PennVet

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

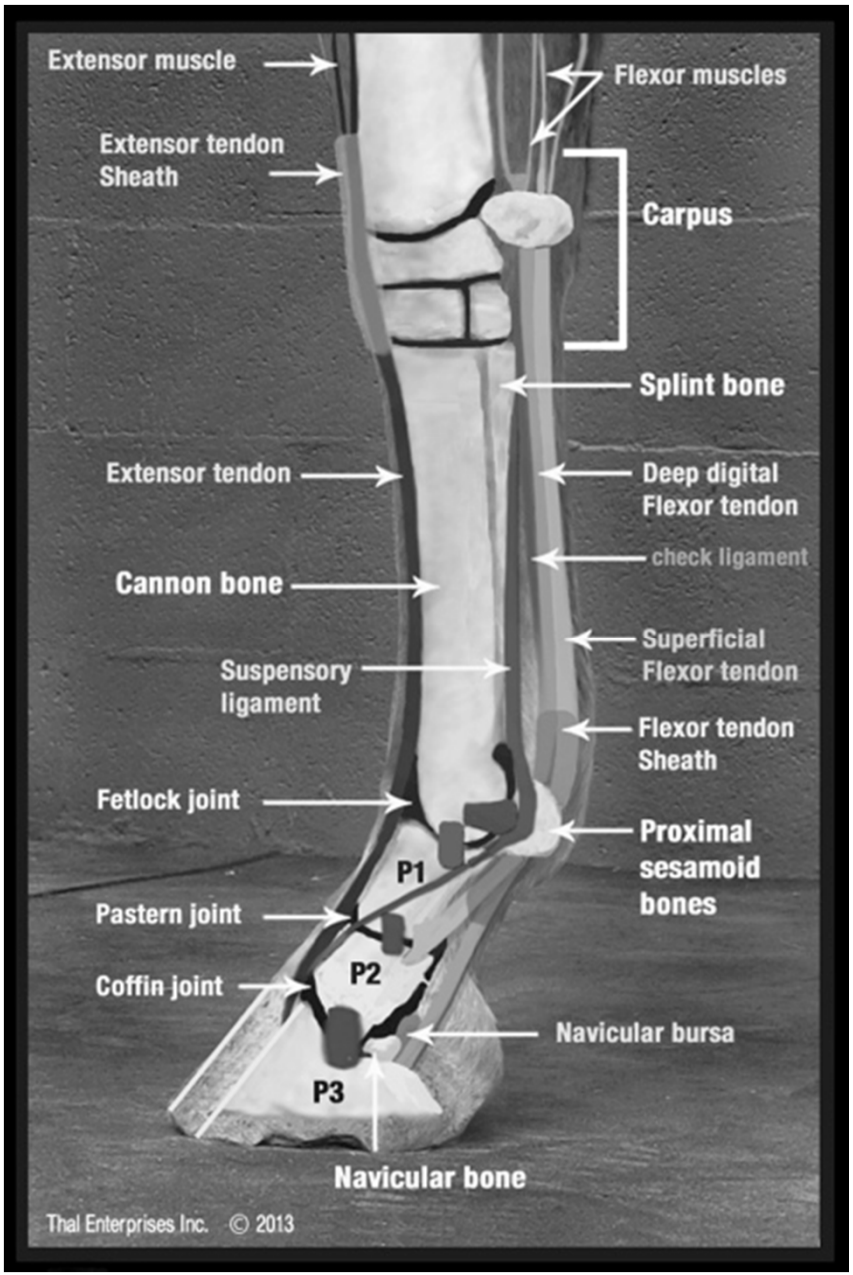
Main Pediatric Conditions

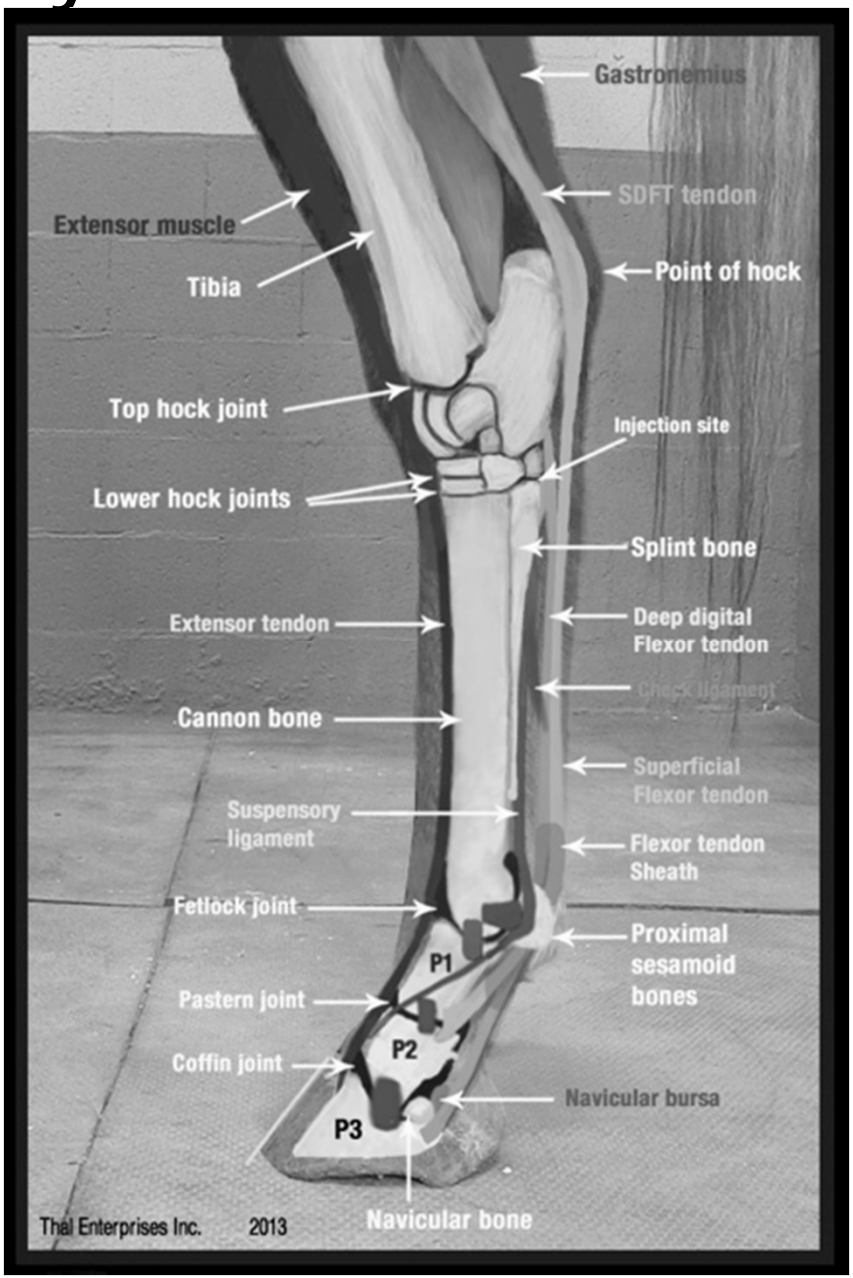
1) **Tendon laxity** = weak flexor tendons

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

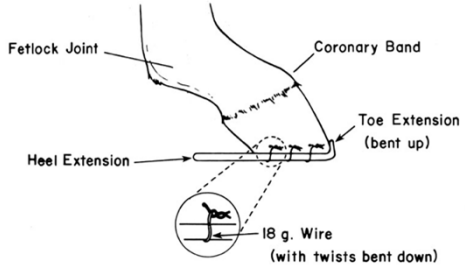
- Etiology: induced weakness
  - Bandaging, splinting, or casting for extended periods
  - Hoof overgrowth

