Relationship between PF pressure and femorotibial posterior overhang and posterior tibial slope pre- and post-TKA

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COI DISCLOSURE

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Patellofemoral (PF) pressure changes in TKA

✓ TKA alters the biomechanics of the patellofemoral (PF) joint

✓ Postoperatively, PF joint pressure may increase

Anterior knee pain[1)]

<u>Patellar osteosclerosis (POS)</u>[2)] after TKA

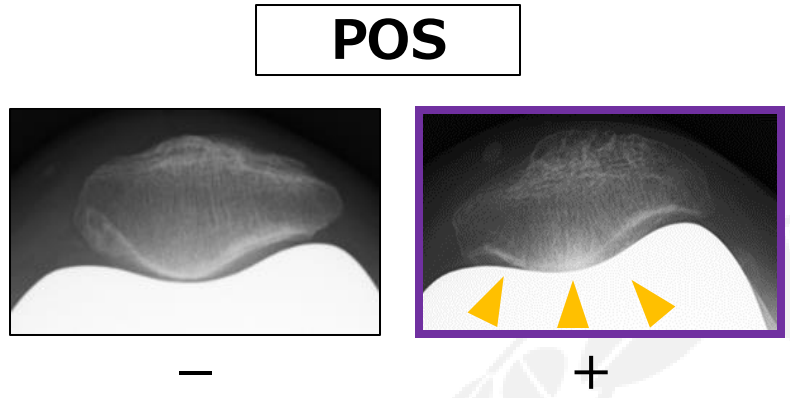


Figure 1.
Postoperative imaging showing Patella subchondral osteosclerosis in the PF joint.

Factors contributing to increased PF pressure

- Internal rotation placement of femoral component[3)]
- Trochlear groove design of femoral component[4)]
- Thick patella[5)]

Relationship with FTPO and PTS

- **Femorotibial posterior overhang (FTPO)**[6]

The anteroposterior position of the femur relative to the tibia

✓ A smaller FTPO ➡ PF pressure ↑[7]

- **Posterior tibial slope (PTS)**

✓ A smaller PTS ➡ PF pressure ↑[8]

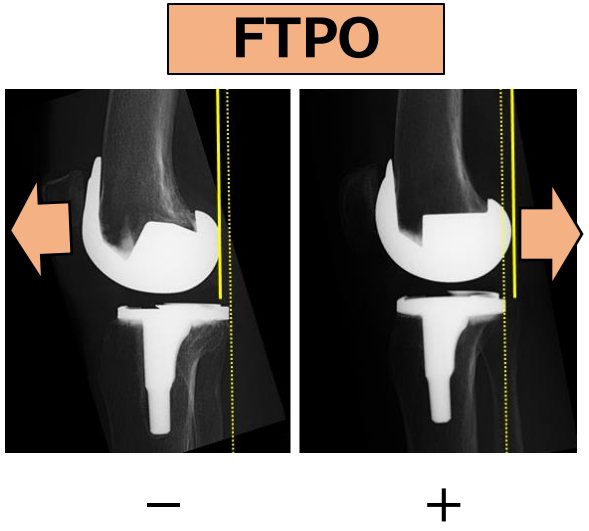


Figure 2.
Smaller FTPO is associated with
higher PF joint pressure.

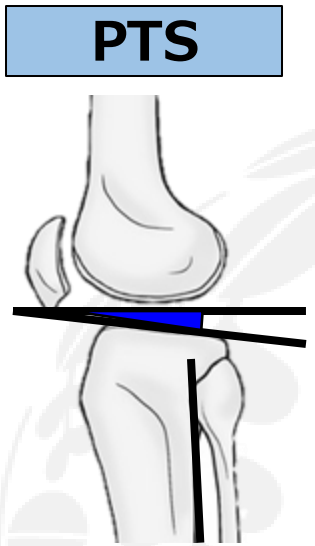


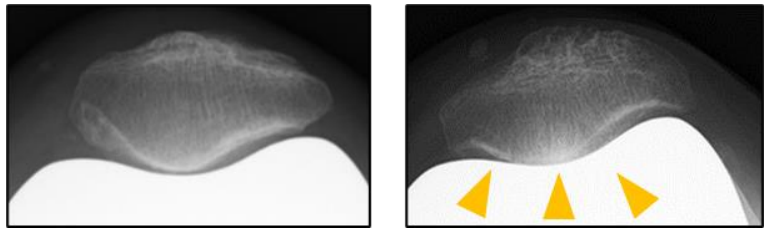
Figure 3.
Effect of PTS on PF joint pressure: a shallower slope may increase pressure.

