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RSUD Dr Chasbullah Abdul  
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## Comparison of craniotomy surgery therapy with conservative medical therapy in haemorrhagic stroke patients RSUD Dr Chasbullah Abdul Majid Bekasi City January-December 2022

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### ABSTRACT

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Hemorrhagic stroke is caused by rupture of blood vessels in the brain, which causes blood to leak into the brain tissue. As a result, the oxygen supply to brain cells is disrupted because blood cannot flow through the ruptured blood vessels. There are two main options for treating hemorrhagic stroke, namely surgical therapy and conservative therapy. The aim of this study was to compare the results of surgical therapy and conservative therapy in hemorrhagic stroke patients at RSUD Dr. Chasbullah Abdul Majid Bekasi City during the period January to December 2022. The type of research used by researchers is retrospective descriptive research. Data were collected from medical records of patients who had undergone surgical therapy and conservative therapy for hemorrhagic stroke. The statistical analysis used is descriptive statistics using frequency analysis. Research findings showed that more patients showed improved prognosis after using conservative therapy, with a percentage reaching 85.5%. Meanwhile, for patients who underwent operative therapy, the percentage of improvement in prognosis was 65.4%. It can be concluded that the percentage of improvement in patient prognosis after receiving conservative therapy is higher than those receiving operative therapy.

#### Keywords:

surgical therapy  
conservative  
haemorrhagic stroke

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### INTRODUCTION

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Hemorrhagic stroke is a serious condition. This type of stroke occurs when a blood vessel in the brain bursts, which can result in bleeding in the brain. This condition disrupts the supply of oxygen to brain cells because blood cannot flow through the ruptured blood vessels. As a result, brain cells can be damaged or die due to lack of oxygen and nutrients carried by the blood (Montaño et al., 2021). When someone is diagnosed with a hemorrhagic stroke, emergency treatment is essential, and in some cases surgery is necessary. Quick action is needed to prevent further brain damage, which could potentially cause disability or even death. Therefore, hemorrhagic strokes tend to be considered more serious than ischemic strokes (Amrina, 2017).

Hemorrhagic strokes account for approximately 10% to 20% of all stroke cases each year. The percentage of bleeding due to stroke is around 8-15% in the United States, England and Australia, and reaches 18% to 24% in Japan and Korea. The incidence is estimated to be around 12% to 15% of every 100,000 cases per year. This incident occurs more often in low and middle income countries and in the Asian region. Meanwhile, the incidence of hemorrhagic stroke tends to be higher in men and increases with age. Globally, the incidence of hemorrhagic stroke continues to increase, especially in countries in Africa and Asia. Data from Japan shows that controlling high blood pressure can reduce the incidence of hemorrhagic stroke. The death rate from this disease ranges from 25% to 30% in high-income countries, while in low- and middle-income countries, the death rate can reach 30% to 48%. The death rate from hemorrhagic stroke depends greatly on the effectiveness of the critical care provided (Unnithan & Mehta, 2020).

Management of hemorrhagic stroke involves two main options, namely surgical therapy and conservative therapy. Surgical therapy involves surgical intervention to treat bleeding in the brain, such as removing a hematoma or bleeding, repairing or strengthening leaking blood vessels, or reducing pressure on the affected brain tissue. Meanwhile, conservative therapy includes intensive medical management and monitoring without direct surgical intervention. The choice between surgical therapy and conservative therapy

usually depends on a number of factors, including the location and size of the bleeding, the patient's overall condition, and patient and family preferences. <sup>1</sup>

Previous research by Farizi (2023) found that the percentage of prognosis that improved was greater in patients who used conservative therapy with a percentage of 85.5%, while the prognosis after operative therapy was 65.4%. It was concluded that the percentage of prognosis after conservative therapy was higher compared to the percentage after operative therapy. Another study by Farizi & Utomo (2023) showed that the percentage of prognosis that improved was greater in patients who used conservative therapy with a percentage of 85.5%, while the prognosis after operative therapy was 65.4%. It was concluded that the percentage of prognosis after conservative therapy was higher than the percentage after operative therapy. <sup>1</sup>

The aim of this study was to compare the results of surgical therapy and conservative therapy in hemorrhagic stroke patients at RSUD Dr. Chasbullah Abdul Majid Bekasi City during the period January to December 2022. The research can contribute to the scientific understanding of the effectiveness of surgical therapy versus conservative therapy in managing hemorrhagic stroke patients.

