

The effect of postoperative mechanical axis alignment on the revision rate of primary total knee arthroplasty after a follow up of 10 years

Cheng Jin, JK Seon, EK Song, JH Yeo, DH Lee

Center for Joint Disease

Chonnam National University Hwasun Hospital

Cheng Jin, MD

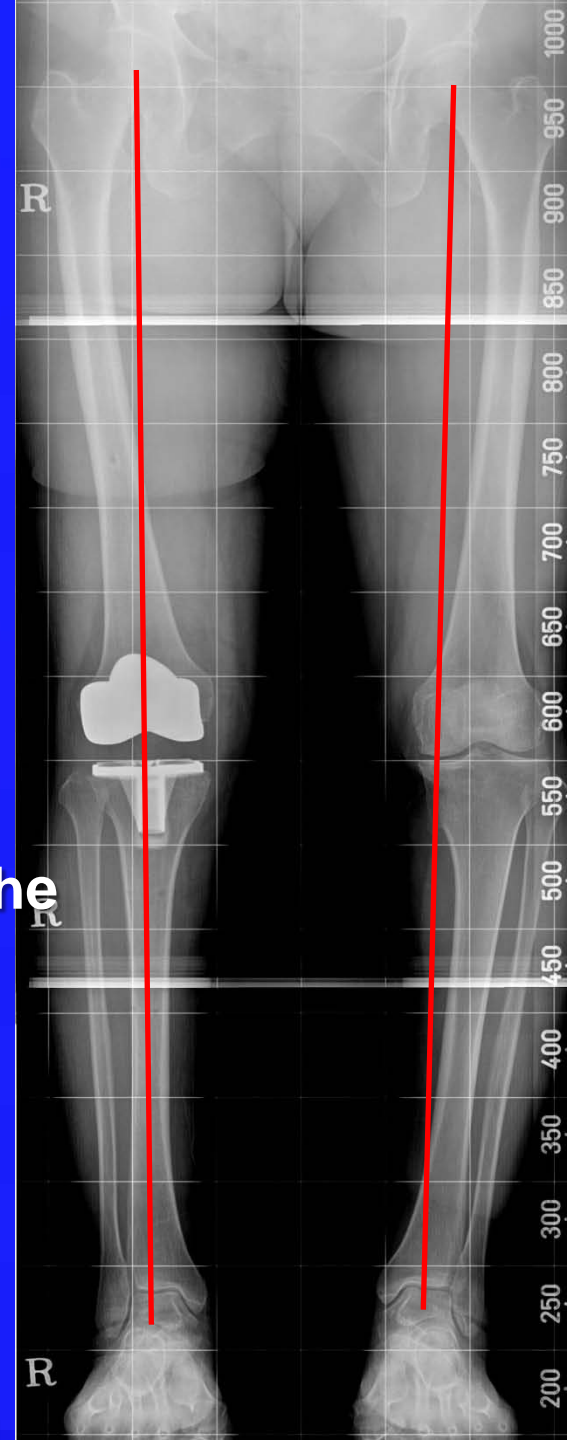
I have no financial conflict to disclose.

Introduction

Neutral limb alignment is crucial for TKA

- One aim for TKA
- Most influential factor of long term outcome after TKA
- Decreases mechanical & shear stress
- Balance the forces transmitted through the soft tissue envelope
- Improve the longevity of the implant

*Dossett HG et al, BJJ; 2014
Howell SM. KSSTA;2013
Halder A. et al JBJS;2012
Collier MB. JBJS;2007*