Tendon Laxity Treatment

- Trim heels flat → 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

Before

After

Tendon Laxity Treatment

Presentation:
Non-weightbearing

With shoes

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

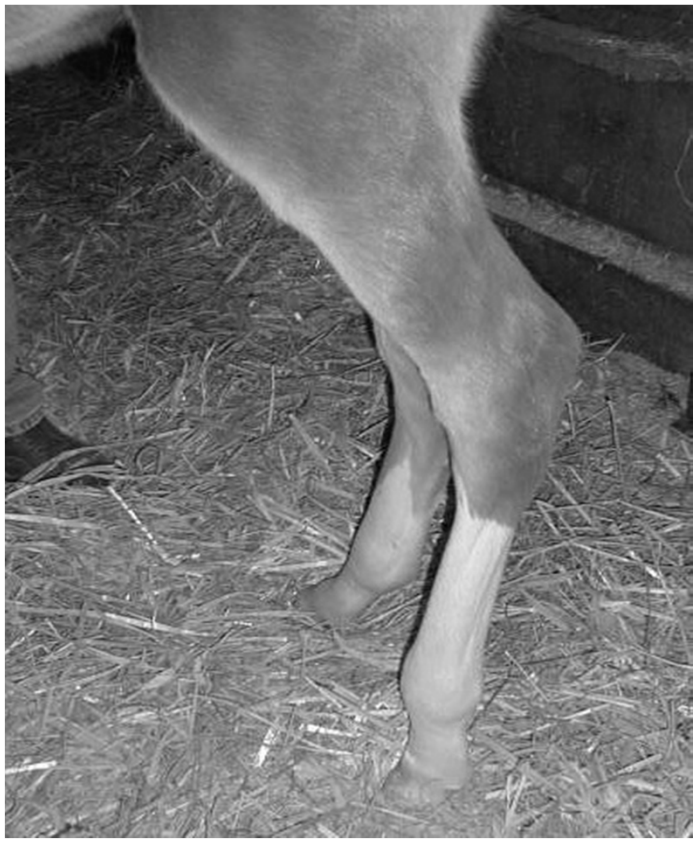
Congenital Flexural Deformities Treatment

- 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

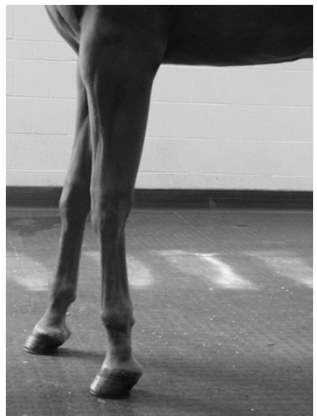
72 hours old

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

Acquired Flexural Deformities

Acquired flexural deformity

- 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

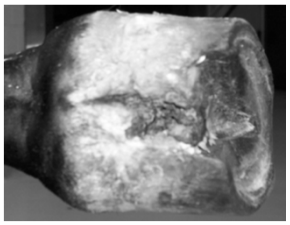
- Contracture of DDFT, “club foot”
- Most develop between 4 weeks to 4 months
- Stage 1: dorsal hoof wall less than vertical
- Stage 2: dorsal hoof wall over vertical

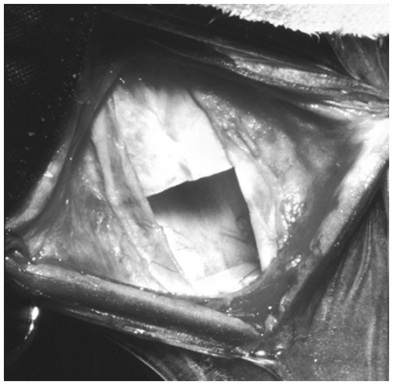
Acquired Flexural Deformities: DIP Joint

- 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

Pre-op





Distal check ligament desmotomy
Toe extension shoes

Post-op

Acquired Flexural Deformities: Coffin Joint: Ex

Pre-op

Distal check ligament desmotomy
Heel wedge then toe extension shoes

Post-op

Acquired Flexural Deformities:

Fetlock Joint

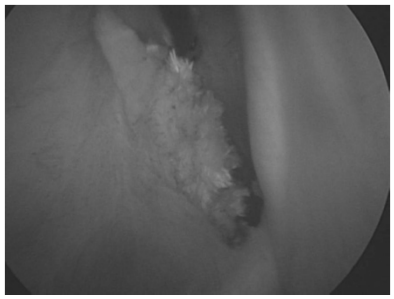
- Contracture of SDFT
- Knuckle forward at the fetlock with the hoof in normal alignment
- Most develop between 9 months to 2 years
- Most often SDFT and DDFT both involved

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 Contracture
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:

