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Hypertensive encephalopathy

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HYPERTENSIVE ENCEPHALOPATHY

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INTRODUCTION

The syndrome of hypertensive encephalopathy since its first description by Fishberg and Oppenheimer[13] in 1928 has been a controversial issue. There has been much discussion as to what etiologic factors may be involved, and one recent author[17] even is skeptical of the syndrome as a unique entity.

Hypertensive encephalopathy may be described as an acute syndrome usually running its course in a matter of days in which severe diastolic hypertension ranging usually between 120 and 180 mm Hg. is associated with headache, nausea and vomiting, weakness, stupor, fits, and even coma and death.[16]

Hypertensive encephalopathy may be seen in a variety of clinical conditions which consequently adds much confusion as to possible etiologic factors. Such conditions as essential hypertension, toxemia of pregnancy, acute glomerulonephritis, pheochromocytoma, acute lead poisoning, Cushing's syndrome, chronic renal disease and arteritides of obscure origin such as lupus erythematosus may exhibit hypertensive encephalopathy as a complication.[16] Oppenheimer and Fishberg in 1928 noted that patients with the above mentioned conditions with hypertensive encephalopathy always had an antecedent hypertension, and the acute syndrome was usually noted to be immediately preceded by an acute rise of blood pressure above the previously elevated level.[16]

The diagnosis of hypertensive encephalopathy is difficult for many reasons. Focal neurologic findings are not common, and if they are promi-

nent and persistent, other diseases such as cerebrovascular thrombosis, hemorrhage, neoplasm, epilepsy or uremia may be the causitive agent. Cerebrospinal fluid protein and pressure levels are often, but not always, elevated.[16] A grade 3 or 4 retinopathy may be noted and may be unilateral.[3] Because of the difficulty in making a specific diagnosis and the ease with which this syndrome may be confused with frank uremia, cerebral and subarachnoid hemorrhage and cerebral infarction with hypertension certain authors[17] feel that hypertensive encephalopathy as a unique and separate syndrome may not exist.

Autopsy examinations of patients who died with symptoms compatible with hypertensive encephalopathy yield a confusing picture. Grossly, the brain is surprisingly normal without any specific lesions to account for the symptoms. The brain substance is pale, and petechial hemorrhages may be present. Edema of the brain substance and meninges is quite variable. Microscopically clusters of glial cells, arteriolar necrosis and minute cerebral infarcts may be noted.[16,13]

In spite of the difficulty in making a specific diagnosis and the ease with which it may be confused with other syndromes, most authors agree that hypertensive encephalopathy as a clinical entity does exist.

DISCUSSION

Oppenheimer and Fishberg, in 1928, postulated that the "encephalopathy resulted from cerebral ischemia produced by cerebral vasoconstriction and that cerebral edema, when present, is a secondary phenomenon."[13] There has been a great deal of controversy concerning the presence or absence of vasospasm and the role of cerebral edema since these early remarks.

In an article by Ziegler, Zasa and Zileli,[17] conclusions were drawn which were quite contrary to those originally postulated by Oppenheimer and Fishberg: "Measurements of cerebral blood flow, oxygen consumption, jugular venous pressure, and vascular resistence in patients with hypertensive headaches, and with hypertensive encephalopathy, do not differ from other hypertensive populations. It has been discovered that hypertensive encephalopathy can be relieved by (a) intravenous caffeine or aminophylline which increases cerebrovascular resistence and decreases cerebral blood flow, and also by (b) veratrum, which diminishes cerebral vascular resistence and does not affect cerebral blood flow. The tentative conclusion of Meyer and his associates is that hypertensive headache and encephalopathy result not from spasm of blood vessels, but from relative relaxation of tone of blood vessel walls in presence of marked hypertension. Diminished arteriolar tone allowed for transmission of pressure to the capillary bed with resultant transudation of fluid and cerebral edema."

