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Lateral laxity is related to the postoperative kinematics and knee symptoms after TKA using a medial stabilizing technique with a navigation system

**Tsushima T, Sasaki E, Sasaki S, Oishi K
Sakamoto Y, Kimura Y, Tsuda E, Ishibashi Y**

**Orthopaedic Surgery, Hiroasaki Univ.
Japan**



Faculty Disclosure Information

- Nothing to disclosure



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Purpose

- To evaluate the effect of lateral laxity after TKA on post-op kinematics and PROMs

Subjects

- 40 knees underwent initial TKA
- Surgical procedure
 - Mobile-bearing CR TKA (e.motion FP, Aesculap)
 - Medial stabilizing technique
 - CT-free navigation (Orthopilot Elite, Aesculap)

Matsuda S et al. Asia Pac J Sports Med Arthrosc Rehabil Technol 2015

Ishibashi K et al. Knee 2020



Evaluation of the kinematics using a navigation system

➤ Every 10° from 0° to 120° flexion

1. AP translation

of the MFC and LFC (mm)

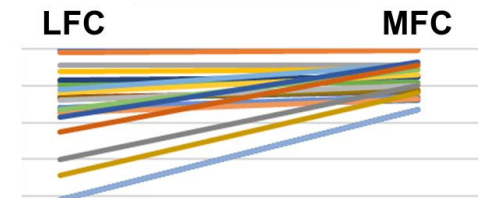
2. Femoral external rotation (°)

3. Lateral laxity (LL)

= lateral gap – medial gap (mm)

