Recent Trends in Management of Spontaneous Ganglionic Intracerebral Hemorrhage

Thesis

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بسم الله الرحمن الرحيم

"قالوا سبحانك لا علم لنا إلا ما
علمتنا إنك أنت العليم الحكيم"

صدق الله العظيم
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Abstract

Ganglionic Intracerebral hemorrhage accounts for about 10-30% of strokes and represents 50% of spontaneous ICH. There is a big controversy about the management of such cases, whether medical or surgical. Surgical approaches are numerous.

The current study was carried in the neurosurgery department in Kasr Al-Aini hospital on 30 patients where we have used the two most recent trends in management, the endoscopic evacuation and the transsylvian transinsular approach.

In the study we have concluded that early evacuation before 24 hours is a must. The endoscopic tools available are not suitable to evacuate such hematomas, especially with late presentation. The transsylvian transinsular approach is a minimally invasive technique, familiar to almost all neurosurgeons. The emergency department staff and ICU staff need to be specially trained to deal with such cases.

Key words: Putaminal Hemorrhage, Intracerebral hematoma, basal ganglia hematoma, spontaneous Intracerebral hematoma, hypertensive hematoma.

Contents

List of Abbreviations

C.T / CT	Computed Tomography
CAA	Cerebral Amyloid Angiopathy
CECT	Contrast Enhancing CT
ED	Emergency Department
ER	Emergency
GCS	Glasgow Coma Scale
ICH	Intracerebral Hemorrhage
ICP	Intracranial Pressure
ICP	Intracranial Pressure
MRI	Magnetic Resonance Imaging
NECT	Non-contrast Enhancing CT
OACs	Oral Anticoagulants
OM Line	Orbito-Meatal Line
PCCs	Prothrombin Complex Concentrates
rFVIIa	recombinant Factor VIIa

List of Tables

List of Figures

Introduction and aim of the study

Spontaneous Intracerebral hemorrhage (ICH) is defined as hemorrhage in the brain in the absence of immediate trauma. It can be divided into primary and secondary types. Primary ICH occurs in the absence of a structural disease process; secondary ICH is associated with a congenital or acquired lesion, it accounts for 10% to 30% of all strokes **(Hseih et al, 2006).**

Primary ICH accounts for 70-80% of cases and are caused by either chronic hypertension, which accounts for over 50% of cases, or amyloid angiopathy **(Mayer and Rincon, 2005).** Secondary ICH is associated with underlying condition such as vascular malformations, coagulopathy, tumors, or substance abuse **(Broderick et al, 1993).**

The pathophysiology of ICH in patients of anticoagulant therapy is not well known but various factors have been hypothesized. In cerebral amyloid angiopathy, the hematoma is usually lobar in the occipital and parietal regions and is due to deposition of amyloid in the media and adventitia of small cortical and leptomenigeal vessels **(Singh et al, 2004).**

The most common locations of cases of spontaneous ICH are basal ganglia (50%) of cases, followed by subcortical white matter, cerebellum, and thalamus. Common neurological signs in cases of putaminal ICH are hemiparesis, hemisensory syndrome, homonymous hemianopsia, horizontal gaze palsy, aphasia (in dominant hemisphere), and hemineglect (in non-dominant hemisphere). Caudate hemorrhage represents approximately 5-7% of cases of ICH. The bleeding vessels are the perforating branches of the anterior and middle cerebral arteries. Ventricular extension into the frontal horn of the lateral ventricle is common with secondary hydrocephalus **(Singh et al, 2004).**

Computed Tomography (CT) scan of the brain has a sensitivity and specificity that approaches 100% for acute ICH. The volume of the ICH can be approximated rapidly with a head CT scan. The estimated volume in cubic centimeters is calculated easily based on the formula, **(AxBxC)/2**, where **A** is the largest diameter of the hematoma on axial CT scan slice in centimeters; **B** is the diameter perpendicular to **A** on the same slice, and **C** is the thickness of the hematoma on CT in centimeters, also counted as the number of axial cuts on CT multiplied by slice thickness in centimeters (excluding the highest and lowest cuts visualizing the ICH) **(Kothari et al, 1996).**

The management of ICH is controversial. Studies show that those who suffer ICH have a 30 days mortality rate of 35-44% and a 6 months mortality rate approaching 50%. The medical management includes control of blood pressure which is the most important factor in determining the rapid extension of ICH **(Bae et al, 1992).** Medical control of Intracranial Pressure (ICP) with the use of osmotic diuretics, Mannitol, which safely and effectively lowers the ICP. Other methods as hypocarbia, sedation with neuromuscular paralysis all aim at decrease ICP **(Hseih et al, 2006).**The use of steroids is controversial **(Singh et al, 2004).**

