Comparison of different models in predicting clinically significant portal hypertension including ELF-score and vWF-Ag

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Background
Clinically significant portal hypertension (CSPH), defined by hepato venous pressure gradient (HVPG) ≥ 10 mmHg causes major complications in patients with liver disease. To improve outcome, early diagnosis and adequate treatment is crucial. VWF-Ag has shown significant ability to diagnose CSPH and is a predictor for mortality. The ELF-Score consists of a panel of three direct markers of fibrosis including hyaluronic acid (HA), tissue inhibitor of metalloproteinase 1 (TIMP-1) and procollagen (PIIINP). ELF-Score detects liver cirrhosis in most of the cases adequately. The gold standard of diagnosing clinically significant portal hypertension by HVPG is not comprehensively available; therefore non invasive tools might help to diagnose CSPH timely and might open diagnosis and subsequent treatment to a larger scale of patients. Therefore we analysed the data of 225 patients to calculate a model to improve prediction of CSPH in cirrhotic patients non invasively.

Methods
225 patients underwent HVPG measurement to prove or rule out CSPH mostly in cirrhotic patients. Categorisation either into CSPH (HVPG≥10mmHg) or no CSPH (HVPG<10mmHg) was done. VWF-Ag and routine laboratory parameters were measured in all patients, ELF-Score was analysed in 119. Additionally we used VITRO-Score (VWF-Ag/platelets). All blood samples were obtained during HVPG measurement. Portal vein thrombosis was ruled out in all patients before HVPG measurement using doppler sonography. None of the patients showed evidence of thrombotic events. All statistical analysis were done with SPSS 19.0. Besides descriptive statistics we compared the diagnostic ability of different parameters and a logistic regression model and ROC analysis were performed.

Results
Etiology of liver cirrhosis:
ALD 39%
NASH 12.0%,
Hepatitis C 28.4% and others 20.4% figure 1.
The median age of the patient-population is 57.4 years. 166 patients are male (73.8%), 59 (26.2%) are female.
CPS A: 59.6%, CPS B: 29.6%, CPS C: 7.6%, unknown: 9.3%.
Etiology of liver cirrhosis:
ALD 39%
NASH 12%
Figure 1

In our logistic regression model VITRO-Score, albumin, bilirubin, INR and ELF-Score show significant correlation with portal hypertension. Therefore we calculated different models for the prediction of PH. ROC-analysis for CSPH was performed and results are shown in Table 1:

<table>
<thead>
<tr>
<th>combination</th>
<th>AUROC</th>
<th>95% CI</th>
<th>cut off</th>
<th>sensitivity %</th>
<th>specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>VITRO-Score</td>
<td>0.87</td>
<td>0.80 - 0.92</td>
<td>11.6</td>
<td>80</td>
<td>70</td>
</tr>
<tr>
<td>ELF-Score</td>
<td>0.68</td>
<td>0.55 - 0.81</td>
<td>11.6</td>
<td>80</td>
<td>70</td>
</tr>
<tr>
<td>VABI</td>
<td>0.91</td>
<td>0.86 - 0.96</td>
<td>11.6</td>
<td>80</td>
<td>85</td>
</tr>
<tr>
<td>VEABI</td>
<td>0.82</td>
<td>0.75 - 0.99</td>
<td>10.87</td>
<td>85</td>
<td>92</td>
</tr>
</tbody>
</table>

Table 1: AUROCs of different parameters for CSPH including 95% CI, sensitivity, specificity and their cut offs;

ROC – curves for the different prediction models are shown in figure 3 (a, b, c, d).

Conclusion
VITRO-Score and even better a combination of VITRO-Score, albumin, bilirubin and INR can detect CSPH in most cases. In the present cohort ELF Score does not improve the diagnostic ability significantly, although the combination of VITRO-Score, ELF-Score, albumin, bilirubin and INR shows the best AUC. In conclusion relatively simple routine parameters show adequate performance in predicting CSPH and especially VITRO – Score additionally might provide information on patients’ survival.