The Results of Ceramic Artificial Talus for the Comminuted Talar Fracture as Initial Treatment

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Our disclosures are in the Final AOFAS Program Book.
We have no potential conflicts with this presentation.
COMMINUTED TALAR FRACTURE

Peculiarity of this fracture
1. Reduction of this fracture is extremely difficulty.
2. Frequency of osteonecrosis is extremely high.
3. Leg discrepancy and decrease of ROM after fusion are extremely large.
Therefore, we made a ceramic artificial talus for aseptic talar necrosis in 1999
### Materials of Artificial Talus for Aseptic Talar Necrosis

<table>
<thead>
<tr>
<th>Total</th>
<th>67 patients</th>
<th>69 talus</th>
<th>1999~2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>------------</td>
<td>----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Women</td>
<td>------------</td>
<td>----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Bilateral</td>
<td></td>
<td>2 patient</td>
<td></td>
</tr>
<tr>
<td>Patient’s age</td>
<td>19 ~ 89 yrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average age</td>
<td>63 yrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genesis of talar necrosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idiopathic</td>
<td>59 patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neck fracture</td>
<td>6 patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congenital clubfoot</td>
<td>1 patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kashin-Beck</td>
<td>1 patient</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Method of designing artificial talus

1. Tomography on unaffected side
2. Extraction of talus boundary
3. It converts into the wire frame data, and take it into 3D-CAD
4. It designs by 3D-CAD
5. Reversing
6. Simulation

5 weeks for production after injury
CERAMIC ARTIFICIAL TALAR PROSTHESIS

First generation

Second generation

Third generation

Results of Third Generation

40 patients 42 talus

Idiopathic -------------- 37 talus
Fracture -------------- 4 talus
Congenital clubfoot -- 1 talus

Results (0.5~6.5 yrs. average 3.2 yrs.)

Excellent -------------- 35 talus
Good -------------- 6 talus
Fair -------------- 1 talus
Poor -------------- 0

Revision -------------- 0

The results of Ceramic Whole Body were extremely good
The results of third generation (Ceramic Whole Body) were excellent.

Therefore, we indicated ceramic talar whole body for the treatment of comminuted fracture.
<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Gender</th>
<th>Side</th>
<th>Occupation</th>
<th>Cause</th>
<th>Complication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59</td>
<td>M</td>
<td>L</td>
<td>Office worker</td>
<td>Fall</td>
<td>Lumbar spine compression fr.</td>
</tr>
<tr>
<td>2</td>
<td>34</td>
<td>M</td>
<td>L</td>
<td>Instructor</td>
<td>Fall</td>
<td>Fibular fr.</td>
</tr>
<tr>
<td>4</td>
<td>49</td>
<td>F</td>
<td>L</td>
<td>Housewife</td>
<td>Traffic ac.</td>
<td>Open fr.</td>
</tr>
</tbody>
</table>
Case 1, 59-year-old. Male

He fell from a high place and broke the talus, fibula and lumbar
Complication of Case 1

Compliance fracture of 1st lumbar spine

No neuropathy
Case 1, 59-year-old. Male

Before replacement

Removed fragments of the talus

After replacement
Case 1, 59-year-old. Male

Weigt-bearing A-P

Dorsal flexion

3.5 years after OP.

Plantar flexion
Case 1, 59-year-old. Male

Dorsal flexion  Plantar flexion

He is playing golf and jogging.

He can sit Japanese style.
Case 2, 34-year-old. Male

He fell from a high place and broke the talus and leg.

Initial x-ray of the injury

X-ray

CT scan

Primary fixation in emergency hospital
Case 2, 34-year-old. Male

Reduction of fibular and tibial fracture at 23 days after injury

Replacement of talar whole body at 2 months after injury
Case 2, 34-year-old. Male

Dorsal flexion

1.8 years after OP.

Plantar flexion

He can perform the job of an instructor.
Case 3, 36-year-old. Male

He broke the talus and proximal tibia by traffic accident.

Initial examination in our hospital at 2.5 months after injury

Open fracture and bony defect of the talus
Case 3, 36-year-old. Male

Before traction

The capacity of the original talus was acquired by external fixation

3 weeks after traction
Case 3, 36-year-old. Male

The cavity of the talus

Removed remaining talus

Tibia

Calcaneus

Navicular
Case 3, 36-year-old. Male

Dorsal flexion 1.7 years after OP.

Plantar flexion

He cannot perform the original job by ankle pain. However, he can do desk job.
Case 4, 49-year-old, Female

Open fracture of the talus by traffic accident

X-ray

CT

X-ray with cast after manual correction
Case 4, 49-year-old, Female

Before OP.  1 year after OP.

She can jog and play mild sports.
## Results

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Gender</th>
<th>Side</th>
<th>Cause</th>
<th>ROM</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59</td>
<td>M</td>
<td>L</td>
<td>Fall</td>
<td>10 / 40</td>
<td>Excellent</td>
</tr>
<tr>
<td>2</td>
<td>34</td>
<td>M</td>
<td>L</td>
<td>Fall</td>
<td>5 / 25</td>
<td>Excellent</td>
</tr>
<tr>
<td>3</td>
<td>36</td>
<td>M</td>
<td>R</td>
<td>Traffic ac.</td>
<td>-5 / 15</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>49</td>
<td>F</td>
<td>L</td>
<td>Traffic ac.</td>
<td>10 / 40</td>
<td>Excellent</td>
</tr>
</tbody>
</table>
SUMMARY

1. A ceramic artificial talus was replaced on 4 comminuted talar fractures as initial treatment.

2. Results of arthroplasty with the prosthesis are now excellent and good, however the follow-up period is short.

3. A ceramic artificial whole body should be indicated for the comminuted talar fracture with destruction or bony defect.