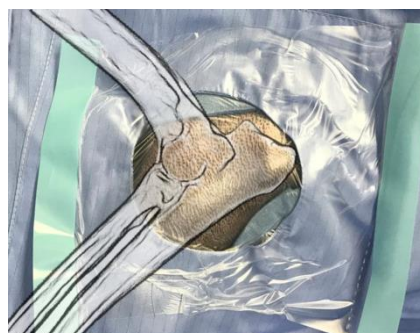


# Arthroscopy Mini Series

## Session 2: First steps in arthroscopy

Dr Kinley Smith MA VetMB CertSAS DipECVS PhD  
MRCVS

RCVS Specialist in Small Animal Surgery (Orthopaedics)  
European Specialist in Small Animal Surgery



# Arthroscopy Miniseries

## Session 2

First steps in arthroscopy

Kinley Smith MA VetMB CertSAS DipECVS PhD MRCVS  
European and RCVS Specialist in Small Animal Orthopaedics  
Willows Referrals, Solihull

# Miniseries Session 2 Course Outline


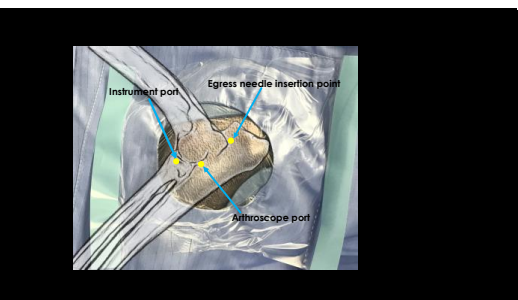
- Establishing medial elbow ports
- Establishing elbow ports: troubleshooting
- Arthroscopic examination of the elbow joint
- Establishing lateral shoulder ports
- Arthroscopic examination of the shoulder joint
- Tips for successful arthroscopy

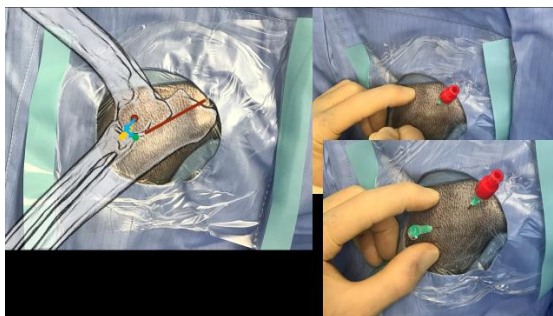
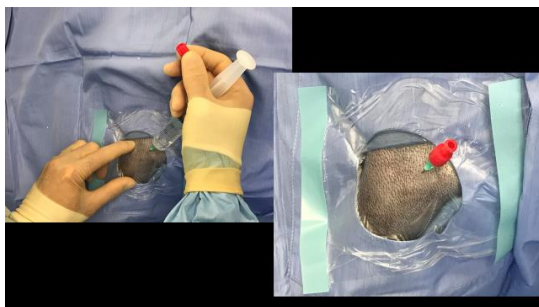
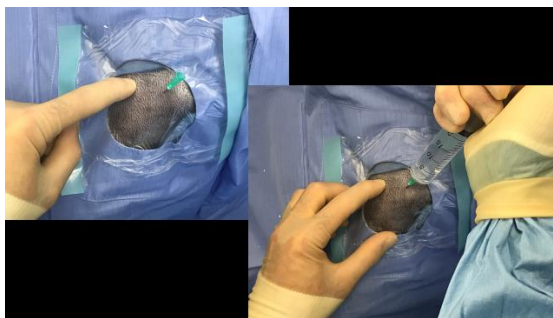
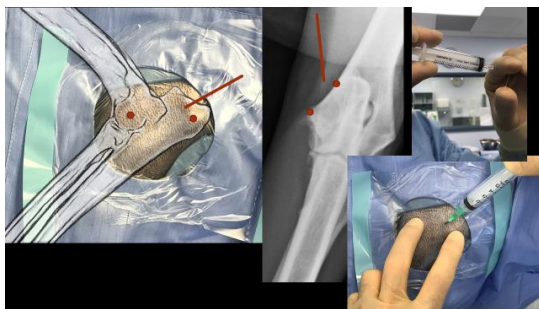
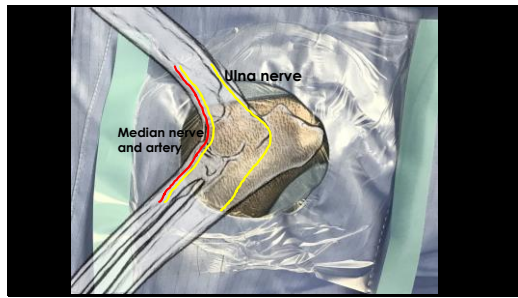
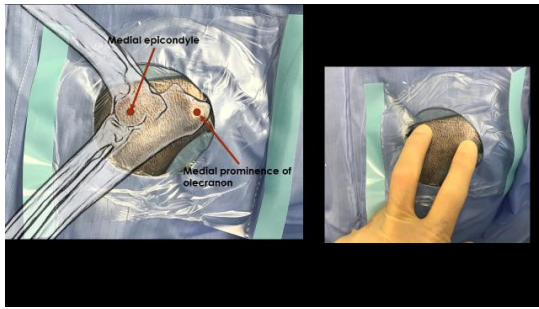