The effect of FTPO and PTS on PF pressure pre- and post-TKA remains unclear

Purpose

To investigate the relationship between FTPO and PTS in relation to postoperative POS after TKA

POS



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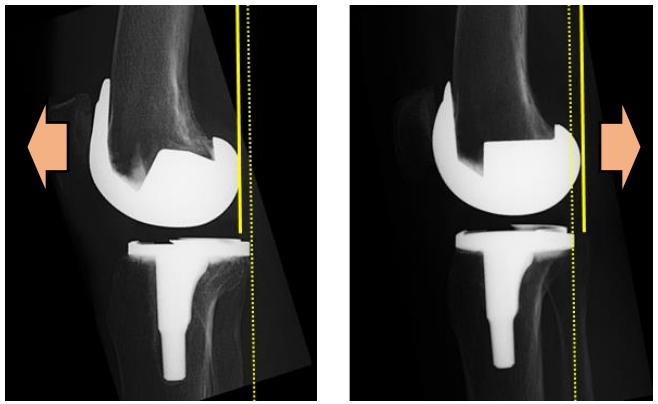
FTPO



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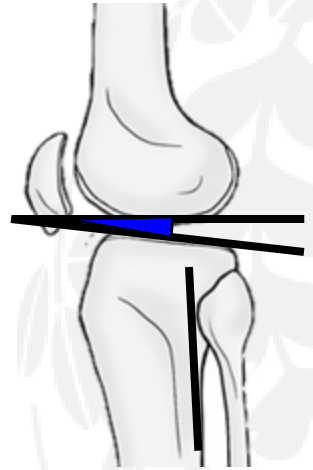
PTS



Subjects and Methods

- Study subjects:

  Jan 2017-Jan 2023, 80 knees (58-84 y/o, 12 male, 47 female)

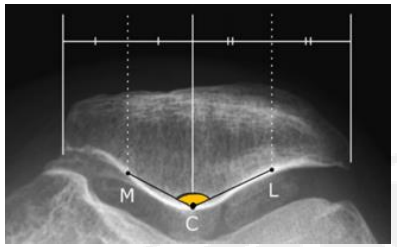
- Indications: Medial knee osteoarthritis

- Diagnosis of exclusion:

  Severe PF joint deformities, **Patella facet angle (PFA) < 132°** [9],
  Lateral knee osteoarthritis, Significant anterior knee symptoms,
  Rheumatoid arthritis, History of trauma or prior surgeries

- Procedure: TKA without patellar resurfacing was performed
  using Journey Ⅱ BCS (Smith & Nephew)

PFA



Subjects and Methods

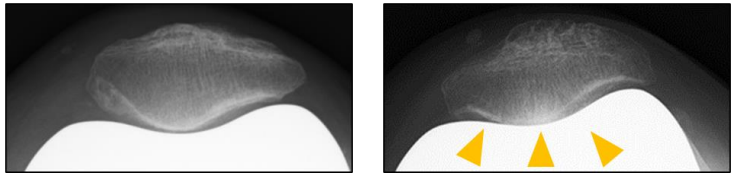
- Radiographic evaluation:

  Assessments at preoperatively and at one year postoperatively.