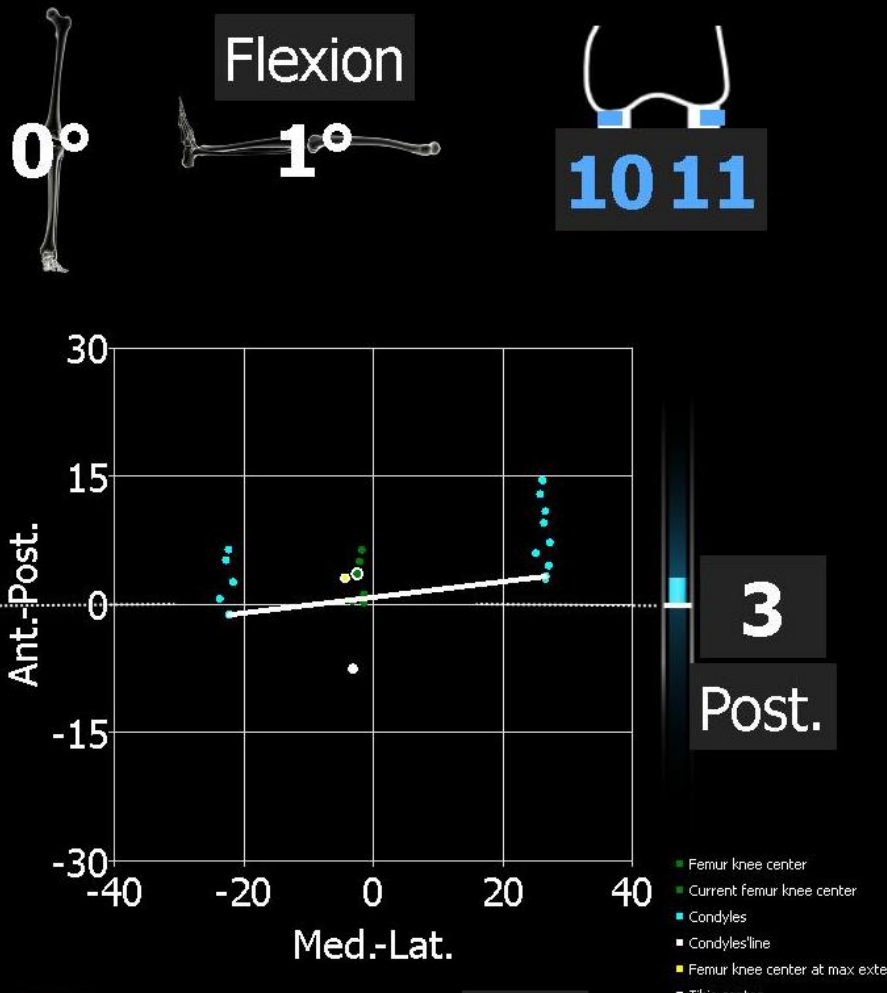
4. Medial pivot (MP) motion

or Non-MP motion



Dennis DA et al. Clin Orthop Relat Res 2003

Nishio Y et al. J Arthroplasty 2014



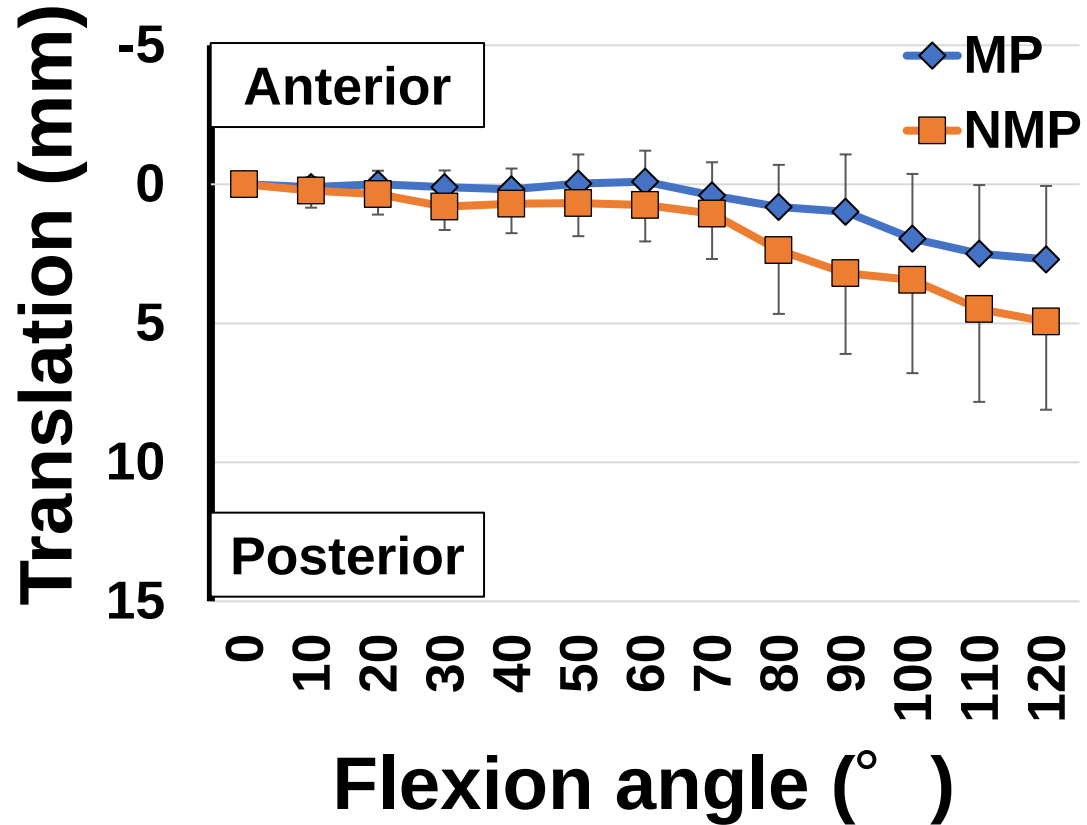
Demographic data

	MP motion	Non-MP motion	P值
n (%)	22 (55)	18 (45)	-
age (y.o.)	71.5 ± 5.2	70.5 ± 4.9	0.968
sex, male : female	3 : 19	3 : 15	0.789
BMI (kg/m ²)	28.8 ± 3.1	25.5 ± 1.8	0.100
Follow-up (m)	24.1 ± 5.9	24.3 ± 5.8	0.240
Pre-flexion (°)	122.5 ± 9.3	130.0 ± 13.7	0.274
Pre-extension (°)	-10.0 ± 5.3	-10.0 ± 5.9	0.925
Pre-FTA (°)	183.1 ± 3.9	181.6 ± 2.6	0.251
Pre-HKAA (°)	10.0 ± 4.1	8.0 ± 3.1	0.476

