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Radiological features, Clinical presentation, hemiparesis, quadriparesis, bladder dysfunction

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Clinical spectrum and outcome of pontine strokes in a tertiary care hospital of Tripura: A case series.

Abstract

Background: Pontine stroke is an uncommon but potentially life-threatening subtype of posterior circulation stroke due to the critical neuroanatomical functions of the pons. Despite its clinical significance, data from northeastern India are scarce. This study aimed to describe the clinical profile, radiological features, management, and short-term outcomes of patients with pontine stroke treated at a tertiary care hospital in Tripura.

Methods: A hospital-based case series was conducted in the Department of Medicine, Agartala Government Medical College and GBP Hospital, Tripura, from February to July 2023. Ten consecutive patients with radiologically confirmed pontine stroke were enrolled. Demographic characteristics, vascular risk factors, clinical presentation, neuroimaging findings, treatment, complications, and in-hospital outcomes were recorded using a structured data collection form.

Results: Among 136 admitted stroke patients, 10 (7.35%) had pontine stroke, of whom, 91.6% were identified as pontine hemorrhages. The mean age was 63.3 years, with a male predominance. Hypertension was the most common risk factor (50%), followed by diabetes mellitus, dyslipidemia, smoking, and family history of stroke. Clinical manifestations ranged from crossed hemiparesis, quadriparesis, vertigo, dysarthria, and impaired consciousness to rare presentations such as one-and-a-half syndrome and bladder dysfunction secondary to pontine infarction. Patients with massive pontine hemorrhage had poor outcomes, accounting for an overall mortality of 30%, whereas those with small hemorrhages recovered well with conservative management.

Conclusions: Pontine stroke exhibits diverse clinical manifestations and variable outcomes. Early neuroimaging, prompt recognition, aggressive blood pressure control, and multidisciplinary supportive care are essential to improve prognosis. Larger multicentric studies with long-term follow-up are warranted to validate these findings and identify prognostic factors.

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Introduction

Stroke constitutes a significant global health issue, ranking as the third leading cause of disability worldwide and accounting for around 11.8% of all fatalities. In India, the situation is particularly concerning, as stroke ranks as the second highest cause of death. Prior research has demonstrated that in India, a stroke transpires every 40 seconds, but a stroke-related fatality occurs every 4 minutes and 2 seconds. These data underscore the pressing necessity for targeted study on various stroke types, their clinical presentations, and patient outcomes.

The pons, an essential component of the brainstem, constitutes approximately 10% of all stroke incidents. Pontine infarctions are rather prevalent among posterior circulation strokes and are deemed especially catastrophic due to their anatomical position and the critical tasks linked with this area. Approximately 90% of deaths associated with brainstem strokes are due to pontine involvement. The clinical manifestation of pontine strokes exhibits considerable variability. The spectrum may include traditional crossover hemiplegia to isolated motor or sensory disorders, with results varying from survival with enduring neurological deficits to swift mortality.

Pontine infarction results in considerable morbidity and death during the acute phase and predisposes individuals to recurrent strokes. Kumral et al. have shown that individuals who survive an initial pontine infarction face a heightened risk of recurrent cerebrovascular episodes. Nonetheless, there is insufficient clarity on the prognostic comparison of isolated pontine infarctions with other posterior circulation strokes or non-pontine infarctions.

In light of this context, the current case series was conducted at a tertiary care hospital in Tripura to evaluate the clinical profile, presenting symptoms, and overall outcomes of patients with pontine strokes. This study aims to provide significant regional data through the

analysis of real-world cases, enhancing the understanding of pontine infarctions, assisting physicians in early diagnosis and therapy, and emphasizing the critical necessity for preventive initiatives to mitigate stroke incidence in northeast India.