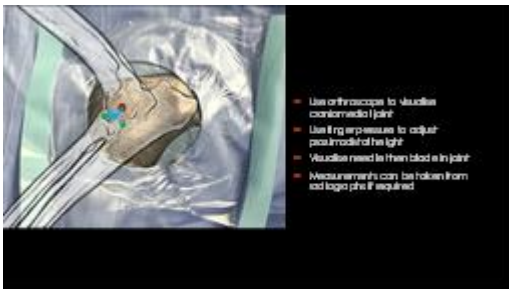
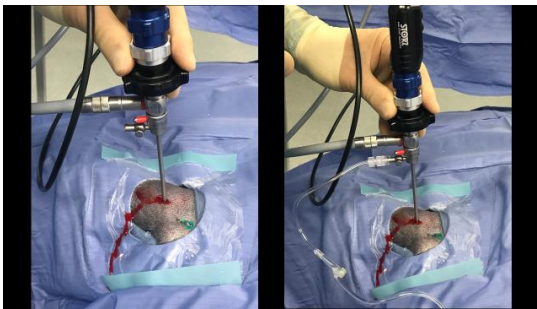
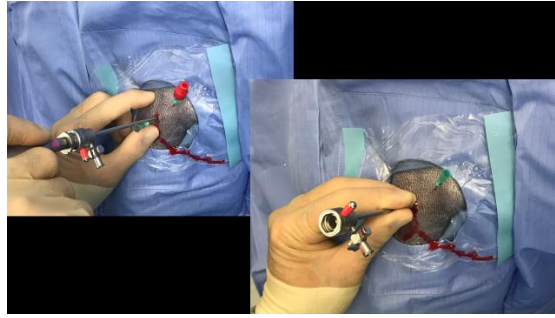
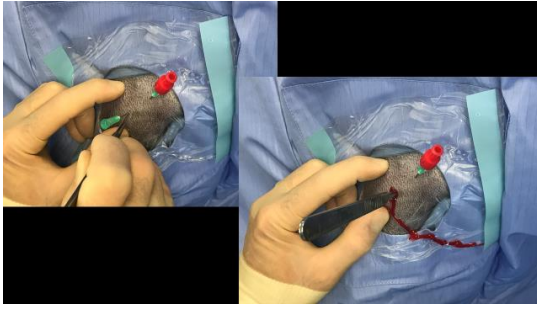
# Establishing medial elbow ports

