Quantization of stenosis

- Ultrasound diagnosis
  - Shear wave elastography
  - Radiofrequency-based ultrasound

Assessment of plaque vulnerability by US:
- Asymptomatic patients with stenosis >60%
- Symptomatic patients with intermediate plaque

Decision-making in following situations:
- Vulnerable plaque is characterized by a thin fibrous cap, a large lipid core, and intraplaque hemorrhage.
- ASA only, lifelong or for as long as it is well-tolerated (IA)

Post CAS (ICA stenting)
- DAPT with ASA and Clopidogrel within 24 hours of a minor cerebral ischemic event/TIA with continuation for up to 1 month (IB)

- In the acute phase of a stroke/TIA, a loading dose of 300 mg ASA and/or 300/600 mg Clopidogrel is always recommended
- Post CAS (ICA stenting)
- DAPT with ASA and Clopidogrel for one month (IA)
- After the first month, lifelong treatment with ASA-only (IA) (except in the case of a recent AMI or stenting within the past year indicating extension of DAPT)
- A loading dose of 300 mg ASA and/or 300/600 mg Clopidogrel is always recommended during the procedure

Plaque vulnerability and its assessment by Ultrasound

- Risk of stroke in patients with carotid plaques depends not only on severity of stenosis but also on plaque vulnerability.
- Vulnerable plaque is characterized by a thin fibrous cap, a large lipid core, and intraplaque hemorrhage.

Assessment of plaque vulnerability could help in therapeutic decision-making in following situations:
- Asymptomatic patients with intermediate plaque
- Symptomatic patients with stenosis >60%
- High-risk patients (dyslipidemia, diabetes mellitus, chronic kidney disease) with any grade of stenosis
- Stenting versus endarterectomy

Assessment of plaque vulnerability by US:
- 2-D ultrasound - echo-endoscopy/ultrasone
- Contrast ultrasound - plaque neovascularization
- Radiofrequency-based ultrasound
- Shear wave elastography

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**Table 1:** Morphology of atherosclerotic plaque

<table>
<thead>
<tr>
<th>Feature</th>
<th>Type (Gray-Weale classification)</th>
<th>Tortuosity</th>
<th>Kinking</th>
<th>Color-Doppler</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface</td>
<td>Regular/Smooth</td>
<td>Maintenance of vascular axis</td>
<td>A bursa-like change in the wall of the artery, producing an acute angle of narrowing or wide range</td>
<td>Associated with stenosis</td>
</tr>
<tr>
<td></td>
<td>Irregular</td>
<td>Tortuous course</td>
<td>Rarely causes stenosis</td>
<td>Type I: Slight angle &gt; 60°</td>
</tr>
<tr>
<td></td>
<td>Ulcerated</td>
<td>Loopy, full or not</td>
<td>Type II: Moderate angle 30° ≤ x ≤ 60</td>
<td>Type III: Severe angle &lt; 30°</td>
</tr>
</tbody>
</table>

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**Table 2:** Characteristics of atherosclerotic plaque

<table>
<thead>
<tr>
<th>Feature</th>
<th>Type</th>
<th>Morphology</th>
<th>Ultrasound detection</th>
<th>Risk of future restenosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface</td>
<td>Regular/Smooth</td>
<td>Homogeneous</td>
<td>Low-echogenicity</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Irregular</td>
<td>Mixed</td>
<td>Hyperechoic</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Ulcerated</td>
<td>Hypertrophied</td>
<td>Very echogenic</td>
<td>Very high</td>
</tr>
</tbody>
</table>

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**Figure 1:** Quantification of stenosis using the NASCET method.