Chapter 28: Neurogenic & Myopathic Dysfunction

**Neurogenic Disorders: Lower Motor Neuron Dysfunction**

* Lower motor neuron dysfunction: a lesion to any of the neurologic structures of the lower motor neuron system
  + Lesions can result from nerve root compression, trauma, toxins, infections, vascular disorders, degenerative diseases of the CNS, & congenital malformations.
* Poliomyelitis: contagious viral disease that affects the anterior horn cells of the gray matter of the spinal cord and the motor nuclei of the brainstem (the active immunization program in the US eradicated polio and last case was reported in 1999 in the US)
  + Results in flaccid paralysis that is either local or widespread
  + Lower extremities, accessory muscles of respiration, and muscles that promote swallowing, but UE can occur and usually marked atrophy is seen in involved extremities, but deep tendon reflexes may be absent
  + Contractures: permanent shortening of the muscles, tendons, & ligaments
  + Asymmetry of muscles pulling on various joints could cause deformities (subluxation which is partial dislocation, scoliosis, and contractures) and may weaken long weight bearing bones
  + Medical treatment includes red rest, positioning, and modified techniques like warm packs to reduce pain
* OT Intervention includes rehab in ROM, muscle reeducation and graded strengthening, precautions against fatigue, psychological support, and retraining in ADL’s.
  + ROM: passive or active depends on patient’s level of voluntary control and all compensatory movement should be avoided. Active mvmts should be done in front of a mirror and under careful supervision
  + Muscle reeducation: first the patient learns “muscle setting” exercises—alternating contractions and relaxation of muscle w/out moving joint. Then w/progress the therapist can apply light resistance manually then eventually equipment.
  + Psychological: OT practitioner should respect patients fear and anxieties & family
  + Precaution against fatigue: assistive devices, splints, and mobile arm supports may be used to gain independence in ADL’s
* Post-polio syndrome: Combination of impairments occurring in individuals who have experienced poliomyelitis years ago and have functioned normally.
  + Increased muscle weakness, muscular atrophy, joint pain and skeletal deformities are common. Fatigue is most common and is debilitating
* OT Intervention: OT assesses strength, ROM, and endurance and how these factors affect ADL, occupational performance, and psychosocial status. Gait and orthotic needs are evaluated as well.
  + 1. Get to know the patient (occupational roles and activity profile of daily life)
  + 2. MMT if needed and joint ROM testing
  + 3. Confront individual with issues of coping, adjustment, and adaptation
  + 4. Strength can be obtained by maintain performance of ADL, but patient is encouraged to stay active within limits of their comfort and safety
  + OT is to guide and facilitate lifestyle modifications
* Guillain-Barré Syndrome: an acute inflammatory condition involving the spinal nerve roots, peripheral nerves, and in some cases selected cranial nerves
  + Often follows a viral illness, immunization, or surgery that affects both sexes
  + Pain and tenderness of muscles, weakness, and decreased deep tendon reflexes
  + As disease progresses it produces motor weakness or paralysis of limbs, sensory loss, and muscle atrophy
* OT Intervention: treatment focuses on PROM, positioning, and splinting to prevent contracture and deformity and to protect weak muscles.
  + PROM: starts w/gentle mvmt of proximal joints, lead into active assisted ROM
  + Ongoing progression should lead into independence in grooming, self-care, and ALD’s.
  + Slings and mobile devices may be used to prevent fatigue
* Peripheral Nerve Injuries: most common is muscle weakness or flaccid paralysis depending on the extent of the injury
  + Atrophy, sensation, and tropic changes (dry skin, hair loss, & more) may be lost
  + Paresthesia: sensations such as tingling, numbness, or burning or pain at night
  + Deformities can be seen from contractures, joint stiffness, or poor positioning
  + Regeneration begins 1 month after injury & rate of regeneration depends on injury
  + Injury, age, location, & early medical treatment all determine rate of regeneration
* Signs of first regeneration include: Skin appearance- edema should subside and collateral blood vessels develop, and circulatory system normalizes (color and texture)
  + Primitive Protective sensations: pain, temp, pressure, touch is normalized
  + Paresthesia: tingling distal to site or lesion
  + Scattered point of sweating: sweat glands recover function
  + Discriminative sensations: ability to identify touch, joint position, recognition of objects in 3D, and two-point touch discrimination
  + Muscle tone: flaccidity will decrease
  + Voluntary muscle function: able to move the extremity w/gravity eliminated and proceed to full ROM as strength increases
* Specific Peripheral Nerve Injuries- Brachial Plexus Injury (caused by birth trauma)
  + Nerve roots of lower anterior cervical and upper dorsal spinal nerves is BP
  + Usually arm hangs limp, hand rotates inward, and functional movement is limited
  + Atrophy and paralysis occur in deltoid, brachialis, biceps and brachioradialis
* Long Thoracic Nerve Injury: C5-C7 innervates the serratus anterior which anchors the apex of scapula to the posterior of rib cage.
  + Caused by lifting heavy weights on shoulder, neck blows, and auxiliary wounds
  + Winging of the scapula, difficulty flexing the outstretched arm above shoulder level, and difficulty protracting shoulder or performing scapular abb./add.
* Auxiliary Nerve Injury: C5-C6 and derived from posterior region of brachial plexus
  + Nerves innervate the superior aspect of the deltoid muscle and teres minor
  + OT should do ROM, passive abduction of shoulder, education of assistive devices
* Volkmann’s Contracture: fracture of the lower end of the humerus which may result in a diminished supply of well-oxygenated blood to muscles of the forearm.
  + Edema can set in near site, ischemia deprives tissues of oxygen and nutrients, and atrophy and contractures of the wrist, fingers, and forearm may appear
  + Skin may become smooth, glossy, or dusky and distal extremity is cold
* OT Intervention: assist patient in regaining maximum level of motor function and independence in performance areas
  + Treatment is directed to the stage of recovery and focuses on remediation and compensation for sensory, motor, and performance deficits
* Peripheral Nerve Pain Syndrome: pain is common and causalgia is pain of great intensity
* OT Intervention: pain management
  + Graded sensory input (tapping), thermal modalities (heat), & protective devices

**Disease of the Neuromuscular Junction**

* Myasthenia Gravis: disease of chemical transmission at the nerve-muscle synapse and results in weakness of skeletal system at all ages
  + Abnormal fatigue of voluntary muscles (pts. may experience respiratory crisis)
* OT Intervention: regain muscle power and build activity tolerance and endurance

**Myopathic Disorders**

* Muscular Dystrophies: 9 genetic, degenerative diseases primarily affecting voluntary
* Duchenne’s and Becker’s Muscular Dystrophy: Only in men and begins at birth. Muscles in pelvic girdle and legs then goes to shoulder
* Facioscapulohumeral Muscular Dystrophy: muscles of face and shoulder girdle
* Myotonic Muscular Dystrophy: muscle spasms are common, seen in men and women, and shows pattern of limb weakness distal rather than proximal. Issues with heart, vision.
* Limb-Girdle Dystrophy: First affect shoulder and hips then progress slowly to cardiopulmonary complications
* OT Intervention: Rehab measures to delay deformity and achieve max function.
  + Passive stretching, active exercise, positioning in seat, and assistive devices