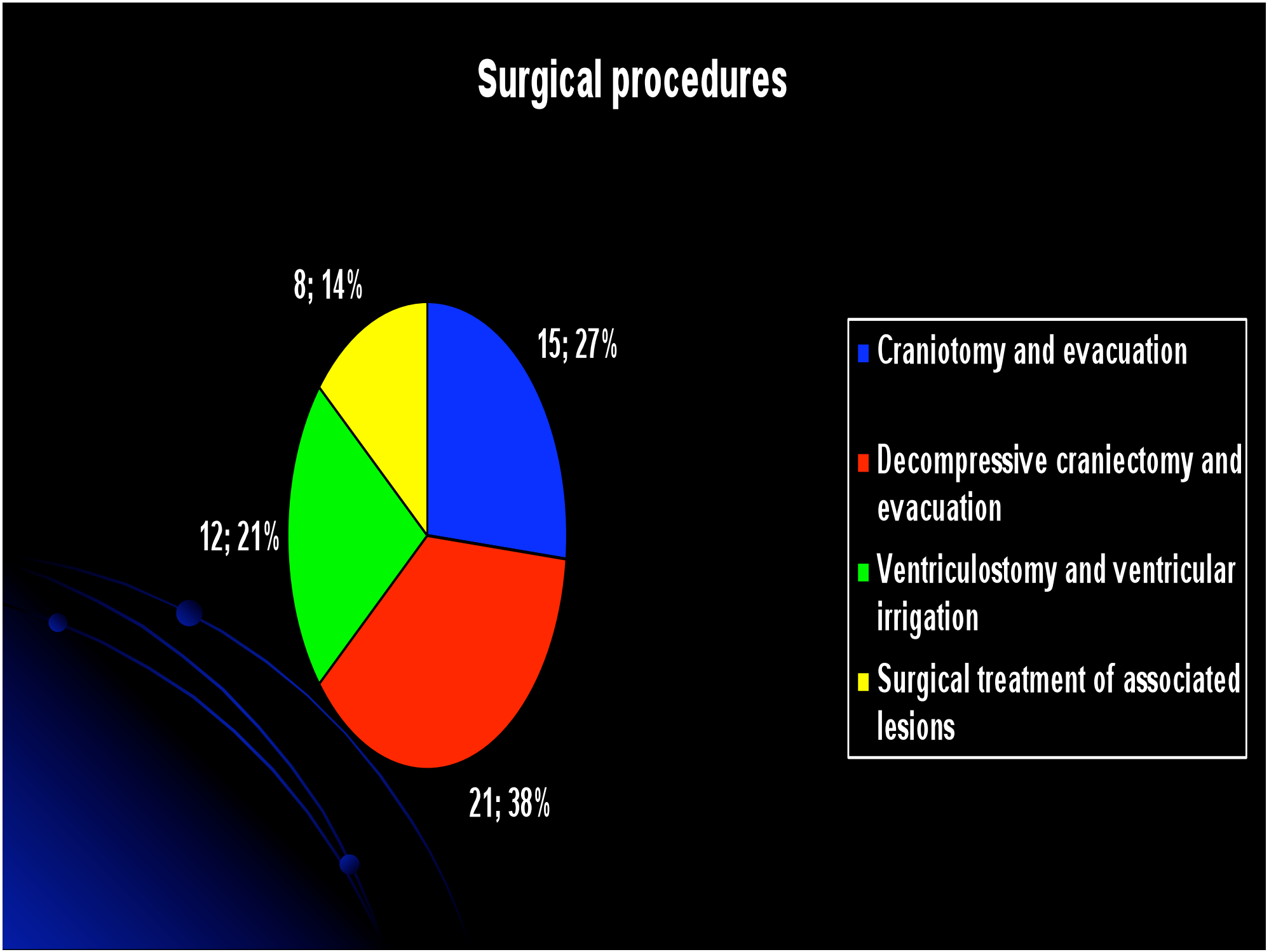

Etiology of SICH
Coagulopathy
1
2,5%
Brain tumors
5%
2
Amyloid ICH
27,5%
11
AVM
5%
2
Intracranial aneurysms
10%
4
Hypertensive
100%
4
50%
20
0
5
10
15
20
25
Infratentorial
Supratentorial