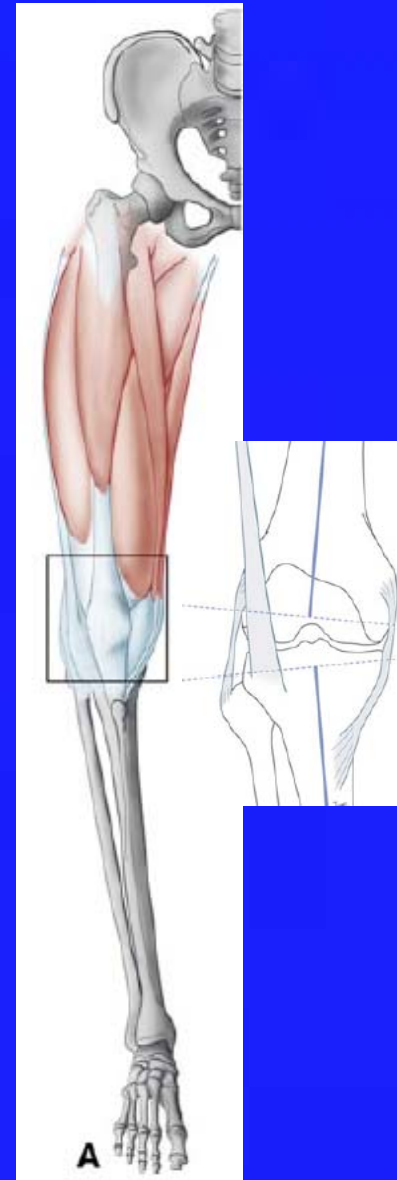
Introduction

Neutral limb alignment is “not” crucial for TKA

- “Constitutional varus”
 - 32 % of men, 17% of woman
 - Without arthritic changes
 - Restoration of neutral MA : **Undesirable**
- Precise postop mechanical axis
 - : Little practical value for durability of TKA
- Perfect mechanical axis
 - **Not a safe harbor** for implant durability
 - Not linked to high patient satisfaction

Bellemans. CORR;2012

Parratte S. JBJS;2010



Purpose

- To evaluate whether postoperative mechanical axis confers an advantage in outcomes and implant revision rate following total knee arthroplasty

Acceptable ($MA 0 \pm 3^\circ$) vs Outlier ($MA > 3^\circ$)

- To compare revision rate and postoperative complication
- To compare the clinical outcomes based on the effects of post operative mechanical alignment

Materials

• March 2000 ~ May 2006, total 334 cases

| | Acceptable (n=286) | Outlier (n=48) | <i>p value</i> |
|-----------------------------|--------------------|--------------------|----------------|
| Sex (M/F) | 23/263 | 4/44 | 0.378 |
| Average age (year) | 70.22 ± 9.04 | 70.96 ± 8.03 | 0.476 |
| BMI (kg/m ²) | 27.05 | 29.41 | 0.113 |
| ROM | 127.5 ± 15.7 | 129.3 ± 19.2 | 0.421 |
| Mean MA (°) | 11.7 ± 7.0 | 11.4 ± 6.1 | 0.526 |
| Etiology | | | |
| Osteoarthritis | 272 (95.1%) | 46 (95.8%) | 0.511 |
| Rheumatoid arthritis | 8 (2.8%) | 1 (2.1%) | 0.120 |
| Others | 6 (2.1%) | 1 (2.1%) | 0.273 |
| Immediate postop MA(°) | 0.74 ± 1.66 | 3.50 ± 4.53 | 0.000 |
| F/U duration | 10.01 ± 0.5 | 10.3 ± 0.6 | 0.741 |
| Implant type | | | |
| Nexgen CR | 72 (26%) | 11 (23%) | 0.422 |
| Nexgen PS | 92 (32%) | 16 (33%) | 0.742 |
| E-motion CR | 122 (42%) | 21 (44%) | 0.676 |
| Preop clinical score | | | |
| HSS | 64.9 ± 8.2 | 63.2 ± 11.4 | 0.417 |
| WOMAC | 41.9 ± 9.0 | 43.9 ± 9.0 | 0.122 |
| KSS pain | 14.7 ± 6.8 | 15.5 ± 7.1 | 0.290 |
| KSS function | 73.8 ± 16.7 | 72.2 ± 23.4 | 0.464 |

Materials

- **Clinical Outcomes**

- **HSS**
- **KSS pain/ function**
- **ROM**
- **WOMAC**

- **Radiological evaluation**

- **Postop/Last F/U mechanical axis through long leg radiograph**
- **Variation of mechanical axis between postop and last follow up**

- **Complication & Revision/Survival rate**

Materials

- **“Definition of failure”**
 - **Revision for any reason, including revision for aseptic complications, with exclusion of septic complications**
 - **Revision because of mechanical failure, aseptic loosening, radiographic wear or patellar complications**
- **Statistical analysis**
 - **SPSS for windows (ver. 20.0, SPSS Inc, USA)**
 - **Kolmogrov-Smirnov (K-S) test, paired t-test**
 - **Kaplan-Meier survival rate**

