Quantification of Abdominal Aortic Aneurysm Calcification Using the Agatston Method Can Predict Accelerated Expansion Rate

Atsuko Nakayama, MD, PhD; Hiroyuki Morita, MD, PhD; Katsuyuki Hoshina, MD, PhD; Issei Komuro, MD, PhD

We recently reported that calcification index <2.74% is a good predictor for the accelerated expansion of abdominal aortic aneurysm (AAA),¹ but it is not easy to put this into practice because of the requirement for manual plotting on the reconstructed volume-rendered AAA images (Figure A,C). Simpler evaluation of AAA calcification should facilitate its practical use. Here, we explored whether the Agatston method, established as a simple and accurate quantification of calcification in coronary arteries,² could be used for the measurement of AAA calcification. After setting both ends of all AAA (n=414) in the same manner as our previous study,¹ Agatston score and AAA calcification volume were automatically calculated with the Agatston method using 3D Slicer (Figure B,D). The study was approved by the Ethics Committee of the University of Tokyo Hospital. The calcification index was significantly correlated with Agatston score and with calcification volume (R=0.525, P<0.001, and R=0.531, P<0.001, respectively). According to the area under the receiver operating characteristic (ROC) curve for predicting accelerated AAA expansion (>5 mm/year), Agatston score and AAA calcification volume could be significant markers for AAA expansion (P=0.016 and P=0.004, respectively; Figure E). AAA Agatston score <1.181, corresponding to the inflection point of the ROC curve, was the optimal cut-off, having a sensitivity of 66% and specificity of 55%. Even after adjusting for age >65 years, sex, body mass index >25 kg/m², hypertension, dyslipidemia, diabetes, ex-smoking, current smoking, past history of chronic obstructive pulmonary disease, and statin use, AAA Agatston score <1.181 remained a significant predictor of accelerated AAA expansion >5 mm/year (hazard ratio, 2.920; 95% CI: 1.474–5.788, P=0.002). In conclusion, the Agatston method can be used to evaluate AAA calcification and hence predict AAA expansion.

Acknowledgments
This work was supported by a Grant-in-Aid from Okinaka Memorial Institute for Medical Research.

Disclosures
The authors declare no conflicts of interest.

References