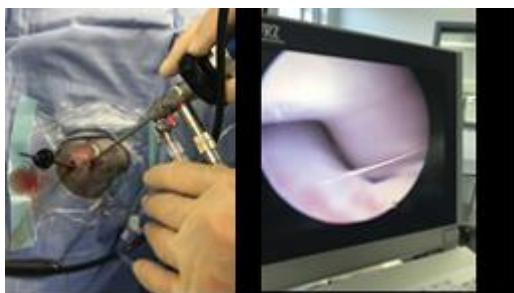
# A reminder on positioning

- Extend shoulder as much as possible
  - If flexed abducting force just rotates shoulder rather than opening medial aspect of elbow
- Externally rotate paw a little
- A moderate amount of force is required
- Proper positioning makes establishing ports so much easier!







## Establishing ports: troubleshooting

### I can't get the egress needle in

#### Technical

- Are your landmarks correct?
- Check imaging
- Is the needle long enough?
- Use 1.5"
- Check the tip of the needle is bent? bent on bone

#### Pathological

- Severe patellofemoral pathology
- Use alternative egress site as visualised from imaging
- Minimal synovial fluid
- Soft cartilage beneath the joint
- Very anterior brachial condyle

### I can't get the cannula in

#### Technical

- Check landmarks
- Refer to imaging
- Have you used a #11 blade?
- Is the cannula too big?
- Use a smaller arthroscope
- Is the limb positioned correctly?
- Use an assistant to apply a valgus stress

#### Pathological

- Severe patellofemoral pathology
- Use imaging to visualise joint
- Medial collateral hypertrophy
- Excessive fluid
- Excessive fluid

### I can't manoeuvre the arthroscope

#### Technical

- Arthroscope too big for joint
- Change to smaller cannula
- Port placed through medial collateral ligament
- Excessive fluid
- Is the limb positioned correctly?
- Use an assistant to apply a valgus stress

#### Pathological

- Severe patellofemoral pathology
- Use 11 blade on the joint
- Use 11 blade on the joint
- Use 11 blade on the joint

### I can't see anything

#### Technical

- Is the light source on?
- Are you in the joint?
- Should see cartilage
- Is there good fluid flow?
- Fluid on and pressure out
- Excessive fluid
- Use an assistant to apply a valgus stress
- Is there camera fogging?
- Is the arthroscope correctly engaged with the cannula?

#### Pathological

- Is there medial synovial proliferation?
- Is there a large joint effusion?
- Is there haemorrhage into the joint?
- Is there a large joint effusion?



## I can't get the instrument port in

### Technical

- Check landmarks
  - Refer to imaging and observe with arthroscopist
  - Common mistake is too proximal and too medial
- Use the scalpel blade

### Pathological

- No history/signs of inflammation obscure visualization
  - It's more easily ignored
- Severe patellofemoral pathology
  - Unusual to affect instrument port
  - Differs markedly from TAO (tibial) (in medial condyle area)
  - Use imaging to help find it (if needed)

## Other common problems

- Camera or instrument cannula pops out
  - Improve medial joint space by repositioning
  - Have a scrubbed assistant hold the base of the port
  - "Open port" for instruments - use haemostats to create open tunnel to joint
- Joint is normal
  - Have you made a correct diagnosis?
  - Are you in the correct side?
  - Have you been systematic in your examination?

