Hemorrhagic stroke in young people

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Abstract

The paper presents the incidence, causes, locations, and prognosis of intracerebral hemorrhages (ICH) in people aged ≤ 35 years. We retrospectively investigated consecutive 191 patients with neuroimaging evidence or pathological confirmation of symptomatic ICH and we found 8 cases of intracerebral hemorrhages in young people (≤ 35 years). The most frequent risk factors were hypertension, tobacco use and alcohol use. The locations of ICH in young people were basal ganglia/internal capsule and lobar, and the most common causes was high blood pressure, one case of vascular malformation and cryptogenic ICH was considered in two cases. Hemorrhagic stroke in young people are mainly located in the basal ganglia in high blood pressure and lobar caused of vascular malformation. Mortality and morbidity in the acute phase are low and are related to hypertension as the cause of hemorrhagic stroke.

Keywords: hemorrhagic stroke, high blood pressure, young people

Introduction

Spontaneous intracerebral hemorrhage is approximately 10% - 20 % of all stroke cases and the incidence of hemorrhagic stroke in young people (aged <35 years) has been estimated to be 0.5/100 000. The absolute proportion of hemorrhagic stroke in young people is strongly linked to the structure of the population. In western European countries, with a high prevalence of old and very old people, less of strokes occur in subject under 35 years but higher incidence rates have been found in the developing countries. The etiology of ICH in young people includes high blood pressure, vascular malformations, and drug use (tobacco use and alcohol use). Few series of intracerebral hemorrhage in young people have been published and most do not provide a detailed discussion of the primary causes of hemorrhagic stroke. This study describes the frequency of spontaneous intracerebral hemorrhage and to provide an analysis of causes, location, and prognosis of hemorrhagic stroke in young people.

Material and Methods

The study included 191 consecutive patients with spontaneous intracerebral hemorrhage during a calendar year aged between 27 and 93 years with a group of 8 patients under 35 years: 5 men and 3 women. The inclusion criteria were age ≤ 35 years at the time of intracerebral hemorrhage and availability of detailed information relating to risk factors, clinical features, hospital course and final outcome.

We retrospectively analyzed the clinical and radiological data from those patients with neuroimaging or neuropathological evidence of spontaneous intracerebral hemorrhage. The patients with primary subarachnoid and traumatic hemorrhages and those with a previously diagnosed vascular malformation, aneurysm or brain tumor were excluded.

We analyzed in each patient the risk factors: high blood pressure, use of antihypertensive drugs, previous medical diagnosis of arterial hypertension, tobacco use, alcohol use and oral contraceptive use, regular use during the last year.

Classification of each hematoma location was based on the location of the center of the hematoma as lobar (frontal, parietal, temporal, occipital), thalamic, basal ganglia/internal capsule established by CT or MRI. (Figure 1, 2 and 3).

The etiology of hemorrhagic stroke was defined in accordance with the following criteria:

- arterial hypertension and documentation of high blood pressure, as well as exclusion of other potential cause of ICH;
- arteriovenous malformation confirmed by MRI or brain angiography;
- drug use and tobacco use or alcohol use and the hemorrhagic stroke in close temporal relation to use of drugs and exclusion of other potential causes;
- hematologic disorders, and
- cryptogenic, patients without risk factors or predisposing conditions in whom structural abnormalities were not found on MRI or cerebral angiography to explain hemorrhagic stroke and with follow-up during a year.

