Physical Aspects of Aging with POST-POLIO SYNDROME

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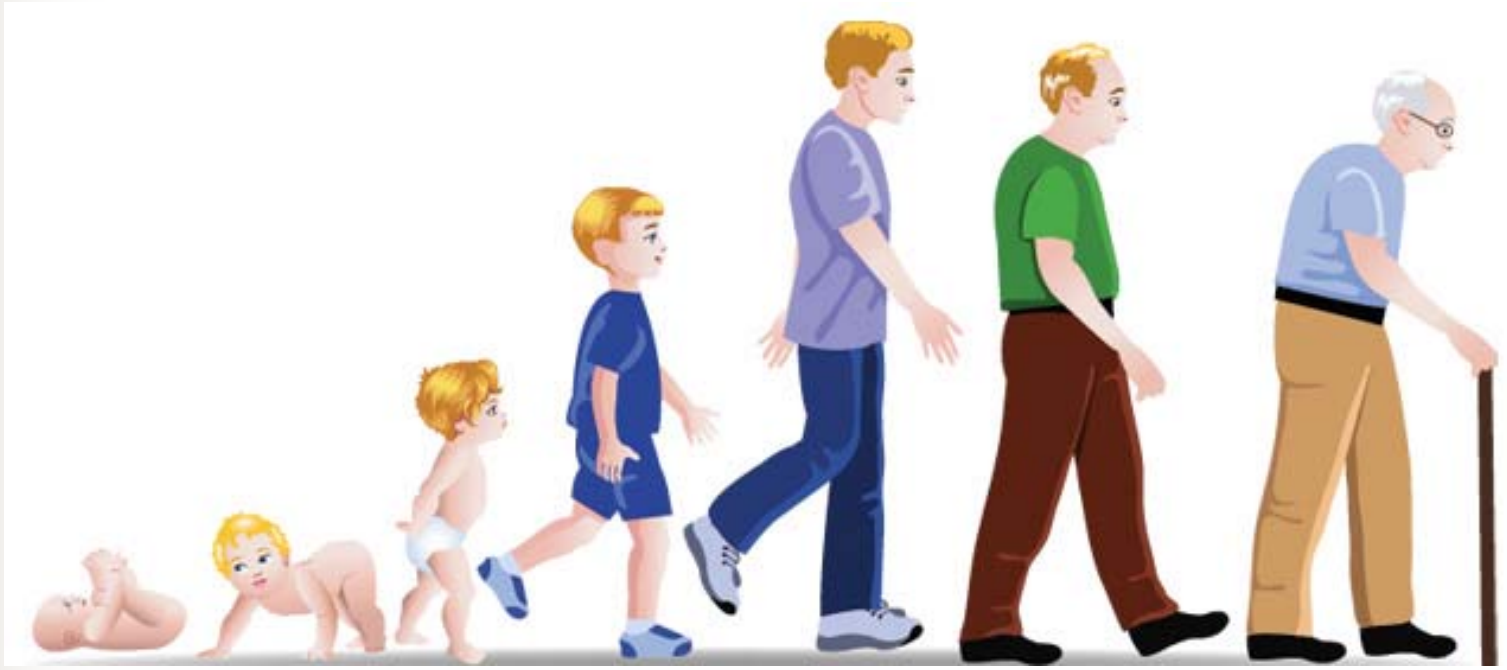
FACING
AGING

Common Facts about Aging

- Physiological changes in the body are a natural part of aging
- Physiological changes occur in almost every organ system in the body
- Genetics affect aging
- Many diseases and conditions become more common
- Psychological and social issues play a role in physical and mental health

Physical Changes of Aging

- Skin/ Hair: thinner, more fragile, dry
- Bones: lose density
- Muscles: become smaller
- Joints: wear and tear
- Skeletal alignment: shorter, increased spine curvature
- Decreased acuity: vision, hearing, taste, smell, touch