  - POS was evaluated using axial views
  - FTPO and PTS were measured using lateral views

- Statistical analysis of the relationship

  Between **POS** and **FTPO** **PTS**



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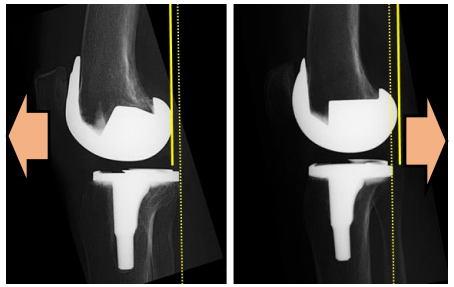

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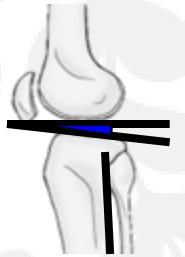
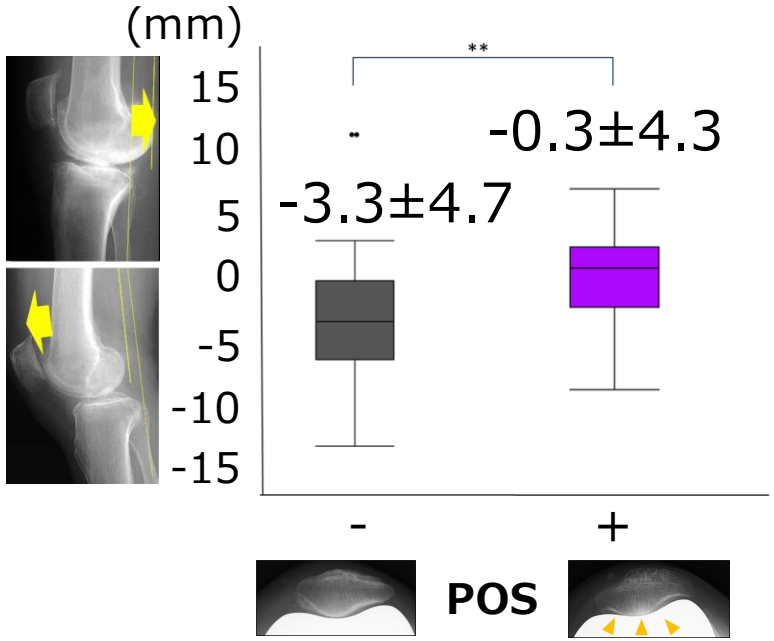


Statical method: t-test, Wilcoxon's rank sum test, x^2 test ($p<0.05$)

