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Case report

Pre-autopsy computed tomography accurately detected cerebral hemorrhage in highly decomposed bodies: Report of two cases

Ayumi Motomura [a,*], Yohsuke Makino [a,b], Yuriko Ohdo [a], Go Inokuchi [a], Daisuke Yajima [a], Mutsumi Hayakawa [a], Hirotaro Iwase [a]

[a] Department of Legal Medicine, Graduate School of Medicine, Chiba University, Japan
[b] Department of Radiology, Chiba University Hospital, Japan

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ABSTRACT

Diagnosis of cerebral hemorrhage as a cause of death is often difficult when bodies are in a highly decomposed state. Postmortem imaging can be useful for estimating cause of death in cerebral hemorrhage cases, but the effects of decomposition on imaging findings have not been well studied. We report here two cases in which pre-autopsy computed tomography (CT) accurately detected cerebral hemorrhage in highly decomposed bodies and consequently allowed for careful autopsy dissection. We found that the CT attenuation value of hematoma remained high in intracranial hemorrhagic lesions, probably due to a postmortem increase in the density of hematomas. The high contrast against the background parenchyma enabled the hematomas to be discriminated from the surrounding cerebral parenchyma even in considerably decomposed bodies. However, dispersion and breakdown of the hematomas over time with decomposition appeared to result in contrast reduction. In such cases, hematomas may be missed or their size underestimated on CT. Thus, a comprehensive approach involving autopsy is necessary to determine cause of death for highly decomposed bodies.
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1. Introduction

Postmortem imaging has recently become an important tool for investigations into the cause of death. It is particularly useful for detecting intracranial hemorrhagic lesions, air embolism, and fracture [1–6]. However, the interpretation of postmortem computed tomography (CT) results for highly decomposed bodies can be difficult because there is as yet insufficient evidence as to how the progression of decomposition influences CT findings. We report here two cases of accurate detection of cerebral hemorrhage by pre-autopsy CT despite the highly decomposed state of the bodies, and discuss the changes in the CT attenuation value of hematomas that occur over time with decomposition.

2. Materials and methods

CT scans were performed using a 16-row multidetector CT scanner (ECLOS, Hitachi Medical Corporation, Tokyo, Japan). The following conditions were used for CT scans of the head and neck area (from the crown of the head to the upper end of the sternum): tube voltage 120 kVp; tube current 200 mA; collimation 0.63 mm; pitch factor 0.9375. Acquired images were reconstructed with a 300 mm field of view and a slice thickness of 0.625 mm and 5 mm with a soft tissue kernel (Hitachi F30). Data were sent to a workstation (SYNAPSE VINCENT, Fujifilm Medical Co., Ltd., Tokyo, Japan) for analysis.

3. Results

3.1. Case 1

A 40-year-old man whose body was found in bed by a neighbor in July. Rectal temperature at the time of discovery was 32.3 °C and room temperature was 34.4 °C. His medical and medication histories were largely unknown.

CT findings. Accumulation of gas, likely due to decomposition, was observed in organs and blood vessels throughout the body. An air-fluid level was noted in the cranium, suggesting liquefaction of brain tissue due to decomposition. Nevertheless, a high-density mass was seen within the left parenchyma and in the ventricle with a focal point in the region corresponding to the left basal ganglia (Fig. 1).

Autopsy findings. Height 170 cm, body weight 42.5 kg. The entire skin was a greenish color due to putrefaction. Subcutaneous accumulation of gas was observed in the thoracoabdominal area and the abdomen was markedly bloated. A dark red patch of discoloration (3.5 cm × 7 cm) was observed on the left forehead.

* Corresponding author at: Department of Legal Medicine, Graduate School of Medicine, Chiba University, 1-8-1 Inohana, Chuo-ku, Chiba City, Chiba 260-8670, Japan. Tel.: +81 43 226 2078; fax: +81 43 226 2079.
E-mail address: tsunetoa@graduate.chiba-u.jp (A. Motomura).

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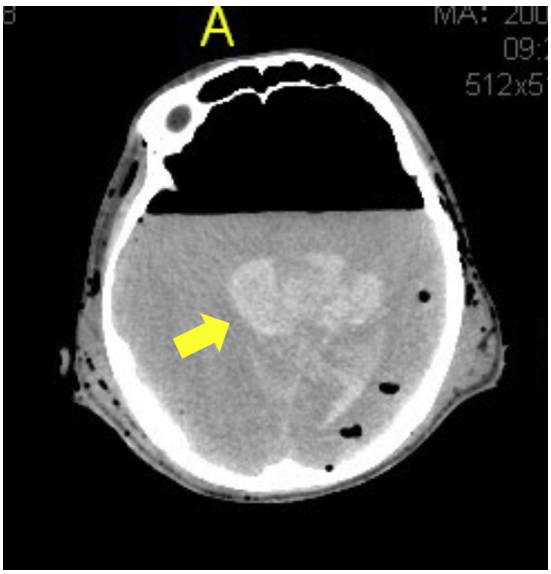

Fig. 1. Case 1: the postmortem CT image of head. A high-density mass (arrow) was seen within the liquefaction parenchyma on the left and in the ventricle of the brain.