Case Description:

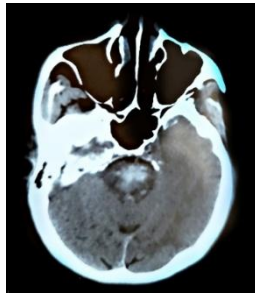
This case series presents ten instances of pontine stroke. They were enrolled in the medicine department of Agartala Government Medical College in Tripura for a duration of six months, specifically from February 1, 2023, to July 31, 2023. Informed written consents were obtained from patients or their relatives before to enrolment in this study. Data were gathered using a pre-structured form that encompassed patient identification details, clinical manifestations, co-morbidities, central nervous system examination, NCCT brain/MRI brain findings, and the duration of hospital stay, both with and without complications.

CASE 1 - A 56-year-old male, a smoker with hypertension and no diabetes, presented with an abrupt onset of loss of consciousness lasting 45 minutes. The patient was unresponsive upon arrival, with a Glasgow Coma Scale score of 6 out of 15 at admission. Upon examination, the patient was afebrile, with a blood pressure of 210/100 mmHg, a pulse rate of 90 regular beats per minute, and a respiratory rate of 21 per minute. During the neurological assessment, the patient exhibited coma with quadriplegia, pupils that were pin-point and little reactive, and bilateral Babinski reflexes. NCCT of the brain reveals a substantial pontine haemorrhage with a volume of 17.6 ml. Emergency resuscitation was performed, and intravenous Mannitol was administered to decrease intracranial pressure, while blood pressure was regulated with intravenous labetalol. The patient was transported to the ICU on day 2, and endotracheal intubation was performed. Result - Fatality on the second day.



MASSIVE PONTINE HAEMORRHAGE

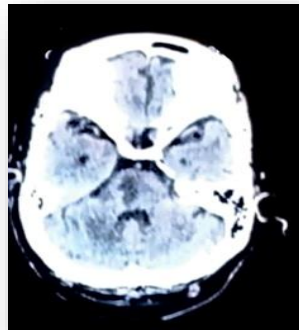
CASE 2 - A 32-year-old male adult with no known predisposing conditions, referred to our hospital due to a sudden onset of loss of consciousness occurring two hours prior. The patient was unresponsive upon arrival, with a Glasgow Coma Scale score of 3 out of 15 at admission. Upon examination, the patient was observed to be febrile, with a blood pressure of 190/110 mmHg, a pulse rate of 68 beats per minute, and tachypnea at a rate of 26 breaths per minute. During the neurological examination, the patient was in a comatose state with quadriplegia, exhibiting pin-point pupils that reacted slightly, and bilateral Babinski reflex was present. NCCT of the brain reveals a substantial pontine hemorrhage with a volume of 19.7 ml. Emergency resuscitation performed and conservative management administered. Result - Fatality occurring 32 hours after the onset of symptoms.



MASSIVE PONTINE HAEMORRHAGE

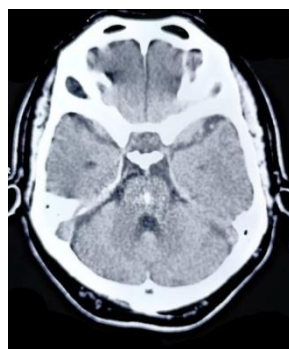
CASE 3: A 63-year-old male with hypertension and diabetes, admitted with left-sided hemiparesis for four hours. Neurological examination revealed left-sided hemiparesis (power 3/5) accompanied by dysarthria, with no sensory deficits observed; nonetheless, urine incontinence was present following the incident. DTR brisk and plantar extensor reflex on the left side. NCCT BRAIN indicates pontine infarction. The patient had aspiration pneumonitis, recovered with a prescribed antibiotic regimen, and required intensive care unit management.

The patient's motor function improved upon discharge on day 14; however, urine incontinence remained, necessitating discharge with a catheter in place. Upon follow-up, the patient underwent an abdominal ultrasound, which yielded normal results. However, the urodynamics testing indicated the presence of detrusor hyperactivity.



