MRV and Major Venous Interventions

VEITH 2017

UT VASCULAR

SOUTH TEXAS CENTER FOR VASCULAR CARE

Disclosures

• Specific Disclosures
  – None

• General Disclosures
  – None

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MRV and Major Venous interventions

• Primary Diagnosis
• Confirmatory Diagnosis
• Procedural Planning
• Procedural Adjunct
• Primary Procedural Modality

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Modalities

• Flow-Dependent MRI
  • sensitivity and specificity, 100% and 93%
  • slow acquisition time

• Flow-Independent MRI
  • sensitivity and specificity, 95% and 100%,
  • better acquisition time

• Contrast-Enhanced MRV
• Direct Thrombus Imaging

Molecular imaging studies of Venous Thrombi

DVT
Acute Pulmonary Embolism

CTEPH

Phlebolymphology N°74
(Vol 19 – N°2 – 2012)

Phlebology, 2012 Mar;27
Suppl 1:163-70

Fig. 3a, b. Example of a bland thrombus with left renal carcinoma. A Non-enhanced FLASH image shows a localized hypointense area within the left renal vein at the left hilum before injection. b After Gd-chelate administration, the signal of the left renal vein enhances, whereas bland thrombus signal remains constant.

Renal carcinoma: diagnosis of venous invasion with Gd-enhanced MR venography

Table 4. Number of true-positive and false-positive diagnoses according to the MR pattern and the MR sequence

<table>
<thead>
<tr>
<th>MR Pattern</th>
<th>Venous Enlargement (SE)</th>
<th>Normal Vein/Clot (false positive)</th>
</tr>
</thead>
<tbody>
<tr>
<td>True Positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 of 19 (84)</td>
<td>3 of 53 (6)</td>
<td></td>
</tr>
<tr>
<td>Contrast enhancement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>14 of 19 (74)</td>
<td>4 of 53 (8)</td>
</tr>
<tr>
<td>FLASH</td>
<td>15 of 19 (79)</td>
<td>2 of 53 (4)</td>
</tr>
<tr>
<td>SE + FLASH</td>
<td>17 of 19 (89)</td>
<td>2 of 53 (4)</td>
</tr>
</tbody>
</table>

Percentages in parentheses.
Table 4. Number of true-positive and false-positive diagnoses according to the MR pattern and the MR sequence

<table>
<thead>
<tr>
<th>Pattern of Thrombus</th>
<th>FLASH</th>
<th>SE + FLASH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neoplastic</td>
<td>15 of 19 (79)</td>
<td>2 of 53 (4)</td>
</tr>
<tr>
<td>Bland</td>
<td>17 of 19 (89)</td>
<td>2 of 53 (4)</td>
</tr>
</tbody>
</table>

Per centages in parentheses

McNemar's test, p < 0.05

The nature of thrombus (neoplastic or bland) was more accurately assessed with FLASH-enhanced MR images (sensitivity 89%; specificity 96%) than with SE and precontrast FLASH images (sensitivity 79%; specificity 94%).

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Renal carcinoma diagnosis of venous invasion with Gd-enhanced MR venography


High-resolution three-dimensional contrast-enhanced blood oxygenation level-dependent magnetic resonance venography of brain tumors at 3 Tesla: First clinical experience and comparison with 1.5 Tesla

Markus Barth, MD,*, Jan-Melanie Nihlsen-Holborn, MD,† I. Jürgen R. Schick, MD,‡ Andreas Mittnacht, PhD,§ and Stefan Treiber, MD

High-resolution BOLD venographic imaging: a window into brain function?

Jürgen K. Schick, MD, and E. Mark Haake, PhD

High-resolution BOLD venography is a window into brain function?

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Fig. 3a, b. Example of a bland thrombus with left renal carcinoma.

Non-enhanced FLASH image shows a localized hypointense area within the left renal vein at the left hilum before injection.

After Gd-chelate administration, the signal of the left renal vein enhances, whereas bland thrombus signal remains constant.

The nature of thrombus (neoplastic or bland) was more accurately assessed (McNemar's test, p < 0.05) with FLASH-enhanced MR images (sensitivity 89%; specificity 96%) than with SE and precontrast FLASH images (sensitivity 79%; specificity 94%).

MR showed wall invasion with a sensitivity of 92.2% (95%-CI: 0.75–0.99) and a specificity of 86.4% (95%-CI: 0.65–0.97) (Fisher-test, p-value < 0.001). The positive predictive value (PPV) was 88.9% (95%-CI: 0.71–0.98) and the negative predictive value reached 90.5% (95%-CI: 0.70–0.99).
Balloon Catheter


Figure 5. Left: right ventricle pointed towards the ventricular septum in the right ventricle. Right: active deflatable catheter crossing ASD.

Figure 6. A: active deflatable catheter in hepatic vein. B: active guidewire directed into hepatic vein. C: active guidewire crossing left ventricular wall. D: active guidewire directed towards left side of heart. E: active guidewire directed into left ventricular wall.
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