Correlation between plaque instability and presence of preoperative ischemic brain lesions in patients undergoing carotid endarterectomy

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☑ I do not have any potential conflict of interest
Background

Carotid Artery Disease

Intraplaque hemorrhage (IPH)

- Associated with higher risk of ipsilateral stroke\(^1\)-\(^2\)
- IPH more common in symptomatic patients\(^3\)
- Symptomatic patients with IPH increased chance of recurrent events\(^4\)

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2 Takaya et al, Association between Carotid Plaque Characteristics and Subsequent Ischemic Cerebrovascular Events, *Stroke*, 2006
Patients with instable plaques: High risk interval period

**Aim:** To investigate the correlation between intraplaque hemorrhage and presence of fresh pre-operative ischemic brain lesions in carotid stenosis patients

Magnetic Resonance Diffusion Weighted Imaging (MR-DWI) lesions

- Surrogate marker for cerebral ischemia
- Clinically relevant: associated with increased chance of future cerebrovascular events

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5 Gensicke, Ischemic brain lesions after carotid artery stenting increase future cerebrovascular risk. *J Am Coll Cardiol*, 2015
Retrospective study on prospectively collected data

**METHODS**

Plaque Characteristics (histology):
- Intraplaque hemorrhage
- Large lipid core
- Calcifications
- Collagen
- Microvessels
- Macrophage staining
- Smooth muscle cell staining

**MRI 1-7 days prior to surgery**

ICSS – MRI substudy

- Ipsilateral DWI lesions (appearing hypo-/isointense on ADC)
- 82% of CEA patients >14 days between last symptom and surgery
- Lesion 0-10 days old

**Athero-Express biobank (UMC Utrecht)**

- 82% of patients >14 days waiting time
- Recurrent thrombo-embolism
- Atherosclerotic plaques of CEA patients
- Index event
- MRI
- Revascularization

Multivariate analysis corrected for age and type of index event

Inclusion of 53 patients

<table>
<thead>
<tr>
<th>Ipsilateral</th>
<th>DWI – (n=40)</th>
<th>DWI + (n=13)</th>
<th>OR (adjusted)</th>
<th>( p )-value multivariate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraplaque hemorrhage</td>
<td>60%</td>
<td>92%</td>
<td>10 (1.2-100)</td>
<td>0.036</td>
</tr>
<tr>
<td>Lipid core ≥40%</td>
<td>58%</td>
<td>23%</td>
<td>0.18 (0.04-0.836)</td>
<td>0.028</td>
</tr>
<tr>
<td>Moderate/heavy calcifications</td>
<td>43%</td>
<td>39%</td>
<td>0.82 (0.22-3.04)</td>
<td>0.770</td>
</tr>
<tr>
<td>Moderate/heavy collagen</td>
<td>78%</td>
<td>54%</td>
<td>0.34 (0.09-1.267)</td>
<td>0.107</td>
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<tr>
<td>% Microvessels</td>
<td>9.15 (5.22)</td>
<td>9.00 (8.00)</td>
<td>1.07 (0.420-2.639)</td>
<td>0.890</td>
</tr>
<tr>
<td>% Macrophage staining</td>
<td>0.63 (1.40)</td>
<td>0.74 (1.68)</td>
<td>1.10 (0.286-4.264)</td>
<td>0.886</td>
</tr>
<tr>
<td>% Smooth muscle cell staining</td>
<td>1.16 (2.40)</td>
<td>0.91 (1.58)</td>
<td>0.74 (0.217-2.520)</td>
<td>0.630</td>
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<tr>
<td>Waiting time in days (IQR)</td>
<td>45 (24-66)</td>
<td>34 (18-50)</td>
<td>0.179</td>
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Patients with intraplaque hemorrhage have an increased risk for recurrent ischemic lesions after the index event.

Detection of intraplaque hemorrhage can be helpful in prioritizing patients for timing of revascularization.

Low number of patients ↔ first study relating histological plaque features to preprocedual risk of (recurrent) ischemic lesions.

Reliable methods for in vivo detection needed.

*Thank You For Your Attention!*