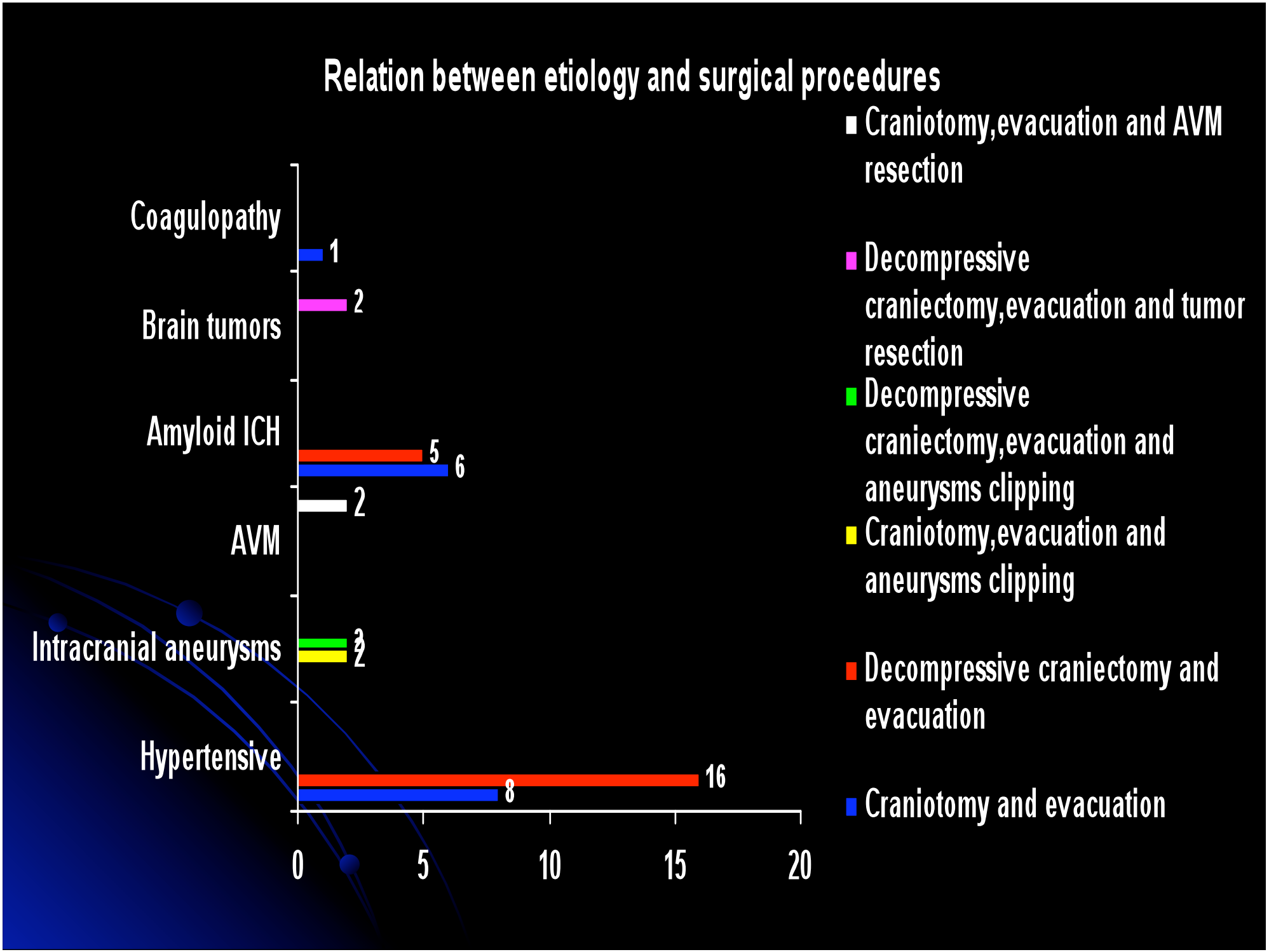
Mean time between hemorrhage stroke and surgical treatment

