

Boomeritis: The Painful Shoulder & Knee

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What is Boomeritis?

- Describes wear and tear changes, vulnerabilities and injuries that most of us have or will develop with our musculoskeletal system
 - Nicholas DiNubile, MD
- Baby boomers have a desire to remain active despite age-related changes
- Boomers are born between 1946 and 1964



Life expectancy increases

- 1900 46 years
- 2007 80 years

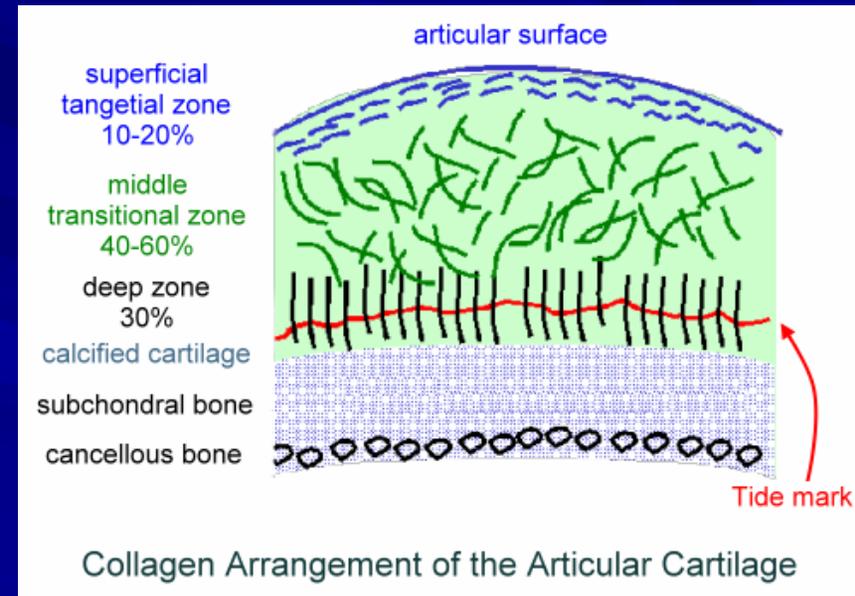
- Life expectancy increases while the durability on our frame and joints remains unchanged

- Wear and tear is predictable with age



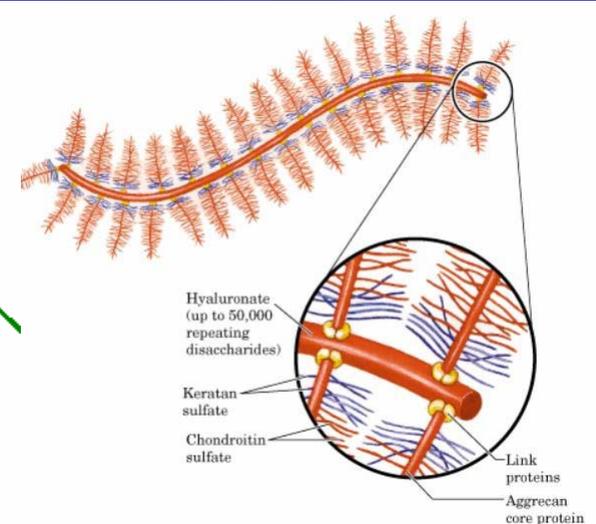
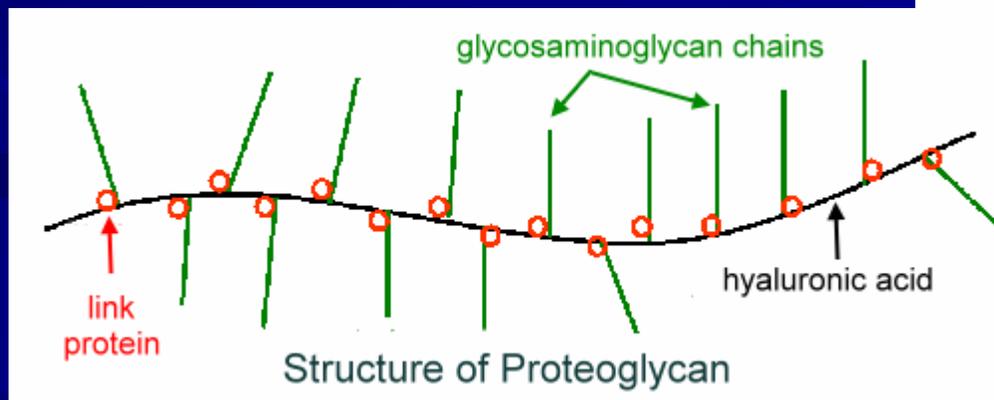
Age-related Cartilage Changes

- Older cartilage is less cellular
- Cartilage cells do not reproduce after growth plates close
- Chondrocytes only in lower layers
- Water content decreases



Age-related Cartilage Changes

- Proteoglycans change
 - Chondroitin decreases
 - Keratin increases
 - PG chains become shorted and retain less water
 - Decreased PG levels leads to decreased cartilage function