Oppenheimer and Fishberg noted that many, but not all, of the patients presenting with hypertensive encephalopathy were demonstrated to have much cerebral edema with such findings as tightly stretched dura, flattened convolutions, shallow sulci, narrowing of the ventricles and even conical deformity of the brain stem. It was also noted that at autopsy many patients with symptoms of hypertensive encephalopathy presented with little or no cerebral edema. It was assumed then that edema was not present in life and did not contribute to the syndrome. It was apparent at autopsy that cerebral anemia resulting from arteriolar constriction was present in all of the cases and was probably the cause of the symptoms. The edema, it was postulated, was secondary to the arteriolar constriction. The edema may then cause the symptoms to become more

severe and may give signs of high cerebrospinal fluid pressure and choked discs.[13] Studies by Meyer, Waltz, and Gotch[11,12] in 1960 supported Fishberg and Oppenheimer's opinion.

Rodda and Denny-Brown[15] in 1966 published results which proved the presence of cerebral vasospasm. In cases of long standing hypertension in monkeys, segmental constrictions of the meningeal arterioles were seen at operation. It was noted that the constrictions were more severe in animals with generally higher blood pressures with a few episodes of extreme hypertension. The arteriolar constrictions were much less severe when the hypertension had been present for only three to four weeks and were absent in normotensive animals or uremic animals with hypertension present for only one to two weeks.

There is now no doubt that cerebral vasospasm does exist, but there continues to be some confusion as to the mechanism of this segmental vasoconstriction. Myer, Waltz, and Gotch,[12] clamping the thoracic aorta of monkeys and cats causing cerebral hypertension, concluded that the cause of the vasospasm was not due to a circulating factor, vascular compression secondary to edema, or changes in the oxygen or carbon dioxide but rather was due to the natural physiologic response to a rapid increase in intraluminal blood pressure by the arteriolar smooth muscle. Yet in a publication one month later[11] these same men concluded that there was not a close enough correlation between the level of blood pressure and the appearance of cerebral arteriolar constriction to state that increased intraluminal pressure played a major etiologic role. In their second publication, Meyer, Waltz, and Gotch concluded that a circulatory vasoconstrictor factor appeared to play an important role. The presence of such a factor was supported by several observations: 1) arterial constriction

increased with time while the blood pressure remained elevated at a constant level; 2) spasm was noted in a ligated vessel with normal intraluminal pressures; 3) intravenous injection of sodium nitroprusside resulted in sudden relaxation of arterial spasm before the blood pressure fell. Whatever the mechanism, there apparently is at least an increased irritability of cerebral arterial smooth muscle since "light mechanical stimulation results in marked segmental arterial constriction not seen in normotensive animals, even with stimulation of a much coarser nature."[11]

TREATMENT

The goal of therapy is agreed upon by most authors, that being to reduce the blood pressure to more normal levels without complicating the problem by causing a relative hypotensive state with added cerebral ischemia. The means to reach this goal are as varied as the number of authors offering opinions. Such agents as intravenous hexamethanium bromide, reserpine, diazoxide,[7] and magnesium sulfate are often mentioned. "Current Diagnosis and Treatment - 1967"[2] gives a recent therapy schedule:

"Hypertensive encephalopathy should be treated vigorously. Sedation with barbituates or paraldehyde may suffice in mild cases. Magnesium sulfate (with its attendant hazardous side effects) is no longer required because more effective agents are available. Reserpine, in doses of 0.05-0.1 mg/kg I.M. for children and total dose of 2.5-5 mg I.M. for adults, may be repeated every 6-12 hours to reduce B.P. The common side effects of reserpine therapy are not often a problem because treatment is usually not prolonged. Short-term therapy with hydralazine (Apresoline), 20-40 mg I.M. for adults followed by oral or I.M. doses as required, may be employed. Reserpine plus hydralazine, in smaller doses of each, may reduce

the side effects of each. In an emergency, veratrum may be useful, but it must be used cautiously because of its potent hypotensive action. Diphenylhydantoin (Dilantin) may be of use in controlling seizures."

SUMMARY

Thus it seems that hypertensive encephalopathy does exist as a syndrome, and the symptoms of headache, nausea, vomiting, weakness, stupor, fits and coma and signs of severe diastolic hypertension lasting for several days, are secondary to a segmental cerebral arteriolar vasospasm which may be caused by circulating humeral vasoconstrictor factor. Cerebral edema is apparently only secondary to the vasospasm but may greatly complicate the syndrome. There also appears to be a correlation between this syndrome and chronic hypertensive states with severe exacerbations. Treatment consists of carefully lowering the blood pressure so as to relieve the vasospasm while not causing a cerebral anemia secondary to a too rapid lowering of the blood pressure.

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