Case Report

Good Outcome in a Patient with Massive Pontine Hemorrhage

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Abstract

Massive pontine hemorrhage with comatose condition has a poor prognosis and bad outcome despite adequate surgical treatment. However, this case report gives a different result. Providing adequate prophylactic treatment to prevent secondary brain injury resulted in a very good recovery at the 6-month follow-up. A 42-year-old man with a history of heavy smoking and poorly controlled blood pressure (BP) developed acute loss of consciousness. He was then brought to the emergency room (ER) in 30 min. At the ER, his Glasgow coma scale score was E1M2V1 and the BP was high. An emergency computed tomography (CT) scan of the brain showed massive hematoma in the pons with intraventricular extension. He was admitted to the intensive care unit with close monitoring of both vital signs and neurosigns. External ventricular drainage was inserted to control intracranial pressure and then removed in only 5 days after adequate control. The patient returned to a good recovery status in 6 months with a modified Rankin scale score of 2 and the CT brain scan showed a small cavity-like lesion at the hemorrhage area. Massive hemorrhage and low consciousness may not truly indicate a poor prognosis in patients with pontine hematoma. Medical and surgical treatments are still needed to control intracranial pressure for prophylaxis of secondary brain injury. Restoration of neuronal functions was achieved after resolution of the hematoma.

Keywords: *Good recovery, hypertensive hemorrhage, massive pontine hemorrhage, poor prognostic factors*

Introduction

The pons is part of the brainstem that relays neural signals from the cerebrum and cerebellum to organs all over the body. Further, cranial nerves V–VIII originate from the pons which control involuntary vital centers, breathing (intensity and frequency), and the sleep-wake cycle. Thus, massive pathology at the pons may indicate a poor prognosis due to these important functions. Primary pontine hemorrhage (PPH) accounts for approximately 5%–10% of intracranial hemorrhages, and the overall mortality rates in recent studies were 40%–50%.[1,2] In general, patients with PPH are treated conservatively. Many reports of massive pontine stroke, either by hemorrhage or infarction, showed high morbidity and mortality rates. Many factors affect the prognosis of PPH, especially the level of consciousness and size of the hematoma.[3] This report shows a good clinical outcome following adequate treatment after the onset of an acute massive pontine hemorrhage.

Case Report

A 42-year-old man had a long history of heavy smoking, poorly controlled blood pressure (BP), and irregular health checkups. He developed projectile vomiting and then sudden loss of consciousness. He was taken to the emergency room within 30 min. The vital signs showed BP 165/95 mmHg, Glasgow coma scale (GCS) score of E1M2V1, and bilateral 2-mm pupils that were slightly reactive to light. Emergency resuscitation and endotracheal intubation were performed before a computed tomography (CT) scan of the brain was obtained. The BP was also rapidly and adequately controlled with an intravenous antihypertensive (calcium channel blocker) agent. A large pontine hemorrhage was demonstrated with a maximum diameter of 3.60 cm with a volume of 11.66 mL (ABC/2 method), involving the basis and tegmentum of the pons [Figure 1a and b].

In the intensive care unit, the patient's BP was tightly controlled at 140/90 mmHg by arterial line monitoring. The neurological signs (GCS, pupils, motor power) were monitored hour by hour in the 1st week. A low-dose, short-acting sedative drug was given intravenously to decrease

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spastic response. Abnormal metabolic conditions such as hyponatremia, hypokalemia, and hyperglycemia were corrected. Pressure-controlled ventilation was provided and oxygen saturation was monitored and maintained at above 94%. Fluid intake and urine output were kept in balance.

On the 3rd day of admission, his clinical condition was stable and his GCS was 3T (E1M2Vt). However, compared to previous examinations, deeper pain stimulation was needed to stimulate a response. A repeated CT scan of the brain showed that the hematoma had slightly increased in size and extended further to the fourth ventricle with more perilesional edema [Figure 2a and b].

At that time, external ventricular drainage (EVD) was inserted to the frontal horn of the right lateral ventricle under general anesthesia. The opening pressure was measured at about 25 cmH_2O. It was retained for continuous release of CSF pressure which reduced to <10 cmH_2O. The EVD was removed 5 days after insertion due to improvement of the neurological signs and good control of intracranial pressure.

On the 7th day of admission, his condition improved to GCS of 6T (E2M4Vt), 3-mm pupils reactive to light in both eyes, and decreased spastic tone. His body temperature had increased slightly but no signs of infection and no administration of antibiotics. A tracheostomy was done to protect the airway for adequate control of secretion and to minimize complications from prolonged intubation.

On the 14th day, the mechanical ventilator was disconnected and the level of consciousness was sustained (E2M4Vt). A CT brain scan showed that the hematoma and area of edema had decreased in size [Figure 3a and b].

