Osteochondral defects reconstruction of the talus with AMIC technique (Matrix-induced autologous Chondrogenesis): our experience at 3 years follow-up

Clinica Ortopedica e Traumatologica

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Policlinico San Matteo, Pavia

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Osteochondral defects of the talus...
SURGICAL TREATMENT

1. THE DEPTH of the lesion

AMIC (autologous matrix-induced chondrocytogenesis)
ACI (autologous chondrocyte implantation)
MACI (autologous chondrocyte implantation) (Microfracturing)

Osteochondral Allograft
Bone plasty + AMIC / OATS (osteochondral autologous transplantation)

Mosaicplasty, Fixation
Debridement, Microdrilling, Microfracturing

Retrograde Drilling
Spongiosa-Plasty

2. EXTENSION of the lesion

Recommendations for primary symptomatic OCLT

<table>
<thead>
<tr>
<th>Depth</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1.5 cm²</td>
<td>- Debridement - Bone marrow stimulation</td>
</tr>
<tr>
<td></td>
<td>(Drilling/ Microfracturing)</td>
</tr>
<tr>
<td>1.5 &lt; 3 cm²</td>
<td>- ACI / MACI</td>
</tr>
<tr>
<td>&gt; 3 cm²</td>
<td>- OATS - AMIC</td>
</tr>
<tr>
<td></td>
<td>- Bulk allograft</td>
</tr>
</tbody>
</table>

3. AGE of the patients

< 50 ys: chondral plasty (AMIC, ACI, MACI)

> 50 ys: Retrogr. drilling, Microfracturing, Total Ankle Arthroplasty, Arthrodesis
**SURGICAL TECHNIQUE WITH AMIC**

**INDICATION**
- CHONDRAL & OSTEOCHONDRAL LESIONS
- LESION >1.0 CM²
- FOCAL DEFECTS, III e V by MINTZ
- INTACT SURROUNDING CARTILAGE
- PATIENTS AGED FROM 18 < TO < 55
- CORRECTION OF ASSOCIATED PATHOLOGIES AXIAL MALALIGNMENT AND LIGAMENT INSTABILITIES

**EXCLUSION CRITERIA**
- KISSING LESIONS / OSTEOARTHRITIS
- METABOLIC ARTHROPATHIES
- OBESITY (BMI>30)
- PATIENTS OLDER > 55YS
- NON-CORRECTABLE AXIAL MALALIGNMENTS
- CHRONIC INFLAMMATORY SYSTEMIC DISORDERS
Our experience
(January 2010 - September 2016)

1. CLINIC

2. HISTORY

3. IMAGING

Patients 15 (3F; 12M)

Age 30.2 anni (17 - 49)

Side 8 left, 7 right

Follow-up 38.3 months (36 - 71)

Type of lesion III and IV Outerbridge

Dimension 1.0 cm² - 3.2 cm²

Symptoms 8 months (3 – 16)

Athletes 20%

Semiprofessional 40%

Amatorial 27%

Sedentary 13%

Previous fractures 22%

Sprained ankle 42%

Silent history 18%

Biomechanical modification 20%

Necrosis 7%

Medial 15%

Lateral 14%

Pain

Instability

Rid ROM

Affatic

Popping
Our experience
(January 2010 - September 2016)

Diagnostic arthroscopy in 13 cases

2 cases of displacement of the fragment (antero-lateral)

9 cases of medial malleolus osteotomy

3 casi di ricostruzione comparto esterno (PAA) e 2 del comparto mediale
A. Clinical evaluation

<table>
<thead>
<tr>
<th>TEST</th>
<th>T=0</th>
<th>T=6</th>
<th>T=12</th>
<th>T=24, 36</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOFAS</td>
<td>52.54±23</td>
<td>89.76±8</td>
<td>91.03±6</td>
<td>93.13±5</td>
</tr>
<tr>
<td>VAS</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Level 10  Competitive sports- soccer, football, rugby (national elite)
Level 9   Competitive sports- soccer, football, rugby (lower divisions), ice hockey, wrestling, gymnastics, basketball
Level 8   Competitive sports- racquetball or bandy, squash or badminton, track and field athletics (jumping, etc.), down-hill skiing
Level 7   Competitive sports- tennis, running, motorcars speedway, handball
Level 6   Recreational sports- soccer, football, rugby, bandy, ice hockey, basketball, squash, raquetball, running
Level 5   Recreational sports- tennis and badminton, handball, raquetball, down-hill skiing, jogging at least 5 times per week
Level 4   Work- heavy labor (construction, etc.)
Level 3   Competitive sports- cycling, cross-country skiing,
          Recreational sports- jogging on uneven ground at least twice weekly
Level 2   Work- moderately heavy labor (e.g. truck driving, etc.)
Level 1   Work- light labor (nursing, etc.)
Level 0   Walking on uneven ground possible, but impossible to back pack or hike
          Work- sedentary (secretarial, etc.)
          Sick leave or disability pension because of knee problems
## Results

### B. MRI evaluation

<table>
<thead>
<tr>
<th>Subchondral signal</th>
<th>T=0</th>
<th>T=6</th>
<th>T=12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>20%</td>
<td>15%</td>
<td>50%</td>
</tr>
<tr>
<td>Good</td>
<td>80%</td>
<td>85%</td>
<td>50%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intra-articular fluid</th>
<th>T=0</th>
<th>T=6</th>
<th>T=12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absents</td>
<td>90%</td>
<td>95%</td>
<td>30%</td>
</tr>
<tr>
<td>A few</td>
<td>10%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>A lot</td>
<td>0%</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bone edema &gt; 0.5 cm²</th>
<th>T=0</th>
<th>T=6</th>
<th>T=12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absents</td>
<td>30%</td>
<td>30%</td>
<td>0%</td>
</tr>
<tr>
<td>&lt;0.5 cm²</td>
<td>65%</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>5%</td>
<td>70%</td>
<td>5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bone edema &lt; 0.5 cm²</th>
<th>T=0</th>
<th>T=6</th>
<th>T=12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absents</td>
<td>65%</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>5%</td>
<td>70%</td>
<td>5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bone edema ≤ 0.5 cm²</th>
<th>T=0</th>
<th>T=6</th>
<th>T=12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absents</td>
<td>30%</td>
<td>30%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>65%</td>
<td>30%</td>
<td>50%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Osteoarthritis findings</th>
<th>T=0</th>
<th>T=6</th>
<th>T=12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Present</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Length: 1.560 cm (B. MRI evaluation)
TAKE-HOME MESSAGES

- A good reliability (one-step technique)

- Good clinical and instrumental results within 12 months (AOFAS + 38,49 e VAS - 6), and also in T=24 e T=36

- Best result in T6 if the surgical operation within 8-10 months after onset of the symptoms

- A good bio-integration of the scaffold

- Ankle unstable (17%-63%)? Flat-cavus foot? / Vara-valga ankle?

Charaterization of the collagen component of cartilage repair tissue of the talus with quantitative MRI: comparison of T2 relaxation time measurements with a diffusion-weighted double-echo steady-state sequence (dwDESS)

M. Kretzschmar · O. Bieri · M. Miska · M. Wiewiorski · N. Haine · V. Valderrabano · U. Studler

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Thank you!