10:50 a.m. 15. Characterization of Thoracic Aortic Arch Anatomy in the Asian Elderly Population
Jackie P. Ho, MD, Peixuan Chiu, Heow Pueh Lee, PhD, Sudhakar K. Venkatesh, MD
1Surgery, National University of Singapore, Singapore, 2Singapore
Discussant: Edmond J. Raker, MD, Seattle, WA

OBJECTIVE: Endovascular repair of the aortic arch is often unsatisfactory due to poor stent-vessel conformity and inadequate landing zones. This study aims to characterize the structural dimensions of aortic arch so as to facilitate the development of arch-specific endovascular devices.

METHODS: Three dimensional models were reconstructed in Mimics (an image segmentation software) from CT aortograms of 120 Asian elderly patients using manual segmentation. Centerlines of each 3D aortic model were calculated using a repulsive force field method. Following which, measurements of the aorta and supra-aortic branches were obtained and analyzed in Patran (a Finite Element software). A statistical aortic arch shape model was built using Principal Component Analysis (PCA).

RESULTS: Average diameters of the ascending, descending aorta, origin of the innominate, left common carotid and left subclavian artery were 39.4±6.7mm, 34.5±7.9mm, 18.0±3.8mm, 12.6±2.7mm and 14.1±2.5mm respectively. Length of the ascending aorta, innominate to left common carotid artery, and left common carotid to left subclavian artery were 62.6±11.4mm, 12.0±5.6mm and 18.7±5.6mm along the centerline. Type II and type III arches were more prevalent than type I. Mean angle of curvature was 103.8±25 degrees. PCA of the 3D centerlines derived three main modes of variation which could account for 61% of the overall shape range.

CONCLUSIONS: Aortic arch anatomical information from the Asian elderly population can be used as reference for the development of future endovascular devices.