Common Neuromusculoskeletal Conditions Related to Aging

- Osteoarthritis
- Sarcopenia: loss of muscle mass
- Osteoporosis
- Degenerative scoliosis/ kyphosis
- Decreased sensation: peripheral neuropathy, presbyopia, hearing loss

Increased Incidence with Age:

- Diabetes, thyroid disease
- Hypertension, heart disease, arrhythmias, peripheral vascular disease
- COPD, loss of lung volume
- Macular degeneration, cataracts, glaucoma
- Cancers
- Anemia, loss of immune function
- Parkinson's, dementia
- Kidney disease
- Constipation, bowel incontinence
- Urinary incontinence, urgency, retention
- Infections: urinary, pulmonary, skin, colon
- Deconditioning
- Depression, anxiety, insomnia

Post-Polio Syndrome

- Excessive fatigue (>80%)
- Muscle/joint pain (60-80%)
- New weakness/atrophy (40-50%)
- Cold intolerance (25%)
- Dysphagia/ breathing changes (10-20%)

Aging with Post-Polio Syndrome

- Symptoms associated with PPS may increase due to aging and associated medical conditions
- Many of the neuromusculoskeletal changes related to aging may be accelerated by PPS

PPS Symptoms

- Fatigue
- Muscle pain
- Joint pain
- New weakness/ atrophy
- Cold intolerance
- Increased breathing difficulties
- Increased swallowing difficulties

Post-Polio Fatigue

- Generalized fatigue- not well understood
- Possibly due to injury to cortical activation
- Possible relation to cytokines in CSF
- Polio involvement of “good muscles” common- 65% of muscles in “uninvolved” limbs have reduced numbers of motor units
- Associated conditions: chronic pain, depression, sleep disturbance, respiratory problems may contribute

Fatigue Exacerbation with Aging

- Acute illness
- Increased pain due to other conditions
- Increased weakness
- Increased insomnia
- Worsening respiratory function
- Reduced heart function
- Reduced peripheral circulation
- Medications
- Deconditioning

Treatment - Fatigue

- Identify/ treat other medical conditions
- Optimize medications
- Energy conservation- assistive devices, mobility aides
- Pacing activities/ regular rest
- Improve sleep hygiene (treatment of apnea, pain)
- Work/ lifestyle modifications
- Medications ??: Modafinil (Provigil), IV Immunoglobulins

Post-Polio Muscle Pain

- Occurs in polio affected muscles
- Often similar to pain with acute polio
- Associated with cramps, twitching, crawling
- Worse at the end of the day
- Aggravated by overuse, stress, cold
- Likely due to loss of nerve fibers/ overuse and damage to muscle tissue

Muscle Pain and Aging

- No direct link
- Slow motor unit loss with aging increases weakness and chance of overuse
- Activity tolerance decreases over time

Treatment – Muscle Pain

- Monitor for signs of overuse: pain, cramping, twitching in muscles
- Modify and pace activities to avoid overuse
- Regular stretching
- Modalities: heat, ice, TENS, massage, acupuncture

Post-Polio Joint Pain

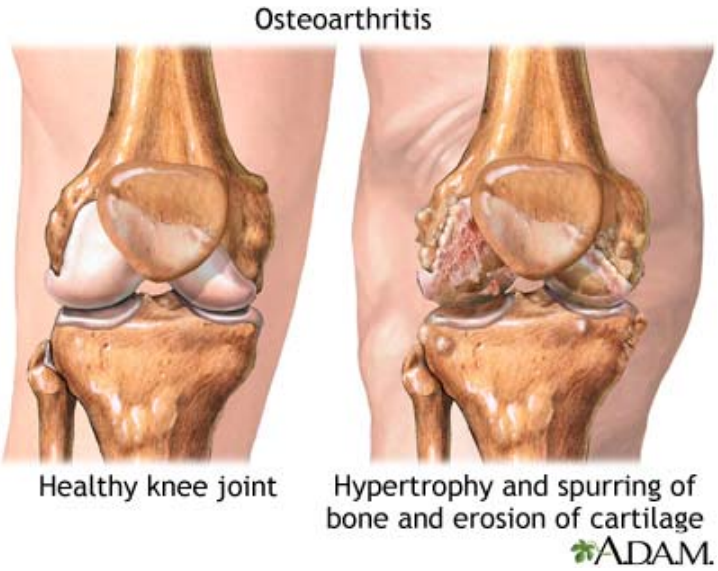
- Polio affected limb: force distribution changes related to weakness, inadequate protection, laxity of ligaments, abnormal joint mechanics
- “Wear and tear” or accelerated “normal aging” in strong limb
- Periarticular pain due to stress on ligaments, tendons and joint capsule

