Plaque imaging in carotid intervention
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**Introduction**  Endovascular treatment of carotid artery stenosis is an attractive alternative in the prevention of stroke but unstable or inflamed carotid plaques may embolise during passage of endoluminal instrumentation.

**AIM**  To investigate whether current imaging modalities could successfully determine unstable plaques to aid appropriate use of radiology or surgical resources.

**Methods**

- **Duplex**
  Using Gray Weale Classification Type 1-5
  
  - 1 Echolucent
  - 5 Echogenic

- **MRI (1.5 T scanner, GE)**
  An ex-vivo MR image of the carotid plaque

Plaques excised at surgery (1,2) were remoulded in PTFE (3) and were subjected to angioplasty in an ex vivo model (4). Emboli collected in distal filters were counted using microscopy (5). Plaques were sent for histology to assess features indicating instability eg. ruptured cap, recent haemorrhage.

**Results**

**DUPLEX**
Comparison of plaque echolucency on Duplex scan with distal emboli number and size during carotid angioplasty

![Graph showing plaque type and emboli number](image)

**MRI**
Comparison of MRI carotid plaque features with histology

<table>
<thead>
<tr>
<th>Feature of Complicated Plaque</th>
<th>Sensitivity of MRI</th>
<th>Specificity of MRI</th>
<th>Positive Predictive Value</th>
<th>Negative Predictive Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibrous cap ruptured</td>
<td>77.8%</td>
<td>72%</td>
<td>50%</td>
<td>90%</td>
</tr>
<tr>
<td>Recent Haemorrhage</td>
<td>88%</td>
<td>72.7%</td>
<td>88%</td>
<td>72.7%</td>
</tr>
<tr>
<td>Emboli number</td>
<td>89.3%</td>
<td>62.5%</td>
<td>89.3%</td>
<td>62.5%</td>
</tr>
</tbody>
</table>

Comparison of MRI plaque features with distal emboli number and size during carotid angioplasty

P=0.002  
P=0.62  
P=0.83  
P=0.72

**Conclusion**

Duplex based plaque echolucency may be able to predict embolisation during ex-vivo angioplasty. MRI assessment using 1.5T scanner has reasonable correlation with histology but in this study failed to correlate with emboli number. Further work may allow MRI details to identify the unstable plaque.