

A comparison of ankle alignment after TKA between computer-assisted surgery (CAS) and conventional

RAUNGTHONG N¹, SRIPHIROM P²

¹*Department of Orthopedic Surgery, Banmi Hospital, Lopburi, Thailand*

²*Department of Orthopedic Surgery, Rajavithi Hospital, Bangkok, Thailand*

pornpavit@yahoo.com

Introduction: Proper alignment of the lower extremity is an important factor to improve long term survival and clinical outcome in total knee arthroplasty (TKA) (1). However, not only tibiofemoral alignment has been changed after TKA, the ankle alignment also was changed from the proximal tibial bone cut. Nowadays, computer assisted surgery (CAS) technique has been used to improve mechanical axis (MA) (2, 3). The authors hypothesized that CAS can improve ankle alignment from the accuracy of MA and tibial component.

The purpose of this study was evaluated and compared the mechanical lateral distal tibia angle (mLDTA) (4, 5) and obliquity of ankle joint line between CAS technique and conventional technique.

Methodology: Retrospective review 109 knees of 76 cases that undergo to TKA, 53 CAS and 56 conventional methods, mean age 66.5 ± 7.9 year (46 – 81 year) were included. Post-operative digital X-ray; long leg, full weight bearing film was performed which patients were stood in the same box and position to prevent error of limb rotation (4). We excluded the patients who had abnormal forefoot, midfoot that could not stand in X-ray box. All cases were measured MA, mLDTA and obliquity of ankle joint by a single non-paramedic reviewer. The Synapse PACS system was used to help more accuracy. All values were analyzed and compared between CAS and conventional groups.

Result: There is no difference of demographic data of two groups. The mean value of mLDTA for CAS group and conventional group were $90^\circ \pm 1.7^\circ$ (rang 86° - 94°) and $91^\circ \pm 3.2^\circ$ (rang 85° - 98°) respectively. This result showed that significant difference in both groups ($P \leq 0.05$). The data distribution in conventional group had more than CAS group. When normal value of mLDTA (89 ± 3) was compared, in CAS group had lower significant outlier than conventional group (11.3% and 32.1%, $p \leq 0.05$).

The mean value of ankle joint line obliquity in CAS group and conventional group were $3.2^\circ \pm 1.7^\circ$ (1° - 8°) and $5.2^\circ \pm 3.5^\circ$ (1° - 12°) respectively. The conventional group had more ankle joint obliquity than CAS group ($P \leq 0.05$).

Conclusion: The CAS technique improved more accuracy in ankle alignment included mLDTA and obliquity of joint line in scanogram than convention technique including had less data distribution. However, it remains unknown whether this data is relate to clinical outcome of ankle function, thus, in clinical outcome of ankle joint deserves further investigation.

Reference

1. Jeffery RS, Morris RW, Denham RA. Coronal alignment after total knee replacement. *J Bone Joint Surg Br.* 1991 Sep;73(5):709-14.
2. Fu Y, Wang M, Liu Y, Fu Q. Alignment outcomes in navigated total knee arthroplasty: a meta-analysis. *Knee Surg Sports Traumatol Arthrosc.* 2011 Oct 15.
3. Cheng T, Zhao S, Peng X, Zhang X. Does computer-assisted surgery improve postoperative leg alignment and implant positioning following total knee arthroplasty? A meta-analysis of randomized controlled trials? *Knee Surg Sports Traumatol Arthrosc.* 2011 Jul 6.
4. Radtke K, Becher C, Noll Y, Ostermeier S. Effect of limb rotation on radiographic alignment in total knee arthroplasties. *Archives of Orthopaedic and Trauma Surgery.* 2009;130(4):451-7.
5. Oswald MH, Jakob RP, Schneider E, Hoogewoud HM. Radiological analysis of normal axial alignment of femur and tibia in view of total knee arthroplasty. *J Arthroplasty.* 1993 Aug;8(4):419-26.