Joint Pain and Aging

- Increased stress on joints in both polio-affected limbs and unaffected limbs leads to osteoarthritis
- Stress on joint capsule, ligaments and tendons can result in tendonitis, bursitis
- Incidence and severity increase with age

Osteoarthritis- Definition

- Gradual loss of articular cartilage, combined with thickening of the subchondral bone, bony outgrowths at joint margins and mild chronic nonspecific synovial inflammation
- Initiation related to pressure/ disruption of articular cartilage



Osteoarthritis

- Leading cause of disability and pain in elderly.
- Predilection for weight bearing joints in the legs and certain joints in the hands.
- Prevalence of OA correlates with age.
- Prevalence increases with obesity, developmental or **acquired skeletal abnormalities**, injury and occupation

Osteoarthritis Treatment

- Weight loss if appropriate
- Analgesics: acetaminophen, anti-inflammatories, tramadol, narcotics
- Topicals: anti-inflammatory gel, capsaicin cream
- Therapies
  - OT: splints, bracing/ wraps, ambulation devices
  - PT: isometric, low-impact, aquatic exercise

Osteoarthritis Treatment

- Joint Injections
  - Corticosteroids
  - Viscosupplementation
- Surgical Intervention
  - Joint debridement
  - Osteotomy
  - Partial/ total joint replacement

Post-Polio Joint Pain Treatment

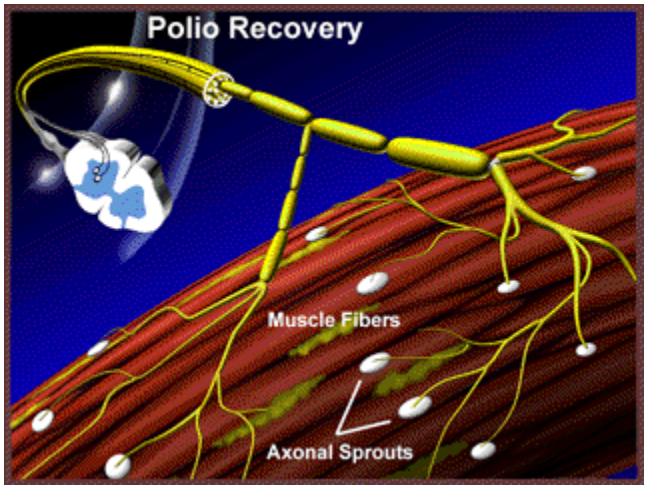
- Reduce stress on joint
  - Weight loss
  - Optimize joint mechanics/ protection with:
    - Gait aids/ assistive devices/ bracing
  - Activity modification
- Non-operative treatment for osteoarthritis
  - Analgesics
  - Therapies
  - Injections