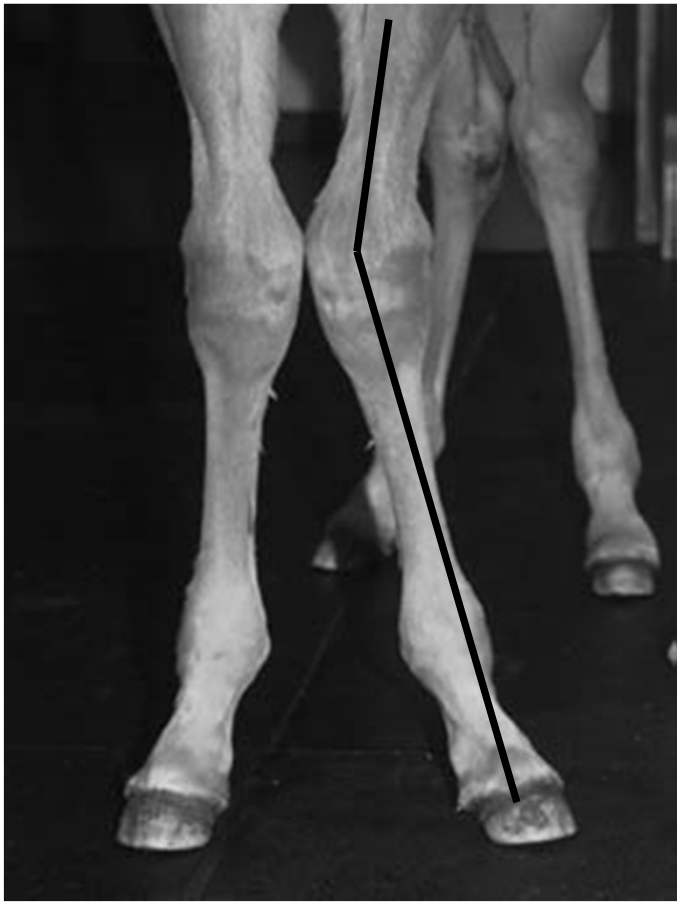
  - Varus: medial deviation of limb below a joint

  - Va**L**gus: **L**ateral deviation of limb below a joint

- Congenital or acquired (opposite limb pain)

Angular Limb Deformities

Varus
Medial deviation



Va**L**gus
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?

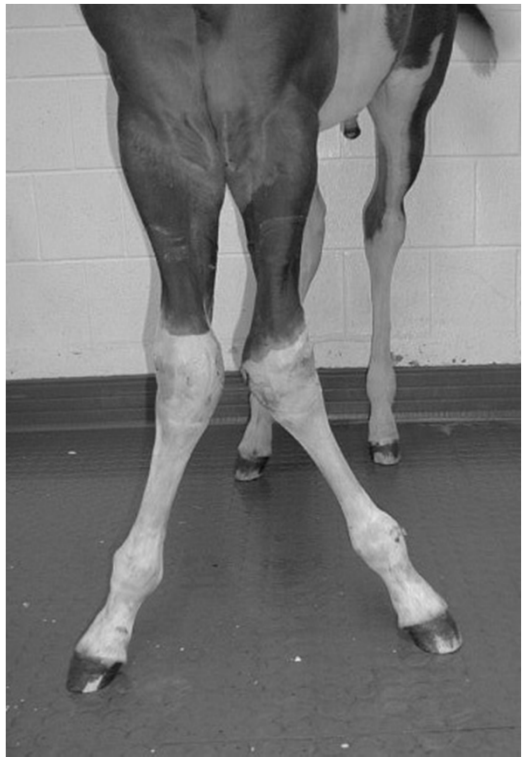
3) Examine the foot

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

5) Know what is normal

- Toe out
- Carpal valgus
  - 5-7^{o} by 4 months
  - <2^{o} 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

