



Science, Movement and Health, Vol. XVI, ISSUE 2, 2016

June 2016, 16 (2): 181-185

Original article

## CLINICAL – IMAGISTIC FEATURES AND NEUROREHABILITATION IN INTRACEREBRAL HEMORRHAGE

GOGU Anca<sup>1</sup>, JIANU Catalin<sup>1</sup>, DOCU AXELERAD Any<sup>2</sup>, LUPU Mirela<sup>1</sup>

### Abstract\*

**Aim.** Non – traumatic intracerebral hemorrhage (ICH) is a major neurological emergency, counting up to 10 – 15 % of all strokes. Approximately 80 – 85 % are primary spontaneous ICH caused by arterial hypertension or cerebral amyloid angiopathy. The early kinetotherapy and the appropriate treatment play the major role in the recovery of these patients.

**Methods.** Between January 2014 – January 2016 we hospitalized on emergency 160 patients with spontaneous ICH, 136 of them with supratentorial hemorrhage and 24 patients with subtentorial hemorrhage. The demographic data, clinical, imagistic (cerebral – CT, cerebral – MRI), paraclinic data as well as risk factors (hypertension, cerebral amyloid angiopathy, age, aneurysms and vascular malformations, anticoagulant and thrombolytic treatment, hypocholesterolemia, diabetes, heavy alcohol and tobacco use, heritability), treatment, kinetotherapy were all considered.

**Results.** We studied 160 patients, 70 females and 90 males (43,75% versus 56,25%). According to the age group, the highest frequency of ICH is between 70 – 79 years old (42, 5 %). Hypertension is the most important and prevalent risk factor for ICH, metat 112 patients (70 %). Other risk factors for ICH were: anticoagulant treatment at 24 patients (15 %), tumor – related hemorrhage at 2 patients (1,25 %), cerebral amyloid angiopathy at 8 patients (5 %), vascular malformations of the brain at 6 patients (3,75 %), cerebral venous and sinus thrombosis at 5 patients (3 %), other factors at 3 patients (2 %) – heavy alcohol use, hypocholesterolemia. We have taken into consideration the location of the hemorrhage: putaminal (the most frequently), caudate, thalamic, lobar, cerebellar and pontine hemorrhage. Clinical features of ICH depends on the location of the hemorrhage: headache, vomiting, seizures, dizziness, hemiparesis, hemiplegia, hemisensory deficits, coma, abnormalities of ocular motility and visual fields, neuropsychological abnormalities. After 30 days for onset and 14 days of kinetotherapy, with appropriate treatment, mortality was 40,62 % (65 patients). 70 patients (43,75%) had a favorable recovery and 25 patients (15,63 %) remained stationary.

**Conclusions.** Incidence rate of ICH increases dramatically with age, the highest frequency was between 70 – 79 years old (42,5 %). The males were more affected than females. Untreated hypertension is a greater risk factorthan treated hypertension. A variety of many factors like age, poor neurological status at onset, measured by Glasgow Coma Scale, larger than 60 cm<sup>3</sup> volume of hematoma, intraventricular extension of hemorrhage, anticoagulant treatment and infratentorial location increase the mortality. Kinetotherapy initiated after 14 days of onset, continued till 6 months has an important role in the improvement of the quality of life.

**Keywords:** intracerebral hemorrhage, hypertension, kinetotherapy

### Introduction

Intracerebral hemorrhage (ICH) is defined as the non-traumatic, abrupt onset of severe headache, altered level of consciousness or focal neurological deficit associated with a focal collection of blood within the brain parenchyma, but which is not due to trauma or hemorrhagic conversion of a cerebral infarction (Carhuapoma at al., 2010).

Non-traumatic ICH is a major neurological emergency, making up to 10-15 % of all strokes.

Because ICH is associated with a high mortality on the first thirtydays, approximately 40-50 %, this disease plays an important role in neurology.

Approximately 80-85 % are primary spontaneous ICH caused by arterial hypertension or cerebral amyloid angiopathy. Untreated hypertension is a greater risk factor than treated hypertension and hypertensive patients who discontinue their indications have greater risk than those who continue them (Woo at al, 2004). Cerebral amyloid angiopathy (CAA) is now considered an important cause of lobar hemorrhage in the elderly (Vonsattel at al., 1991).

