Long-term Outcomes of External Rotation Tendon Transfers in Children with Brachial Plexus Birth Palsy

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Disclosure
The authors have no disclosures to report

Brachial plexus birth palsy (BPBP)
• The incidence of brachial plexus birth palsy is 0.4-4.6 per 1000 live births
• Complete recovery in 60%
• Long-term sequelae
  • Elbow flexion contracture
  • Weakness of wrist extension
  • Impaired hand function
  • Internal rotation contracture of the shoulder

External Rotation Tendon Transfer (ERTT)
• Sever, L'Episcopo, Hoffer
• Latissimus dorsi and teres major cut from their insertion on anteromedial humerus and transferred to the rotator cuff
• Small case series with short term follow-up demonstrate favorable results
• Long-term outcomes have yet to be established
Specific Aims

1) To determine if ERTT improves ER and abduction initially (within the first post-operative year)

2) To determine if gains in ER and/or abduction are maintained over time

3) To evaluate predictive factors of outcomes (age at the time of surgery, gender, subscapularis and/or pectoralis release)

Study Design

- Prospective, longitudinal case series
- 139 children undergoing ERTT (one surgeon) at Shriners Hospital between 1994 and 2007
  - 116 included in analysis (>2 yr f/u)
- Shoulder ER and abduction were measured pre-op, post-op and yearly

Statistical Analysis (SPSS)
- Paired t-test
- Linear mixed modeling
- Significance criterion p<0.05

Results

(Specific Aim #1 – Initial gains)

- Initial post-operative abduction improved by 28 degrees (p<0.001)
- Initial post-operative ER improved by 41 degrees (p<0.001)
- Improvements were statistically significant whether or not the pectoralis and/or the subscapularis were released

<table>
<thead>
<tr>
<th>Variable</th>
<th>N (%)</th>
<th>Pre-op ROM (deg)</th>
<th>Post-op ROM (deg)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median age at surgery (yr)</td>
<td>5.3 (2-13)</td>
<td>125.3</td>
<td>120.9</td>
<td>&lt;0.001</td>
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<td>Median follow-up (yr)</td>
<td>7 (2-13)</td>
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<tr>
<td>Gender</td>
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</tr>
<tr>
<td>Male</td>
<td>49 (42)</td>
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<tr>
<td>Female</td>
<td>67 (58)</td>
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<tr>
<td>Narakas Classification</td>
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<tr>
<td>I (C5-6)</td>
<td>63 (54)</td>
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<tr>
<td>II (C5-7)</td>
<td>33 (28)</td>
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<tr>
<td>III (global palsy)</td>
<td>21 (18)</td>
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<tr>
<td>Pectoralis release</td>
<td>84 (72)</td>
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<tr>
<td>Subscapularis release</td>
<td>17 (15)</td>
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Results
(Specific Aim #2 – Gains over time)

- Gains in ROM declined over time but was statistically significant (p<0.05) through 8 years of follow-up

Results
(Specific Aim #3 – predictive factors)

- There were no statistically significant difference in outcomes for patients who underwent pectoralis and/or subscapularis releases
- Increased age at the time of surgery was predictive of decreased gains in abduction and ER (correlation coefficient -0.22)
- Gender and Narakas classification were not predictive of outcome

Conclusions

- Largest case series to date to evaluate long-term outcomes of ERTT
- **Aim #1**: ERTT improves both abduction and ER in the initial post-operative period
- **Aim #2**: Gains in abduction and ER decrease over time but remain statistically significant through 8 years of follow-up
- **Aim #3**: Additional releases are not predictive of outcomes. Increased age at the time of surgery is predictive of decreased gains in ER and abduction
- New surgical techniques may improve initial and long-term outcomes of children with BPBP and an internal rotation shoulder contracture

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