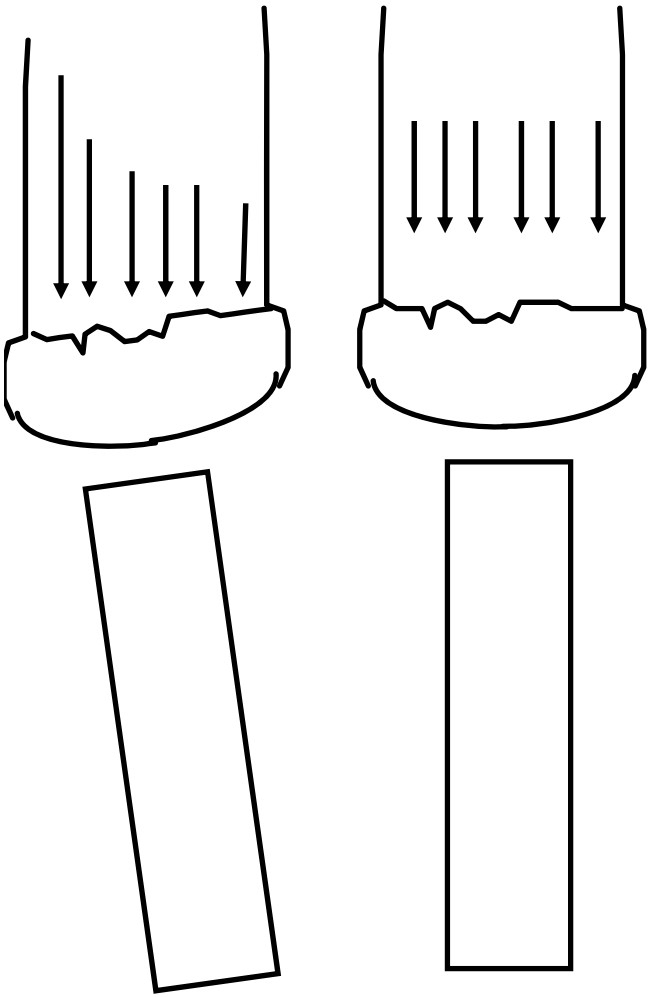
- Premature “Windswept” foals in which:
  - Both hindlimbs curve in the SAME direction
    - ➢ Ligament/tendon laxity
    - ➢ Self-correct in couple weeks
    - ➢ Tx: Controlled exercise

Acquired
Angular Limb Deformities

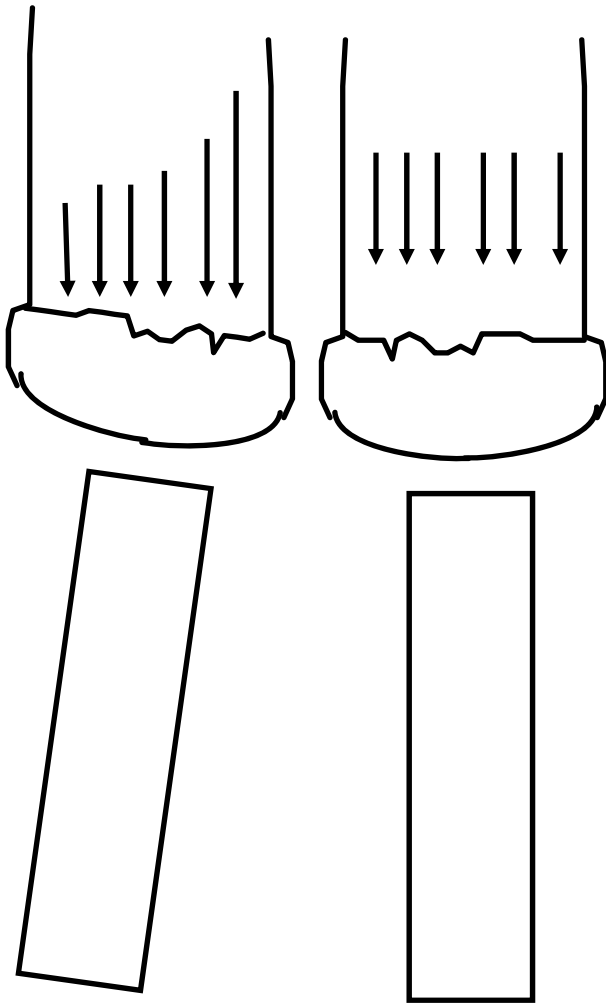
- Born straight, go crooked within weeks or months of birth
- Etiologies:
  - Asymmetric physeal growth
  - Growth plate injury or physitis
  - Lame in contralateral limb
  - Overnutrition leading to rapid growth
  - Genetic predisposition to rapid growth