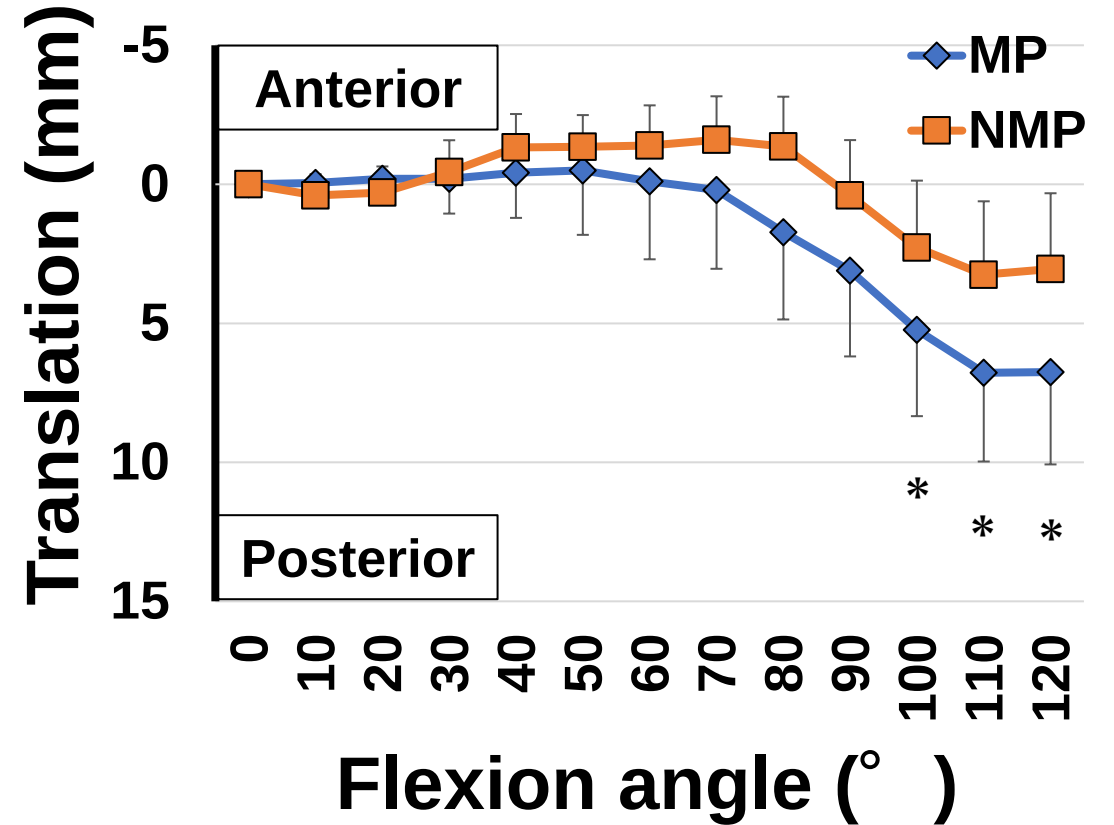
Mean ± SD, Mann-Whitney U test, χ^2 test

