

Diagnosis, treatment and long-term management of elbow dysplasia

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Outline

- How to diagnose forelimb lameness?
- Differential diagnoses for forelimb lameness
- Elbow dysplasia
 - Diagnosis
 - Treatment options
 - Prognosis
 - Long- term management
- Personal experience



1. How to diagnose forelimb lameness?

- Gait



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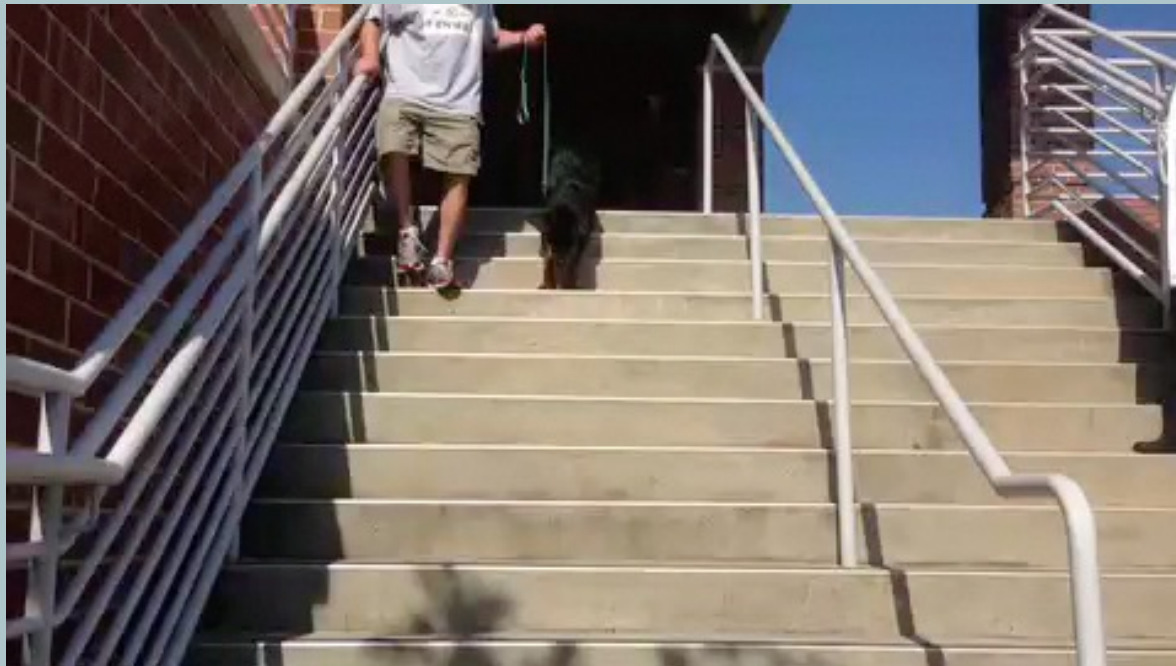
1. How to diagnose forelimb lameness?



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1. How to diagnose forelimb lameness?



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1. How to diagnose forelimb lameness?



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1. How to diagnose forelimb lameness?

- Stance

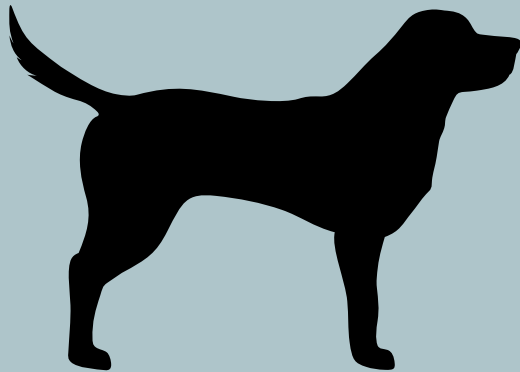


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1. How to diagnose forelimb lameness?



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1. How to diagnose forelimb lameness?



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1. How to diagnose forelimb lameness?

- Hands-on orthopedic exam
 - Crepitus
 - Range of motion
 - Effusion
 - Pain
 - Instability
 - Thickening

C R E P I T



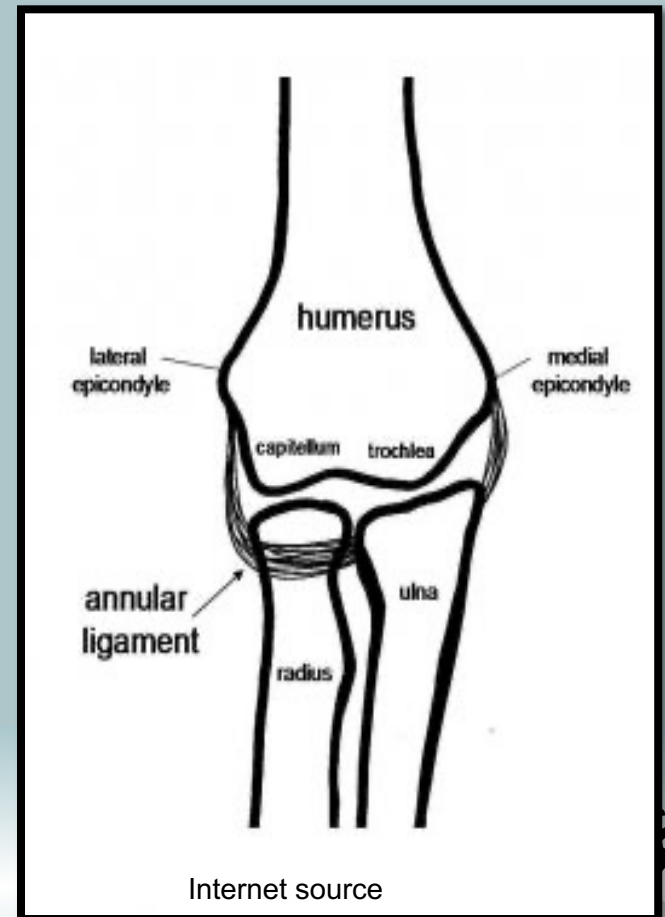
1. How to diagnose (forelimb) lameness?

