CT FINDINGS IN HYPERTENSIVE INTRACRANIAL PARENCHYMA HEMORRHAGE

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ABSTRACT

A retrospective study of the CT scans of the patients with hypertensive intracranial parenchymal bleeding, was performed in 141 patients. Bleeding at the putamen/ external capsule, thalamus, subcortical white matter, cerebellum, brain stem and internal capsule was seen in 42, 26, 12, 10, 9 and 1 percents of cases respectively. The incidence of rupture of the hematoma into the ventricles from the sites mentioned above was 44, 75, 41,43,30 and 0 percents of the total hematomas at each site respectively.

Focal brain hemorrhage occurs spontaneously in three common settings: hypertension, ruptured AVM's and amyloid angiopathy (1). Additional contributing causes are excessive anticoagulation, systemic bleeding diatheses, and trauma. Hypertensive bleeding is believed to result from rupture of microaneurysms in small, intracerebral arteries and necrotic vascular degeneration.

A retrospective study of the CT scan was performed in the patients who bled into the brain parenchyma due to high blood pressure, to determine the sites of bleeding and the pattern of spreading of the hematoma.

PATIENTS AND METHODS

We reviewed 141 cranial CT scans in the cases of hypertensive intracranial parenchymal hemorrhage. The films were collected from January 1989 to December 1993. The study was concerned about the location of the hematoma, the ventricular rupture and the pattern of spreading.

RESULTS

One hundred and forty one patients were consisted of 97 males and 64 females and the ratio of male to female was 1.5:1. Only one site of the hematoma was found in each patient. Most of the patients had essential hypertension and only four patients had known underlying causes; 2 cases had chronic renal failure and another two cases had renal arterial stenosis. The mean age of the patients who had essential hypertension was 62.6 years old. Fifty one percents of the patients were below 60 years old and 20.4% were below 50 years old. The locations of the hematomas were shown in Table 1. The most common location was putamen/external capsule and the second most common location was thalamus. The incidence of ruptured hematoma to the ventricular system was shown in Table. 2. The thalamic hematoma was associated with the highest incidence of ventricular rupture. All of the thalamic hematomas dissected along the paraventricular white matter superiorly and broke into the nearby ventricle, shown in Fig. 1. The patterns of spreading of the hematomas

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in the other locations were variable and will not mention here. The CT images of the hematomas at putamen/external capsule, subcortical area, cerebellar hemisphere, brain stem and internal capsule were illustrated in Fig. 2,3,4,5,6, respectively.

DISCUSSION

Hypertensive intracerebral hemorrhage (HICH) has a predilection for areas supplied by penetrating branches of the middle cerebral and basilar arteries. It therefore preferentially involves the external capsule and putamen, thalamus, and pons. (2). Large hematomas often extend beyond the putamen to include the globus pallidus and internal capsule (3). Clot dissection into the ventricular system occurs in about half the cases of hypertensive ICH and is associated with poor prognosis (4), particularly when intraventricular hematoma involves the fourth ventricle (5). Lobar white matter hemorrhage is seen in 15% to 20% of ICH cases (6).

The cerebellum is a relatively common site of hypertensive hemorrhage; the midbrain, medulla and spinal cord are rarely involved (2). Cerebellar hemorrhages typically originate near the dentate nucleus along perforating branches of the superiorcerebellar or posterior inferior cerebellar arteries (7,8).

The mean age of the patients who had essential hypertensive bleeding was similar to a report published in Thailand (9) and worldwide (10,11,12). The two most common locations were similar to other reports. The most common site was the putamen/external capsule. They were very characteristically lens-shaped hematoma, situated between lenticular nucleus and the insula, displacing the surrounding tissue without destroying them or destroyed only a small part (13). Some authors preferred using the term "putaminal hematoma" and there were many debates whether the putamen or the external capsule was the primary site of bleeding (14,15). We have found no cases of hematoma at the caudate or globus pallidus.

The subcortical white matter hematoma (lobar hematoma) was found in higher frequency than the autopsy report (16), and in similar frequency to the study by CT scan (6). The hematoma at brain stem and cerebellum occurred in about equal frequency.

Table 1. The location of the hematomas detected by CT scan of the brain and the number of the patients

Location	No. of Patients	(% of total patients)
Putamen/External capsule	59	(42)
Thalamus	36	(26)
Subcortical white matter (lobar	17	(12)
Cerebellum	14	(10)
Brain stem *	13	(9)
Internal capsule	2	(1)
Total	141	(100)

*13 Brain stem hematomas included 7 pontine and 6 midbrain hematomas

Table 2. The incidence of ventricular rupture at each site

Location	No. of ruptured hematomas	(% of all hematomas of that region)
Putamen/External capsule	26/59	(44)
Thalamus	27/36	(75)
Subcortical white matter (lobar)	7/17	(41)
Cerebellum	6/14	(43)
Brain stem	4/13	(30)
Internal capsule	0/2	(0)

The incidence of rupture of the hematoma into the ventricles was highest at thalamus and was about equally occurred at putamen/external capsule, cerebellum and subcortical white matter. Less incidence was shown in the brain stem hematoma and none at internal capsule.

