



## Case Report

# Bilateral middle cerebral artery infarction associated with traumatic common carotid artery dissection: A case report and review of literature



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## ABSTRACT

Traumatic common carotid artery dissection is very rare, and although it is associated with mild symptoms, it can sometimes be fatal. Therefore, careful examination of common carotid artery dissection and additional pathological examination as appropriate are important during the autopsy of traumatic death patients. A 60-year-old previously healthy drunken woman was run over. She had remained unconscious shortly after the accident, and 15 h later, emerging bilateral cerebral infarction was confirmed using brain computed tomography. Despite conservative management, she died 4 days after the injury due to multiple chest traumas and broad cerebral infarction. A medico-legal autopsy was conducted. According to the autopsy results, microscopically identified common carotid artery dissections with thrombus formation were considered the cause of infarction. In the present case, macroscopic common carotid artery lesions were relatively mild, and this made diagnosis difficult. However, the correct diagnosis was achieved by a combined analysis of the antemortem images and autopsy results. Thus, in such cases, a combined comprehensive analysis of autopsy results and antemortem clinical images is important to determine the exact cause of death.

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## 1. Introduction

In general, common carotid artery dissection (CCAD) represents a complication of aortic dissection, and traumatic CCAD is very rare. To the best of our knowledge, only 17 articles (Table 1), including ours, on traumatic CCAD have been reported thus far in the English literature [1–11]. In addition, only one study thus far reported their findings by in-depth examination of autopsy results [11]. In this study, we describe the second autopsy case of traumatic CCAD associated with fatal cerebral infarction.

## 2. Case report

A 60-year-old previously healthy drunken woman lying on the road was run over by a mini-vehicle. Her blood pressure was normal and spontaneous breathing was sustained. Her electrocardiogram showed a normal sinus rhythm, but she was unconscious

when the emergency services arrived. She was brought to the hospital 30 min after the accident. She remained unconscious and was thus placed on ventilator support. Her blood level of ethanol was 286.2 mg/dL. A computed tomography scan was performed with a 128-row detector CT (Siemens Somatom Definition AS, Siemens Medical Systems, Forchheim, Germany) and the scanning protocol was as follows: tube voltage 120 kV; automatically regulated tube current: about 100–400 mA; pitch 0.8; collimation of 4.8–9.6 mm; rotation time 0.5 r/sec. DICOM image reconstruction protocol was as follows: image matrix, 525 × 525; slice thickness of 10 mm; field of view, 336 mm × 336 mm; reconstruction kernel, B41f. A head CT taken 1 h after the accident revealed sporadic, slightly low-dense areas in both cerebral cortices (Fig. 1). Contrast-enhanced thoracoabdominal CT revealed asymmetrically thickened walls in both the common carotid arteries, and carotid artery dissection was suspected (Fig. 2). Given her general status, she was not a candidate for surgery and conservative management was begun. Head CT was performed 15 h after the injury with a 320-row detector CT (Aquilion ONE, Toshiba Medical Systems, Nasu, Japan) and the scanning protocol was as follows: tube voltage 120 kV; automatically regulated tube current: about

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**Table 1**  
Literature review of common carotid artery dissection.

Age (years), sex	Cause	Side	Clinical symptoms	Outcome	Citation
68, male	Blunt neck injury	Right	Left hemiparesis, unilateral spatial neglect	Alive	[1]
37, male	Blunt neck injury	Left	Neck pain	Alive	[2]
33, female	Hanging injury	Left and right	Left hemiparesis	Alive	[3]
30, female	Motor vehicle accident	Right	Tetraplegia	Alive	[4]
42, female	Motor vehicle accident	Right	Left hemiparesis	Alive	[4]
58, female	Fall with neck trauma	Right	Left hemiparesis	Alive	[4]
41, female	Hanging injury	Right	Dizziness	Alive	[4]
42, male	Blunt neck injury	Right	Left hemiparesis, DOC (GCS score, not available)	Alive	[4]
19, female	Motor vehicle accident	Right	Visual loss	Alive	[5]
50, female	Hanging injury	Right	Left upper limb weakness	Alive	[6]
20, male	Blunt neck injury	Right	Left hemiparesis	Dead	[7]
61, female	Strangulation	Left and right	Tetraplegia, left hemiparesis	Alive	[8]
27, male	Blunt neck injury	Left	Right hemiparesis, aphasia	Alive	[9]
43, female	Motor vehicle accident	Left	Difficulty finding words	Alive	[10]
38, male	Manual strangulation	Left and right	Right hemiparesis, DOC (GCS, 9), bilateral Babinski	Dead	[11]
42, female	Manual strangulation	Left and right	Headache	Alive	[11]
60, female	Motor vehicle accident	Left and right	Disturbance of consciousness (GCS, 3)	Dead	Current report

