

# ACUTE SUBDURAL HEMATOMA: A FIVE-YEAR REVIEW

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## ABSTRACT

*Eighty-three cases of acute subdural hematoma admitted to the Philippine General Hospital from 1983 to 1993 were reviewed. The profile, management and outcome of the cases are presented. The typical patient is a young Filipino male, frequently a pedestrian or intoxicated driver involved in a traffic accident and secondarily a victim of assault or fall injury. Forty-eight % arrived with severe head injuries requiring immediate surgical decompression. The choice of diagnostic procedure is dependent on its availability. In those with severe head injuries, the operative mortality is 54.1% with an overall mortality of 50.0%. In all cases, the overall mortality is 30.1%. The mean age of non-survivors is 33.5 years. The mortality reaches 40% in those associated with confusion and 67% in those with systematic injuries.*

**Keywords:** *acute subdural hematoma, vehicular accident, blunt trauma, carotid angiography.*

Acute subdural hematomas (SDH) are those operated upon within 24 hours and become clinically manifest within 48 to 72 hours. They often present with a higher mortality than other mass lesions resulting from head injury. The course of the patients is determined by the severity of the brain injury at the time of trauma and by the rapidity of the expansion of the hematoma. Prompt diagnosis and intervention are essential. It is the objective of this paper to

review the profile, management and outcome of patients with acute subdural hematomas admitted to the Philippine General Hospital (PGH) in order to determine if improvement in diagnosis and management is attainable.

## METHODOLOGY

This is a descriptive study. The records of 83 patients admitted to the Philippine General Hospital from 1989 to 1993 for acute subdural hematoma, diagnosed either by CT scan, carotid angiography or exploratory craniotomy, were reviewed.

There were 335 entries under the general heading of "subdural hematoma" for 1989 to 1993 at the PGH Division of Records. Only 196 records were available for review. Of these, 96 were chronic subdural hematomas, 4 were acute subdural hygromas and 13 were subacute subdural hematomas, and hence were excluded from the review. The cases of head injuries which were seen at the emergency room but were not admitted were also excluded. This necessarily gives an underestimate of the total number of acute SDH for the last five years. Also, the data presented did not include the functional outcome in subsequent follow-ups. Despite these limitations, it is hoped that the data will give a workable picture of the problem at hand.

## RESULTS

The year 1990 yielded the most number of cases. The average number of cases per year was 16.6. Eighty-seven percent of the patients were males with a ratio to females of 6.5 to 1 as shown in Table 1.

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**Table 1. Case Distribution of Acute SDH at the PGH**

Year	Cases	Male	Female
1989	10	10	0
1990	29	22	7
1991	16	14	2
1992	16	15	1
1993	12	11	1
Total	83	72	11

The ages ranged from 6 months to 72 years, with 6 unknown cases. The mean age was 33.4 years with females averaging 28.4 years and males 34.1 years. In males, 47.2% were in the third and fourth decades whereas in females, 45.5% were below 20 years (Table 2).

Fifty-four percent of admitted cases were involved in vehicular accidents. Of these 45 cases, 57.8% were pedestrians while 26.7% were drivers.

Blunt trauma represents 21.7% whereas, 19% was associated with assault using hard objects like lead pipes, wood blocks, bolo, and fists. Fall injuries comprised 15.7% of cases.

**Table 2. Age Distribution of Acute SDH at the PGH**

Age	Total	Male	Female
0-9	7 (8.4%)	5 (6.9%)	2 (18.2%)
10-19	9 (10.8%)	6 (8.3%)	3 (27.3%)
20-29	20 (24.1%)	19 (26.4%)	1 (9.1%)
30-39	16 (19.3%)	15 (20.8%)	1 (9.1%)
40-49	9 (10.8%)	8 (11.1%)	1 (9.1%)
50-59	9 (10.8%)	9 (12.5%)	0
60-69	5 (6.0%)	3 (4.2%)	2 (18.2%)
70-72	2 (2.4%)	2 (2.8%)	0
Unknown	6 (7.2%)	5 (6.9%)	1 (9.1%)
Average	33.4 years	34.1 years	28.4 years
Range	0.5 to 72	4 to 72	0.5 to 65

There were two cases of gunshot wounds and 5 cases were unknown. These 5 cases were found sprawled on the pavement (Table 3).

