Pediatric Musculoskeletal Disorders

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Disorders

- Club Foot
- Hip Dysplasia
- Scoliosis
- Muscular Dystrophy

Congenital Clubfoot

- A common deformity in which the foot is twisted out of its normal shape or position
- The foot has a typical appearance of pointing downwards and twisted inwards
- Condition starts in first trimester of pregnancy
- The bones, joints, muscles, and blood vessels of the limb are abnormal
Congenital Clubfoot

Common Positions

- Talipes= ankles (talus=ankle, pes=foot)
- Talipes varus=inversion, bending inward
- Talipes valgus=eversion bending outward
- Talipes equinus=plantar flexion ,toes are lower than heel
- Talipes calcaneus=dorsiflexion, toes are higher than heel
- Talipes equinovarus=(TEV) IS THE MOST COMMON TYPE OF CLUBFOOT. Foot is pointed downward and inward in varying degrees of severity
Frequency

- 1 per 700 to 1 per 1000 live births
- Unilateral or bilateral-unilateral more common
- Boys affected twice as often as girls

Etiology and Pathophysiology

- May be hereditary
- May occur in combination with other disorder
- May be abnormal intrauterine position
- May be neuromuscular or vascular problems

- Affected foot is usually smaller and shorter, with an empty heel pad and transverse crease
- If unilateral defect, limb is usually shorter with possible calf atrophy
### Etiology and Pathophysiology

![Image of club foot]

The deformity is characterized by angulation of the hindfoot, eversion of the foot, and equinus of the hindfoot.

### Diagnosis

- Easily detected at birth
- May be recognized on prenatal ultrasound
- Must be differentiated from positional deformity that can be passively corrected or overcorrected

### Treatment

- Application of serial casting in the newborn period
- Continued for 8-12 weeks
- Changed every 1-2 weeks
- After correction from cast
  - Dennis-Browne splints
Treatment

- Surgery in children who do not respond to casting
- Best done between 4 months and 12 months
- Done on bones
Treatment

Nursing care: post casting and post surgical
- Neurovascular check q 2 hr
- Check swelling around cast edges
- Elevate ankle and foot on pillow
- Monitor drainage in the cast
- Pain management
- Appropriate (age related) distraction

Nursing Diagnoses
- Impaired physical mobility related to cast wear
- Altered parenting related to emotional reaction following the birth of an infant with a physical defect
- Risk for impaired skin integrity related to cast wear
- Knowledge deficit: treatment and home care
Education: child and family

- Change diaper frequently to prevent soiled diaper from touching the cast and causing the cast to be soiled
- Sponge bath infant to keep cast dry
- Teach parents that crying episodes must be evaluated carefully as they may be caused by the tingling sensation of circulatory compression
- Reinforce the need for passive ROM exercises several times a day for several months

Developmental Dysplasia of the Hip

- DDH involves displacement of the femoral head from the acetabulum (during the perinatal period) which disrupts the normal development of the hip joint

- In DDH the hip abnormalities reflect a shallow acetabulum, subluxation or dislocation.
Types

- Dysplasia/ Preluxation: femoral head remains in the acetabulum
- Subluxation: femoral head remains in contact but stretching of capsule and ligament cause the head to be partially displaced. This condition accounts for the largest %of CHD
- Dislocation: femoral head loses contact with the acetabulum and is displaced posteriorly and superiorly

Frequency

- 10 per 1000 live births
- Left hip is involved 60% of cases (due to fetal positioning)
- Right hip is involved in 20% of cases
- Both hips are involved in 20% of cases
- 60% of patients are girls
- White children have a greater incidence
- More in Eskimos and Navajo population
- North American Indians have a higher incidence (35/100 per live births) of DDH

Etiology and Pathophysiology

- Family history increases risk
- Prenatal Conditions
  1. Frank breech position
  2. Maternal hormones of relaxin and estrogen
  3. Twinning
  4. Large infant size
Etiology and Pathophysiology

Sociocultural methods of child rearing such as the way infants are carried may increase or decrease the extent of involvement; infants held with hips ABDUCTED have decreased involvement.