- Based on signalment
 - Large, giant breeds
 - Example: OCD shoulder
- Based on localization of pain
 - Long bone pain
 - Example: Panosteitis
- Based on anatomical landmarks
 - Lateral humeral epicondyle and radial head
 - Example: elbow luxation



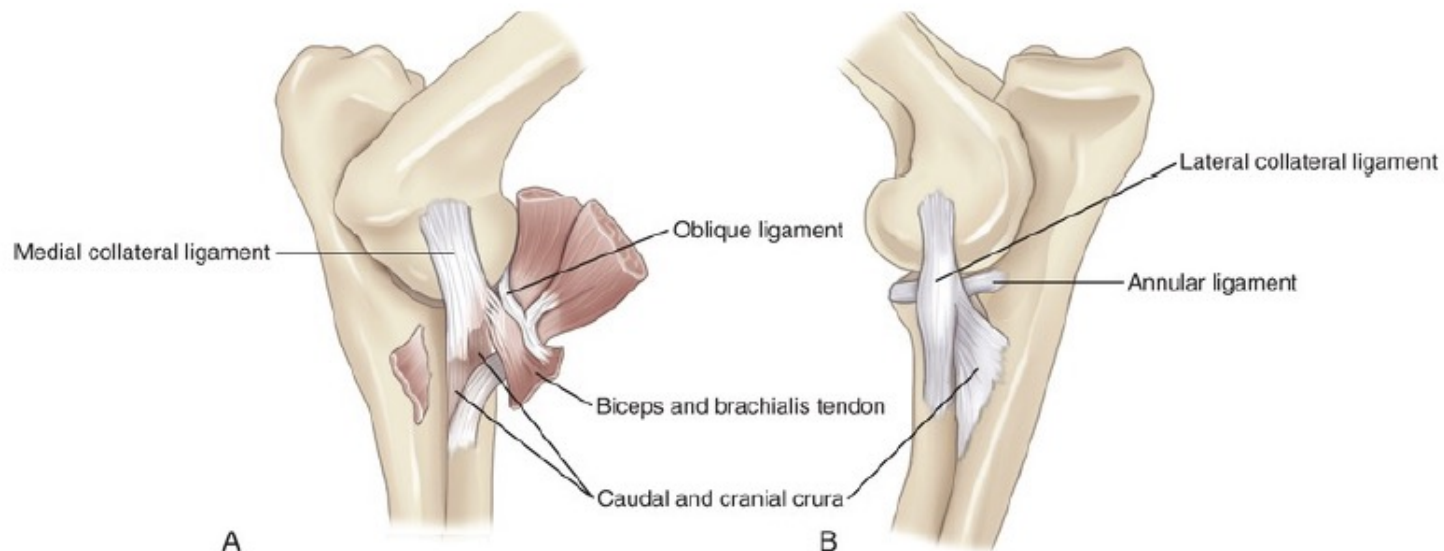
2. It's the elbow!

- Pertinent anatomy of elbow joint
 - Skeletal anatomy
 - 3 synovial joints of elbow
 - Humeroradial
 - Humeroulnar
 - Radioulnar



2. It's the elbow!

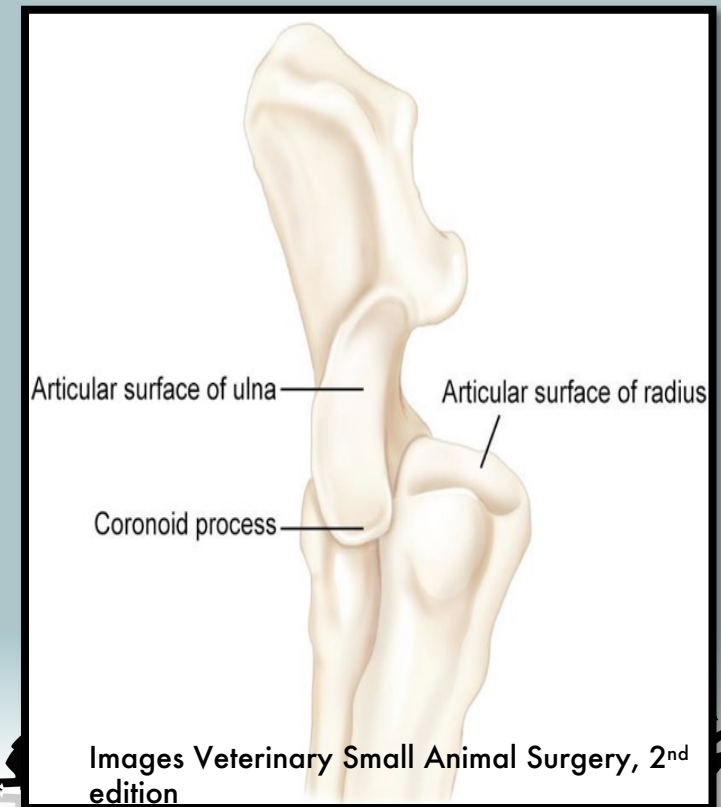
- Pertinent anatomy of elbow joint
 - Ligamentous anatomy



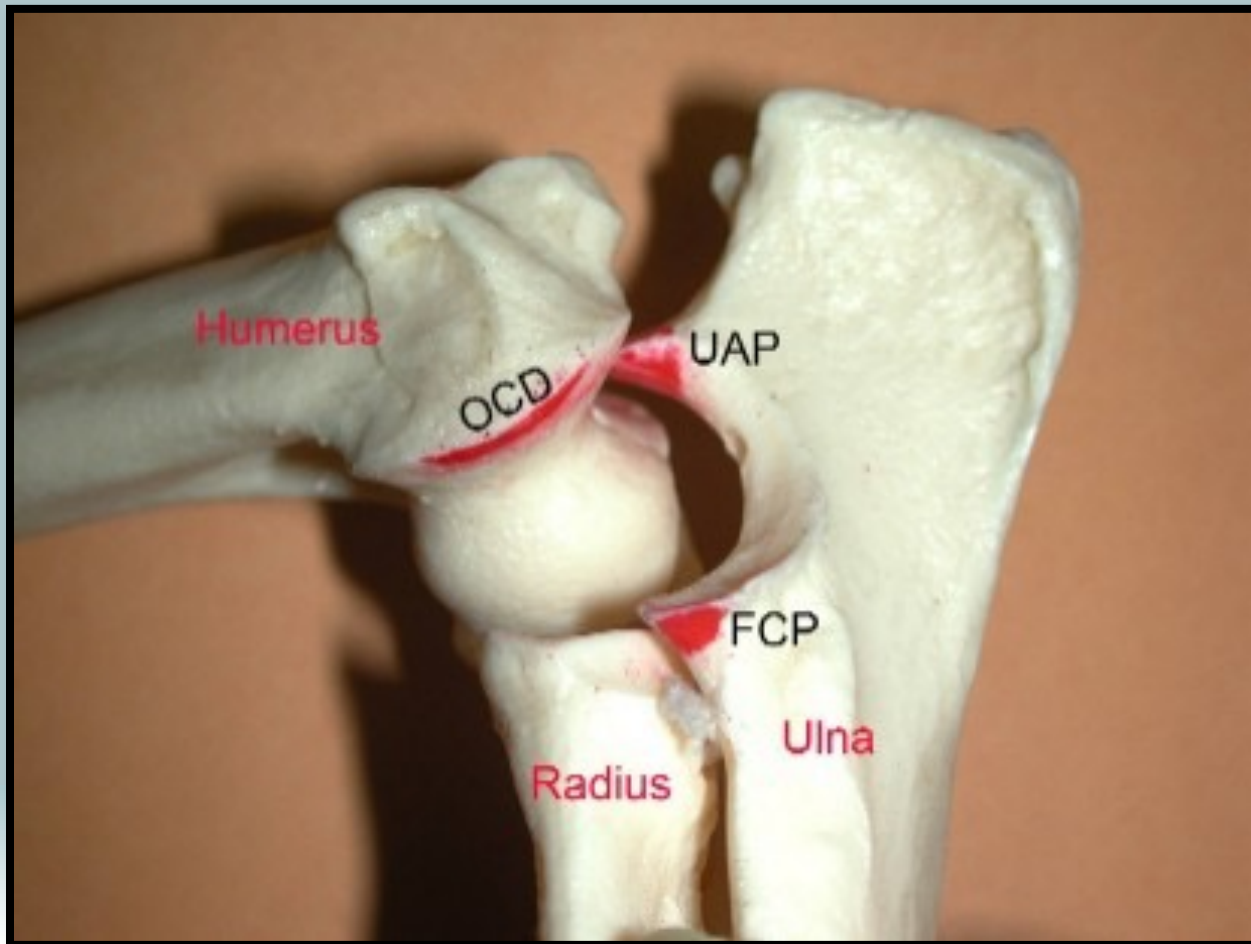
2. It's the elbow!