In the 4th week, the patient could breathe room air perfectly and follow easy commands such as "close your eyes" and "lift your hand." The CT brain scan showed that the hematoma had resolved but a small cavity-like lesion was found at the left tegmentum [Figure 4a and b]. In the 6th week, the patient could sit on a chair, orient to the left and right, count fingers, and communicate using simple words [Figure 4c]. The patient was then discharged from the hospital for home rehabilitation.

Follow-up and outcomes

In the 8th week, the patient could sit with support, swallow a soft diet, and speak some easy words [Figure 5a]. In the 16th week, he started to show some facial expression and

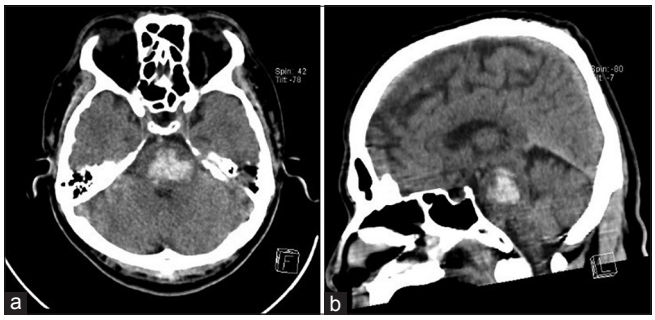

Figure 1: Computed tomography scan of the brain at admission revealed a large hematoma involving the basis and tegmentum of the pons predominantly on the left side. (a) axial view, maximum hematoma diameter of 3.6 cm. (b) Sagittal view, the hematoma extended along the lower midbrain to the pontomedullary area

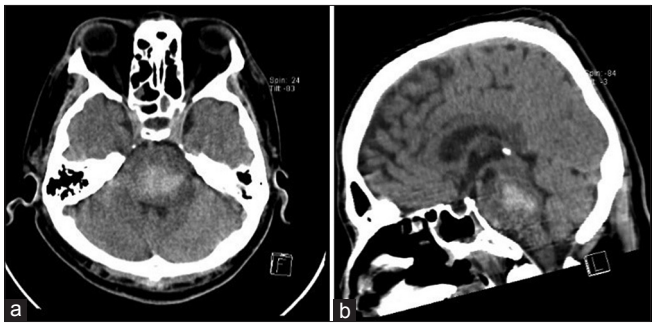

Figure 3: Computed tomography scan on day 14. The hematoma had resolved and no more hydrocephalus. (a) axial view, (b) sagittal view

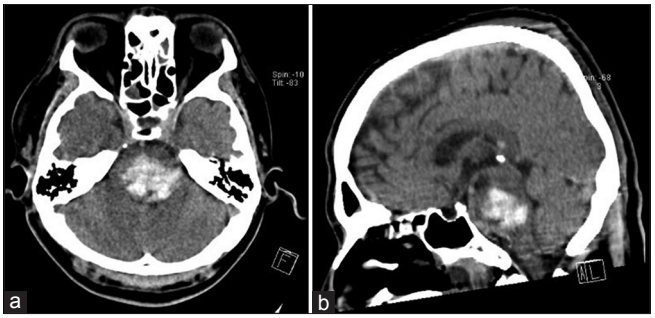

Figure 2: Computed tomography scan on the third day. Hematoma increased slightly in size and extended more to the fourth ventricle with more perilesional edema. (a) axial view, (b) sagittal view

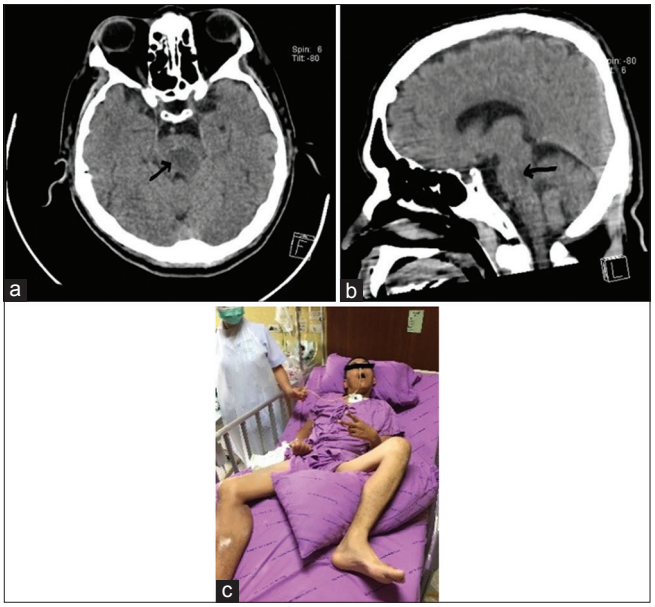

Figure 4: (a and b) Computed tomography brain scan showed resolved hematoma, residual area of cavity-like lesion at left tegmentum (arrow), (c) patient can count fingers

his swallowing skill improved. He was able to speak some short sentences and he tried to stand by himself [Figure 5b]. In the 20th week, the patient could have an easy two-way communication, grasp or pick up things, sit without support, and he could stand and walk with some assistance. He could swallow almost normally [Figure 5c].

