CT Children's CLASP Guideline

Brachial Plexus and other Peripheral Nerve Injuries

INTRODUCTION

Neonatal Brachial Plexus Palsy:

Neonatal Brachial Plexus Palsy occurs at a rate of about 1/1000 live births and should be suspected with asymmetric arm movements that persist at the time of discharge from newborn nursery/NICU. Patients are managed by a combination of pediatricians, family practitioners, neurologists, therapists, neurosurgeons, and orthopaedic surgeons. Pediatric patients may be referred for unnecessary and invasive testing (MRI requiring anesthesia, nerve conduction studies), and they may not undergo recommended testing (Xrays to rule out diaphragm palsy or concomitant fracture). While almost all patients "recover" to some degree, this may not occur to a clinically useful or optimized extent. There is a window of time roughly between ages 6-12 months, during which microsurgical exploration and plexus reconstruction may benefit these patients.

Secondary deformities of the shoulder and elbow occur in over 1/3 of patients, yet often go unidentified for three main reasons.

1. Children adapt well and do not miss functionality they never had.
2. Children may not yet participate in activities that give them functional deficits from their limitations.
3. Families may not be aware that treatment options exist for these late deformities.

Other Peripheral Nerve Injuries:

Peripheral nerve injury should be suspected with decreased sensation and/or motor function. There are many causes including traction injury such as with fracture, penetrating trauma such as laceration, and iatrogenic injury from surgery. Early recognition allows optimized treatment, whether that be observation when there is high likelihood of spontaneous recovery or early surgical exploration to allow primary repair. Nerves that are lacerated, for example, will instead retract and never heal without surgery, and a critical window during which repair is possible may be lost with delayed recognition or evaluation. Direct nerve repair, nerve repair with interposition grafting, direct nerve transfers, and tendon transfers are all options for treating nerve injuries.

DIFFERENTIAL DIAGNOSES: trauma, infection, metabolic disturbance, neoplasia, iatrogenic damage, inflammatory, congenital

CT Children's Departments of Orthopaedics & Neurosurgery now offers a joint comprehensive treatment program, **Orthopaedic Surgery's Brachial Plexus and Peripheral Nerve Clinic** including microsurgical reconstruction in infants, correction of secondary deformities in older children, formal videotaped motional analysis, and skilled therapy from infancy through young adulthood. ***(See Appendix A).***

INITIAL EVALUATION AND MANAGEMENT

INITIAL EVALUATION:

Neonatal Brachial Plexus Palsy:

Targeted History:

- Was there prolonged labor, shoulder dystocia, cephalopelvic disproportion, or fetal distress?

Targeted Physical Exam:

- Does the arm have decreased movements or is it flaccid?
- Are the pupils symmetric or asymmetric?
- Is there suspicion of diaphragm palsy (symmetric abdominal movement with breathing)?
- Is a fracture suspected (crepitus, gross deformity, skin tenting, bruising)?

Diagnostics

- For suspected brachial plexus palsy, a chest x-ray is helpful to rule out clavicle or humerus fracture, as well as diaphragm palsy.

Peripheral Nerve Injuries:

Targeted History:

- Did the deficit occur gradually or acutely?
- Was there an inciting incident such as trauma or surgery?
- Are the deficits worsening, staying the same, or improving?

Targeted Physical Exam:

Sensory testing in specific peripheral nerve distributions (very young or non-verbal children will have difficulty with this, therefore alternative methods such as the skin wrinkle test can be used):

- Manual motor testing
- Range of motion testing to check for secondary joint or tendon contracture

Diagnostics

- A timely referral for diagnostics as deemed appropriate by subspecialists.

INITIAL MANAGEMENT:

If a brachial plexus injury is confirmed:

- For isolated newborn brachial plexus injury, further traction on the limb should be minimized by swathing the arm/pinning the sleeve to the front of the shirt.

Peripheral nerve injuries

- Timely referral to subspecialty team

WHEN TO REFER

If symmetry of movements is restored in 1 month, referral to specialist not needed at discretion of primary care provider

EMERGENT REFERRAL (to be seen within 1 week):

- Peripheral nerve: a penetrating injury, such as a laceration

ROUTINE REFERRAL (to be seen within 1 month):

- Suspected brachial plexus injury with visible asymmetric arm movement
- Peripheral nerve injury, such as traction injury associated with a fracture

HOW TO REFER	**Referral to Orthopaedic Surgery's Brachial Plexus and Peripheral Nerve Clinic within one month or sooner via CT Children's One Call Access Center** For more information on how to place referrals to Connecticut Children's, click **here**. **Phone:** 833.733.7669 **Fax:** 833.226.2329 ***Information to be included with the referral:*** ▪ Any imaging that was performed (X-Ray, ultrasound, MRI). Bring CD if available. ▪ Notes from prior evaluation, particularly the operative note if any prior surgery was performed
WHAT TO EXPECT	**What to expect from CT Children's Visit:** ▪ Concomitant Neurosurgical evaluation when appropriate ▪ Thorough physical and history ▪ Potential referral to OT by the plexus clinician ▪ X-ray, U/S as needed ▪ Discuss surgical options when appropriate ▪ Teaching at-home exercises

APPENDIX A: