Selected Topics in Pediatric Neuromuscular Disorders

Pathway of PNS

Anterior Horn Cell > Nerve > Neuromuscular Junction > Muscle

Disorders of Muscle:

Dermatomyosis:

- Inflammatory Myopathy
- Overall incidence 0.2 - 0.6/100,000
- Prevalence 6-8/100,000
- Childhood forms peak 5-15 years
- Adults 45-60 years old

Clinical:

- Insidious onset weakness proximal > > distal
- Ocular muscles: rare to ever be involved
- Myalgias
- Decreased DTR's; normal sensation; muscle atrophy
- Skin manifestations:
    - Shawl rash
    - Heliotrophic rash
    - Gottren's nodules
    - Dilated capillary loops at fingernail base
    - Mechanics' hands
- Calcinosis
    - Common in childhood forms (40-75%)
    - Relatively inresponsive to therapy
- Cardiac involvement (20-25%)
- Interstitial lung disease
- GI symptoms
    - Particularly GI bleed
- Contractures
    - Arthritis
- Systematic symptoms
    - Fever
    - Malaise
    - Weight loss
- CK
    - Usually elevated 1-3000 range
    - ESR elevated
    - ANA often elevated
- Muscle biopsy shows classic perifasicular atrophy
- Prednisone first line of therapy followed by Immuran or methotrexate

Duchenne's Muscular Dystrophy:

- X-linked recessive disorder of the dystrophin gene
- Incidence: 1/3000 live male births

Clinical:

- Onset weakness less than 5 years old
- Walking slightly delayed (18 months) in 50%
- Climbing stairs and running more noticeably delayed
- Pelvic Girdle 1st affected- Gower's sign
- Pseudohypertrophy
- Cardiac involvement
- Mental retardation
    - Mild in about 1/3

Lab:

- CK grossly elevated even prior to symptoms (10,000 - 40,000)
- Genetic testing positive in 65% (Xp 21)

Course:

- Wheelchiar bound by 7-11 years of age
- Death in early 20's

Treatment:

- Supportive
- Prednisone

Myotonic Dystrophy:

- Most common dystrophy
- Incidence 2.4 - 4.8/100,000
- Autosomal dominant- triplicate repeat CTG chromosome 19q
- Progressive disease with distal >>> proximal weakness
    - Myotonia prominent
    - Hatchet facies
    - Pleiotropic disease: multisystem involvement

Congenital Myotonic Dystrophy:

- No clinical myotonia
- Floppy infant
    - Poor suck

    - Tent Mouth
- Developmentally delayed
- Must be inherited from mother and often she is unaware she has the disease.

Neuromuscular Junction Defects:

Hallmark Fatigability

Myasthenia Gravis

- <10% in pediatric population
- Adult and neonatal forms are autoimmune
- Most childhood forms are from defects in functions of the NMJ
- Acquired MG
    - Incidence 1/30,000
    - F>M 3:2
    - Peak females age 20-30 years old
    - Peak male age 50-60 years old
- Autoimmune
    - Acetylcholine receptor antibodies present

Clinical:

- FATIGABILLITY
- Ocular involvement 90%
- Facial involvement 80%
- Bulbar involvement 50%
- Neck and shoulder girdle maximum weakness usually < 36 months after onset
- Mortality 5%
- Thymic abnormalities occur in up to 75% some include thymoma more likely to have associated autoimmune disorder

Diagnosis:

- Tensilon test
- Repetitive nerve stimulation
- ACHR antibodies
- SFEMG

Treatment:

- Anticholinesterases- watch for crisis!
- Thymectomy
- Corticosteriods
- Immunosupression
- Plasmapheresis

Transient Neonatal Form:

- Infants born to MG mother's
- Occurs in about 15% of MG pregnancies
- Risk 75% if previous pregnancy affected due to transfer antibodies

Congenital forms are much more complex: Can be due to a myriad of abnormalities of the NMJ.

Botulism:

- Toxin blocks ACH release
- Risks
    - Canned foods
    - Toxin production favored by a low pH
    - Boiling destroys toxin

Clinical

- 2-36 hours post ingestion
- Oculobulbar weakness
- Descending pattern of weakness
- Autonomic symptoms
    - Constipation
    - Pupillary abnormalities
    - Postular hyoptension

Diagnosis:

- Stool culture and test serum for toxin

INFANTILE BOTULISM:

- Most cases < 6 months old
- Weak cry
- Difficulty feeding
- Bulbar and limb weakness
- Progress from 1-3 days
- Due to colonization of the GI tract with clostridium botulinum
- Stool culture
- Infantile associated with honey

Disorders of Nerve:

Charcot Marie Tooth Disease:

- Most common hereditary sensory motor polyneuropathy
- Type 1a demyelinating
- Autosomal dominant (Chromosome 17 P22 myelin gene)

Clinical:

- Onset 10-40
- Insidius distal weakness
- Sensory loss
- Not painful foot deformities
- Pes cavus
- Nerve Hypertrophy

Diagnosis:

- NCS
- Genetic

Guillian Barre:

- Also known as acute inflammatory demyelinating neuropathy: AIDP
- Medical emergency preceeding event in 50%
    - Viral syndrome
    - Immunization

Signs and Symptoms:

- Ascending paralysis
- Areflexia
- Respiratory and/or bulbar involvement
- Autonomic involvement
- Peak deficit in 2-3 weeks
- Recovery

Lab:

- CSF elevated protein
- Abnormal NCS c/w demyelinating disease

Treatment:

- Supportive
- IVIG
- Plasmapheresis

Miller Fisher Variant of Guillian Barre:

- Opthalmoplegia
- Areflexia
- Ataxia
- More common in childhood than adults
- Associated with GDIb antibodies

Disorders of the Motor Neuron:

Spinal Muscular Atrophy:

- All forms Autosomal ressessive
- Associated with deletion of chromosome 5 form holds true within families

Clinical:

- Loss of strength
- Fasiculations
- Absent reflexes
- Normal sensation

Werding Hoffman:

Infantile SMA:

- Onset: birth - 3 months
- Progression rapid: most die by 2-3 years

Late Infantile:

- Onset: 6 months - 3 years
- Progression: moderate to rapid
- Worse prognosis with earlier onset

Treatment:

- Supportive