Results: Relationship between POS and FTPO

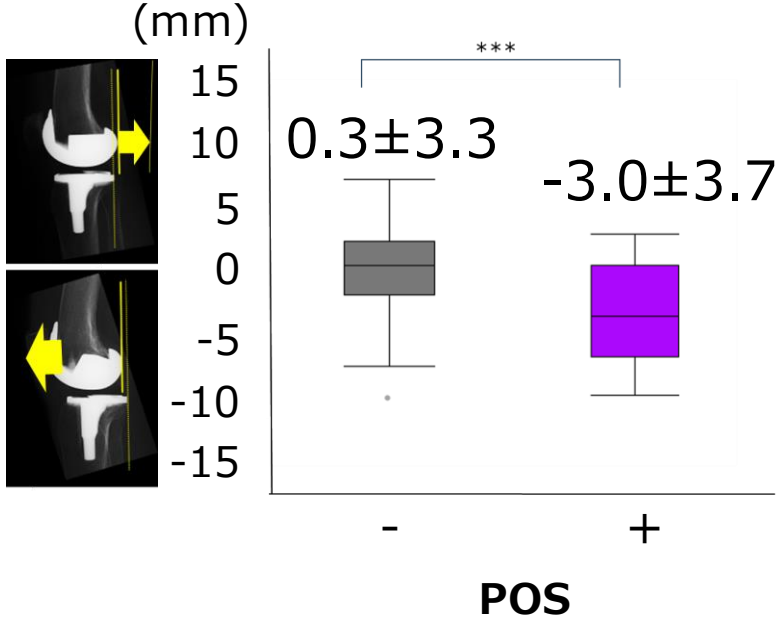
Pre-TKA FTPO

p＜0.01



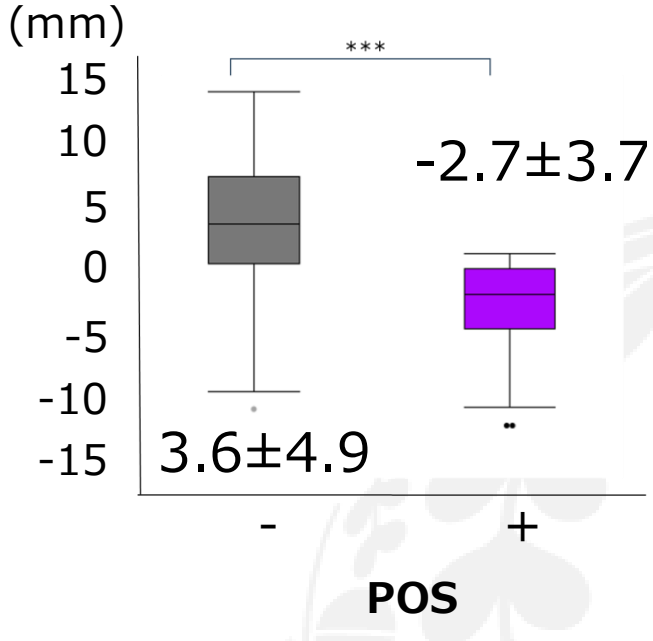
Post-TKA FTPO

p＜0.01



Pre- and Post- FTPO Change

p＜0.01



In the POS-positive group (23/80 knees)

