HYPERTENSIVE ENCEPHALOPATHY

by

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Hypertensive encephalopathy is a relatively rare medical emergency but is likely to be encountered more often in view of the increasing prevalence of hypertension at least in the urban population in Fiji. The condition is defined as the appearance of cerebral symptoms due to sudden and marked elevation of blood pressure. The situation is life-threatening but largely reversible process provided prompt treatment with effective hypotensive drug or combination of drugs are instituted. If the neurological symptoms worsen with treatment, hypertensive encephalopathy is unlikely.[1]

CLINICAL FEATURES

Hypertensive encephalopathy, like other hypertensive emergencies, rarely develops in previously normotensive patients during the course of acute glomerulonephritis, eclampsia, collagen vascular diseases, head injury or drug ingestion. It most commonly occurs as a complication of the accelerated phase of poorly controlled or uncontrolled hypertension of various causes.

The manifestations of hypertensive encephalopathy are severe headache, vomiting, apprehension and mental confusion. Blurred vision, nausea, and focal neurological deficit such as hemiparesis, aphasia, focal seizures and even blindness may occur. The symptoms develop over a period of one to few days and if untreated the condition deteriorates with convulsions, stupor, and coma leading to death in 12-48 hours.

Fundoscopic examination may show hypertensive changes such as papilloedema, exudates or haemorrhages. In some cases the fundi may be normal or show minimal changes. The spinal fluid pressure is raised but the fluid is otherwise clear; occasionally may be mildly xanthochromic and the protein may be elevated to 100mg%.[2] There may be associated features of hypertension in chest Xray, ECG and on urinalysis. Cerebral oedema is the most common finding in fatal cases but petechial haemorrhages, minute infarcts and arteriolar necrosis may be seen.

The condition has to be differentiated from hypertension related complications such as uraemic encephalopathy, hypertensive intracerebral haemorrhage and thrombotic or embolic strokes, as well as, from seizures, meningitis, encephalitis, pseudotumour cerebri, subarachnoid haemorrhage and transient ischaemic attack.

CEREBRAL BLOOD FLOW

Constant cerebral blood flow is vital for survival. Arrest of cerebral circulation for more than five seconds is followed by unconsciousness and cerebral ischaemia of longer than three minutes causes irreparable brain damage.[3] The brain receives a relatively large blood supply of 750 ml/min or 14% of the cardiac output.[4]

Normal brain has the ability to autoregulate its blood supply[5] and maintains a relatively constant blood flow over a wide range of blood pressure. When the blood pressure rises too high the cerebral vessels constrict, and likewise when it falls the vessels dilate to ensure a constant flow.

The range of blood pressure over which cerebral autoregulation occurs ranges from about the mean arterial pressure of 60mm Hg at the lower limit to 150-200mmHg at the upper limit.[6] When the blood pressure falls below the lower limit of autoregulation, even with maximum dilatation of cerebral vessels, the cerebral blood flow falls and hypoxia occurs. When the blood pressure exceeds the upper limit of autoregulation the cerebral blood flow increases and hypertensive encephalopathy may occur.

The pathogenesis of hypertensive encephalopathy is unclear. Both vasospasm and vasodilator therories have been suggested and the latter seems to be the more likely mechanism.

The level of blood pressure at which hypertensive encephalopathy may occur varies. It may occur in a normotensive patient with blood pressure as low as 160/100 and in chronic hypertensive patient may not develop even with the arterial pressure of 200 or 225mmHg.[6] In hypertensive patients, the autoregulatory curve is shifted to the right i.e. both the lower and upper limits are shifted upwards, probably as a consequence of hypertrophy of the arteriolar wall.[7] This would explain the rarity of hypertensive encephalopathy in chronic hypertensives even with very high pressures and also has very important therapeutic implications. The

reduction of blood pressure in these patients must be gradual to avoid hypotension, cerebrovascular and cardiac complications. If a normotensive state is finally achieved, a shift of autoregulation curve back to normal would be expected.[7]

CASE I

A 49 year old lady was admitted with severe hypertension. She gave a 12-year history of hypertension and diabetes mellitus but the treatment had been erratic. Three months before admission, she developed throbbing frontal headache. Two days before admission, the headache became severe and generalized and she experienced exertional and nocturnal dyspnoea. On the day of admission, she was nauseated and vomited several times.

On examination, she was grossly obese. The BP was 250/160, pulse 80/minute regular and the heart sounds were normal. The heart size was indeterminate. There were bilateral basal crepitations in the chest. The optic fundi showed numerous exudates and haemorrhages thought to be due to hypertension and diabetes.

The blood urea was 60mg%, serum sodium 135mEq/L, serum potassium 5mEq/L, blood sugar 232mg% and the ECG was normal. The chest Xray showed a normal sized heart but the lung fields were congested. There was trace proteinuria.

She was treated with intramuscular hydralazine and oral methyldopa and frusemide. By next day she became asymptomatic and her BP came down to 160/80.

CASE II

A 34 year old male, with a family history of hypertension, was admitted to CWM Hospital 15 years ago.

Three days before admission, he developed slight generalized headaches. AP Codeine gave temporary relief. The headache gradually became very severe over the next 48 hours and on the day of admission, he developed persistent vomiting and felt weak, tired and drowsy.

In the past he had enjoyed good health except for occasional sinus headaches. His BP a year previously was normal.

On admission he felt weak, tired and sleepy. The BP was 180/120, pulse 100/minute and the heart sounds were normal. The chest and the abdomen were normal. Femoral pulses were normal and undelayed. The optic fundi were normal. There was no sign of meningeal irritation.

The full blood count, ESR, blood urea, serum electrolytes, and chest Xray were all normal. Except for trace proteinuria, the urinalysis was normal. The CSF was clear and colourless with pressure of 180mm H2O, sugar 18mg% and protein of 52mg%. The culture was negative. ECG showed changes of left ventricular hypertrophy.

He received pethidine, chlorpromazine and sedatives. The next day, BP was 170/100 and headache and vomiting subsided. On the third day, BP was 140/90 and he was discharged on the 4th day on Reserpine. Twelve months later his BP remained normal. The ECG was unremarkable. Oral hypotensives were restarted 18 months later. Some months later he was found to have a BP of 180/130. He was asymptomatic. After further stabilization he was discharged from hospital. He has remained well since, taking hypotensive drugs regularly.

TREATMENT

The aim of the treatment is to lower the blood pressure rapidly but not excessively, to a diastolic pressure of 100mm Hg initially. There are a large number of drugs available that could lower blood pressure quickly. They have to be given parenterally. The clinician has to decide the rapidity with which reduction is desirable.

HYDRALAZINE (APRESOLINE)

Hydralazine lowers blood pressure after parenteral administration by causing vascular smooth muscle relaxation and thus arteriolar dilatation and lowering of the peripheral vascular resistance. It lowers the blood pressure within 15 minutes of parenteral administration. Doses of 10 to 20mg can be given intravenously slowly or intramuscularly. With the reduction in blood pressure the dose interval needs to be increased. Hydralazine causes reflex increase in heart rate, stroke volume and cardiac output and has to be used with care in patients with coronary artery disease. This reflex cardiac stimulation can be blocked by simultaneous administration of a beta-blocker such as propranolol. The drug also tends to cause fluid retention which is avoided by giving a diuretic. Diuretics will potentiate the hypotensive effect of hydralazine, Hydralazine does not decrease renal blood flow and is recommended for hypertensive emergencies in acute glomerulonephritis.

DIAZOXIDE (HYPERSTAT)

Diazoxide, a benzothiadiazine derivative chemically related to thiazide diuretics, is a more potent vasodilator than hydralazine. It is a very rapid acting drug, lowering blood pressure within

minutes of administration. It can be given in a dose of 300mg or 5mg/kg body weight intravenously over 10-20 seconds. This dose may cause an excessive fall in blood pressure, and the hypotensive effect may last up to 12 hours.