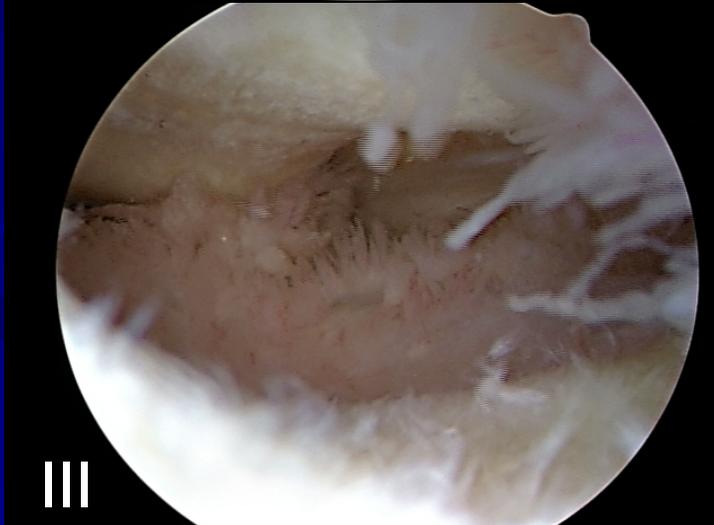
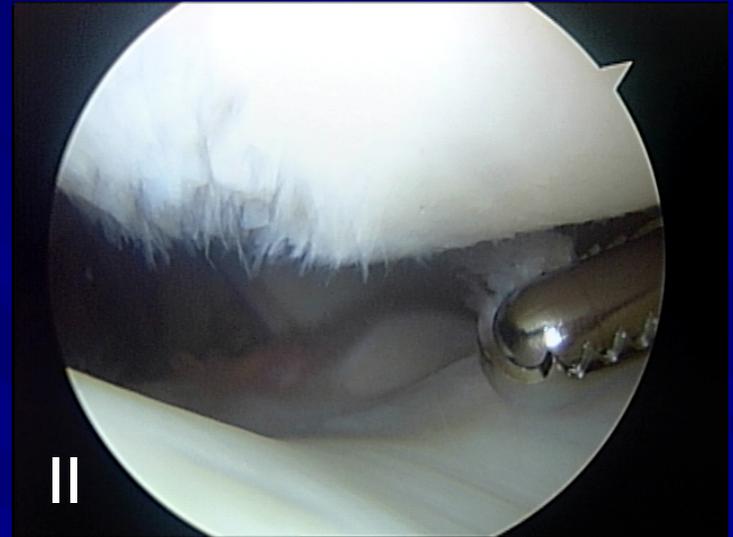
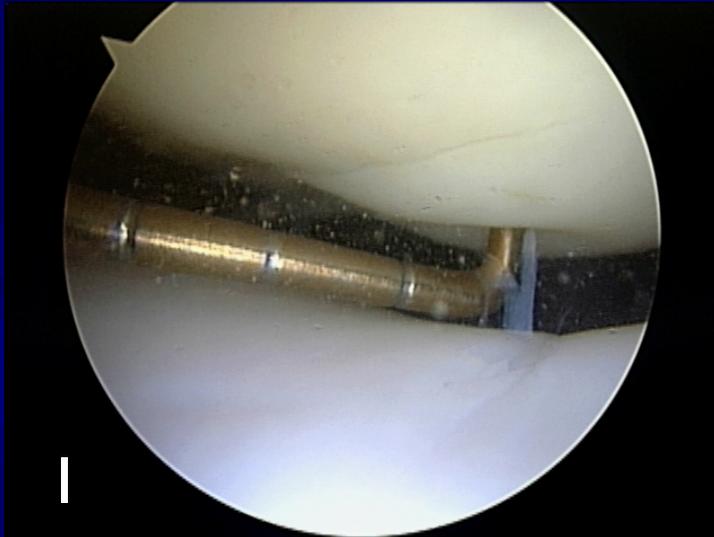
Grading Cartilage Wear

■ Outerbridge Classification

- Stage I Soft discolored superficial fibrillation
- Stage II Fragmentation $< 1.3 \text{ cm}^2$
- Stage III Fragmentation $> 1.3 \text{ cm}^2$
- Stage IV Erosion to subchondral bone (eburnation)



Grading Cartilage Wear



Osteoarthritis

- 43 million American adults have doctor-diagnosed arthritis
- 100 different types
- Osteoarthritis – “wear-and-tear arthritis” – is the most common
- Exact causes are unknown
- Researchers say genetics may play a role in 40-65 percent of knee osteoarthritis cases



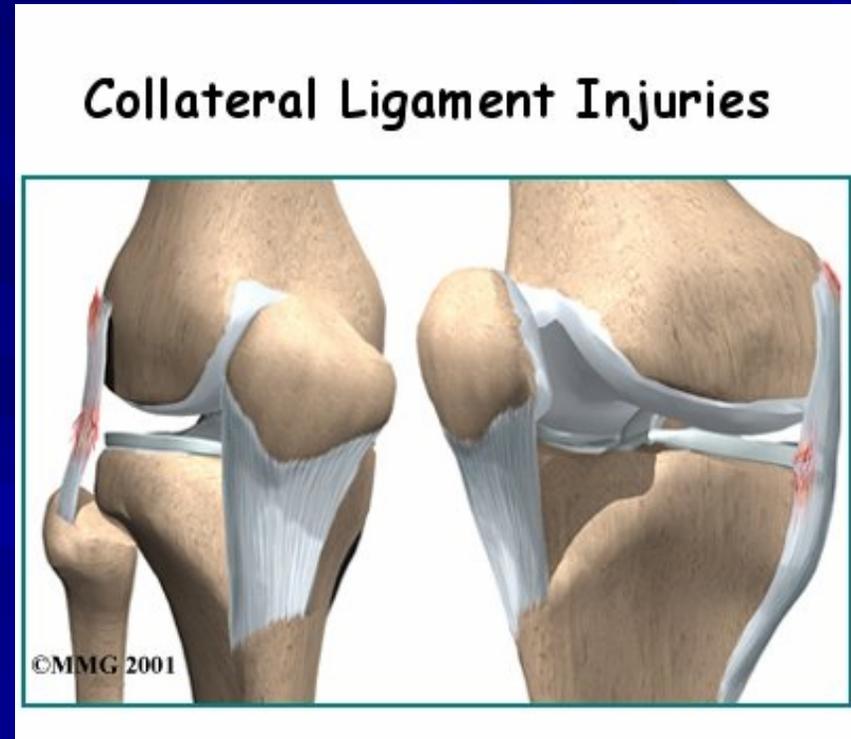
Age-related Muscle Changes

- “Senile Sarcopenia”
 - Muscle mass decreases by 1/3 between 50 and 85
- Loss of strength is a major cause of falls
- Sarcopenia is not diffuse atrophy
 - Loss of muscle mass, fiber number, and specific force reduced
 - Shift toward slow twitch fibers