Physeal Asymmetry

Varus



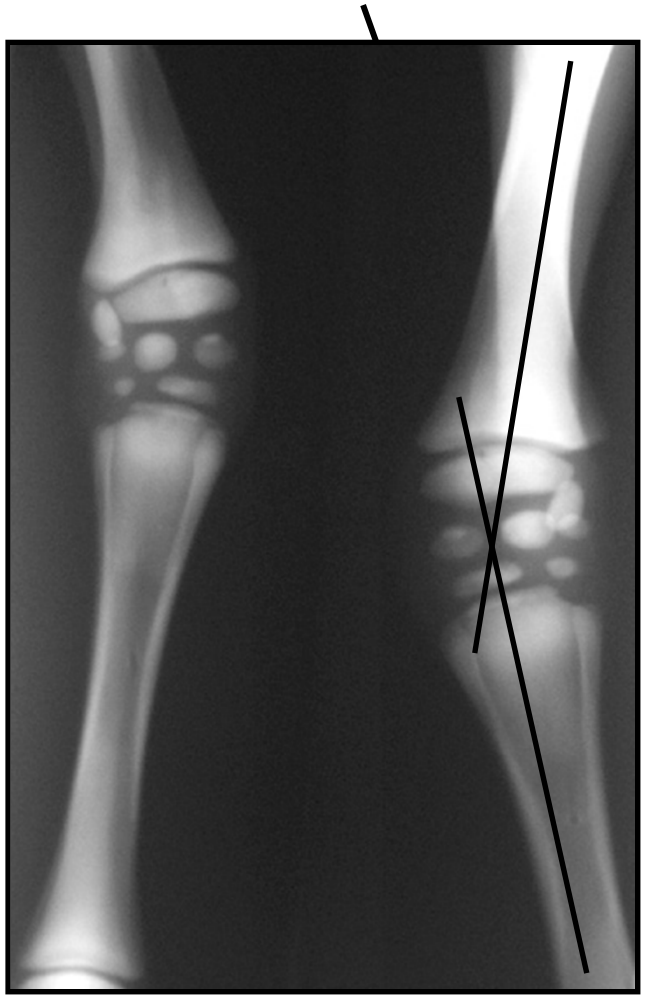
Valgus



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



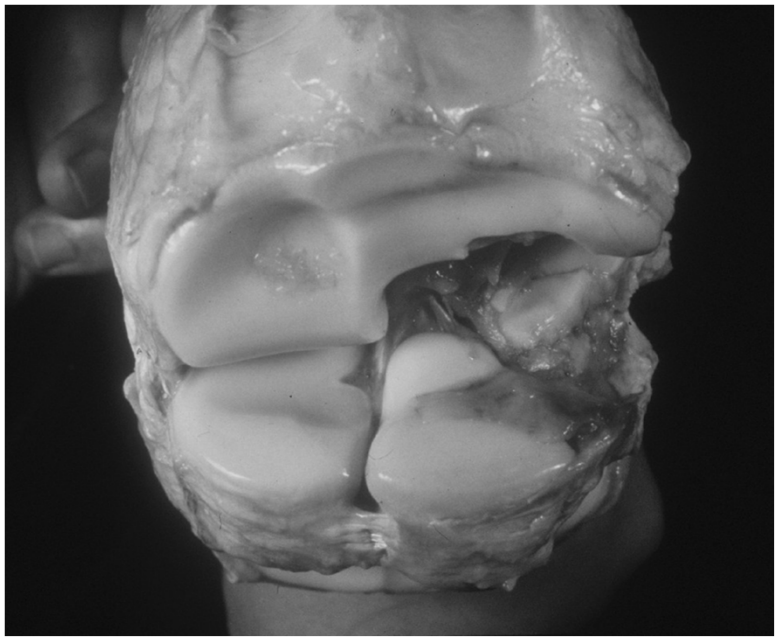
DP Projections

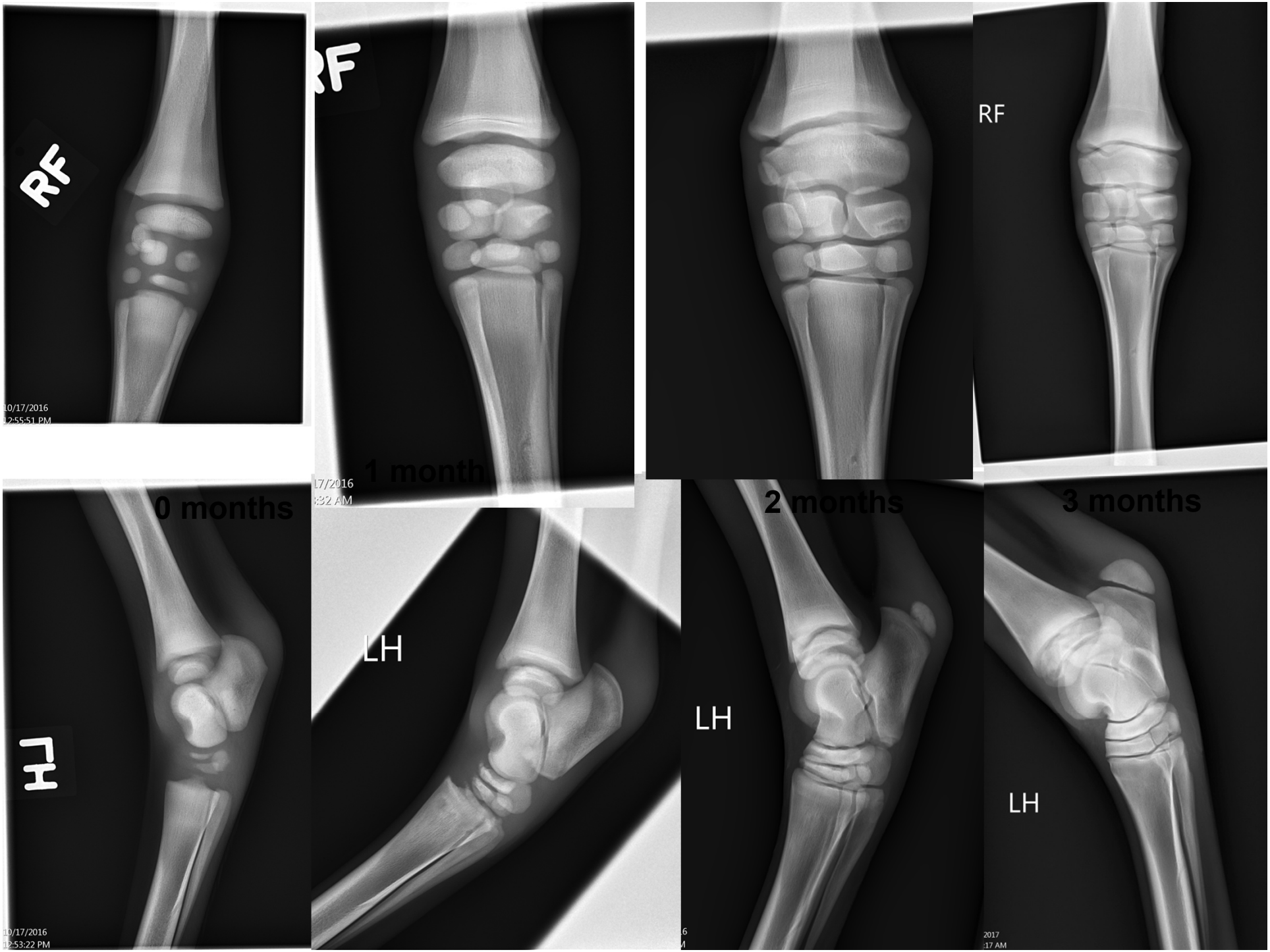
Incomplete Ossification

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

Incomplete Ossification: Treatment