## METHOD <sup>1</sup>

The type of research used by researchers is retrospective descriptive research that aims to provide an overview or description of a situation objectively by looking backwards (Talari & Goyal, 2020). The location for this research data collection was carried out at DR Chasbullah Abdul Majid Regional Hospital, Bekasi City. The time for carrying out, collecting and implementing the research was carried out in February – March 2023. Data was collected from medical records of patients who had undergone surgical therapy and conservative therapy for hemorrhagic stroke. The population of this study were all Hemorrhagic Stroke patients who were at the DR Chasbullah Abdul Majid General Hospital, Bekasi City in the West Java Region for the period April-December 2022. The samples taken in this study were all Hemorrhagic Stroke sufferers in April-December 2022 who underwent therapy, operative or conservative. The sampling technique for this research was taken using the Purposive Sampling technique, namely a population that has been determined by meeting the inclusion criteria determined by the researcher. The statistical analysis used is descriptive statistics using frequency analysis.

## RESULTS AND DISCUSSION

The results were obtained from data on patients with hemorrhagic stroke who underwent operative or conservative therapy at Chasbullah Abdulmajid Regional General Hospital (CAM) Bekasi during the period April 2022 to December 2022. A total of 95 patients who met the inclusion criteria were involved in this study. Of these 95 patients, data collected included age, gender, risk factors, NIHSS, and mortality. These variables were used in the analysis of the study.

**Table 1.** Gender Distribution of Hemorrhagic Stroke Patients at CAM Hospital

Gender	Frequency	Percentage (%)
Men	57	60%
Women	38	40%
<b>Total</b>	<b>95</b>	<b>100%</b>

<sup>18</sup> Based on table 1, the data shows the number of male patients is 57 out of 95 (60%), while female patients are 38 out of 95 (40%). These results show that men make up the majority of hemorrhagic stroke patients at Chasbullah Abdulmajid Hospital. In contrast to research by Rexrode et al. (2022), which states the opposite that women are more often affected by hemorrhagic stroke than men. However, this is in line with the findings of Abdu & Seyoum (2022), who showed that globally, the burden of stroke increased in both men and women, but was greater in men. This may be due to more significant improvements in women after stroke than men in some countries. <sup>4</sup>

In addition, men are more likely to develop hypertension than women due to lower levels of the hormone estrogen in men, which functions to increase HDL (High Density Lipoprotein) levels. As a result, men are more prone to hypertension. Chronic hypertension in men can lead to decreased elasticity and permeability of blood vessels. As a result, blood vessels in the body become more susceptible to tears, increasing the risk of carrying small fats to the brain, which can cause blockage of cerebral blood vessels or even rupture of cerebral blood vessels, resulting in hemorrhagic stroke (Maydinar et al., 2017).

**Table 2.** Age Distribution of Hemorrhagic Stroke Patients at CAM Hospital

Age	Frequency	Percentage (%)
20 – 50	18	18,9%

51 – 80	74	77,9%
>80	3	3,2%
<b>Total</b>	<b>95</b>	<b>100%</b>

Based on the table, it was found that the majority of hemorrhagic stroke patients at Chasbullah Abdulmajid Hospital were in the age range of 51-80 years with 71 out of 95 patients (77.9%). Furthermore, there were 18 patients aged 20-50 years (18.9%), and finally, there were 3 patients aged more than 80 years (3.2%). This data shows that when a person enters productive age, their needs and quality of life tend to increase. However, this increase is often accompanied by an unhealthy lifestyle. Productive age often brings greater pressure and responsibility, which can lead to stress and unhealthy lifestyles, such as poor diet, lack of physical activity, smoking and alcohol consumption. All of these factors contribute to a higher risk of developing hypertension and cardiovascular disease, ultimately increasing the risk of hemorrhagic stroke (Yang et al., 2023).