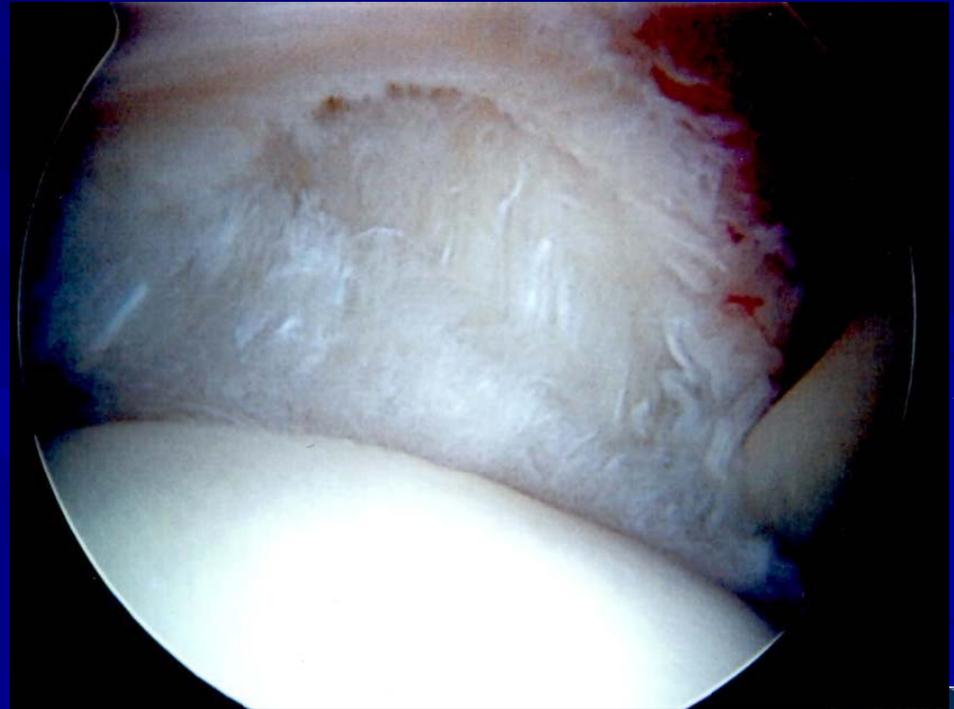
Age-related Ligament Changes

- Ligaments become weaker and are more likely to tear in midsubstance rather than pull away from the bone as in younger stronger ligaments



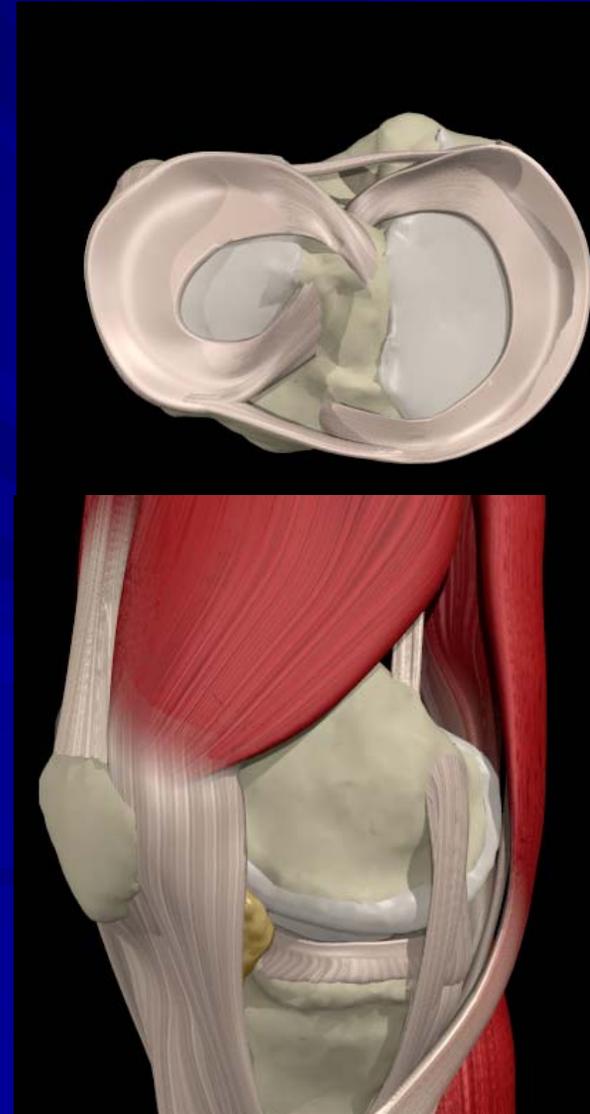
Age-related Tendon Changes

- Older tendon contains fewer fibroblasts, decreased tendon fibril diameter, decreased stiffness
- Tendon can be partially restored to strength (65%) and elasticity (69%) with eccentric exercises



Age-related Meniscus Changes

- Blood supply decreases with age
 - 100% at birth
 - 33% at 30
 - 25% at 50
- MRI's show positive tears in 40% asymptomatic knees > 50 years old
- Collagen cross-linking changes with age
- Proteoglycans decrease with age
 - Chondroitin decreases, keratin increases



Exercise as a Prescription

- Too little exercise can have negative effects
- Incorrect exercise can result in injuries
- Good nutrition combined with the right dose of balanced well designed exercises can lead to a healthy frame and joints



