CONTEXT : UPDATED ELASTOGRAPHY GUIDELINES:

The World Federation of Ultrasound in Medicine and Biology (WFUMB) guidelines were updated this year. These guidelines aim at presenting the different liver dedicated elastography techniques available for the clinicians, with its respective advantages and inconveniences according to the existing literature. Authors are all clinicians experts in the use or comparisons of these techniques in their daily routine.

Different elastography techniques are listed in the document:

- Vibration Controlled Transient Elastography (FibroScan)
- Point Shear wave speed quantification (Siemens ARFI system, Philips ElastPoint Quantification system)
- Point Shear Wave Imaging (SuperSonic Imagine [SSI] Aixplorer system)
- Strain Elastography techniques (Toshiba, Hitachi systems…)

A. FibroScan VCTE (Echosens)

Advantage/limitations:

<table>
<thead>
<tr>
<th>ADVANTAGES*</th>
<th>LIMITATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• User friendly, rapid (around 5 minutes), short learning curve, immediate results.</td>
<td>• Failure on overweight patients, and on patients with intercostal spaces or ascites</td>
</tr>
<tr>
<td>• Can be performed at bedside of patient</td>
<td>• Confounding factors influencing stiffness results (inflammation, cholestasis, right sided cardiac insufficiency)</td>
</tr>
<tr>
<td>• Can be performed by nurse after training (100 exams are required → 30 shall be sufficient according to our experience)</td>
<td>• Influence of food intake leading to fasting recommendations</td>
</tr>
<tr>
<td>• Excellent exam reproducibility, especially for advanced stage of fibrosis</td>
<td></td>
</tr>
<tr>
<td>• Most clinically validated technique</td>
<td></td>
</tr>
<tr>
<td>• User friendly, rapid (around 5 minutes), short learning curve, immediate results.</td>
<td></td>
</tr>
<tr>
<td>• Can be performed at bedside of patient</td>
<td></td>
</tr>
<tr>
<td>• Can be performed by nurse after training</td>
<td></td>
</tr>
</tbody>
</table>

* The CAP is not listed as an advantage since these recommendations focus on quantitative assessment of liver fibrosis only

Main recommendations:
- Limited applicability in obese patients, although the use of the XL probe reduces failure rate
  - It shall be pointed out that most of the FibroScan centers are not equipped with the XL probe yet.
- No use on patients with ascites
Influence of co factors must be taken into account (to be interpreted cautiously if level of transaminases >5ULN) → this applies to all liver elastography techniques.

- Mostly validated in chronic viral hepatitis. Strategy remains to be validated for other diseases.

- **Combining VCTE with serum biomarkers of fibrosis increases the diagnostic accuracy for significant fibrosis in patients with chronic hepatitis C**, a strategy that needs to be validated for other liver diseases, such as hepatitis B or NAFLD.

  ➔ *Useful to stress the importance of the use of FibroScan in combination with FibroMeter*

- **VCTE offers better performance for detecting cirrhosis than significant fibrosis and is currently the standard among non-invasive methods.**

- Current evidence suggests that VCTE could be used for monitoring the response to antiviral treatment and for predicting the prognosis of patients with chronic liver disease.

Authors also point out that “**Most studies use single elasticity cut-offs for patients with advanced fibrosis and cirrhosis, but more information can be obtained when values are interpreted as a continuum**”

  ➔ *This is interesting to see that the liver stiffness starts to be now considered as a surrogate marker of liver damage by itself, and that the systematic correlation with liver biopsy fibrosis stage in not mentioned anymore.*

**B. Point Shear Wave Elastography /Point Shear Wave Imaging (Siemens ARFI, Philips Elasto Point Quantification...)**

Advantage/limitations:

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
<th>LIMITATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• High reproducibility</td>
<td>• Body habitus (obesity, intercostal spaces) may hamper the results</td>
</tr>
<tr>
<td>• Measurement on patients with ascites</td>
<td>• Because of frequency dependency of elasticity properties of tissues, results in kPa are not comparable between SSI, FibroScan VCTE and Philips technologies.</td>
</tr>
<tr>
<td>• Possibility to perform B mode conventional ultrasonography</td>
<td>• Same cofactors could influence the results as it is for FibroScan VCTE: liver inflammation, congestive heart failure, feeding will be associated with a stiffer liver.</td>
</tr>
<tr>
<td></td>
<td>• Most studies performed in chronic hepatitis C patients, further assessment required to better interpret results in other clinical indications.</td>
</tr>
</tbody>
</table>

**Official recommendations:**

“**PSWSM (Siemens, Philips) and SWSI (SSI) can be used to assess the severity of liver fibrosis in patients with chronic viral hepatitis, best evidenced in patients with hepatitis C. Nonetheless, the evidence that is available is still limited**, particularly of SWSI (SSI)”.

C. Strain Elastography (SE, qualitative evaluation by Toshiba, Hitachi)

Limitations
- Several methods of SE available, but absence of comparative studies to define the most relevant one
- Difficulty to get pictures on overweight patients
- Weak cardiac pulsations can adversely affect the quality of images
- Influence and skills of operator may influence the result
  → Complicated technique requiring skills in ultrasonography and full training.
- Standardization of protocol still needs to be established
- Only one current semi quantitative analytic method: Liver Fibrosis Index (LFI) by Hitachi
  → this latter method is still under clinical validation

Recommendations
- Objective assessment can only be made on Hitachi system using the Liver Fibrosis Index (LFI) semi quantitative evaluation
- Still under clinical validation (multicenter study)

CONCLUSION AND KEY MESSAGES

- Liver elastography is useful for the evaluation of chronic liver diseases. **Level of evidence is high for FibroScan VCTE**, moderate for Point Shear Wave Speed Measurement (**ARFI by Siemens**) and low for Shear Wave Speed Imaging (**SSI, Philips**) and Strain Elastography (**Toshiba, Hitachi**)
- Values vary between manufacturers