- Pertinent anatomy of elbow joint

- Range of motion
 - Flexion $\sim 35^\circ$
 - Extension $\sim 160^\circ$
- Distribution of weight bearing
 - Radius 51%
 - Ulna 49%



3. Elbow dysplasia or developmental elbow disease



Internet source

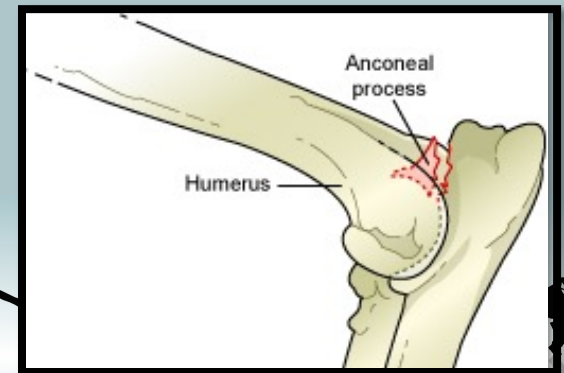
3. Elbow dysplasia or developmental elbow disease

- Medial compartment disease
 - Fragmented medial coronoid disease (FMCP)
 - Osteochondrosis of medial humeral trochlea (OC)
 - Joint incongruity (JI)
- Caudal compartment disease
 - Ununited anconeal process (UAP)



4. Ununited anconeal process (UAP) - caudal compartment disease-

- Breed predisposition
 - Large, giant breeds
 - Bernese, Mastiff
 - Basset hounds
 - Premature closure of distal ulnar physis
- Males 2x more likely affected
- Bilateral in 15-35% of cases
- FMCP in 15-30% of UAP cases



Internet source

4. Ununited anconeal process (UAP) - caudal compartment disease-

- Diagnosis

- Orthopedic exam

- Weight-bearing uni/bilateral lameness
 - 5-12 months of age
 - Severe elbow effusion- caudolateral joint
 - Pain on elbow extension
 - Limited extension

- Radiographs

- Hyperflexed lateral view
 - Oblique views
 - 20- 24 weeks old

- CT scan



Images Veterinary Small Animal Surgery, 2nd edition



5. Medial compartment disease

- FMCP, JI, OC-

- Young, large/giant breed dogs
 - Labs, German Shepherds, Golden Retrievers, Bernese Mountain Dogs
- Joint incongruity
 - Large and chondrodystrophic breeds
- Males 2x more likely
- 6-18 months old
 - OC- 5-8 months
 - Other components- 6-18 months
- Bilateral in 25-80%



5. Medial compartment disease

- FMCP, JI, OC-

- Inherited independently as polygenic traits
- Up to 60% of dogs have multiple components
 - Joint incongruity in 40% of elbows with two or three pathologies
- Dogs with advanced or end-stage disease
 - Older (3-7yrs)
- Biphasic pattern
 - Peaks at <3yrs, >7yrs
- Etiopathogenesis
 - Poorly understood



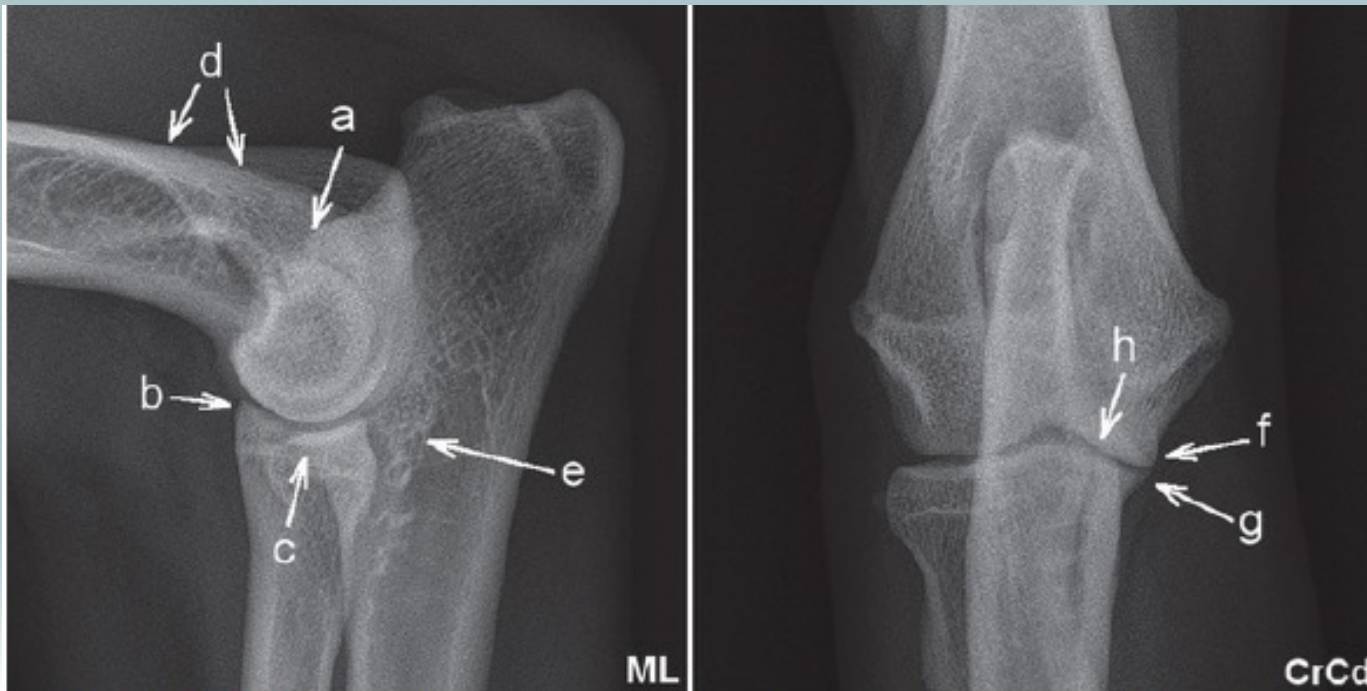
6. Diagnosis of medial compartment disease

