Treatment of the Child with Cerebral Palsy Post Surgical Rehabilitation

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Objectives

• Perform an initial evaluation of post-surgical conditions
• Identify appropriate splinting per surgical intervention
• Demonstrate knowledge of therapeutic interventions and home programs

Cerebral Palsy: General Information

• Non-progressive neurological disorder of movement that is related to an insult to the developing brain
• Can result in abnormal sensation, dyskinesia, athetosis, ataxia or most commonly spasticity
• Classic presentation of child with spastic U/E is shoulder adduction with internal rotation, elbow flexion, forearm pronation, wrist flexion with ulnar deviation and thumb adducted in palm
Considerations

- Pediatric patients with cerebral palsy present unique challenges.
- Any treatment regimen must take into account potential growth, possible sequelae of surgery, and behavioral issues.
- Careful evaluation of motor and sensory function of the extremity and also use patterns is critical in determining the ultimate success of any intervention.

Considerations

- Every patient is addressed independently and treatment individualized.
- The patient and parents must understand that surgery can address only the function or position of the anatomic area that the surgeon will work on.
- Surgery will not correct the underlying problem.
General Evaluation

Evaluation: General

Parent/Patient interview:
History:
• Medical history/birth history
• Medications
• Interventions: medical, surgical, therapeutic
• Pain
• Functional deficits/current level of function
  – Parent report, PEDI, UEFI
• Current concerns

Evaluation: Parent Report
Evaluation: Functional Deficits

**THE UPPER EXTREMITY FUNCTIONAL INDEX (UEFI)**

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Evaluation: General

Pain: use of numeric/faces pain scale

**PAIN ASSESSMENT TOOL**

<table>
<thead>
<tr>
<th>Score</th>
<th>No Pain</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Very Severe</th>
<th>Worst Pain Possible</th>
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Initial Evaluation: General

AROM/PROM measurements (as allowed per protocol)
Initial Evaluation: General

Strength measurements (per protocol)

Functional skills assessment (per protocol)

Evaluation: General QUEST

Quality of Upper Extremity Skills Test (QUEST): an outcome measure designed to evaluate movement patterns and hand function in children with cerebral palsy.

Evaluation: General MACS
Evaluation: Clinical observations

Measurement of incisions and scar tissue formation using the Vancouver or Manchester Scar Scale

<table>
<thead>
<tr>
<th>Scar Description</th>
<th>Vancouver Score</th>
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<tr>
<td>Excellent</td>
<td>1</td>
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<tr>
<td>Good</td>
<td>2</td>
</tr>
<tr>
<td>Fair</td>
<td>3</td>
</tr>
<tr>
<td>Poor</td>
<td>4</td>
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Specific Procedures

Evaluation and Treatment
Green Transfer
Evaluation and Treatment

The Green Procedure:
- Transfer of the Flexor Carpi Ulnaris to the Extensor Carpi Radialis Brevis and/or the Extensor Carpi Radialis Longus

This procedure was developed from
- Clinical work by Dr. Green in 1942
- To treat children with limited wrist extension due to spastic, infantile, or obstetrical paralysis

Candidates:
- Children with weak wrist extension
- Children with ulnar deviation of the wrist
- Children with flexion posturing of the wrist

Benefits:
- Improved wrist extension
- Improved grasping
- Improved functional use of hand for bilateral tasks and ADLs
Post Operative Phase

The patient is casted up to four weeks

Evaluation: First Steps Post Cast Removal

Scar/Incision:
- Debride and clean incision
- Remove sutures
- Measure: length, width
- Note open areas

Evaluation: Clinical Observations

Edema:
- Circumferential measurements
- Pitting/non-pitting

Sensation:
- Changes in sensation
- New sensation
Clinical Observations

Range of motion measurements: Passive measurements

Clinical Observations:

AROM measurements

Clinical Observations:

How is the Activation of Transfer?

Can the patient get the transfer to fire?

In what planes can the patient get the transfer to fire?

