

# A Cost-Effectiveness Analysis of Combined Dual Motor Nerve Transfers versus Conservative Management Strategies to Restore Shoulder Function in Upper Brachial Plexus Injuries

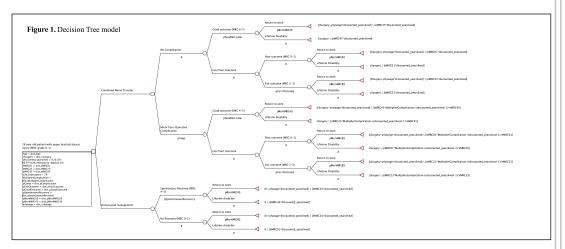
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### **Introduction**

Restoration of shoulder function is an important treatment goal in upper brachial plexus injuries. Combined dual nerve transfers (CDNT) of spinal accessory to suprascapular nerve and radial to axillary nerve have been shown to be consistently effective, providing significant functional recovery with minimal associated procedural risk. In this study, we aim to evaluate the cost-effectiveness of CDNT surgery versus non-operative treatments in patients with upper brachial plexus injuries affecting the shoulder.

#### **Methods**

A decision tree cost-effectiveness model was built to evaluate costs (\$) and effectiveness (quality-adjusted life years, QALYs), associated with CDNT compared to non-operative treatments (Figure 1). Analyses were performed from a third-party payer perspective. Estimates for probabilities of surgical success, complications, non-operative outcomes, QALYs, and costs were derived from published studies. Incremental cost-effectiveness ratios (ICERs), in \$/QALY, were calculated for each strategy, and the willingness-to-pay (WTP) threshold was set at \$50,000/QALY. One-way, two-way, and probabilistic sensitivity analyses with 100,000 iterations were performed to account for uncertainty in model inputs and their effects on costs and effectiveness outcomes.



#### **Results**

Base case model showed CDNT surgery increases survival by 0.92 QALY in patients with upper brachial plexus injuries at an increased cost of \$5,000 (CDNT versus Non-Operative; 22.74 versus 21.81 QALY). ICER for CDNT versus Non-Operation was \$5,494/QALY gained. When adjusting for income losses associated with disability, the ICER for CDNT was dominant at \$-77,682/QALY gained, suggesting lifetime savings with surgery. Our model was sensitive to changes in estimates of life expectancy, patient age, surgical success, and surgical costs. CDNT remained cost-effective within reasonable limits of parameter variation in sensitivity analyses. Probabilistic sensitivity analyses showed CDNT cost-effectiveness at WTP=\$50,000 in 72.5% and 56.3% of trials, with and without income adjustment respectively. (Figure 2)

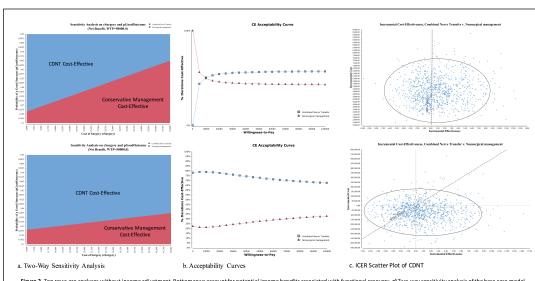


Figure 2. Top rows are analyses without income adjustment. Bottom rows account for potential income benefits associated with functional recovery. a) Two-way sensitivity analysis of the base case model showing CDNT as the dominant treatment strategy across a wide range of surgical scots between 5.5,000 and 550,000 and corresponding probabilities of surgical success between 0.1 and 0.95. b) Cost-Effectiveness Acceptability curves showing the probability of CDNT cost-effectiveness with increasing WTP thresholds. CDNT dominates in 72.5% and 56.3% of trials at WTP=550,000. c) ICER Scatterplot Of CDNT versus Non-surgical management for the restoration of shoulder function in upper brachial plexus injuries. Probabilistic analysis performed with 100,000 iterations.

## **Conclusions**

CDNT surgery is a cost-effective intervention to regain shoulder function in patients with upper brachial plexus injuries.