- Orthopedic exam
 - Elbows slightly abducted and antebrachium rotated laterally
 - Pain
 - Flexion +/- pronation
 - Palpation of medial compartment
 - Mild effusion
 - Reduced ROM
 - Periarticular fibrosis
 - Mild muscle atrophy



6. Diagnosis of medial compartment disease

- Radiographs
 - Traditional views (CrCd, Lat, flexed lateral)
 - Oblique view for OC



6. Diagnosis of medial compartment disease

- Radiographs
 - OC
 - Easily diagnosed with Rx
 - Medial humeral trochlea, triangular subchondral defect or flattening
 - FMCP and JI require advanced imaging



6. Diagnosis of medial compartment disease

- Computed tomography (CT)
 - Gold standard for diagnosing FMCP and JI
 - Advantage over arthroscopy for evaluation of subchondral bone
 - Sclerosis, microcracks, necrosis, cysts
 - Cannot assess cartilage



6. Diagnosis of medial compartment disease

- Computed tomography (CT)

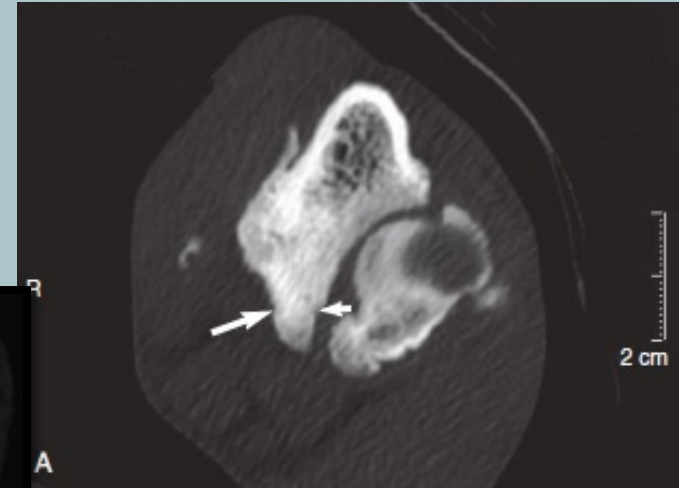
Coronal



Sagittal

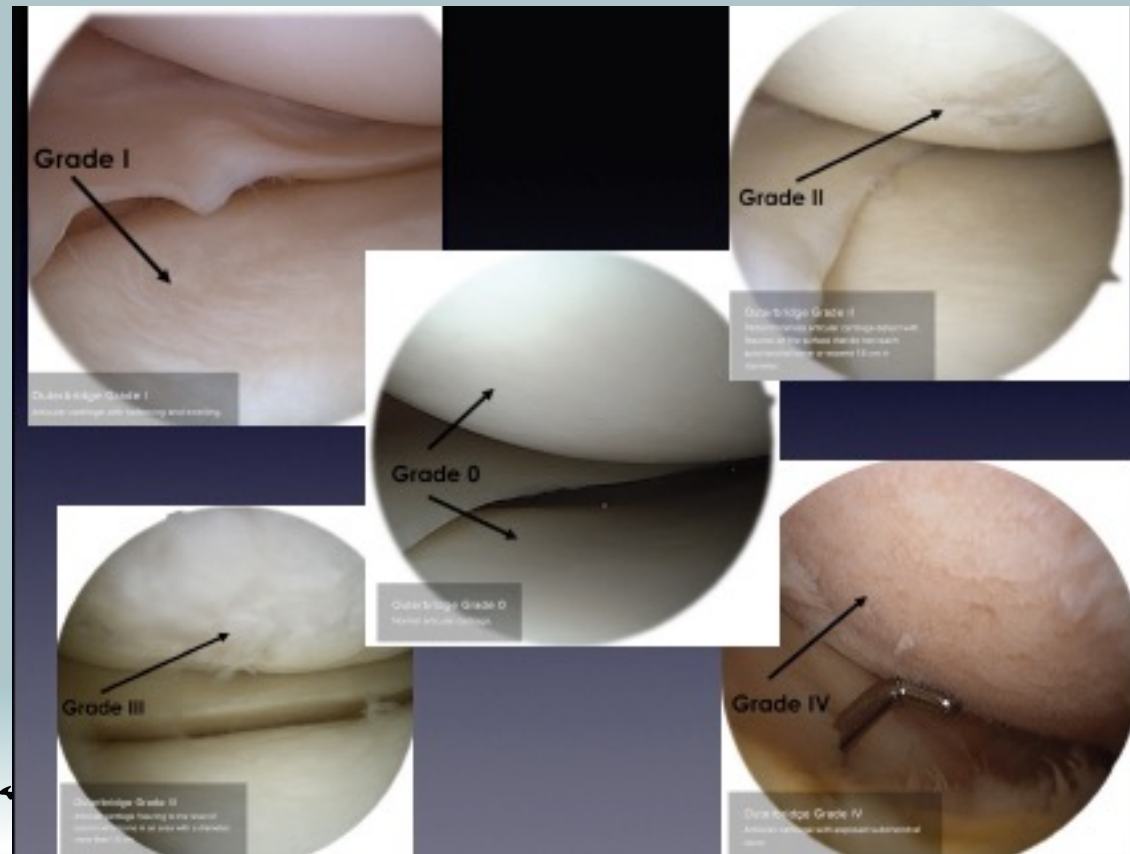


Transverse

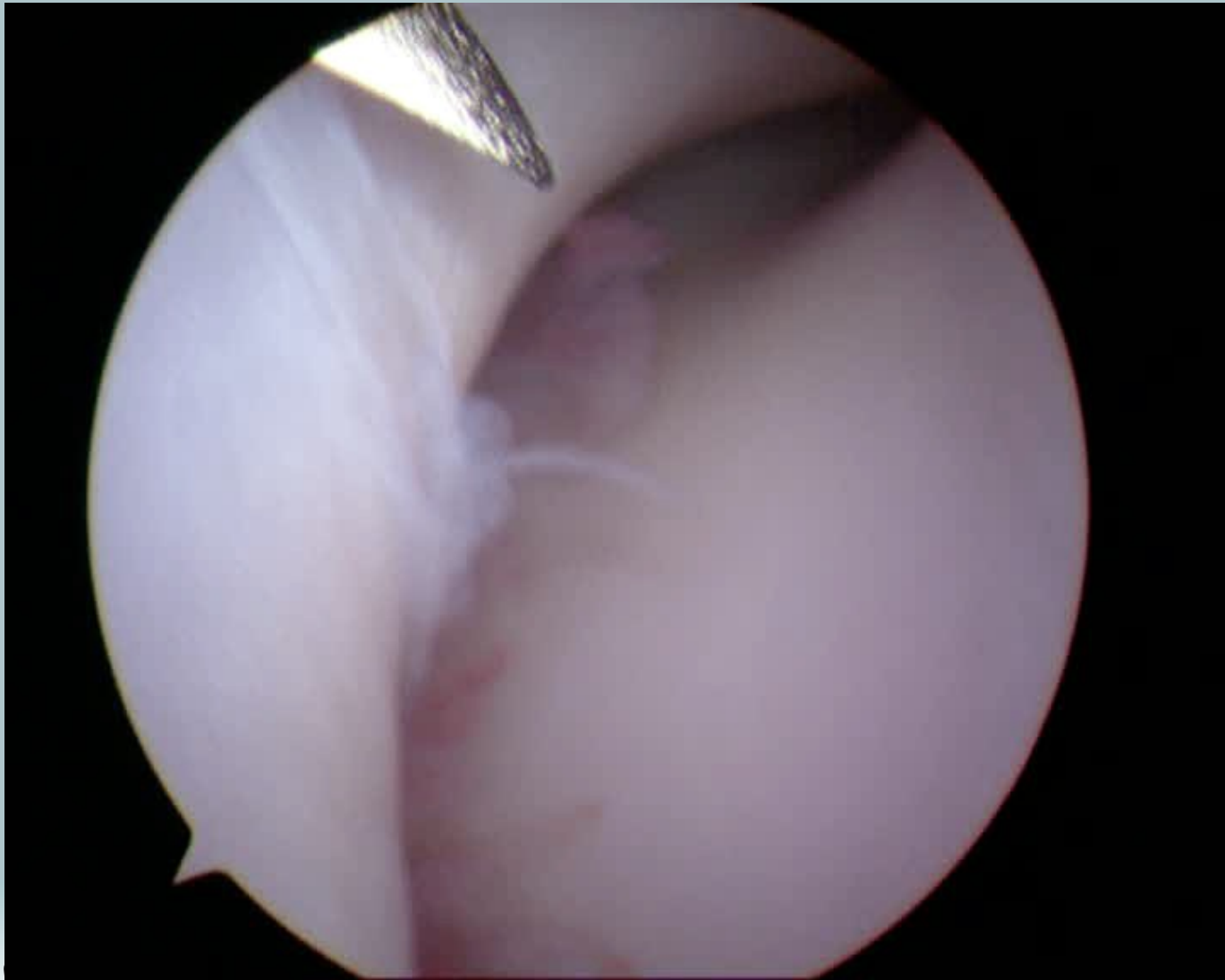


6. Diagnosis of medial compartment disease

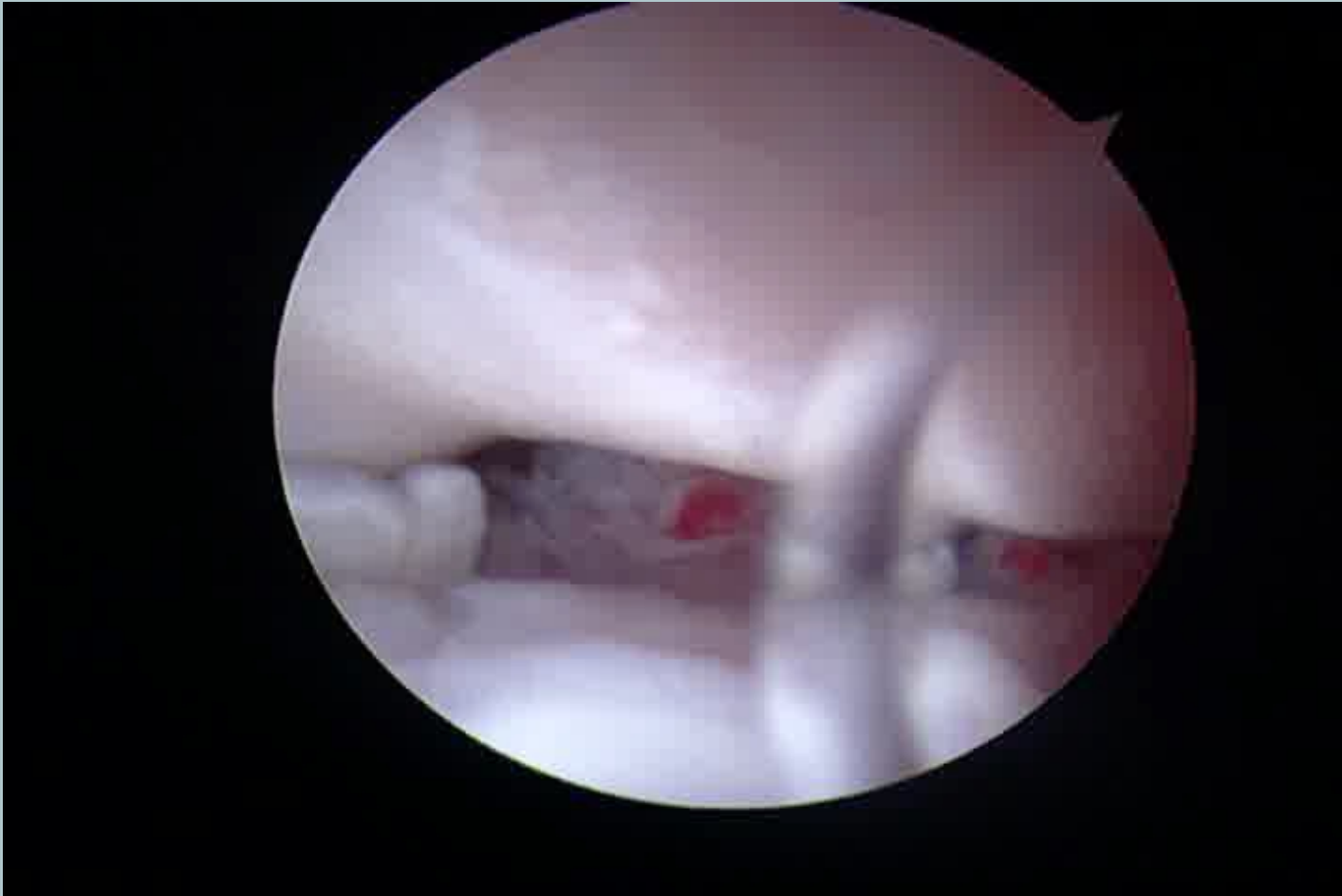
- Arthroscopy
 - Cartilage assessment and debridement
 - Outerbridge chart
 - Grade 1-5



