Primary Putaminal and Thalamic Hematomas: Clinical-CT Comparisons of 96 Cases

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ÖZET

Primer Putaminal ve Talamik Hematomalar

Amaç: *Bu çalışmada putaminal hematoma (PH) talamic hematoma (TH) ile interventriküler hemaroji arasında klinik özellikleri araştırdık.*

Materyal ve Metod: *Putmem hematom (n=50) ve talamus (n=46) vaka çalışmaya alındı. Hematomlardan 20 mm.ye dek olanları küçük, 20-30 mm arasında olanları medium ve 30 mm.den fazla olanlar ise büyük hematomlar olarak değerlendirildiler.*

Sonuç: *Bu çalışma; hematomaların büyüklüğü, ventriküler penetrasyon ve prognosis arasında PH ve TH grupları arasında anlamlı bir fark olduğunu gösterdi.*

Anahtar kelimeler: *Hemoraji, kraniyal BT, putamen, talamus*

SUMMARY

Objective: *In this study, we investigated clinical entities in the cases of putaminal hematoma (PH) and thalamic hematoma (TH) and clinical relation of prognosis between the dimension of hematoma and intraventricular hemorrhage (IVH) in computerized tomography (CT).*

Material and method: *Consecutive 96 patients who have putamen (n=50) and thalamus (n=46) localized hematomas and who were hospitalized with the diagnosis of hemorrhagic stroke were included in the study prospectively. Hematoma localization was performed by using saggital reconstruction technique with the thick transverse sections of 10 mm with the help of Atlas of Schaltenbrand and Wahren. Hematomas whose dimensions are smaller than 20 mm were appreciated as small, whose dimensions are 20 to 30 mm as medium and whose dimensions are bigger than 30 mm as big hematomas. In our study, Student-T, Spearman correlation and Chi-Square distributions were used for statistical analyses.*

Findings: *The number of the cases whose hematoma dimension is smaller than 20 mm was 9 in PH (18 %), 24 in TH (52 %). The number of the hematomas whose dimension is 21 to 30 mm was 7 in PH (14 %) and was 18 in TH (39 %) and the hematomas which have dimension bigger than 30 mm was 34 (68 %) in PH and 4 (8 %) in TH. Among the patients died, the smallest hematoma dimension was 15 mm in TH, 32 mm in PH. In all cases, the rate of IVH was 41 % (39 cases), this rate was 24 % (12 cases) in PH and 59 % (27 cases) in TH. Hematoma dimensions of the cases with IVH were 20 to 60 mm in PH, 5 to 42 in TH. The rate of death in the cases of IVH was 27 % (10 cases), 33 % in PH (4 cases) and 22 % (6 cases) in TH. The patients in 74 % (71 cases) of all cases survived with different degrees of disabilities and remaining 26 % (25 cases) patients died. The rate of death in PH group was found 30 % (15 cases), 22 % (10 cases) in TH.*

Result: *This study showed us that there was a meaningful difference between hematoma dimension and ventricular penetration and the prognosis between the groups of PH and TH ($p<0.05$). This condition can be explained with the fact that putaminal hematomas have bigger dimensions and thalamic hematomas are more frequently penetrate in ventricule.*

Key Words: *İntracerebral hemorrhage, cranial CT, putamen, thalamus*

INTRODUCTION

Computerized tomograpy (CT), would provide information concerning the dimensions, side, localization, extension, advance and IVH of ICH beside recognizing them rapidly and correctly in clinical since 1970's (1,2,3). ICH constitutes 10-15 % of all stroke cases (4,5). Putamen is the region in which spontaneous ICH are most frequently localized (4,6,7,8,9). While TH are previously less frequently diagnosed in post-mortem studies (10-15 %), the rate increased after using CT (25-30 %)

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(1,10). There are some studies concerning radiologic and clinical relations of primary ICH' s CT to the prognosis especially after (3,7,8,11). After Massora and his colleques classified supratemporal hematomas into two groups as lobar and deep hematomas, they compared clinical findings, CT findings and clinical outcomes of these two groups (15).

In this study, we compared statistical significiance of prognosis relations, the state of conciousness, and CT findings in deep hematomas (except for caudate nucleus hemorrhage) by norrowing the regions in which ICH' s are localized.

MATERIAL AND METHOD

Consequtive 101 patients who came to Emergency Department with the clinical setting of acute stroke and who had hematomas localized in putamen and thalamus were studied prospectively for nine months. Five cases with putamino-thalamic localized hematoma were excluded. Head trauma, brain tumor, ruptured aneurysm, primary intraventriculer hemorrhage, multiple hemorrhages, arteriovenous malformation, coagulopathy or using anticoagulant drug before stroke were questioned during taking the history. Secondary ICH cases developing due to mentioned reasons weren't included in the study (6,15).