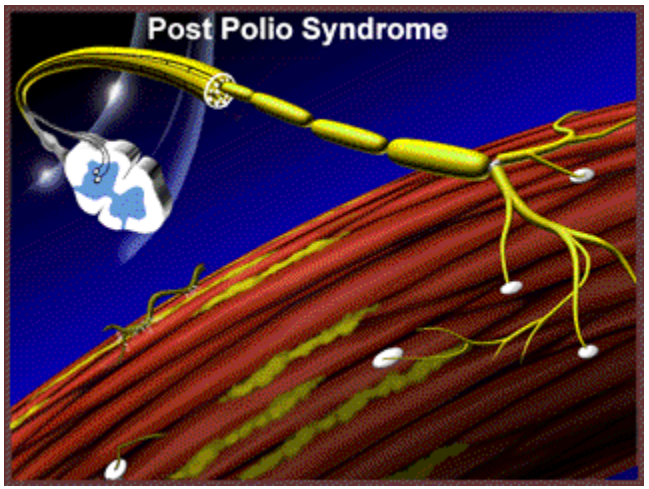
Post-Polio Joint Pain Treatment

- Surgical treatment
  - Unaffected limb: consider post-op restrictions and need for additional assistance
  - Affected limb:
    - Debridement/ lavage well tolerated
    - Expect recovery to be slower than normal
    - Joint replacement (arthroplasty) only if bone and muscles strength adequate

Post-Polio Muscle Weakness

- Peripheral disintegration model: loss of re-innervation through axon sprouts after acute polio
- Partially affected muscles may appear normal but have no reserve capacity
- Increased stress reveals lack of reserve strength





Muscle Weakness and Aging

- Aging- loss of about 1% of motor units/ year after age 30 results in sarcopenia
- Natural loss of “giant” motor units
- “Normal” aging in muscles thought to be unaffected by polio, reveal lack of reserve and evidence of motor neuron loss
- Deconditioning due to other factors may contribute to increased weakness

Muscle Weakness- Treatment

- Recognize and avoid muscle overuse
- Protect overused muscles
- Recognize deconditioning
- Exercise if appropriate (most patients)
- Strengthening, aerobic conditioning, and stretching can be beneficial
- Orthosis and/or assistive devices may allow more productive activity and exercise
- Careful pacing and monitoring

PPS- Cold Intolerance

- Decreased metabolic rate due to lower muscle mass
- Decreased peripheral circulation due to lower capillary density / demand from active muscle tissue
- Decreased activity due to mobility impairment

Cold Intolerance and Aging

- Loss of muscle mass with aging
- Decreased activity due to mobility impairment
- Reduced cardiac function/ peripheral circulation
- Hormone changes
- Medications

Management of Cold Intolerance

- Medical evaluation/ treatment
- Review medications
- Avoid: smoking, caffeine, alcohol
- Good hydration/ nutrition
- Regular exercise
- Environmental control

PPS- Breathing Difficulties

- Diaphragm may be involved if upper cervical spine affected
- Accessory muscles of respiration may be weak decreasing rib expansion and elevation causing restrictive lung disease
- Oropharynx weakness from bulbar polio may result in obstructive sleep apnea

PPS- Swallowing Difficulties

- Swallowing may be slow, difficult if bulbar polio affected muscles of throat
- Vocal cords may be weak, affecting voice production/ projection
- Epiglottis may not protect trachea (wind pipe) well and lead to aspiration into lungs

Breathing/ Swallowing Difficulties with Aging

- Restrictive lung disease and sleep apnea increase with weight gain, increased weakness
- Increased complications occur in association with heart disease, pulmonary disease, stroke

Management of Breathing/ Swallowing Problems

- Medical evaluation
- Evaluation of breathing/ swallowing function
- Speech therapy/ Respiratory therapy
- Optimize weight
- Adaptive techniques
- Assisted ventilation

