Arthroplasty vs Arthrodesis for End Stage Ankle Arthritis: Decision Analysis Using Markov Model

Foot & Ankle Category: Ankle Arthritis

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Introduction
Total ankle arthroplasty and arthrodesis is the two mainstreams of treatment for end stage ankle arthritis. This study was performed to determine which is a better choice for ankle arthritis between total ankle arthroplasty and arthrodesis, using a decision analysis and Markov model to reflect the repetitive nature of revision arthroplasty.

Methods
Based on the current published evidences, a decision tree was constructed to compare the clinical outcomes of total ankle arthroplasty and arthrodesis, which contained the possible clinical events and the probabilities. Total ankle arthroplasty was subject to revision arthroplasty, and Markov model was adopted for this branch to reflect this repetitive trait of the procedure. Arthrodesis could cause adjacent arthritis, and conventional decision analysis model was adopted for this branch. Quality well-being index score was used for clinical outcome assessment, which was the utility in the decision tree. Sensitivity analysis was performed to test the stability of the decision tree and the threshold values.

Results
The model favored total ankle arthroplasty over arthrodesis in terms of quality well-being index score. Sensitivity analysis showed that the model was considerably stable, unaffected by the changes in probabilities of failure after total ankle arthroplasty and adjacent arthritis after arthrodesis.

Conclusion
Total ankle arthroplasty was found to be a better treatment than arthrodesis for ankle arthritis, based on current evidences. Future development in the implant materials, improved understanding of ankle biomechanics, and surgical techniques are believed to further enhance the clinical outcome of total ankle arthroplasty.