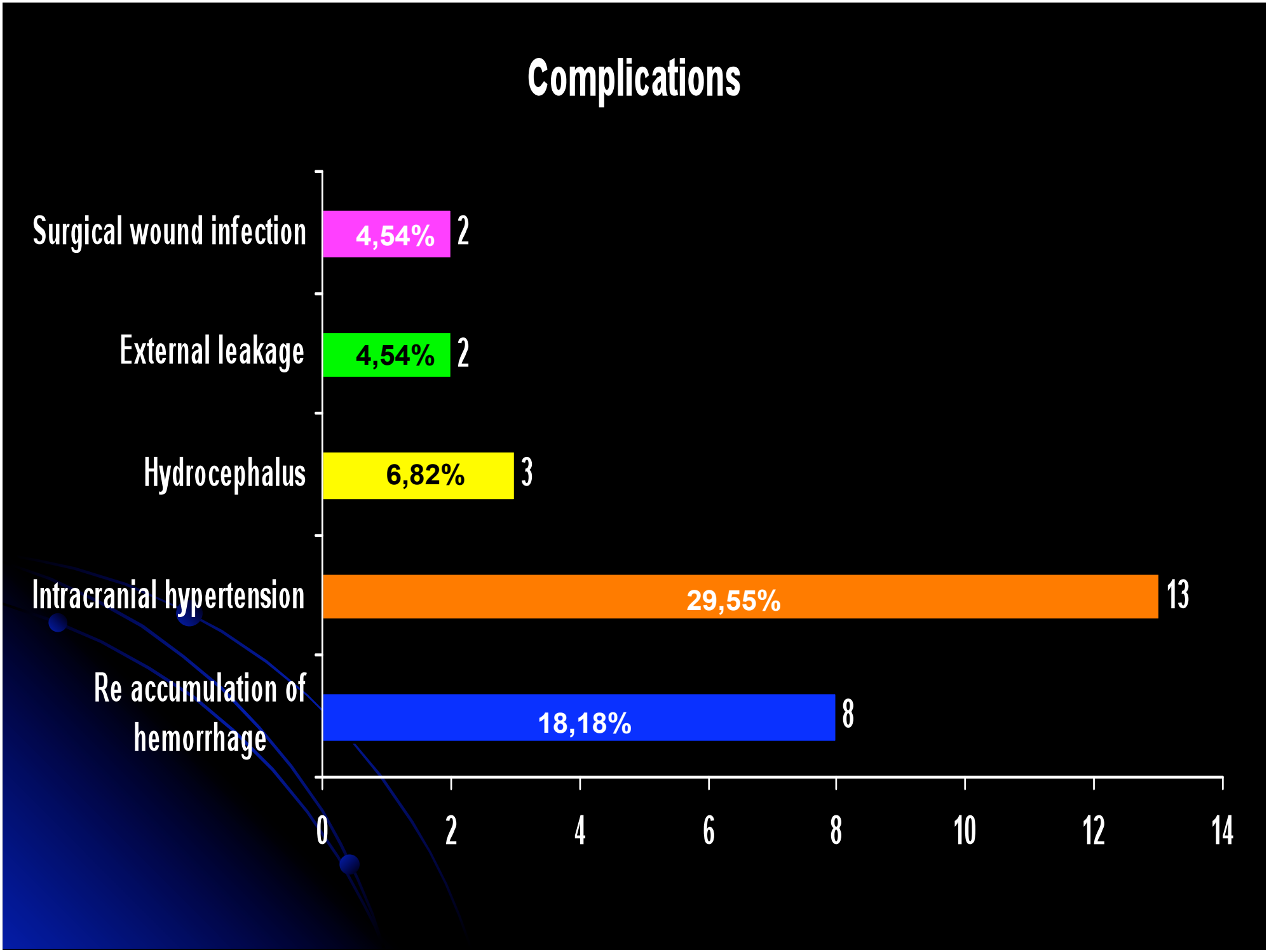


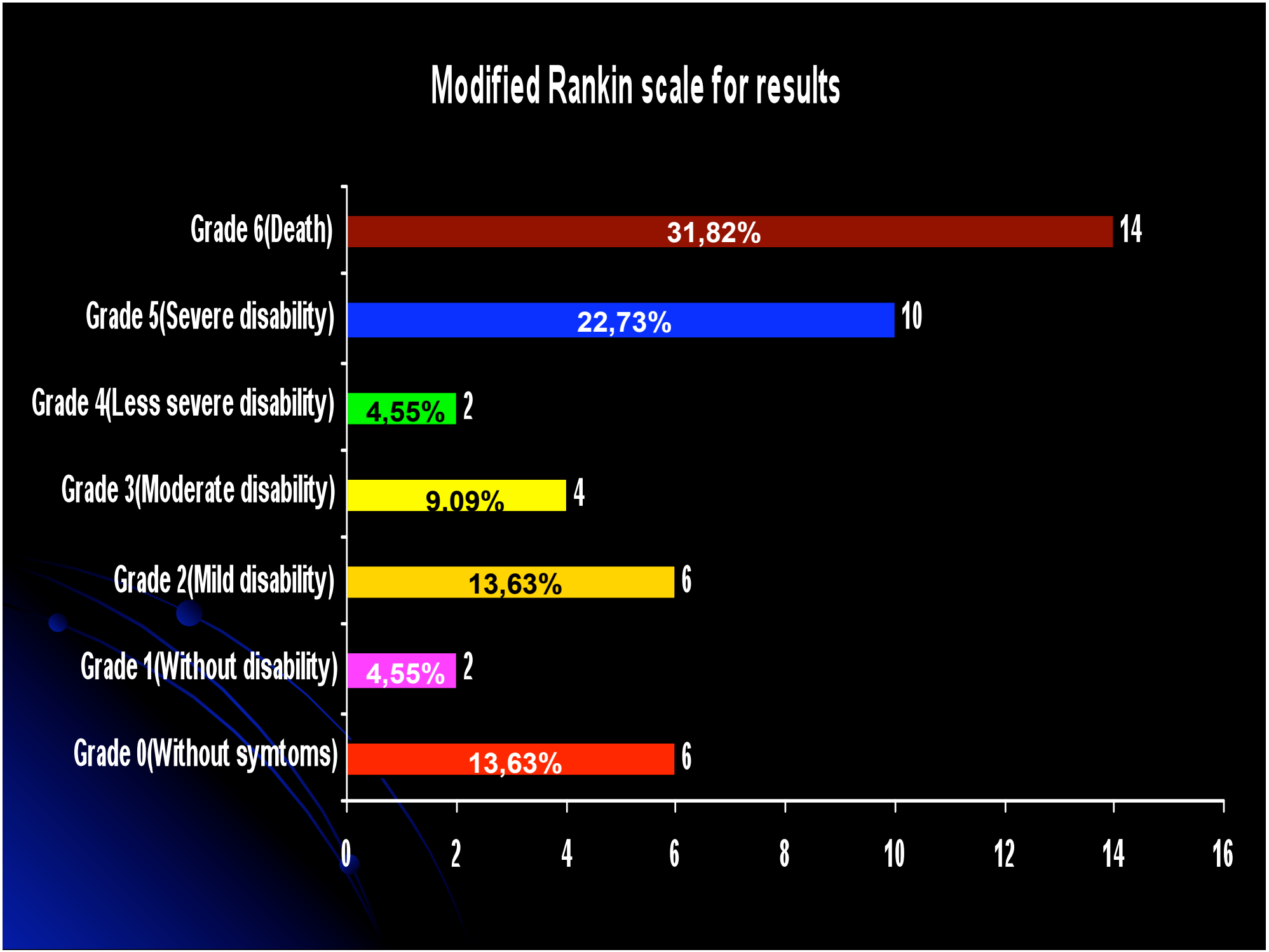

Relation between etiology of SICH and mean time of surgical treatment
Coagulopathy
Brain tumors
Amyloid ICH
AVM
Intracranial aneurysms
Hypertensive
1
1
1
4
1
5
2
2
1
1
4
3
4
13
0
2
4
6
8
10
12
14
> 96 h
73 h- 96 h
49 h- 72 h
25 h- 48 h
< 24h