Aging with Post-Polio Syndrome

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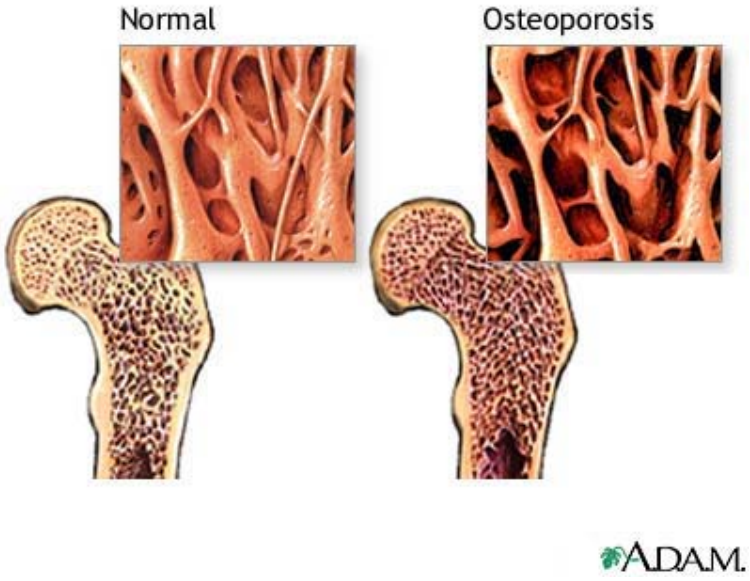
- **Many of the neuromusculoskeletal changes related to aging may be accelerated by PPS**

Common Neuromusculoskeletal Conditions Related to Aging

- Osteoarthritis
- Sarcopenia: loss of muscle mass
- **Osteoporosis**
- **Degenerative scoliosis/ kyphosis**
- Decreased sensation: peripheral neuropathy, presbyopia, hearing loss

Osteoporosis

- Osteoporosis is a condition characterized by a decrease in the density of bone, decreasing its strength and resulting in fragile bones..
- Osteoporosis increases the risk of bone fractures – both spontaneous and with minor trauma
- Incidence increases with age



Osteoporosis Risk Factors

- Low peak bone mass
- Genetics
- **Prolonged immobility/ illness**
  - **Lower stress on bone**
- Female
- Smoking/ alcohol/ medications
- Diet low in calcium
- Low weight

Osteoporosis Treatment

- Calcium and Vitamin D supplements
- Exercise
  - Weight-bearing, low impact exercises such as walking, jogging, playing tennis, dancing
  - Free weights, weight machines, stretch bands
  - Balance exercises such as tai chi and yoga
  - Avoid any exercise that presents a risk of falling.

Osteoporosis Treatment

- Medications
  - Bisphosphonates
  - Estrogen and estrogen receptor modulators
  - Teriparatide (a man-made form of a hormone)
  - Calcitonin (a man-made form of a hormone, used mainly to treat the sudden pain from a spine fracture)
  - Denusomab (lessens bone loss and increases bone density)

Osteoporosis Treatment

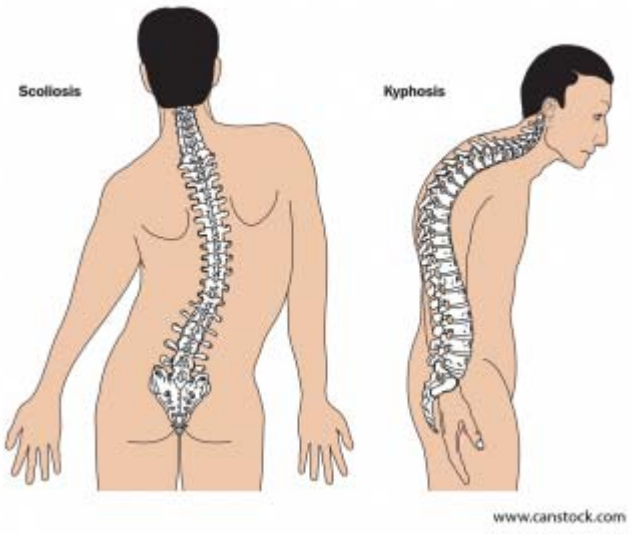
- Fall prevention
  - Limit sedating medicines
  - Remove household hazards, such as throw rugs
  - Leave lights on at night
  - Install and use safety grab bars in the bathroom.
  - Install anti-slip flooring in bathtubs and showers.
  - Make sure your vision is good.
  - Wear shoes that fit well and have low heels.
  - Do not walk outdoors alone on icy days.

