CORRECTION OF RESIDUAL HUMPBACK DEFORMITY AFTER ARTHROSCOPIC TREATMENT OF SCAPHOÏD NONUNION

A DE BIE, P LOUIS, JM COGNET
SOS Mains Champagne Ardenne Clinique Courlancy
Introduction

- Risk of scaphoïd nonunion ≈ 5%-15%

- Non union -> radiocarpal and midcarpal ostéoarthrosis Scaphoïd (Non Union Advanced Collapse)

- Several surgical technique

- More recently -> arthroscopic technique with high union rate.

- What about correction of humpback deformity?
The aim of this study was to assess residual humpback deformity after arthroscopic treatment of scaphoid nonunion.

Hypothesized -> Arthroscopic treatment of scaphoid nonunion can successfully correct the humpback deformity.
Materials and methods

- Single-centre, observational, retrospective study
- December 2012 and December 2018.
- Only two surgeons.
- Inclusion criteria
- Exclusion criteria
Materials et Methods

Surgical treatment:
- Placing a cancellous bone graft harvested from the distal radius using arthroscopy.
- No additional reduction manoeuvres (Linscheid) were performed.

Follow-up:
- 3 weeks, 3 months, 6 months, 1 year, then as needed.
- Evaluation of pain level (VAS), strength (Jamar dynamometer), wrist range of motion in flexion and extension, Quick DASH and PRWE scores.
Materials and methods

Radiological assessment:
- Standard radiographs and CT scan before the surgical treatment.
- Radiographs each visits
- CT scan at 3 months (bone union?)
- Humpback deformity was determined by measuring the radiolunat angle, scapholunate angle and Youm index
Materials and methods
Resultats

■ 47 patients included (4 women / 43 men)

■ Age 26.3 years (SD 9.9 range 16-63)

■ Time between fracture and treatment was 15.4 months (SD 13.3 ; range 6-60)

■ Follow-up 17.8 months (SD 17.5; Range 6-81)

■ Schernberg classification : 8.3% type I; 41% type II; 42% type III, 2.1% type IV

■ 11 patients had preoperative dorsal intercalated scaphlunate instability (DISI)
Table 1: Radiological outcomes with comparison of preoperative and final follow-up data

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>Final follow-up</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scapholunate angle (°)</td>
<td>62 SD 9 (40; 74)</td>
<td>54 SD 8 (36; 80)</td>
<td>0.005</td>
</tr>
<tr>
<td>Radiolunate angle (°)</td>
<td>13 SD 8 (3; 37)</td>
<td>11 SD 7 (2; 45)</td>
<td>0.067</td>
</tr>
<tr>
<td>Youm ratio</td>
<td>0.50 SD 0.02</td>
<td>0.50 SD 0.03</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Mean values with standard deviation given (min; max)
Table 2: Clinical outcomes

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>Final follow-up</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain during exertion (VAS)</td>
<td>5.1 SD 2.18 (0; 8)</td>
<td>2.76 SD 2 (0; 7)</td>
<td>1.3'</td>
</tr>
<tr>
<td>Strength (kg, Jamar)</td>
<td>30 SD 10 (5; 50)</td>
<td>42 SD 8 (20; 60)</td>
<td>0.001</td>
</tr>
<tr>
<td>Strength contralateral hand</td>
<td>40 SD 11 (20; 66)</td>
<td>46 SD 8 (22; 62)</td>
<td>0.088</td>
</tr>
<tr>
<td>Flexion (degrees)</td>
<td>57 SD 15 (15; 90)</td>
<td>64 SD 14 (20; 90)</td>
<td>0.34</td>
</tr>
<tr>
<td>Extension (degrees)</td>
<td>58 SD 13 (20; 90)</td>
<td>69 SD 11 (30; 90)</td>
<td>0.0049</td>
</tr>
<tr>
<td>QuickDASH</td>
<td>33 SD 14 (4.5; 61)</td>
<td>11 SD 13 (0; 56.8)</td>
<td>0.008</td>
</tr>
<tr>
<td>PRWE</td>
<td>42 SD 13 (0; 66)</td>
<td>13 SD 10 (0; 41)</td>
<td>0.0079</td>
</tr>
</tbody>
</table>

Mean values with standard deviation given (min; max)
Discussion: Should scaphoid height be restored?

- **Pros:**
  - Condamine (Condamine, Lebourg et al. 1986) - Correlation between the radiolunate angle larger than 21° and failed healing
  - Amadio (Amadio, Berquist et al. 1989) - Lateral intrascaphoid angle greater than 45° - worse clinical outcomes/ higher risk of developing osteoarthritis

- **Cons:**
  - Lenoir et al. (Lenoir, Lazerges et al. 2011) - Neutral correction or hypercorrection - worse function / Less correction - better function
  - Schreuder et al (Schreuder, Degree et al. 2008) - no correlation between DISI deformity and osteoarthritis
Can arthroscopic treatment partially or fully restore carpal height without additional procedures?

- Scapholunate angle at the last follow-up are 55° SD 13°
- Radiolunate angle did not change significantly (p = 0.067).
- Youm ratio did not change after the surgery (p = 0.24).

- Of the 11 patients with a preoperative DISI, only 4 patients had a residual malunion
- Deformity was partly corrected in the three other patients.

Same results in the literature (Delagado et Al. 2017, Wong et Ho 2019, Kim et Al. 2015)
Implication of graft type

- Sayeg et al. (Sayegh and Strauch 2014) -> Cancellous bone grafts improved flexion more / lower Mayo Wrist Score than corticocancellous grafts. Corticocancellous grafts improved the wrist’s geometry although cancellous grafts improved the intrascaphoid angle.

- Cohen et al. (Cohen, Jupiter et al. 2013) -> when the distal and proximal pôles were large enough to accept a screw, cancellous bone graft was sufficient.

- Park et al. (Park, Yoon et al. 2013) -> carpal alignment on RX after using K-wire fixation and a cancellous graft harvest from the iliac crest

- Jarett et al (Jarret, Kinzel et al. 2007) -> radius graft > crest graft
Study limitations

- Non randomized, observation, retrospective study

- Lateral intrascaphoid angle and the height/width ratio could not be measured
Conclusion

Our study showed that arthroscopic treatment of scaphoid nonunion with cancellous graft from the distal radius corrects the humpback deformity in patients with preoperative DISI, without the need for additional manoeuvres in most cases.