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Craniocervical Arterial Dissection

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Advanced Pathophysiology (NURS 5330)

Introduction

- The annual incidence for spontaneous carotid artery dissection (CAD) ranges from 2 to 3/100,000 patients and is even lower for a spontaneous vertebral artery dissection (VAD). Furthermore, there is only a .08% - .04% chance for the incidence of a traumatic dissection (TD), of the entire trauma population (Mortazvi, Verma, Tubbs, Harrigan, 2011). However, despite these low levels, CAD/VADs pose a serious threat to a patient's plan of care if not identified and treated early.

Case Process

- 23 y/o male admitted as a Trauma code 1 into the ICU
- Patient injuries include:
 - Facial Lacerations
 - C4 Fx.
 - R Hemopneumothorax
 - R Pulmonary Contusion
 - Pelvic Fx.
- Patient stabilized and transferred to floor
- Patient re-admitted with changes in his neurological assessment.
- CT/MRI shows multiple cerebral infarcts.
- Autopsy revealed traumatic CAD

Underlying & Significant Pathophysiology of Internal Carotid Artery Dissection

- Craniocervical vertebral artery dissections (CVAD) occur in the most mobile parts in the neck (Mohan, 2014).
- Spontaneous dissection of ICA occurs most frequently b/w the second cervical vertebrae and skull, and just distally to the origin of the artery (Mohan, 2014)
- A sheering injury to the artery results from the countercoup and rotational forces on the cervical vertebrae. Despite the area of injury, circulating blood being exposed to the sub endothelial matrix secondary to a tear of the innermost intimal layer or middle layer of the vessel wall initiates the activation of intrinsic clotting factors. When this occurs, CTA scan can show development of an intramural hematoma with subsequent luminal stenosis (Mohan, 2014).



Figure 1: Luminal Stenosis following an intramural hematoma indicated by white arrows (Mohan, 2014)

- The build up of pressure within the intimal lumen can also show a double lumen appearance of the vasculature confirming a dissecting aneurysm via CTA/MRI scans (Redekop, 2008).



Figure 2: Formation of double lumen from Intimal tear indicated by asterisk (Wessem, Meijer, Leenen, van der Worp, et al., 2011)

- Arterial dissections will ultimately narrow or completely occlude an arterial lumen, this narrowing or occlusion is the result from a thrombus formation which can potentiate cerebral ischemia or stroke (Wessem, Meijer, Leenen, van der Worp, et al., 2011)

“Cerebral infarction is the most common neurological sequelae in up to 70%-80% of cases (Mohan, 2014).”

Nursing Considerations & S/S

- Within the trauma patient population, physicians and nurses alike must remain astute in considering all aspects in regards to a patient's plan of care, specifically collisional related injuries resulting in blunt trauma to the face or neck. Due to lower levels of consciousness associated with MVA patients and multiple injuries, patients may not be able to verbalize pain location or levels, as well as report neurological disturbances. Thus, aggressive screening via CTAs of head and neck for patient populations who meet this criteria is paramount.

- The healthcare provider must screen for focal neurological deficits, neck hematomas or “seatbelt sign”, cervical bruits in patients less than 50 years old, and intraoral arterial hemorrhages (Wessem, Meijer, Leenen, van der Worp, et al., 2011).
- CAD is associated with anterior headaches, and VAD are associated with posterior headaches (Thomas, Price, Pollentine, 2012).



Figure 3: Left partial ptosis and miosis (Thomas, Price, Pollentine, 2012).

- Early detection of Horner syndrome can reduce risk of disabling stroke (Thomas, Price, Pollentine, 2012).

Conclusion

- Despite academic literature debating whether early aggressive screening via CTA in blunt facial trauma is necessary, CTA of head and neck is gold standard in diagnosis these abnormalities in trauma patients (Mohan, 2014). Because of the case presented to the St. Vincent Hospital of Indianapolis, all patients with blunt force trauma to head or neck will have a CTA performed to rule out any dissecting aneurysms.



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