Management of upper limb in cerebral palsy

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Importance of upper limb in CP

- Activities of daily living
- Feeding
- Toilet care
- Walker and wheelchair
- Support hand
Problems in upper limb

- Shoulder adduction and internal rotation contracture
- Elbow flexion contracture
- Forearm pronation
- Wrist palmer flexion
- Finger flexion
- Thumb in palm
Aims and objectives

• Document improvement in hand and upper limb function using Botulinum toxin A or surgical approach in children with cerebral palsy
Material and Methods

- 20 children diagnosed with spastic type of cerebral palsy with upper limb involvement
- Age 3 yrs-18 yrs.
- Follow up of 1-4 yrs.
- All children were undergoing regular physiotherapy
- 8 Children-less than 8 yrs - with spasticity were injected with Botulinim toxin A
- 12 Children-more than 8 yrs. were operated
Botulinum toxin A - 8 children

- Pronator teres - 8
- Wrist flexors - 6
- Biceps - 2
- Thumb adductors - 2
- Pectoralis - 1
Surgery - 12 children

- Pronator release - 5 cases
- Flexor carpi ulnaris to extensor carpi radialis brevis transfer – 12 cases
- Biceps aponeurotic release – 1 case
- Thumb adductor release – 1 case
Flexor carpi ulnaris (FCU) to extensor carpi radialis brevis transfer (ECRB)
Flexor carpi ulnaris to extensor carpi radialis brevis transfer
Flexor carpi ulnaris to extensor carpi radialis brevis transfer
Flexor carpi ulnaris (FCU) to extensor carpi radialis brevis transfer (ECRB)
Flexor carpi ulnaris to extensor carpi radialis brevis transfer

Before surgery

After surgery
Results

- Mean improvement in range of supination: 40 degrees
- Mean improvement in wrist dorsiflexion: 50 degrees
- Mean improvement in elbow extension: 30 degrees
# House scoring system of upper extremity functional use

<table>
<thead>
<tr>
<th>Level</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Does not use</td>
<td>Does not use</td>
</tr>
<tr>
<td>1</td>
<td>Poor passive assist</td>
<td>Uses as stabilizing weight only</td>
</tr>
<tr>
<td>2</td>
<td>Fair passive assist</td>
<td>Can hold object placed in hand</td>
</tr>
<tr>
<td>3</td>
<td>Good passive assist</td>
<td>Can hold object and stabilize it for use by other hand</td>
</tr>
<tr>
<td>4</td>
<td>Poor active assist</td>
<td>Can actively grasp object and hold it weakly</td>
</tr>
<tr>
<td>5</td>
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</tr>
<tr>
<td>6</td>
<td>Good active assist</td>
<td>Can actively grasp object and manipulate it</td>
</tr>
<tr>
<td>7</td>
<td>Spontaneous use, partial</td>
<td>Can perform bimanual activities and occasionally uses hand spontaneously</td>
</tr>
<tr>
<td>8</td>
<td>Spontaneous use, complete</td>
<td>Uses hand completely independently without preference</td>
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Results
## Supination

<table>
<thead>
<tr>
<th></th>
<th>before (Passive)</th>
<th>After (passive)</th>
<th>Before (active)</th>
<th>After (active)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botulinum toxin A</td>
<td>neutral</td>
<td>Full supination</td>
<td>20 deg pronation</td>
<td></td>
</tr>
<tr>
<td>Surgical group</td>
<td></td>
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Botulinum Toxin A

Before Botox

After Botox
## Surgery - House scoring system of upper extremity functional use

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After FCU to ECRB transfer
After FCU to ECRB transfer

Before Surgery

After Surgery
Conclusion

• Both Botulinum Toxin A and Surgery improved the upper extrimity functional use
• Duration of action of Botox for upper limb was short lived
• Full active supination was not possible even after botox or release of pronator
• Tendon transfer to augment supinator action can be considered
Conclusion

• Early surgical transfer (Before 12 yrs.) can lead to late deformities like wrist extension contracture and supination contracture
• Tendon transfer may be required for thumb in palm deformity
• An accurate assessment of hand sensation, power and spasticity is essential to get the best results
Literature Review


• Late deformities following the transfer of the flexor carpi ulnaris to the extensor carpi radialis brevis in children with cerebral palsy. Patterson JM, Wang AA, Hutchinson DT. J Hand Surg Am. 2010 Nov;35(11):1774-8. doi: 10.1016/j.jhsa.2010.07.014