Division of Neurology
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Carotid Plaque Volume Changes of Stroke and TIA patients in Six Month Follow-up Period: Observational Study with New Three-Dimensional Carotid Ultrasound

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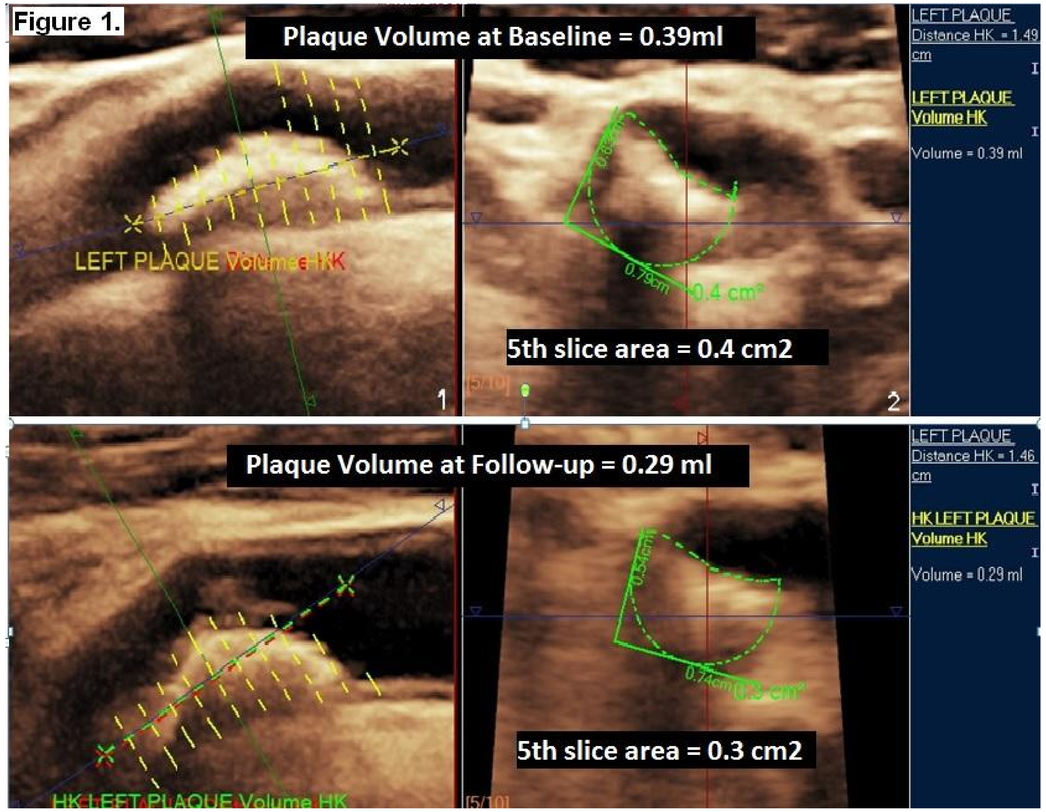
INTRODUCTION:

Carotid plaque volume measured by Three-Dimensional Carotid Ultrasound (3DUS) is considered a reliable indicator of atherosclerosis burden.
This is an observational, 6 months follow up study to determine the changes of carotid plaque volume in patients referred to Stroke Prevention Clinic after a cerebrovascular event.

METHODS:

Consecutive patients with a history of stroke or transient ischemic attack (TIA) were recruited for this study. All patients were on clinically indicated secondary prevention treatment based on current guidelines. Patients with internal carotid artery (ICA) occlusion or plaques extending beyond the ICA or with poor image quality were excluded.
New Single-Sweep 3D Ultrasound technique (Philips iU 22) equipped with volumetric transducer (vL 13-5) has been used to acquire images at baseline and follow-up (see Figure 1). The off-line volumetric measurements were performed using Q-Lab quantification software and employing the semiautomatic Stacked Ellipse method.
Recently our group has published the detailed methods used for acquisition and measurements. Inter-observer reproducibility was 5.6% ± 6.02%. Based on this, a change in plaque volume is considered real if it exceeds 12%.

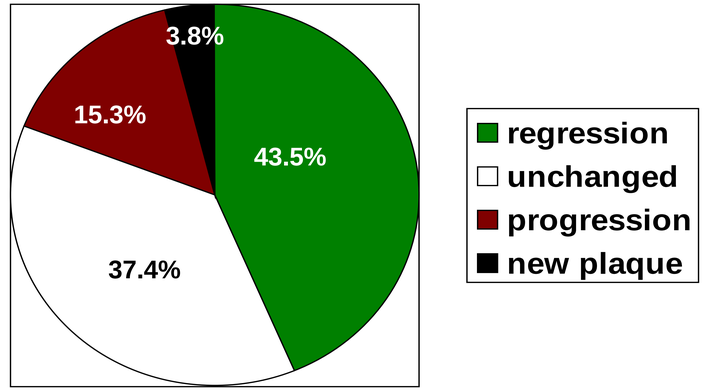


The Plaque Volume at the baseline measurement was 0.39 ml (upper image). After 6 month the Plaque Volume was measured again and it was 0.29 ml (bottom image).

CONCLUSIONS:

Using the new single sweep 3DUS technique, it is possible to detect plaque regression and progression at 6 months follow-up. In this group of stroke and TIA patients the plaque volume positively responds to the control of vascular risk factors by means of current secondary prevention measures

RESULTS:



One hundred and sixteen patients (mean age 67.8±10.2 years, 36% women) and 232 carotid arteries were screened at baseline. Eighty eight patients had a history of hypertension (75.9%), 93 dyslipidemia (80.2%) and 24 diabetes mellitus (20.7%).
At this time 131 follow-up plaque volumes are available for analysis. At baseline, the mean PV was 0.337±0.31ml and at follow up 0.273±0.24ml, mean difference=0.064ml, $p<0.001$, (Paired-Samples T test, $t=3.6$, $df=130$).
Overall, 80.9% of plaque volumes regressed or remained unchanged (positive response) and 19.1% progressed or developed a new plaque (negative response). The positive response rate of the plaque volume to secondary prevention was significantly higher than the negative one: Chi-Square=50.1; df-1; $p<0.001$.

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