

Cost-Effectiveness of Reconstructive Neurosurgery to Restore Elbow Flexion in Upper Brachial Plexus Injury

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Background

- Brachial plexus injury (BPI) disproportionately affects young males causing lifelong disability and decreased quality of life.
- Reconstructive neurosurgery has an array of procedures to restore lost function: elbow flexion is a surgical priority.
- Critical 6 month window post-injury: nerves can be transferred as muscle remains receptive to reinnervation.
 - Beyond a year, options are more limited
- Most common procedure to re-innervate elbow flexion: Oberlin procedure
- Redundant ulnar fascicles are cut as they pass the biceps, then attached to the musculocutaneous branch just before entering the Biceps muscle, usually with excellent results.

Objective:

- Analyze the cost-effectiveness of early restoration of elbow flexion through nerve transfer.

Methods

- Effectiveness determined using quality adjusted life years (QALY).
- Medical/surgical costs estimated using Medicare payment rates for appropriate CPT codes.
- Indirect costs: return to work probabilities and average national wage (bureau of labor statistics).
- A state-transition model captured changing health states over time and a Markov model simulated lifetime costs and QALYs.
- Transition probabilities were collected from published studies assessing efficacy, complication rates, and natural history of conservative treatment.
- Summary measure: Incremental cost-effectiveness ratio (ICER).
- ICERs less than a willingness-to-pay of \$50,000/QALY were considered cost-effective.

Results

- Base-case analysis demonstrated Oberlin had a cost of \$5066.19 and lifetime effectiveness of 0.79 QALY compared with conservative management.
- Without modeling loss of income, surgical treatment had an ICER of \$6,453.41/QALY.
- With income accounted for, surgical treatment strongly dominated conservative management.
- Spontaneous recovery after 4.5m is likely low but unknown. Fig 1 shows a sensitivity analysis analyzing this (excluding potential income).

Implications

- Within the critical window, Oberlin procedure is highly cost-effective.
- Nerve transfer should be considered in the acute phase of any management plan for peripheral nerve injury.
- Prospective studies with detailed health-utilization and indirect cost data would greatly advance health economic knowledge in the expanding fields of restorative neurology and reconstructive neurosurgery.

Fig 1. Sensitivity Analysis

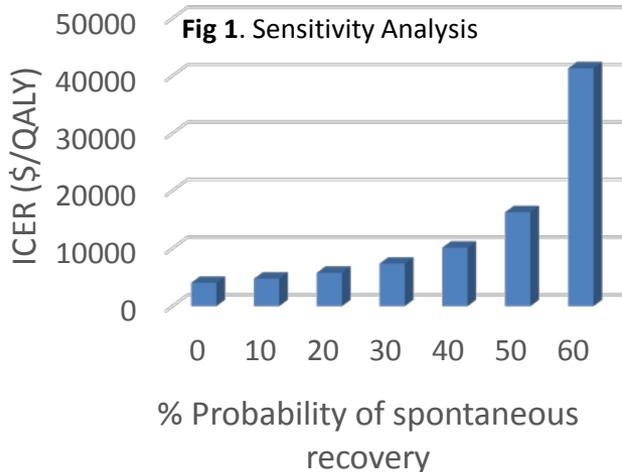


Fig 2. Ulnar fascicle transfer to Biceps branch