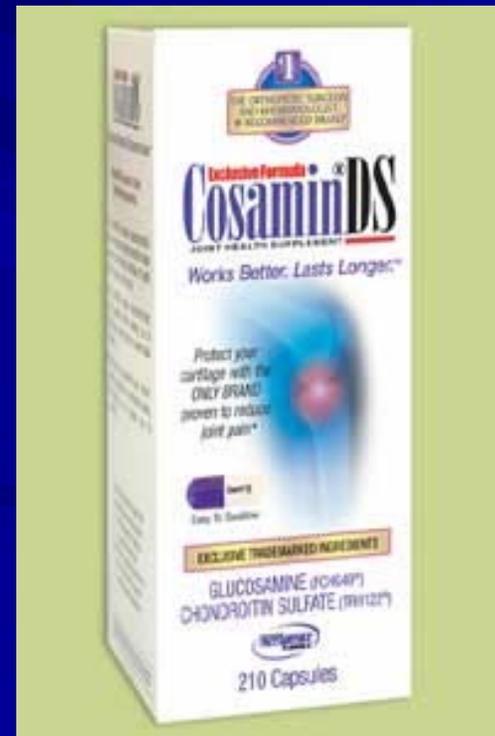
Weak Links

- Must accommodate the weak links
 - Old injury
 - Musculoskeletal imbalance
 - Incomplete rehab syndrome
 - Alignment and anatomy
 - Genetics
 - Aging effects
 - Mindset / attitude
 - Exercise program design / technique



Glucosamine

- Involved in maintenance and repair of joint cartilage
- Stimulates production of synovial fluid, proteoglycans, and glycosaminoglycans
- Anti-inflammatory
- 1200 – 2000 mg/ day
- Higher doses
 - Obesity
 - GERD
 - Diuretic use



Glucosamine

- Proteoglycans form the ground substance of the extracellular matrix in cartilage
- Of these, glycosaminoglycan hyaluronic acid is vital for the structure and function of cartilage
- Decrease incidence of severe joint space narrowing by 60%
- Treatment for >12 months reduces risk for TKR by 73% at 5 years

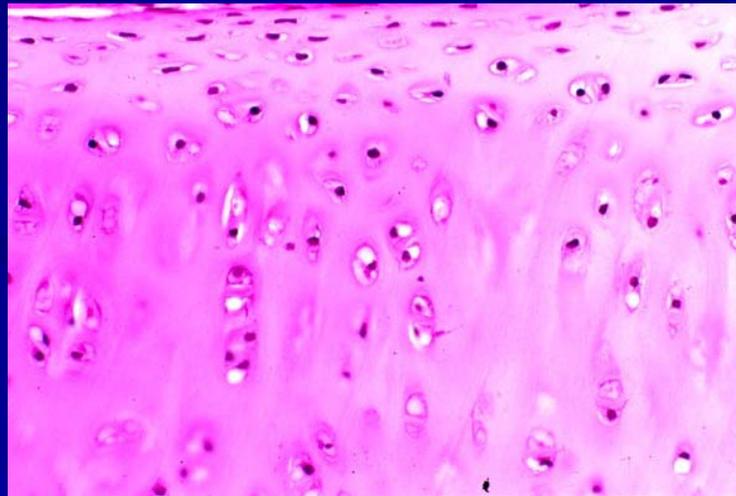
Chondroitin Sulfate

- Influences synthesis and metabolism of glycosaminoglycans
- Increases total proteoglycan production
- Inhibits collagen breakdown by chondrocytes
- Increased production of synovial fluid
- Anti-inflammatory
- Chondroprotective
- 600-1500 mg per day



Glucosamine / Chondroitin

- Multiple conflicting studies
- No problems with side effects on liver or kidney
- No affect on diabetes
- Mild infrequent GI upset
- Seems to help moderate to severe OA
- Must be taken for 1-3 months to see effects



Nonsteroidal Anti-inflammatory

inflammatories

- Affect the inflammatory mechanism
- NSAIDS may cause
 - Gastric ulceration
 - Renal insufficiency
 - Prolonged bleeding time
- Patients >60 may have 4-5 X risk of
 - GI ulceration and bleeding
 - Renal failure requiring hospitalization



NSAIDs

- High risk individuals
 - >60
 - h/o peptic ulcer disease
 - Anticipated duration of treatment over 3 months
 - Moderate to higher doses
 - Concurrent oral steroid use



Corticosteroids

- Very effective in acute flairs
- Most effective in first 1-3 weeks
- Less effective than viscosupplements from 6 weeks - 6 months
- No more than 3 times per year



