PS66.

Carotid Artery Segmentation and Wall Thickness Measurement Using CTA

Eric K. Shang, Alison M. Pouch, Chun Xu, Melissa M. Levack, Robert C. Gorman, Clyde F. Barker, Chandra M. Sehgal, Benjamin M. Jackson. Surgery, University of Pennsylvania, Philadelphia, PA

Objectives: Carotid wall thickness (CWT) is important for cardiovascular risk stratification and for biomechanical modeling of carotid atherosclerotic disease. Surface ultrasound (US) is the standard means of measuring carotid intimal-medial thickness (IMT). We hypothesized that semi-automated segmentation algorithms applied to computed tomographic angiography (CTA) can accurately measure CWT.

Methods: Patients (n = 5) with carotid disease having undergone both CTA and US were identified retrospectively. CTA DICOM images were segmented with custom algorithms utilizing active contour generation for luminal surfaces, and isoline contour detection to delineate the outer (adventitial) carotid wall and both calcified and soft plaque. CWT was computed in areas absent of plaque as the minimal distance between the luminal and adventitial walls. Six corresponding locations in the common and internal carotid in each patient were identified on duplex and wall thickness measurements taken to validate CTA results (n = 30 comparisons).

Results: CWT by CTA ranged from 0.78 to 1.41 mm. There was 3.8% ± 2.4% absolute difference between CTA and US. The measurements correlated well with R = 0.955. There was no detectable bias by Bland-Altman analysis.

Conclusions: CTA can be used to accurately measure CWT. 3D models of the carotid bifurcation which incorporate locally-resolved wall thickness are possible and will allow more realistic biomechanical engineering analyses.

Author Disclosures: C. F. Barker: Nothing to disclose; R. C. Gorman: Nothing to disclose; B. M. Jackson: Nothing to disclose; M. M. Levack: Nothing to disclose; A. M. Pouch: Nothing to disclose; C. M. Sehgal: Nothing to disclose; E. K. Shang: Nothing to disclose; C. Xu: Nothing to disclose.

PS68.

Association between Carotid Artery Occlusion and Ultrasoundic Plaque Type: A Case Control Study

Constantine N. Antonopoulos, Triantafilllos G. Giannakopoulos, Ioannis Vassilopoulos, George Sfyroeras, Konstantinos G. Moulakakis, John D. Kakisis, Christos D. Liapis. Athens University Medical School, Attikon University Hospital, Haidari, Greece

Objectives: Internal carotid artery (ICA) occlusion is associated with acute stroke and carries significant morbidity and mortality. The aim of this study was to examine whether ultrasonographic carotid plaque type may be an independent risk factor for ICA occlusion.

Methods: During a 25-year period, 211 consecutive patients (85% males, mean age 66.01 ± 9.52) with ICA occlusion were included in this case-control study. Ultrasonographic Gray-Weale plaque type (I-V, echolucent to echogenic) characterization was obtained in both occluded and contralateral ICA. Each carotid artery with stenosis was treated as control to the occluded contralateral ICA of the same patient.

Results: A total of 261 carotid arteries (61.8%) were recorded with type I-II plaque type. Of the occluded ICAs 165/211 had a type I-II plaque, while 96/211 of the contralaters (P < 0.001). Univariate analysis showed that carotid plaque type I-II significantly increased the risk for carotid artery occlusion (OR = 4.29, 95% CI = 2.81-6.57, P < 0.001) compared to plaque type III-IV.

Conclusions: Echolucent plaques are associated with increased risk of carotid artery occlusion. Carotid duplex ultrasound may help identifying the subgroup of patients with carotid stenosis that are more prone to occlusion.

Author Disclosures: C. N. Antonopoulos: Nothing to disclose; T. G. Giannakopoulos: Nothing to disclose; J. D. Kakisis: Nothing to disclose; C. D. Liapis: Nothing to disclose; K. G. Moulakakis: Nothing to disclose; G. Sfyroeras: Nothing to disclose; I. Vassilopoulos: Nothing to disclose.

PS70.

