Quantitative evaluation of the plantar pressure in soccer players with 5th metatarsal stress fracture (Jones fracture)


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Background

- Jones fracture is a common problem in many athletes, especially high activity athletes in running and jumping sports. However, little is known about the mechanism of this fracture.

Purpose

- To investigate the plantar pressure patterns of soccer players with 5th metatarsal stress fracture (Jones fracture).
Subjects

51 male soccer players

- professional soccer players : 31
- high school soccer players : 20

Height 175.4±5.9cm  Weight 68.8±5.8kg  Age 21.1±4.7yrs

- Jones fracture group: 7
  - Op. tx. : 4
  - Conservative tx. : 3
  - All patients were available for clinical healing and return to soccer

- Control group: 44
  - without fracture

All patients were available for clinical healing and return to soccer
**Measurement**

- Measuring device: Win-pod (MEDICAPTEURS)
- Task: single leg standing and walking

### Single-leg standing
- Track length of Center of pressure: (COP)
- Foot was placed pointing straight forward
- Maintain this position 25 seconds
- Black line shows track

### Walking
- Fifth metatarsal pressure
- Fifth metatarsal angle
- Doted-line is indicated as track of the COP
Data analysis

- **Track length of COP**
- **Fifth metatarsal pressure**
  - Calculated Maximum pressure and average pressure in center area of the fifth metatarsal
- **Fifth metatarsal angle** *(between A and B)*
  - Line A: medial line of foot
  - Line B: medial heel to most lateral point of the doted-line (COP)

- Statistical analysis: Mann-Whitney test
- Compare these data between Jones fracture group and control group
Result: Track length of COP

N.S: Not Significant

Fracture group:
- N = 7
- Track length: 1182.4 mm

Control group:
- N = 44
- Track length: 1118.8 mm
Result : Fifth metatarsal pressure

<table>
<thead>
<tr>
<th>Group</th>
<th>Values</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fracture group</td>
<td>244.2</td>
<td>7</td>
</tr>
<tr>
<td>Control group</td>
<td>138.9</td>
<td>44</td>
</tr>
</tbody>
</table>

* P < 0.05
Result: Fifth metatarsal angle

- Fracture group: 18.2° (N=7)
- Control group: 12.4° (N=44)

* P<0.05
Discussion

- Lateral metatarsal pressure is high in Kick motions
  

- Plantar loading on the lateral portion increased fifth metatarsal stress fractures
  

Our study:

- Fifth metatarsal pressure and fifth metatarsal angle are significantly higher in fracture group

- Extreme loading of the lateral aspect of foot in soccer players who had suffered Jones fracture

Evaluation of the plantar pressure may contribute to prevention of Jones fracture
Conclusions

- We examined the plantar pressures patterns of soccer players with 5th metatarsal stress fracture.
- Fifth metatarsal pressure and fifth metatarsal angle are significantly higher in fracture group than control group.
- The results of this study showed characteristic loading patterns of the foot in soccer players with fifth metatarsal stress fracture.

References