Developmental Orthopedic Disease - (DOD)

- What is it?
- How do they get it?
- How do I evaluate/diagnose it?
- How should it be treated?
- What should I expect with treatment?
- Why treat it?
Why treat it?
Normal bone growth

- “Endochondral Ossification”
- Cartilage leads the way
- Maturation and differentiation from cartilage to bone
Foals are Plastic

- **Growth** influenced by:
  - nutrition
  - amount of weight bearing
  - our intervention - surgical
Treat the foal - Not just the problem

- Stabilization / support
- Exercise
- Medications
- Nutrition
- “Soft” vs. “Hard” tissue
Angular Deformities

- “Crooked” Foal
- Limb distal to the joint
  - valgus or varus
- Carpus/Tarsus and fetlock
Growth vs. Deformity
Varus

Valgus
Angular Deformities

- Asymmetric physeal growth
Angular Deformities

- Periarticular laxity
Angular Deformities

- Delayed/irregular ossification of cuboidal bones
Angular Deformities

- Delayed/irregular ossification of cuboidal bones
Angular Deformities

- Delayed/irregular ossification of cuboidal bones
Angular Deformities

- Excessive weight bearing
What is normal?

- Toe out
- Carpal valgus
Early recognition is critical

- Site of deformity
- Degree of deformity
- Potential for correction
  - shaping remaining growth
Determinants for our intervention

- Physical examination
  - Which joint, severity, precipitating cause

- Duration and Progression

- Previous “management”
  - Exercise, nutrition, any treatment

- +/- Radiographs
Expectations for the carpus

- Some valgus
- 5-7 degrees by 4 mths
- <2 degrees by 8-10 mths
- Most rapid growth < 6 mths of age
Fetlock deformities

- Often undiagnosed
- Varus; left rear most common
- Rapid growth < 3 mths
Treatment options

- Conservative management
Treatment options

- External coaptation
  - Too much is BAD
Treatment options

- Limited External Coaptation
Treatment options

- **Limited External Coaptation**
Treatment options

- Conservative management
- External coaptation
- Surgical intervention
Surgical options

- Periosteal transection
- Transphyseal bridging
- Step osteotomy
Periosteal Transection
Advantages of early periosteal transection

- Minimal risk
- No overcorrection
- Decreased cost
- 6-8 weeks of effect
Periosteal Transection
Transphyseal bridging

- Can overcorrect
- Requires 2nd removal procedure
- Increased Cost
  - 1st procedure + removal procedure
- *But* quicker resolution
Transphyseal Bridging
Transphyseal Bridging
Transphyseal Bridging
Surgical limitations

- 15-20 degrees for the carpus
- 6-8 degrees for the fetlock

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Continues to "correct" itself

Stops correcting earlier
Surgical limitations

Continues to “correct” itself

Stops correcting earlier
Step Osteotomy

Sagittal plane

Frontal plane

Flexural Deformities

- Contracture
  - congenital
  - acquired
- Laxity
  - primarily congenital
Contracture

- Bone outgrows tendons
- Flexors overpower extensors
- Pain-myotactic reflex
- “Contracted Tendons”
Sites of Contracture

- Coffin joint - “Club Footed”
Sites of Contracture

- “Fetlock joint”
  - “Posty”
  - “Upright”
Sites of Contracture

- “Carpus - “Over””
Determinants for our intervention

- Physical examination
  - which joint
  - severity
  - precipitating cause
Determinants for our intervention

- Duration and Progression
- Previous “management”
  - amount of exercise
  - nutritional
  - any treatment
Nonsurgical management

- Limited exercise
Nonsurgical management

- Oxytetracycline
- Bandaging/support/splinting
- Analgesics
Nonsurgical management

- Bandaging/support/splinting
Nonsurgical management

- Shoeing:
  - Toe extensions
  - Heel elevations
Surgical management

- “Check” ligament desmotomies
  - cut the tether to allow greater flexibility

- Tenotomies
  - cut the attachment
  - severe cases - breeding animal
Inferior check ligament
“Club-Footed”

- < 4 mths of age
- Inferior check ligament desmotomy
- Shoeing with sx
  - toe extension
“Posty”

- 8-18 mths of age
- Superior and inferior desmotomy
- Shoeing?
Flexor laxity

- Coffin joint
- Fetlock
Flexor laxity

- Less is better
Flexor laxity

- Controlled exercise
Flexor laxity

- Shoeing
Flexor laxity
Flexor laxity

- Shoeing
Musculoskeletal Exam

- Palpation - often in recumbency
  - Heat
  - Pain
  - Swelling
  - Range of motion

Symmetry
Musculoskeletal Exam

- Observe at a walk / trot
  - More evident than adults
  - Sequential evaluations
- Radiographs
- Ultrasound
Critical to alleviate lameness as quickly as possible

- Angular / Flexural deformities can have a more significant effect than the primary problem
Sepsis

- Multiple joints or physis
  - Cultures
  - “Squeeze the bone”
- Source
- Often insidious onset
- Difficulty in interpreting radiographs