Introduction

Nerve transfers are being used with increasing frequency for surgical reconstruction following brachial plexus injury. This systematic review compares functional outcomes of the donor activation focused rehabilitation approach (DAFRA) and general rehabilitation for C5-C7 brachial plexus palsy reconstruction with nerve transfers.

Methods

A literature review of all published data from 2005 to March 2014 was conducted using PubMed, Cochrane Database of Reviews, Ovid-Medline, Web of Science, and PEDro databases. Studies were selected based on predefined criteria. Synthesis of 12 papers which fit the inclusion criteria was performed. To allow for easier comparison of results, outcomes of BRC manual muscle testing were converted into three categories: “poor,” “moderate,” and “excellent.”

Inclusion Criteria:

A level C5-C7 brachial plexus injury, nerve transfer performed to restore elbow flexion and/or shoulder abduction motion, a follow up time of at least 1 year post surgery, and at least one of the following outcomes: elbow flexion/shoulder abduction strength or range of motion, donor motor nerve strength, return to work ability, appropriate outcome measures, or a description of ADL performance.

Terms:

• Donor Activation Motor re-education program - includes any post-operative exercise intervention that is described in detail, focused on activation of the donor motor nerve and is provided by physical therapists or the primary physician for specialized treatment

• General postoperative rehabilitation - includes any post-operative exercise interventions that are not focused on donor activation and are provided by physical therapists or the primary physician.

Results

TABLE 1: SUMMARY OF ELBOW FLEXION STRENGTH GRADING BY GROUP

<table>
<thead>
<tr>
<th>Group</th>
<th>Grade</th>
<th>Percentage</th>
<th>N (Number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAFRA Group (N=43)</td>
<td>M4-5</td>
<td>Excellent</td>
<td>37 (86.05%)</td>
</tr>
<tr>
<td></td>
<td>M3</td>
<td>Moderate</td>
<td>4 (9.30%)</td>
</tr>
<tr>
<td></td>
<td>M0-2</td>
<td>Poor</td>
<td>2 (4.65%)</td>
</tr>
<tr>
<td>General Rehabilitation Group (N=188)</td>
<td>M4-5</td>
<td>Excellent</td>
<td>81 (43.09%)</td>
</tr>
<tr>
<td></td>
<td>M3</td>
<td>Moderate</td>
<td>100 (53.19%)</td>
</tr>
<tr>
<td></td>
<td>M0-2</td>
<td>Poor</td>
<td>7 (3.72%)</td>
</tr>
</tbody>
</table>

- Surgical delay ranged from 0-11 months in the DAFRA group and 0.5-15 months in the general group.
- Mean age ranged from 19-37 with a predominantly male population.
- Follow-up ranged from 1-4 years for both groups.
- Comparison between groups was performed by contingency table for the variables of ROM (shoulder abduction, external rotation, and elbow flexion), strength (shoulder abduction, elbow flexion, grip, and pinch), return to work time, and self-reported disability scales (DASH, pain).
- A meta-analysis of 12 studies was completed for the outcome of elbow flexion strength with a total of 231 patients. Analysis by SPSS showed a statistically significant group mean and median difference (Mann Whitney U=2330, p< 0.001, z=-1.69, 1-tailed exact) for excellent elbow flexion strength grade outcomes in the DAFRA group (86.0%) compared to the general rehabilitation group (43.0%).

Conclusion

This review demonstrates positive rehabilitation outcomes for post nerve transfer patients after a C5-C7 brachial plexus injury. Strength return to muscle grades of 4/5 and 5/5 are possible and may be achieved to a greater extent with a focused donor activation motor re-education program.

References