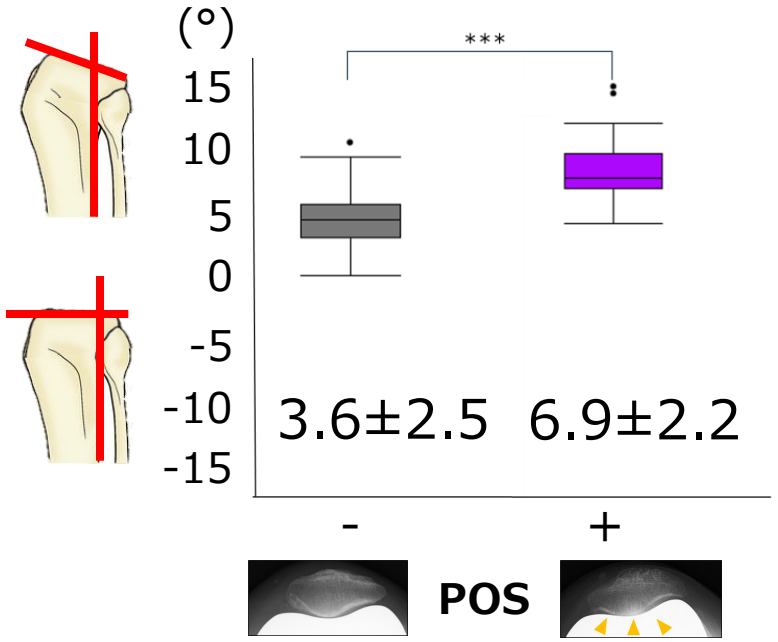
FTPO was significantly greater

Greater anterior shift of the femur after TKA

Results: Relationship between POS and PTS

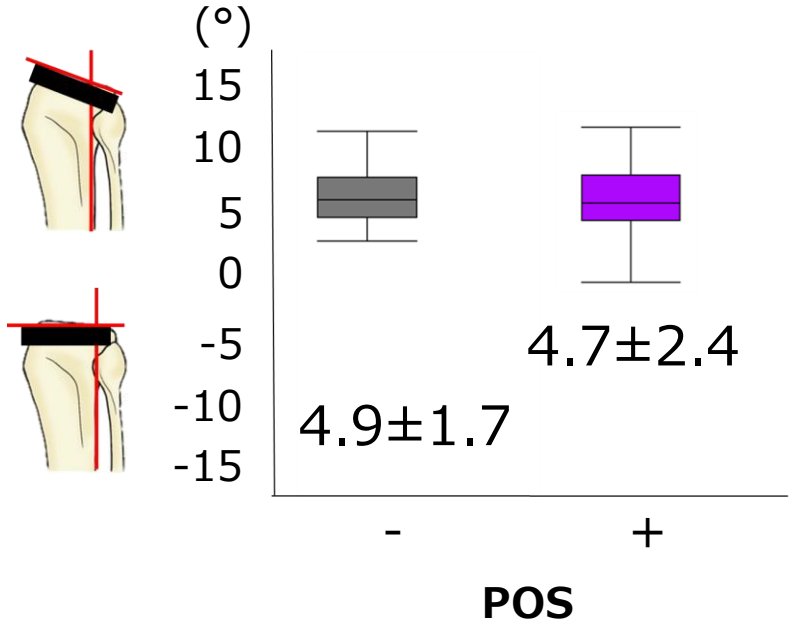
Pre-TKA PTS

p＜0.01



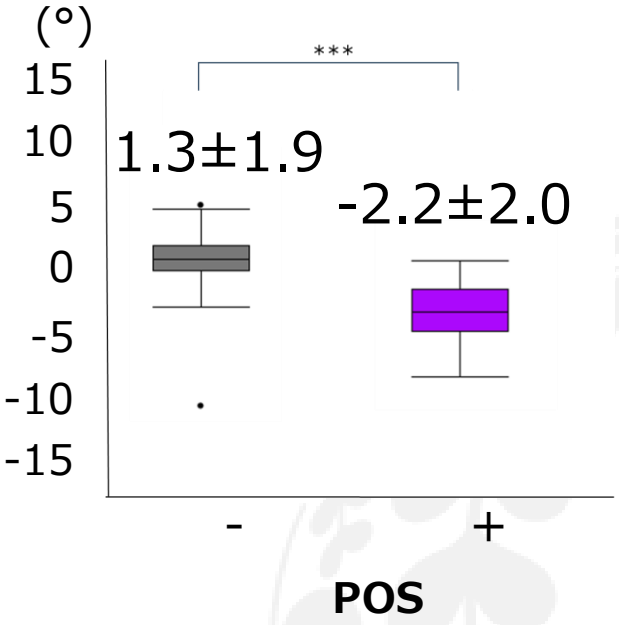
Post-TKA PTS

n.s.