Assessment: newborn and infant period

- Shortening of the affected limb
- Allis sign: child in supine position thighs flexed to a 90° angle toward the abdomen, unequal knee height
- Uneven number and placement of skin folds on posterior thigh
- Restricted abduction of the hips after 6-10 weeks of age
- Wide perineum in bilateral dislocation
- Positive Ortolani or Barlow signs

Figure 50-4: Asymmetrical gluteal folds.

The asymmetry of the gluteal and thigh fat folds is easy to see in this child with developmental dysplasia of the hip.
Assessment: older child

- Affected leg shorter
- Delay in walking
- Limp and toe walking
- Waddling gait and lordosis with bilateral dislocation
- Trendelenberg sign: when the child bears weight on the affected side, the pelvis tilts downwards on the normal side, instead of upward as it would with normal stability
Treatment

Correction: goal is to have hip into flexed abducted position (externally rotated)

Treatment: Infants <3 months
- Pavlik harness
- Adjustable chest halter that abducts the legs, soft plastic stirrups hold the hips flexed, abducted and externally rotated
- May/may not be removed for bathing
- Worn continuously for 3-6 months

Treatment: Infants >3 months
- Skin traction followed by spica cast
Treatment: Child >18 months
- Traction
- Operative reduction
- Rehabilitation

Child in Pavlik Harness

Nursing Diagnosis
- Knowledge deficit
- Impaired physical mobility related to restriction of braces and casts
- Risk for impaired skin integrity
- Risk for altered growth and development related to limited mobility and potential decreased exposure to stimulation
Education: child and family

- Pavlik harness
  - May/may not be removed
  - Depends on the child’s condition and parents level of understanding
  - No powders or lotions: tend to cake or ball underneath straps or clothing
  - Proper application
  - Sponge bath

- Assess skin under straps daily for irritation or redness
- T-shirt and knee socks should be worn under the brace to prevent skin irritation
- Diaper under the straps and changed without taking the harness off
- Parents should not adjust the straps without supervision from a medical practitioner

- Adequate stimulation with age appropriate toys
- Activities to stimulate upper extremities
- Modification of car seat, and positioning for nursing and eating
- Children will catch up with developmental milestones once abduction splints off
Muscular Dystrophy
Duchenne’s Congenital

- Group of disorders characterized by progressive degeneration of skeletal muscles

Frequency

- Duchenne’s pseudohypertrophic muscular dystrophy is the most common
- Sex-linked (x) recessive gene
- Wasting, contractures, with loss of independent ambulation by 9-11 years of age
- Mom and sibling should be tested to see if they have the disease or they are carriers
- 1:3,500 male births

Etiology and Pathophysiology

- The cause of the disease stems from an enlargement of the muscle caused by infiltration of fat (pseudohypertrophy)
- Profound muscular atrophy
- Ambulation impossible by 12 years
Etiology and Pathophysiology

- Terminal stages involve facial, oropharyngeal and respiratory muscles
- Last stage involves the diaphragm and auxiliary muscles of respiration
- Death is caused by respiratory tract infection or cardiac failure

Assessment

- Children meet developmental milestones in earliest years
- First signs:
  - Waddling gait
  - Lordosis
  - Difficulty climbing stairs, running or pedaling a bike
- Later:
  - Difficulty walking on an even floor (Gower’s sign)
  - Progression of disease:
    - More muscle weakness
    - Walking more difficult
    - Wheel chair use by age 11 to 12 years
    - Muscles feel woody on palpation, and look enlarged: pseudohypertrophy
The child first maneuvers to a position supported by arms and legs.

Figure 50-10C  Gower's maneuver - Muscular dystrophy

The child next pushes off the floor and rest one hand on the knee.
Figure 50-10D  Gower’s maneuver - Muscular dystrophy

The child then pushes to himself upright.

