Plasma Serotonin Contents in Cerebrovascular Disease

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Summary

The plasma serotonin contents of forty-three cerebrovascular patients were examined.

1. Abnormal serotonin contents were found in 72 per cent of forty-three cerebrovascular patients.

2. In cerebral hemorrhage, serotonin contents were significantly low in the acute period.

3. Serotonin contents in cerebral hemorrhage and subarachnoid hemorrhage, had an increasing tendency from the fourth week to the eighth week, but after the eighth week, they returned to normal.

Introduction

It has been reported in many studies that spasms of intracranial arterial vessels which occur following the rupture of an aneurysm or subarachnoid hemorrhage, may be attributable to the direct effect of serotonin, a powerful vasoconstrictor in the blood (Raynor et al., 1961; Echlin, 1965; Brawley et al., 1968; Arutjunov et al., 1970). It has also been reported that in experimental cerebral ischemia, increased brain serotonin were found (Welch et al., 1972; Welch et al., 1973). It is speculated that serotonin may have an important role in the pathogenesis of cerebrovascular disease (CVD). In this study, the
plasma serotonin contents of cerebrovascular patients in their acute period and periods afterwards, and the relationship between plasma serotonin contents and clinical examinations were investigated.

Methods

Over the period of September 1974 to July 1977 the serotonin contents in the plasma of forty-three cerebrovascular patients with acute strokes were examined. Thirty-two were male and 11 female. The mean age was 57.3. Eleven had cerebral hemorrhage, 22 had cerebral infarction, and 10 had subarachnoid hemorrhage. The diagnoses were based on history, clinical examinations and laboratory findings. Some of these diagnoses were confirmed selective angiography, EEG, brain scan and computed tomography.

The procedure of Bogdanski (1956) was used for the assay of serotonin in the plasma. Plasma samples were isolated from 4.5 ml of blood which was collected at 11 a.m. in silicon treated materials. A total of 160 serotonin assays were performed.

Results

The normal contents of plasma serotonin is 0.180 μg/ml to 0.350 μg/ml. The serotonin content is therefore shown in three categories, low (under 0.180 μg/ml), normal (0.180—0.350 μg/ml), and high (over 0.350 μg/ml).

In the comparison of serotonin abnormality between CVD and polyneuritis, the percentage of serotonin abnormality in CVD is 77, and in polyneuritis, 21. Therefore, serotonin abnormality seen in CVD is significantly high (p < 0.005) (Fig. 1).

In cerebral hemorrhage, serotonin contents are significantly low in acute period, but in subarachnoid hemorrhage they are normal or high. Each CVD may be differentiated by the value of serotonin (p < 0.025) (Fig. 2).

In the incidence of thrombocytopenia (thrombocyte count < 80,000 per mm³), both cerebral hemorrhage and infarction have higher incidence of thrombocytopenia than subarachnoid hemorrhage. And all cases of cerebral hemorrhage with thrombocytopenia have serotonin abnormality (Fig. 3 a).

The serotonin contents show a decreasing tendency in cerebrovascular patients with thrombocytopenia (Fig. 3 b).

In the incidence of CRP, RA test or ESR, sixty-two per cent of cerebral hemorrhage, 43 per cent of cerebral infarction, and 66 per cent of subarachnoid hemorrhage have one or more of these abnor-