Thoracic Dissecting Aneurysm and the Importance of Genetics

Dan R. Kramer, BA and Anthony Prestipino, M.D.
Department of Pathology, Anatomy, & Cell Biology, Jefferson Medical College of Thomas Jefferson University, Philadelphia, PA

Pathogenesis of Aortic Dissection
- Laceration of the intima and inner layer of the aortic media, forming an entrance tear
- There are cases where this there is no tear in the intima, but instead an intramural hematoma due to rupture of the vasa vasorum
- Allows blood to split the aortic media, forming a double-barrel aorta, with the true and false lumen separated by the aortic dissection flap
- The tear can propagate antegrade, and sometime retrograde
- The propagation of the false lumen can occlude various vessels based on its location
- The pattern of propagation causes the large variety of clinical manifestations seen with aortic dissection
- Cystic Medial Necrosis
- Involves a combination of response to increased hemodynamic pressures and inherited connective tissue defects leading to a weakness in the aortic wall, which is susceptible to rupture
- Myxoid/Mucoid degeneration
- Loss and fragmentation of the elastic fibers

Histology
- Fragmentation of Elastic Fibers
- Myxoid/Mucoid Degeneration

Genetics
- Although a major manifestation of connective tissue disorders like Marfan’s and Ehlers-Danlos syndromes, most cases occur in individuals who do not have identifiable syndromes or diseases
- For patients without these syndromes who have thoracic aortic dissections:
  - Up to 19% have a first degree relative with aortic aneurysms or dissections
  - Indicates a strong genetic predisposition to this disease
  - Inheritance: primarily autosomal dominant with decreased penetrance and variable expression

Conclusion
- While chronic, untreated hypertension is a necessary and vital predisposing factor for dissecting aneurysms of the thoracic aorta, we believe that a genetic predisposition is also required for the dissection to occur.
- Based on the literature, the idea of non-syndromic genetic predisposition to aortic dissection accounts for the majority of cases and it is important that such mutations be identified
- By identifying the non-syndromic genetic mutations that put certain families at increased risk, clinicians can better monitor such individuals to prevent dissection, as well as better anticipate when a dissection has occurred.

REFERENCES