## Arthroscopic examination of the elbow joint

### Anatomy: Humerus

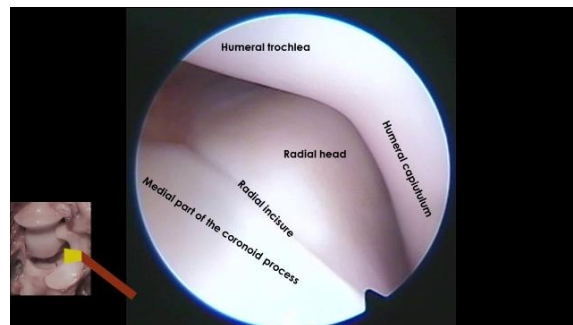
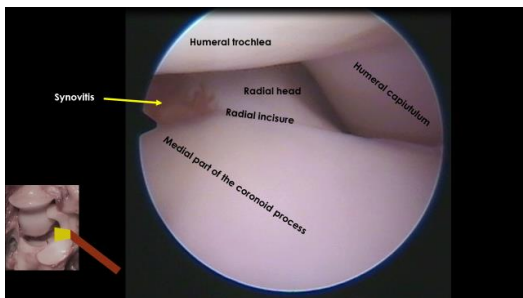
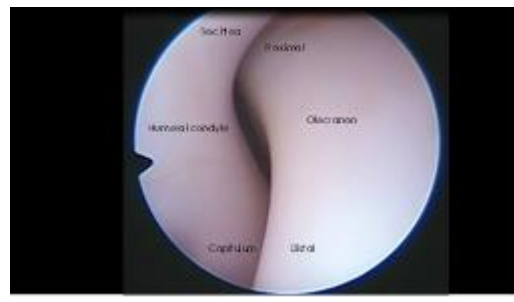
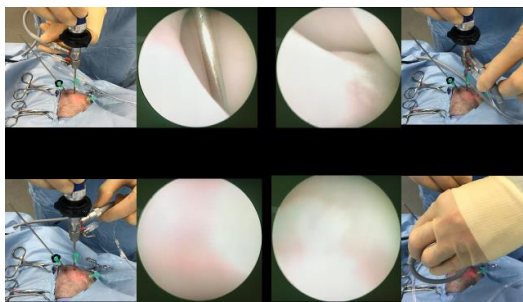
Suprathoracic foramen  
olecranon  
distal epicondyle  
lateral epicondyle  
trochlear notch

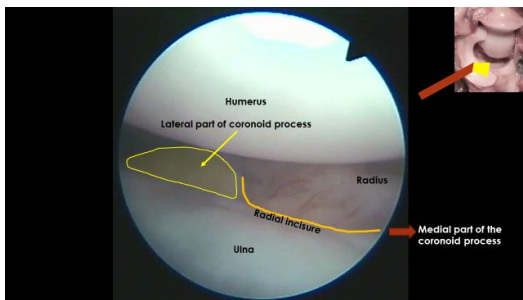
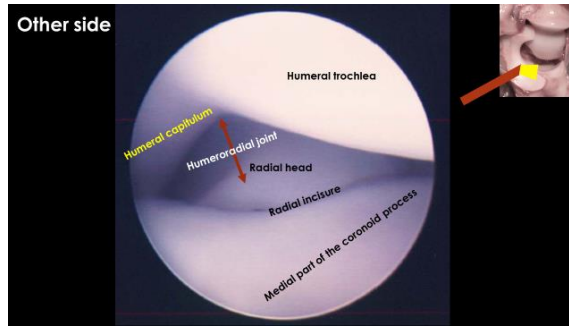
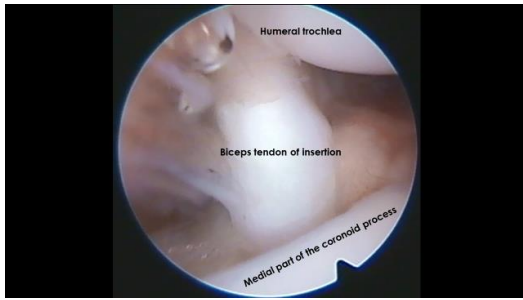
Medial  
Lateral

### Anatomy: Radius and ulna

Proximal radius  
lateral part of coronoid process (LPCP)  
radial head  
ventral part of coronoid process (VPCP)