AP translation after TKA

MFC

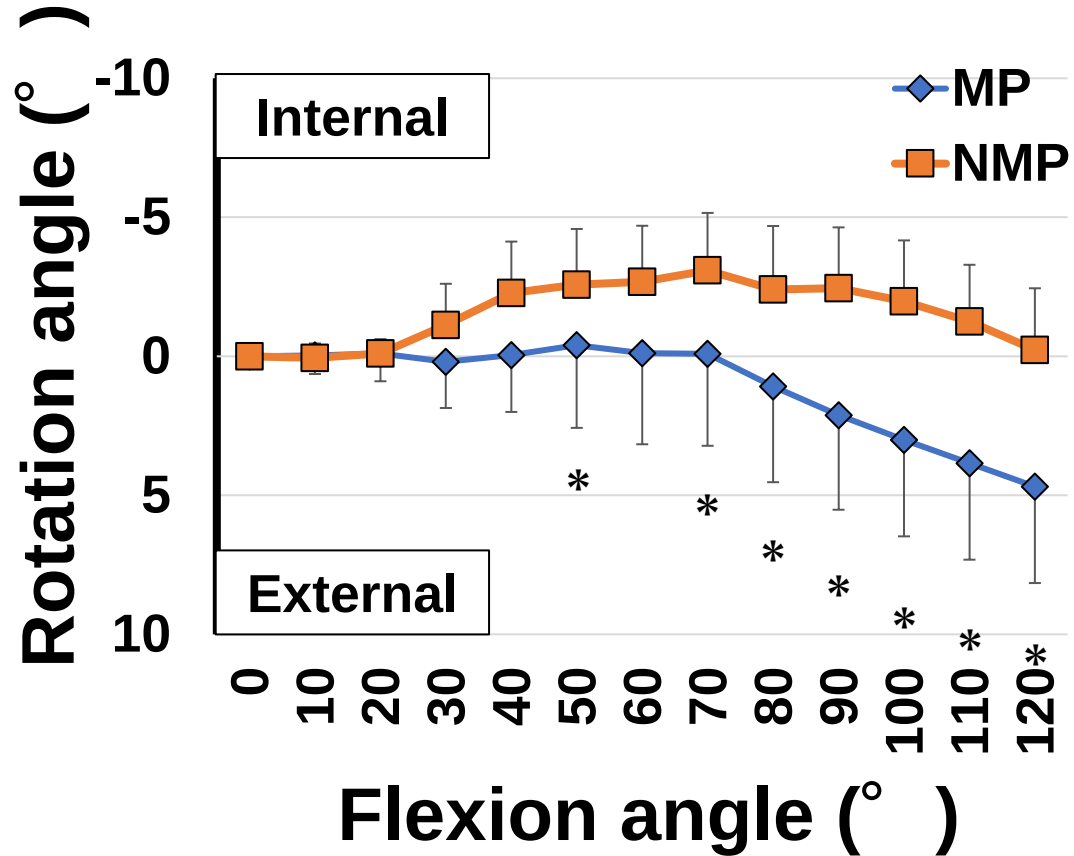


LFC



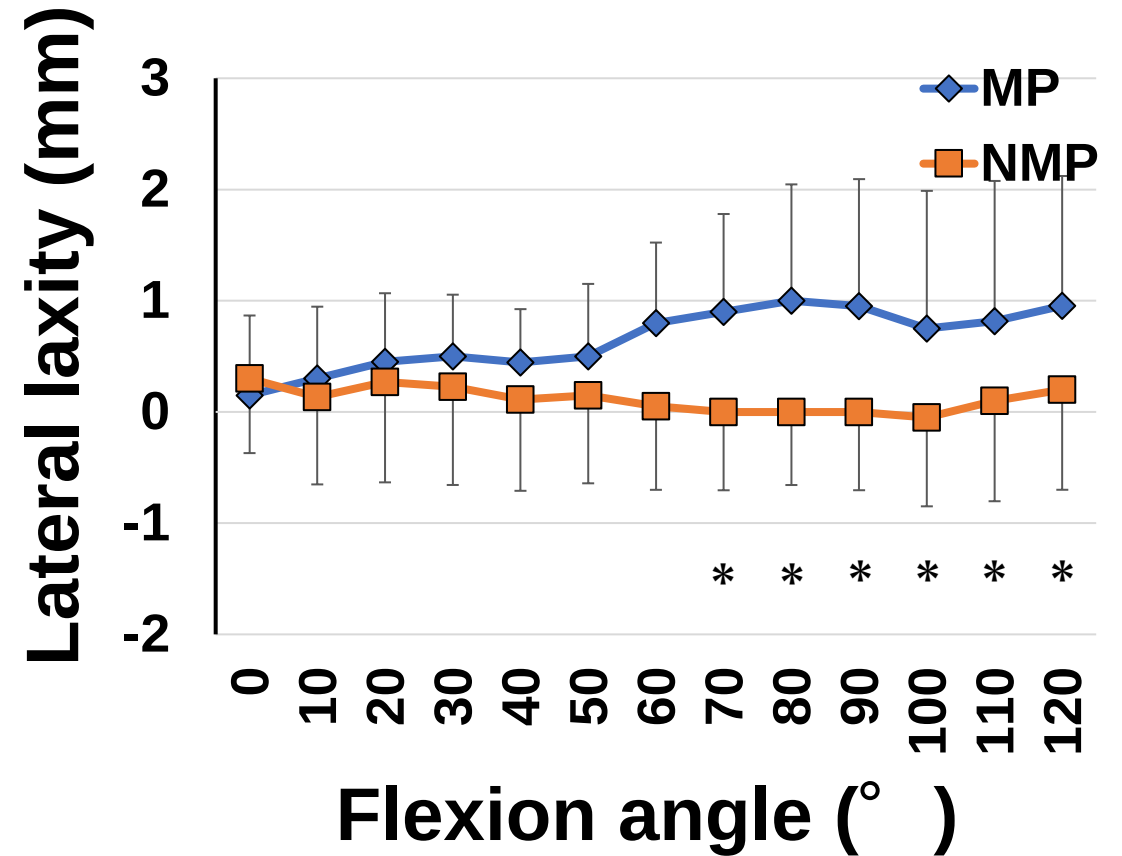
Mann-Whitney U test, * $p < 0.05$

Femoral rotation after TKA



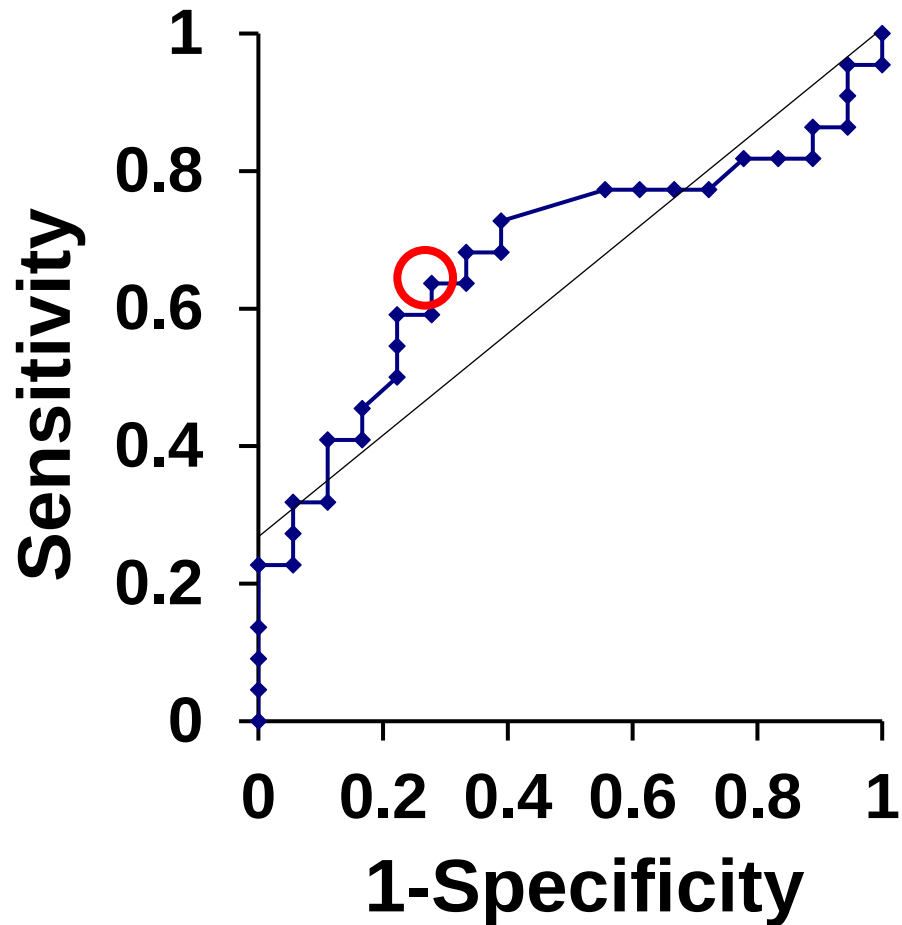
