

CASE REPORT

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Delayed Fatal Hemothorax Due to Traumatic Carotid Dissection: A Case Report of a Previously Unreported Cause of Death

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ABSTRACT: A unique case of delayed fatal hemothorax in a 12-year-old girl resulting from atypical dissection of a traumatic carotid aneurysm is reported, due to occult neck trauma received in a sledding accident which occurred one week prior to death. Aspects of traumatic carotid dissection and forensic implications of delayed presentation of such findings in the setting of occult trauma are discussed.

KEYWORDS: pathology and biology, accidental death, hemothorax, carotid dissection

Traumatic carotid dissection (TCD) is an uncommon sequela of blunt trauma to the neck, but has been increasingly recognized in recent literature [3-5,7,11,12] for its often catastrophic neurologic consequences, resulting from ischemic and embolic central nervous system phenomena, often delayed in presentation [4,5]. We report the first case, to our knowledge, of a descending TCD causing fatal ipsilateral hemothorax.

Case Report

A 12-year-old girl presented to the emergency room in cardiopulmonary arrest following a one week history of progressive, paroxysmal cough, with mild post-tussive emesis and increasing dyspnea. No neurologic symptomatology was reported and initially no history of trauma was elicited. Physical examination showed no outward manifestations of injury. The patient was intubated and ventilated with continued poor response (PO₂ 20.6; PCO₂ 70.8, PH 6.88). Cardiac monitor leads showed electromechanical dissociation, and pressor agents and fluid bolus challenge were without effect.

Pericardiocentesis was performed without return. Monitor leads demonstrated progressive deterioration to ventricular fibrillation and finally to occasional wide complex

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agonal rhythms. Death was pronounced approximately one hour after the patient presented.

The girl's body was submitted to autopsy with presumptive diagnosis of pertussis. Examination of the thoracic cavity demonstrated 1500 cc of right hemothorax associated with a ruptured parietal subpleural hematoma that was found to be in continuity with a dissecting aneurysm of the right carotid artery (Fig. 1), which extended from the level of the right thyroïdal artery takeoff to the origin of the right innominate artery. Present was a partially intra-adventitial, partially intra-medial dissection (Fig. 2) with resulting false lumen that communicated with the true vascular lumen both inferiorly and superiorly, with lateral displacement of a histologically unremarkable arterial intima and media. Present surrounding this area and expanding the right carotid sheath was local soft tissue hemorrhage and organization, histologically consistent with a one week course. The aortic arch and the suprathyroidal right internal carotid were unremarkable, both on gross and histologic examination. The brain showed only diffuse cerebral edema, consistent with acute hypovolemic ischemia. No skeletal fractures were present.

Subsequent investigation disclosed a history of a sledding accident that occurred one week prior to death, with initial swelling at the base of the neck, which subsided over a two-day period; this injury was judged to be trivial by the historian.

Discussion

Traumatic carotid dissection is an entity that has received substantial attention in radiologic and neurosurgical/trauma literature [2,7,11]. First reported in 1872 as a rare manifestation of blunt neck trauma [14], recent literature has estimated an overall incidence of up to 3% of traumatic carotid dissection in the setting of all nonpenetrating head and neck injury [12]. A number of studies using large series of patients with this injury have been published and certain etiologic, epidemiologic, and symptomologic characteristics have been well described [4-8,11].

Traumatic carotid dissection is caused by either blunt trauma, or sudden hyperexten-



FIG. 1—Chest cavity with ruptured subpleural hematoma.

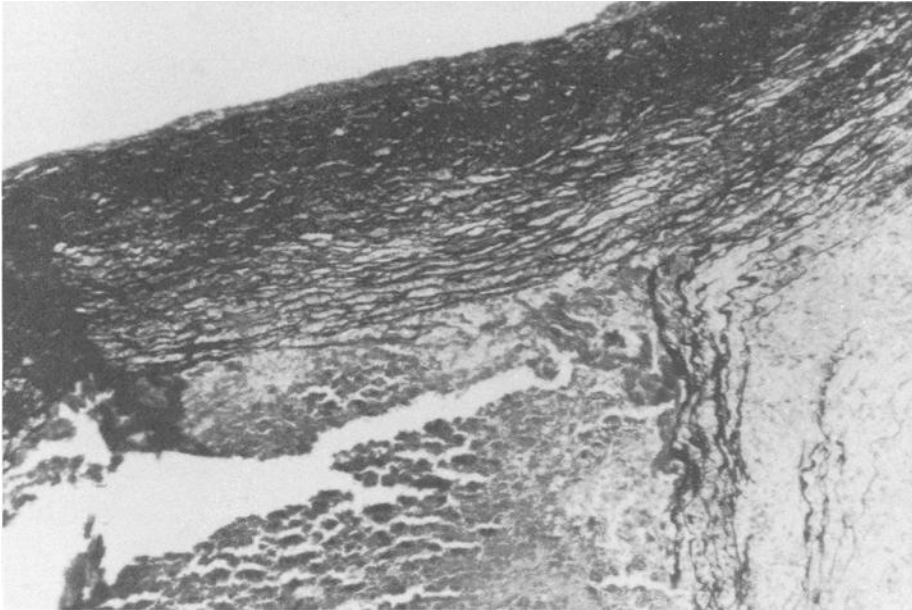


FIG. 2—Right carotid artery with dissection (Verhoffs elastin stain; 40 \times).

sive and rotational, or flexive motion of the head and neck, with resultant compressive or tensile forces causing intimal carotid laceration [4,8]. The clinical presentation is often delayed [4,11], and appears invariably as focal or global neurologic signs, reflecting cerebral ischemia due to carotid dissection, or as a result of distal thromboembolic phenomena arising within a thrombotic carotid occlusion [5]. To our knowledge, this case report is unique, in that here the dissection carried a largely intra-adventitial false lumen from the distal right carotid artery to the right chest subpleural connective tissue, to present as increasing respiratory embarrassment over a period of one week due to progressive enlargement of a subpleural hematoma. The terminal event was rupture of the hematoma into the right pleural cavity, with resultant fatal hypovolemic shock.

Pozzati et al. [4] in a published series of patients with TCD noted that intra-adventitial dissection was seen more commonly in young individuals, and tended to have a subacute or delayed course, reflecting a preserved carotid lumen and a lack of age-related degenerative arterial changes involving the media. A novel dissection such as occurred in our case may relate to both the intra-adventitial location of the dissection and contusion of carotid peri-adventitial soft tissues at the time of the sledding accident. Thus, there may have been coexistent injuries: a carotid dissection partially mitigated by incomplete carotid perforation, occurring at the same time.

It is of forensic interest that consequences of cervical carotid injury may be delayed for a period of hours to years [11], starting with an initial event that may be considered trivial in relation to the consequences [5], as was the case here.

Clinical reports have characterized a large series of patients with traumatic carotid dissection as having "spontaneous" cervical dissection (SCD) [5], when such findings were unrelated to a history of trauma. Patients presenting with SCD, when compared with their traumatic cohorts, were noted to have a somewhat better prognosis [5]. Unfortunately, none of these studies was able to include histologic examination of carotid tissues, and none attempted to adjust cohort groups for the contributory effects of co-

incidental serious injury included within the trauma group. Thus, reviews of TCD have listed serious injury, usually in the setting of a motor vehicle accident as a major feature of TCD [3]. However, studies have shown that less than 50% of patients demonstrate visible surface injuries associated with such carotid trauma [6]. Further, studies that have attempted to compare the clinical course of SCD and TCD suggest that "SCD" type presentations predominate [5]. The case reported here would have been included in such series as a spontaneous dissection, without the benefit of a careful inquiry made of the initial circumstances of this girl's fatal course. Thus, in the absence of significant predisposing local or systemic vascular disease [8], even in apparently atraumatic circumstances, the presentation of extracranial carotid dissection requires that an initial traumatic event must be diligently searched for, at least for the purposes of accurate death certification. The term "spontaneous," as it is used to denote certain cases of dissecting cervical carotid aneurysm, in the absence of any predisposing condition, should not be taken to convey a connotation of natural disease [8], as in other pathologic circumstances.

Summary

The clinical literature makes functional distinction between spontaneous and traumatic carotid dissections. Because initial trauma leading to dissection may be viewed as trivial, or not associated with the carotid dissection due to a delayed presentation, in the absence of significant vascular or systemic disease, the forensic pathologist must strongly consider occult injury as the initial event when certifying such a death. While the only reported serious consequences of carotid dissection have been focal or global neurologic signs and symptoms, we report a case of delayed fatal hemothorax in a 12-year-old girl, due to atypical carotid dissection, causing only pertussislike respiratory symptomatology.

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