Epidemiologic data strongly suggest that control of hypertension reduces the risk of hypertensive intraparenchymal hemorrhage (1).

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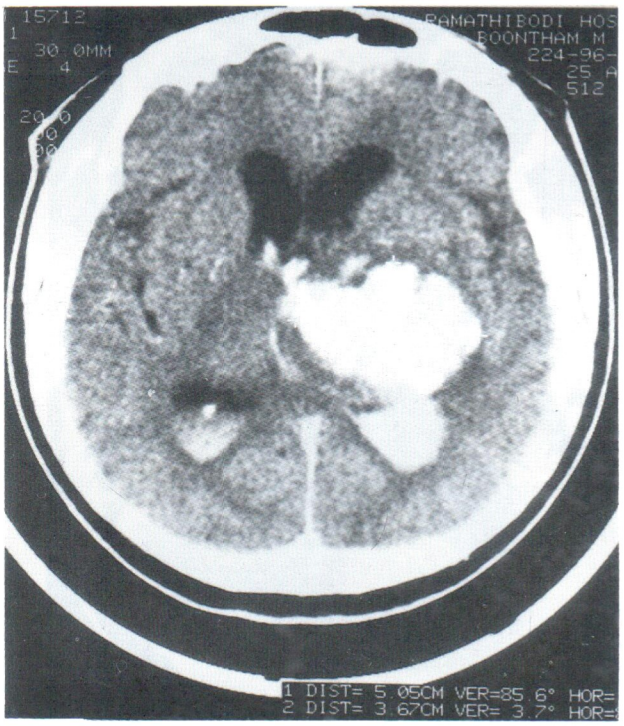

Fig. 1A. CT shows large hematoma in left thalamus and blood in the occipital horns and third ventricle

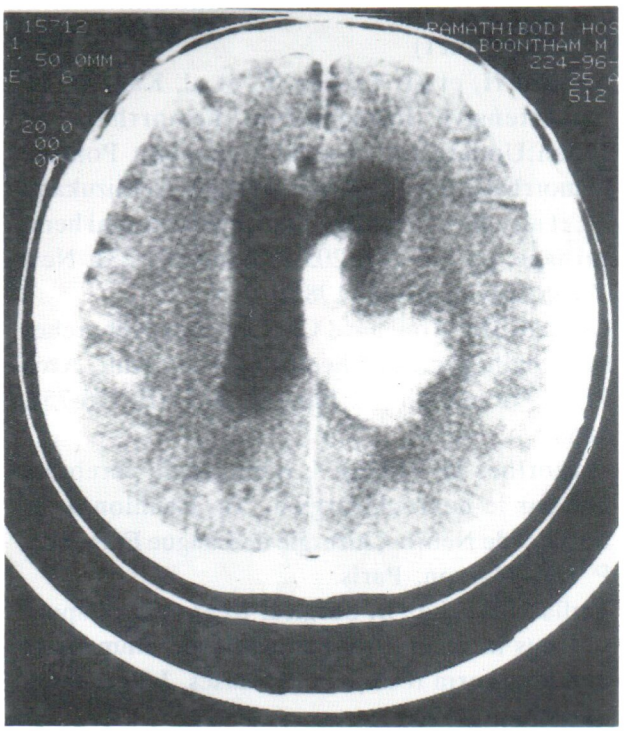

Fig. 1B. Thalamic hematoma dissected superiorly along the paraventicular white matter and ruptured into the lateral ventricle