With appropriate treatment and early kinetotherapy, the recovery of these patients is possible.

<sup>1</sup> Department of Neurology, University of Medicine and Pharmacy "Victor Babes", Timisoara, ROMANIA

<sup>2</sup> Department of Neurology, "Ovidius" University, General Medicine Faculty, Constanta, ROMANIA

E-mail address: agogu@yahoo.com

Received 24.02.2016 / Accepted 07.04.2016

\* the abstract was published in the 16th I.S.C. "Perspectives in Physical Education and Sport" - Ovidius University of Constanta, May 20-21, 2016, Romania

**Methods**

**Patients:**

Between January 2014 – January 2016 we hospitalized on emergency 160 patients with spontaneous ICH, 136 of them supratentorial hemorrhage and 24 patients withintracerebral hemorrhage.

The demographic data, clinical, imagistic (cerebral – CT, cerebral - MRI, EKG), paraclinic data as well as risk factors (hypertension, cerebral amyloid angiopathy, age, aneurysms and vascular malformations, anticoagulant and thrombolytic treatment, hypocholesterolemia, diabetes, heavy alcohol and tobacco use, heritability), treatment, kinethotherapy were all considered.

**Investigation:**

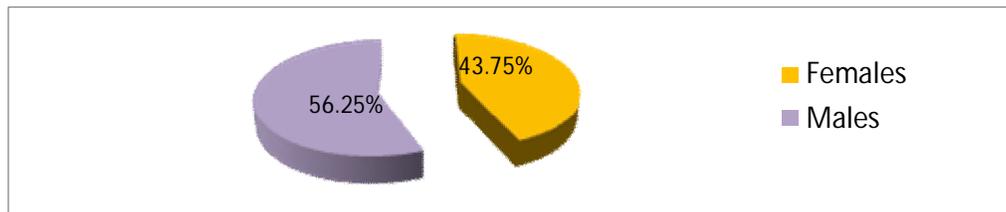
- Cerebral Native Computer Tomography (cerebral – CT), made in the emergency, showed usexactly hemorrhage lesions (appears as hyperdense on non-contrast CT).

- In addition to detecting acute blood, non-contrast CT scans may reveal complications like extension of the hemorrhage into the intraventricular space, edema, hydrocephaly and herniation.
- Cerebral – MRI ( 1.5 Tesla scanner ) is the initial diagnostic procedure for detecting underlying structural causes of secondary ICH, including vascular malformations, especially cavernomas and neoplasms (Atlas at al., 1987). MRI was markedly superior for the detection of chronic blood.
- Electrocardiogram (ECG): for each patient we have made a first ECG in the Emergency Unit and another one later.
- Blood pressure measurement
- Blood tests: CBC, glycaemia, cholesterol, creatinine etc.

**Results**

We studied 160 patients, 70 females and 90 males (43,75 % vs. 56,25 %). (Fig. 1)

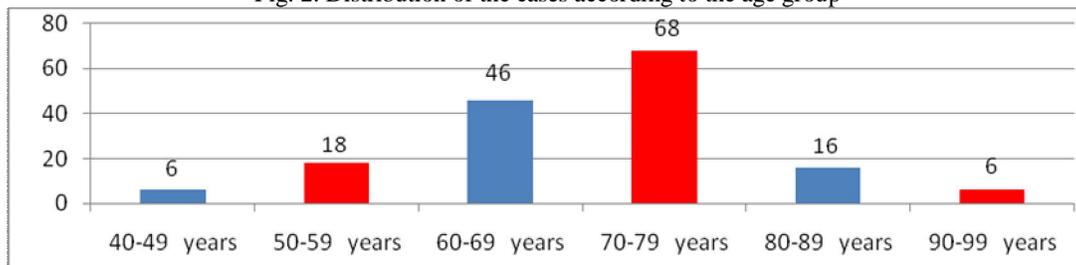
Fig. 1. Distribution of the cases according to sex



According to the age group, the highest frequency of ICH is between 70–79 years old (68

cases; 42,5%), followed by 60–69 years old (46 cases; 28,75 %). (Fig. 2)

Fig. 2. Distribution of the cases according to the age group



The average age spotted by patients with infratentorial hemorrhages is lower than for the patients with supratentorial hemorrhage (64 years versus 74 years).

