CHAPTER VII

RESULTS

During the study period from May - December 1994, 85 patients with spontaneous supratentorial intracerebral hemorrhage confirmed by CT scan or MRI brain were admitted. Age of onset varies from 41 - 87 years (mean 61 years) Figure 7.1.

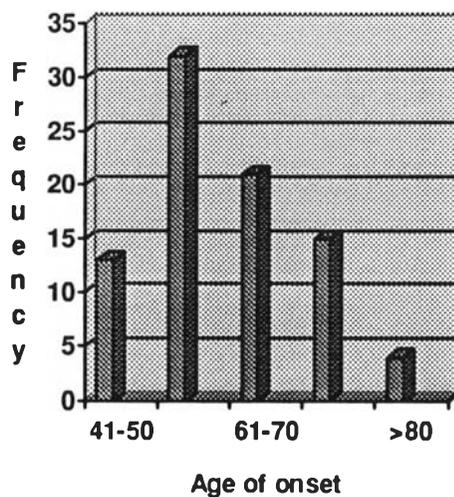### AGE OF ONSET DISTRIBUTED HISTOGRAM

FIGURE 7.1

Mortality rate at day-21 was 36/85 cases (42.4 percent), mean duration from diagnosis until death was 3.28 days, (range 1-14 days), 91 percent were death by day-7(range from 1 - 14 days) and all of them were death by day-14. (Figure 7.2) Causes of death are due to increase intracranial pressure and brain

herniation secondary to mass effect and cerebral edema in 33 cases and sepsis in 3 cases.
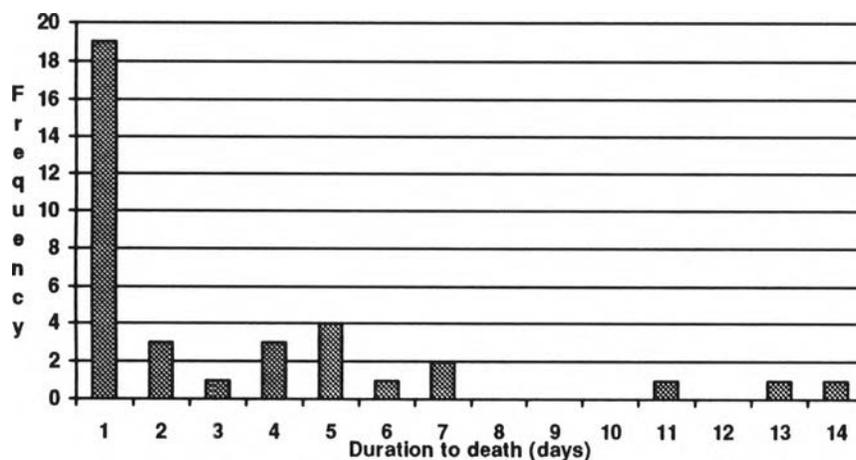
MORTALITY DISTRIBUTED HISTOGRAM

FIGURE 7.2

The univariate analysis compared 11 baseline characteristics and 4 risk factors. Baseline characteristics of survival and non-survival group are shown in TABLE 7.1. The mean age of the overall group was 60.96 ± 2.38 years, of the survival group was 61.78 ± 2.8 years and of the death group was 59.86 ± 4.16 years, the different was not statistically significant (P = 0.161). Overall sex ratio, male : female was 51 : 34, for the survival group was 26 : 23, for the death group was 25 : 11 (P = 0.193). Total mean duration from onset to diagncsis by CT scan or MRI brain are 27.44 ± 8.64 hours, the survival group had a mean duration of 33.84 ± 8.64 hours, and the death groups had one of 42.72 ± 13.2 hours (P = 0.033). At the time if admission, patients were divided into 3 groups according to the Glasgow Coma Scale (see TABLE 4.1).