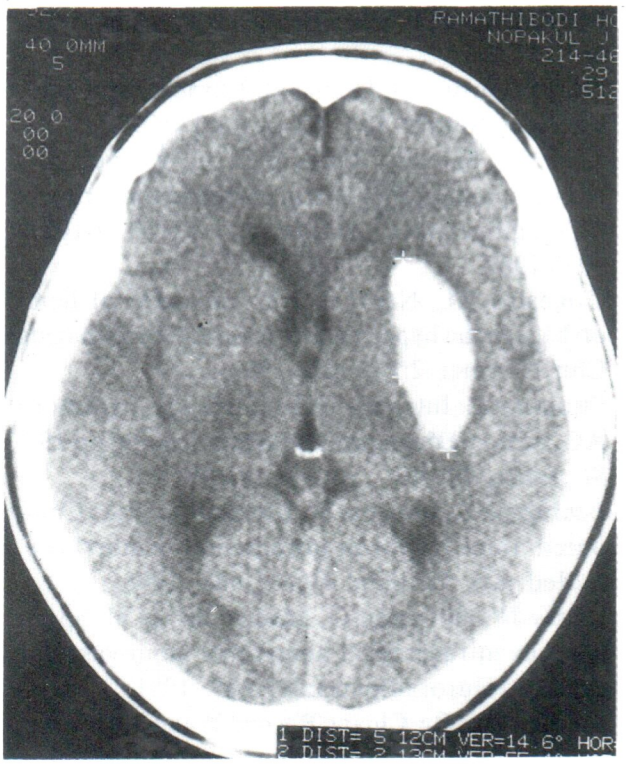

Fig. 2 CT shows hematoma in the location of left putamen-external capsule

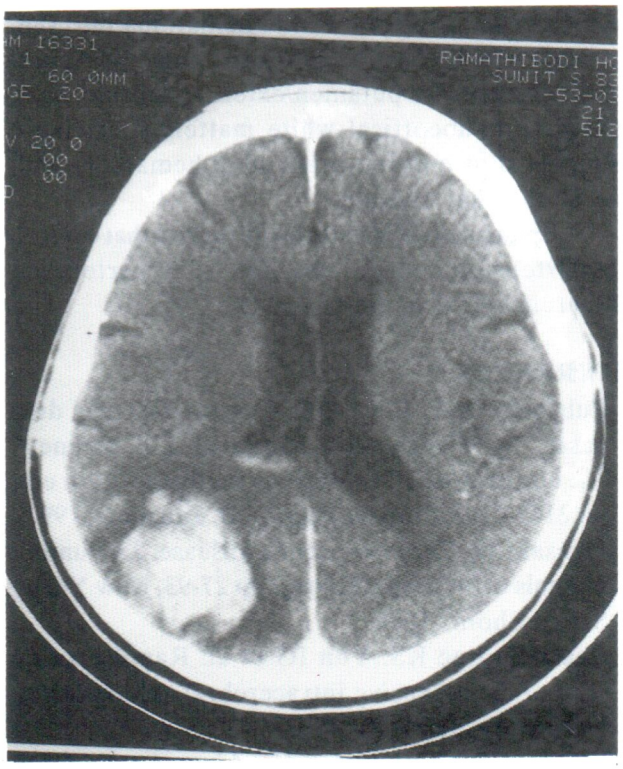

Fig. 3 CT shows hematoma in the right parieto-occipital subcortical area and thin layer of blood in right lateral ventricle