TABLE 1

Distribution of hemorrhagic stroke by age and sex

Age	Man	Women
27 - 35 years	5	3
36 - 93 years	108	75

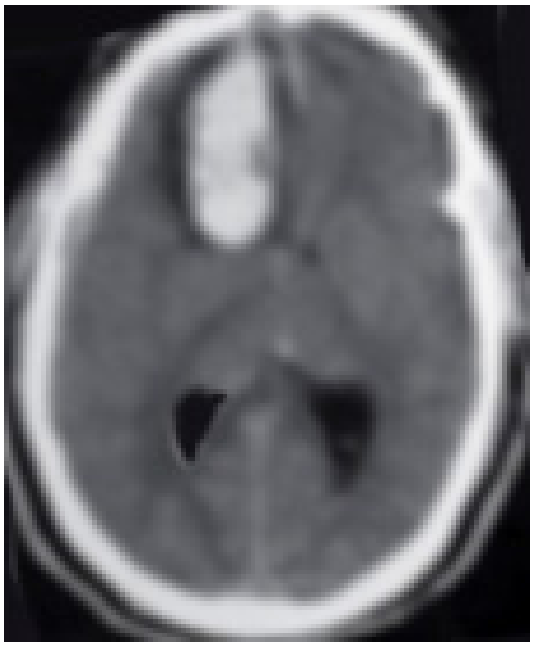


Figure 1 CT image of frontal intracerebral lobar hematoma

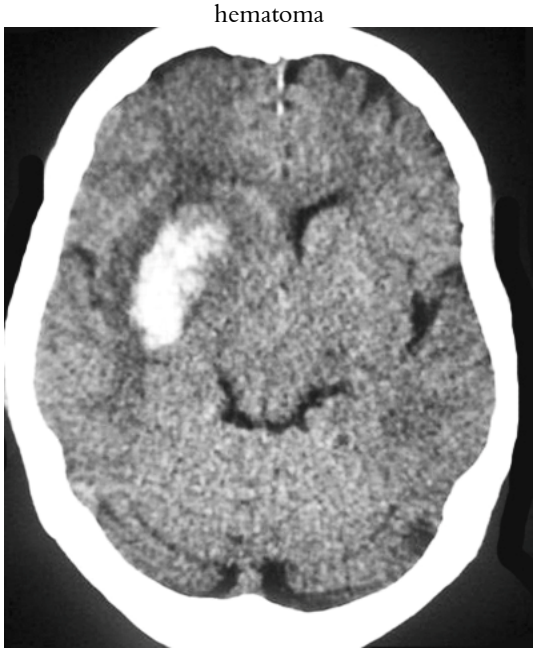


Figure 2 CT image of basal ganglia hematoma

Results

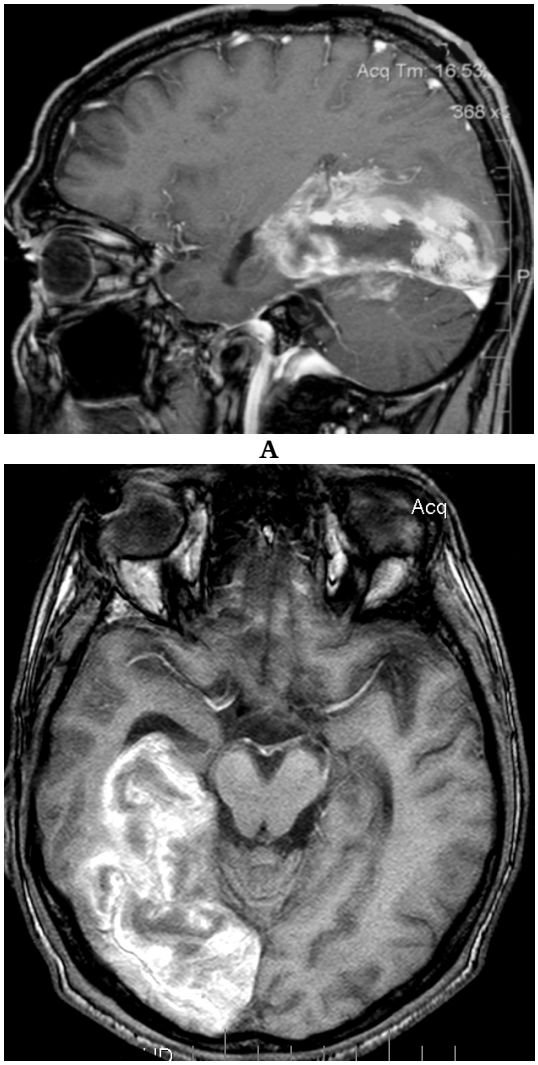
The most common locations of hemorrhagic stroke were basal ganglia/internal capsule in 4 patients and lobar in 4 patients . The most common causes of ICH were hypertension in five patients, the rupture of an arteriovenous malformation in one patient and in two patients we could not demonstrate the cause of intracerebral hemorrhage. All 5 patients from our series with hemorrhagic stroke related to hypertension had persistent increase of blood pressure.

