HOW TO INVESTIGATE INTRACEREBRAL HAEMORRHAGES? DO WE KNOW, WHOM, HOW & WHEN TO INVESTIGATE?

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Abstract : *Intra cerebral Haemorrhage (ICH) is much less common than ischaemic stroke (15% vs 85% in most western studies), but is associated with a significantly worse prognosis.*
ICH is more common in Asian population, probably reflecting higher rates of small vessel disease, hypertension and genetic factors. Over all ,ICH mortality rates approach 50% and there has been little effective treatment to date, except for the overall benefits from stroke unit care. Hypertension, trauma and cerebral amyloid angiopathy cause the majority of these hemorrhages. Advanced age and heavy alcohol consumption increase the risk and, cocaine use is one of the most important causes in the young.

CAUSES OF INTRACRANIAL HEMORRHAGE

HYPERTENSIVE HEMORRHAGE:

Hypertensive Intracerebal hemorrhage, one of the most common causes, usually results from spontaneous rupture of small penetrating artery deep in the brain. The most common sites are the basal ganglia (putamen, thalamus and adjacent deep white matter), deep cerebellum and pons. The hemorrhage may be small or a large clot may form and compress adjacent tissues, causing herniation and death. Blood may dissect in to the ventricular space, which substantially increases mortality and may cause hydrocephalous.

Clinically they present with abrupt onset of focal neurological deficit, occasionally seizures diminishing level of consciousness and signs of increased ICH, such as headache and vomiting.

Common Sites & Presentations:

a) **Putamen:** Most common site for hypertensive hemorrhages, contra lateral hemi-paresis along with slurring of speech, gradual weakness of arm and leg, and the eye deviate away from the site of the hemiparesis. When hemorrhages are large, drowsiness gives way to stupor as signs of upper brain stem compression appear. Coma ensues accompanied by deep, irregular or intermittent respiration, a dilated and fixed ipsilateral pupil, and decerebrate rigidity.

b) **Thalamus:** Thalamic hemorrhages also produce a contralateral hemiplegia or hemiparesis from pressure on adjacent internal capsule. A prominent sensory deficit & aphasia may be seen in dominant thalamic involvement or mutism in non dominant hemorrhages. They also produce a lot of ocular disturbances like nystagmus, ocular palsies, Horner's syndrome etc.

c) **Pons**: In Pontine hemorrhages deep Coma with quadriplegia usually occurs over a few minutes with prominent decerebrate rigidity and pin point pupils that react to light and impaired ocular movements. Hyper apnea, severe hypertension and hyper hidrosis are common.

d) **Cerebellum:** Cerebellar hemorrhages develop over several hours and are characterized by occipital headache, repeated vomiting and ataxia of gait. In mild cases there may be no other neurological signs other than ataxia. Dizziness and vertigo may be prominent. There is often paresis of conjugate lateral gaze towards the side of the hemorrhage, forced deviation of the eye towards the opposite side, or an ipsilateral sixth nerve palsy. Dysarthria and dysphagia may occur. As hours pass the patient may become stupor and then comatose from brain stem compression or obstructive hydrocephalous; immediate surgical evacuation before brain stem compression occurs, may be life saving.

Hydrocephalous from fourth ventricle compression can be relieved by external ventricular drainage, but definite haematoma evacuation is essential for survival.

LOBAR HEMORRHAGES

Most lobar hemorrhages are small and cause a restricted clinical syndrome caused by embolus to an artery supplying one lobe. For example in occipital hemorrhages characterized by hemianopia, Left temoral hemorrhages:aphasia and delirium, parietal hemorrhages hemi sensory loss, frontal hemorrhages;arm weakness. Large hemorrhages may be associated with stupor or coma if they compress the thalamus or mid brain. Most patient with lobar hemorrhages have focal headaches, and more than half vomit or are drowsy. Stiff neck and seizures are uncommon.

CEREBRAL AMYLOID ANGIOPATHY

Disease of the elderly in which arteriolar degeneration occurs and amyloid is deposited in the walls of the cerebral arteries. It causes both single and recurrent lobar hemorrhages and is probably the most common cause of lobar hemorrhage in the elderly. It also includes some intracranial hemorrhages associated with intravenous thrombolysis given for MI. This disorder can be suspected in patients who present with multiple hemorrhages (and infarcts) over several months or years or in

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patients with "micro bleeds" seen on brain MRI sequences sensitive for haemosiderin and is definitely diagnosed by demonstration of congo red staining of amyloid in cerebral vessels. There is no specific therapy.

