outlook
Trauma Corner

A typical MVC with an atypical pattern of injury: Carotid artery dissection

By Margaret Dymond, RN, BSN, ENC(C)

Case

A 49-year-old male involved in a head-on MVC at highway speeds of 100 km/hour arrives in a northern community emergency department (ED) by emergency medical services (EMS) at 1900 hours. EMS reports the patient was conscious on scene and complaining of neck and back pain. The patient arrives to the ED in spinal protection, oxygen per high flow mask, and one large bore intravenous (IV) running normal saline. The patient's vital signs are stable with a Glasgow coma score of 15 and no spinal deficits. The rest of the primary and secondary trauma survey are unremarkable. The patient's workup includes laboratory trauma panel, x-rays of the cervical, thoracic and lumber spine, chest x-ray, and a pelvic x-ray. All investigations are normal. The patient is observed overnight in hospital and discharged the following morning in stable condition.

Table 1. Common mechanisms of injury in carotid artery dissection

- Direct blow to the neck
- Neck hyperextension
- Penetrating injury
- Neck manipulation or strain
- Intraoral trauma
- Basilar skull fracture
- Abdominal compression

At 1400 hours the day following the MVC, the patient experienced acute onset of dizziness at home, fell to the floor, and was found to have left hemiplegia and hemiparesis, left facial droop, and expressive aphasia. EMS transported the patient to the community hospital for further assessment. Air transport was arranged from the local hospital to a trauma facility for assessment of the stroke-like symptoms following an MVC. The patient remained stable during transport with no resolution of the symptoms.

On arrival to the trauma facility, the patient was clinically stable. A computerized tomography (CT) of the head revealed a thrombus within the right middle cerebral artery (MCA) and an acute right MCA territory infarct. The patient was found to have bilateral carotid artery dissections on magnetic resonance angiography (MRA).

Introduction

Carotid artery dissection (CAD) is an uncommon injury in trauma patients. The symptoms may not present from hours to days post injury and should be considered in any patient who presents with a stroke-like syndrome following trauma. CAD following trauma may have significant morbidity ranging from transient focal deficits to cerebral infarction (Opeskin, 1997). Blunt carotid artery injury has been associated with a mortality of 20% to 40% and permanent neurologic deficit in 40% to 80% of patients (Opeskin, 1997). Carotid artery injury may not be associated with any outward sign of injury and may go undetected until the appearance of obvious irreversible neurologic complications occurs. It may also be masked or misinterpreted in the setting of associated head or neck trauma.

Incidence

CAD occurs in less than one in 1,000 victims of blunt injuries according to one source (Davis et al., 1990). Another trauma facility documented CAD in eight of 2,024 patients (0.4%) incurring blunt force trauma (Laitt et al., 1996). Increased risk of this injury occurred in patients with head, facial, and cervical spine injuries (Davis et al., 1990). The actual incidence may be higher, as some dissections are asymptomatic or cause only minor transient symptoms and remain undiagnosed (Zohrabian, 2009).

Mechanisms of injury

The main mechanism is blunt trauma from high-impact forces, but CAD can occur from minor mechanisms of injury. Direct blow to the neck accounts for 50% of cases followed by neck hyperextension (Opeskin, 1997; Pica, 1995). Other mechanisms of injury include penetrating injury, wearing a three-point restraint seatbelt during an MVC, neck manipulation or strain (even yoga), intraoral trauma (mostly children), basilar skull fracture, and abdominal compression (Opeskin, 1997; Franges, 1986). See Table 1.

Pathophysiology

CAD starts as a tear in the inner lining of the arterial wall leading to hematoma and/or thrombus formation. Pseudo aneurysm formation in the ves-

sel can also occur. These mechanisms occlude blood flow leading to lack of flow to the territory of brain supplied by the injured vessel resulting in an ischemia or infarction. Some patients have presented years later due to the development of intraluminal stenosis (Zohrabian, 2009).

Clinical presentation

Most patients have associated head and neck injuries. Of patients who have a diagnosis of blunt carotid trauma, only 6% of patients with CAD are diagnosed at the time of hospital admission, as the symptom onset can be delayed Opeskin, 1997). Clinical findings common in carotid artery injury include Horner's syndrome (see Table 2), a lucid interval followed by decreasing level of consciousness, transient focal signs, hemiplegia or hemiparesis, and speech abnormalities (Zohrabian, 2009: Franges, 1986). Some patients may have evidence of physical trauma to the neck such as a hematoma or ecchymosis.

Table 2. Horner's syndrome

- Ptosis
- Miosis
- Anhidrosis
- Enophtalmos

Headache and neck pain may be present. Less common symptoms may include visual changes, pulsatile tinnitus, decreased taste sensation, and cervical bruit (Zohrabian, 2009).

Therapeutic approaches to treatment

The goal of treatment is to restore blood flow to prevent further ischemia or infarction. Therapeutic approaches to injuries of the carotid artery include both medical and surgical options ranging from observation, anticoagulation, carotid reconstruction or ligation, or extracranial bypass (Zohrabian, 2009).

Medical management includes management of blood pressure to prevent further compromise of blood flow, volume expansion to increase vascular volume and flow, and managing cerebral edema and increased intracranial pressure should these symptoms occur (Franges, 1986).

The patient's clinical course

The patient has no past medical problems. All laboratory tests were within normal limits including the 12-lead electrocardiogram. The patient was placed on Aspirin for secondary stroke prevention and referred to a rehabilitation centre for further care and management. The patient continues to have severe motor and speech deficits. Re-imaging of the neck vessels will be required in the future to assess recanalization.

Summary

CAD is an uncommon injury seen in trauma patients. Signs and symptoms may not be clinically apparent for hours to days later. Any patient presenting with a stroke-like syndrome following a head or neck injury should have investigations to rule out a CAD.

References

Davis, J., et al. (1990). Blunt carotid artery dissection: Incidence, associated injuries, screening, and treatment. *Journal of Trauma-Injury, Infection, and Critical Care, 30*(12), 1514–1517.

Franges, E. (1986). Assessment and management of carotid artery trauma associated with mild head injury. *Journal of Neuroscience Nursing, 18*(5), 272–274.

Laitt, R.D., et al. (1996). Blunt carotid arterial trauma. *Clinical Radiology, 51*(2), 117–122.

Opeskin, K. (1997). Traumatic carotid artery dissection**.** *The American Journal of Forensic Medicine and Pathology, 18*(3), 251–257.

Pica, R. (1995). Traumatic internal carotid artery dissection presenting as delayed hemilingual paresis. *American Journal of Neuroradiology, 17*, 86–88.

Zohrabian, D. (2009). *Dissection, Carotid Artery*. Retrieved from http://emedicicne.medscape.com/article/757906-overview

Awards of Excellence

Do you have an idol? Someone who helped you through that long day, evening, or night shift in ER?

Well, NENA wants to hear about them!

NENA is looking for nominations for Awards of Excellence in emergency nursing. There is no limit to the number of awards that are awarded in four categories:

- Emergency Nursing Practice
- Emergency Nursing Research
- Emergency Nursing Administration
- Emergency Nursing Education

The nomination form is included as an insert in this issue.