Radiographic Assessment of TFCC Foveal Tear Using Arthrographic Computed Tomography in Distal Radius Fractures

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Objective:
Triangular fibrocartilage complex (TFCC) is important as a stabilizer for the distal radioulnar joint. TFCC injury with the distal radius fracture is reported as 39-84%, especially at the fovea, is a serious complication leading to chronic pain of wrist joint. Prevalence were reported based on the evaluation using arthroscope and MRI, although these are impractical to be routinely performed. TFCC evaluation using arthrographic computed tomography (CT) was reported by Quinn et al. In 1988. Helical CT can perform thin slice photography and multi-directional analysis of TFCC, and it has accuracy comparable to MRI (1-3).

The purpose of this study is to find the predictor in X-ray of TFCC foveal tear in analysis of the relationship between X-ray parameters of distal radius fracture and foveal tear of TFCC on arthrographic CT.

Methods:
Thirty-six wrists of 35 patients (8 men and 28 women, mean age, 69 years) were surgically treated with volar locking plates for distal radius fracture. Immediately after the surgery, 5ml non-ionic contrast material was injected within the distal radioulnar joint under the fluoroscopy. Within 10 minutes after the injection, the CT was taken using a helical CT unit (Aquilion 64, Toshiba, Tochigi, Japan). We determined the foveal tear of TFCC on the slice of coronal and radial view centered on the ulnar styloid process. Radiological parameters were measured on X-rays after the surgery, including radial inclination (RI), volar tilt (VT), radial translation (RT), and radial translocation of the ulnar styloid (UT) (Fig. 1). The radiological parameters and categorical variables were statistically assessed between the patients with (group T) and without foveal tear on CT arthrography (group N) using Mann-Whitney U test or chi-square test. Multiple logistic regression analysis was also performed to assess the independent risk factor (Fig. 2). Values of p < 0.05 were considered statistically significant.

Results:
Out of 36 wrists, 21 wrists (61%) were diagnosed as foveal tear of TFCC on CT arthrography, of which 10 did not have ulnar styloid fracture.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male: 8 Female: 27</th>
<th>Age</th>
<th>60.0(39.89)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause of injury</td>
<td>Falling down: 23</td>
<td>Falling(1.5-3cm): 6</td>
<td>Traffic accident: 6</td>
</tr>
<tr>
<td>AO classification</td>
<td>AO classification: 5</td>
<td>AO classification: 6</td>
<td>AO classification: 4</td>
</tr>
</tbody>
</table>

Ulmer et al. (5) have reported the predictive value of the fracture involving the ulnar styloid process. We detected the foveal tear of TFCC in 61% patients of this series. In group T, the degree of RT and UT was significantly greater than the value (17.7°, 6.2°, 1.7 mm, and 0.2 mm, respectively) in group N (Fig. 3). Multiple logistic regression analysis revealed that translocation of fractured ulnar styloid was an independent risk factor of TFCC foveal tear.

Conclusion:
CT arthrography immediately after the surgery could be easily performed without additional pain due to the injection, because of the anesthesia for the plate fixation. As a result, the clear images made us diagnose foveal tear of TFCC in 61% patients of this series. In addition, the radial translocation of ulnar styloid fracture was shown to be an independent risk factor of the foveal tear. Distal radius fracture accompanied with greater ulnar styloid dislocation should be carefully treated, including cast and surgical treatment for foveal tear of TFCC.

References:

COI Disclosure Information: Takahiro Asano I have no financial relationship to disclose