COCAINE INCLUDED HEMORRHAGE

This is frequent cause of stroke in young age (>45 years) patients. Intra cerebral hemorrhages, ischemic stroke and SAH are all associated with cocaine use.

HEAD INJURY

This often causes intracranial bleeding. The common sites are intracerebral (esp. temporal and inferior frontal lobes) and in to the subarachnoid, subdural and epidural spaces. Trauma must be considered in any patient with an unexplained acute neurologic deficit (hemiparesis, stupor or confusion), particularly if the deficit occurred in the context of a fall.

ANTICOAGULANT THERAPHY

Intracranial hemorrhages associated with anticoagulant therapy can occur at any location; they are often lobar or subdural. Anticoagulant related intracerebral hemorrhages may evolve slowly, over 24 to 48 hrs. Coagulopathy should be reversed with FFP or factor replacement, vitamin K and platelet transfusion in case of & decreased platelets, to limit the volume of hemorrahages.. Intra cerebral haemorrhages associated with hematologic disorders (leukemia, aplastic anemia, Thrombocytopenic pururas) can occur at any site and may present as multiple intracerebral haemorrhages.

BRAIN TUMORS

Haemorrhages in the brain may be the first manifestation of neoplasm; cholangio carcinoma, malignant melanomas, renal cell carcinomas and bronchogenic carcinomas are among the most common metastatic tumors associated with intracerebral haemorrhage. Glioblastoma multiforme in adults and meduloblastoma in children may also have areas of intracerebral haemorrhage.

HYPERTENSIVE ENCEPHALOPATHY

This condition is a complication of malignant hypertension, characterized by severe hypertension associated with headache, nausea, vomiting, convulsions, confusion, stupor and coma. There is retinal haemorrhages, exudates, papillodema (hypertensive retinopathy) and evidence of renal and cardiac disease.

INVESTIGATIVE APPROACH

CT Scan: This is the most important tool and confirms the diagnosis in most ICH cases. It defines the size, site and surrounding oedema and midline shift. It can also identify hydrocephalous, tumour bleed and occasionally AV malformations.

MRI Scan: MRI brain is not routinely used but in situations like tumour bleed, AV malformation and other bleeds gives better view of tumours, malformations and aneurysms.

CT Angio or MRI Angio & Conventional Angiography of intracranial vessels are needed in cases of atypical ICH or suspected AV malformation, particularly if the patient is young or not hypertensive and the hematoma is not in one of the four usual sites for hypertensive haemorrhage; for example, haemorrhage in to the temporal lobe suggests rupture of a MCA saccular aneurysm.

A detailed history and examination along with routine laboratory investigations esp. liver function tests (LFT's) and Coagulation profiles are essential to identify and treat the underlying basic systemic illness.

CONCLUSION

Hypertension, trauma and cerebral amyloid angiopathy cause the majority to these haemorhages. Advanced age and heavy alcohol consumption increases the risk, and cocaine use if one of the most important causes in the young.

RECOMMENDED READING

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ETHICAL GUIDELINES FOR BIOMEDICAL RESEARCH

The need for uniform ethical guidelines for research on human subjects is universally recognised. It has acquired a new sense of urgency as the critical issues in the area of biogenetic research involving human subjects have become acute. Apart from the mandatory *clinical trails* on new drugs, a number of *diagnostic procedures, therapeutic interventions and prevention measures* including the use of vaccines, are being introduced which involve human subjects. Further the advent of *new medical devices* and *radio-active materials* and therapeutic benefits of *recombinant DNA products* have added a new dimension to the ethical issues that need to be considered before evaluating these for their efficacy, utility and safety.

Any research using the human beings as subjects shall bear in mind the following **principles** of : i) **essentiallity**, (ii) **voluntariness, informed consent**, (iii) **non exploitation**, (iv) **privacy** and **confidentially**, (v) **precaution** and **risk minimisation**, (vi) **professional competence**, (vii) **accountability & transparency**, (viii) **maximisation of public interest** and **distributive justice** (ix) **institutional arrangements** (x) **public domain** (xi) totality of **responsibility** and (xii) **compliance**.

Recent advances in the field of **Assisted Reproductive technologies, organ transplantation, Human genome analysis**,and **gene therapy** promise unquestionable benefits to mankind. At the same time, they raise many questions of law and ethics, stimulating public interest and concern.

(Source : ICMR Publication 2000)

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