Mild elbow disease

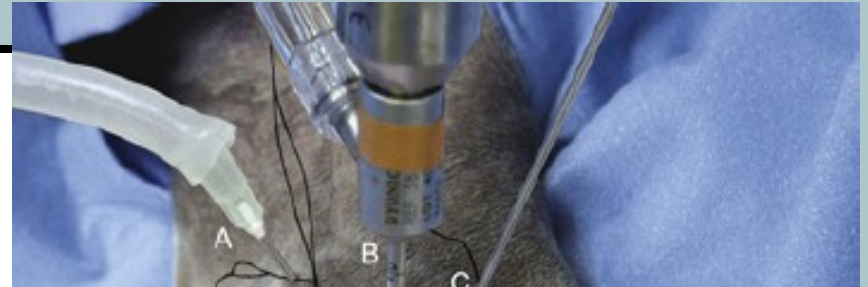
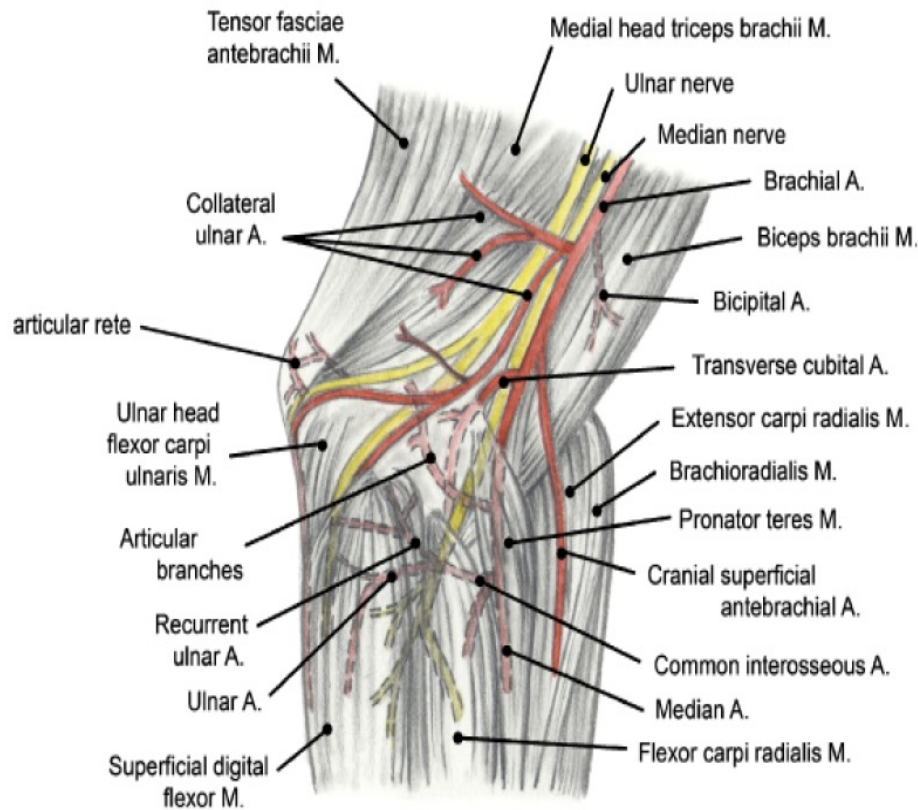


Severe elbow disease



7. Treatment options

- Arthrotomy VS arthroscopy?



8. Specific treatment options- UAP

- Early surgical intervention to minimize progression of OA
 - Anconeal process removal
 - In cases with established OA
 - But progression of OA continues

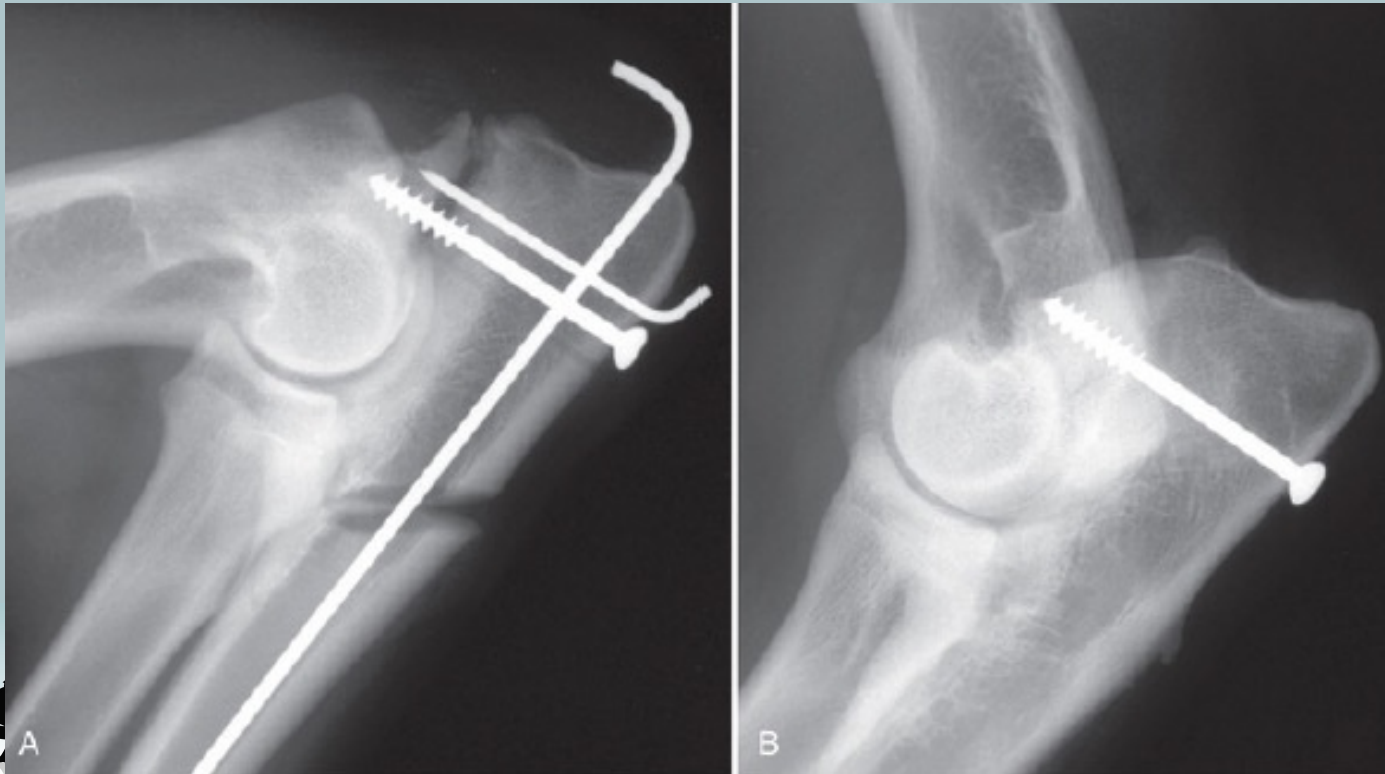


- Anconeal process re-attachment +/- ulnar osteotomy/osteectomy
 - In young dogs (24 weeks old)
 - Only with absence of OA
 - Using K-wire or lag screws
 - Increased implant failure if used **without** ulnar osteotomy (not recommended)