Mann-Whitney U検定, * p<0.05

Lateral laxity after TKA



Mann-Whitney U検定, * p<0.05

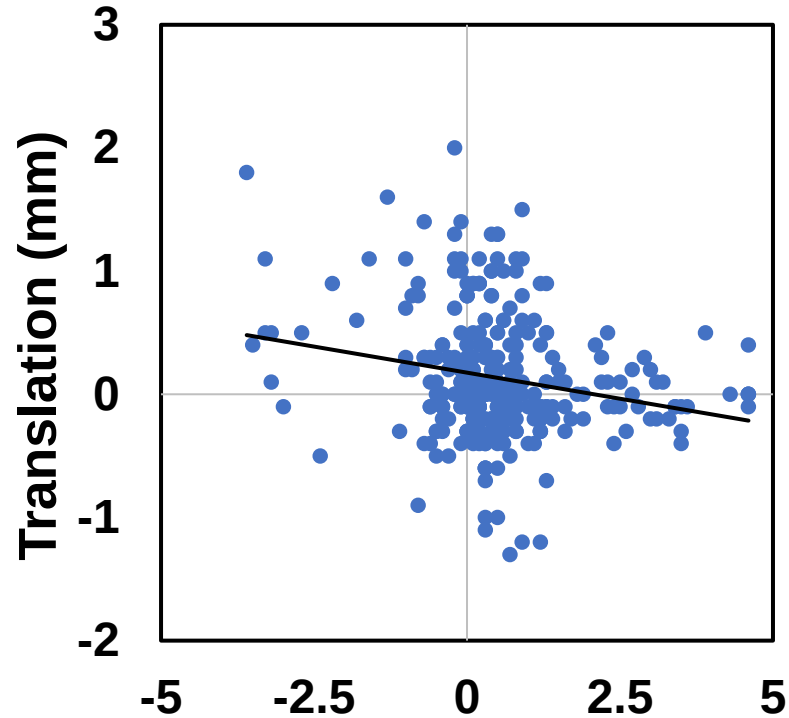
Relationship between lateral laxity and MP motion after TKA



Cutoff	0.9 mm
p-value	0.046