Radio-ulnar joint space medially





### Cartilage assessment

- Assess all parts of elbow joint
  - Probe humeral trochlea and medial part of coronoid process
  - Radius, humeral capitulum, olecranon and lateral part of coronoid process can be assessed visually
- Probe systematically
  - Osteochondrosis flaps may be hidden
- Healthy cartilage will deform and spring back to normal shape
- Early diseased cartilage will elevate from subchondral bone easily
- Advanced cartilage disease assessed visually and probing not required
- Cartilage graded on modified Outerbridge scale

### Modified Outerbridge Score (MOS)

<p><b>Normal</b></p> <ul style="list-style-type: none"> <li>No visible cartilage pathology</li> <li>There should be normal apposition in normal elbows; however, attrition of a global cartilage pathology grade of 3 should not be effused by the presence of synovial inflammation</li> </ul>	<p><b>MOS 3</b></p> <ul style="list-style-type: none"> <li>Deep fibrillation to the level of subchondral bone</li> <li>Differentiated from MOS 4 due to the presence of poor quality flocculent cartilage</li> </ul>
<p><b>MOS 1</b></p> <ul style="list-style-type: none"> <li>Cartilage softening and swelling</li> <li>Cartilage thickening or a full surface loss (translucent cartilage with adjacent cartilage) are seen at most points in the absence of acute feedback from the host probe</li> </ul>	<p><b>MOS 4</b></p> <ul style="list-style-type: none"> <li>Full thickness cartilage erosion</li> </ul>
<p><b>MOS 2</b></p> <ul style="list-style-type: none"> <li>Partial thickness surface defects</li> <li>Cartilage fibrillation</li> <li>Fibrillation does not reach subchondral bone</li> </ul>	<p><b>MOS 5</b></p> <ul style="list-style-type: none"> <li>Subchondral bone abutment</li> <li>The exposed subchondral bone has a burnished appearance</li> </ul>

### Elbow exam check list

<b>Joint surface</b> <ul style="list-style-type: none"> <li>Anconeus</li> <li>Trochlear notch</li> <li>Central MPJ</li> <li>Cranial MPJ</li> <li>Caudal, central and cranial humeral trochlea</li> <li>LCP</li> <li>Humeral capitulum</li> <li>Radial head</li> </ul>	<b>Other pathology</b> <ul style="list-style-type: none"> <li>Synovitis               <ul style="list-style-type: none"> <li>Degree and location</li> </ul> </li> <li>Biceps tendon of insertion</li> <li>Separate sites of mineralisation</li> <li>Radial/ulnar congruity (step)</li> </ul>
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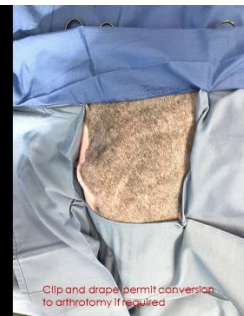
### Wound closure

- Cruciate mattress nylon sutures in skin only
- Cover with Primapore dressing for 6 hours
- Some fluid leakage expected for 24h

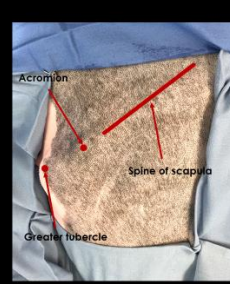
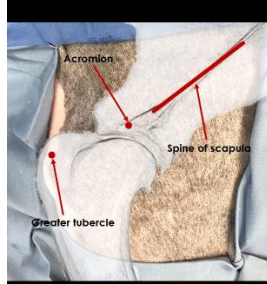
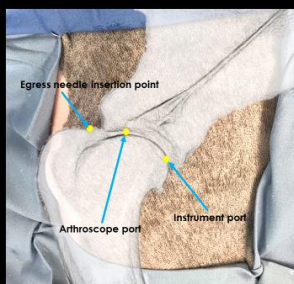
### Post operative care

