

Neonatal Orthopedic Conditions

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Learning Objectives

- Differentiate between the main equine pediatric orthopedic conditions
- Understand principles behind the treatment strategies for each condition

Main Pediatric Conditions

1) Tendon laxity = weak flexor tendons

2) Flexural deformities = contracted tendons

3) Angular limb deformities = limb deviations

Brief Anatomy Review





Tendon Laxity

- Typically newborn foals
 - Congenital more common than acquired
- Clinical signs
 - Not weight bearing on toes, walking on heel bulbs
 - Severe cases rest fetlocks on ground
- Hindlimbs most commonly affected



Congenital Tendon Laxity

- Etiology: musculotendinous weakness
 - Prematurity
 - Primary systemic illness
 - Lack of exercise



Acquired Tendon Laxity

- Etiology: induced weakness
 - Bandaging, splinting, or casting for extended periods
 - Hoof overgrowth



Tendon Laxity Treatment

- Trim heels flat \rightarrow eliminate "rocker" effect
- Heel extension shoes (more severe cases):
 - Provide plantar/palmar support
 - Protect fetlocks and heel bulbs from trauma
- Exercise
- Prognosis: Favorable





Tendon Laxity Treatment







After

Tendon Laxity Treatment







With shoes

Presentation: Non-weightbearing



2 months Post-discharge

Flexural Deformities

- "Contracted tendons"
- Persistent hyperflexion of joint
- Tendons functionally too short compared to bone
- Pain-myotactic reflex
- Forelimbs most commonly affected
 - Typically only one joint: DIP, fetlock, or carpus
- Congenital or acquired



Congenital Flexural Deformities

- Etiology: multifactorial
 - Uterine malpositioning
 - Genetics
 - Idiopathic
- Fetlock and carpal deformities most common
 - Fetlock: SDFT, DDFT
 - Carpus: SDFT, DDFT and carpal fascia



Congenital Flexural Deformities Treatment

- Increase exercise
- Oxytetracycline (3g/foal)
- NSAIDs
- Splints during the day
- Toe extension shoes
- Surgery (severe cases)

*** MUST ASSIST TO STAND AND NURSE ***

 Prognosis: Better if shorter duration and if limb can be straightened manually



Congenital Flexural Deformities Treatment



24 hours old



1 week later: Tx = exercise

Congenital Flexural Deformities Treatment



72 hours old



3 days later: Tx = oxytetracycline, NSAIDs, splints, exercise

Acquired Flexural Deformities

- Unilateral or bilateral: DIP or fetlock joint most common
- Etiology:
 - Chronic pain in affected limb
 - Rapid growth
 - Nutritional imbalance
 - Genetics







Acquired Flexural Deformities: DIP Joint

- Contracture of DDFT, "club foot"
- Most develop between 4 weeks to 4 months
- Stage 1: dorsal hoof wall less than vertical
- Stage 2: dorsal hoof wall over vertical



Acquired Flexural Deformities: DIP Joint

- Treatment:
 - Dietary changes
 - Exercise
 - Toe extension shoes
 - NSAIDs and sometimes oxytetracycline
 - Surgery: distal check ligament desmotomy; may need DDF tenotomy for stage 2
- Prognosis: Guarded for stage 2 cases



Acquired Flexural Deformities: Coffin Joint: Ex

	Liey	
	and a fill	500





Pre-op

Distal check Distal check Distal check Distal check Post-op Toe extension shoes



Acquired Flexural Deformities: Coffin Joint: Ex

	The state





Post-op

Pre-op

Distal check ligament desmotomy Heel wedge then toe extension shoes

Acquired Flexural Deformities: Fetlock Joint

- Contracture of SDFT
- Knuckle forward at the fetlock with the hoof in normal alignment
- Most develop between 9 months to 2 years
- Most often SDFT and DDFT both involved



Acquired Flexural Deformities: Fetlock Joint

- Treatment:
 - Dietary changes
 - Exercise
 - Toe extension shoes



- NSAIDs and sometimes oxytetracycline
- Surgery: proximal +/- distal check ligament desmotomy; rarely SDF tenotomy
- Splinting of limb
- Prognosis: Variable joint capsule fibrosis

Acquired Flexural Deformities: Fetlock Joint: Ex



1 year old

3 days post-op

Proximal check ligament desmotomy, toe extensions, splinting, oxytetracycline, NSAIDS

Angular Limb Deformities

- A lateral or medial deviation of a limb:
 - Varus: medial deviation of limb below a joint
 - VaLgus: Lateral deviation of limb below a joint
- Congenital or acquired (opposite limb pain)



Angular Limb Deformities



Varus Medial deviation



VaLgus Lateral deviation

Angular Limb Deformities

- Age: foals, usually quite young
- Breed: all, particularly those with rapid growth
- Limb: forelimb more common than hind
- Sites: carpus, fetlock, tarsus

Most common deformities: carpal valgus, fetlock varus

Angular Limb Deformities Need To Know...

- Is a deformity present?
- Has the deformity changed over time?
- What is the deformity?
- What joint(s) are involved?
- What should you do, act or wait and see?