Surgery was successful in three patients with lobar intracerebral hemorrhage : the case of the arteriovenous malformation and in two patients with cryptogenic hemorrhagic stroke and they were discharged home with no neurological deficits.

Discussion

Spontaneous hemorrhagic stroke in young people (aged <35 years) has been estimated to be 0.5/100 000 and few series of intracerebral hemorrhage in young people have been published.

Ruíz-Sandoval et al, 1999, analyzed 200 patients aged < 40 years, among 1734 consecutive patients diagnosed with hemorrhagic stroke. They found that the most common risk factors included tobacco use in 20%, hypertension in 13% and alcohol use in 10%. Also they found that the most common locations of intracerebral hemorrhage were lobar in 55%, basal ganglia/internal capsule in 22%, the brain stem in 26 (13%), cerebellum in 10 (5%), intraventricular in 4%, and multiple in 3 cases. The most common causes of intracerebral hemorrhage were rupture of an arteriovenous malformation in 33 % of patients, cavernous angioma in 16% of patients and hypertension in 11% and in 15 % patients they could not demonstrate the cause of intracerebral hemorrhage.



A

B

Figure 3 A, B MRI of hemorrhagic stroke in right occipito-temporal area

Fuh JL et al, 1994, evaluated 170 patients aged 15–45 years who had nontraumatic hemorrhagic stroke and they found that the main causes of spontaneous intracerebral hemorrhage were hypertension, ruptured arteriovenous malformation and blood dyscrasia. A cause was not found in 42

patients (24.7%). Also they found that young adults with nontraumatic intracerebral are a heterogeneous group and hypertension accounts for about one-third of intracerebral hemorrhage and it is an important preventable cause of hemorrhagic stroke in young adults .

We evaluated 191 patients diagnosed with hemorrhagic stroke and young adults with nontraumatic intracerebral hemorrhage were only 8 cases and the main cause of hemorrhagic stroke in young people was high blood pressure (for 5 patients). Therefore arterial hypertension is an important preventable cause of hemorrhagic stroke in young adults.

But in other series with large number of patients hypertension was responsible for a low percentage of intracerebral hemorrhage and compared with other causes, this produced the worst outcome and resulted in high morbidity, mortality, and recurrence. Hypertension as a cause of intracerebral hemorrhage was most common in individuals aged >31 years and the intracerebral hemorrhage was often located in the basal ganglia.

We found only a case of intracerebral hemorrhage caused of the rupture of an arteriovenous malformation, but in other series the most common cause of intracerebral hemorrhage was rupture of vascular malformations, including both arteriovenous malformation and cavernous angioma. The most common location of intracerebral hemorrhage resulting from arteriovenous malformations was lobar. Cavernous angioma was most commonly located supratentorially but was the most common cause of intracerebral hemorrhage located in the brain stem.

Cryptogenic intracerebral hemorrhage was considered in two patients, compared with other studies that show cryptogenic intracerebral hemorrhage in 15% of their patients, but the number of our cases is small.

Risk factors for intracerebral hemorrhage are known: age and race; hypertension, cerebral amyloid angiopathy, arteriovenous malformations, alcohol use and tobacco use.

Age is the greatest risk factor for intracerebral hemorrhage. Incidence rates increase dramatically among persons older than 60 years. Hypertension is the most important and prevalent modifiable risk factor for ICH. Untreated hypertension is a greater risk factor than treated hypertension, and hypertensive patients who discontinue their medications have greater risk than those who continue them Cerebral amyloid angiopathy is now considered an important cause of lobar hemorrhage in the elderly.

