Aneurysms and arterial dissections of the Cranioscervical Junction

Case 1. A 57 year-old-man presented TIA after chiropractic treatment.

There have been numerous reports of associated risk factors for vertebral artery dissection; many of these reports suffer from methodological weaknesses, such as selection bias. Elevated homocysteine levels, often due to mutations in the MTHFR gene, appear to increase the risk of vertebral artery dissection.

People with an aneurysm of the aortic root and people with a history of migraine may be predisposed to vertebral artery dissection.

Chiropractic sometimes gives us, not only the relaxation, but also the mechanical stress to VA.
There are many stress in modern society.

Case 2. A 58 year-old man, who had a fall accident, presented with TIA.

Case 3. A 37 year-old woman wanted to make her car parking in proper position.


Authentic bow does not compromise the vertebral artery.

Slight bow 15 degree Salute 30 degree Respectful bow 45 degree

Interventional Neuroradiology

There are many stress in modern society...

Functional anatomy of craniospinal junction

ASA and anterior medullary perforators from the union of vertebro-basilar artery.

Metal artifact reduction

High resolution CBCT

Nineteen dissections were found on the right side, 3 on the left side, and 2 were bilateral (P = 0.48).

Choi M et al. AJNR 2014;35:323-326

The location of arterial dissection was confirmed by cerebral angiography (P = 0.008). Normal activity was possible in 7 patients, but the other cases revealed 5.

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Interventional Neuroradiology
Right lateral view showing the caudal loop of the PICA. No perforating arteries emerge from the vertebral artery under the PICA's emergence. Mercier P. et al. INR 2008.

ASA and anterior medullary perforators originating from the VA distal to the orifice of PICA. Rt.perforators originating relatively lower part of V4 portion that is at least 10mm apart from the union.


Pair of ASAs originate from both fenestrated trunk.
Section 1: Basilar Trunk Fenestration

- Triple fenestrations of basilar trunk
- Double fenestrations of basilar trunk
- Lower BA trunk saccular aneurysm associated with Type I fenestration invaginating into the REZ of CN VII-VII complex.

Section 2: Neuroanatomical and Neuroradiological Analysis

- Anatomical variation: Results from 12058 cases of MRA (2004~2006)
  1. Basilar trunk fenestration: 156 (1.29%)
  2. Anterior communicating artery fenestration: 91(0.76%)
  3. Persistent primitive trigeminal artery: 82 (0.68%)
  4. Accessorius or duplication of middle cerebral artery: 69 (0.57%)
  5. Azygos A2: 28(0.23%)
  6. Primitive dorsal ophthalmic artery: 6 (0.05%)
  7. Middle cerebral artery (M1) fenestration: 4 (0.03%)
  8. Infraoptic course of anterior cerebral artery: 3 (0.02%)
  9. Persistent hypoglossal artery 7 (0.06%)

- Neuroanatomical findings:
  - 365 cases with significant neuroradiological abnormality
  - 204 cases presented with headache
  - 1267 males
  - 1013 females
  - In total, 2280 cranial MR angiographies were performed at our institution between April 2004 and September 2004.

Section 3: Case Illustration

- A 57-year-old female with right hemifacial spasm
- Lower BA trunk saccular aneurysm associated with Type I fenestration invaginating into the REZ of CN VII-VII complex.

References:

- Tanaka M et al. Interventional neuroradiology 2006
- Adachi B. Kyoto University 1928
- Das Arteriensystem der Japaner
several studies have shown that pain is typically the first symptom associated with CAD, and a recent descriptive study involving 245 CAD patients reported that 8% of them presented with head or neck pain as their only symptom.

Cervical artery dissection typically involves an initial tear in the artery lining. It may cause the layers to separate from each other forming a subintimal dissection.
**HEALING PROCESS FOR CEREBRAL DISSECTING ANEURYSMS**

Saccular aneurysms may have a permanent risk of bleeding. Genesis eloquently demonstrate chronological changes. These dissecting aneurysms), according to our clinicopathological classification, are usually generated with sudden widespread disruption of the internal elastic lamina (IEL). The Type 1 aneurysm (segmental aneurysm), Type 2 aneurysm (segmental ectasia), Type 3 aneurysm (dolichoectatic aneurysm), and Type 4 aneurysm (saccular aneurysm arising from arterial trunk). The Type 4 aneurysm occurs from the portion of minimally disrupted IEL without intimal thickening. The dome comprises fragile adventitial connective tissue.

