



Case Report

Sudden unexpected death owing to unilateral medial medullary infarction with early involvement of the respiratory center

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ABSTRACT

A 64-year-old woman was found dead in her home. At autopsy, although relatively fresh bruises were found on her body, no lethal injury was observed in an internal observation. Mild edematous swelling of the right half of the medulla oblongata was observed. There was acute medial medullary infarction (MMI), which mainly involved the nucleus hypoglossi, medial lemniscus, hypoglossal root, inferior olivary nucleus, and pyramidal tract. Subacute infarction of the lower part of the cerebellum was also found, and severe atherosclerosis of the right vertebral artery containing thrombi was found as the culprit lesion. Immunohistochemistry using amyloid precursor protein (APP) was positive in neuronal tissue in the nucleus ambiguus, despite not showing coagulative necrosis in the nucleus. Therefore, acute ischemic necrosis of the nucleus ambiguus, which is considered to be a component of the dorsal respiratory group, may be a significant finding for her expected death. Immunohistochemistry of APP may be useful for confirming the precise extent of acute ischemia in brain stem infarction, such as unilateral MMI.

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1. Introduction

Infarction of the medulla oblongata is divided into lateral and medial types from the territory of the lesion. The incidence of medial medullary infarction (MMI) is lower than the lateral type, accounting for approximately less than 1% of all cerebral infarctions [1]. Typical neurological signs of infarction proposed by Dejerine include hemiparesis sparing the face contralateral to the infarct, hemisensory loss of the posterior column type contralateral to the infarct, and weakness of the tongue ipsilateral to the infarct [2]. However, many authors have commented on the diversity of symptoms in MMI because of variation in vascular distribution around the medulla and related variation of topography of the infarction [3–5]. To the best of our knowledge, there has only been a small number of autopsy reports on the rarity. We report here an autopsy case of small but defined acute unilateral medial medullary infarction that was not treated. We performed immunohistochemistry to determine the exact area of infarction, and subsequently discuss the mechanism of death in our case.

2. Case report

A 64-year-old woman living alone was found dead in her room in the prone position. A police examination showed that she had been a housewife and had a history of hypertension. However, she had not received any medication during the last 5 years. There was no family history of hypertension and other vascular disease. Nobody had seen her since 3 days before her death. According to the last witness who was her neighbor, she did not show obvious motor disturbance or psychiatry disorder. However, the witness had the impression that she was mildly unable to properly articulate.

3. Autopsy findings

Full autopsy, including toxicological examination, was performed. The deceased was 143 cm in height and weighed 30.9 kg. There were some bruises on her face and bilateral extremities, especially in projecting parts, such as the joints of extensor surfaces. No fracture of the bones or injury of the thoraco-abdominal organ was found. The estimated time of death was approximately 1 day before discovery of her body.

The brain weighed 1265 g. No injury or hemorrhage was found on the surface of the brain, but softening of the basal aspect of the right cerebellum was evident. A coronal section of the cerebrum

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showed mild symmetric atrophy, and no focal lesion was evident. A horizontal section of the brain stem showed pallor discoloration of the right side of the upper medial medulla oblongata (Fig. 1).

Tissue samples of the brain were obtained, including frontal, temporal, parietal and occipital cortices, anterior cingulate, anterior and posterior basal ganglia, anterior, medial and posterior thalamic nuclei, hippocampus, amygdala, midbrain, pons, medulla oblongata, olfactory bulb, cerebellar vermis and dentate nucleus, and cervical, thoracic and lumbar spinal cord, and cerebral arteries. Samples of other organs were also obtained for histological examination. Microscopically, the basal aspect of the right cerebellum showed focal loss of neuronal tissue, infiltration of microglia, and fine gliosis (Fig. 2). A serial section of the upper medulla revealed acute ischemic necrosis without inflammatory reaction. The principal areas involved, which were identified under low to moderate magnification, were the nucleus hypoglossi, root of the hypoglossal nerve, inferior olivary nucleus, and pyramid (Fig. 3A–C). The nucleus ambiguus, which is located deep in the medulla [6], did not show obvious coagulative necrosis. Neuronal tissue in the nucleus showed central chromatolysis of neuronal cells and axonal swelling (Fig. 3D). Immunohistochemical staining for anti-amyloid precursor protein (APP) (DakoCytomation, dilution 1:100) showed a positive reaction in neuronal cells and axonal fibers in the nucleus ambiguus, as other infarcted areas (Fig. 3E,F). The cerebellum, mid brain and pons showed no pathological findings. A serial section of the cerebral artery showed severe atherosclerosis and fresh thrombi with very small organized area in the right vertebral artery (VA). Dissection of the arteries was not found (Fig. 4).