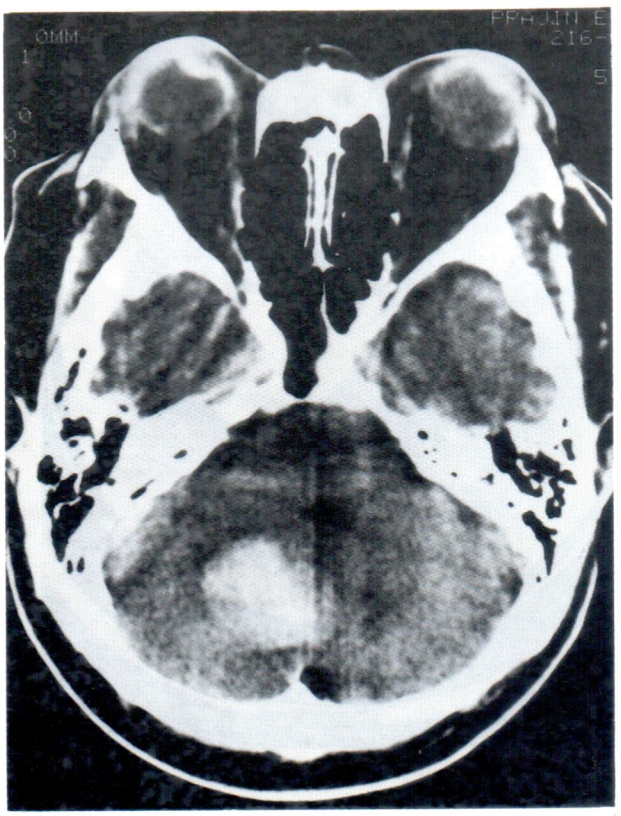

Fig. 4 CT shows hematoma in right cerebellar hemisphere

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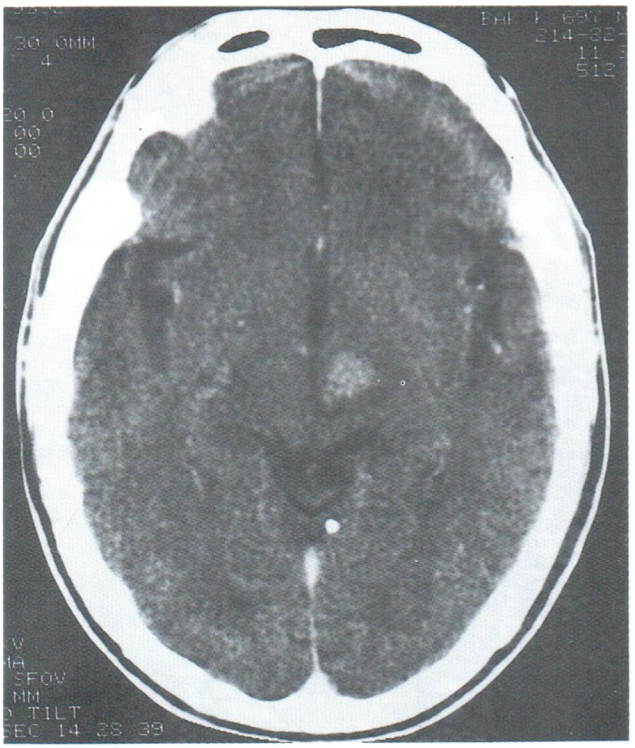

Fig.5A CT shows hematoma in the left mid brain

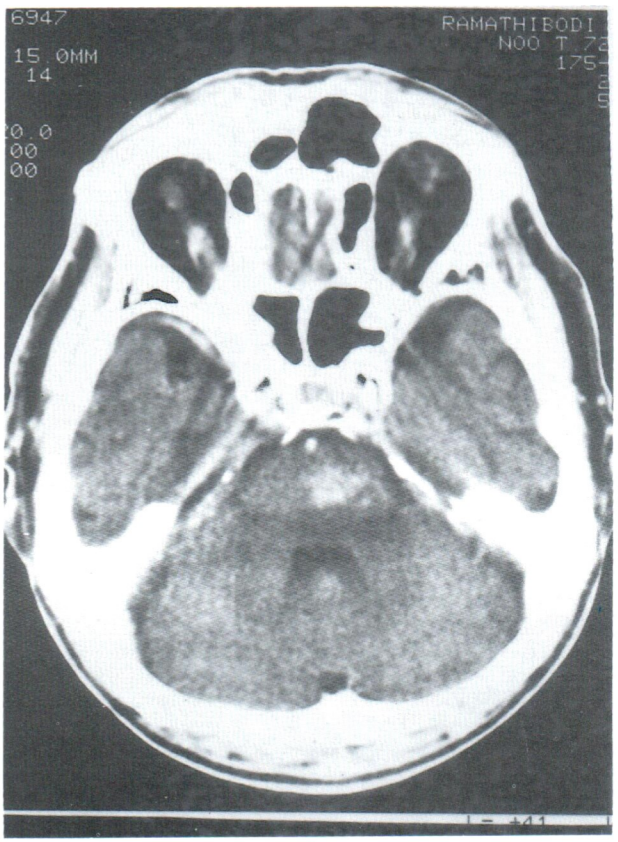

Fig.5B. CT shows left pontine hematoma

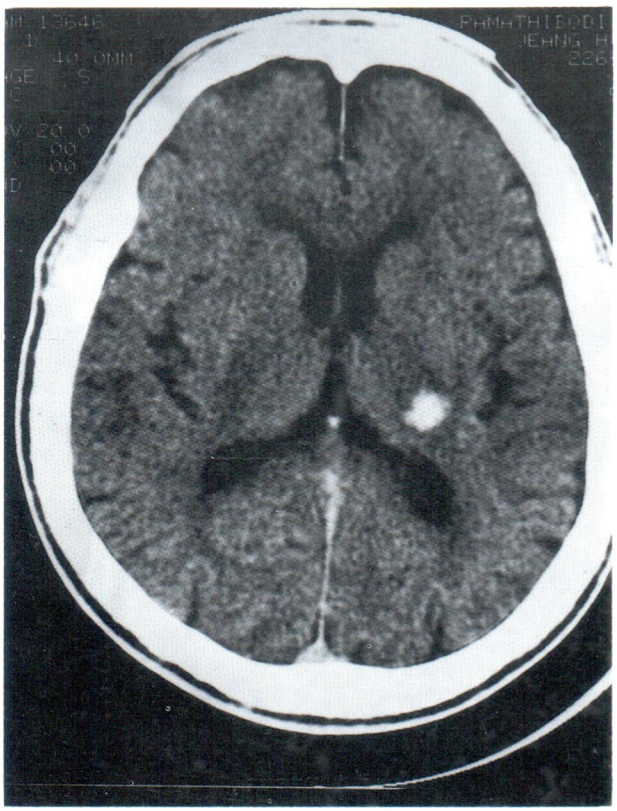

Fig. 6 CT shows small hematoma at left internal capsule