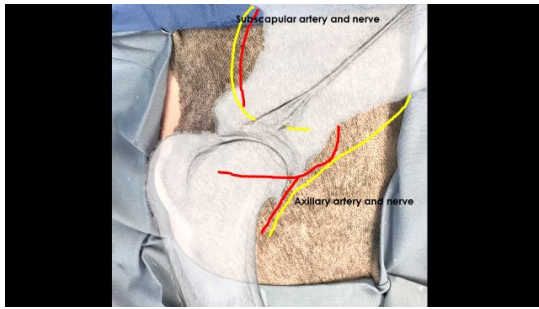
- No requirement for antibiotics unless major break in aseptic technique
- Pain relief for 7-10 days
  - NSAID preferred
  - Gabapentin 10mg/kg q8-12h if NSAID not tolerated
- Cold compresses 3-6 times daily for first 24 hours
- Lead walks of up to 10 minutes until suture removal (2 weeks)
  - Avoid running, jumping and climbing stairs
- Lead walks of up to 20 minutes after suture removal until 6 weeks
- Build up exercise after 6 week recheck

### Preparation for arthroscopy of the shoulder



Clip and drape permit conversion to arthrotomy if required

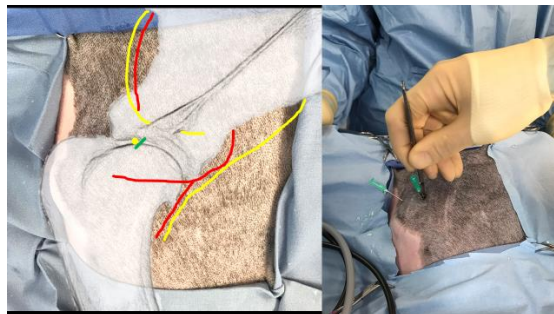
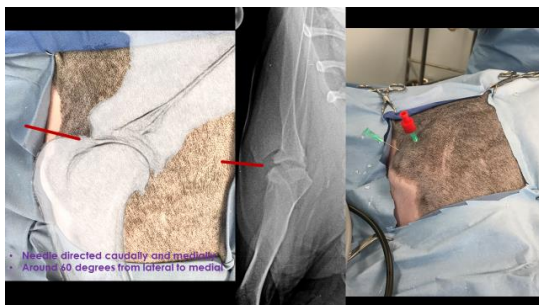
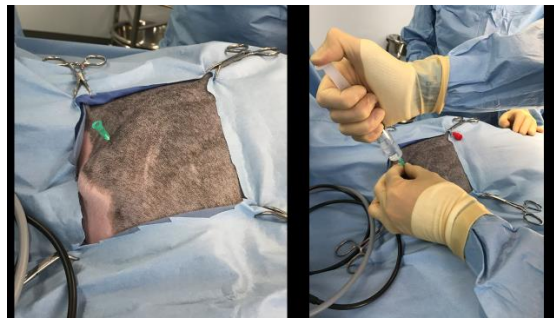


