



Effect of Restricted Kinematic Alignment Total Knee Arthroplasty On Coronal Plane Alignment Of The Ankle Joint

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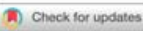
Conflict of interest

*The authors of this study declare
no financial interest or any other relationship
with a commercial institution*

- previous studies have reported that concomitant ankle OA occurs in 24%-35% of patients undergoing TKA
- one study showed that 35% of patients had ankle arthritis before TKA and 22% had newly developed or progressive ankle arthritis after surgery during at least 3 years of follow-up
- although the effects of knee OA on ankle degeneration have not been fully established, the association between knee malalignment and concomitant ankle morphology change has been proven

Primary Knee

Effect of Total Knee Arthroplasty on Coronal Alignment of the Ankle Joint



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Radiologic Changes of Ankle Joint after Total Knee Arthroplasty

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Radiographic assessment of knee–ankle alignment after total knee arthroplasty for varus and valgus knee osteoarthritis

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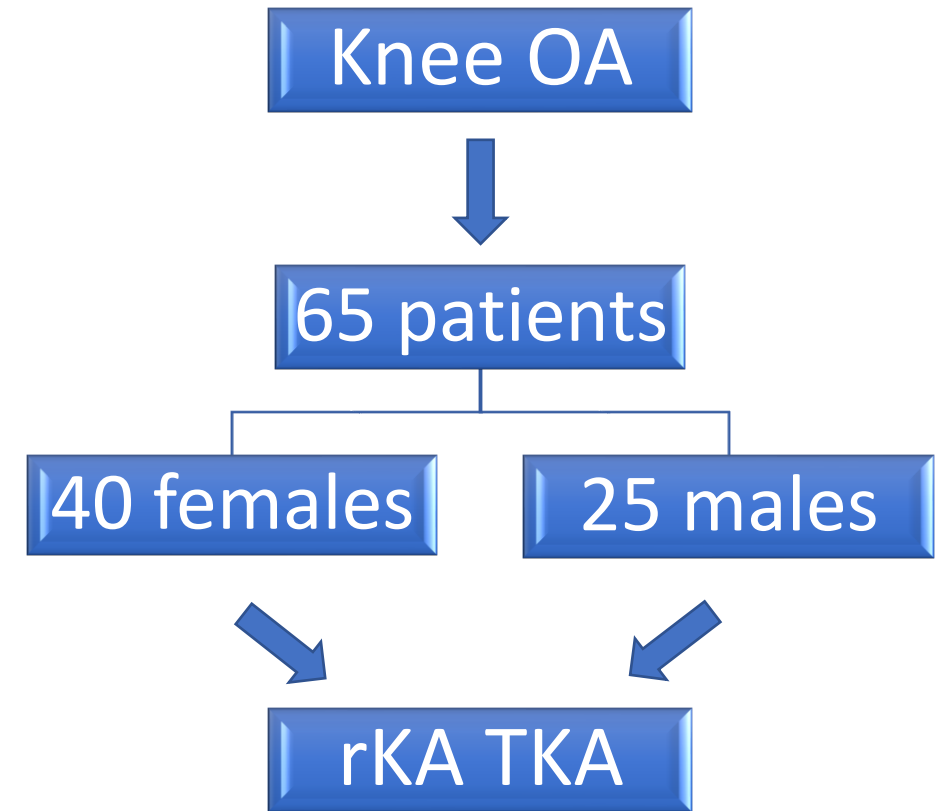
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Aim of the study

To evaluate how total knee arthroplasty affects ankle joint coronal alignment 6 weeks following the surgery

Materials and methods

- primary osteoarthritis → total knee arthroplasty
- two groups with varus deformity ($<10^\circ$ and $>10^\circ$)
- deformity correction in restricted kinematic alignment concept
- exclusion criteria:
 - ❖ prevalent fracture of lower limb
 - ❖ neurological disorders
 - ❖ valgus knee deformity



