Significance of Aberrant Vertebral Artery

- Aberrant origin of the vertebral artery (VA) is the second most common aortic arch anomaly (2-6%).
- It is more common in patients with Thoracic Aortic Disease compared to the general population.
- Usually of no clinical significance, except when encountered while treating cerebro-vascular disease or Aortic arch pathology.
- Critical decision-making to preserve its perfusion becomes necessary.

Origin of VA

- Left VA
- LCA
- LVA
Variations of the VA and posterior circulation

- Dominant left or hypoplasia of the right VA
- Termination in the posterior inferior cerebellar artery (PICA)
- Occlusive lesion on the right VA

Case Reports/Series

An alternative approach in treating an aortic arch

- Aberrant left vertebral artery transposition and concomitant carotid-subclavian bypass for treatment of acute intimal rupture with thoracic endovascular aortic repair


- Low morbidity and mortality
- Complications include Thoracic duct injury, RLN injury, Horner's syndrome and CVAs
- High patency rates

SVS Recommendation: In selected patients who have an anatomy that compromises perfusion to critical organs, routine preoperative LSA revascularization is strongly recommended despite the very low-quality evidence (GRADE 1, level C).

Indications for Left SCA revascularization prior to TEVAR

- Presence of a patent left internal mammary artery to coronary artery bypass graft
- Termination of the left vertebral artery at the posterior inferior cerebellar artery or other discontinuity of the vertebrobasilar collaterals
- Absent or diminutive or occluded right vertebral artery
- A functioning arteriovenous shunt in the left arm
- Prior infrarenal aortic repair with ligation of lumbar and middle sacral arteries
- Planned long-segment (20 cm) coverage of the descending thoracic aorta where critical intercostal arteries originate
- Hypogastric artery occlusion
- Presence of early aneurysmal changes that may require subsequent therapy involving the distal thoracic aorta.

Indications for Vertebral Artery Revascularization Prior to TEVAR

| Dominant Ipsilateral vertebral artery (Hypoplastic contralateral VA) |
| Incomplete Circle of Willis (termination in PICA) |
| Diseased or occluded contralateral vertebral artery |
| Extensive aortic coverage |
| Instability to evaluate Circle of Willis prior to intervention |

Technical tips

- Supraclavicular incision
- Postero-medial to the CCA
- Beware of RLN or NRLN, Thoracic duct on the left
- Transpose to the posterior surface of the CCA avoiding twists or kinks
- Clamp distal to complete CS bypass
Our experience

- 6 VA transpositions from 2016 to 2018
- Average age 59 years
- 4 Left VA transposition to Left CCA
- 2 Right VA transposition to Right CCA
- No perioperative complications or mortalities
- 1 lost follow up
- Average follow up 12.4 months, longest of 27 months
- All patent at follow up

Summary

- Aberrant VA is an uncommon finding but associated with Thoracic Aortic disease
- Origin and course of the VA should be thoroughly evaluated prior to treatment
- Revascularization should be considered in certain situations to avoid posterior circulation ischemia
- More data is needed to establish guidelines