Degenerative Scoliosis/ Kyphosis

- Spinal curves increase with degenerative changes in the spine
  - Asymmetrical disk degeneration
  - Vertebral compression fractures
  - Lateral slippage of vertebrae (spondylolisthesis)

Degenerative Scoliosis/ Kyphosis

- Progression of scoliosis (common in polio survivors) can cause:
  - Pain
  - Nerve impingement
  - Unbalanced spine
  - Reduced lung function



Treatment of Spine Degeneration

- Evaluation by spine specialist
- Physical therapy
- Medications/ injections for pain
- Bracing/ assistive devices
- Surgical stabilization/ correction

Treatment of PPS / Aging

Management of PPS and Aging

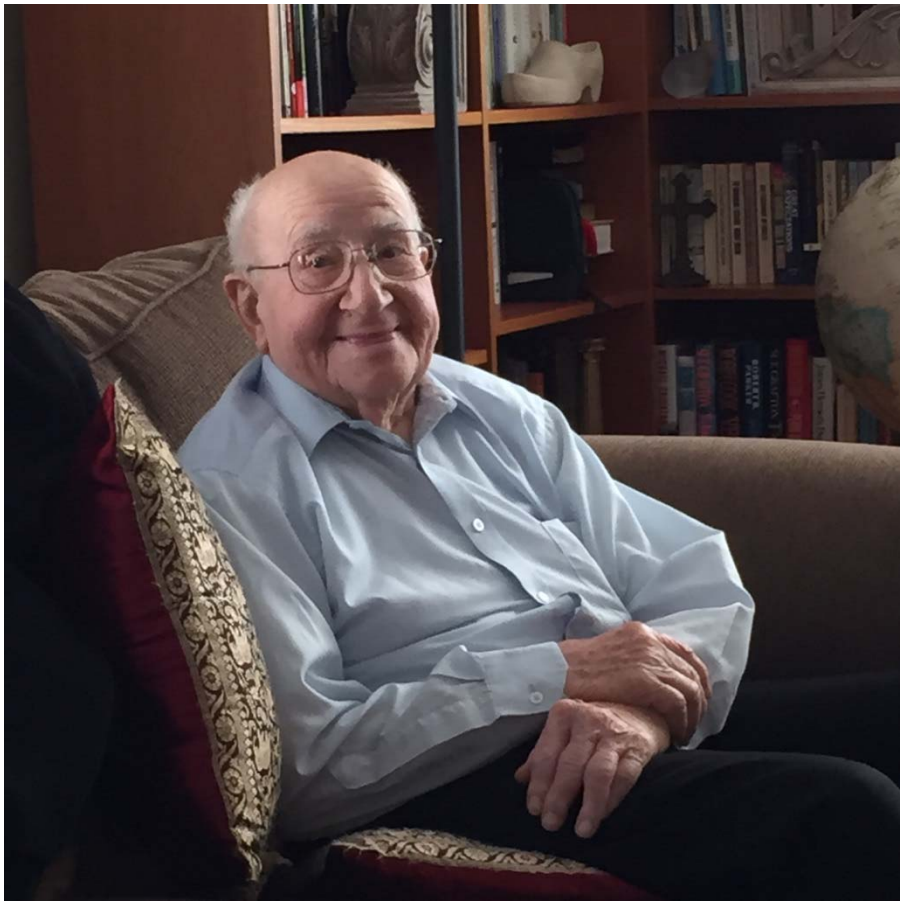
- **Complete** medical assessment essential (and time-consuming)
- Diagnosis and treatment of associated medical, neurological or musculoskeletal conditions
- Optimize body mechanics/ protect weak or painful joints with assistive devices and bracing
- Management of specific symptoms
- Judicious use of medications
- Optimize wellness/ illness prevention

Optimize Wellness

- Lifestyle changes
  - Eliminating bad habits
  - Pacing activities
  - Reducing stress
- Diet / Nutrition
- Adequate sleep
- Individualized exercise program
- Psychosocial health and support

Illness Prevention

- Identify risks
- Regular medical care/ screening
- Optimizing health management of medical conditions
- Vaccines for flu, pneumonia
- Safety measures/ Fall prevention
- Ongoing education



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