It is safer to give the drug in multiple small doses i.e. 50-75mg intravenously and repeated at 10-15 minute intervals until a satisfactory reduction of blood pressure occurs. Like hydralazine, it causes reflex cardiac stimulation. The drug should be avoided in hypertensive emergencies due to dissecting aneurysm of the aorta.

The drug inhibits the release of insulin from the pancreas and may cause hyperglycaemia, and in addition can cause hyperuricaemia, both of which are not a major problem in short term administration. Diazoxide relaxes smooth muscles, including the uterine muscle and may therefore arrest labour in eclampsia. It crosses the placenta and can cause hyperbilirubinaemia and alter carbohydrate metabolism in the foetus.[1]

SODIUM NITROPRUSSIDE (NIPRIDE)

It is a very potent peripheral vasodilator drug, immediate-acting and of short duration. The effect wears off in 1-10 minutes after stopping the drug. It is given by slow intravenous infusion i.e. 50mg in 500ml of 5% dextrose, in the concentration of 100mcg/ml and need to be monitored continuously. It is probably best used when other drugs have failed.

RESERPINE (SERPASIL)

Reserpine was widely used in the past but seldom used nowadays. It reduces blood pressure by depleting catecholamines at the postganglionic adrenergic nerve endings. It also depletes serotonin from various tissues including the hypothalamus and vasomotor centres. The drug is slow acting and leads to a smooth fall in blood pressure over several hours. Much larger doses than oral therapy is required to cause fall in blood pressure when given parenterally. The usual dose is 1mg intramuscularly and doubling the dose every four hours depending on blood pressure response. Doses in excess of 4 to 8mg may result to unfavourable effects. Sedation, depression and drowsiness are undesirable side effects.

LABETALOL (TRANDATE)

Labetalol has both alpha and beta-adrenoreceptor blocking action. It is a potent and rapid acting hypotensive when given intravenously. The usual dose is 50mg given intravenously over one minute and repeated at 5 minute intervals until satisfactory reduction of blood pressure occurs. The total dose should not exceed 200mg. It can also be given as a continuous infusion at the rate of 2mg/minute. The maximum effect is seen in 5 minutes and the effect may last for upto 6 hours. To prevent hypotension the patients should be in supine position during and few hours after administration. Bradycardia, which may occur is treated with atropine.

OTHER DRUGS

Methyldopa (Aldomet) has been used in the treatment of severe hypertension. Its gradual response and hypotensive effect is achieved with a dose of 500-1000mg intravenously which should be repeated at 4-6 hourly intervals. Somnolence is a common side effect.

There are a number of other drugs, but they have no added advantage over the drugs mentioned above.

Oral labetatol in the doses of 300-400mg produces a smooth and gradual reduction in blood pressure over a period of hours and is useful where rapid reduction is not desirable.[8] Of the more commonly used drugs chlorpromazine and frusemide combination seems to be effective.[9 10 11]

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References

1. Becker CE and Benowitz NL, Hypertensive Emergencies, Medical Clinics of North America, 1979, 63: 127-140.
2. Koch-Weser J, Hypertensive Emergencies, New England Journal of Medicine, 1974, 290: 211-214.
3. Lenman JAR, The Nerrous System, in Textbook of Physiology, Ed. Bell GH, Emslie-Smith D and Peterson CH, 10th Ed. Churchill-Livingstone, London, p290.
4. Milnor WR, Regional Circulation, in Medical Physiology, Ed. Mountcastle VB, 14th Ed. Mosby, London, p1094-1097.
5. Murray Harper A, Control of Cerebral Circulation in Scientific Foundation of Neurology. Ed. Cretchly M, O'Leary JL and Jennett B, Heinmann London, 1972, p235-243.
6. Cuneo RA and Caronns JJ, The Neurological Complications of Hypertension, Medical Clinics of North America, 1977, 61: 565-580.
7. Strandgoord S, Olesen J. Skinhoj E and Lassen NA, Autoregulation of brain circulation in severe arterial hypertension, British Medical Journal, 1973, 1:507-510.
8. Chose RR, Mathur YB, Upadhyay M, Morgan WD and Khan S, Treatment of hypertensive emergencies with oral labetalol, British Medical Journal, 1978, 2: 96.