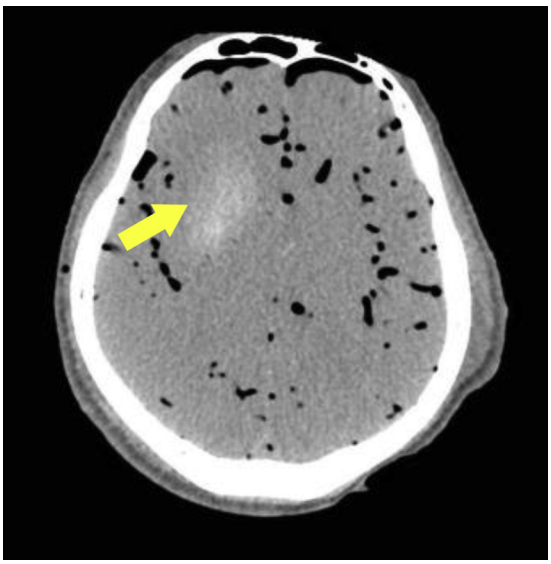

Fig. 3. Case 2: the postmortem CT image of head. Accumulation of gas was noted in the cranium. A high-density mass (arrow) was seen around the right basal ganglia.

Dissection of the head revealed infiltration of hemoglobin under this patch of discoloration but no obvious skull fracture or epidural or subdural hemorrhage. The weight of the brain was 1075 g. Liquefied red-colored brain tissue spilled out upon opening the skull (Fig. 2), and blood clots were found in the liquefied brain (total weight 35 g). We were not able to distinguish during autopsy on which side of the brain the hematoma had occurred. No obvious damage was seen in other organs, although they were similarly highly decomposed and not suitable for detailed examination.

Taken together, the findings suggested that the postmortem interval was approximately 3 days and the likely cause of death was cerebral hemorrhage.

3.2. Case 2

A 60-year-old man whose body was found in a water-filled bath in his house in March. He was last seen alive approximately 3 weeks earlier. His medical history included hypertension and diabetes mellitus. He was not taking any oral medications. Rectal temperature at the time of discovery was 5.7 °C and the water temperature had been 5.6 °C.

CT findings. Accumulation of gas was noted in the cranium and blood vessels throughout the body, as expected for the high state of decomposition. A high-density mass was seen around the region corresponding to the right basal ganglia (Fig. 3). Accumulation of gas in the right lateral striate artery served as a contrast agent, enabling a hemorrhage to be confirmed in the right putamen (Fig. 4).

Autopsy findings. Height 167 cm, body weight 68.0 kg. Green or purple patches were observed on the skin across the body. Weeping dermis was exposed in several areas because of epidermal loss due to decomposition. There were no obvious external wounds on the head or other areas of the body. Dissection of the head revealed no obvious agglutination of the blood in the subcutaneous tissue or calvarial fracture. Brain liquefaction to a semiliquid state was seen upon opening the skull. Red-purple discoloration was seen on the surface of the brain and green discoloration on cross sections due to decomposition. The weight of the brain was 1390 g. Hemorrhage was confirmed around the right corpus striatum (Fig. 5), and the total weight of a hematoma

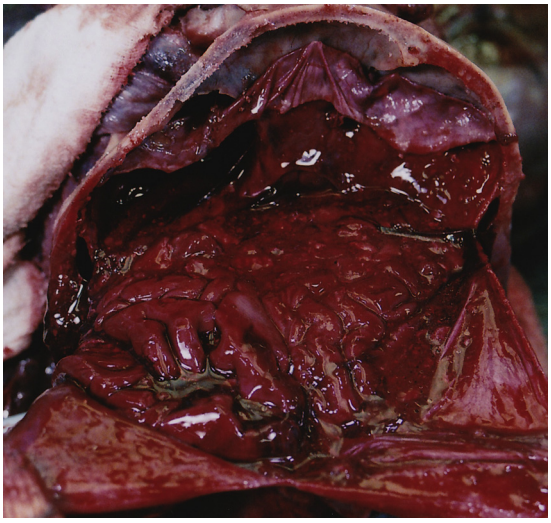

Fig. 2. Case 1: the highly liquefied brain spilled out.

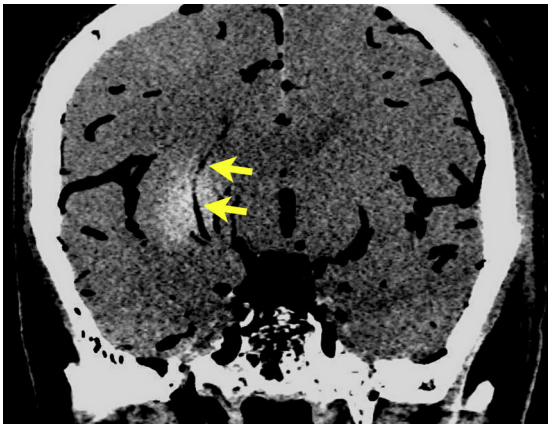

Fig. 4. Case 2: the coronal section image. Accumulation of gas in the right lateral striate artery, a penetrating branch of MCA, served as a contrast agent (arrows).

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