CT scannig was performed in acute period (2 hours to 3 days) in 92 (96 %) of all patients. In remaining four patients (4 %), this imaging test was done on the 4 th to 7 th days after the stroke. Hematom localization was performed with thick transverse sections of 10 mm, by using saggital reconstruction technique and with the help of Atlas of Schaltenbrand and Wahren (16).

Routine labratory studies beside systemic and neurologic examinations were done. Age and sex of all cases were recorded. The level of consciousness of the patients was classified into four groups as alert, somnolance, stupor, coma (1). Also, Glasgow Coma Scale (GCS) was evaluated for each patient. Prognosis was as follows in each patient group: 1. Normal social life, 2. Not dependent on the bed and home, 3. Dependent on home (capable of doing his own management even if partly), 4. Dependent on bed (incapable of doing his own management), 5. Vegetative state, 6. Death (17).

Table 1: Age and sex distribution in the patients with PH and TH
PH: putaminal hematoma, TH: thalamic hematoma,

	PH n=50	%	TH n=46	%	p
Male	29	(58)	25	(54.3)	p>0.05
Female	21	(42)	21	(45.6)	p>0.05
Average age	59.9		62.4		p>0.05
The span of age	21-83		43-76		

Table 2: The relationship between the localization and dimension in the cases with PH and TH.
PH: putaminal hematoma, TH: thalamic hematoma,
S: Small, M: Medium, B: Big

Hematoma Dimension	PH n=50	%	TH n=46	%	p
s<20 mm	9	(18)	24	(52)	
M: 20-30 mm	7	(14)	18	(39)	p>0.01
B > 30 mm	34	(68)	4	(8)	

IVH was looked into in CT. The average of bigger and smaller dimensions of the hematomas whose dimensions are smaller than 20 mm was enrolled as small and those whose dimensions are 20 to 30 mm as medium, and those whose dimensions are over 30 mm as big (17,18,19).

RESULTS

Our study groups covered 96 of 101 cases with deep hematoma (DH). 50 cases (52 %) whose hematoma localization was in putamen constituted PH group and 46 cases (48 %) whose hematoma localization was in thalamus formed TH group. The periods of the hospitalization of the patient varied 1 to 38 days. 54 of the cases was male (56 %) and 42 (44 %) female. Average age in two DH groups was 61.1, this was 59.9 in PH and 62.4 in TH. In respect of average age and sex rates, a significant difference was not present (Table 1).

In the onset of stroke, the rate of hemiparesis / hemiplegia was 93.7 % (90 / 96) in these two groups, 98 % (49

Table 3: The relationship amongs IVH, stupor/coma and death in the cases of PH and TH.
PH: putaminal hematoma, TH: thalamic hematoma,
IVH: Intraventricular hemorrhage.

Hematoma Dimension	PH n=50	%	TH n=46	%	p
s<20 mm	9	(18)	24	(52)	
M: 20-30 mm	7	(14)	18	(39)	p>0.01
B > 30 mm	34	(68)	4	(8)	

/ 50) in PH and 89 % (41 / 46) in TH. The hematoma dimensions of six subjects who haven't motor deficit were smaller than 15 mm (1 case in PH, 5 cases in TH). In all of these cases in TH, there was IVH (100 %). A highly significiant relationship between hematoma dimension and localization was determined (p<0.001). In PH group 18 %, in TH group 52 % small hematoma, in PH group 68 %, in TH group 8 % big hematoma were found. Also statistically, hematoma dimension was significiantly bigger in PH group than that in TH group (Table 2). There was also a significant relationship between ventricular penetration and the localization of the hematomas (p<0.001). In our cases, IVH frequency is significiantly higher in DH group than in TH group (24 % in PH, 58.6 % in TH) (Table 3). The rate of stupor/coma (GCS ≤ 8) was not different between PH and TH groups (Table 3). Similarly, an important discrepancy between death rates in both groups was not found (Table 3).