**Table 3. Mechanisms of Injury in Acute SDH at the PGH**

Mechanisms	Total
Vehicular accident	45 (54.2%)
pedestrians	26 (31.3%)
passengers	12 (14.5%)
drivers	7 (8.4%)
Blunt trauma	18 (21.7%)
assault	16 (19.3%)
Fall injury	13 (15.7%)
Gunshot wound	2 (2.4%)
Unknown	5 (6.0%)

Among those involved in vehicular accidents, 84.4% were males and 15.6% were females. Of the males, 60.5% were pedestrians, 21.0% were passengers and 18.4% were drivers. Of the females, 42.9% were pedestrians and 57.1% were passengers.

Ninety-four percent of blunt trauma victims were males; 5.6% were females. Ninety-four percent of blunt trauma in males were due to assaults whereas no such assault involved females. Twenty-four percent of males and 9.1% of females had subdural hematoma secondary to blunt trauma.

Males predominated (92.3%) in fall injuries over females (7.7%). Among the males with fall injuries one had prior seizure, five were intoxicated, while six were at work.

All gunshot victims were males one of whom was asleep when he was hit. Sixty percent of those with unknown etiology were males and 40% were females (Table 4).

**Table 4. Sex Distribution and Etiology of Acute SDH at the PGH**

Mechanisms	Male	Female
Vehicular accident	38 (52.8%)	7 (63.6%)
pedestrians	23 (31.9%)	3 (27.3%)
passengers	8 (11.1%)	4 (36.4%)
drivers	7 (9.7%)	0
Blunt trauma	17 (23.6%)	1 (9%)
Assault	16 (22.2%)	0
Fall injury	12 (16.7%)	1 (9.1%)
Gunshot wound	2 (2.8%)	0
Unknown	3 (4.2%)	2 (18.2%)

Twenty-seven percent of all vehicular accidents occurred in the 20 to 29 age group whereas injuries to pedestrians were present across all age groups. Fifty percent of the passengers were in the third and fourth decades, including those female patients who fell off their vehicles. The drivers were all males in the 20 to 60 age group (Table 5).

**Table 5. Age Distribution of Vehicular Accidents in Acute SDH**

Age	Pedestrians	Passengers	Driver	Total
0-9	4	(1)*	0	5
10-19	3	3(2)*	0	6
20-20	4	4(1)*	4	12
30-39	0	2(1)*	2	4
40-40	3	1	0	4
50-59	5	(1)*	1	7
60-69	3	0	0	3
70-72	1	0	0	1
Unknown	3	0	0	3

\*Figures in parenthesis indicate those falling from vehicles.

Seventy-seven percent of blunt trauma occurred in the 20 to 49 age groups. Sixty-nine percent of fall injuries was found among the 20 to 39 years old.

**Table 6. Age Distribution of Etiologies of Acute SDH at the PGH**

Age	Blunt Trauma	Fall	Gunshot Wound	Unknown
0-9	1	1	0	0
10-19	0	1	1	1
20-29	6	2	0	0
30-39	3	7	1	1
40-49	5	0	0	0
50-59	1	1	0	0
60-69	1	1	0	0
70-72	1	0	0	0
Unknown	0	0	0	3

All the patients in this retrospective study were taken to the PGH Emergency Room within 24 hours of injury, with a range of 0.25 hour to 23.5 hours. Seventy-two percent of the patients required immediate surgical decompression. Forty patients (48.2%) of the total number had severe head injuries with a Glasgow Coma Scale (GCS) of less than 8. Of these, 37 patients underwent emergency evacuation of the subdural hematoma. On the other hand, 26 patients had moderate injuries of GCS 8 to 12. Of these, 13 patients underwent evacuation of hematoma. Twenty percent (17 patients) had mild injuries with 10 undergoing surgical decompression. All the operations were done within four hours of diagnosis (Table 7).