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

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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 →Trim outside wall

- Shoeing: place extension on side of hoof that is wearing the most

  - Ex: Turned out → Inside (medial) extension

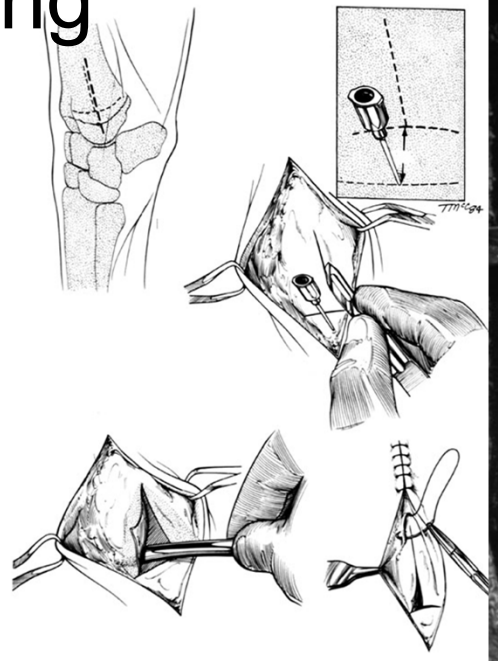
Other Angular Limb Deformities: Conservative Treatment: Ex