By the 24th week, the patient had recovered his communication skills, swallowing function, and his motor functions. He could draw, pick up, and hold things and stand up and walk by himself with a modified Rankin scale (mRS) score of 2. However, there were still some losses of extrapyramidal control [Figure 6].

Discussion

Huang *et al.*[3] developed a new PPH score that consisted of two independent factors: GCS score and PPH volume to predict 30-day mortality and 90-day functional outcome. The study revealed a 100% mortality rate in comatose patients with a high PPH volume. Chung and Park[4] classified axial CT brain features of PPH into four types: (1) basal-tegmental, (2) bilateral tegmental, (3) massive, and (4) small unilateral tegmental. The massive type was defined as a hematoma that occupied both the basis pons and the tegmentum bilaterally.

From many studies, the factors that affect the prognosis of PPH are shown in Table 1. The most consistent predictors of mortality are the level of consciousness on admission and size of hematoma.[12] On the other hand, this current study showed a difference result.

This patient had poor prognostic factors based on several reports in the literature. The patient was in a coma on admission with a massive type of PPH with a transverse diameter >20 mm and volume >10 mL. Prophylactic treatment was given for secondary brain injury and the rest was just waiting for resolution of the hematoma. During the 4th week, the hematoma had clearly resolved, he could breathe spontaneously, and obey commands. By the 6th month, the patient had nearly full recovery (mRS = 2) with better communication. However, long-term deficit would still remain but only in the small area of destructive lesion which was the bleeding point.

Conclusion

Size of hematoma and level of consciousness on admission may not be accurate prognostic factors. A cavity-like lesion

Figure 5: (a) Sit with support in the 8th week, (b) stand with support in the 16th week, (c) improvement of swallowing function, grasping, and picking up things in the 20th week

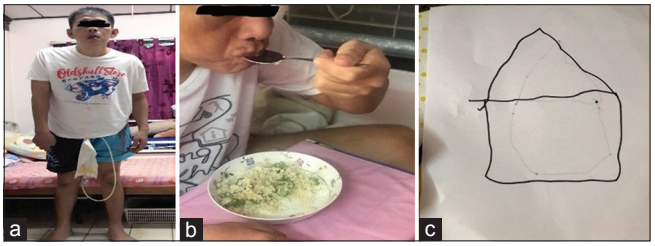

Figure 6: (a) By the 24th week, he could stand independently and do a short walk, (b) hold things in his hands and swallow perfectly, (c) he still had some ataxic movement

Table 1: Literature review of factors related to poor outcome in primary pontine hemorrhage

Author	Year	*n*	Outcome
Iwasaki *et al.*[5]	1988	10	All seven patients who presented with massive PPH and low level of consciousness had a fatal outcome
Wijdicks and St. Louis[6]	1997	38	Eight patients, who were alert on admission and had a small unilateral PPH, had a good recovery but the others had a bad outcome
Jang *et al.*[7]	2011	281	30-day mortality was found in the comatose group (76.1%), hematoma volume >5 ml (55.9%), and massive location group (66.9%)
Huang *et al.*[3]	2017	171	30-day mortality in comatose patients with PPH volume >10 mL was 100%. These 2 factors indicated a high PPH score
Wessels *et al.*[8]	2004	29	Poor outcome was found in patients with hematoma volume >4 mL, ventral or massive location, and coma on admission
Shin *et al.*[9]	2007	35	Poor outcome was found in patients with hematoma volume >4 mL, massive location, coma on admission, and intraventricular hemorrhage
Balci *et al.*[10]	2005	32	Patients who had a mean GCS score of 4.4±0.2 or mean hematoma volume of 9.9±3.3 mL were dead
Chung and Park[4]	1992	61	Survival rate for the massive type was 7.1% but higher in the small unilateral tegmental type which was 94.1%
Dziewas *et al.*[2]	2003	39	Unfavorable outcomes were found in comatose patients and hematoma that involved the large basal tegmentum or transverse diameter of hematoma>20 mm or both
Murata *et al.*[11]	1999	80	Factors related to a significant poor outcome were coma and transverse diameter of hematoma >20 mm

PPH – Primary pontine hemorrhage; GCS – Glasgow coma scale

that persists after resolution of the hematoma may be the main concern. The aim of treatment in pontine hematoma is to prevent secondary brain injury and wait for neural function recovery after the hematoma has resolved. Further prospective research is needed to support this finding.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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