Common Shoulder Problems

■ Rotator Cuff

- Tendinitis, Bursitis, Partial and complete tears

■ Arthritis

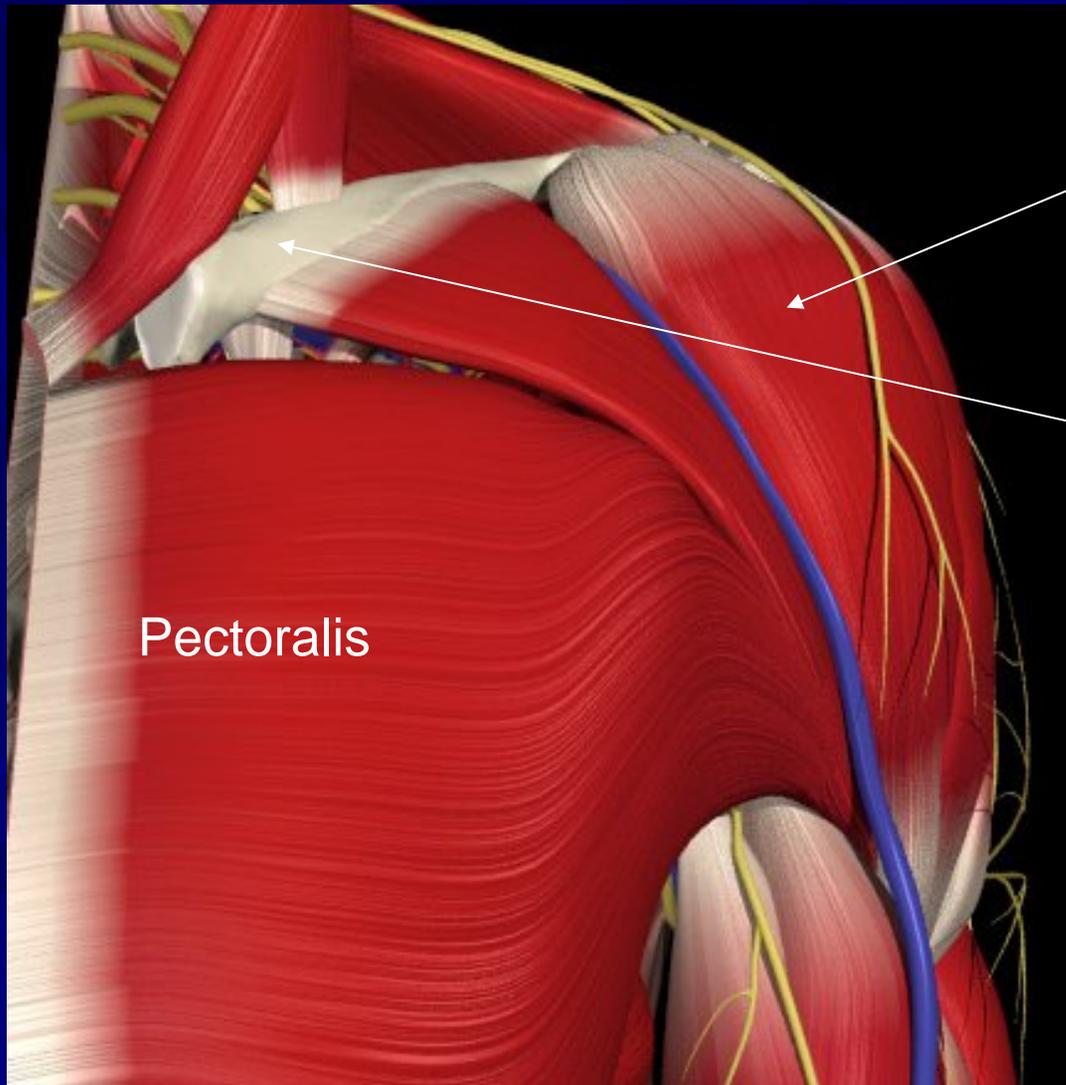
- Wearing out of the joint cartilage

■ Stiffness

- Adhesive capsulitis



The Shoulder Complex



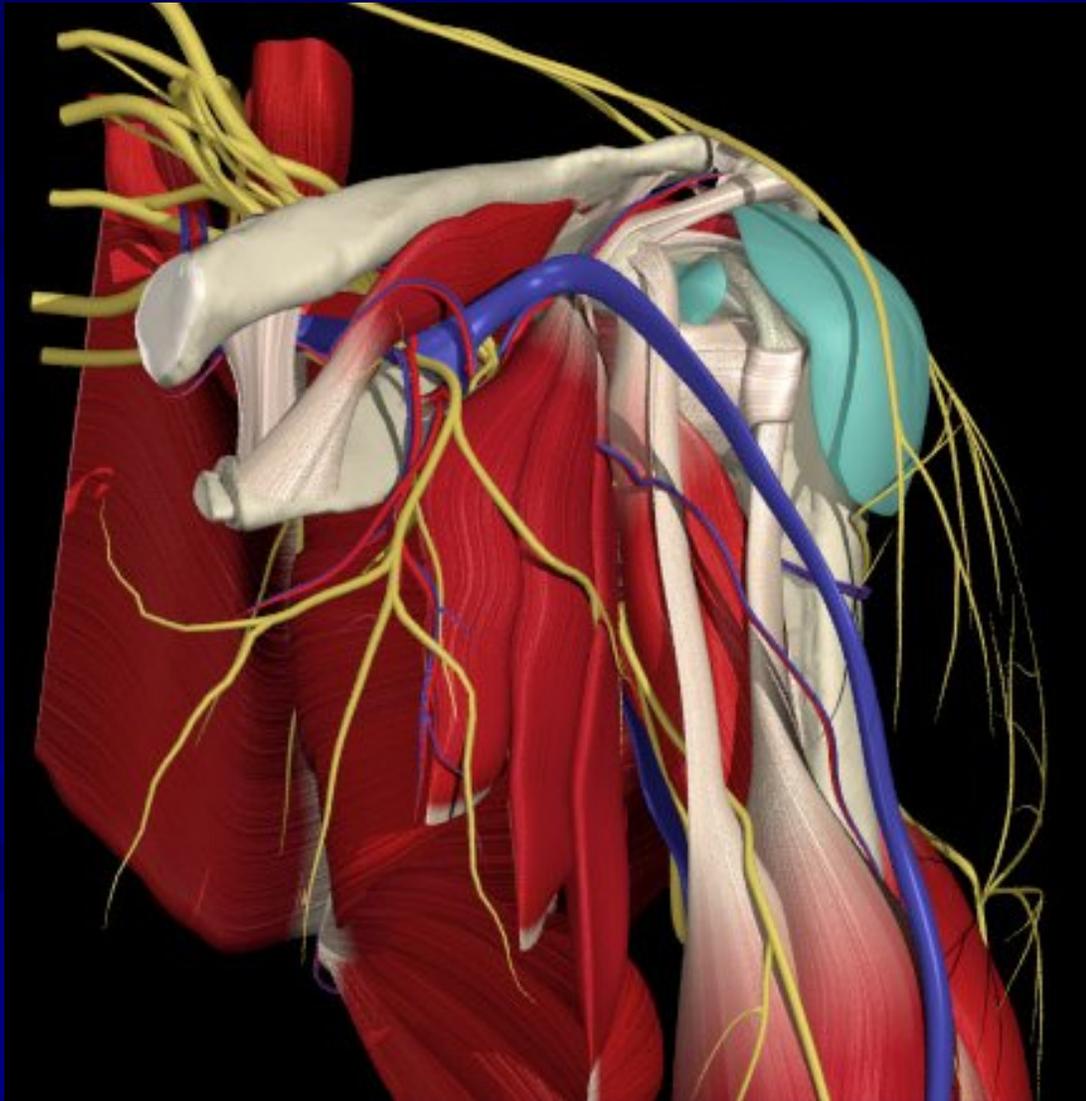
