ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

Association Between Articular Incongruence Post-Trochleoplasty And Long-Term Patellofemoral Osteoarthritis

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Faculty Disclosure Information

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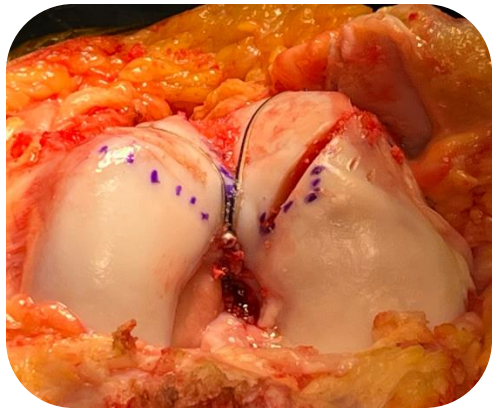
Trochleoplasty



- Trochleoplasty is a surgical option for **severe trochlear dysplasia**.[1-2]
- The impact of trochleoplasty on **OA development** remains unclear.
- **Unknown factors** may contribute to OA development.
- Postoperative articular **congruence** has not been evaluated.

Objectives

1. Assess if **post-trochleoplasty incongruence** correlates with long-term **OA**.

2. Determine if a **flat trochlea or patella** is an independent **risk factor**.

We hypothesized that poor congruence may increase OA risk over time.

Methods

Retrospective (2003 – 2013)

- Patients undergoing sulcus-deepening trochleoplasty

Exclusion:

- Unavailable full X-ray study (Postop and final follow-up)

X-ray institutional protocol

- Axial view (20º of flexion)
- HOROs DICOM software
- (version 3.3.6)

Postoperative Assessment

- Iwano classification
- IKDC
- Kujala

Methods

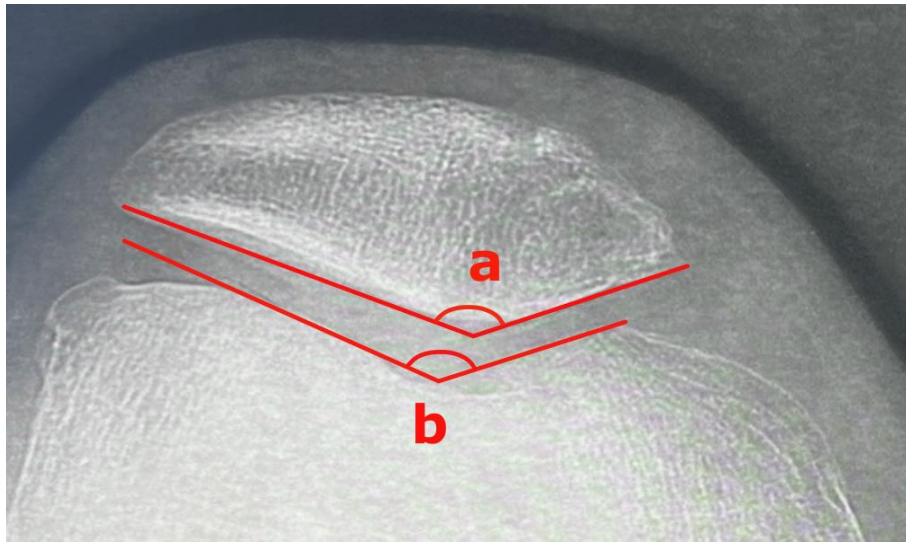


Figure 1. The articular surface angles are demonstrated on an axial view x-ray of a right knee. The patellar articular surface angle (PA) is based on the most posterior part of the patella and two lines along the lateral and medial facets (a). Trochlear articular surface angle (TA) is based on the deepest point of the trochlear groove and the most prominent aspects of the medial and lateral condyles (b)

Results

Table 1. Demographics Data and Surgical Details

Age (years), mean (SD)	20.4 (5.44)
Gender, Male (%)	4 (40%)
Side, Right (%)	5 (50%)
Previous Surgery, n (%)	2 (20%)
TT Osteotomy, n (%)	2 (20%)
Associated Procedures, n (%)	
TT Osteotomy, n (%)	4 (40%)
MPFLR, n (%)	8 (80%)
VM Plasty, n (%)	2 (20%)

SD; Standard Deviation, TT;Tibial Tuberosity, MPFLR; Medial Patellofemoral Ligament Reconstruction, VM; Vastus Mediales

Results

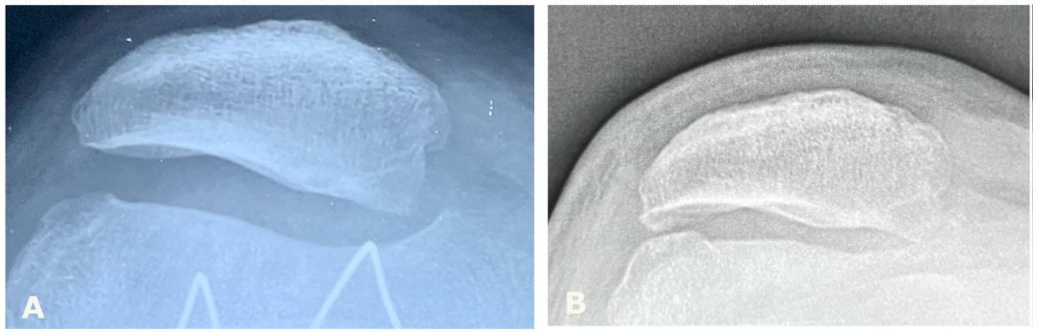


Figure 2. Incongruent patellofemoral joint example. (A) Immediate postoperative axial view x-ray of a trochleoplasty patient. (B) 17 years of follow-up axial view x-ray after fixation devices removal.

