Not so:
1. Carotid Plaque Morphology is Helpful (with other criteria) in Predicting Stroke Risk in ACS Patients
2. What Percentage of ACS Patients are High Risk and Justify CEA or CAS?

Andrew Nicolaides

Image Normalisation

- Image normalization (1996) opened the gate that had been holding us back for 20 years:
- Provided images on which reproducible measurements of texture features could be made on different equipment
- Made identification of unstable plaque possible

The Value of Grey Scale Median (GSM)

- Two prospective studies demonstrated that low GSM is associated with an increased risk of stroke
  - Tromso Study
    Mathiesen et al, Circulation 2001 (GSM) RR = 4.6
  - Hashimoto et al, Cerebrovasc Dis 2009 (GSM) RR = 4.4
- Both studies used image normalisation
**Image contouring**

<table>
<thead>
<tr>
<th>Grey scale</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-25</td>
<td>black</td>
</tr>
<tr>
<td>25-50</td>
<td>blue</td>
</tr>
<tr>
<td>50-75</td>
<td>green</td>
</tr>
<tr>
<td>75-100</td>
<td>yellow</td>
</tr>
<tr>
<td>100-125</td>
<td>orange</td>
</tr>
<tr>
<td>&gt; 125</td>
<td>red</td>
</tr>
</tbody>
</table>

**Discrete plaque white areas**

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**Juxtaluminal Black Area**

- Concept first introduced by Pedro in 2002
- JBA was associated predominantly with symptomatic plaques
  - Pedro LM et al Eur J Vasc Endovasc Surg 2002;24:492-498
- Low GSM values near the luminal portion of the plaque were associated with a necrotic core located at a juxtaluminal position on histology.
  - Sensitivity 84%; specificity 75%

**JBA** ? Thrombus on plaque surface

**ACSRS** 1121 patients with ACS followed for 6 months to 8 years (mean 4 years)
Conclusions

- Independent predictors of risk:
  1. Degree of stenosis
  2. History of contralateral TIAs or Stroke,
  3. JBA and
  4. DWA

- Risk stratification is possible
- On the basis of the Cox model the risk of stroke can be calculated for each patient

Risk Stratification

Of the 923 patients with ≥ 70% stenosis

Annual stroke rate  n
< 1%  524
1-2%  149
2-4%  176
4-6%  40
>6%  34

25 %

Stenosis 70-89% ECST (50-82% NASCET) (n=598) and predicted annual stroke risk


Where we go from here?

1. User friendly software for image analysis is now available for vascular labs
2. Doctors who like a number: They should ask for
   (a) % Stenosis
   (b) Annual stroke risk

Printed Report