**Table 3.** Distribution of CT Scan Results of Hemorrhagic Stroke Patients in RSUD

<b>Etiology</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<20 cc	31	32,6%
20 – 40 cc	45	47,4%
>40 cc	19	20%
<b>Total</b>	<b>95</b>	<b>100%</b>

The table shows that the most common bleeding volume was between more than 20 to 40 cc, with a frequency of 45 patients out of 95 (47.4%), almost half of the population studied. Next, bleeding volume of less than 20 cc occurred in 31 patients out of 95 (32.6%). Finally, bleeding volumes in the range of 20 to 40 cc were found in 19 patients out of 95 (20%). That is, if adjusted to the indication of craniotomy surgery for bleeding in the range of more than 25 cc (Dharmajaya, 2018). Based on the CT scan results, it can be concluded that the total frequency of patients who meet the criteria for craniotomy surgery is 64 out of 95 patients (67.3%).

**Table 4.** Distribution of Risk Factors for Hemorrhagic Stroke Patients at CAM Hospital

<b>Risk Factors</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Hypertension	63	66,3%
Hypertension, Cholesterol	27	28,4%
Hypertension, Cholesterol, Smoking	1	1,1%
Hypertension, Smoking	4	4,2%
<b>Total</b>	<b>95</b>	<b>100%</b>

Based on the table above, patients with hemorrhagic stroke had the most history of risk factors, hypertension, which was found in all 95 patients out of a total of 95 patients (100%). Cholesterol risk factor was found in 28 out of 95 patients (29.4%), while smoking was only found in 5 out of 95 patients (5.2%). This study did not highlight Diabetes Mellitus as a major risk factor in hemorrhagic stroke, as usually Diabetes Mellitus is more commonly associated with ischemic stroke. In fact, uncontrolled Diabetes Mellitus can lead to complications such as diabetic ulcers and diabetic retinopathy, so it is not the main focus in research on hemorrhagic stroke. In line with the statement expressed by Rezha (2019), hypertension has a significant impact on the risk of stroke because it can disrupt blood flow to the brain, which in turn can cause narrowing of the brain's blood vessels. Meanwhile, smoking contains various toxic chemicals, such as carbon monoxide, which can replace oxygen in the bond with hemoglobin in the blood, thus increasing the risk of atherosclerosis.

**Table 5.** Distribution of NIHSS Before Therapy in Hemorrhagic Stroke Patients at CAM Hospital

<b>NIHSS Before</b>	<b>Frequency</b>	<b>Percentage (%)</b>
1 – 4	9	9,5%
5 – 14	53	55,8%
15 – 20	22	23,2%
>20	11	11,6%
<b>Total</b>	<b>95</b>	<b>100%</b>

<sup>16</sup> The results from the table show that most hemorrhagic stroke patients had a pre-therapy NIHSS (National Institute of Health Stroke Scale) distribution in the range of 5 to 14 (moderate stroke), with a

frequency of 53 patients out of a total of 95 patients (55.8%). Meanwhile, a total of 22 patients out of 95 patients (23.2%) had NIHSS scores in the range of 15 to 22 (severe stroke).

**Table 6.** Distribution of NIHSS After Therapy in Hemorrhagic Stroke Patients at CAM Hospital

NIHSS After	Frequency	Percentage (%)
1 – 4	23	24,2%
5 – 14	47	49,5%
15 – 20	8	8,4%
>20	17	17,9%
<b>Total</b>	<b>95</b>	<b>100%</b>

The table presents the distribution of NIHSS (National Institute of Health Stroke Scale) scores after therapy in hemorrhagic stroke patients. It was found that the score range of 5 to 14 (moderate stroke) had the highest frequency, with 47 out of 95 patients (49.5%). The score range of 1 to 4 (mild stroke) was the second most frequent with 23 patients out of 95 (24.2%). The score range of more than 20 (very severe stroke) had a frequency of 17 patients out of 95 (8.4%).