Deltoid Muscle

Clavicle (Collar Bone)

Pectoralis



The Shoulder Complex

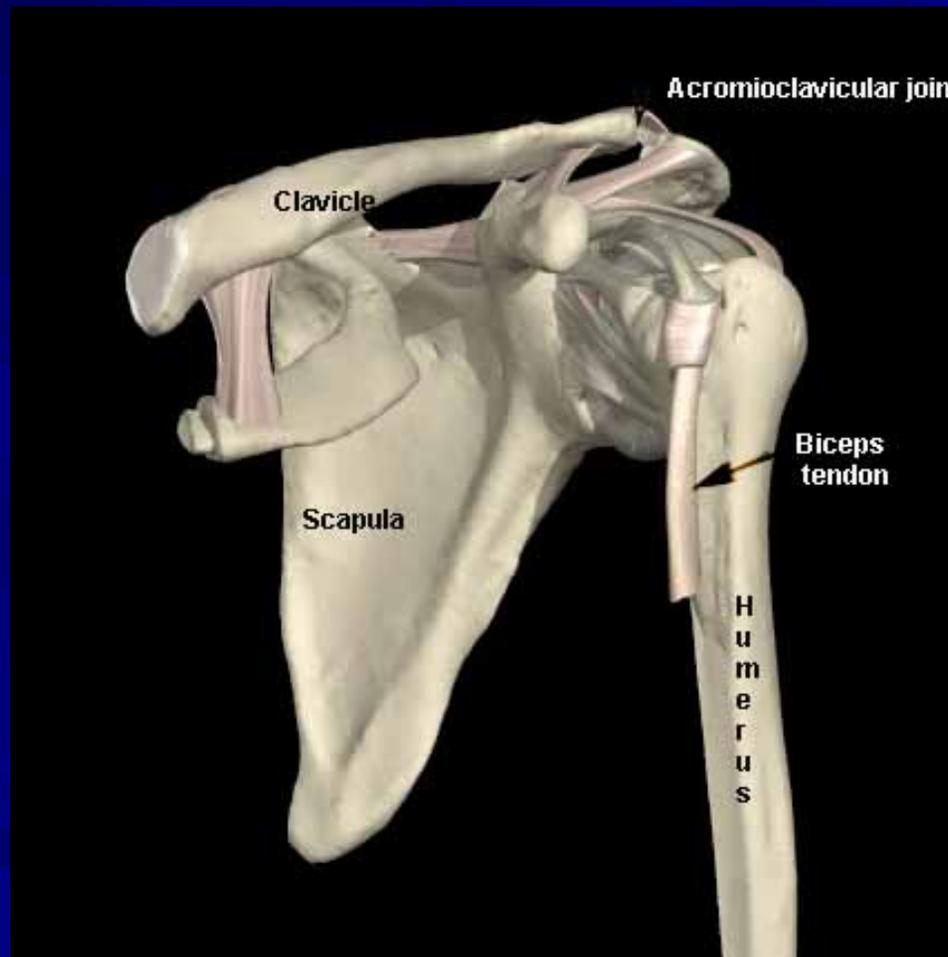


Deltoid muscle
removed



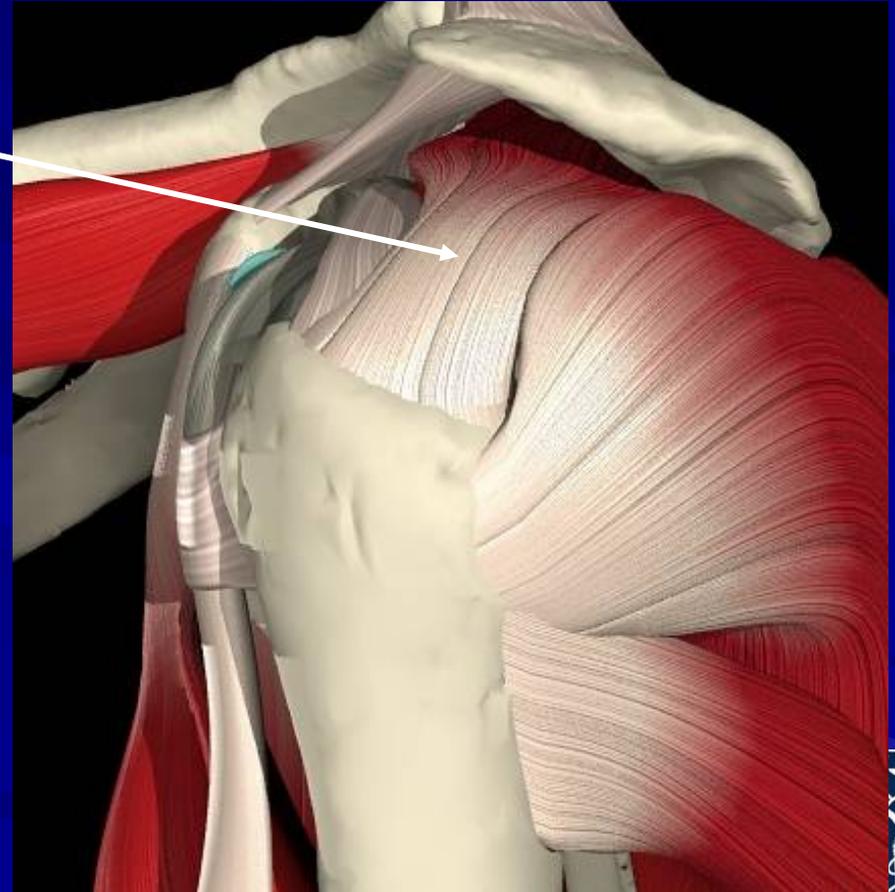
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The Shoulder Complex



