Clinical Outcomes of Total Knee Arthroplasty with Concomitant Total Ankle Arthroplasty Versus Ankle Arthrodesis

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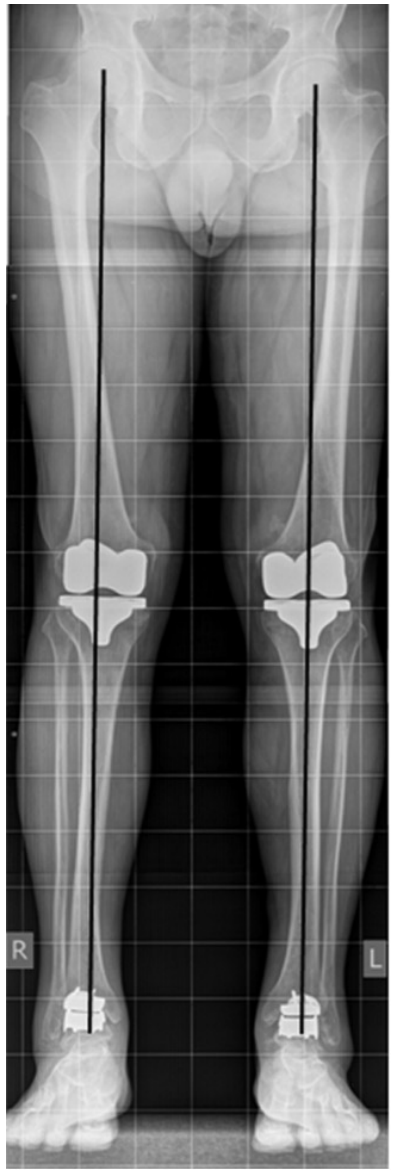
Disclosures

- No relevant disclosures

Background

- Anecdotal experience of at least one patient who underwent total knee arthroplasty (TKA) with ipsilateral ankle arthrodesis who developed severe instability and recurvatum
- No anecdotal observations of this in patients with TKA and total ankle arthroplasty (TAA)
- Little is known about the effect of these concomitant knee and ankle procedures



Literature Review

- Two case reports describing simultaneous TKA and TAA or ankle arthrodesis without mid- or long-term results reported [1,2]
- Prior studies have demonstrated worse TKA outcomes and early implant failure in the setting of ankle osteoarthritis (OA) and hindfoot malalignment [3,4]

Literature Review

- No studies exist regarding mid- or long-term outcomes of patients with TKA and concomitant TAA or arthrodesis
- A recent review article by Naylor et al highlighted the need for outcomes studies illuminating our currently limited understanding of the knee-ankle relationship comparing it to the hip-spine relationship [5]

Study Hypothesis and Question

- Hypothesis: Preservation of ankle motion afforded by TAA reduces pathologic stresses across the knee joint resulting in superior outcomes in TKA
- Study Question: Do patients with concomitant TKA and TAA have superior clinical outcomes relative to patients with TKA and ankle arthrodesis?

Methods

- Design: Retrospective cohort
- Subjects: Patients having undergone total knee arthroplasty (CPT: 27447) AND either ankle arthrodesis (Open CPT: 27870, arthroscopic CPT: 29899) OR total ankle arthroplasty (CPT: 27702, 27703, 27700)
- Exposure period
  - Defined as beginning after completion of both knee and ankle procedures
  - Used to determine follow up period and relevant revision procedures
- Patients contact by telephone to collect outcome measures

Methods

- Outcomes of interest:
  - Primary:
    - **Short form Knee Injury and Osteoarthritis Outcome Score (KOOS Jr) at final follow up**
  - Secondary
    - Foot and Ankle Ability Measure (FAAM) Activities of Daily Living (ADL) and Sports subscores
    - All-cause revision (after beginning of exposure period)
    - Knee range of motion
    - Incidence of knee recurvatum
    - Visual Analog Scale (VAS) pain score