**Table 7.** Distribution of GCS Before Therapy in Hemorrhagic Stroke Patients at CAM Hospital

GCS Before	Frequency	Percentage (%)
3 – 8	34	35,8%
9 – 12	24	25,3%
13 – 15	37	28,9%
<b>Total</b>	<b>95</b>	<b>100%</b>

Based on the table, the results of the GCS (Glasgow Coma Scale) distribution before therapy in hemorrhagic stroke patients showed that the highest frequency was in the 13-15 value range with 37 of 95 patients (38.9%). Furthermore, the score range of 3-8 had a frequency of 34 out of 95 patients (35.8%). Finally, the score range of 9-12 included 24 out of 95 patients (25.3%).

**Table 8.** Distribution of GCS after therapy in hemorrhagic stroke patients at CAM Hospital

GCS After	Frequency	Percentage (%)
3 – 8	20	21,1%
9 – 12	21	22,1%
13 – 15	54	56,8%
<b>Total</b>	<b>95</b>	<b>100%</b>

According to the table above, the distribution of Glasgow Coma Scale scores in hemorrhagic stroke patients after therapy shows that the score range of 13-15 has the highest frequency, which is 54 out of 95 patients (56.8%). Furthermore, the score range of 9-12 was found in 21 out of 95 patients (22.1%). Finally, a score range of 3-8 was recorded in 20 out of 95 patients (21.1%).

**Table 9.** Distribution of Hemorrhagic Stroke Patients who Underwent Surgery and Non-Surgery at CAM Hospital

Operation	Frequency	Percentage (%)
No	69	72,6%
Yes	26	27,4%
<b>Total</b>	<b>95</b>	<b>100%</b>

The table shows that the distribution of hemorrhagic stroke patients at Chasbullah Abdulmadjid Hospital who underwent surgery was 26 out of 95 patients (27.4%), while 69 out of 95 patients (72.6%) underwent conservative therapy without surgery.

**Table 10.** Distribution of Mortality of Hemorrhagic Stroke Patients at CAM Hospital

Mortality	Frequency	Percentage (%)
Died	16	16,8%
Not Died	79	83,2%
<b>Total</b>	<b>95</b>	<b>100%</b>

Based on the mortality table above, the distribution of hemorrhagic stroke patients at Chasbullah Abdulmadjid Hospital shows that 16 out of 95 patients (16.8%) died, while 79 out of 95 patients (83.2%) survived.

**Table 11.** Distribution of Postoperative Improved Prognosis in Hemorrhagic Stroke Patients at CAM Hospital

Age	Frequency	Percentage (%)
20 – 50	5	29,4%
50 – 80	11	64,7%
>80	1	5,9%
<b>Total</b>	<b>17</b>	<b>100 %</b>

Based on the table above, the results of improved postoperative prognosis in hemorrhagic stroke patients at Chasbullah Abdulmadjid Hospital show that 17 patients experienced improvement. Divided in the age range of 20-50 years, there were 5 patients (29.4%) who experienced improvement. The age range of 50-80 years had 11 patients (64.7%) who experienced improvement, and at the age of more than 80 years, there was 1 patient (5.9%) who experienced improvement. The indications for craniotomy included bleeding of more than 20 ml, midline shift of more than 5 mm, and decreased consciousness. The results of the craniotomy procedure include improved balance in reducing bleeding, reducing intracranial pressure, and maintaining brain perfusion (Sanjaya & Kurniawan, 2022).

**Table 12.** Distribution of Worsening Prognosis After Operative Therapy in Hemorrhagic Stroke Patients at CAM Hospital

Age	Frequency	Percentage (%)
20 – 50	2	22,2%
50 – 80	6	66,7%
>80	1	11,1%
<b>Total</b>	<b>9</b>	<b>100 %</b>

The table above shows the results of worsening prognosis after operative therapy in hemorrhagic stroke patients at Chasbullah Abdulmadjid Hospital, with 9 out of 26 patients who underwent operative therapy experiencing deterioration. Based on patient age, there were 2 patients in the age range of 20-50 years (22.2%), 6 patients in the age range of 50-80 years (66.7%), and 1 patient aged over 80 years (11.1%). This mortality rate may occur due to various factors. First, after surgery, patients may experience sepsis shock, such as pneumonia. Infections in the incision wound during surgical procedures can cause fever and increased pain threshold (Purwanto & Astrawinata, 2018).