How to Examine Foals

- 1) Look at the foal from the front
- 2) Palpate the limb can you correct it?
- 3) Examine the foot
- 4) Watch the foal walk
- 5) Know what is normal!



1) Look at Foal From the Front

- Align yourself with the toe of foot
- Ask where is knee and rest of limb?



2) Palpate the Limb

- Joint laxity
- Can the deformity be manually corrected?
- Any heat, pain, swelling?
 - Check opposite limb



3) Examine the Foot

 Is the hoof worn more on one side?



4) Watch the Foal Walk

- Watch the foal travel
- Look for:
 - Multiple limb involvement
 - Lameness in opposite limb
 - Similar deformities in mare

4) Watch the Foal Walk

the crooked foal...

5) Know what is normal

- Toe out
- Carpal valgus
 - 5-7° by 4 months
 - <2° by 8-10 months

Congenital Angular Limb Deformities

- Present at birth, many correct without treatment
- If severe (≥15°) or not improving within 5-7 days, treatment indicated
- Etiologies:
 - Intrauterine malpositioning
 - Joint laxity (prematurity)
 - Incomplete ossification of cuboidal bones (normally 300 days of gestation)

Congenital Angular Limb Deformities

- Premature "Windswept" foals in which:
 - Both hindlimbs curve in the SAME direction
 - Ligament/tendon laxity
 - Self-correct in couple weeks
 - Tx: Controlled exercise



Acquired Angular Limb Deformities

- Born straight, go crooked within weeks or months of birth
- Etiologies:
 - Asymmetric physeal growth
 - Growth plate injury or physitis
 - Lame in contralateral limb
 - Overnutrition leading to rapid growth
 - Genetic predisposition to rapid growth



Physeal Asymmetry



Angular Limb Deformities Diagnosis

- Visual and physical exam:
 - Lameness in opposite limb
 - Mare's legs
- Radiographic exam:
 - Long plates: 7x17
 - DP and lateral
 - Determine degree and pivot point

Diagnosis: Radiographic Evaluation





DP Projections

Incomplete Ossification

- Premature/dysmature foals
- Usually severe deformity:
 - Carpus valgus
 - Sickle hocked



Incomplete Ossification: Treatment

- Strict limitation of exercise
- Splints
- Radiographic monitoring of ossification





Incomplete Ossification: Treatment

- Sleeve (tube) cast:
 - Ends at fetlock (i.e. doesn't not include foot)
 - Side effect is tendon laxity (max 14 days)





Incomplete Ossification: Treatment

EARLY treatment essential before abnormal ossification pattern occurs





Other Angular Limb Deformities: Treatment

- Conservative:
 - Mild cases (5-10°) or early in physeal growth
 - Rest, trimming, shoes
- Surgery:
 - Moderate to severe cases or at end of physeal growth
 - Periosteal transection, transphyseal bridging, single transphyseal screw, wedge osteotomy

Review: Physeal growth

Joint	Physis	Radiographic closure	Physiologic closure	Majority growth completed by	Recommended treatment time
Fetlock	Distal MC/MT III	8-10 months	4 months	3 months	<1 month
Carpus	Distal radial	22-28 months	18 months	12 months	<4 months
Tarsus	Distal tibial	17-24 months	9 months	8 months	<4 months

Other Angular Limb Deformities: Conservative Treatment

- Corrective trimming: lower the wall toward which hoof is deviating
 - Ex: Turned out \rightarrow Trim outside wall
- Shoeing: place extension on side of hoof that is wearing the most
 - Ex: Turned out \rightarrow Inside (medial) extension



Other Angular Limb Deformities: Conservative Treatment: Ex

- Fetlock varus (turned in)
 - Trim inside
 - Outside extension



Treatment 10 days later

Other Angular Limb Deformities: Surgery - Periosteal Transection

- Performed to stimulate growth:
 - On CONCAVE side, proximal to physis
- Radius ulnar ostectomy
- +/- transphyseal bridging on opposite side



Other Angular Limb Deformities: Surgery - Transphyseal Bridging

- Slow growth on CONVEX side of deformity
 - Screws proximal and distal
- to physis
 - Figure of 8 wires around

screws

 REMOVE IMPLANTS WHEN STRAIGHT



Other Angular Limb Deformities: Surgery - Transphyseal Screw

- Performed to slow growth:
 - On CONVEX side of deformity
 - Single lag screw across physis
 - Improved cosmetic appearance v
- REMOVE IMPLANTS WHEN STR







Severe Angular Limb Deformities: Surgery – Ostectomy



Ostectomy



B) Step Ostectomy



Angular Limb Deformities: Alpacas!

 Normal carpal valgus - surgery ONLY if true deformity!



Angular Limb Deformities: Prognosis

- Incomplete ossification:
 - Good if treated early
 - Guarded if treated late/crush injuries
- Other angular limb deformities:
 - Severe $(>15^{\circ})$ = fair if early
 - Lower joint = fair if early, generally less success due to short time for correction
 - End of physeal growth = less success

Questions?

