Validation of LIVERSTAT as a non-invasive test for risk stratification for patients with metabolic-dysfunction associated fatty liver disease (MAFLD): a single-centre study using liver biopsy as reference standard

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INTRODUCTION

- **LIVERSTAT** is an AI-based non-invasive test, devised to screen for and risk-stratify non-alcoholic fatty liver disease (NAFLD).
- It uses simple blood biomarkers and anthropometric measurements.
- The study aimed to validate LIVERSTAT in patients with metabolic dysfunction associated fatty liver disease (MAFLD) and to explore its role in combination with other non-invasive tests for the diagnosis of advanced fibrosis.

METHOD

- This is a retrospective study of data of MAFLD patients who underwent liver biopsy and patients with diabetes who had controlled attenuation parameter <248 dB/m and liver stiffness measurement (LSM) <5 kPa on transient elastography examination.
- The LIVERSTAT results were generated while being blinded to the histological and liver stiffness measurement results.
- LIVERSTAT has 4 diagnostic categories:
  - N0: no presumed fibrosis, no presumed steatosis
  - N1: no presumed fibrosis, presumed steatosis
  - N2: presumed mild/moderate fibrosis, any steatosis
  - N3: presumed severe fibrosis, any steatosis

RESULT

- The data for 350 patients were analyzed (median age 55 years, 45% male, advanced fibrosis 22%).

Table 1. Histological diagnosis and LIVERSTAT categories

<table>
<thead>
<tr>
<th>Histological diagnosis</th>
<th>LIVERSTAT Categories</th>
<th>N0</th>
<th>N1</th>
<th>N2</th>
<th>N3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No steatosis and fibrosis</td>
<td></td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>Steatosis only, no fibrosis</td>
<td></td>
<td>5</td>
<td>8</td>
<td>51</td>
<td>45</td>
<td>109</td>
</tr>
<tr>
<td>Mild or moderate fibrosis, any steatosis</td>
<td></td>
<td>0</td>
<td>6</td>
<td>64</td>
<td>86</td>
<td>156</td>
</tr>
<tr>
<td>Advanced fibrosis, any steatosis</td>
<td></td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>61</td>
<td>68</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>7</td>
<td>14</td>
<td>128</td>
<td>201</td>
<td>350</td>
</tr>
</tbody>
</table>

* Numbers in red indicates correct diagnosis by LIVERSTAT

<table>
<thead>
<tr>
<th>Misclassification, %</th>
<th>LIVERSTATa</th>
<th>FIB4b (no indeterminate group)</th>
<th>FIB4c</th>
<th>Combination of LIVERSTAT and LSMd</th>
<th>Combination of FIB4 and LSMe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indeterminate results, %</td>
<td>42</td>
<td>22</td>
<td>14</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Sensitivity, %</td>
<td>0</td>
<td>0</td>
<td>22</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Specificity, %</td>
<td>90</td>
<td>56</td>
<td>9</td>
<td>60</td>
<td>38</td>
</tr>
<tr>
<td>Positive predictive value, %</td>
<td>30</td>
<td>44</td>
<td>30</td>
<td>76</td>
<td>83</td>
</tr>
<tr>
<td>Negative predictive value, %</td>
<td>95</td>
<td>89</td>
<td>89</td>
<td>94</td>
<td>89</td>
</tr>
</tbody>
</table>

*For “LIVERSTAT” analysis, category N0 were considered as diagnosis of advanced liver fibrosis.
*For “FIB4 alone without indeterminate group” analysis, N0, N1 and ≥2.0 were considered as diagnosis of advanced liver fibrosis for patients <65 years old and for patients ≥65 years old, respectively.
*For “FIB4 alone analysis, 1.5 – 2.0 and 2.0 – 3.0” were considered as indeterminate for patients <65 years old and for patients ≥65 years old, respectively. N0, N1 and ≥3.0 were considered diagnosis of advanced liver fibrosis.
*For “Combination of LIVERSTAT and LSM” analysis, patients with LIVERSTAT “Advanced fibrosis, any steatosis” result underwent LSM.
*For “Combination of FIB4 and LSM” analysis, patients with indeterminate FIB4 result underwent LSR. Patients with LSM ≥30 kPa were considered unlikely to have advanced fibrosis, ≤10 kPa to ≤15 kPa may have advanced fibrosis, and ≥15 kPa likely to have advanced fibrosis.

DISCUSSION

- **LIVERSTAT** had a higher negative predictive value for advanced fibrosis compared with FIB4.
- **LIVERSTAT** had a lower misclassification rate when used as a two-step approach in combination with LSM to diagnose advanced fibrosis compared to FIB4 in combination with LSM.
- Two other studies observed that LIVERSTAT performed as good as FIB4 to diagnose advanced fibrosis, 1, 2
- One study suggested that LIVERSTAT was superior to FIB4 in males aged 65 years old and above to diagnose advanced fibrosis. 2
- Hence, LIVERSTAT can potentially be used as an alternative marker to diagnose advanced fibrosis in MAFLD.

REFERENCE

- Naim Alkhouri AK, Phillip Leff, Rida Nadeem, Mona Munteanu. LIVERFAS GP+ (GP+) a non-invasive blood testing for NAFLD staging improves risk stratification of patients with indeterminate FIB-4 results

CONTACT

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