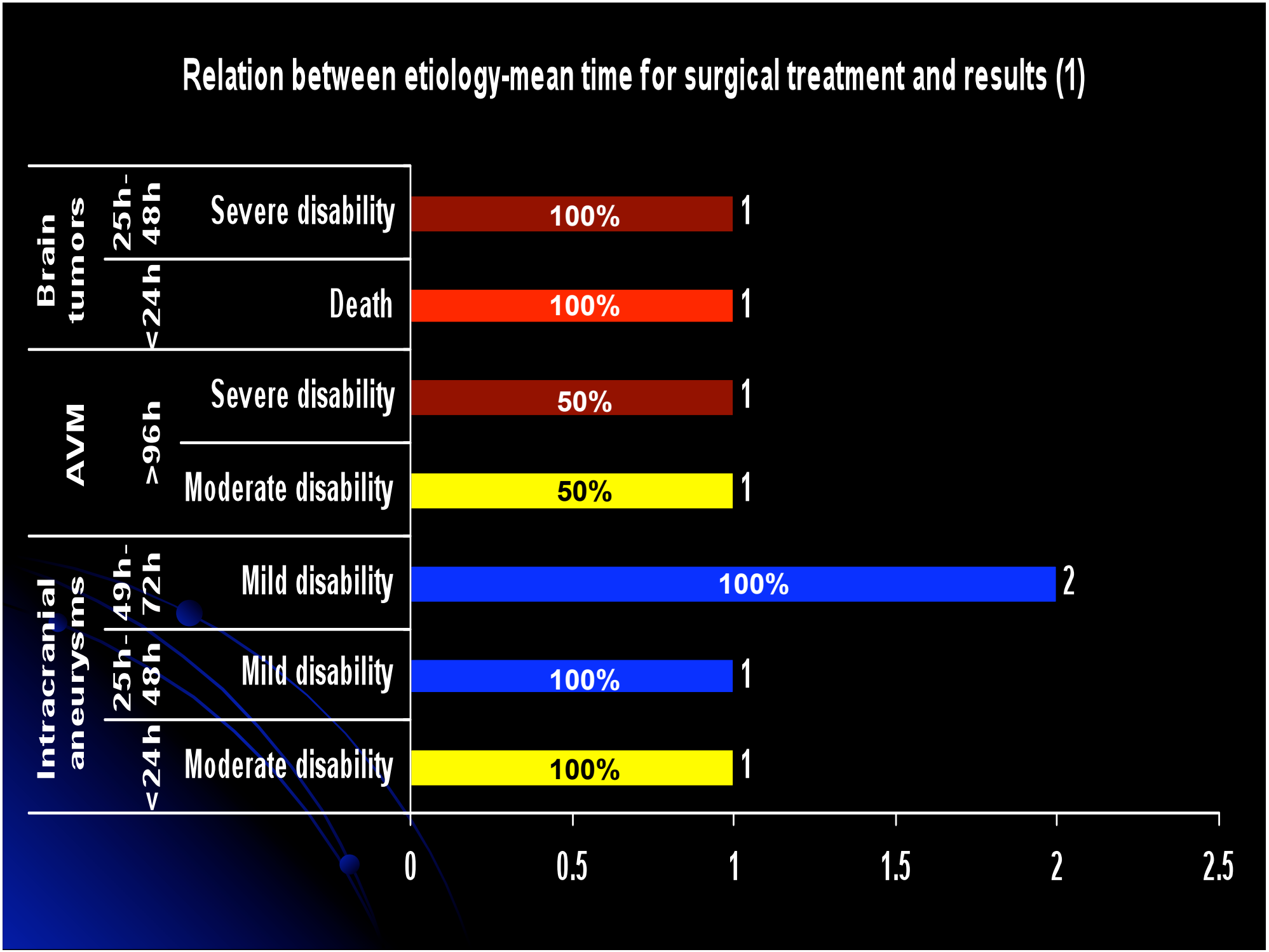
Surgical procedures

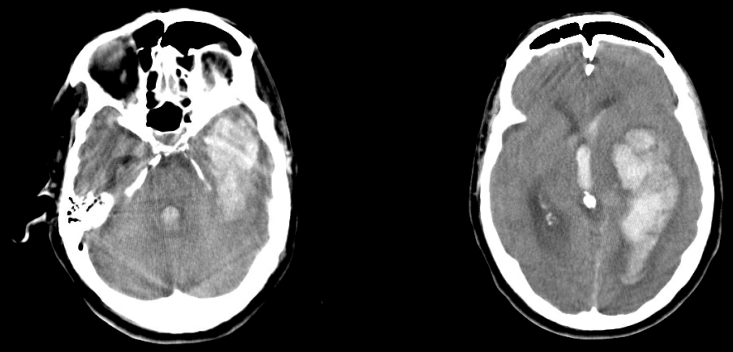



Relation between etiology and surgical procedures
Coagulopathy
Brain tumors
Amyloid ICH
AVM
Intracranial aneurysms
Hypertensive
1
2
5
6
2
3
2
16
8
0
5
10
15
20
Craniotomy,evacuation and AVM resection
Decompressive craniectomy,evacuation and tumor resection
Decompressive craniectomy,evacuation and aneurysms clipping
Craniotomy,evacuation and aneurysms clipping
Decompressive craniectomy and evacuation
Craniotomy and evacuation