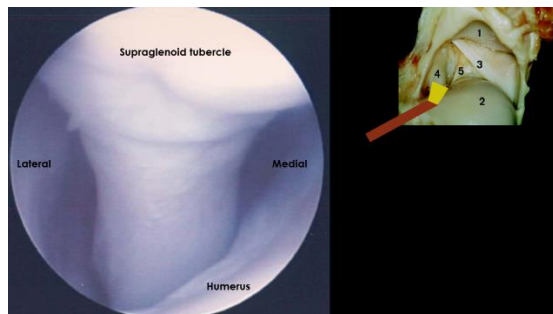
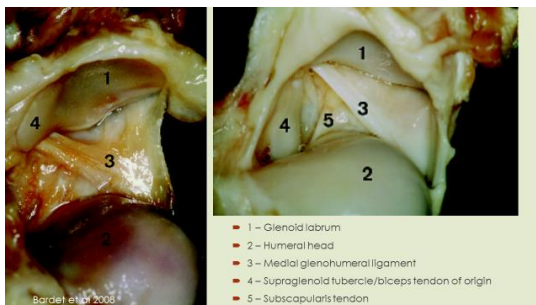
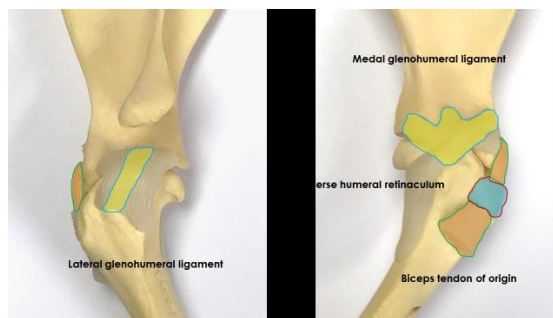
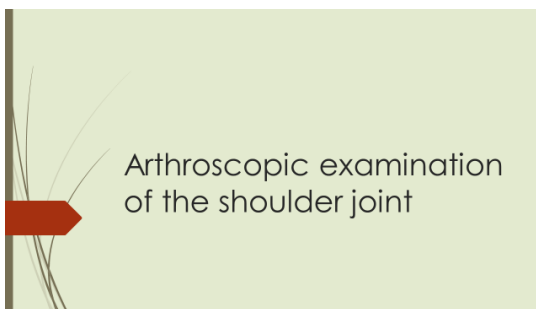
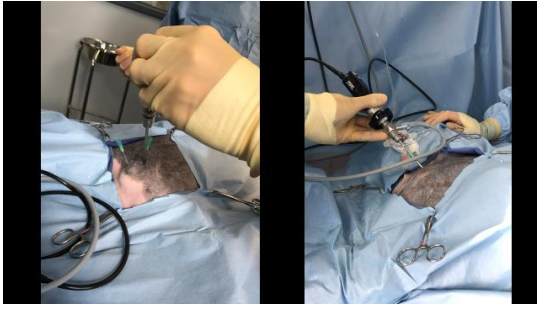


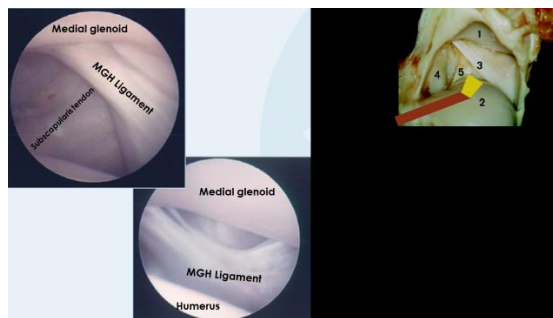
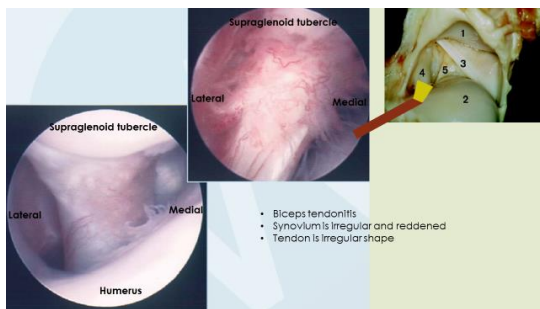
## Establishing portals

Conventional	Alternative
<ul style="list-style-type: none"> <li>Place egress needle</li> <li>Distend joint with saline</li> <li>Cap egress needle</li> <li>Place needle in arthroscope port</li> </ul>	<ul style="list-style-type: none"> <li>Place needle in arthroscope port</li> <li>Distend joint with saline</li> <li>Cap arthroscope needle</li> <li>Place egress needle</li> </ul>