8. Specific treatment options- UAP

- Anconeal process re-attachment + ulnar osteotomy
 - 90% radiographic fusion rate



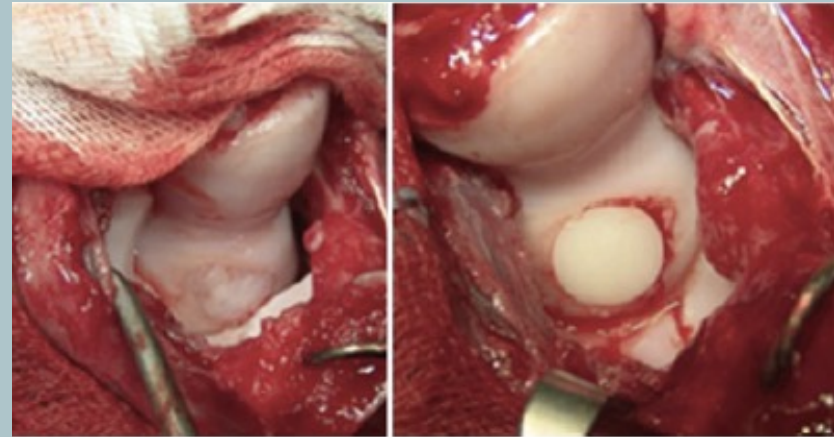
8. Specific treatment options- UAP

- Ulnar osteotomy/ostectomy alone
 - Contraction of triceps muscle that pulls ulna proximally
 - <7 months old
 - For non-displaced anconeal process



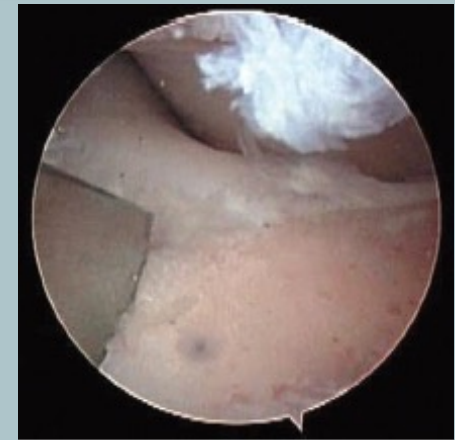
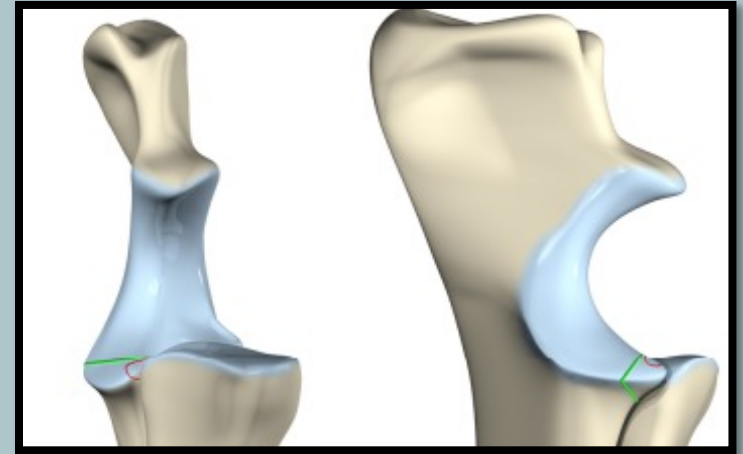
8. Specific treatment options- OC

- Removal of cartilage flap
- Abrasion arthroplasty
 - Curette/ high-speed burr
 - Microfracture of subchondral bone
- Osteochondral transplants
 - Autogenous transfer (OAT)
 - Donor from non-weight bearing surface of stifle
 - Synthetic (SynACART)



8. Specific treatment options- FMCP and JI

- Early surgical intervention to minimize OA
- Fragment removal
- Subtotal coronoidectomy
 - Large fragments involving medial coronoid
 - R/U incongruence
 - Takes away abnormal bone to remove pain



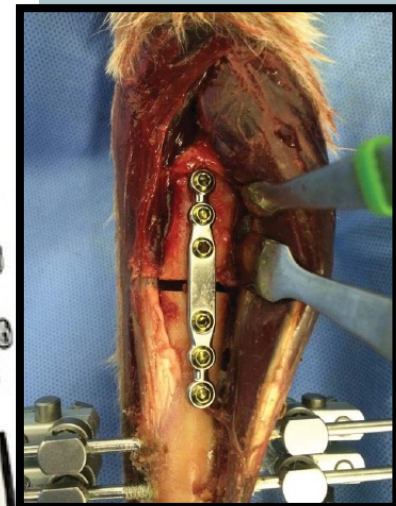
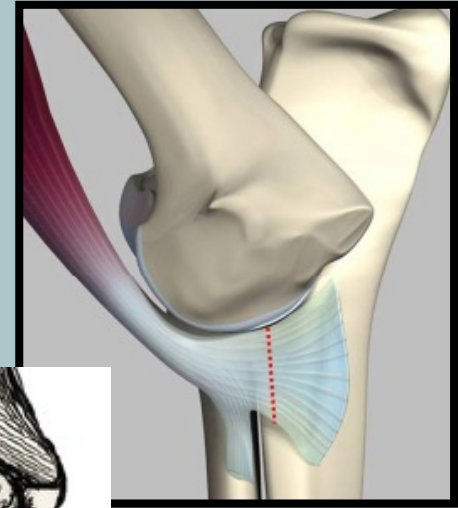
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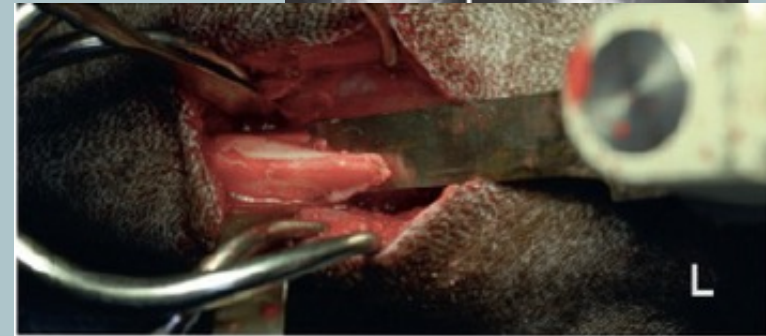
8. Specific treatment options- FMCP and JI

- Biceps ulnar release procedure
 - Rotational incongruency
 - Preventative
 - In combination with other procedures
- Radial osteotomy
 - For R/U incongruity
 - Radial lengthening
 - For short radius



8. Specific treatment options- FMCP and JI

- Ulnar ostectomy/ osteotomy
 - Proximal/ distal
 - Dynamic/static
- Distal dynamic ulnar ostectomy (DDUO)
 - 4-6 months old puppies
 - Early coronoid disease
 - R/U Incongruity
- Bioblique Dynamic Proximal Ulnar Osteotomy (BDPUO)



8. Specific treatment options- FMCP and JI

Sliding humeral osteotomy



Canine unicompartimental elbow (CUE)

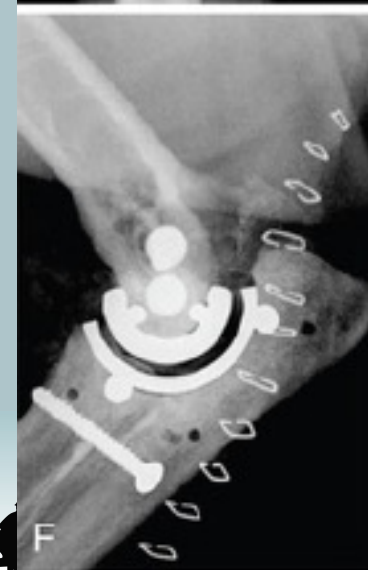


Proximal abducting ulnar osteotomy (PAUL)



9. Salvage procedures

- Total elbow replacement (TER)
 - If complication, amputation often not an option due to bilateral disease
 - Special



9. Salvage procedures

- Arthrodesis
 - Loss of medial and lateral articular cartilage
 - If TER not an option
 - Circumduction of elbow
 - 15-50% complication rate



10. Conservative treatment

- Conservative/ non-surgical management
 - NSAIDs
 - Joint injections
 - Hyaluronic acid
 - Steroids
 - Platelet-rich plasma
 - Stem cells
 - Physical therapy
 - Joint supplements



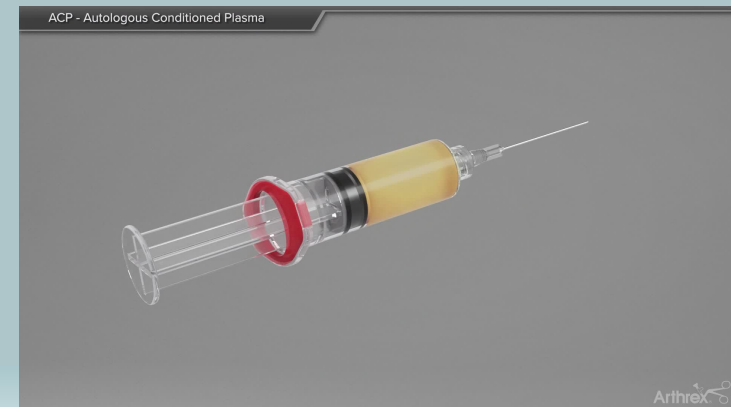
11. Platelet-rich plasma (PRP)

- Activated platelets release growth factors
 - Transforming GF beta
 - Platelet-derived GF AB and BB
 - Additional anabolic GF
- Growth factors
 - Stimulate cellular proliferation and healing
 - Reduce expression of inflammatory cytokines



11. Platelet- rich plasma (PRP)

- Collect anticoagulated blood
- Centrifuge it
- Concentrate platelets in a small volume of plasma
 - Platelet concentration at least 1.5-2 x higher than whole blood
- Collect as close to buffy coat



11. Platelet-rich plasma (PRP)

- Proposed to treat inflammatory conditions in dogs
 - Osteoarthritis
 - Tendinopathies
 - Bone regeneration
 - Wound healing
- Lack of controlled studies
- Personal experience



12. Physical therapy

- Pain management
 - Acute
 - Chronic
- Mobility
 - Strength
 - Coordination
 - Stamina
 - Speed/performance
 - Activities of daily living



13. Case example- elbow osteoarthritis

- PT protocol focuses on:
 - Pain control
 - Medications
 - Modalities
 - Joint injections
 - Increase mobility
 - Increase range of motion
 - Increase muscle mass/ decrease muscle loss



13. Case example- elbow osteoarthritis

- Home therapy plan for owners:
 - Heat
 - Stretching
 - PROM
 - Swimming
 - Low obstacles/cavalettis
 - Irregular surface walking
 - Minimize high impact activities/jumping



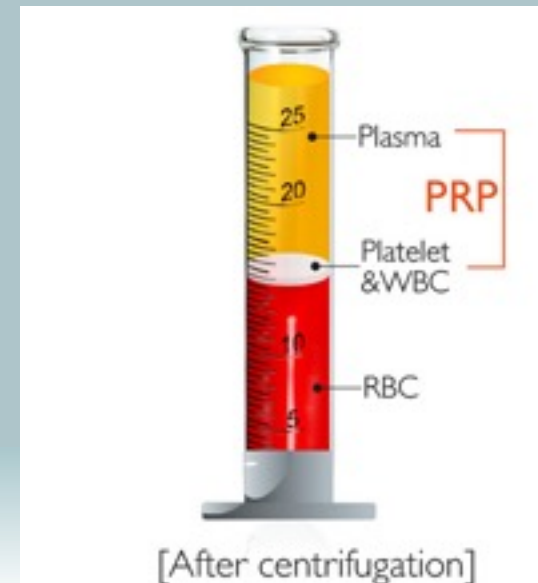
14. Overall prognosis- what does literature say?

- Poorly defined
- Reported improvement in 50-100% of cases, depending on study
- Studies with >6 months follow up
 - Progression of OA for all treatments
 - Older dogs have higher pain scores



14. They need long-term management!

- NSAIDs
- Weight loss
- Joint supplements- Omega 3
- Physical therapy
- Joint injections
 - Hyaluronic acid
 - Steroids
 - Platelet-rich plasma (PRP)



15. Personal experience

- When to choose which treatment option?
 - Age of animal
 - Degree of present OA
 - Activity level
 - Can the owners confine the dog?
 - Any previous treatments?
 - Financial concerns?



14. Personal experience

**Prepare the owners for life-long
management**



15. Summary

- Orthopedic exam findings based on signalment and pain localization
 - Differential diagnoses based on that
- Elbow
 - Early surgical referral/ intervention to minimize OA
 - Lack of evidence of efficacy of different treatments
- Prepare owners expectations to minimize future frustrations
- Long-term management is necessary



Questions?

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*** References available upon request ***



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