Alcohol Use Patterns as an Independent Risk Factor for Symptoms in Patients with Carotid Artery Stenosis

Sean J. Hislop, David L. Gillespie, Adam J. Doyle, Neil G. Kumar, Elisa Roztocil, John P. Cullen. University of Rochester, Division of Vascular Surgery, Rochester, NY

Objectives: Patterns of alcohol use have been associated with increased risk of cardiovascular events. Our lab
has previously demonstrated the differential effect of daily-moderate vs. weekend-binge alcohol consumption on atherosclerotic plaque development in a murine model. In this study we hypothesized that patterns of alcohol use including binge drinking would be associated with an increased risk of developing symptoms in patients with a carotid stenosis by comparison of asymptomatic and symptomatic patients undergoing carotid endarterectomy.

Methods: In this IRB approved study, patients were asked to fill out a validated questionnaire assessing their pattern of alcohol use, specifically focusing on lifetime binge and overall drinking patterns. Past medical history, social history, and current laboratory data were assessed to evaluate for confounding variables. All patients were selected for surgery based upon NASCET and ACAS criteria.

Results: 47 patients (18 symptomatic, 29 asymptomatic) were included in this study. There were no statistical differences in patient demographics. Traditional risk factors for cardiovascular events were significant in univariate analysis. Lifetime number of drinks and lifetime number of binge drinking days were found more often in symptomatic patients. When compared in multivariate analysis, only total number of drinks and lifetime number of binge drinking days remained significant. In multivariate analysis with known cardiovascular event risk factors, binge drinking (OR = 1.21 per 1000 binge drinking days, 95% CI = 1.03-1.42, P = .022) and non-HDL cholesterol level (OR = 1.31 per 10 mg/dL, CI = 1.01-1.69, P = .040) remained significant predictors of symptoms in patients with carotid stenosis.

Conclusions: These data suggest that there may be a significant relationship between symptoms in patients with carotid artery stenosis and the pattern in which they consume alcohol that is independent of traditional risk factors for cardiovascular events.

Author Disclosures: J. P. Cullen: Nothing to disclose; A. J. Doyle: Nothing to disclose; D. L. Gillespie: Nothing to disclose; S. J. Hislop: Nothing to disclose; N. G. Kumar: Nothing to disclose; E. Roztocil: Nothing to disclose.

PS72.

What Is an Acceptable Morbidity Rate after Carotid Endarterectomy?

Elias Kfoury, Dipankar Mukherjee. Inova Fairfax Hospital, Falls Church, VA

Objectives: Interpreting the results of the CREST trial suggest that carotid endarterectomy and carotid stenting are somehow equivalent in postoperative morbidity with less stroke rate in carotid endarterectomy (CEA) arm and less myocardial infarction (MI) rate in carotid stenting arm. We hypothesized that stroke rate and myocardial infarction rate lower than the reported results of the CREST trial can be achieved with carotid endarterectomy.

Methods: A retrospective review of medical charts for patients undergoing CEA was conducted at a large community hospital from July 2007 - June 2010. 30-day postoperative myocardial infarctions (MI) and strokes were evaluated for patients undergoing CEA.

Results: A total of 663 patient charts were reviewed for patients who underwent carotid endarterectomy. No adjustments were made for surgeon specialty or anesthesia type. 30-day postoperative stroke rate and myocardial infarction rate were reviewed. Carotid endarterectomy postoperative stroke rate was 1.36% (total of 9 patients) and myocardial infarction rate was 0.45% (total of 3 patients). No myocardial infarctions were reported and a stroke rate of 0.7% was detected in 407 carotid endarterectomies done under local anesthesia.

Conclusions: Our published results fall well below the reported numbers in the CREST study in terms of postoperative stroke rate of 2.3% for carotid endarterectomy and myocardial infarction rate of 2.3%. Since the guidelines for management of patients with carotid artery stenosis are dependent on risk and benefit ratio further evaluation of carotid endarterectomy compared to stenting and medical therapy should be considered with large scale studies.

Author Disclosures: E. Kfoury: Nothing to disclose; D. Mukherjee: Nothing to disclose.