The second possibility is that advanced age plays a significant role, because with age, thickening and atrophy of the brain occurs where dendrite protrusions disappear and progressively brain cells undergo fragmentation and death. Atrophy caused by closed head injury in one year is equivalent to several years of natural aging (Harris et al., 2019). Another possibility is the risk of recurrent bleeding that can occur if surgery is performed during periods of instability (<2 hours from onset). For example, stereotactic suction can lead to rebleeding rates of 40% within 4 hours and 12% within 12 hours (Guo et al., 2021).

**Table 13.** Distribution of Improved Prognosis After Conservative Therapy in Hemorrhagic Stroke Patients at CAM Hospital

Age	Frequency	Percentage (%)
20 – 50	11	18,6%
50 – 80	47	79,7%
>80	1	1,7%
<b>Total</b>	<b>59</b>	<b>100 %</b>

The table above describes the improved prognosis after conservative therapy in hemorrhagic stroke patients, with a total of 59 patients using conservative therapy. This data is divided into three age range categories. First, the age range of 20-50 years included 11 patients (18.6%). Next, the age range of 50-80 years included 47 patients (79.7%). Finally, those over 80 years old included 1 patient (1.7%). Based on research written by Schreiber et al. (2018), regarding the use of mannitol which works by reducing osmolality. This leads to a decrease in water content in the brain parenchyma, which in turn reduces intracranial pressure. This finding is consistent with the results obtained in this study, where conservative therapy showed improved

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prognosis for many patients. Mannitol helps reduce brain swelling and pressure within the skull, which are important factors in the conservative management of hemorrhagic stroke.

**Table 14.** Distribution of worsening prognosis after conservative surgery in patients with hemorrhagic stroke at CAM Hospital

Age	Frequency	Percentage (%)
20 – 50	1	10%
50 – 80	9	90%
<b>Total</b>	<b>10</b>	<b>100%</b>

The table above displays the distribution of worsening prognosis after conservative therapy in hemorrhagic stroke patients at CAM Hospital, with a total of 10 patients. According to the table, only one patient (10%) was within the age range of 20-50 years. While nine patients (90%) were in the age range of 50-80 years. No patient was older than 80 years old.

There are several factors that can cause a patient's prognosis to worsen after conservative therapy. One of them is electrolyte imbalance that may occur due to the administration of mannitol as part of the therapy. Mannitol can cause electrolyte imbalances, such as hyponatremia or hypernatremia in blood sodium, and hypokalemia or hyperkalemia in blood potassium, as mannitol has an inductive effect on potassium. Long-term and high-dose administration of mannitol may cause acute renal failure. In addition, prolonged use of mannitol can also cause dehydration due to its osmotic properties, which in turn can result in decreased brain tissue volume and increase the risk of brain herniation (Cook et al., 2020). Herniations of the brain can be categorized into subfalsinal herniation, transtentorial uncal herniation, central (trans-tentorial) herniation (descending and ascending), and cerebellar tonsil herniation.

## CONCLUSION

Based on the percentage of those aged 20 - 50 years who underwent operative or conservative therapy, it was found that operative therapy was better than conservative with a percentage ratio of 29.4% to 18.6%. Based on the percentage of those aged 20 – 50 years who underwent operative or conservative therapy, it was found that conservative therapy was much better than operative with a percentage ratio of 79.7%: 64.7%. Based on the percentage of those aged 80 years and over who underwent operative or conservative therapy, it was found that operative therapy was much better than conservative with a percentage ratio of 79.7%: 64.7%. Research findings show that more patients show improved prognosis after using conservative therapy, with a percentage reaching 85.5%. Meanwhile, for patients who underwent operative therapy, the percentage of improvement in prognosis was 65.4%. It can be concluded that the percentage of improvement in patient prognosis after receiving conservative therapy is higher than those receiving operative therapy.

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