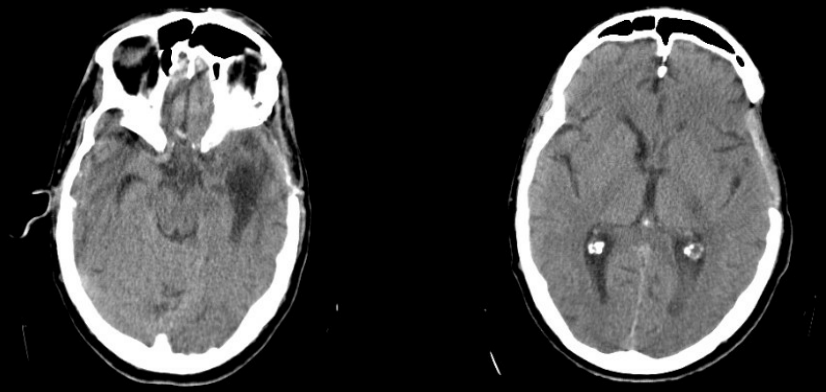

Complications
Surgical wound infection
4,54%
2
External leakage
4,54%
2
Hydrocephalus
6,82%
3
Intracranial hypertension
29,55%
13
Re accumulation of hemorrhage
18,18%
8
0
2
4
6
8
10
12
14


Modified Rankin scale for results
Grade 6(Death)
31,82%
14
Grade 5(Severe disability)
22,73%
10
Grade 4(Less severe disability)
4,55%
2
Grade 3(Moderate disability)
9,09%
4
Grade 2(Mild disability)
13,63%
6
Grade 1(Without disability)
4,55%
2
Grade 0(Without symtoms)
13,63%
6
0
2
4
6
8
10
12
14
16