Rotator Cuff

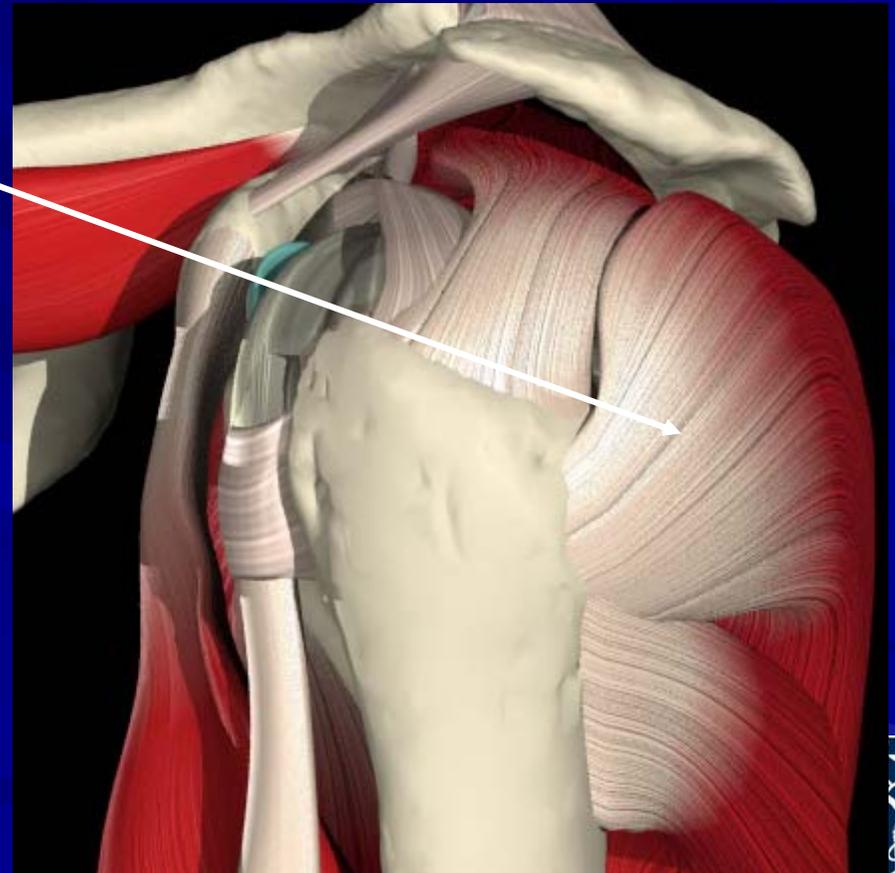
- **Supraspinatus**
 - Active in any **elevation of the arm**
 - **Stabilizes** the shoulder joint