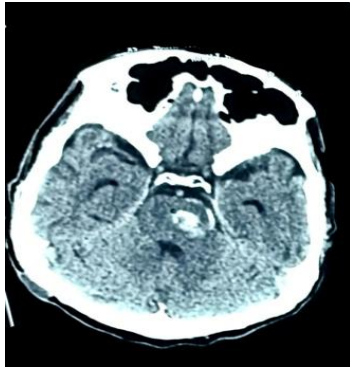
PONTINE INFARCTION WITH BLADDER DYSFUNCTION

CASE 4 - A 61-year-old female with a history of hypertension presented with sudden onset of vertigo, nausea, two episodes of vomiting, and generalized weakness. The patient was alert upon presentation, with a Glasgow Coma Scale score of 15/15 at admission. Upon examination, the patient was afebrile, with a blood pressure of 150/90 mmHg, a pulse rate of 78 beats per minute, and a respiratory rate of 16 breaths per minute. Upon neurological examination, the patient had no neurological deficits. NCCT of the brain reveals a pontine haemorrhage with a volume of 1.76 ml. Blood pressure was regulated using a calcium channel blocker and managed carefully. Result - discharged on the third day.



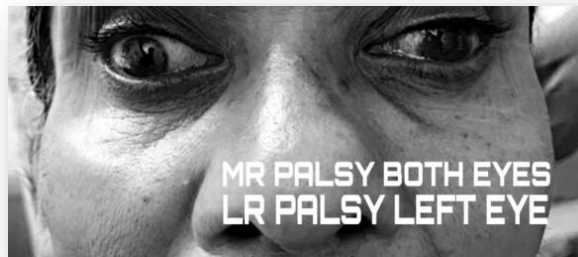
SMALL PONTINE HAEMORRHAGE

CASE 5 - A 57-year-old female, previously non-diabetic but with a history of hypertension managed with regular medication, appeared with an abrupt onset of weakness and slurred speech. The patient was alert at arrival, with a Glasgow Coma Scale score of 15/15 at admission. Upon examination, the patient was afebrile, with a blood pressure of 130/80 mmHg, a pulse rate of 62 regular beats per minute, and a respiratory rate of 18 per minute. During the neurological examination, the patient exhibited right-sided facial palsy (lower motor neuron type) and left-sided hemiparesis (upper motor neuron type), with a positive Babinski sign on the left side. NCCT of the brain reveals unilateral pontine hemorrhage with a volume of 5.8 ml in the tegmentum. The patient was handled cautiously. Result - discharged on the seventh day.



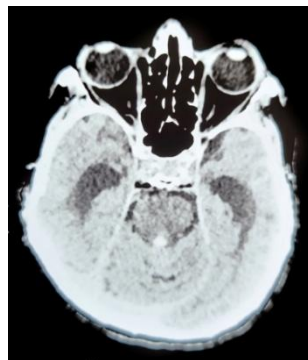
PONTINE BLEED WITH CROSSED HEMIPARESIS

CASE 06 - A 60-year-old Male individual exhibited vertigo, visual disturbances, and several episodes of emesis over a duration of 3 hours. The patient has a medical history of uncontrolled hypertension for the past 15 years and has been taking Amlodipine irregularly. During the physical examination, his blood pressure was recorded at 170/110 mmHg, and his pulse rate was 76 bpm, regular. No limb palsy or sensory involvement was observed during the neurological evaluation; nevertheless, horizontal gaze palsy was present. The patient has medial rectus and lateral rectus palsy in the left eye, while the right eye shows medial rectus palsy. Non-contrast computed tomography of the brain demonstrates acute pontine hemorrhage. The patient is diagnosed with one-and-a-half syndrome. Patient discharged on day 7 following conservative treatment. The patient had persistent gaze palsy at the time of discharge and requested a follow-up.