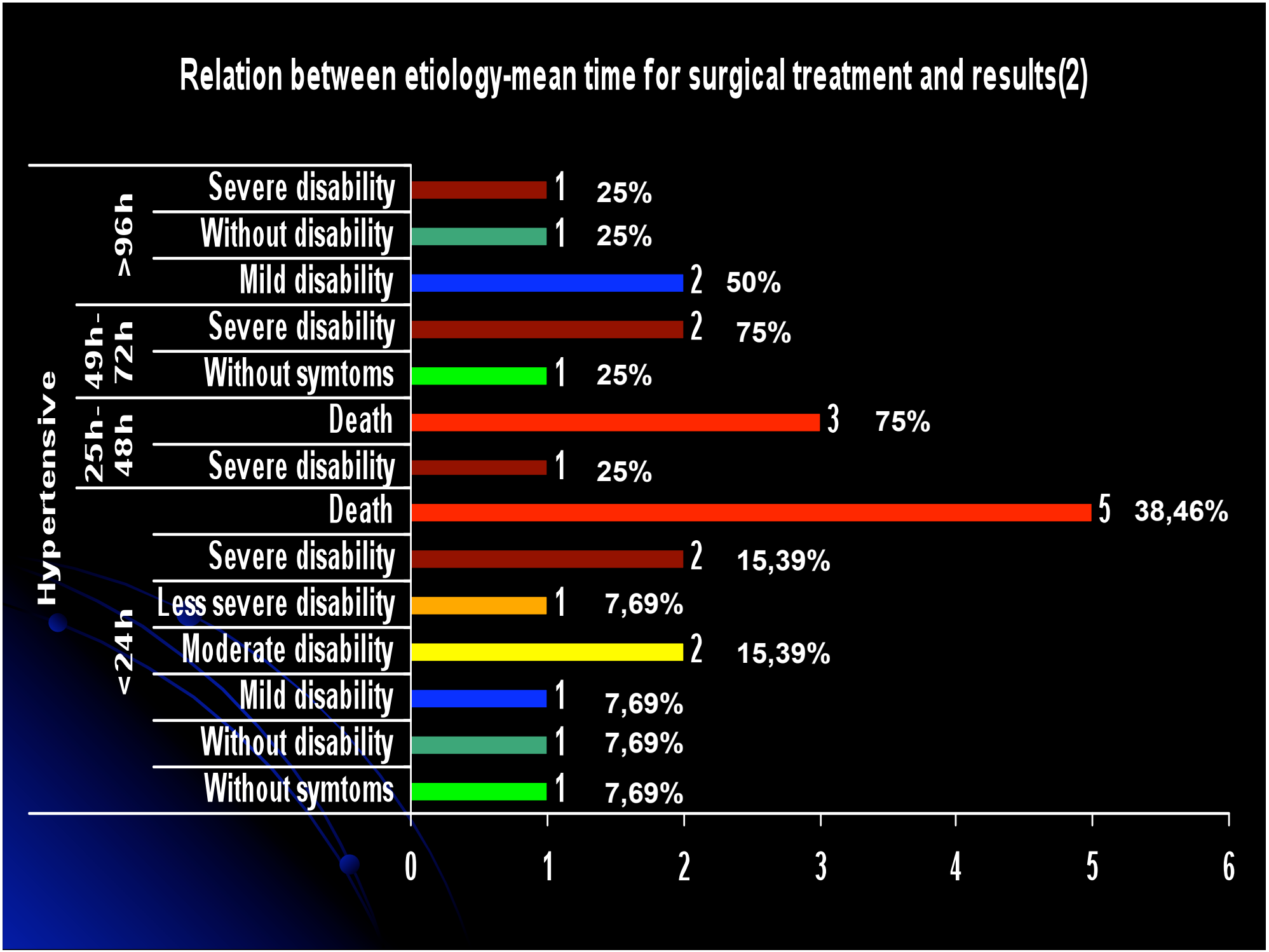

Relation between etiology-mean time for surgical treatment and results (1)
Brain tumors
25h-48h
Severe disability
100%
1
<24h
Death
100%
1
AVM
>96h
Severe disability
50%
1
Moderate disability
50%
1
Intracranial aneurysms
49h-72h
Mild disability
100%
2
25h-48h
Mild disability
100%
1
<24h
Moderate disability
100%
1
0
0.5
1
1.5
2
2.5