I find arthroscope needle easier to place in arthritic joints







### Shoulder arthroscopy checklist

<b>Joint surface</b> <ul style="list-style-type: none"> <li>■ Glenoid cavity <ul style="list-style-type: none"> <li>■ Osteophytes</li> <li>■ Osteochondrosis</li> </ul> </li> <li>■ Humeral head <ul style="list-style-type: none"> <li>■ Osteochondrosis</li> </ul> </li> <li>■ Other cartilage pathology <ul style="list-style-type: none"> <li>■ Outerbridge lesions</li> </ul> </li> </ul>	<b>Other pathology</b> <ul style="list-style-type: none"> <li>■ Synovitis <ul style="list-style-type: none"> <li>■ Degree and location</li> </ul> </li> <li>■ Biceps tendon of origin</li> <li>■ Subscapularis tendon</li> <li>■ MGH ligament</li> <li>■ (LGH ligament)</li> <li>■ Caudal joint pouch</li> </ul>
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### Wound closure



- Cruciate mattress nylon sutures in skin only
- Cover with Primapore dressing for 6 hours
- Some fluid leakage expected for 24h
- Seromas are common
  - Manage conservatively
  - Do not drain!

### Post operative care

- No requirement for antibiotics unless major break in aseptic technique
- Pain relief for 7-10 days
  - NSAID preferred
  - Gabapentin 10mg/kg q8-12h if NSAID not tolerated
- Cold compresses 3-6 times daily for first 24 hours
- Lead walks of up to 10 minutes until suture removal (2 weeks)
  - Avoid running, jumping and climbing stairs
- Lead walks of up to 20 minutes after suture removal until 6 weeks
- Build up exercise after 6 week recheck

### Tips for successful arthroscopy

## Avoiding fogging

- Water condensation obscuring light transmission
- Two mechanisms
  - Water ingress between arthroscope and camera
  - Difference in temperature across the arthroscope
- Preventing water ingress
  - Careful technique
  - Use direct coupling camera
- Minimise temperature gradients
  - Bring arthroscopic equipment into theatre the night before (or a warm room)
  - Connect camera and light source prior to starting surgery
    - Allows arthroscope to warm up

## Cables galore!

- Camera, light and fluid all connect to the arthroscope
- Movement of cables can compromise sterility
  - Anchor to the table or drapes with clamps
  - When passing cables to nonsterile assistant hand 30cm from your hand and assistant grabs the other end
- Rotation of the arthroscope needs a lot of slack
  - Ensure additional 50cm of cable beyond the joint to be examined
  - Important to have no tension on cables
    - Can damage equipment
    - Difficult and time to operate

## Difficult joints – very small

- 1.9mm arthroscope can be used in 10 Kg dogs with care
- Use scrubbed assistant to position limb in surgery
- Maximise valgus stress on elbow with shoulder straight
- Traction on limb recommended so counter-traction helpful
  - Put sling around axilla in anticipation
- Minimise movement of arthroscope to prevent damage to joint and dislodgement
- May not manage full examination of joint

## Difficult joints - osteoarthritis

- Marked synovitis
  - Obscures visibility
  - Establish instrument port early to debride or brush away
- Periarticular thickening
  - Manipulation of arthroscope of elbow is difficult
  - Establish ports on straight line rather than oblique entry
  - Use No 11 blade to establish ports
- Confusing anatomy
  - Preoperative CT scan of great benefit
- Severe cartilage eburnation
  - Therapeutic interventions limited but examination of joint important prognostically

## Flexor tendon enthesiopathy

- Thickening or mineralisation of medial flexor tendons
- Difficult or impossible to pass arthroscope or instruments through
- Mineralisation may be big enough to obscure both arthroscope and instrument portals
- If the needle won't pass easily the arthroscope definitely won't
- Move the arthroscope entry point proximocaudally
  - Accept examination will be more limited
- Move the instrument entry point distocranially
  - Needle aimed caudolaterally rather than laterally
- Removal of large fragments should not be attempted
  - Bring fragments out in small pieces

## Forthcoming Miniseries on arthroscopy

- Arthroscopy Miniseries Session 3**
  - Improving your arthroscopy skills
    - Arthroscopic-assisted surgery in elbow and shoulder disease
    - November 14<sup>th</sup> 1400