PONTINE BLEED WITH ONEAND HALF SYNDROME

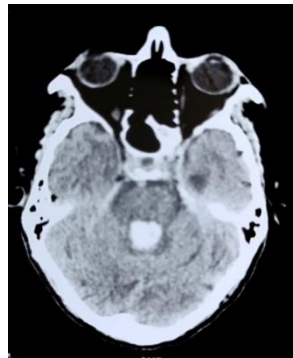
CASE 07: A 76-year-old female presented with growing weakness on the left side of the body lasting for 6 hours. The patient had no notable medical history but had a family history of stroke in a first-degree relative. During the physical examination, his blood pressure was recorded at 170/100 mmHg, and his pulse rate was 79 bpm, regular. Neurological evaluation revealed left upper and lower limb paralysis, with no sensory deficits seen. NCCT of the brain demonstrates an acute minor pontine hemorrhage with a volume of 2.1 ml. The patient had conservative treatment and was administered dual antihypertensive therapy for effective blood pressure management. The patient continued to exhibit hemiparesis at the time of discharge and requested a follow-up.



SMALL PONTINE HAEMORRHAGE

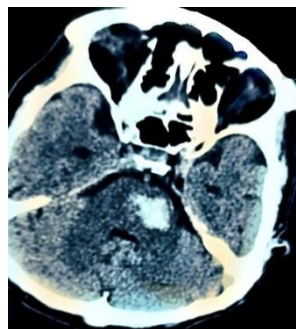
CASE 08: An 83-year-old male with poorly managed hypertension for the past five years and inconsistent medication adherence was referred to our hospital following a sudden onset of weakness and a fall, accompanied by involuntary jerky movements that began four hours prior. The patient presented in an unconscious state, with a Glasgow Coma Scale score of 8 out of 15 upon admission. Upon examination, the patient was observed to be febrile, with a blood pressure of 210/110 mmHg, a pulse rate of 68 beats per minute, and tachypnea at a rate of 23 breaths per minute. During the neurological

examination, the patient exhibited coma, quadriplegia, pupils that were pin-point and mildly reactive, and bilateral Babinski reflexes. NCCT of the brain reveals significant pontine haemorrhage with a volume of 10.4 ml. Emergency resuscitation was performed, and blood pressure was regulated with intravenous labetalol, while seizures were managed with a 1g oral dose of levetiracetam administered twice daily. Result - Fatality on the twelfth day following the onset of symptoms.



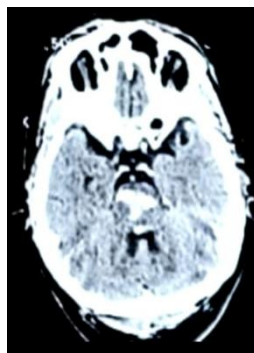
MODERATE PONTINE HAEMORRHAGE

CASE 9: A 68-year-old male with a history of diabetes and dyslipidaemia, currently on regular medication, presented with a sudden onset of vertigo, headache, and weakness in both upper and lower limbs during the past three hours. The patient exhibited drowsiness upon presentation, with a Glasgow Coma Scale score of 11 out of 15 at admission. Upon examination, the patient was observed to be febrile, with a blood pressure of 160/100 mmHg, a pulse rate of 62 regular beats per minute, and a respiration rate of 16 per minute. During the neurological evaluation, the patient had quadriplegia with no sensory deficits seen. NCCT of the brain reveals a unilateral tegmental pontine haemorrhage with a volume of 6.7 ml. The patient received conservative management, with diabetes regulated with insulin therapy and physiotherapy administered. The patient exhibited clinical improvement and was discharged on the seventh day.



UNILATERAL TEGMENTAL PONTINE HAEMORRHAGE

CASE 10: A 76-year-old woman complained of left-sided weakness that had persisted for six hours. In addition to being diabetic and on insulin, the patient has had hypertension for the past 21 years and has been using dual antihypertensive medication. When the doctor checked her vitals, she was mildly feverish and had Healthy vitals: 206/100 mm Hg, normal heart rate of 62 beats per minute. There was no sensory involvement observed during the neurological examination, yet the patient did have right-sided facial weakness (LMN type) and left-upper-and lower-limb palsy (UMN type). Acute basal pontine haemorrhage with a volume of 11.0 ml is seen by NCCT brain. The patient was prescribed dual antihypertensive medication to ensure her blood pressure was well controlled during her conservative treatment. Even after being discharged, the patient requested a follow-up appointment since their crossing hemiparesis continued.