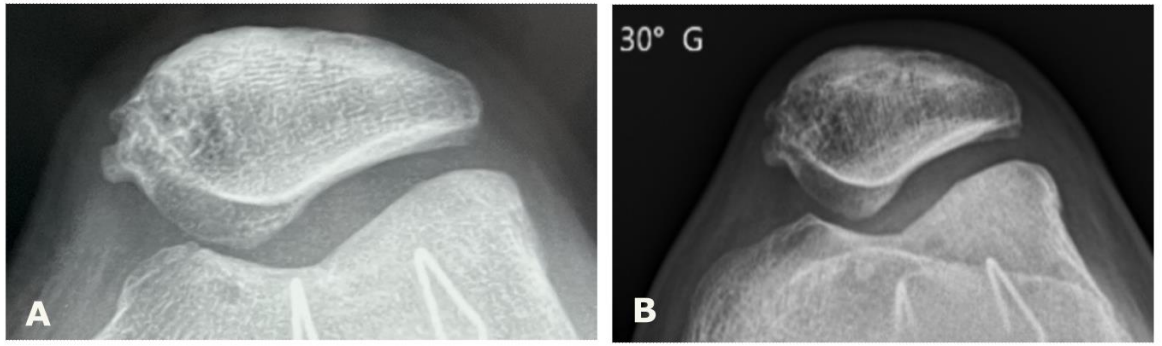


Figure 3. Congruent patellofemoral joint example. (A) Immediate postoperative axial view x-ray of a trochleoplasty patient. (B) 15 years of follow-up axial view x-ray.

Results

Table 2. Final Follow-up Results

		Range
Follow - up (years), mean (SD)	15.3 (3.93)	10.4 - 22.9
Patellar Angle, mean (SD)	148.5 (24.75)	110 - 180
Trochlear Angle, mean (SD)	148.5 (17.85)	120 - 174
Δ PT Angle, mean (SD)	21.4 (16.03)	6 - 56
Range of Motion (º), mean (SD)		
Extension	0	0 - 0
Flexion	135 (5.2)	130 - 140
CDI, mean (SD)	1.01 (0.17)	0.7 - 1.3
Kujala, mean (SD)	82.5 (10.09)	68 - 98
IKDC, mean (SD)	84.4 (9.79)	72.4 - 98.9
Return to Sports, n (%)	8 (80%)	
Satisfaction, mean (SD)	8.2 (1.75)	4 - 10
Patellofemoral OA (Iwano), n (%)		
None	6 (60%)	
I	2 (20%)	
II	2 (20%)	
Redislocation, n (%)	1 (10%)	

SD; Standard Deviation, Δ PT Angle; Patelar Angle - Trochlear Angle, CDI; Caton-Deschamps Index, IKDC; International Knee Documentation Committee, OA; Osteoartritis

Results

- **Higher patellofemoral incongruence** correlated with **OA** (p = 0.017).
- **No independent correlation** between:
  - Trochlear angle & OA (p = 0.553).
  - Patellar angle & OA (p = 0.884).
- **Follow-up duration & OA**: **Near-significant association** (p = 0.060).
- **No difference** when grouped by **<15** years **vs >15** years (p = 0.363).

Discussion

- Studies report high OA rates post-trochleoplasty, but the causes **remain unclear**.[3]
- **Biomechanical evidence** suggests **increased** patellofemoral contact **pressures post-trochleoplasty.**[4]
- Key findings:
  - Postoperative **incongruence** is **linked** to long-term **OA**
  - Higher articular **congruence** after trochleoplasty **may reduce OA** risk

Conclusion

- Postoperative **incongruence** correlates with long-term **OA**.
- **No** independent link between **OA** and a **flat trochlea or patella**.
- Higher **congruence** in trochleoplasty **may prevent OA** development.
- **Long-term evidence** on trochleoplasty outcomes is **limited**.

References

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3. Leclerc JT, Dartus J, Labreuche J, et al. Complications and outcomes of trochleoplasty for patellofemoral instability: A systematic review and meta-analysis of 1000 trochleoplasties. Orthop Traumatol Surg Res. 2021;107(7):103035.

4. Kaiser D, Götschi T, Bachmann E, Snedeker JG, Tscholl PM, Fucentese SF. Deepening trochleoplasty may dramatically increase retropatellar contact pressures- a pilot study establishing a finite element model. J Exp Orthop. 2022;9(1):76.