Table 4: The relationship amongs IVH, dimension, coma and death in the cases of PH and TH.
PH: putaminal hematoma, TH: thalamic hematoma,
IVH: Intraventricular hemorrhage, S: Small, M-B: Medium-Big

Hematoma Dimension	PH n=12	%	TH n=27	%	p
S<20 mm	0	(0)	9	(33.3)	p<0.05
M-B>20 mm	12	(100)	18	(66.6)	
Stupor/coma	6	(50)	6	(22.2)	p>0.05
Died	4	(33.3)	6	(22.2	p>0.05

In subgroups of hematomas, the relationship of IVH to the dimension of hematoma was investigated. An insignificiant relationship in PH group and all groups was found (p>0.05, p>0.05, whereas an significiant one in TH group (p<0.005). Hematoma dimensions in PH cases with IVH varied from 20 to 60 mm, in TH cases, from 5 to 42 mm. In PH group, the rate of small hematomas with IVH was 0 %, in TH 33.3 %. This difference between two groups was significiant (p<0.05) (Table 4).

Table 5: The relationship coma and death in the hematomas with small and medium dimensions in the cases of PH and TH.
PH: putaminal hematoma, TH: thalamic hematoma,
S: Small, M-B: Medium-Big

	PH (n=50)		TH (n=46)		p
	S<20	M-B>20	S<20	M-B>20	
	n=9(%)	n=41(%)	n=24(%)	n=22(%)	
Stupor/coma	- (0)	14 (34.1)	- (0)	7 (31.8)	p>0.05
Died	- (0)	15 (36.5)	2 (8.3)	8 (36.3)	p>0.05

The relationship between the level of consciousness at the onset of stoke and the dimensions of the hematomas and IVH was studied. In bouth groups IVH didn't affect the initial level of consciousness significiantly (p >0.05, p>0.05). Although In IVH cases, the rate of stupor / coma was 50 % (6/27) in PH group, in TH group 22 % (6/27), this difference was not significant (Table 4). In PH and TH groups, hematoma dimension is importantly related to the level of consciousness (p<0.001, p<0.001). But in either group, a significiant difference between the rates of stupor/coma of the cases with the average dimension of 20 mm or smaller or bigger than this was not found (p>0.05) (Table 5). In PH and TH cases, a relationship was not determined between prognosis and IVH (p>0.05, p>0.05). There wasn't an important discrepancy in respect of death rates in IVH cases in PH and TH groups (Table 4). Although the prognosis of the patients was not affected by IVH but was highly influenced by the increase of the dimension of hematoma in both groups (p<0.001, p<0.001). But these wasn' t a significiant difference in respect of death rate amongs the cases with small, medium and bigger hematomas in PH and TH groups (36.5 %, 36.3 % and 0 %, 8.3 %) (p>0.05, p>0.05) (Table 5). The smallest hematoma dimension among the patients died was 32 mm in PH group and 15 mm in TH. The biggest hematoma dimension amongs those survived was 45 mm in PH (2 cases) and 35 mm in TH group (1 cases). Prognosis was seen to be significiantly affected by the level of consciousness at the onset of the stroke in the cases with PH and TH (p<0.001, p<0.001). Death rate of the patients come to the hospital in the state of stupor/coma was 71.4 % in PH group. This was higher than that of TH group (57.1 %). But this dfference was not significiant (p>0.05, p>0.05). In both of two groups, a meaningful relationship between the age and prognosis was not determined (p>0.05, p>0.05).

DISCUSSION

Recently, clinical and radiological findings and their effects on among deep and lobar hematomas, comparatively, or in all primary intracerebral hemorrhages have been investigating (3,7,8,12,13,14,19,20,21). In our study, we investigated the relationship between radiological findings and the level of consciousness and prognosis in putaminal and thalamic hematomas, by narrowing ICH localization (because caudate nucleuse hemorrhage frequency is in lowe rates such as 6 %-10 % (3,7)).