BASAL TEGMENTAL PONTINE HAEMORRHAGE

Results:

Out of 136 admitted cases of stroke patients, 10 cases (7.35%) showed pontine involvement. Among these, 91.6% were identified as pontine haemorrhages. A significant gender difference was observed, with a male preponderance. The mean age of the patients was 63.33 years. Hypertension was the most common risk factor, present in 50% of the cases.

The clinical spectrum of pontine stroke varied widely. Crossed hemiparesis was seen in 25% of patients, quadriparesis in another 25%, pure motor hemiparesis in 8.33%, and unconsciousness at presentation in 16.6%. Interestingly, 25% of patients presented with seizures but showed no neurological deficits. The average duration of hospital stay ranged from 6 to 10 days.

Patients with massive pontine haemorrhage experienced severe adverse outcomes, including death, whereas those with smaller haemorrhages had favourable clinical outcomes and shorter hospital stays. The overall mortality rate for pontine stroke during the study period was 30%, which is comparatively lower than figures reported in other studies from India.

Discussion: This case series was executed in the Department of Medicine at AGMC & GBP Hospital from February 1, 2023, to July 31, 2023, encompassing subjects diagnosed with pontine strokes. Pontine strokes comprised 7.35% of all stroke cases admitted to the hospital in this study. The recognized risk factors were diabetes mellitus, hypertension, dyslipidaemia, a familial history of stroke, and smoking, all of which can expedite atherosclerosis in the brain's posterior circulation. Hypertension was identified as the predominant risk factor, occurring in 50% of patients. Chronic, inadequately managed hypertension can result in lipohyalinosis of the tiny perforating arteries in the pons, increasing the risk of cerebrovascular incidents.

In this series, 60% of the patients were male. The etiology of stroke seems to be affected by gender in multiple ways; however, the underlying mechanisms are not well comprehended. Seventy-five percent of patients were over 60 years old, with a mean age of 63.3 years. The results align with research by V. Bhat et al. about posterior circulation strokes, which indicated a mean age of 61 years. The prevalence of pontine stroke in the elderly can be attributed to metabolic risk factors that contribute to atherosclerotic plaque development, vascular degeneration, and angiopathy.

The clinical manifestations of pontine strokes encompassed crossing hemiparesis, quadriparesis, pure motor hemiparesis, and loss of consciousness upon presentation. Notwithstanding the potentially disastrous consequences, two individuals in this investigation exhibited only mild symptoms attributable to minor pontine haemorrhages and demonstrated no neurological

impairments. Two distinct presentations were also noted. An older diabetic male with pontine infarction and motor hemiparesis experienced bladder problems due to detrusor muscle activation. Comparable bladder impairment has been documented in instances of extensive pontine infarctions affecting the pontine micturition centre. A separate example exhibited a pontine haemorrhage characterized by one-and-a-half syndrome, devoid of motor or sensory impairment. This syndrome arises from injury to the medial longitudinal fasciculus and the paramedian pontine reticular formation or abducens nucleus, leading to horizontal gaze palsy with maintained abduction of the contralateral eye and accompanying nystagmus. Similar results have been reported in previous research on brainstem haemorrhages. In this series, haemorrhagic pontine strokes (91.6%) were significantly more prevalent than ischemic strokes. Extensive pontine haemorrhages correlated with grave adverse results, including fatality, whereas smaller haemorrhages typically resulted in favourable clinical outcomes, reduced hospitalizations, and no fatalities. The overall death rate for pontine strokes was 30%, lower than rates documented in other Indian research.

Limitations: This study was constrained by its brief length and limited sample number, which hindered the evaluation of long-term results. It also lacks information on thrombolysis and surgical procedures in pontine strokes. Furthermore, predictive biomarkers and systematic rehabilitation outcomes were not assessed.