Results

- Clinical score (Last F/U)**

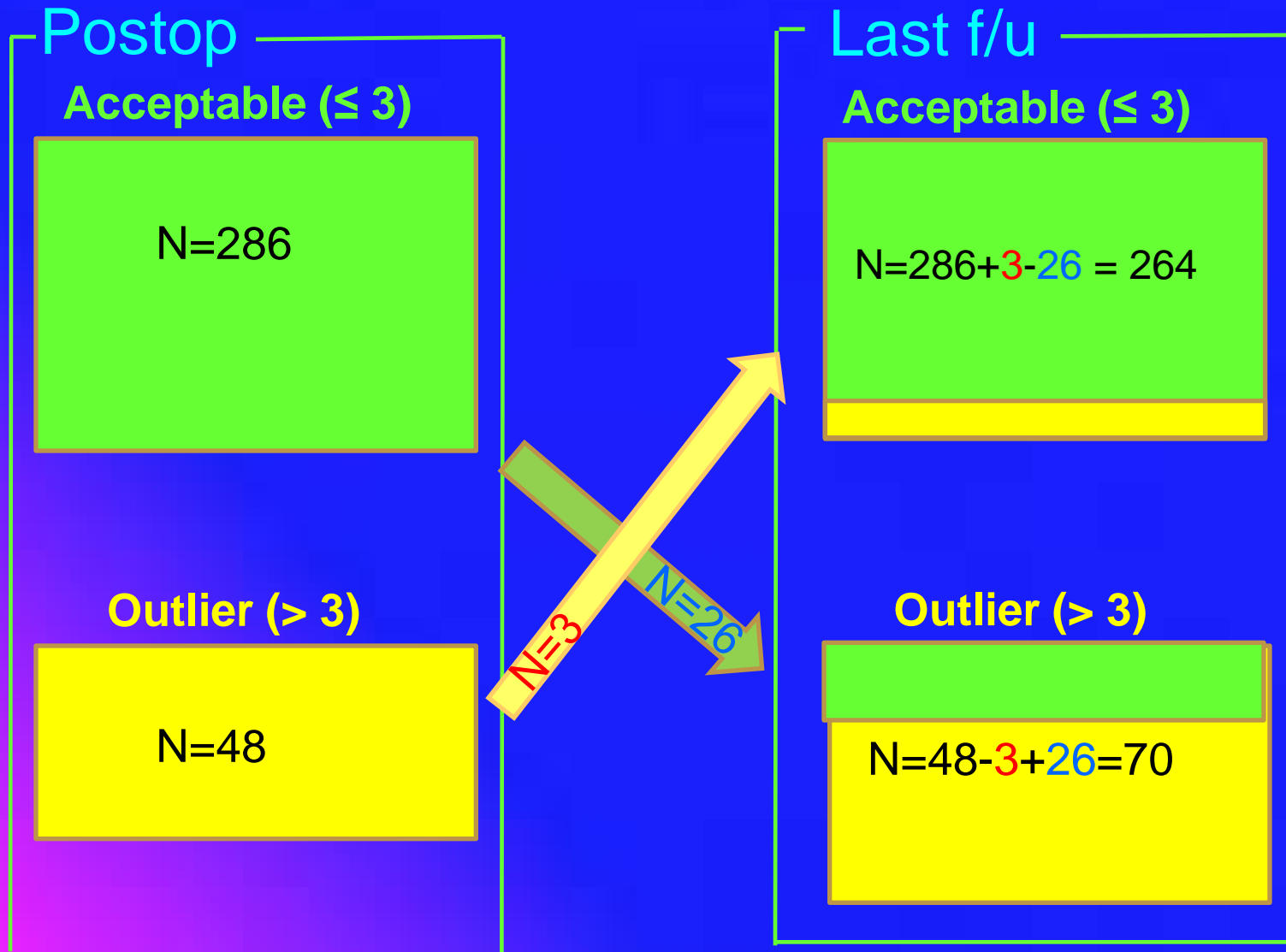
| | ≤ 3 (Acceptable) (n=286) | > 3 (Outlier) (n=48) | <i>P-Value</i> |
|--------------|----------------------------------|---------------------------|----------------|
| ROM | 132.25 \pm 15.21 | 135.70 \pm 19.21 | 0.471 |
| HSS | 90.65 \pm 9.63 | 91.29 \pm 9.31 | 0.243 |
| KSS pain | 46.23 \pm 8.82 | 47.23 \pm 9.15 | 0.497 |
| KSS function | 86.73 \pm 13.27 | 89.54 \pm 13.18 | 0.195 |
| WOMAC | 11.94 \pm 14.12 | 11.70 \pm 10.71 | 0.189 |

- Intergroup changes of mechanical axis**

| | Acceptable (N=286) | Outlier (N=48) | P value |
|------------------|-----------------------|-------------------|--------------|
| Immediate postop | 0.74 \pm 1.66 | 3.50 \pm 4.53 | 0.000 |
| Last f/u | 1.55 \pm 2.20 | 5.13 \pm 3.62 | 0.010 |
| Interval change | 0.81 \pm 2.43 | 1.63 \pm 2.70 | 0.012 |