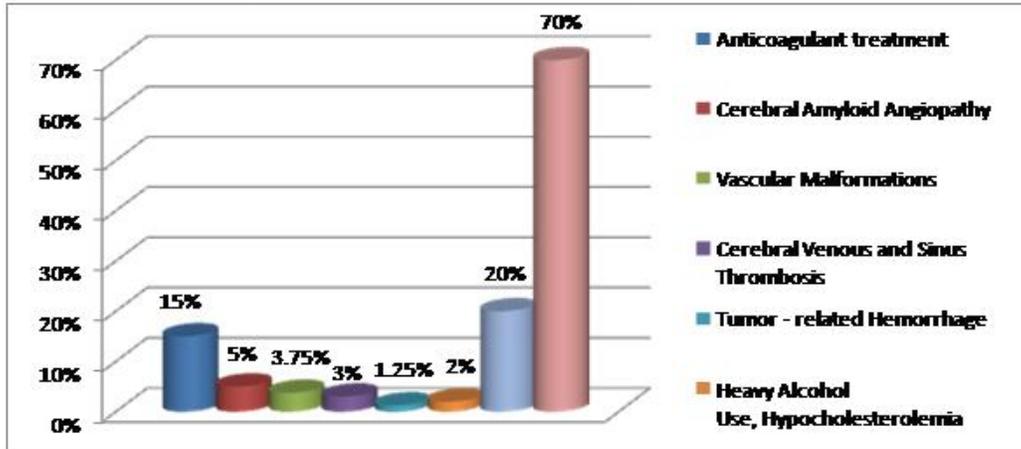
Hypertension is the most important and prevalent risk factor for ICH, met at 112 patients (70 %). In our study, 80 patients (50 %) are with continued treatment for hypertensive and 32 patients (20 %) with discontinued treatment.

**Other risk factors for ICH were:**

- Anticoagulant treatment (24 cases; 15 %)
- Cerebral amyloid angiopathy (8 cases; 5 %)
- Vascular malformations of the brain (6 cases; 3.75%)
- Cerebral venous and sinus thrombosis (5 cases; 3%)
- Tumor – related hemorrhage (2 cases; 1.25%)

- Other factors like heavy alcohol use, hypocholesterolemia (< 150 mg/dl cholesterol) - (3 cases; 2 %)
- Diabetes (32 cases; 20 %), but these patients were also with another risk factor, not only with diabetes. (Fig. 3)

Fig. 3. Distribution of the cases according to the risk factors



We have taken into consideration the location of the hemorrhage because several studies correlated the anatomical location to their clinical presentation and outcome.

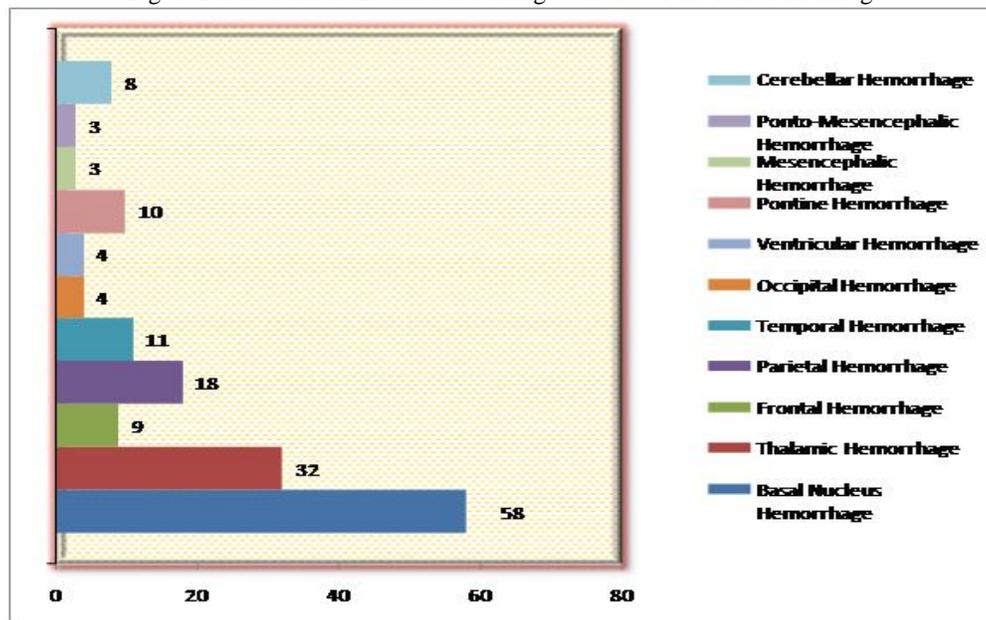
In our study 136 patients (85 %) are with supratentorial hemorrhage and 24 patients (15 %) with infratentorial hemorrhage.

