Ultrasound in Diverticular Disease

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Evang. Krankenhaus Kalk, Köln
Is there a role of Ultrasound in diverticular disease?
Acute left lower quadrant pain

Criteria for an ideal imaging technique:

- broad availability
- low cost
- no side effects
- easy and fast carrying-out
- repeatable any time
Technique and wall structures

layers of the bowel wall

1 mucosa
2 musc. mucosae
3 submucosa
4 muscularis propria
5 serosa

thickened bowel wall in Crohn's colitis
Requirements for gastrointestinal US

- small-parts US probes (5-10 MHz)
- colour (power-) doppler
- experienced examiner
US in diverticular disease

longitudinal view
US in diverticulosis

Hollerweger et al., Ultraschall in Med 2002

<table>
<thead>
<tr>
<th>number of proofed diverticula</th>
<th>sonography</th>
<th>colonoscopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>14</td>
<td>1 (+4)</td>
</tr>
<tr>
<td>6-10</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>&gt;10</td>
<td>11</td>
<td>17 (+1)</td>
</tr>
<tr>
<td></td>
<td><strong>28</strong></td>
<td><strong>33</strong></td>
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</tbody>
</table>

5 false neg.  →  sensitivity 85%
Criteria for evaluation of diverticulitis

- thickening of the bowel wall – "target sign"
- hypertrophy of Lamina muscularis
- diverticulum – "dome sign"
- inflammatory pericolic fat – "pericolitis"
- pericolic abcess
US in diverticulitis
US in diverticulitis
## US in diverticulitis

<table>
<thead>
<tr>
<th>study</th>
<th>n</th>
<th>sensitivity</th>
<th>specificity</th>
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</thead>
<tbody>
<tr>
<td>Federmann 1989</td>
<td>23</td>
<td>96%</td>
<td>98%</td>
</tr>
<tr>
<td>Verbank et al. 1989</td>
<td>123</td>
<td>85%</td>
<td>80%</td>
</tr>
<tr>
<td>Wilson &amp; Toi 1990</td>
<td>54</td>
<td>85%</td>
<td>-</td>
</tr>
<tr>
<td>Wada et al. 1990</td>
<td>18*</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Schwerk et al. 1992</td>
<td>52</td>
<td>98%</td>
<td>98%</td>
</tr>
<tr>
<td>Schwerk et al. 1993</td>
<td>74</td>
<td>99%</td>
<td>97%</td>
</tr>
<tr>
<td>Zielke et al. 1997</td>
<td>74</td>
<td>84%</td>
<td>93%</td>
</tr>
<tr>
<td>Estaban Hernandez et al. 1998</td>
<td>19</td>
<td>95%</td>
<td>100%</td>
</tr>
<tr>
<td>Pisanu et al. 2000</td>
<td>22</td>
<td>95%</td>
<td>91%</td>
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<tr>
<td>Hollerweger et al. 2001</td>
<td>102</td>
<td>77%</td>
<td>99%</td>
</tr>
<tr>
<td>Chou et al. 2001</td>
<td>23*</td>
<td>91%</td>
<td>100%</td>
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<tr>
<td>Alberti et al. 2002</td>
<td>51</td>
<td>91%</td>
<td>100%</td>
</tr>
<tr>
<td>Moll et al. 2002</td>
<td>247</td>
<td>76%</td>
<td>97%</td>
</tr>
<tr>
<td>Ripollés et al. 2003</td>
<td>203</td>
<td>94%</td>
<td>98%</td>
</tr>
<tr>
<td>Soliman et al. 2004</td>
<td>63</td>
<td>97%</td>
<td>97%</td>
</tr>
</tbody>
</table>

*right-sided diverticulitis

1148 91% 96%
US vs. CT in acute diverticulitis

Farag Soliman et al. 2004

- prospective study, n = 63
- US & CT exam. within 24 h after admission
- results:

<table>
<thead>
<tr>
<th>diagnosis</th>
<th>US</th>
<th>CT</th>
<th>follow up/histopathology</th>
</tr>
</thead>
<tbody>
<tr>
<td>diverticulitis (n=43)</td>
<td>43(0)</td>
<td>42(0)</td>
<td>43/28</td>
</tr>
<tr>
<td>carcinoma of sigmoid (n=3)</td>
<td>3(0)</td>
<td>2(0)</td>
<td>3/3</td>
</tr>
<tr>
<td>gynecologic tumor (n=2)</td>
<td>2(0)</td>
<td>3(1)</td>
<td>2/2</td>
</tr>
<tr>
<td>appendicitis (n=1)</td>
<td>0(0)</td>
<td>1(0)</td>
<td>1/1</td>
</tr>
<tr>
<td>gastroenteritis (n=3)</td>
<td>3(1)</td>
<td>3(0)</td>
<td>3/0</td>
</tr>
<tr>
<td>no pathology (n=11)</td>
<td>12(1)</td>
<td>12(1)</td>
<td>11/0</td>
</tr>
</tbody>
</table>

sensitivity & specificity for CT and US: 97%
limitations of US

- large and complex abcess
- distal sigmoid involvement
- overlap between colonic cancer
- and other inflammatory diseases
peridiverticular abscess
perforated carcinoma of the sigmoid
Crohn’s disease
acute colitis
Advantages of US in diverticular disease

- wide availability
- diagnostic method with sufficient sens.
- low cost
- no iodinated contrast material
- no side effects (radiation)
- examiner = attending physician
Clinical ultrasound

US  \(\rightarrow\)  MD

experience & skill

US  \(\rightarrow\)  Patient

clinical knowledge
(history, physical exam., Lab. values etc.)

Patient  \(\rightarrow\)  Diagnosis

?  \(\rightarrow\)  plausibility control

Diagnosis  \(\rightarrow\)  US

control
Conclusions

**US** as initial imaging technique in abdominal/pelvic pain and suspicion of diverticulitis is highly sensitive

**Reserve CT:**
- in patients with doubtful results in US or
- discrepancy between US and clinical evolution
- in large abcesses

**US** as a follow-up imaging technique
"You cannot depend on your eyes when imagination is out of focus"

Mark Twain