Twenty patients belonged to GCS 3-7 ,of whom 4 survived and 16 died, 19 patients belonged to GCS 8-11, of whom 9 survived and 10 died and 46 patients belonged to GCS 12-15, of whom 36 survived and 10 died the difference was statistically significant (P=0.00004). The distribution of hematoma into left and right was 41 and 44 respectively, in the survival group 26 patients had the hematoma on the left and 23 on the right. In the death group, 15 patients had hematoma on the left and 21 on the right (P=0.4127). The overall mean volume of the hematoma was 58.75 ± 14.86 cm^3, in the survival group was 42.21 ± 10.93 cm^3 and in the death group was 81.27 ± 30.45 cm^3, the difference was statistically significant (P = 0.047). According to the site of lesion cases were divided into basal ganglia, thalamus and lobar hemorrhage, there were 45 cases of basal ganglia lesions, 32 cases belonged to the survival group and 13 cases to the death group. There were 19 thalamic cases, 5 cases belonged to the survival group and 14 to the death group. There were 21 lobar cases, 12 cases belonged to the suevival group and 9 to the death group, the difference was statistically significant (P = 0.00412). Hemorrhage into the brain parenchyma that ruptured into the ventricle ˎ (intraventricular hemorrhage) was found in 36 cases, 11 cases belonged to the survival group and 25 to the death group, the difference was statistically significant (P = 0.00004). Mean of fasting venous glucose in first 24 hours after admission was 148.16 ± 10.48 mg/dl. the survival group had a fasting venous glucose of 145.74 ± 15.16 mg/dl. and death group had one of 151.45 ± 15.02 mg/dl. (P = 0.88). Overall mean systolic blood pressure was 187.40 ± 6.48 mmHg. for the survival group was

BASELINE CHARACTERISTICS OF SURVIVAL AND NON-SURVIVAL GROUPS(FIRST 24 HOURS AFTER ADMISSION)

	Overall (n=85)	Survivors (n=49)	Deaths (n=36)	p value
1. Age(years)§	60.96±2.38	61.78±2.8	59.86±4.16	0.161*
2. Sex (M:F)	51:34	26:23	25:11	0.193**
3. Duration from onset to diagnosis (day)§				
	1.56±0.36	1.41±0.36	1.78±0.55	0.033*
4. Glasgow Coma Scale at admission				
GCS 3-7	20	4	16	
GCS 8-11	19	9	10	
GCS 12-15	46	36	10	0.00004**
5. Lesion side(L:R)	41:44	26:23	15:21	0.4127**
6. Volume of hematoma(cm3)§				
	58.75±14.86	42.21±10.93	81.27±30.45	0.047*
7. Site of lesion				
Basal ganglion	45	32	13	
Thalamus	19	5	14	
Lobar	21	12	9	0.00412***
8. Intraventricular bleeding				
	36	11	25	0.00004**
9. Fasting venous glucose§				
	148.16±10.48	145.74±15.16	151.45±15.02	0.88*
10. Systolic blood pressure §				
	187.40±6.48	182.33±8.09	194.31±10.29	0.463*
11. Diastolic blood pressure §				
	110.79±4.82	109.47±7.22	112.58±5.6	0.14*

*   t-test
**   chi-square with continuity correction
*** chi-square (Pearson)
§   mean ± 2 S.E.

TABLE 7.1

182.33 ± 8.09 mmHg.   and death group was 194.31 ± 10.29 mmHg.
(P = 0.463).   The overall mean diastolic blood pressure was
110.79 ± 4.82 mmHg.   the survival group had a DBP of 109.47 ±
7.22 mmHg.   and death group had one of 112.58 ± 5.6 mmHg.
(P=0.14)

Comparison of the risk factor between the survival and
death group as shown in TABLE 7.2.   History of previous stroke
was found in 15 patients (17.6 percent), 8 patients survived
and 7 died (P=0.9325).   History of myocardial infarction was
found in 48 patients (56.5 percent), 27 survived and 21 died
(P=0.9398).   History of diabetes mullitus was found in 7
patients, 4 patients survived and 3 died (P=1.00).es and dead 7
cases which is no statistical significant difference. (P =
0.9325).   History of myocardial infarction 6 cases, survivor 4
cases and death 2 cases which is no statistical significant
difference.   (P = 1.00)