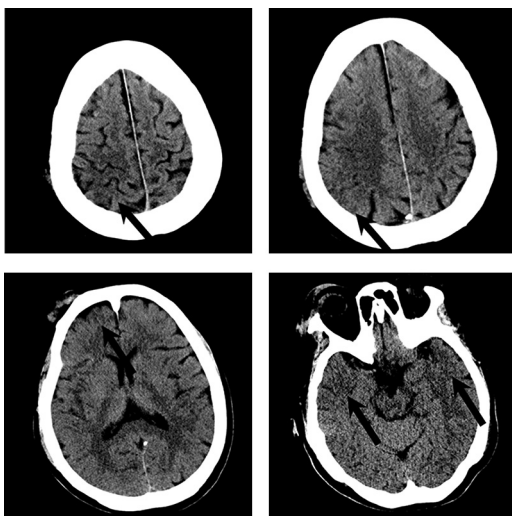
400 mA; pitch 0.813; collimation of 0.5 mm; rotation time 0.5 r/s. DICOM image reconstruction protocol was as follows: image matrix,  $525 \times 525$ ; slice thickness of 10 mm; field of view,  $345.1 \text{ mm} \times 345.1 \text{ mm}$ ; reconstruction kernel, FC04. The head CT revealed broad enlarged low-density areas in both the hemispheres (Fig. 3). The distribution of low-density areas corresponded to the middle cerebral artery (MCA) territory. The patient's condition was diagnosed as newly emergent bilateral broad cerebral infarction, and the onset was presumed to be around the time of injury. On the other hand, contrast-enhanced thoracoabdominal CT obtained on the same day showed a normalized wall of the common carotid artery (Fig. 4). The patient remained comatose and eventually died 4 days after the injury.

At autopsy, cervical disk rupture between C4 and C5, bilateral scapula fractures, left humerus fracture, sternal fracture, sixth dorsal vertebra fracture, bilateral multiple rib fractures, and hemothorax were found. Multiple small fissures were macroscopically observed on both the common carotid arteries (Fig. 5). Microscopically, disruption of the intima, dissection of the media, and formation of thrombus were observed (Fig. 6). The thrombus was accompanied with deposition of fibrin, and Berlin blue iron staining was negative in the thrombus. Subsequently, the thrombus may have developed at less than one week that is approximately four days, after the injury. No medial degeneration

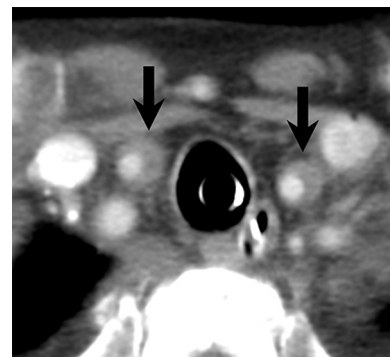
or vasculitis at the systemic arteries, including the common carotid artery, was observed. No intraventricular thrombus, verrucous lesion at the cardiac valve, or thrombus in the major vessels, including the MCA, was observed. Tests for antibodies against human immunodeficiency virus (HIV)-1/2 and *Treponema pallidum* were negative.

### 3. Discussion

According to the autopsy results, the cause of death was multiple chest traumas and cerebral infarction. Disturbance of consciousness (DOC) occurred shortly after the accident, and the patient remained comatose until death. Although acute alcoholic intoxication would have had an effect on the state of consciousness immediately after the accident, prolonged coma was assumed to be due to broad cerebral infarction. At autopsy, multiple small fissures were observed macroscopically, and dissection of the media and formation of thrombus were observed microscopically at the fissures. Consequently, wall thickness of both the common carotid arteries, as noticed in antemortem contrast-enhanced CT, was presumed to be due to thrombi sticking to the walls of the artery. Contrast-enhanced CT obtained 15 h after the injury showed normalized wall thickness of the artery; thus, the thrombi must have adhered to the arterial walls at the time of the first CT scan and might have been dislodged during the interval between the first and second CT scan. From these findings, the cause of cerebral infarction was suspected to be thrombi formed by CCAD. In addition, cerebral infarction due to other causes was excluded after considering the findings described below. Antemortem



**Fig. 1.** Head CT scan obtained 1 h after the accident. Arrows: sporadic, slightly low-density areas.



**Fig. 2.** Contrast-enhanced CT scan obtained 1 h after the accident. Arrows: crescent-shaped thickened wall of both the common carotid arteries.

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