Preoperative CT quantification of liver surface nodularity helps anticipating postoperative morbidity in HCC patients requiring liver resection

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Background and aims
LIVER resection represents the most relevant curative treatment of early to intermediate stage HCC but remains associated with significant postoperative morbidity due to the frequent existence of underlying parenchymal alterations with various degrees of fibrosis. In this setting, anticipating postoperative morbidity has been a major axis of research and various preoperative clinical, biological and morphological indicators are currently used to capture the risk of liver resection preoperatively. While hepatic vein pressure gradient measurement remains the gold standard for the detection of clinically significant portal hypertension (CSPH), it remains limited by its invasiveness and indirect evaluation of portal hypertension has gained wide acceptance. Liver surface nodularity quantification (LSN) on CT scan is a new non-invasive tool which has recently demonstrated high diagnostic performance for detecting CSPH in cirrhotic patients and has outperformed multiple other non-invasive tests in this setting. Yet, its significance in a peri-operative setting remains to be assessed. The present study therefore aimed at determining the value of LSN in a series of resected HCC patients with and without severe fibrosis in order to assess its significance in the anticipation of postoperative morbidity.

Methods
Retrospective analysis of 239 patients undergoing liver resection for HCC at Beaujon hospital from 2012 to 2017

Feasibility of LSN quantification
• Success rate
• Duration of LSN measurement

Association of LSN and major postoperative complications
• ROC curve analysis
• Multivariate analysis

Results

Characteristics of the underlying liver
F1-F2: 32%
F3-F4: 54%
NAFLD: 35%

Feasibility of LSN
Available imaging for LSN quantification: 207/239 patients
Success rate: 90%
Reasons for failure:
Large lesion (n= 3); No liver-fat interface (n=9); other (n=8)
Duration of LSN: 89 +/-31 seconds

A LSN cut-off value of 2.625 was significantly associated with increased risk of major postoperative complications (AUC: 0.692; p<0.001) in the whole population, in patients with (AUC: 0.654, p=0.014 ) and without (AUC: 0.698, p=0.012 ) severe fibrosis.

Multivariate analysis of the risk factors for major post-operative complications

<table>
<thead>
<tr>
<th>Variables</th>
<th>Univariate p</th>
<th>Multivariate p</th>
<th>HR</th>
<th>IC 95 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSN Score ≥2.625</td>
<td>0.001</td>
<td>0.004</td>
<td>5.23</td>
<td>1.69-16.17</td>
</tr>
<tr>
<td>Blood loss ≥500 (ml)</td>
<td>0.012</td>
<td>0.046</td>
<td>2.96</td>
<td>1.02-8.58</td>
</tr>
<tr>
<td>ASA Score ≥3</td>
<td>0.018</td>
<td>0.001</td>
<td>7.13</td>
<td>2.25-22.62</td>
</tr>
</tbody>
</table>

Conclusions
LSN measurement is easily feasible in the vast majority of patients and represents a valuable tool in the anticipation of major postoperative complications following hepatectomy for HCC patients in patients with and without severe fibrosis.