Evaluate the hindfoot alignment after total knee arthroplasty; new radiographic view of the hindfoot.

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Disclaimer

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

Many authors described that total lower limb alignment should be evaluated including the hindfoot.

It is difficult to visualize the subtalar joint with conventional radiographic techniques because of the helical form of the posterior subtalar facet.

New radiographic technique was proposed to evaluate the alignment of the hindfoot on weight bearing.
Total knee arthroplasty (TKA) alters the alignment of whole lower extremity.

Some authors reported that varus deformities of the knee have associated valgus hindfoot and the alignment of hindfoot changed after TKA, but what influence has TKA had on the hindfoot alignment is still unclear.

There are some patients who had hindfoot pain after TKA. We hypothesize that the alteration of limb alignment after TKA is associated with hindfoot alignment, and this influence may cause a hindfoot pain.

**Purpose**

The purpose of this study is to evaluate the new radiographic view of the hindfoot alignment and to examine the alternation of hindfoot alignment after TKA.
Methods

Subjects
One hundred ankles in 82 patients (12 males and 70 females, mean age, 73.9 years) who underwent TKA for the varus knee osteoarthritis (OA).

Radiography
All patients underwent two kinds of radiographs. One is the total limb radiograph and the other is our radiograph technique to evaluate the hindfoot alignment3). Preoperative and postoperative Femoro-Tibial angle (FTA) with former radiograph and Varus-Valgus angle (VVA) with latter were measured.

Fig. 1: Our radiographic technique:
Patients stood on a radiolucent platform with equal weight on both feet. This platform was flat in the rear part and inclined by 30° in the front part, so that the midfoot and forefoot of patients was planter flexed. The X-ray beam was oriented down 5° from the horizontal.

Fig. 2: Hindfoot alignment view
The ankle joint and the middle and posterior subtalar facets are visualized clearly.
The value of the angle between the line which connect on these two points and the axis of tibia is measured and this angle defined as Varus-Valgus angle (VVA).

The mean value of VVA about 46 normal legs in 23 normal subjects was $76.4 \pm 3.6$ degree.

The normal mean value of VVA was regarded as the threshold value of varus and valgus of hindfoot.

These subjects were divided into 2 groups (varus hindfoot group: VVA under 76 degrees, valgus hindfoot group: VVA over 76 degrees at preoperative period) and the values before and after TKA were compared statistically by paired T-test.

<table>
<thead>
<tr>
<th>varus hindfoot group</th>
<th>30 ankles</th>
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<tbody>
<tr>
<td>valgus hindfoot group</td>
<td>70 ankles</td>
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The mean FTA of all patients was 186.7 ± 4.6 degrees preoperatively, and that was 174.5 ± 3.1 degrees postoperatively, respectively. There are significant differences between preoperative and postoperative FTA ($p<0.01$). Similarly, there are significant differences in each group. The knee deformity was collected properly after TKA.
The mean VVA in **valgus hindfoot group** was $81.6 \pm 3.0$ degrees preoperatively, and that was $78.6 \pm 2.7$ degrees postoperatively, respectively. There are significant differences between preoperative and postoperative VVA ($p<0.01$).

The mean VVA in **varus hindfoot group** was $72.3 \pm 3.5$ degrees preoperatively and that was $72.7 \pm 4.2$ degrees postoperatively, respectively. There are no significant differences ($p=0.72$).
Discussions

In this study, hindfoot alignment was affected by TKA surgery especially in valgus hindfoot.

**valgus hindfoot group**

- Hindfoot alignment was improved. ➔ Hindfoot flexibility(+) 
  
  Valgus hindfoot alignment is compensation of knee deformity.

**varus hindfoot group**

- Hindfoot alignment did not change. ➔ Hindfoot flexibility(-) 
  
  Hindfoot has less ability to compensate for knee deformity.

**varus hindfoot**

- TKA ➔ no knee deformity with varus hindfoot 

**hindfoot pain??**

A long-term follow-up should be needed.
Conclusions

- We have evaluated the alignment of hindfoot not only valgus pattern but varus pattern in patients who has varus knee deformities.

- The alignment of valgus hindfoot improved, however the alignment of varus hindfoot did not change after TKA.

- The alignment of varus hindfoot may cause the hindfoot pain after TKA.

References

