Arterial Dissection and Stroke: A Veiled Risk and Case Example

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Purposes

- To alert clinicians to a relatively under-recognized cause of stroke and aphasia
- To present a background review on arterial dissection and CVA from environmental causes
- To present a case report of a 41 year old woman who suffered arterial dissection and aphasia after a prolonged period of neck extension during a root canal procedure
Stroke Background

- Tissue death in the brain due to lack of oxygen or blood supply
  - Typically associated with the elderly, but the young are not immune

- 2 types
  - Hemorrhage
  - Thromboembolic event

- 2 basic causes
  - Genetic
  - Environmental
    - (We were surprised...)
Genetic Risk Factors in Arterial Dissection

- Similar to those that contribute to cerebrovascular accidents in the elderly
  - Hypertension
  - Carotid artery stiffness
  - Hereditary connective tissue disease
  - Differences in vertebral bony structures

- Estimated 2.9-10% of all strokes attributed to arterial dissection

- Up to 45% of CVAs in adults younger than 45 years old can be related to environmental factors
Arterial Dissection

- Occurs when there is breakdown in the vessel wall of the artery causing blood to flow into the tissue layers instead of into the lamina and clot formation (Norris, Beletsky, & Nadareishvili, 2000)

- Typically, the subsequent stroke is secondary to the dissection
  - Dissection in arterial wall causes clot to form with possible embolic event
Types of Arterial Dissection

2 specific types

Carotid Artery Dissection (CAD)
Vertebral Artery Dissection (VAD)
Arterial Dissection

Level of section
Right common carotid artery

Normal carotid artery

Lining of artery compressed due to blood dissecting up from a tear
Unveiling the Risk

- **Head Position**
  - Dental procedures
  - Ceiling Painting
- **Sports Activities**
  - Wrestling
  - Judo
  - Treadmill running
- **Accidents**
  - Motor vehicle accidents
  - Falls
  - Airbag or seatbelt trauma
- **Neck Trauma**
  - Cervical manipulation
  - Abuse
  - Incredibly, even sea wave induced trauma
  - Hand-held massager
- **Leisure Activities**
  - Roller coasters
  - Yoga
- **Infection**
  - Narrowing of blood vessel
  - Bouts of violent coughing

These factors can cause an arterial dissection which result in a secondary stroke
3-5 times more prevalent than VAD
- 75% of stroke cases in people 45 years old and younger

Presenting signs and symptoms include:
- Unilateral headache
- Dysarthria
- Dysphagia
- Memory impairments
- Hemiparesis
- Visual impairment involving one field of vision

(Campellone, 2004)
VAD
(Caplan, Zarins, & Hemmati, 1985)

- Relatively rare
- 15% of strokes in people 40 years old and younger
- Presenting symptoms include:
  - Unilateral posterior headache
    - Pain may radiate to neck and face
  - Dysarthria
  - Dysphagia
  - Ataxia
  - Double vision
  - Limb or trunk numbness
Diagnosing VAD/CAD

- Computed tomography (CT) or magnetic resonance imaging (MRI) are not sensitive enough to detect arterial dissections
  - Magnetic resonance angiography (MRA), carotid ultrasound, or digital subtraction angiography (DSA) are more sensitive
    - Rarely administered unless physician suspects CAD/VAD

- Accurate diagnosis of CAD/VAD in adults 45 years old and younger is rare
  - Physicians and patients are relatively unaware of the link between precipitating events and presenting signs/symptoms
Treatment

- Aimed at preventing CVA
  - Anticoagulation and antiplatelet therapy
  - Surgery required in very few cases
    - Bypass
    - Stenting

- Patient prognosis is dependent on the timeliness of diagnosis and subsequent treatment (Saeed, Shuaib, Al-Sulaiti, & Emery, 2000)
  - If the dissection is discovered early, patients have an excellent prognosis for recovery from symptoms
    - Embolic or hemorrhagic event may be avoided completely
The Case of K.S.

- 41 year old single mom of 6 year old twins
  - No significant medical history or history of CVAs
  - Smoked 1-2 packs a day
- Had a root canal 2 days prior to CVA
  - Patient’s mom reports that K.S. was talking and laughing on the phone 1 day prior to CVA
- K.S. found unconscious by twins
  - When twins were unable to wake her, they alerted a neighbor who called 911
  - CT showed large left Middle Carotid Artery CVA
    - Carotid ultrasound showed large dissection on left carotid artery
- K.S. remained unconscious for 2 days following her admission to the hospital
The Case of K.S.

Upon awakening K.S. was:
- Unable to communicate in a meaningful way but could follow simple commands
  - Significant right sided facial weakness and droop impacted attempts at speaking
- Unable to swallow any food or liquid safely
  - Percutaneous endoscopic gastronomy (PEG) was conducted so that she could receive nutrition in non-oral form
- Unable to move limbs on right side due to hemiparesis
  - Also had signs/symptoms of right neglect
The Case of K.S.

After comprehensive speech-language evaluation, K.S. diagnosed with:
- Mixed aphasia
  - Western Aphasia Battery Aphasia Quotient: 34.8
    - Spontaneous Speech: 4 (including Fluency, Grammatical Competence, and Paraphasias)
    - Auditory Comprehension: 8
    - Repetition: 2.4
    - Naming: 2.2
- Apraxia of speech
- Moderate to severe oropharyngeal dysphagia
  - Aspiration of all liquids and deep penetration of puree consistency
- In addition to speech therapy, K.S. also had intensive physical and occupational therapy

Despite K.S.’s significant language deficits, she showed great potential for recovery of communicative skills:
- At discharge from acute rehab (~8 weeks post onset)
  - Effectively communicating with family and hospital staff via gestures and written choice
  - Meeting nutritional needs via oral means on regular diet with thin liquids
Preventative Measures

- Avoid trauma to the head and neck
- Wear seatbelts when driving or riding in vehicles
- Take appropriate safety precautions for sporting events
  - Helmet
  - Padding
- Be aware that extended or extreme neck extension or cervical manipulation may increase risk for arterial dissection
Implications

- Community Education
  - Target young as well as older adults in stroke education
  - Include risk factors for dissection to raise awareness of causes and signs/symptoms of CAD/VAD

- Acute Care
  - Change protocol for young adults who present with signs/symptoms
    - History should include specific questions about possible environmental causes

- Treatment Goals
  - Focus of goals shift from end-of-life to continuing life with appropriate interventions and compensations
References