**BASELINE RISK FACTORS IN SURVIVAL AND NON-SURVIVAL (FIRST 24
HOURS AFTER ADMISSION)**

Risk factor	Over all (%)	Survivor	Death	p value
Previous Stroke	15(17.6)	8	7	0.9325[*]
History of MI	6(7.1)	4	2	1.00[**]
Hypertension	48(56.5)	27	21	0.9398[*]
Diabetes mellitus	7(8.2)	4	3	1.00[**]

* Chi-square with continuity correction
** Fisher's exact test (two-tail)

TABLE 7.2

Only 5 out of 15 categorical potentially significant predictors were prognostic of outcome, which are duration from onset to diagnosis, Glasgow coma scale, hematoma size, location of hematoma, and intraventricular hemorrhage.

Age, hematoma size, fasting venous glucose were stratified into categories. Age was stratified into 5 categories (41-50, 51-60, 61-70, 71-81, and more than 80 years). The hematoma size was stratified into 2 groups, those with a volume less than or equal to 60 cm^3 and more than 60 cm^3. Fasting venous glucose was also stratified into 2 groups, less than or equal 140 mg/dl and more than 140 mg/dl.

To substantiate the results initially obtained, all 15 variables and new 3 variables were subjected to a stepwise logistic regression analysis. Dummy variable in the categories of age, and site of lesion were used for analysis. With this method only 4 variables were potentially predictors of outcome (TABLE 7.3).

The maximum likelihood estimate of the coefficient, standard error, and corresponding Chi-square were calculated and a P value of each variable of less than 0.05 indicates a significant association between these variables and the patient's survival or dead. The positive logistic coefficients of a hematoma volume of more than 60 cm^3 indicate that the estimated probability of death in hospital raises with a volume of more than 60 cm^3 .

MAXIMUM LIKELIHOOD OF FIT OF LOGISTIC REGRESSION MODEL IN

PATIENTS WITH SPONTANEOUS SUPRATENTORIAL INTRACEREBRAL

HEMORRHAGE.

Variables	Logistic coefficient	Standard error	Wald χ^2	df	P-value	Exp(b)
GCS	-.2908	.1008	8.3270	1	.0039	.7477
IVH	-1.3922	.6362	4.7888	1	.0286	.2485
Sex	-1.7214	.7408	5.4000	1	.0201	.1788
Volume >60cm^3	1.2209	.6047	4.0765	1	.0435	3.3902
Constant	5.7204	2.0370	7.8864	1	.0050	

-2 Log Likelihood   75.816
Hosmer-Lemeshow chi square of goodness of fit 7.38(df=8, P=0.49)
Model chi square   40.023 (df=4, P=0.0000)
Improvement (chi square)   4.256 (df=1, P=0.0391)

TABLE 7.3

The odd ratio of a hematoma size of more than 60 cm^3, Glasgow Coma Scale, intraventricular hemorrhage and sex were 3.39, 0.75, 0.25 and 0.18 respectively. Which means that, if the hematoma volume is more than 60 cm^3 the prognosis is bad. Conversely, a high Glasgow Coma Scale, no intraventricular hemorrhage, and female sex are good prognostic factors.

To test how well the model fit the data, we used Hosmer-Lemeshow chi square for goodness of fit of model was 7.38 (P=0.4963),so model does fit data quite well.

The model sensitivity, specificity and predictive accuracy were calculated with the Receiver Operating Characteristics (ROC) curve (Figure 7.2) The model sensitivity was 75 percent, the

specificity was 85.71 percent, the false positive rate was 20.59 percent, the false negative rate 17.65 percent, the positive predictive value was 79.41 percent, and the negative predictive value was 82.35 percent, the predictive accuracy was 81.18 percent, when the probability of outcome = 0.5 was the cut off point (TABLE 7.4).

SENSITIVITY, SPECIFICITY, AND PREDICTIVE ACCURACY OF MODEL ESTIMATED FOR DEAD (POSITIVE = P > 0.5).