Aneurysms and vascular malformations are particularly important as a cause of intracerebral hemorrhage among young people, although in our series the rupture of an arteriovenous malformation was found only in one patient. Antiplatelet drugs probably increase the risk of intracerebral hemorrhage by a small amount. The absolute risk of intracranial hemorrhage among elderly persons taking aspirin has been estimated at 0.2–0.3% annually (vs. 0.15% in similar persons not taking antiplatelets or anticoagulants).

Numerous studies have identified a relationship between alcohol use and the risk of hemorrhagic stroke and also several studies suggest that current smoking increases the risk of intracerebral hemorrhage .

Spontaneous intracerebral hemorrhage causes 10–15% of first ever strokes and is

associated with the highest mortality of all cerebrovascular events. The initial diagnostic question in a patient with acute onset of focal neurological deficits is whether or not the deficits are caused by intracerebral hemorrhage . The answer is of utmost importance in determining the direction of treatment. Non-contrast CT is the first-line imaging modality in this setting. Computerized tomography scans are rapid, readily available, and relatively inexpensive. Most importantly they have exquisite sensitivity and specificity, approaching 100%, in the detection of acute blood.

Because hypertension is the most common cause of spontaneous intracerebral hemorrhage, its treatment in this setting is of considerable importance.

Intracerebral hematoma growth may be accelerated by hypertension in the setting of acute intracerebral hemorrhage. The occurrence of intracerebral hemorrhage is strongly related to premorbid blood pressure; however, the relationship between the growth of hematoma and uncontrolled blood pressure remains to be clarified.

Jauch et al demonstrated that there was no definitive correlation between hemodynamic parameters,such as blood pressure and hematoma growth. The recent studies emphasize aggressive blood pressure control for a systolic blood pressure >200 mmHg or mean arterial blood pressure (MAP) >150 mmHg . For an systolic blood pressure >180 mmHg (or MAP >130 mmHg), with a suspicion of elevated ICP, ICP monitoring is recommended; on the other hand if ICP elevation is not a concern based on the patient's neurological examination, a goal of systolic blood pressure <160 mmHg or MAP <110 mmHg is recommended.

Surgical therapies have been unable to improve the neurological outcome of the patients with intracerebral hematoma and to minimize brain tissue trauma that is induced by surgical manipulation, and in view of the failure of craniotomy/hematoma evacuation to improve survival and neurological outcome after intracerebral hemorrhage, new modalities as minimally invasive surgery (MIS = e.g., stereotactic-guided aspiration) have emerged as treatment alternatives that are amenable to testing. Studies testing the safety and efficacy of minimally invasive surgery techniques in the treatment of intracerebral hematoma have taken advantage of mainly two different procedures: the use of endoscopic aspiration of the hematoma and the stereotactic placement of a flexible catheter in the core of the hematoma followed by the administration of thrombolytic agents. Both approaches are viable treatment alternatives of craniotomy in hematoma evacuation . Clot evacuation combining the use of fibrinolysis with clot aspiration has emerged as the most promising surgical modality in the acute care of intracerebral hematoma.

Conclusion

Arteriovenous malformations are particularly important as a cause of spontaneous intracerebral hemorrhage in young people intracerebral hemorrhage, although in our series the rupture of an arteriovenous malformation was found only in one patient.

The use of non-contrast CT in the initial evaluation of patients presenting with suspected intracerebral hemorrhage is well established and universally accepted.

Because hypertension is the most common cause of spontaneous intracerebral

hemorrhage, an aggressive blood pressure control for a systolic blood pressure >200 mmHg is needed.

The surgical treatment of intracerebral hematoma consist of a conventional craniotomy and evacuation of the clot under direct vision, with or without the microscope; a stereotactic aspiration through a burr hole - aspiration of a dense clot can be facilitated either by instillation of fibrinolytic agents or by fragmenting it by means of an ultrasonic device and endoscopic surgery.

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