When patients come in the Emergency Department with acute stroke, urgent neuroimaging is essential. The first diagnostic question in these

cases is whether or not the stroke is caused by ICH. Non-contrast CT is the first-line imaging modality in this setting.

Our study described a number of anatomical origins and patterns of extension of the hemorrhage correlated with clinical presentation and outcome. The most frequent locations of the ICH were in the area of basal and thalamic nucleus, both represented 56.25 % from total cases and 66,17 % from supratentorial hemorrhage. (Fig. 4)

Fig. 4. Distribution of the cases according to the location of the hemorrhage



Clinical features of ICH depend on location of hemorrhage:

- headache ( 37,5 % in patients with supratentorial hemorrhage and 62,5 % in patients with cerebellar hemorrhage)
- vomiting / dizziness is very common (87,5 %) in patients with cerebellar hemorrhage
- seizures at onset of ICH are rare, reported at 5,62 % of patients, especially in the frontal lobe hemorrhage and massive pontine hemorrhage
- moderate hemiparesis, hemiplegia are frequent in patients with putaminal, putamino-capsular, thalamic, frontal, parietal hemorrhage (89 % cases with supratentorial hemorrhage)
- coma at the onset (25 %)
- hemisensory deficits (50%)
- abnormalities of ocular motility and visual field (72,5%)
- neuropsychological abnormalities including abulia, confusion, disorientation, amnesic syndrome and language disturbances (any type of aphasia ) (82,5 %).

All our patients made cerebral native Computer Tomography (cerebral – CT) in Emergency, because this method is rapid, readily available and relatively inexpensive and has a great sensitivity and specificity in the detection of acute blood.

The volume of the hemorrhage on CT is an important predictive factor of mortality; if the volume is greater than 60 cm<sup>3</sup> the prognostic is bad. Predictors of poor outcome include advanced age, poor neurological status at presentation, larger hematoma size, early hematoma growth,

intraventricular extension, anticoagulant treatment and brainstem location of hemorrhage (Flaherty et al, 2006).

We presented some cerebral - CT scans in patients with different location of the hemorrhage.

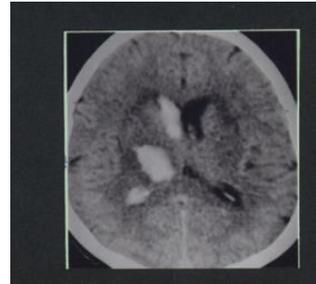


Fig. 5. Right postero-lateral thalamic hemorrhage with extension into internal capsule and lateral ventricle.



Fig. 6. Small hemorrhage in the left lateral ventricle.



Fig. 7. Massive left-sided hemorrhage in the nucleobasales area with medial extension into thalamus and ventricular system.

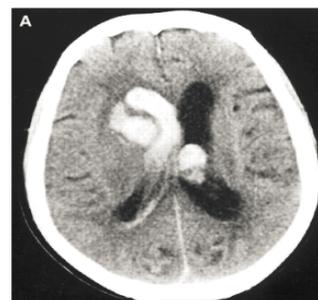


Fig. 8. Right caudate hemorrhage with extension into the anterior limb of the Internal capsule and ventricular system.