The heart muscle including sinoatrial node and atrioventricular conduction system, coronary artery showed no pathological changes macro and microscopically. In other organs, mild congestion of lung, liver and kidney was found. A full toxicological examination of the blood and urine showed negative results.

4. Discussion

Duvenoy et al. described that there are four vascular territories in the medulla according to corresponding perforating arteries

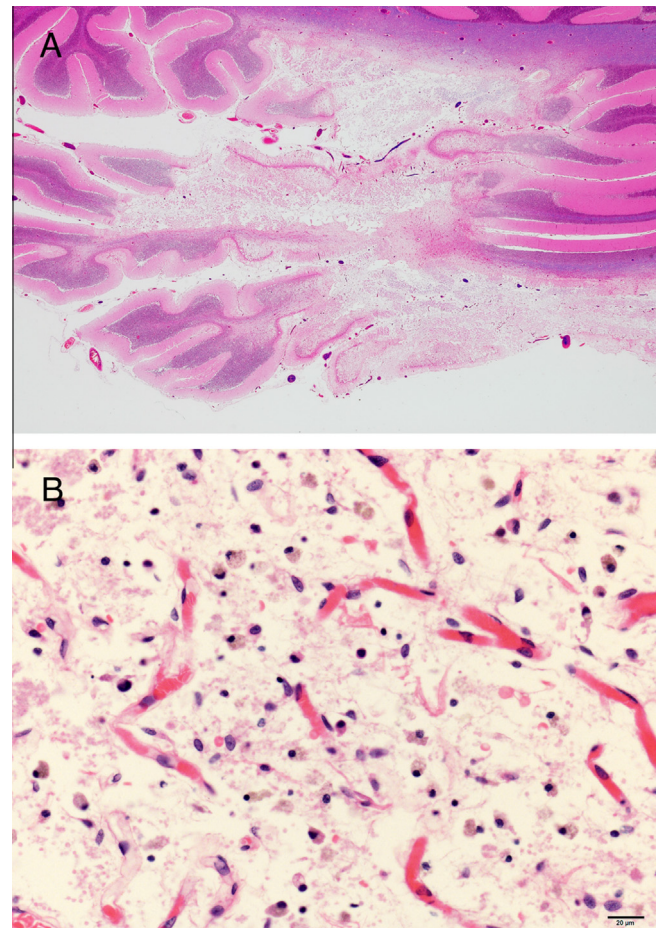


Fig. 2. Microscopic appearance of the cerebellum (Luxol fast blue-hematoxylin eosin). (A) Low power view. Subacute necrosis can be seen. (B) High power view of the necrosis. Infiltration of microglia with an abundant cytoplasm is evident.

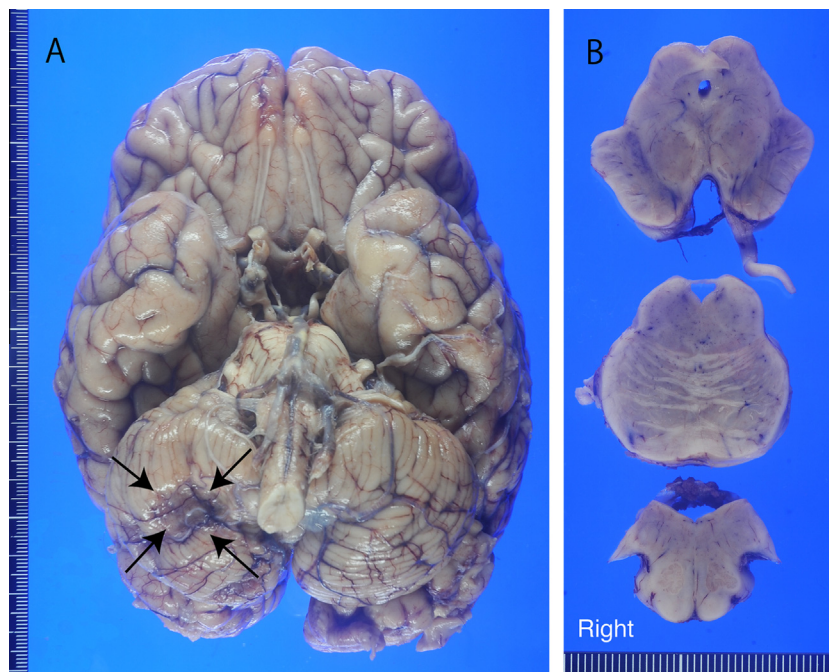


Fig. 1. Gross appearance of the brain. (A) Basal view of the whole brain. Arrows indicate cerebellar infarction. (B) Horizontal section of the mid brain, pons, and upper medulla.

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