**Table 7. Severity of Head Injuries and Surgical Decompression in Acute SDH at the PGH**

Glasgow Coma Scale	Total Cases	Total Operations
3-7	40 (48.2%)	37 (92.5%)
8-12	26 (31.3%)	13 (50.5%)
13-15	17 (20.5%)	10 (58.5%)
Total	83 (100.0%)	60 (72.3%)

Of those patients who underwent surgery, 45% were diagnosed by carotid angiography, 30% by CT scan and 15% by exploratory craniotomy. Two cases (3.3%) were depressed fractures and four (6.7%) had fungal infection of the brain. These were operated on after skull films were taken. In severe head injuries that underwent operation, 56.8% had bilateral carotid angiography (BCA), 25% had CT scan, 8.3% were explored and 1.7% had cerebral fungal infection. In moderate head injuries that were operated on, 30.8% had either BCA or CT scan, 23.1% were explored and 15.4% had cerebral fungal infection. In mild head injuries that required operation, 40% had CT scan, 20% had BCA, 20% depressed fractures and 10% each had fungus and exploration (Table 8).

**Table 8. Diagnostic Modalities in Operated Patients with Acute SDH at the PGH**

GCS	CT	BCA	Explore	Depressed	Fungus
3-7	10	21	5	0	1
8-12	4	4	3	0	2
13-15	4	2	1	2	1
<b>Total</b>	<b>18</b>	<b>27</b>	<b>9</b>	<b>2</b>	<b>4</b>

Of the 23 patients who did not undergo surgery, 22 were diagnosed by CT scan.

Overall, the diagnosis was arrived at based on CT scan in 40 cases (48.2%) and carotid angiography in 28 cases (33.7%). Nine patients (10.8%) underwent exploratory craniotomy, four patients (4.8%) underwent debridement for brain fungus and two (2.4%) underwent elevation of depressed fracture with incidental note of SDH.

Nine percent of the acute subdural hematoma cases occurred without associated injuries whereas 18.1% were associated with a combination of intracranial lesions such as epidural hematomas, contusion-hematomas, intracerebral hematoma, skull fractures, or subarachnoid hemorrhage (SAH). Sixty percent of those who underwent operations had multiple cranial injuries. Operative mortality was 31% in

these cases but reached 100% in those associated with systemic injuries. Overall, the mortality was 23.5% in those with multiple injuries, 40% in those with contusion only and 66.7% in those with systemic injuries (Table 9).

**Table 9. Associated Injuries and Operative Mortality in Acute SDH at the PGH**

Injuries	Total	Operated on	OR Mortality	Mortality
None	8 (9.6%)	4 (6.7%)	3 (75.0%)	37.5%
Contusion	15 (18.1%)	14 (23.3%)	6 (42.9%)	40.0%
Epidural hematoma	3 (3.6%)	2 (3.3%)	0	0
Multiple	51 61.4%	36 (60.%)	11 (30.6%)	23.5%
Systemic	6 (7.2%)	4 (6.7%)	4 (100%)	66.7%
Fracture	44 (53.0%)	40 (66.7%)	5 (37.5%)	36.7%

There were 23 mortalities, 22 of them operative. Two patients were brought home against medical advice postoperatively. If these two cases were regarded as mortalities, the overall mortality is 30.1%.

In the group with severe head injury, overall mortality was 50% and operative mortality reached 54.1%. One patient was brought home against advice. All the survivors had GCS greater than 4. The mean age of non-survivors was 36.1 years. Seventy percent died within one week postoperatively. All three female mortalities belong to this group.

In the group with moderate head injury, overall mortality was 11.8% and operative mortality was 10%. One succumbed to myocardial infarction and the other decompensated pre-operative. Both died within 5 days. The mean age of non-survivors was 40 years.

The mean age for mortality in males was 35.3 years, and in females, 15 years. The mean age for all non-survivors was 33.5 years (Table 10).

**Table 10. Mortality in Acute SDH at the PGH**

GCS	Total*	Operative Mortality	Overall Mortality
3-7	19 (1)	51.4% (54.1%)	47.5% (50.0%)
8-12	2 (1)	15.4% 23.1%	7.7% (11.5%)
13-15	1 (1)	10.0%	11.8%
Total	22 (3)	36.7% (40.0%)	26.5% (30.1%)

\*Include one case each for the severe and moderate head injury group who went home against advice and one case in the mild head injury who did not undergo surgical operation.

The yearly mortality for acute subdural hematoma ranged from 16.7% to 43.7%. Overall, the mortality is 30.1% (Table 11).