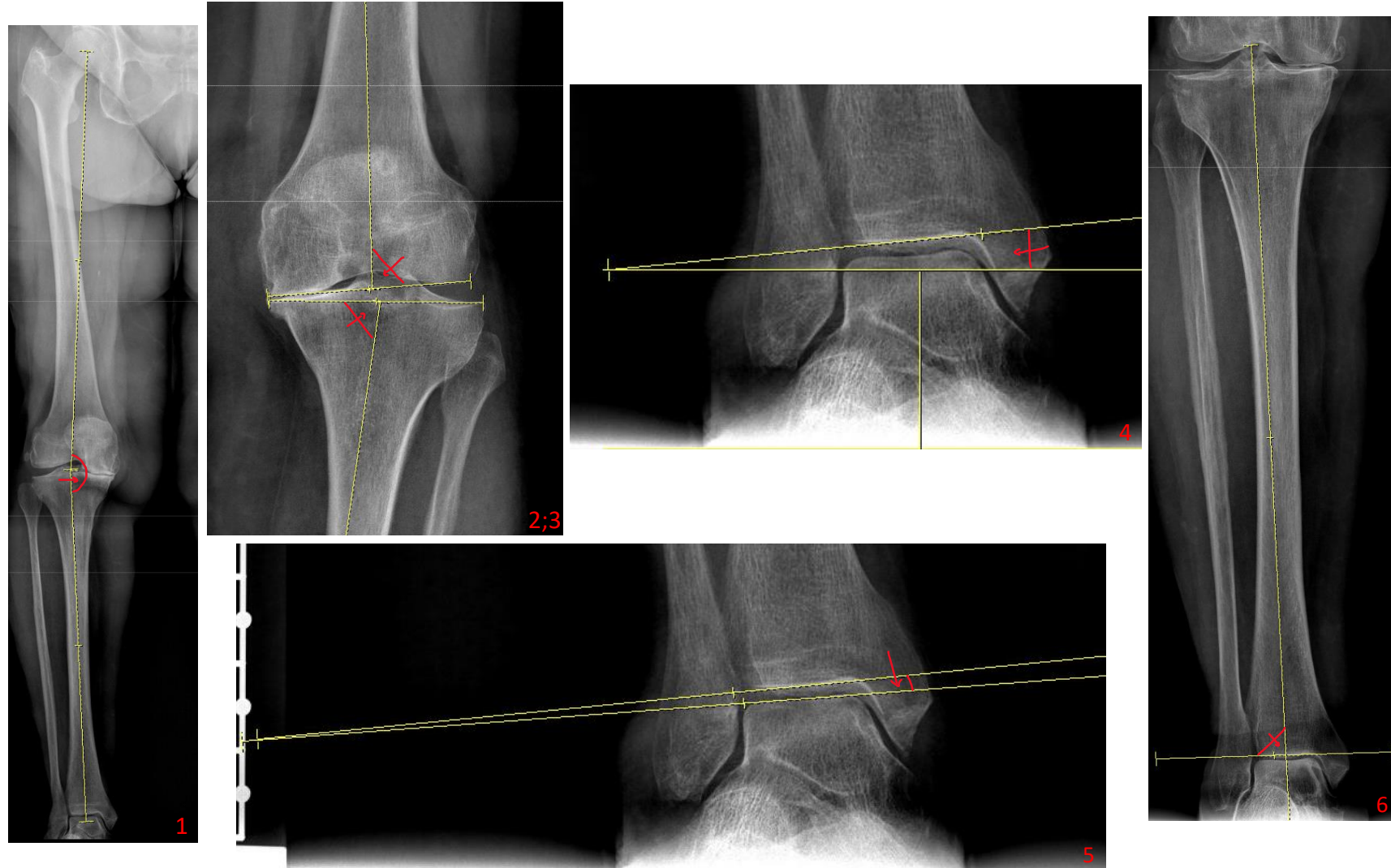
Radiographic evaluation

- pre- and postoperative X-Rays

- follow-up → 6 weeks

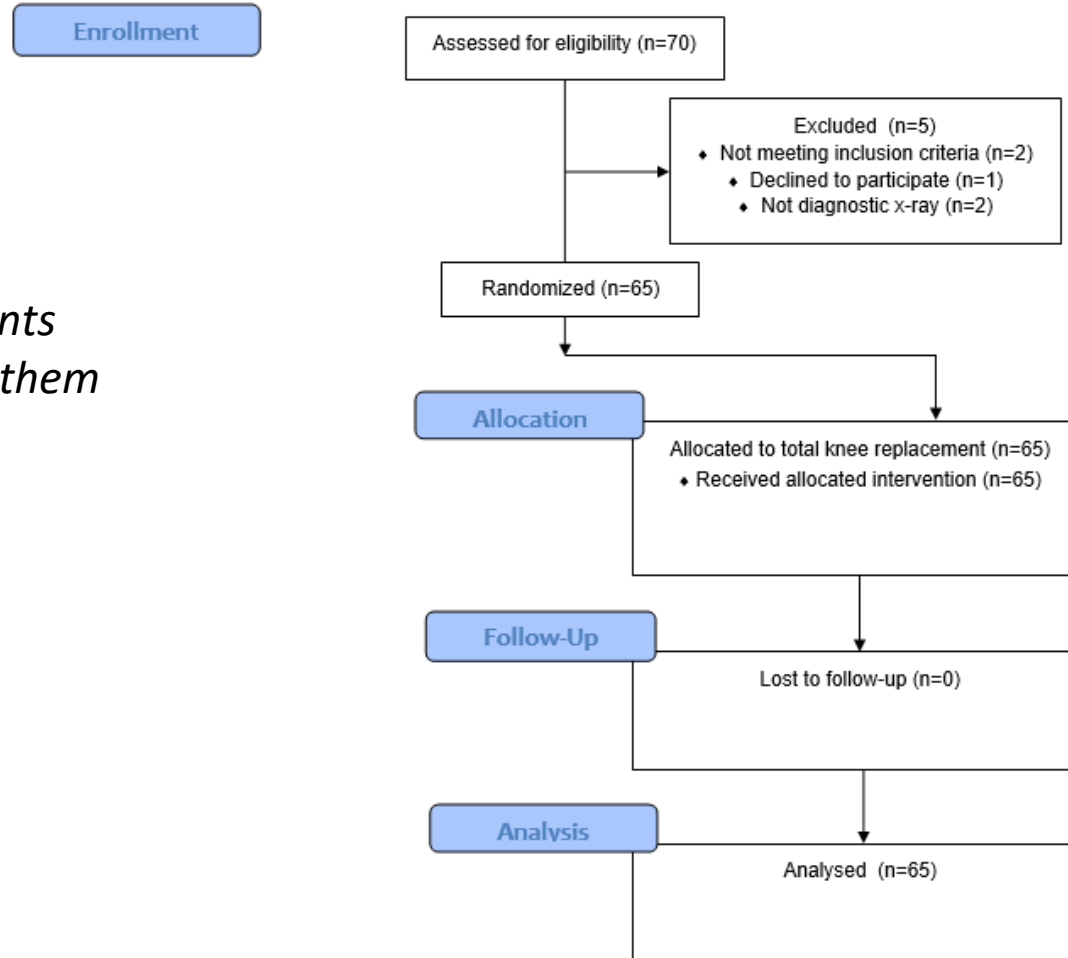
- measured parameters:

- ❖ lower limb mechanical axis (HKA) **1**
- ❖ lateral distal femoral angle (LDFA) **2**
- ❖ medial proximal tibial angle (MPTA) **3**
- ❖ ankle joint line orientation angle (AJOA) **4**
- ❖ tibial plafond talus angle (PTA) **5**
- ❖ lateral distal tibial angle (LDTA) **6**



The process of the study

From the group of 70 patients qualified for the study 5 of them were excluded



Results

	Change of HKA lesser than 3 degrees n=8 (Median(Q1-Q3))	Change of HKA greater than 3 degrees, n=54 (Median (Q1-Q3))	p-value
M:F ratio	1:7	21:33	0.24
Age	71.38 +- 8.21	70.04+-8.65	0.9

Tab.1 Baseline characteristics of the group with change of HKA lesser than 3 degrees and the group with change of HKA greater than 3 degrees.

There was no difference in patients' baseline characteristics regardless of HKA change or post-op values of HKA

	Post-op HKA values between 177-184 degrees, n=22 (Median (Q1-Q3))	Post-op HKA values other than 177-184 degrees, n=40 (Median (Q1-Q3))	p-value
M:F ratio	10:12	12:28	0.27
Age	71.32+-7.88	69.60+-8.92	0.4

Tab.2 Baseline characteristics of the group with post-op values of HKA between 177-184 degrees and the group with other post-op values of HKA.