Conclusion: A pontine stroke does not necessarily lead to unfavourable results. Progress in intensive care, neurology, and neurosurgery may enhance survival and recovery in some patients. This study enhances the comprehension of the clinical range and consequences associated with pontine strokes in northeastern India.

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Conflicts of interest:

There is no conflict of interest

Table 1: Clinical profile of all the Participants

Serial No.	Age in years	Sex	Chief complain	RISK FACTORS	GCS SCORE AT ADMISSION	CNS EXAMINATION	NCCT BRAIN	Duration of hospital stay	Outcome
1	56	M	Unconsciousness	Hypertension, Chronic Smoker	6/15	Comatize, Pin Point pupil	Massive Pontine Bleed	2 days	Death
2	32	M	Unconsciousness	Nil	3/15	Comatize, Pin Point pupil	Massive Pontine Bleed	36 Hours	Death
3	63	M	Weakness, Incontinence	Hypertension, Diabetes mellitus	9/15	Crossed Hemiparesis	Pontine Infarction	14 days	Survival with Sequel Bladder Dysfunction
4	61	F	Severe Headache	Hypertension	15/15	No Neuro deficit	Small Pontine Bleed	3 days	Survival
5	57	F	Weakness	Hypertension	11/15	Crossed Hemiparesis	U/L Tegmental Pontine Bleed	7 days	Survival with Sequel
6	60	M	Weakness	Hypertension	14/15	Hemiparesis One and half syndrome	Small Pontine bleed	5 days	Survival with Sequel
7	76	F	Weakness	FHO Stroke ⁴	14/15	Hemiparesis	Small Pontine Bleed	5 days	Survival with Sequel
8	83	M	Weakness, Seizure	Hypertension	8/15	Quadripareisis	Moderate Pontine Bleed	12 days	Death
9	68	M	Weakness	Dyslipidemia Diabetes mellitus	11/15	Quadripareisis	U/L Tegmental Pontine Bleed	7 days	Survival with Sequel
10	76	F	Weakness	Hypertension Diabetes Mellitus	12/15	Crossed Hemiparesis	Basal Pontine Bleed	9 days	Survival with Sequel