Results

- Intergroup transfer



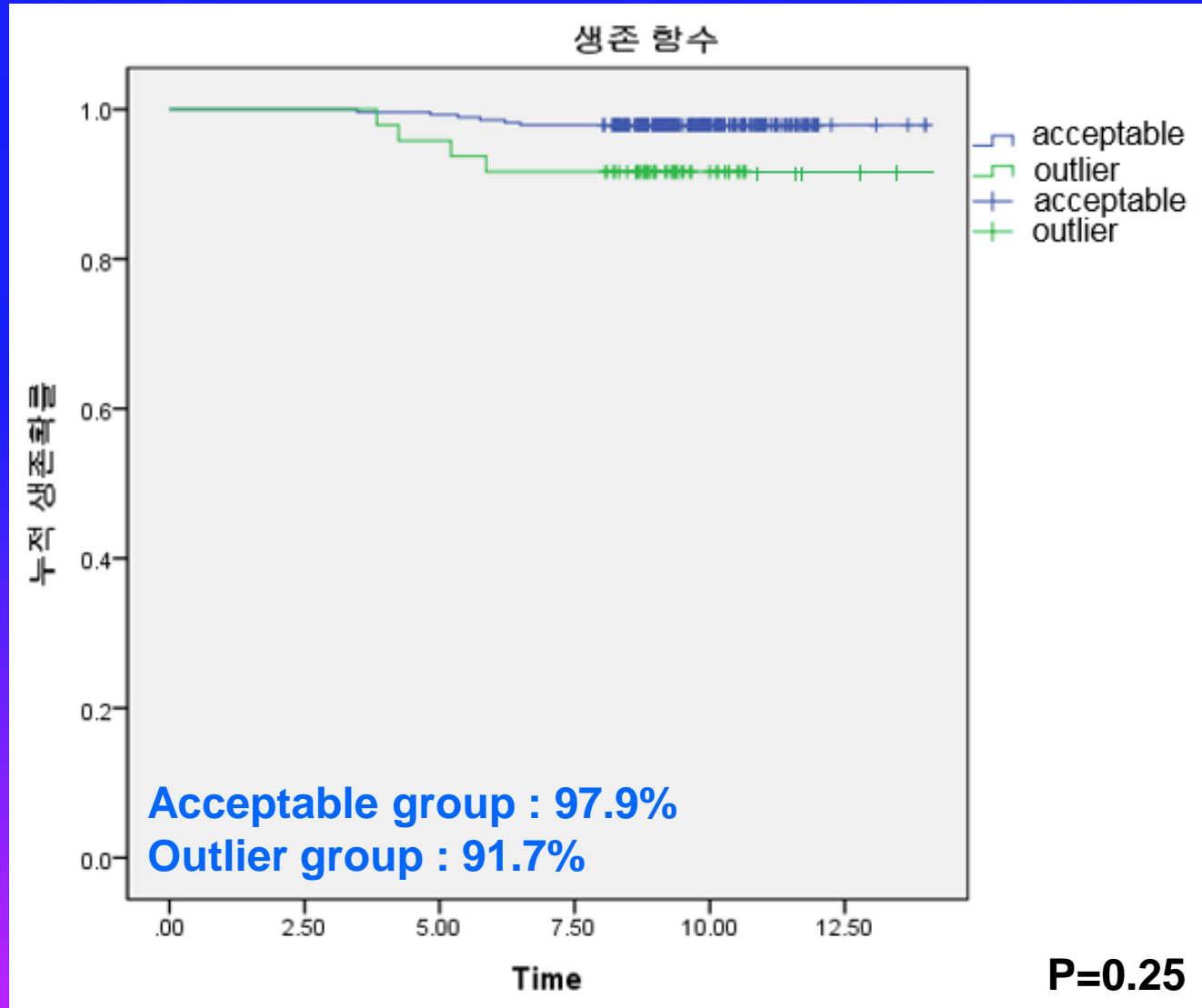
Results

- **Postoperative complications in both groups**

| | Acceptable (N=286) | Outlier (N=48) | P value |
|----------------------------|-----------------------|-------------------|--------------|
| Aseptic loosening | 2 (2 revision) | 1 (1 revision) | 0.211 |
| Instability | 4 | 1 (1 revision) | 0.211 |
| PE wear | 2 (2 revision) | 2 (2 revision) | 0.330 |
| PE Breakage | 2 (2 revision) | 0 | 0.357 |
| Periprosthetic fx | 2 | 0 | 0.326 |
| Total (n,%) | 20 (7.0%) | 5 (10.4%) | 0.107 |
| Revision rate (n,%) | 6 (2.1%) | 4 (8.3%) | 0.041 |

Results

- *Survival rates between two groups*



Conclusion

- Restoration of neutral limb alignment is *one of the determinant factor* of total knee arthroplasty influence less revision rate which means more of a longevity
- There were *no significant differences* in clinical outcomes in both acceptable and outlier groups