**RESULTS**: All dissecting aneurysms were generated with sudden widespread disruption of its internal elastic lamina or media. The healing process occurred with neointimal proliferation. The neointima, consisting mostly of newly synthesized smooth muscle cells and collagen fibers, extended from the disrupted ends of the media proper forward to the intact portion.

**CONCLUSION**: It is assumed that the healing process, with neointimal proliferation, begins after 1 week and may not be complete even after 1 month, depending on the extent of the wall injury.

**OBJECTIVE**: This was a pathological study to investigate the healing process for cerebral dissecting aneurysms presenting with subarachnoid hemorrhage (SAH).

**METHODS**: Twenty dissecting aneurysms that presented with SAH were collected from 33 patients. Nine aneurysms arise from the vertebral artery and one from the superior cerebellar artery. Eight aneurysms were collected during surgery and five were resected during surgery (leaving with or without bypass). The period between the onset of SAH and the time of specimen collection ranged from 2 hours to 35 days. All 13 aneurysms were pathologically examined with immunohistochemical staining, with a focus on the chronic-healing process after SAH.

**RESULTS**: All dissecting aneurysms were generated with sudden widespread disruption of its internal elastic lamina or media. The healing process occurred with neointimal proliferation. The neointima, consisting mostly of newly synthesized smooth muscle cells and collagen fibers, extended from the disrupted ends of the media proper forward to the intact portion.

**CONCLUSION**: It is assumed that the healing process, with neointimal proliferation, begins after 1 week and may not be complete even after 1 month, depending on the extent of the wall injury.

**A 41-year-old male. The right VA dissecting aneurysm presented with SAH, was treated conservatively, and was collected during autopsy on Day 15.**

**A 41-year-old male. The right VA dissecting aneurysm presented with SAH, was treated conservatively, and was collected during autopsy on Day 15.**
The PICA usually arises from the dominance of a segmental branch originating from the extraspinal longitudinal arteries (most from the AICA or caudally from a segmental branch originating from the vertebral artery, but-butyl cyanoacrylate (Glubran 2, GEM -asterisk-) fed by the ASA (arrowhead) is observed. Figure is available in color online only.

Table of contents

1 - Arterial considerations of craniovertebral junction
2 - Morphology of arterial dissections
3 - Imaging modalities and the clinical application

Key words:
Dissections, Intermammary Lamina, Segmental variability, Lateral spinomegal anatomy, Homology

Case 4
A 75-year-old man presented with sudden onset of headache and loss of consciousness. H&H grade 2, WPNS grade 2, Fisher group 3
A 37 year-old-man presented with suboccipital and nuchal pain.

Case 5.

Type 4

Semis are technique with Headway 21, LVIS 4.5×23mm, Target Nano 1.5mm×2cm, Deltaplush 1.5mm×2cm.

Pre Post

High resolution cone beam CT

Onset @1week @3 weeks

He could return to his home after post onset. mRS 0

High resolution CBCT

Type 1 Classic dissection
A 60 yo female has presented her nuchal and occipital headache for a couple of days. She consulted a neurologist in regional hospital, but was not diagnosed as a SAH. Afterwards, she presented with more severe headache and vomiting. An emergency CT showed a massive SAH mainly distributed at the level of cerebello-medullary and preoptine cistern.
Summary

1. There are two major factors as the susceptibility to dissection of VA.
   - Kinetic motion factor at the level of atlantoaxial joint.
   - Anatomical fragility of the intracranial V4 portion and PICA corresponding to the vasa corona as the homology of lateral spinal artery.

2. Functional vascular anatomy is the key to indicate the proper management and decision making.
   → Anatomical disposition is the message to predict the important perforators.

3. Sophisticated imaging technologies (e.g., high resolution CBCT) can provide in vivo microangiography.