How much cueing is needed?
Splinting: 4 weeks Post-Op

**Splint**: fabricated in position of pronation with the wrist in neutral or slight extension determined by the position of casting

Treatment Goals: 4 weeks Post-Op

1. Fire transfer in gravity eliminated plane
2. Grasp and release of objects
3. Pain free
4. Follow through with home program

Treatment

**AROM**: shoulder, elbow, fingers and thumb, initiate firing of transfer with flexion block

**PROM**: shoulder, elbow, fingers

**Precautions**: no forced wrist motions, splint at all times, no weight bearing, no sports
Treatment

Scar Management:
- Initiate scar management two to three times daily
- Use silicone gel or elastomer as indicated

Scar Management:
- Scar massage
  - Manual
  - Use of Mini massager
- Silicone Gel
- Scar pump
- Elastomer
- Compression

Treatment: Edema Control
- Retrograde massage
- Compression
- Elevation
Four weeks post-operatively

Home Program:

- Daily/nightly splint wear
- Active range of motion exercises
- Practice firing of transfer
- Scar massage
- Use of silicone gel or elastomer as indicated

4-6 weeks post-operatively

- Goal:
  - Fire transfer against gravity consistently
- Splint:
  - At all times except for bathing, therapy and home program
- AROM:
  - Continue with active range as in week 4
  - Firing of transfer in gravity eliminated without splint
  - Firing of transfer against gravity
  - Light activities that encourage pronation, wrist extension and grasp and release
  - Cleared to use NMES for muscle transfer re-training

4-6 weeks post-operatively

- PROM:
  - Shoulder, elbow, fingers
- Precautions:
  - No resistive activities, splint at all times, no weight bearing
- Scar Management:
  - As noted previously
- Home program:
  - Splint for day and night
  - Firing of transfer/light activities
  - Scar massage
    - Use of silicone gel or elastomer
7-8 weeks post-operatively

- **Goal:**
  - Fire transfer consistently in all planes
- **Splint:**
  - Night time only
- **AROM:**
  - Continue with active range
  - Firing of transfer in all planes and in multiple positions
  - Light activities that encourage pronation, wrist extension and grasp and release
  - NMES for muscle transfer re-training

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7-8 weeks post-operatively

- **PROM:**
  - Full passive range of motion allowed
- **Strengthening:**
  - Light weight bearing
- **Scar Management:**
  - As noted previously
- **Home program:**
  - Splint for night
  - Firing of transfer/light activities
  - Scar massage

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**Treatment: Kinesiotaping**

Assisted wrist extension
Treatment: E-stim

• Goal:
  — Fire transfer consistently in all planes

• Splint:
  — Wean splint

• AROM:
  — Firing of transfer in all planes and in multiple positions
  — NMES for muscle transfer re-training

9-12 weeks post-operatively

• Goal:
  — Fire transfer consistently in all planes

• Splint:
  — Wean splint

• AROM:
  — Firing of transfer in all planes and in multiple positions
  — NMES for muscle transfer re-training

• Strengthening:
  — Progress weight bearing activities
  — Progress strengthening
    • Grip
    • Pinch
    • Wrist extension
Discharge Planning

• The child should be ready for discharge after 12 weeks of consistent therapy and active participation in home program
• Home program of continued strengthening, range of motion and scar massage
• A follow up appointment in one month may be recommended to ensure continued progress and to adjust home program as needed

Elbow release

Anterior Elbow Release

• Release of the soft tissues of the anterior elbow
• Lengthening of the Brachialis at the muscle tendon junction
• Lengthening of the Biceps
Anterior Elbow Release

Candidates:
• Primarily children with CP/spasticity causing flexion contractures of the elbow

Benefits:
• Increased active and passive elbow extension
• Improved ability to perform bilateral tasks
• Improved ability to weight bear
• Improved posture for ambulation/mobility
• Ease of caregiving for dressing/bathing/transfers

Post Operative Phase: 4 weeks

Placed in long arm cast for 4 weeks with elbow in 25 to 30 degrees of flexion, forearm and wrist in neutral

Evaluation: Initial Steps Post Cast Removal

Scar/Incision: Debride and clean incision

- Remove sutures
- Measure: length, width
- Note open areas
Evaluation: Clinical Observations

Edema:
- Circumferential measurements
- Pitting/non-pitting

Sensation:
- Changes in sensation
- New sensation

Splinting: 4 weeks Post-Op

Long Arm elbow extension splint: wrist neutral, forearm in pronation or neutral for 3 weeks full time than transition to night time use
Scar Management:
- Initiate scar management two to three times daily
- Use silicone gel or elastomer as indicated

Scar Management:
- Scar massage
  - Manual
  - Use of Mini massager
- Silicone Gel
- Scar pump
- Elastomer
- Compression

Treatment: Edema Control
- Retrograde massage
- Compression
- Elevation
Treatment 4-6 weeks post-operatively