In two deep hematoma groups, 54 (56 %) of the patients was male and 42 (44 %) female. There wasn't sex difference between the group of putaminal hematoma and that of thalamic hematoma. The average age has been found to be similar in both groups. In PH group, hematoma dimension was bigger significiantly compared to that in TH group. Such a difference was determined in a similar study between lobar and deep hematomas (15). It is suggested that IVH means a big hemorrhage (13) and that there is a meaningful correlation between the dimension of hemorrhage and IVH (7). But Massora didn't observe the same relationship in deep hematomas while he found that IVH frequency was related to hematoma dimension in lobar hematomas (15). In our study, IVH frequency of hematoma is higher in TH group than that in PH group. While IVH was found to be related to hematoma dimension in TH group, it was independent of that dimension in PH and in whole group. Thalamic hematomas were found to be smaller than putaminal hematoma but IVH frequency was higher in thalamic hematomas. As a reason of this, we could consider their being closer to the ventricular systeme. That there wasn't a significiant relationship between IVH and dimension in PH group compared to the relationship in TH group. It might be result from the fact that our study group hadn't enough in respect of the number of the patient included in the study. But hematoma dimension in PH cases with IVH was significiantly higher than that in TH groups. The authors say that stupor/coma at onset of the stroke (GCS ≤ 8) occurs more frequently in the patients who have big hematoma with IVH (15,22). It is suggested that IVH behaves as independent of hematoma dimension and that it shows its own essential effect on the prognosis, and due to its interaction with GCS (13). In this study, we didn't determine a statistically significiant relationship between IVH and the level of consciousness in both group. Massora determined that coma (GCS ≤ 8) occured in 81 % of the cases with lobar hematoma with ventricular rupture, in 53 % of those with deep hematomas (15). We encountered stupor/coma only in PH group with ventricular rupture, with the same frequency (50 %). Although these rates were twice as smaller as in TH group (22 %), a significiant difference between these rates in both group weren't found. While the level of consciousness and stupor/coma at onset weren't related to IVH, the relationship of these to the IVH in two groups seperately and in whole group was significiant. But there wasn't a significiant difference between the groups of putaminal and thalamic hematoma in respect of the frequency of stupor/coma. There are some studies reporting that IVH affects prognosis statistically in ICH's (3,7,12,13,14,20,22,23,24) ın addition to many studies concerning the factors which affect the prognosis (7,14).

Young and his colleques emphasize that blood volume draining into vetricule is more important than rupture itself in supratentorial hematomas. In the same study, Young states that all the patients whose blood volume draining into venricule is over 20 cc died, that this volume shows a meaningful relationship to the prognosis in TH group and that there isn't such kind of relationship in PH group (3). In other study, that IVH leads to poor prognosis, especially in comatose patients (GCS ≤ 8) is reported (13). There are also some investigators stating that IVH is a meaningful prognostic factor (22) in addition to those suggesting ıt dosen't show a significiant relationship to the prognosis in thalamic hematomas (23). In this study, in both PH and TH groups, significiant relationship between ventricular penetration and prognosis wasn't determined. Hematoma dimension in both group is importantly related to the prognosis. Hematoma dimension is accepted as an independent predictor factor for poor prognosis (vegetative state or death) (12,13,14,20). Weisberg states that 5 of 32 cases whose maximal hematoma diameters are 18 to 35 mm with primary putaminal hemorrhage have died (25). In our study, none of the patients in PH group with hematoma whose average diameter is below 32 mm died in a month after the stroke. In TH group, the smallest average hematoma dimension which is enough to cause death was 15 mm. Only two patients with TH whose hematoma dimension is over 30 mm survived (those with 30 mm and 35 mm hematoma dimensions). In some studies, the critical dimension in respect of death was 30-33 mm (26). In the studies of Kumral and his colleques, two patients with TH whose diameters are 33 to 36 mm returned to their normal and independent life in the first month after the stroke (18). Steinke and his colleques have observed that the death because of stroke has increased with the incline in the hematoma volume (22). In our study, another parameter seen to be highly related to the prognosis was the consciousness state at admission of the patient. In both group, it has been seen that prognosis got significiantly worse as the level of consciousness is decreased. While in PH group, ten of the patients (71.4 %) with stupor/coma at admission died within the first month after stroke, three of remaining four patients stayed in vegetative state and one of them as dependent on the bad. In TH group, within the first month after stroke, four of seven patients with stupor/coma died, three of them stayed in vegetative state. In both group, there wasn't any patient showing a better prognosis among those come with stupor/coma. Steinke and his colleques have found that mortality is significiantly related to the fact that GCS < 9 without considering IVH in TH group (22). While Kase has emphasized that GCS score at admission is a valid clinical parameter which is helpful in predicting the prognosis (5), Miranda has suggested that consciousness state is the most important factor for it (24). In the studies performed, the authors have agreed that consciousness state at admission is a meaningful, independent predictor factor of prognosis in the cases with hemorrhagic stroke (5,12,13,14,20). In our study, the age of patient doesn't been found to be related to the prognosis in both group. Juvela and his colleques have found this factor meaningful in determining the prognosis in the cases of spontaneous ICH within a year after the stroke (14). But, in some studies, the patient age hasn't been found to be related to the prognosis in the cases of supratentorial hematoma and TH (3,23).

This study has shown that there is a meaningful difference between two groups in respect of IVH and hematoma dimension in the CT's. Massora explains the similar prognosis in the deep and lobar hematoma groups with the fact that lobar hematomas have bigger dimension and deep hematomas cause IVH more frequently (15). In conclusion, we explain the similar prognosis in our study groups with the fact that putaminal hematomas are bigger and thalamic hematomas more frequently drain into ventricule.

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