AUC	0.676
95% CI	0.503 – 0.848
Odds ratio	4.6
Sensitivity	0.636
Specificity	0.722

Correlation between lateral laxity and kinematics after TKA

MFC AP translation

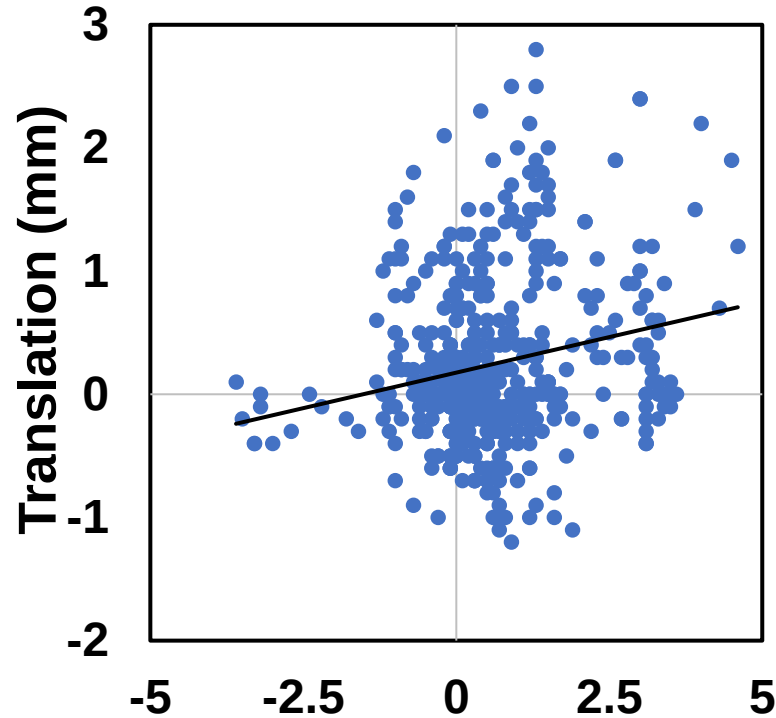


Lateral laxity (mm)