The goals of surgery are to reduce the mass effect and to remove potential neurotoxic factors and prevent their interaction with surrounding normal tissue **(Hseih et al, 2006).** The surgical techniques used for evacuation of ganglionic (putaminal) ICH are numerous, starting with conventional craniotomy, where three general approaches have been used:

transtemporal, transfrontal, and transsylvian **(Mizukami, 1983).** Burr hole aspiration is a simple procedure but has a low effectiveness and high rates of recurrence. Stereotactic aspiration has been used but carries the risk of rebleeding and disadvantage of lack of direct visualization **(Niizuma et al, 1989).** Other less commonly used methods are fibrinolytic therapy and mechanically assisted aspiration. Recently neuroendoscopy has been used for management of spontaneous Ganglionic ICH, either in the form of endoscopy guided removal of spontaneous ICH and endoscopic evacuation of putaminal hemorrhage **(Nishihara et al, 2007), (Hseih et al, 2005).**

Endoscopic evacuation of intracerebral hematoma (ICH) has the advantage of being less invasive than craniotomy but limited visualization and difficult hemostasis are still a concern **(Hayashi et al, 2006).** The collapse of the hematoma cavity limits the visualization of the surgical field. Inflation of the hematoma cavity with saline irrigation improves visualization and facilitates accurate intra-operative orientation **(Nagasaka et al, 2008).**

The aim of this study is to review the literature and recent publications regarding the management of spontaneous ganglionic ICH. Discussing the timing of surgical intervention and evaluating the new trends in the surgical management.

Review of Literature

EPIDEMIOLOGY:

Intracerebral Hemorrhage (ICH) is the second leading cause of stroke. It is estimated to be about double the incidence of subarachnoid hemorrhage. Only 38% of patients affected with ICH survive the first year **(Dennis et al, 1993).** The rate of ICH is expected to double in the next 50 years as a result of the increasing age of the population **(Aghi et al, 2006).**

RISK FACTORS:

Six risk factors for ICH have been identified, age, male sex, race, hypertension, high alcohol intake, and low serum cholesterol. Regarding other possible risk factors, current or past smoking and diabetes mellitus are weak risk factors, if at all **(Ariesen et al, 2003).**

The incidence of ICH increases significantly after the age 55 and doubles with each decade of age until the age of 80, at which point the incidence increases 25 folds during each decade **(Giroud et al, 1991).**

ICH is more common in men than in women. During the 20-year period covered by the National Health and Nutrition Examination Survey Epidemiologic Follow-up Study, the incidence of ICH among blacks was 50 per 100,000, a little more than twice the incidence among whites **(Qureshi et al, 1999).** It has been hypothesized that hypertension and factors leading to limited access to health care result in the higher incidence of ICH within African-American community. The higher incidence of ICH in Japan has been attributed to a higher incidence of hypertension in

Japanese populations and diets leading to low serum cholesterol, another risk factor for ICH. The reversibility of the dietary factor may lead to the reduction in ICH seen when Japanese people emigrate to the United States, whereas their persistent hypertension may explain why their rates never drop to the same level as whites even after they emigrate to the United States **(Aghi et al, 2006).**

There have been 11 case-controlled studies on hypertension and risk of ICH, with all showing a positive association between hypertension and ICH. Hypertension is classified as high normal (systolic 130 to 139 or diastolic 85-89) stage I hypertension (systolic 140-159 or diastolic 90-99), stage II hypertension (systolic 160-179 or diastolic 100-109), or stage III hypertension (systolic > 180 or diastolic > 110). Suh and colleagues found a relative risk of 2.2 for high normal, 5.3 for stage I hypertension, 10.4 for stage II hypertension, and 33 for stage III hypertension **(Suh et al, 2001).** Iribarren and colleagues found for each one standard deviation increase in systolic blood pressure (18mmHg in men and 19 mmHg in women) a relative risk of 1.14 in men and 1.17 in women **(Iribarren et al, 1996).** Leppala and colleagues found a relative risk of 2.20 for systolic blood pressure 140 to 159 mmHg and 3.78 for systolic blood pressure more than 160 mmHg compared with systolic blood pressure less than 139 mmHg **(Leppala et al, 1999).**

The correlation between blood pressure and ICH also leads to diurnal and seasonal variations in the onset of ICH. In general, ICH onset is usually during activity and rarely during sleep, which may be related to elevated blood pressure or increased cerebral blood flow. One study covering a decade of ICH cases in a Japanese city found that men 69 years of age and