Results – Subjects

- TKA: 19,061 cases
- Ankle arthrodesis: 1,223 open, 4 arthroscopic
- TAA: 359 primary, 55 revisions, 4 unclear (CPT: 27700)
- TKA + ankle arthrodesis: 56 unique subjects (34 ipsilateral)
- TKA + TAA: 13 unique subjects (7 ipsilateral)

Results – Demographics

- No differences ($p > 0.05$) between the two groups in:
  - Age at time of primary procedures
  - Proportion of female subjects
  - BMI
  - Smoking status
  - Comorbidities
  - Proportion of ipsilateral procedures
  - Baseline VAS pain scores
  - Follow up time
- Mean follow up time: 47.1 months

Results – Primary Outcome

- **No difference** median KOOS Jr scores at final follow up **(p = 0.24)**
  - TKA + TAA: 100
    - IQR: 92.0 – 100
  - TKA + Arthrodesis: 84.6
    - IQR: 74.8 – 100
- **No difference** in KOOS Jr scores in **ipsilateral only** subgroup **(p = 0.46)**
  - TKA + TAA: 100
    - IQR: 63.8 – 100
  - TKA + Arthrodesis: 84.6
    - IQR: 74.8 – 100

Results – Secondary Outcomes

- **No differences ($p > 0.05$)** observed between TAA vs arthrodesis groups in:
  - FAAM ADL or Sports subscores
  - VAS pain scores (0 vs 1.5)
  - Incidence of TKA revision (0 vs 2)
  - Incidence of ankle revision (1 vs 4)
  - Knee range of motion (122.2 ± 10.9 vs 118.0 ± 15.3)
  - Incidence of recurvatum (0 vs 2)

Discussion

- Summary of results
  - Outcomes appear to be **equivalent** between the two groups
  - The data **do not favor** TAA over arthrodesis from the perspective of TKA outcomes and thus should not influence indications
  - Our study is significant in that it is the **first of its kind** reporting the mid-term outcomes of these concomitant knee and ankle procedures

Discussion

- Limitations
  - Relatively small number of subjects (n = 69)
    - Ours is one of the highest volume centers in the country
    - For a significantly larger cohort, a multi-center study would be necessary
  - Complex relationship between procedures (temporality and laterality)
  - Migration into and out of the system (subjects relocate or transfer care)
  - Inherent selection bias when choosing candidates for each procedure

References

[1] Pagenstert G, Hintermann B. Simultaneous bilateral total knee and ankle arthroplasty as a single surgical procedure. BMC Musculoskelet Disord 2011;12:233. https://doi.org/10.1186/1471-2474-12-233.

[2] Nozaka K, Miyakoshi N, Yuasa Y, Mita M, Shimada Y. Simultaneous Total Knee Arthroplasty and Ankle Arthrodesis for Charcot Neuroarthropathy. Case Rep Orthop 2019;2019:6136409. https://doi.org/10.1155/2019/6136409.

[3] Chang CB, Jeong JH, Chang MJ, Yoon C, Song MK, Kang S-B. Concomitant Ankle Osteoarthritis Is Related to Increased Ankle Pain and a Worse Clinical Outcome Following Total Knee Arthroplasty. J Bone Joint Surg Am 2018;100:735–41. https://doi.org/10.2106/JBJS.17.00883.

[4] Meding JB, Keating EM, Ritter MA, Faris PM, Berend ME, Malinzak RA. The planovalgus foot: a harbinger of failure of posterior cruciate-retaining total knee replacement. J Bone Joint Surg Am 2005;87 Suppl 2:59–62. https://doi.org/10.2106/JBJS.E.00484.

[5] Naylor BH, Seidman D, Scuderi GR. Bridging the Gap: The Influence of Foot and Ankle Pathomechanics in Total Knee Arthroplasty. J Am Acad Orthop Surg 2021. https://doi.org/10.5435/JAAOS-D-20-00786.

Thank You