$R = -0.21$

$P < 0.001$

LFC AP translation

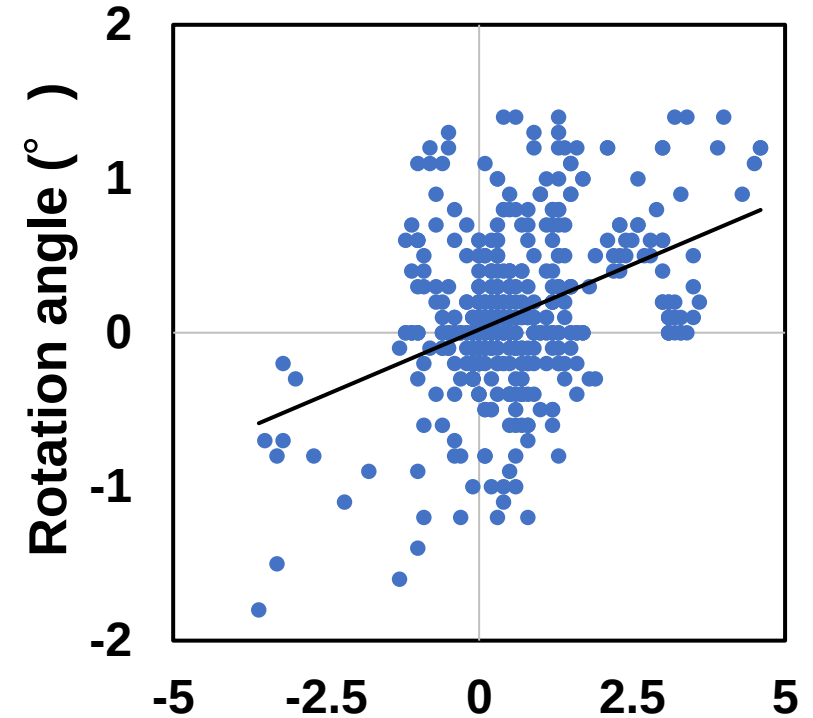


Lateral laxity (mm)

$R = 0.21$

$P < 0.001$

Femoral rotation



Lateral laxity (mm)

$R = 0.40$

$P < 0.001$

Spearman's correlation test

Clinical outcomes

	MP motion (n=22)	Non-MP motion (n=18)	P值
Post-FTA (°)	176.5 ± 1.2	176.0 ± 1.4	0.251
Post-flexion (°)	120.0 ± 7.6	120.0 ± 12.7	0.819
Post-extension (°)	0.0 ± 2.7	0.0 ± 3.1	0.757
Post-KOOS			
Pain	91.6 ± 5.6	83.3 ± 13.6	0.161
Symptoms	92.9 ± 6.9	85.7 ± 11.5	0.257
ADL	86.8 ± 9.2	86.8 ± 9.2	0.317
Sports	70.0 ± 21.1	50.0 ± 24.1	0.367
QOL	81.3 ± 17.7	62.5 ± 16.0	0.205

Mean ± SD, Mann-Whitney U test

Related factors of post-op KOOS

	<u>Pain</u>	<u>Symptom</u>	<u>ADL</u>	<u>Sports</u>	<u>QOL</u>
	β	β	β	β	β
Age	0.43*	0.42	0.19	0.24	0.60*
Sex	0.01	0.12	-0.24	-0.10	-0.11
BMI	-0.01	0.00	-0.03	-0.08	0.09
Follow-up periods	0.01	-0.17	0.15	0.30	0.05
Pre-FTA	-0.01	-0.16	0.12	0.06	-0.07
Pre-flexion angle	-0.42	-0.46	-0.05	-0.27	-0.41
Post-extension angle	-0.25	-0.17	0.02	0.30	0.16
Post flexion angle	0.32	0.52	-0.08	0.03	0.38
Post-lateral laxity	0.34	0.43*	0.11	0.17	0.20

Linear regression analysis, * :p<0.05

Conclusions

- **Postoperative lateral laxity related to knee kinematics, medial pivot motion pattern and KOOS symptoms after TKA**
- **For favorable postoperative outcomes after TKA, it is important to maintain a soft tissue balance that leaves physiological lateral laxity**

References

1. Matsuda S et al. Asia Pac J Sports Med Arthrosc Rehabil Technol 2015
2. Ishibashi K et al. Knee 2020
3. Dennis DA et al. Clin Orthop Relat Res 2003
4. Nishio Y et al. J Arthroplasty 2014
5. Tsushima T, et al. J ISAKOS 2024

