Tibial torsion and knee varus angle; Are these Etiologies of hallux valgus?
Tibial torsion and knee varus angle; Are these Etiologies of hallux valgus?

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My disclosure is in the Final AOFAS Program Book.

I have no potential conflicts with this presentation.
Factors associated with painful hallux valgus were presence of pain in the knee

The correlation between HV and IMA of patellofemoral pain syndrome

Almost all Japanese patients with OA of knee have varus deformities of the tibia

Purpose
- To investigate correlation between knee varus angle and hallux valgus angle and intermediate angle
- To investigate correlation between tibial torsion angle and hallux valgus angle and knee varus angle
Material

- **Power analysis**
  - Pearson’s correlation coefficient
  - $\alpha=0.05$ $\beta=80\%$
  - Sample size =15 cases

- **49 patients**

- **Inclusion criteria**
  - Osteoarthritis
  - Continuous knee joint pain
  - Oriental population

- **Exclusion criteria**
  - Rheumatoid arthritis
  - Trauma hx
  - Western population
The knee varus angle and tibial torsion-HV Registry

1. Prospective Enrollment of Consecutive 49 patients before TKA due to osteoarthritis of knee

Torsional CT scan, AP and lateral weight-bearing foot radiograph was performed in 49 patients before Total knee replacement arthroplasty

AP and lateral weight-bearing knee and long leg standing AP view will be performed

2. Correlation between knee varus and hallux valgus angle and 1-2 intermetatarsal angle

3. Correlation between tibial torsion and hallux valgus angle and 1-2 intermetatarsal angle

4. Correlation between TCA-AP, TCA-lateral and hallux valgus angle and 1-2 intermetatarsal angle
The subject was placed supine on the CT scanner and the lower extremity was positioned so that the long axis of the tibia was parallel to the bed in the sagittal and coronal planes with 30° knee flexion.

Two images of CT scans were superimposed and angle TT-AA was measured.
### Result

#### Sperman Rho rank order correlation coefficient with Knee Varus Angle

<table>
<thead>
<tr>
<th></th>
<th>HVA</th>
<th>IMA</th>
<th>TCA-AP</th>
<th>TCA-lat</th>
</tr>
</thead>
<tbody>
<tr>
<td>KVA</td>
<td>r=0.09</td>
<td>r=0.05</td>
<td>r=0.09</td>
<td>r=-0.18</td>
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<tr>
<td></td>
<td>p=0.534</td>
<td>p=0.723</td>
<td>p=0.554</td>
<td>p=0.214</td>
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<tr>
<td></td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>9</td>
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#### Sperman Rho rank order correlation coefficient with Tibial torsion angle

<table>
<thead>
<tr>
<th></th>
<th>HVA</th>
<th>IMA</th>
<th>TCA-AP</th>
<th>TCA-lat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angle TT-AA</td>
<td>r=-0.07</td>
<td>r=-0.18</td>
<td>r=0.08</td>
<td>R=0.28</td>
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<tr>
<td></td>
<td>p=0.6549</td>
<td>p=0.2213</td>
<td>p=0.5743</td>
<td>p=0.0556</td>
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#### Sperman Rho rank order correlation coefficient with TCA-AP, TCA-lat

<table>
<thead>
<tr>
<th></th>
<th>HVA</th>
<th>IMA</th>
<th>TCA-AP</th>
<th>TCA-lat</th>
</tr>
</thead>
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<tr>
<td>TCA-AP</td>
<td>r=0.23</td>
<td>r=0.03</td>
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<td></td>
<td>p=0.1092</td>
<td>p=0.8198</td>
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<tr>
<td>TCA-lat</td>
<td>r=-0.10</td>
<td>r=-0.10</td>
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<tr>
<td></td>
<td>p=0.4748</td>
<td>p=0.4737</td>
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</tbody>
</table>
Discussion

- **Suggestion of reason (1)**
  - Mal position or mal alignment → affect pain (for example patellofemoral pain..)
  - Mal position or mal alignment → not affect statistic posture (esp. old age (skeletal mature patient))

- **Suggestion of reason (2)**
  - The association of pes planus with the development of a hallux valgus deformity is controversial
  - Pes planus correlated with hallux valgus
  - Pes planus be no more common in those with hallux valgus than in the general population

- **Suggestion of reason (3)**
  - In our result
  - No statistical significant relationship
  - That results show tibial torsion and knee varus were not etiology factors

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**Tanaka et al. Foot Ankle Int 1999**

**Coughlin. Foot Ankle Int 1995**
**Kilmartin et al. Foot Ankle Int 1992**
**Saragas et al. Foot Ankle Int 1995**
Conclusion

1. Tibial torsion (esp. Internal rotation) don’t affect the hallux valgus angle, intermetatarsal angle

2. Knee varus angle don’t affect the hallux valgus angle, intermetatarsal angle
References

1. Akcali, O; Tiner, M; Ozaksy, D: Effects of lower extremity rotation on prognosis of flexible flatfoot in children. Foot Ankle Int. 21:772-774, 2000


3. Carl, A; Ross, S; Evanski, P; Waugh, T: Hypermobility in hallux valgus. Foot Ankle. 8:264-270, 1988


23. Saragas, NP; Becker, PJ: Comparative radiographic analysis of parameters in feet with and without hallux valgus. Foot Ankle Int. 16:139-143, 1995


27. Tanaka, Y; Takakura, Y; Fujii, T; Kumai, T; Sugimoto, K: Hindfoot alignment of hallux valgus evaluated by a weightbearing subtalar x-ray view. Foot Ankle Int. 20:640-645, 1999

THANKS FOR YOUR ATTENTION

Love to my family.. HW, HJ, HY, HS..