- 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

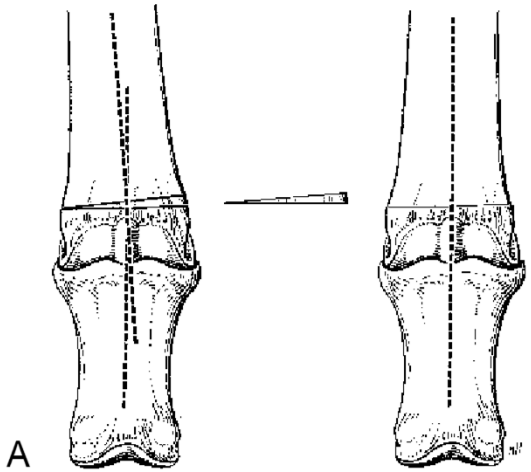
- REMOVE IMPLANTS WHEN STRAIGHT

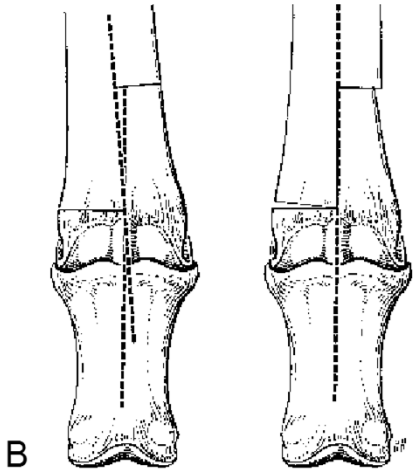
Other Angular Limb Deformities: Surgery - Transphyseal Screw

- 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

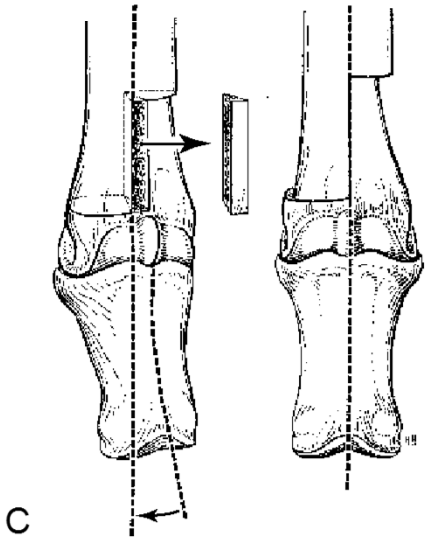
A) Closing Wedge Ostectomy

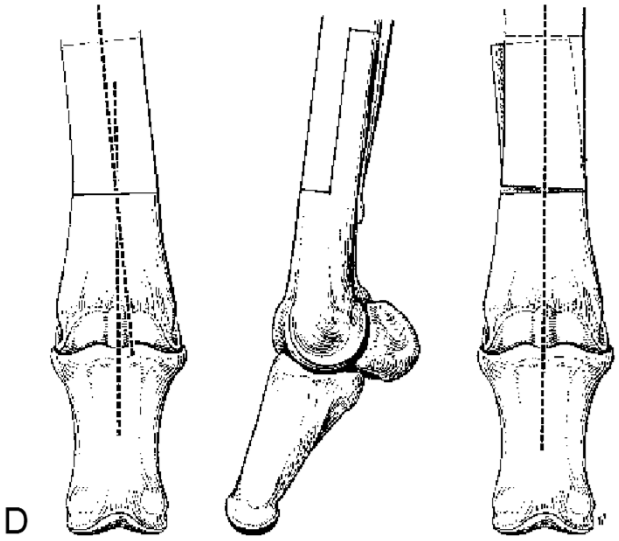




B) Step Ostectomy

C) Derotational Ostectomy





D) Step Osteotomy

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^{o}) = fair if early
  - Lower joint = fair if early, generally less success due to short time for correction
  - End of physeal growth = less success

Questions?