Pre- and Post- PTS Change

p＜0.01

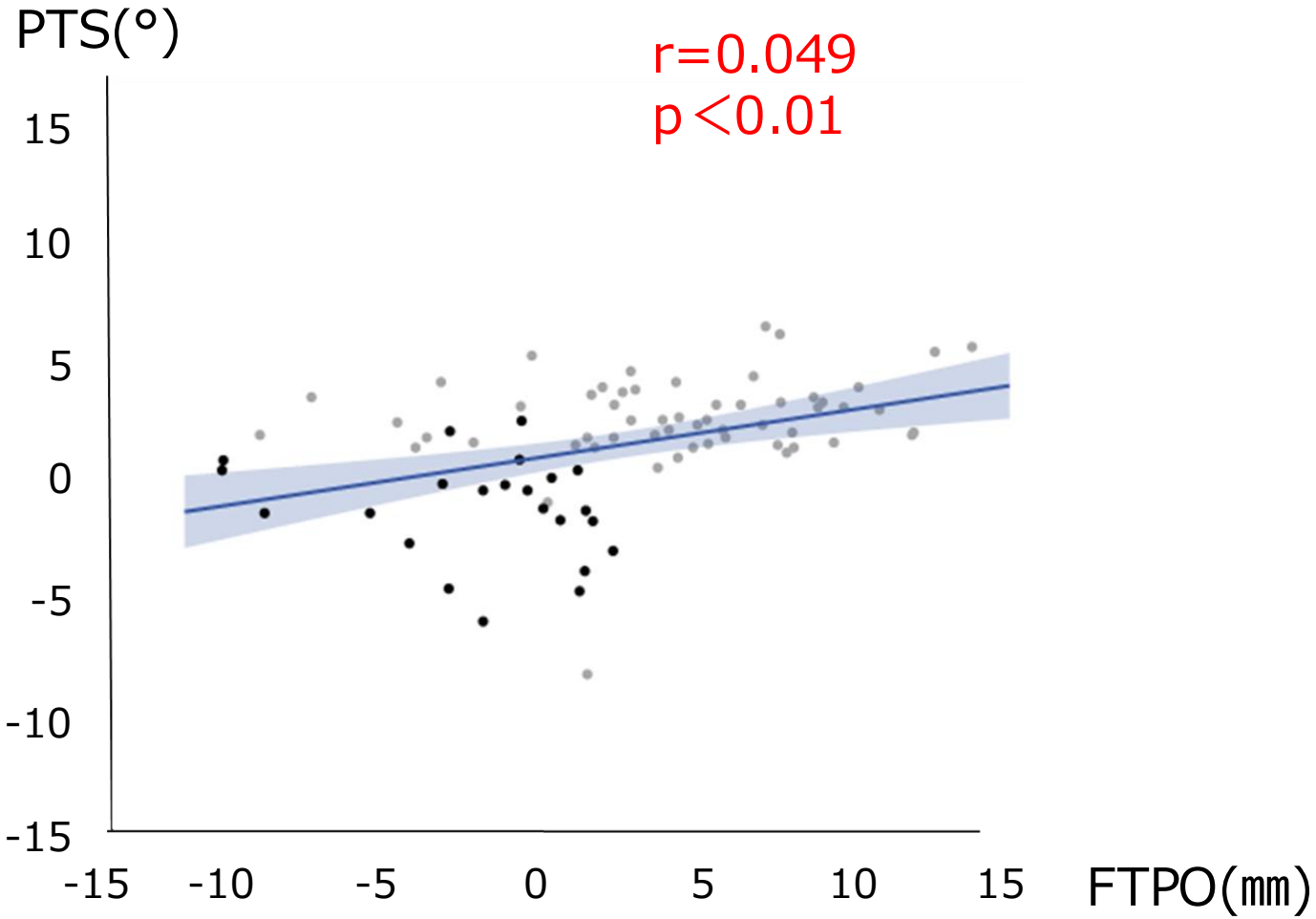


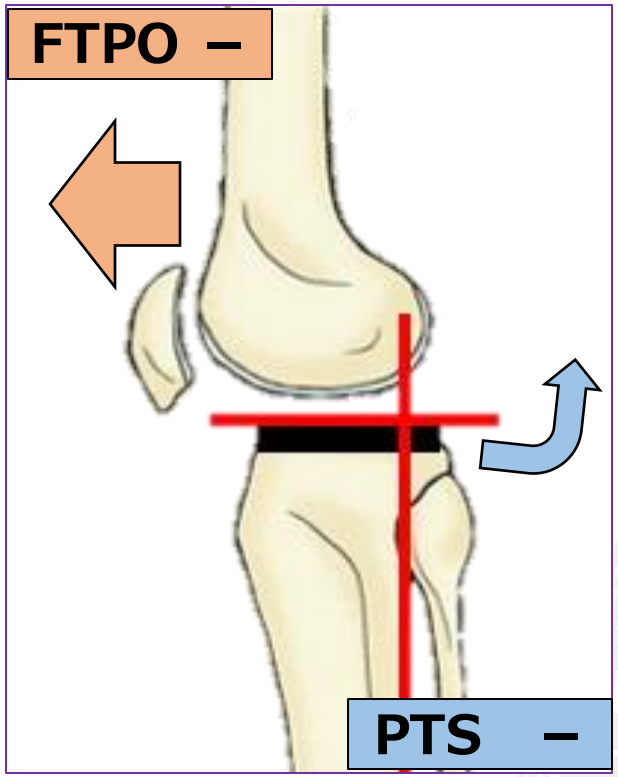
In the POS-positive group (23/80 knees)

the preoperative PTS was significantly larger

the postoperative PTS was reduced

Results: Correlation between FTPO and PTS



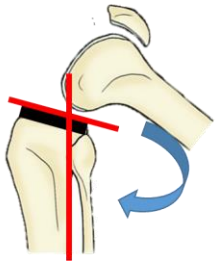


A moderate statistical correlation was observed FTPO and PTS

Discussion: Relationship between FTPO and PTS change

✓ An appropriate PTS ➡ Femoral rollback during deep knee flexion[10)]