Assessment

- Scoliosis of spine and fracture of long bones may occur from abnormal muscle tension and lack of muscle support
  - Mental deficiency (common), mild approx. 20 IQ points below normal
Diagnostic Tests
- Serum enzyme measurement
- Electromyography (EMG)
- Muscle biopsy

Treatment
- Supportive, physical therapy
- Decrease immobilization
- Frequent rest periods in recumbent position
- Splinting and bracing

Treatment
- Well-child- approx. 3 hrs. of walking per day to maintain muscle strength
- Low-calorie diet
- Increase protein diet
- Avoid obesity
Treatment

- Increase fiber and fluid to decrease constipation
- Breathing exercises daily A MUST

Education: child and family

- Teach ROM
- Reinforce diet to prevent obesity and constipation
- Teach self-help skills
- Optimal level of activity with child’s limitations

Education: child and family

- Support groups (parent and child)
- Information on environmental issues that promote mobility and allow for w/c use
- Genetic counseling (parents, siblings, maternal aunts and their off-springs)
Scoliosis

- Medical term for lateral curvature of the spine involving rotation of the vertebral bodies
- Can be congenital or develops during infancy or in childhood

Terms

- Kyphosis: abnormal curvature of the thoracic spine
- Lordosis: accentuation of cervical or lumbar curvature beyond physiologic limits
- Thoracic hypokyphosis: the forces of a curved spine on the structure of the body causes the rib cage to become misshapen
Types

- Functional: compensatory, children who have unequal leg lengths or poor posture
- Structural: permanent curvature of the spine accompanied by damage to the vertebrae

Frequency

- 70% of structural are idiopathic
- Occurs most often during the rapid growth spurt in adolescence: 11-14 years for females, 13-16 years for males
- Female to male ratio, 5:1 for curves >21 degrees
- Scoliosis is common in diseases where there is unequal muscle balance
Assessment

- Painless, insidious onset
- Parents notice skirts hang unevenly or that bra straps are adjusted unevenly
- Unequal shoulder heights
- Waist angles
- Scapula prominences
- Chest asymmetry

Assessment

- Screening by school nurse begins in the 5th grade as mandated by law in many states
- Screening controversial: no controlled studies to demonstrate improved outcome
- Scoliometer is used to document clinical deformity

Treatment

- x-ray to identify the extent of the curvature and give baseline information for follow up
Treatment

- Option 1: if curvature of spine is <15-20 degrees
  1. Do nothing
  2. Monitor teen every 3-6 months for change
  3. Exercises to improve posture and muscle tone to increase flexibility of the spine

- Option 2: if curvature of spine is <40 degrees
  BRACE
  - Boston: an underarm customized prefabricated plastic shells with lateral pads

- TLSO (thoracolumbarsacral):
  - orthotic underarm
  - customized
  - molded on the body
  - Milwaukee: individually adapted with neck ring.
  - Braces worn until teens spinal growth stops
Treatment

- Option 3: if curvature of spine >40 degrees
- Surgery: spinal instrumentation

Pre-operative Teaching

- Deep breathe and cough
- Turn q 2 hr. use of spirometer
- Pain meds
- ROM, activity
- Possible ICU tour

Post-operative Teaching

- ROM
- Log roll q 2 hr.
- Skin care
- Cough, deep breathe, incentive spirometer
Post-operative Teaching

- NPO
- NG tube, strict I&O
- Monitor urinary output
- Frequent vital signs

Post-operative Teaching

- Neuro checks
- Check wound and circulation
- Monitor hematocrit, blood transfusions
- Pain management

Post-operative Teaching

- Gradual resumption of activity as ordered, simple physical therapy
- Halo traction may be used for non-surgical treatment of moderate curves or post-op in severe curves to provide stability for the spine
Discharge Teaching

- Do not slump in chair
- Do not bend or twist the torso or lift over 10 lbs.
- Compliance with activity restrictions must be followed for 6-8 months

Discharge Teaching

- Address self-esteem issues
- Being one of the group is important
- Comply with follow-up visits

Education: child and family

- Milwaukee or other brace
- Brace worn for 23 hrs. a day
- Brace off to shower, bathe swim
Education: child and family

- T-shirt worn under brace next to skin (to protect skin)

- Exercises (such as pelvic tilt & lateral strengthening) are done several times a day while in brace to correct thoracic (lordosis) kyphosis

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Education: child and family

- Slight muscle ache at first use of brace

- Consistent use of brace results in maximum benefit

- Much activity while brace is in place

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Scoliosis - Nursing Diagnoses

- Body image disturbance related to bracing

- Pain related to surgery (spinal fusion)

- Impaired physical mobility related to brace wear

- Risk for noncompliance with treatment regimen
Prognosis

- Idiopathic Scoliosis: excellent
- Congenital scoliosis: variable and depends on defect, if neuromuscular disease is present, then complex