	Predicted		total
	survivors	death	
Observed			
survivors	42	7	49
death	9	27	36

TABLE 7.4

So, the model is

$pj = p(d =1|x)$

$= 1/\{1+\exp[-(\alpha+ \beta_1 x_{1j}+ ...+ \beta_i x_{ij} + ...\beta_m x_{mj})]\}$

$= 1/\{1+ \exp[-(5.72-0.29GCS -1.39IVH -1.72SEX +1.22VOL)]\}$

p = probability of death in j-th subject (j= 1,2,...n)

IVH (1 = yes, 2 = no)

SEX (1 = male, 2 = female)
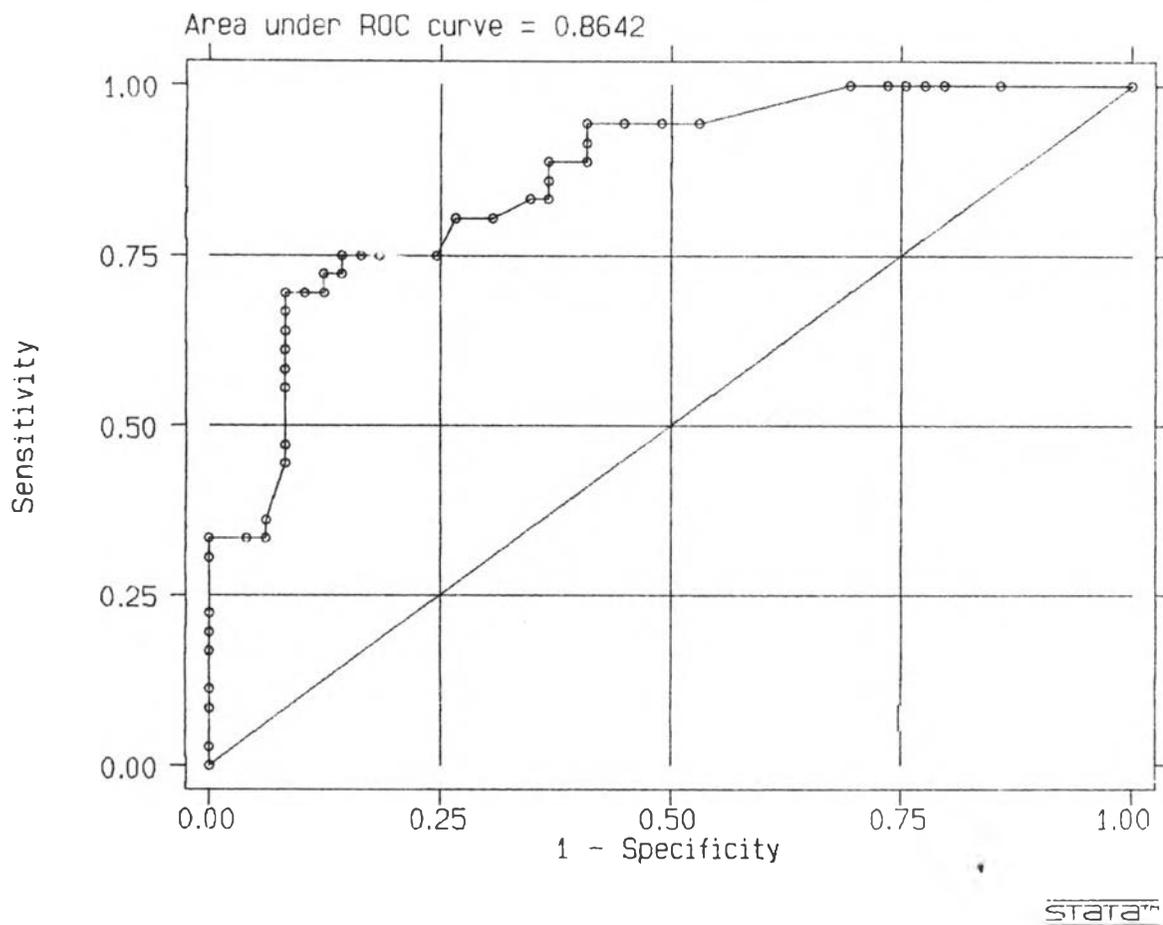
VOL (1 = ≤ 60 cm^3, 2 = >60 cm^3)

RECEIVER OPERATING CHARACTERISTIC (ROC) CURVE OF THE MODEL

FIGURE 7.2