- **Goal:**
  - Increase passive/active elbow extension

- **Splint:**
  - at all times except for bathing, therapy and home program

- **AROM/PROM:**
  - active/pasive range of motion for extension, flexion and supination, reaching activities that encourage elbow extension
Treatment Activities

Range of motion with air splint

4-6 weeks post-operatively

Home Program:
- Daily/nightly splint wear
- Active/Passive range of motion exercises
- Scar massage
- Use of silicone gel or elastomer as indicated
Treatment 6-12 weeks post-operatively

- **Goal:**
  - Increase passive/active elbow extension
  - Increase triceps strength

- **Splint:**
  - At night time only

- **AROM/PROM:**
  - Active/passive range of motion for extension, flexion and supination, reaching activities that encourage elbow extension
  - Triceps strengthening

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**Treatment: Kinesio taping**

![Kinesio taping image]

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**Treatment: E-Stim**

Triceps activation

![E-Stim image]
Treatment Activities

Weight bearing

Treatment Activities: Postural Stretching

- Towel Stretching
- Retraining Scapular Positioning
6-12 weeks post-operatively

Home Program:
- Nightly splint wear
- Active/Passive range of motion exercises
- Scar massage
- Use of silicone gel or elastomer as indicated
- Strengthening activities as provided

Discharge Planning
- The child should be ready for discharge after 12 weeks of consistent therapy and active participation in home program
- Home program of continued strengthening, range of motion and scar massage
- A follow up appointment in one month may be recommended to ensure continued progress and to adjust home program as needed

Thumb in Palm Deformity
EPL reroutement surgery
EPL reroutement

- Reroutement tendon transfer of EPL from the 3rd compartment through the 1st compartment
- Typically combined with adductor pollicis, flexor pollicis brevis, and first dorsal interosseous release at the muscle origins.

Candidates:

- Child with spastic thumb adduction posturing or thumb in palm deformity

Benefits:

- Improved thumb function
- Improved functional grasping
- Improved finger flexion
- Improved bilateral skills

Post Operative Phase: 4 weeks

Placed in a short arm thumb spica cast with the wrist in neutral deviation and flexion/extension. Thumb placed in midpalmar and radial abduction. Avoidance of metacarpal phalangeal hyperextension in cast.
Evaluation: Initial Steps Post Cast Removal

Scar/Incision:
- Debride and clean incision
- Remove sutures
- Measure: length, width
- Note open areas

Evaluation: Clinical Observations

Edema:
- Circumferential measurements
- Pitting/non-pitting

Sensation:
- Changes in sensation
- New sensation

Range of motion: Active thumb extension/abduction, no passive thumb flexion until 6 weeks post-op
**Splinting 4 weeks post-op**

Fabricate volar forearm thumb spica splint with wrist in 15 degrees extension and thumb in radial abduction

Worn full time for a minimum of 2 weeks depending on tone

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**Treatment 4-6 weeks post-operatively**

- **Goal:**
  - Increase active thumb motions

- **Splint:**
  - at all times except for bathing, therapy and home program

- **AROM/PROM:**
  - Active range of motion for thumb extension, abduction
  - Progress to passive range of motion for thumb extension, abduction as tolerated

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**Treatment: Scar Management:**

- Scar massage
  - Manual
  - Use of Mini massager
- Silicone Gel
- Scar pump
- Elastomer
- Compression
Treatment: Edema Control

- Retrograde massage
- Compression
- Elevation

Treatment: 4-6 weeks post-op

Range of motion

Treatment 4-6 weeks
4-6 weeks post-operatively

Home Program:
- Daily/nightly splint wear
- Active/Passive range of motion exercises
- Scar massage
- Use of silicone gel or elastomer as indicated

Treatment 6-12 weeks post-operatively

Goal:
- Increase active thumb motions

Splint:
- At night

AROM/PROM:
- Active range of motion for thumb extension, abduction
- Passive range of motion for thumb extension, abduction, adduction, and flexion

Treatment

Kinesiotape for thumb abduction assist

Splinting for thumb stabilization during day as needed
Treatment: E-Stim

Treatment activities

Strengthening activities
6-12 weeks post-operatively

Home Program:

- Nightly splint wear
- Active/Passive range of motion exercises
- Scar massage
- Use of silicone gel or elastomer as indicated
- Strengthening activities as provided

Discharge Planning

- The child should be ready for discharge after 12 weeks of consistent therapy and active participation in home program
- Home program of continued strengthening, range of motion and scar massage
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References

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