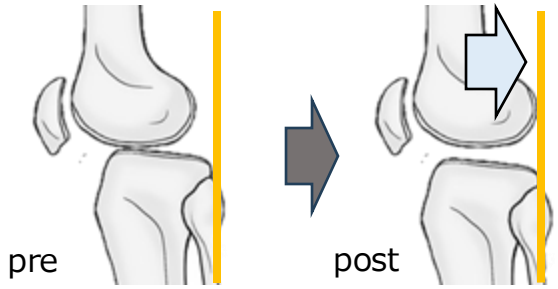
✓ Proper rollback movement ➡ Reduce PF pressure[11)]



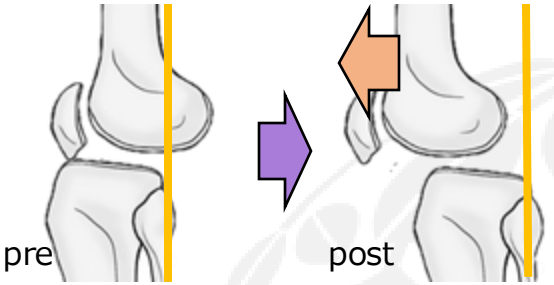
The results of this study

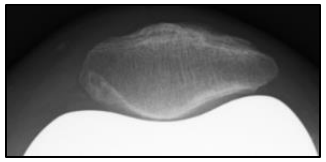
POS-negative group

FTPO

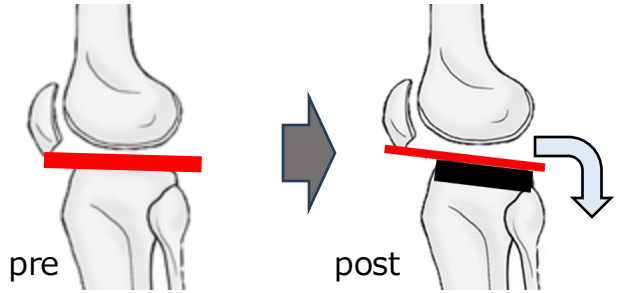


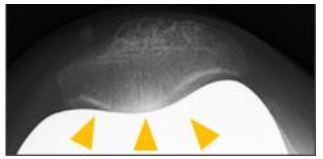
POS-positive group

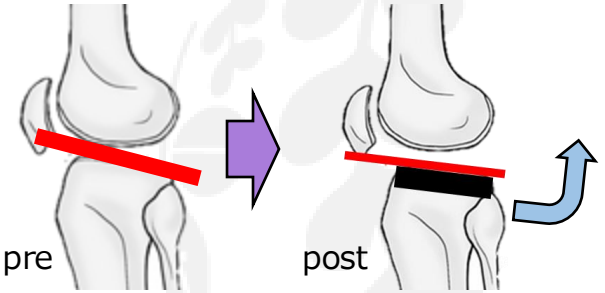




PTS







➢ Decrease in PTS ➡ Rollback ✕
Anterior deviation of the femur ➡ PF pressure↑
POS+

Discussion: POS after selective patellar surfacing TKA

- ✓ 52% of patients without patellar resurfacing TKA develop POS[12)]
- ✓ Patellar shape was related to PF contact stress following TKA without patellar resurfacing[9)]

The results of this study

- ➢ POS occurred in only **28.8%** of cases
- ➢ Selective patellar resurfacing based on patellar shape may contribute to the prevention of POS

※ Patella facet angle < 132° may indicate the need for patellar replacement in TKA

Conclusion

This study suggests that,

FTPO and PTS significantly influence postoperative PF pressure.

A smaller FTPO and reduced PTS may lead to increased PF pressure and bone sclerosis.

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