9. Young RJ, Lawson AAH and Malone DNS, Treatment of severe hypertension with chlorpromazine and frusemide, British Medical Journal, 1980, 280: 1579.

10. De Asa V and Ram P, The role of chlorpromazine and frusemide in the outpatient treatment of severe hypertension — In preparation.

11. Patel IC and Ram P, Frusemide and chlorpromazine in the inpatient treatment of severe hypertension — In preparation.

ADRENAL INSUFFICIENCY

by

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Adrenal insufficiency is a relatively rare disorder. It results when the level of adrenal steroids fall below the level required for the maintenance of normal health, both under basal and stress conditions. Five cases of adrenal insufficiency, seen in the last five years, are described.

CASE HISTORIES

CASE I

A 44 year old man was admitted for investigation of generalised weakness and hyperpigmentation of nine months duration. Six months before admission he was said to have had low blood pressure. For some months before admission he developed occasional headaches, dizziness, abdominal pain and loose stools at times blood stained.

There was no significant past history other than heavy alcohol intake until 12 months previously.

On examination the general condition was good. The BP was 110/80 with no postural drop, pulse 96/min regular and the heart sounds were normal. The chest and abdomen were normal. There was hyperpigmentation of the skin over the forehead, pinna of the ears, both hands, dorsum of the feet and the oral mucous membranes.

The haemoglobin was 11.3G/100ml, WBC 10600/cmm, neutrophils 60%, lymphocytes 30%, eosinophils 10%, ESR 40mm/Hr and platelet count 200,000/cmm. The blood urea was 56mg/100ml, serum sodium 132mEg/L, potassium 5ml Eq/L, serum cholesterol 267mg/100ml, serum uric acid 6.6mg/100ml and serum creatinine 2.0mg/100ml. The glucose tolerance test, liver function, thyroid function, stool examinations, urinalysis, ECG, xrays of the chest, skull and abdomen, barium meal and enema examinations were all normal. Serum cortisol level was low (0.06 u mol/L) and short synacthen test showd a flat curve.

Prednisone was prescribed, 5mg mane and 2.5mg in the evening. He increased his salt intake, took some herbal medicine, felt better and stopped prednisone. Repeated attempts are requesting him to take prednisone were unsuccessful. Three months later he died at home during a febrile illness, presumably due to acute adrenal insufficiency.

CASE II

A 55 year old male was admitted with a 10 year history of mild intermittent headache, nausea, vomiting and dizziness. Twenty five years previously he was treated for pulmonary tuberculosis.

On admission he was vomiting, had headache and felt lethargic. The BP was 100/70 with slight postural drop to 80/30, pulse 70/min regular and the heart sounds were normal. He was dehydrated. There was some increase in skin pigmentation as well as in the oral mucous membranes.

The haemoglobin was 14.0G/100mls, WBC 3900/cmm, neutrophils 24% lymphocytes 60%, eosinophils 7%, monocytes 9%, platelet count 280,000/cmm; blood urea 45mg/100ml, serum sodium 120mEq/L, serum potassium 6.4mEq/L, serum cholesterol 277mg/1000ml, serum creatinine 1.2mg/100ml, blood sugar 74mg/100ml and serum uric acid 6.1mg/100ml. The chest xray showed old bilateral apical tuberculosis and a small calcification was seen in the right parietal region on skull xray. There was no adrenal calcification. The spinal fluid was normal.

He was treated with hypertonic saline, antiemetics corticosteroids and antituberculous drugs (streptomycin and isonizid). The ECG and