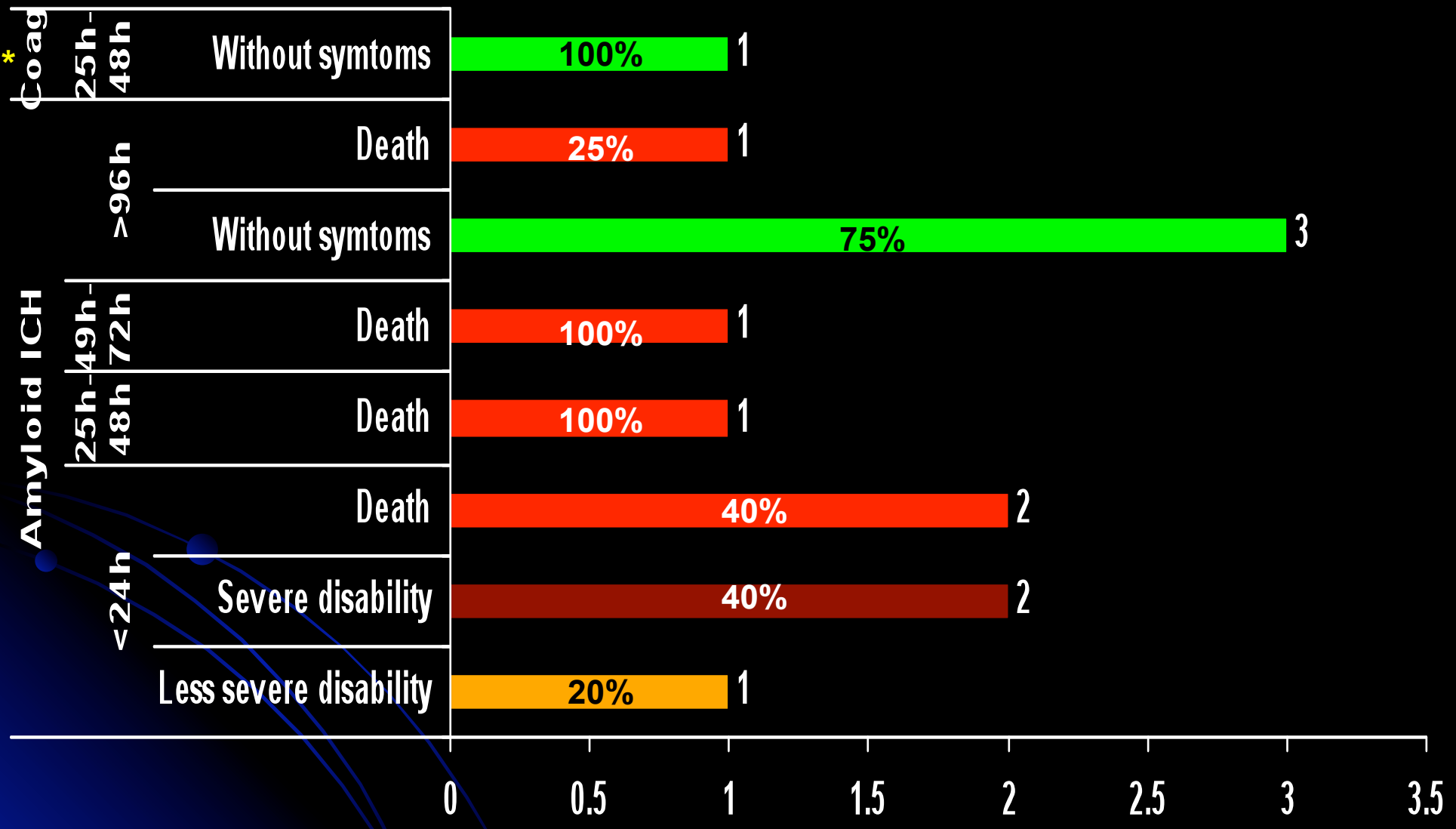
Initial CT scan serie



Post surgical CT scan serie 1 month later


Relation between etiology-mean time for surgical treatment and results(2)
Hypertensive
>96h
Severe disability
Without disability
Mild disability
49h-72h
Severe disability
Without symtoms
25h-48h
Death
Severe disability
<24h
Death
Severe disability
Less severe disability
Moderate disability
Mild disability
Without disability
Without symtoms
1 25%
1 25%
2 50%
2 75%
1 25%
3 75%
1 25%
5 38,46%
2 15,39%
1 7,69%
2 15,39%
1 7,69%
1 7,69%
1 7,69%
0 1 2 3 4 5 6

Relation between etiology-mean time for surgical treatment and results(3)



* Coag = Coagulopathy.

Conclusions:

- *Surgical treatment could be effective for some patients with spontaneous ICH.*
- *The surgical treatment had low impact over quality of life.*
- *In secondary SICH is necessary to treat the etiology in the same surgical time of clot evacuation.*
- *For hypertensive and amyloid clots there was a tendency of poor results in the patients operated on in the first 48 hours.*
- *The association between clots volumen-brain edema and intracranial hypertension in the first hours of a hemorrhagic stroke could be related with poor results in the first 48 hours.*

THANK YOU VERY MUCH