Acutrak screw fixation for proximal fifth metatarsal stress fracture in Japanese soccer players.

Ryo Matsunaga, Takashi Sando, Takahisa Haraguchi, Yoichi Katori, Kengo Yamamoto
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My disclosure is in the Final AOFAS Mobile App.
I have no potential conflicts with this presentation.
Purpose

- Intramedullary screw fixation is an adequate option for fifth metatarsal stress fracture instead of canulated cancellous screws.
- Yet, bending intramedullary screw could be observed after surgical treatment.
- The aim of this study is to evaluate clinical results of headless compression screw (Acutrak screw) fixation for proximal metatarsal stress fracture in Japanese soccer players.
Materials

Tokyo Medical University
Fifth metatarsal stress fracture: 27 feet, 27 cases
Acutrak screw® fixation: 17 feet, 17 cases

*Exclusion: Acute fracture, Revision surgery

✓ Gender: Male 17, Female 0
✓ Age: mean 17.9 years old
✓ Follow-up period: mean 14 months (range: 8-24 months)

✓ Sports Level:
  Professional player (J-League): 1 case
  College soccer player: 9 cases
  J-League youth player: 6 cases
  High school player: 1 case
Methods

✓ Fracture location
✓ Fracture type
✓ Return to soccer
✓ Radiographic evaluation after surgery
  : Bone union
  : Screw/Metatarsal ratio (SM ratio)
✓ Recurrent case / non union case

Acutrak screw®

Acutrak 4/5 or Acutrak Plus
**Result: Fracture location and type**

Zone I: Tuberosity Avulsion FX  
Zone II: Jones Fx  
Zone III: Proximal diaphyseal stress FX

Complete Fx : 8 feet  
Incomplete Fx: 9 feet

Zone III: 17 feet  
Type 2: 17 feet

Torg classification

Type 1: **Acute fractures**, which were characterized by a narrow fracture line and absence of intramedullary sclerosis.

Type 2: Those with **delayed union**, with widening of the fracture line and evidence of intramedullary sclerosis.

Type 3: Those with **nonunion** and complete obliteration of the medullary canal by sclerotic bone.

【Lawrence SJ et al, 1993】
Clinical results and failure cases

<table>
<thead>
<tr>
<th>Age</th>
<th>Torg class.</th>
<th>Sports level</th>
<th>Union</th>
<th>Return to soccer</th>
<th>Time from surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Type II</td>
<td>College</td>
<td>11 wks</td>
<td>13 wks</td>
<td>4 mo.</td>
</tr>
<tr>
<td>21</td>
<td>Type II</td>
<td>College</td>
<td>8 wks</td>
<td>10 wks</td>
<td>6 mo.</td>
</tr>
<tr>
<td>19</td>
<td>Type II</td>
<td>Professional</td>
<td>8 wks</td>
<td>11 wks</td>
<td>8 mo.</td>
</tr>
</tbody>
</table>

Recurrent fracture: **18.0% (3/17)**

Non-union: **6% (1/17)**

Bone union: **10.7 weeks**

Return to Soccer: **12.5 weeks**

Revision surgery using bone grafting.
Screw / Metatarsal ratio (SM ratio)

SM ratio: mean **0.68** (range: 0.62-0.73)

Inadequate screw length might widen fracture gap and could cause delayed union.

Indication for surgical treatment

【Lehman et al, Foot and Ankle 1987】

Torg classification

type 1 & type 2 → Conservative treatment

type 3 → Surgical treatment

For athletes: surgical treatment > type 2

Conservative treatment involved 23% revision rate caused by recurrent and non-union. 【Jesefsson et al, CORR 1994】

Returning to sports needed 30.0 weeks with conservative treatment, and 15.6 weeks with surgical treatment. 【Chuckpaiwong et al, CORR 2008】

Current study: 12.5 weeks to return to Soccer

Our strategy:
Surgical treatment was recommended for all competitive athletes
## Screw selection

<table>
<thead>
<tr>
<th>Implant</th>
<th>Stiffness</th>
<th>Screw head problem</th>
<th>Compression force</th>
<th>Intramedullary occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannulated Cancellous Screw</td>
<td>△</td>
<td>×</td>
<td>○</td>
<td>△</td>
</tr>
<tr>
<td>Herbert Screw</td>
<td>×</td>
<td>○</td>
<td>○</td>
<td>×</td>
</tr>
<tr>
<td>Charlotte Carolina screw</td>
<td>○</td>
<td>×</td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td><strong>Acutrak Screw</strong></td>
<td>○</td>
<td>○</td>
<td>?</td>
<td>○</td>
</tr>
</tbody>
</table>

Acutrak screw would be optimal implant option for preventing from recurrent fracture by its **stiffness** and **intramedullary occupancy**.
Summary

✓ We evaluated clinical results of Acutrak screw fixation for proximal metatarsal stress fracture in Japanese soccer players retrospectively.

✓ The clinical results showed bone union in 10.7 weeks and returning to soccer in 12.5 weeks after acutrak screw fixation.

✓ Acutrak screw fixation is a good option for surgical treatment in soccer players to return to sports early, however we should pay attention to recurrent fracture after coming back to their sports activity.
References


