Paper #18

Reconsidering the Strategies to Manage Chronic Periprosthetic Total Knee Infections: Using Decision Analytics to Find the Optimal Strategy between One-Stage and Two-Stage Total Knee Revision

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Notes

Introduction: Treatment strategies of chronic periprosthetic infections(PJI) following total knee arthroplasty include either 2-stage or 1-stage revision. Even though 2-stage strategy is the gold-standard, there is significant morbidity and mortality with this strategy. One-stage revision is associated with lower mortality rates and better quality of life. Surgeons are faced with a difficult decision regarding which strategy to use to treat these infections considering the uncertainty in infection eradication, quality of life and societal costs. This study uses decision analysis to determine the optimal decision in managing these infections.

Methods: Expected-value decision trees were constructed to estimate the quality-adjusted life years(QALY) and costs associated with each strategy. Decision Tree 1 was constructed for all pathogens, while Decision Tree 2 analyzes difficult to treat pathogens including methicillinresistant infections. Parameter values in the decision model such as mortality rate, reinfection rate and need for additional surgeries were derived from the literature. Medical costs were obtained from Medicare data. A Markov model was used to calculate QALYs gained over a 15-year period.

Results: In both decision trees, 1-stage strategy produced more QALYs and was the more cost-effective solution. In 90% of the Monte Carlo trials for Decision Tree 1, 1-stage was the dominant strategy in producing more QALY units and in being more cost-effective. In 72% of the Monte Carlo trials for Decision Tree 2, 1-stage was the dominant strategy in producing more QALY units and in being more cost-effective. Sensitivity analysis showed that reinfection rate with both strategies and mortality rate within the 1st year of surgery were the most sensitive parameters influencing the decision.

Conclusion: Despite 2-stage revision being the gold-standard treatment, the optimal decision that produces the highest quality of life is 1-stage revision. These results should be considered in shared decision making with patients who suffer from PJI following TKA.

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