Comparison of treatment effects between Ilizarov external fixation and internal fixation methods in elderly patients with periarticular fracture of the ankle

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Presentation Title: Comparison of treatment effects between Ilizarov external fixation and internal fixation methods in elderly patients with periarticular fracture of the ankle

Presenter’s Name: Koji Nozaka

My disclosure is in the Final AOFAS Program Book. I have no potential conflicts with this presentation.
Introduction

Due to bone fragility and difficulty in partial weight-bearing, elderly patients with periarticular fracture of the ankle experience:

- delayed initiation of postoperative weight-bearing prolonged hospitalization in Japan.

- a tendency for progression of disuse syndrome.

Even in periarticular fractures where the cortical bone is thin and the use of screws for internal fixation is difficult, suitable fixation can be achieved using multiple Ilizarov wires.

No reports appear to have compared treatment effects between internal fixation and Ilizarov external fixation methods.

We have been performing osteosynthesis using an Ilizarov external fixator and early weight-bearing in elderly patients with periarticular fracture of the ankle.

The objective of this study was to retrospectively compare treatment effects of Ilizarov external fixation and internal fixation methods among elderly patients with periarticular fracture of the ankle.
Subjects and Methods

15 patients with periarticular fracture of the ankle, age ≥60 years
(fracture of distal tibia including pilon fracture, trimalleolar or bimalleolar fracture of the ankle)

* unimalleolar fractures were excluded

<table>
<thead>
<tr>
<th>Internal (n=7)</th>
<th>Ilizarov</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (range)</td>
<td>Mean age (range)</td>
</tr>
<tr>
<td>67.1 (60-75 years)</td>
<td>66.2 (60-79 years)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight bearing (PO=postoperatively)</th>
<th>Weight-bearing as tolerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial weight-bearing: 3 weeks PO</td>
<td>Weight-bearing as tolerated: 1 day PO</td>
</tr>
<tr>
<td>Full weight-bearing: 8 weeks PO</td>
<td>Half partial weight-bearing: 2 weeks PO</td>
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<tr>
<td></td>
<td>Full weight-bearing: 4 weeks PO</td>
</tr>
</tbody>
</table>

External fixator mounting period
91.1 days (79-102 days)
## Result

Comparison of internal fixation and Ilizarov external fixation fixation

<table>
<thead>
<tr>
<th></th>
<th>Internal (n=7)</th>
<th>Ilizarov (n=8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of hospitalization</td>
<td>75.1 days</td>
<td>52.9 days*</td>
</tr>
<tr>
<td></td>
<td>(46-123 days)</td>
<td>(41-63 days)</td>
</tr>
<tr>
<td>Range of motion in the sagittal plane</td>
<td>44.6°</td>
<td>44.3°</td>
</tr>
<tr>
<td></td>
<td>(15-60°)</td>
<td>(15-60°)</td>
</tr>
<tr>
<td>Bone density (YAM%)</td>
<td>63.1%</td>
<td>56.1%</td>
</tr>
<tr>
<td></td>
<td>(48-72%)</td>
<td>(30-70%)</td>
</tr>
<tr>
<td>JSSF ankle-hindfoot standard scale</td>
<td>88.2</td>
<td>92.1</td>
</tr>
<tr>
<td></td>
<td>(72-100)</td>
<td>(72-100)</td>
</tr>
<tr>
<td>Skin disorders requiring additional surgical treatment</td>
<td>28.6% (2/7 patients)</td>
<td>0% (0/8 patients)</td>
</tr>
</tbody>
</table>

*p<0.05
Case (pilon fracture)
A 60-year-old man

- Chief complaint: Left ankle pain
- Past history: Hypertension
- History of present illness:

The patient was injured when he fell on a snowy road and was transported by ambulance to the previous hospital. Since comminuted fracture was observed and skin condition was also not improving, he was transferred to our department.

X-ray & 3D-CT on initial consultation

Condition at the time of transfer to our department

Anterior-posterior view  Lateral view

8 days after injury
Postoperative X-ray

Anterior-posterior view
Lateral view
Anterior-posterior view
Lateral view

Postoperative Range of Motion

Dorsiflexion
Plantar flexion

JSSF ankle-hindfoot scale score: 100 (maximum score)
Discussion

- Periarticular fracture of the ankle: Thinning of subcutaneous tissue, poor dermal extensibility, and swelling that accompanies trauma all facilitate secondary injury to skin tissue.
- Ilizarov external fixation is useful for pilon fractures with poor soft tissue conditions.
- Negative impacts of non-weight-bearing on bones with osteoporosis.
  - Tibial cancellous bone mass decreases to approximately 50% in just 1 week \(^1\).
  - Even when weight-bearing is restarted after non-weight bearing, at least twice
    the duration of non-weight-bearing is necessary for bone mass to recover \(^2\).
  - Local blood flow is important for fracture healing, but non-weight-bearing decreases blood flow velocity in the legs \(^3\).
- JSSF scores were almost identical between groups, and the Ilizarov external fixation group had a shorter duration of hospitalization in Japan.
- Ilizarov external fixation is a useful options for treating elderly patients with periarticular fracture of the ankle.
Conclusions

- We compared treatment effects between internal fixation and Ilizarov external fixation methods in elderly patients with periarticular fracture of the ankle.
- JSSF scores were almost identical between groups, and the Ilizarov external fixation group had a shorter duration of hospitalization.

References