**Table 11. Annual Mortality in Acute SDH in PGH**

Year	Mortality	Rate(%)
1989	4	40.0%
1990	6(1)	20.7% (24.1%)
1991	6(1)	37.5% (43.7%)
1992	5	31.2%
1993	2	16.7%
Total	23(2)	27.7% (30.1%)

## DISCUSSION

The most frequent etiology of acute subdural hematoma among patients at the PGH is vehicular accidents. More than half of these cases involved injuries to the pedestrians. Injuries to passengers are the next most common followed by injuries to the driver. Why a majority of accidents affected pedestrians calls attention to road traffic practices. Half of the injuries to

passengers were caused by vehicular falls. This may be due to a lack of proper passenger restraint in a moving vehicle. Some patients actually fell off while sleeping atop cargo trucks while some fell from the back of tricycles.

A serious concern was the common finding of intoxication (86%). Driving motor bikes was also a common cause of accident (71%). Bikes afford less protection to the drivers than enclosed vehicles.

Blunt trauma was the next common with the majority associated with assault. While half of the fall injuries occurred at work, the other half involved intoxicated males.

These findings compare differently with foreign data which indicate that subdural hematoma was more likely due to falls and assaults than vehicular accidents.

The majority of male accident victims were injured as pedestrians while female victims were involved equally either as pedestrians or passengers. All the injured drivers were males. All assaults involved males and majority of fall injuries involved males.

The majority of cases were males within the 20 to 60 age groups. It appeared that passengers of cargo trucks, drivers of motor bikes, victims of assault or intoxicated patients who suffered from injuries were mostly males. This explains the overwhelming predominance of male victims.

The mean age of the PGH patient is younger than those reported in foreign literature, which was 41-42 years; the youngest was a 6 months old girl with a fall injury. The oldest was a 72-year-old male with a mauling injury. The injured pedestrians belonged to almost all age groups while passengers and drivers were mostly below 40 years. Blunt trauma affected those below 50 years and fall injuries mostly affected those below 40 years. Overall, the patients belonged to a productive age group of 10 to 60 years.

Most of the cases that were brought in already had severe head injuries. These were also the patients requiring immediate surgical decompression with 92.5% undergoing surgery. Among those brought in with severe head injuries, overall mortality was 50%.

The rest were brought in with mild to

moderate head injuries. About half of these patients underwent surgery. There was a higher operative mortality in those with moderate injuries (23.1%) compared to those with mild injuries (10%). But overall mortality approached 12% in both groups.

The overall mortality of 30.1% represents a good figure compared with those in foreign literature. The Filipino non-survivor, however, is younger than his foreign counterpart. This might be due to the preponderance of vehicular accidents which affects the younger age groups in the local setting.

Most of the cases with severe head injuries were diagnosed by means of carotid angiography. This was most probably due to lack of financial resources or to unavailability of the CT scan machine. In these cases, angiography provided a fast and affordable alternative to diagnose a subdural mass lesion requiring emergency surgery. In cases with mild to moderate head injuries, CT scan was more commonly used as a means of diagnosis. This was probably due to availability of time to produce the necessary funds and to transport the patients to institutions equipped with the CT scan machine. Among those not operated on, CT scan was done in all except one case.

The associated injuries determine the outcome of the patients. Those with contusions have a mortality of 40% while those with multiple injuries have a 25.5% mortality. Patients with systemic injuries had a 66.7% mortality.

## CONCLUSION

The typical patient with acute subdural hematoma brought to the PGH for management is a young Filipino male, frequently a pedestrian or intoxicated driver involved in accidents, and secondarily a victim of assault and fall injury.

About 40% of these patients arrived with severe head injuries requiring immediate surgical decompression. The choice of diagnostic procedure depends upon its availability and the urgency of the need for such a diagnosis.

The overall mortality for those having severe head injuries was 50%. For those having multiple injuries, the operative mortality was 24%. Those with contusions only have 42.9% operative and 40% overall mortality. Those with systemic injuries have 100% operative and 66.7% overall mortality. The mean age of non-survivors is 33.5.

Vehicular accident was the leading cause of acute subdural hematoma in the local setting. Preventive measures through appropriate public education and traffic regulation enforcement are essential to decrease these incidents. Efforts in this direction may be of much help in addressing these problems.

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