Considering Palmer & Werner classification [1, 2], TFCC lesions are divided in two categories depending on the origin of the lesion (class 1 for traumatic and class 2 for degenerative), on the location of the tear and the level of eventually associated chondropathic lesions.

Class 1 was divided in 4 types and we continue to use it. But two of them have benefited of an update: the 1B and 1D lesions.

Class 1B was considered as dorso-ulnar avulsion of TFCC and characterized arthroscopically by a positive “trampoline test” assessing the tautness of the horizontal portion of triangular disk. The test is considered as positive when the TFCC is soft and compliant and suggests a peripheral TFCC tear (fig.1).

![Fig 1: classical 1B peripheral lesion characterized by a positive trampoline test](image-url)
Recent histology and functional anatomy research [3] demonstrates that the ulnar side of the TFCC is arranged in a more complex 3-dimensional manner and can be separated into 3 components: the proximal triangular ligament, the distal hammock structure, and the ulnar collateral ligament (UCL) (fig. 2).

**Fig. 2:** Coronal slice of the ulnar aspect of the wrist. The TFCC is outlined and composed of a “distal component” (D), formed by the Ulno Carpal Ligament (UCL) and the distal hammock structure, and of the “proximal component” (P) that originates from the ulnar fovea and the basis of styloid (Nakamura).

Depending on the intensity and direction of the applied traumatic forces, either the distal-TFCC or proximal-TFCC or both may be torn. Clinical DRUJ stability is still preserved in cases of isolated distal-TFCC laceration. Conversely, when a type 1-B TFCC tear involves the proximal-TFCC foveal attachment, DRUJ becomes unstable and results in ulnar-sided pain, reduced grip strength and decreased forearm rotation.

MRI (fig.3) and arthro-CTscan (fig. 4) can contribute in the accurate diagnosis of ulnar side pain but complete assessment of TFCC needs a dynamic exploration with a radiocarpal and DRUJ arthroscopy.
Andrea ATZEI & al. [4] have described the radiocarpal “hook test”: the probe is inserted through the 6-R portal, and traction is applied to the ulnar-most border of the TFCC. The test is positive when the TFCC can be pulled upward and radially, when the distal and proximal-TFCC are detached from the fovea (fig. 5).
Fig. 5: The Hook test positive in associated Distal and Proximal TFCC lesion (Atzei)

We have recently described a mixed radiocarpal and DRUJ arthroscopy ulnar side lesion assessment that we have called « the ghost sign »: the probe is inserted proximally through a DRUJ portal and the scope is in 3-4 radiocarpalportal. The test is positive when we can pull distally and ulnarly the foveal attachment of TFCC (as a cloth on a ghost...) characteristic of an isolated roximal lesion of TFCC (fig. 6).

Fig. 6: the « ghost sign » characteristic of an isolated proximal TFCC foveal avulsion (Fontès)
Regarding clinical, radiological and arthroscopic assessment of traumatic TFCC lesion, we can propose an UPDATE of classical Palmer CLASSIFICATION.

**TFCC Class 1 Traumatic Updated Classification**

1. **Class 1: Central lesion of TFCC** (fig. 7)
   - Clinical: ulnar side wrist pain, clicking, no DRUJ instability
   - XRay: arthroCT scan ++, MRI +/-
   - Arthroscopy ++ (trampoline + on the flap, hook - , ghost -): tear > 2mm from radius rim

![Fig. 7: Class 1A lesion with a central flap of fibrocartilage located at more than 2mm from radius margin](image)

2. **Ex Class 1B: Ulnar avulsion of TFCC**
   - Clinical: ulnar side wrist pain, clicking +/- , DRUJ instability +/-
   - XRay: arthroCT scan +/-, MRI +/-
   - Arthroscopy ++ (trampoline +, hook +/-, ghost +/- depending on location) determines 5 sub classes regarding Atzei classification (table 1)
3. Class 1C: Extrinsic peripheral lesion of TFCC (fig.8)

- Clinical: ulnar side wrist pain, clicking -, DRUJ instability -
- XRay: arthroCT scan -, MRI +/-
- Arthroscopy ++ (trampoline -, hook -, ghost -)
4. Class 1D: Radial attachment lesion of TFCC (fig.9)

- Clinical: ulnar side wrist pain, clicking +/-, DRUJ instability +/-
- XRay: arthroCT scan +, MRI +/-
- Arthroscopy ++ (trampoline +, hook, ghost -)
- Precise extend +/- to DRUJ anterior or post ligaments +/- notch fracture [5] defining four possible sub types regarding Nakamura classification [6]

![Fig. 9: Class 1D lesion of central portion of fibrocartilage](image)

After the first descriptions of Whipple [7] and Palmer [1, 2], TFCC lesions classification was limited in the 4 original types and allowed satisfactory treatment of thousands of patients, but few of them didn’t experience significant improvement [5, 8].

A best knowledge and practice of wrist arthroscopy has largely contributed in a better understanding of TFCC physiopathology.

New update of this classification (table 2) will largely contribute undoubtedly to a more accurate management of TFCC lesions, especially with the new reliable arthroscopic procedures.
Table 2: MODIFIED PALMER CLASSIFICATION of TFCC traumatic lesions

<table>
<thead>
<tr>
<th>Class</th>
<th>Sub Class</th>
<th>Location</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1A</td>
<td></td>
<td><img src="image1.png" alt="Image" /></td>
<td>Central lesion of fibrocartilage</td>
</tr>
<tr>
<td>Class 1B</td>
<td>class 1B1</td>
<td><img src="image2.png" alt="Image" /></td>
<td>Distal TFCC involved</td>
</tr>
<tr>
<td></td>
<td>class 1B2</td>
<td><img src="image3.png" alt="Image" /></td>
<td>Distal and Proximal TFCC involved</td>
</tr>
<tr>
<td></td>
<td>class 1B3</td>
<td><img src="image4.png" alt="Image" /></td>
<td>Proximal TFCC involved</td>
</tr>
<tr>
<td></td>
<td>class 1B4</td>
<td><img src="image5.png" alt="Image" /></td>
<td>Complex no repairable lesion</td>
</tr>
<tr>
<td></td>
<td>class 1B5</td>
<td><img src="image6.png" alt="Image" /></td>
<td>Complex lesion + arthritis</td>
</tr>
<tr>
<td>Class 1C</td>
<td>Distal extrinsic lesion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>------------------------</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Class 1D  
 class 1D1 | Central radial rim lesion |
| class 1D2 | Osteo-avulsion of DRUJ ligts |
| class 1D3 | Dorso-radial DRUJ ligt avulsion |
| class 1D4 | Complete ligamentous avulsion |
REFERENCES


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