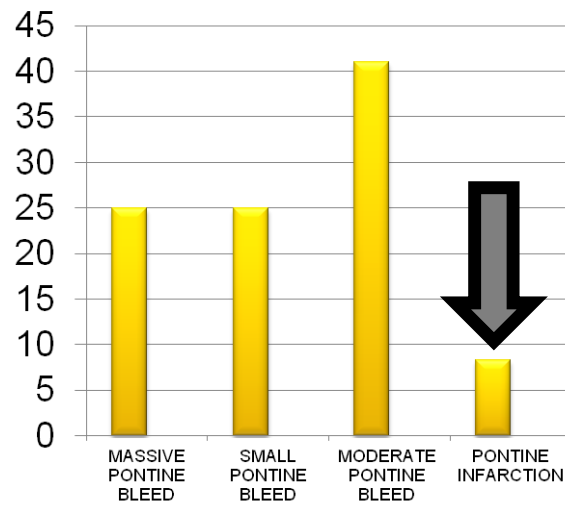


Figure 1: CT classification of Pontine stroke

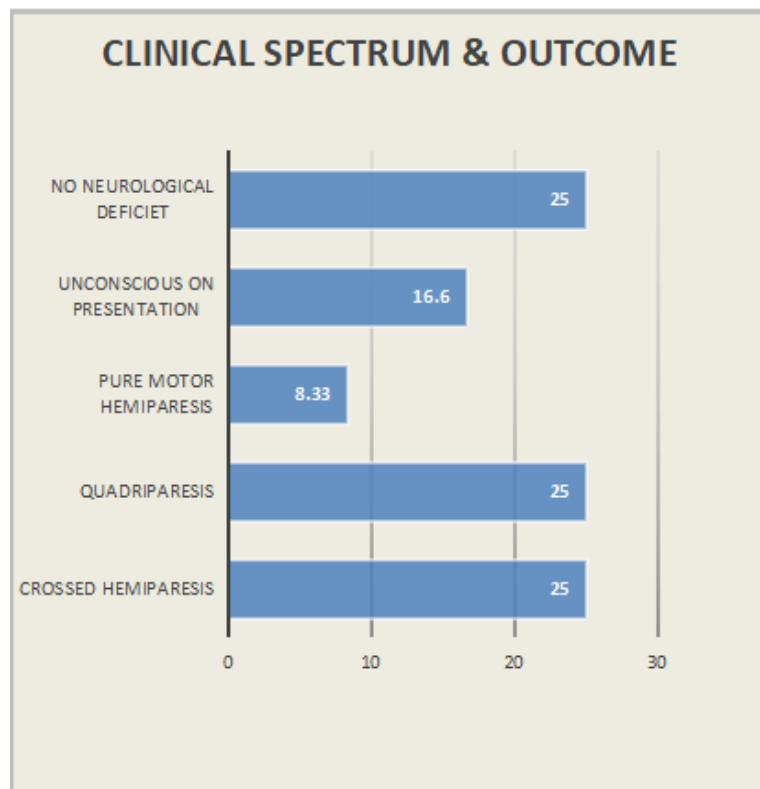


Figure 2: Clinical Spectrum and outcome (%) of Pontine stroke cases

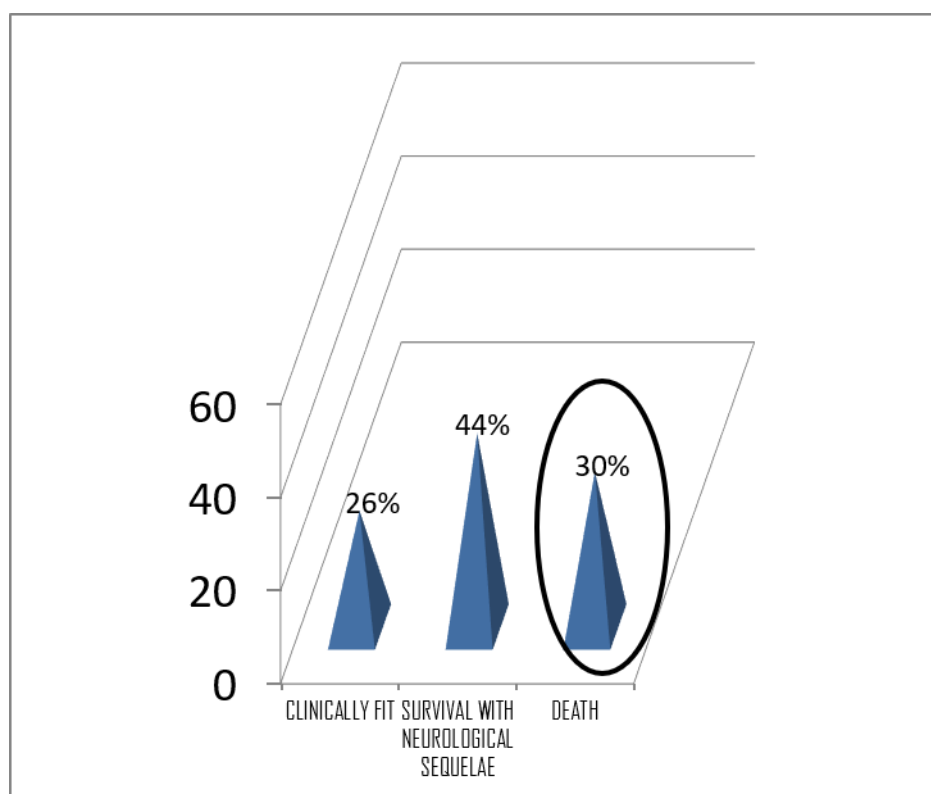


Figure 3: Mortality rate of Pontine Strokes

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