Conservative treatment of ICH included initial stabilization, the prevention of hematoma growth, hemodynamic goal – setting, the prevention of complications such as cerebral edema, herniation and seizures.

Most of the patients received conservative treatment (144 cases; 90 %) and only 16 patients (10%) were treated with surgery. The benefits of surgery are important if ICH is caused by arteriovenous malformations or aneurysm, then the



risk of rebleeding is a much more major problem. (Carhuapoma, 2010). Many trials (Hamlet, Decimal, Destiny) have shown that surgery saves lives, but more survivors remain disabled (Vahedi et al., 2007).

Neurorehabilitation is a complex medical process whose purpose is to minimize or to compensate alterations resulting from a brain injury (Gogu et al, 2015). Impaired motor function after stroke is a major cause of disability in stroke survivors. The patients with hemorrhagic stroke appear to have a greater ability to recover than patients with ischemic stroke. Kinetotherapy should be started by a kinethotherapist in the 14<sup>th</sup> day after onset and must be continued minimum six month.

After 30 days for onset and 14 days of kinetotherapy with appropriate treatment, mortality was 40,62 % (65 patients). 70 patients (43,75%) had a favorable recovery and 25 patients (15, 63 %) remained stationary.

### Discussions

Only 30 years ago, we discussed about ICH like a catastrophic disease without hope. During the next three decades, we made a great progress in understanding the clinical – radiographic features in ICH, since the introduction of brain computerized – tomography (cerebral- CT).

We know that hypertension is the most important modifiable risk factor for ICH, but is greater in younger patients than in elderly.

Cerebral amyloid angiopathy is now considered an important cause of lobar hemorrhage, multifocal microhemorrhagic in the elderly.

ICH is the deadliest form of stroke with high mortality, between 40 – 55 % (Franke, 1990). The mortality rate is increased to as high as 72 % in patients who were on oral anticoagulant in our study, the majority of the surviving patients remained with severe disability. Kinetotherapy should be performed by a kinethotherapist during the hospitalization and then, by the family. He should teach the patient's family all the techniques needed to work.

### Conclusions

Incidence rate of ICH increases dramatically with age, the highest frequency was between 70 – 79 years old (42.5%). The males were more affected than females.

Untreated hypertension is a greater risk factor than treated hypertension.

A variety of many factors like age, poor neurological status at onset, measured by Glasgow Coma Scale, larger than 60 cm<sup>3</sup> volume of hematoma, intraventricular extension of hemorrhage, anticoagulant treatment and subtentorial location increase the mortality .

Kinetotherapy initiated after 14 days of onset and continued till six months has an important role in the improvement of the quality of life.

### Aknowledgements

We thanks to all our participants and subjects in this study.

### References

- Atlas SW, Grossman RI, Gomori JM, 1987, Hemorrhagic intracranial malignant neoplasms: spin-echo MR imaging. *Radiology* 164:71-77.
- Carhuapoma JR, Mayer SA, Hanley DF, 2010, Intracerebral hemorrhage. *pg 1-3; 170-171.*
- Flaherty MI, Haverbusch M, Sekar P, 2006, Long-term mortality after intracerebral hemorrhage. *Neurology* 66: 1182-1186
- Gogu A, Lupu M, Parv F, 2015, The correlation between ischemic stroke, atrial fibrillation and early neurorehabilitation. *Science, Movement and Health, vol XV, ISSUE 1, pg 35-40.*
- Vahedi K, Vicant E, Mateo J, 2007, DECIMAL Investigators. Sequential design, multicenter, randomized, controlled trial of early decompressive craniectomy in malignant middle cerebral artery infarction. *Stroke.* 38 (9): 2506-2517.
- Vonsattel JP, Myers RH, Hedley-Whyte ET, 1991. Cerebral amyloid angiopathy without and with cerebral hemorrhages: a comparative histological study. *Ann. Neurol.* 30:637-649.
- Woo D, Haverbusch M, Sekar P, et al., 2004, The effect of untreated hypertension on hemorrhagic stroke. *Stroke* 35: 1703 – 1708.