Results

- no significant difference between groups both regarding change of AJOA and PTA

	Group with change of HKA lesser than 3 degrees n=8 (Median(Q1-Q3))	Group with change of HKA greater than 3 degrees, n=54 (Median (Q1-Q3))	p-value
Change in PTA	-1.24(-2.78 - 0.34)	-0.08(-0.9 - 0.71)	0.09
Change in AJOA	2.41(1.12 - 4.81)	3.05(1.18 - 4.56)	0.84

Tab. 3 Differences between the group with change of HKA lesser than 3 degrees and the group with change of HKA greater than 3 degrees in regard to change in PTA and AJOA values, respectively.

- significant difference between HKA values groups in change of PTA
- no significant difference with regard to AJOA between those groups

	Post-op HKA values between 177-184 degrees, n=22 (Median (Q1-Q3))	Post-op HKA values other than 177-184 degrees, n=40 (Median (Q1-Q3))	p-value
Change in PTA	-0.72 (-1.57 - 0.06)	0.33 (-0.71 - 0.79)	0.0193
Change in AJOA	2.99(1.80 - 4.17)	3.10(0.77 - 4.81)	0.9

Tab. 4 Differences between the group with post-op values of HKA between 177-184 degrees and the group with other post-op values of HKA in regard to change in PTA and AJOA values, respectively.

Results

	Change in HKA (rs-value)	p-value
Change in MPTA	0.37487	0.0027
Change in PTA	-0.05569	0.6673
Change in AJOA	0.33735	0.0073

Tab. 5 Spearman's correlation coefficients values (rs-values) of associations between change in HKA and change in MPTA, PTA and AJOA, respectively.

- significant positive weak association between change of AJOA and change of HKA
- significant positive weak association between change of MPTA and change of HKA

Conclusions

- The correction of knee joint malalignment **does** affect ankle joint abnormalities
- Possible cause of discomfort, ankle pain, gait disorders
- Ankle joints should always be investigated prior TKA

Thank You



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References

- Shichman I, Ben-Ari E, Sissman E, Oakley C, Schwarzkopf R. Effect of Total Knee Arthroplasty on Coronal Alignment of the Ankle Joint. *J Arthroplasty*. 2022 May;37(5):869-873. doi: 10.1016/j.arth.2022.01.059. Epub 2022 Jan 31. PMID: 35093550.
- Gursu S, Sofu H, Verdonk P, Sahin V. Effects of total knee arthroplasty on ankle alignment in patients with varus gonarthrosis: Do we sacrifice ankle to the knee? *Knee Surg Sports Traumatol Arthrosc*. 2016 Aug;24(8):2470-5. doi: 10.1007/s00167-015-3883-2. Epub 2015 Nov 21. PMID: 26590564.
- Feng Z, Ma M, Wang Y, Yang C, Liu Z and Xia Y (2021) Clinical and Radiological Changes of Ankle in Knee Osteoarthritis With Varus After Total Knee Arthroplasty: A Systematic Review. *Front. Surg*. 8:713055. doi: 10.3389/fsurg.2021.713055
- Lee JH, Jeong BO. Radiologic Changes of Ankle Joint after Total Knee Arthroplasty. *Foot & Ankle International*. 2012;33(12):1087-1092. doi:10.3113/FAI.2012.1087
- Onodera T, Majima T, Iwasaki N, Kamishima T, Kasahara Y, Minami A (2012) Long-term stress distribution patterns of the ankle joint in varus knee alignment assessed by computed tomography osteoabsorptiometry. *Int Orthop* 36(9):1871–1876
- Chandler JT, Moskal JT. Evaluation of knee and hindfoot alignment before and after total knee arthroplasty: a prospective analysis. *J Arthroplasty*. 2004 Feb;19(2):211-6. doi: 10.1016/j.arth.2003.09.007. PMID: 14973865.
- Gao F, Ma J, Sun W, Guo W, Li Z, Wang W. Radiographic assessment of knee-ankle alignment after total knee arthroplasty for varus and valgus knee osteoarthritis. *Knee*. 2017 Jan;24(1):107-115. doi: 10.1016/j.knee.2016.09.023. Epub 2016 Nov 14. PMID: 27856127.