Rotator Cuff

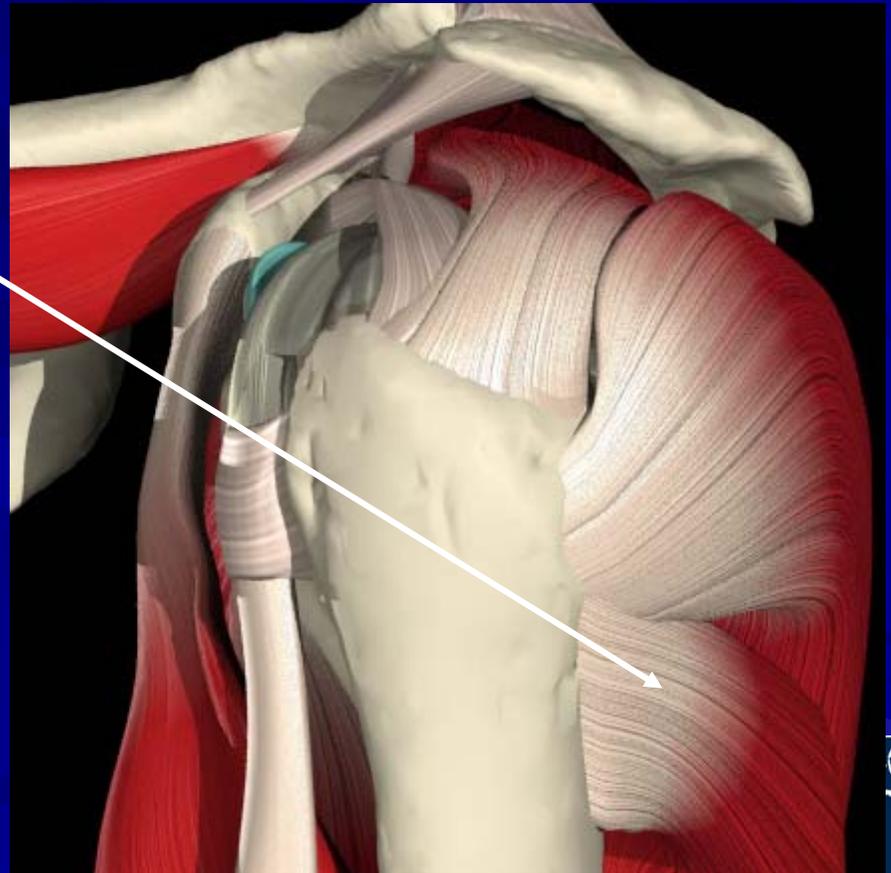
■ Infraspinatus

- **Depressor** of the humeral head
- **Stabilizer** of the back of the shoulder



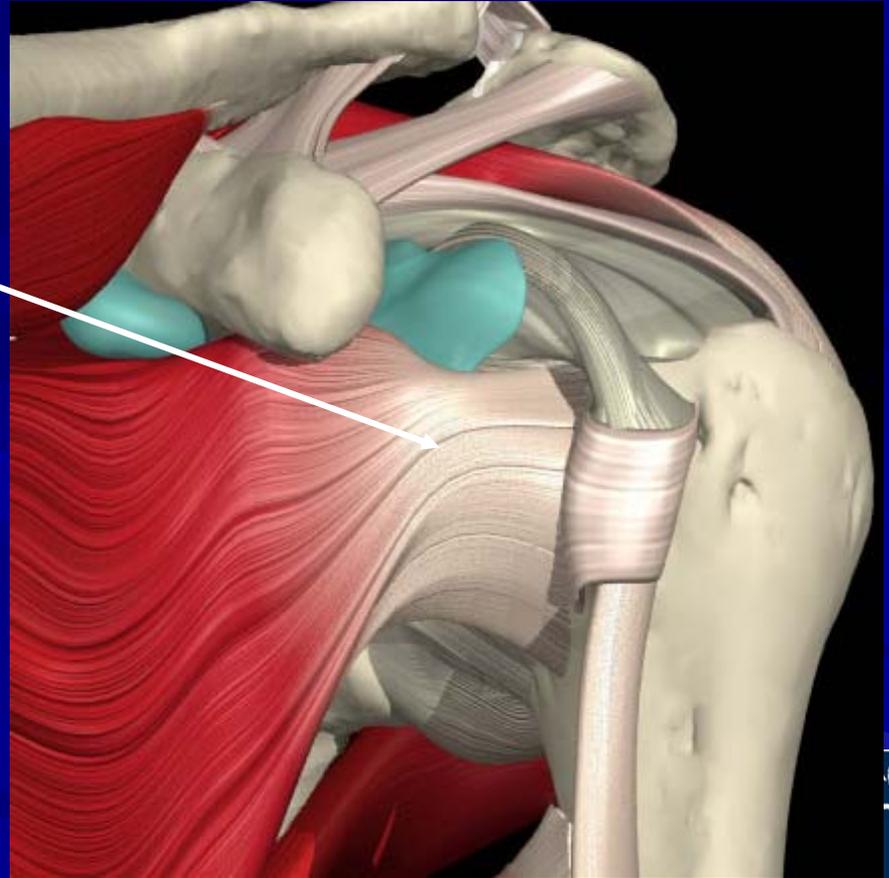
Rotator Cuff

- Teres Minor
 - Rotates the shoulder out from the side



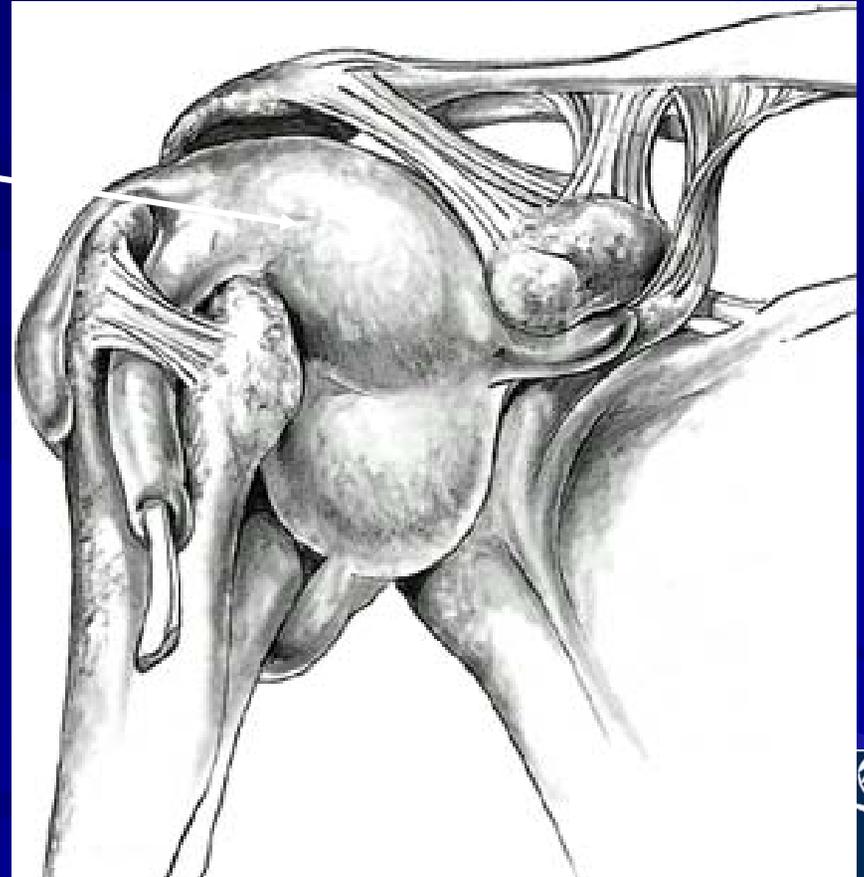
Rotator Cuff

- **Subscapularis**
 - Stabilizes the front of the shoulder
 - **Rotates the arm inward**



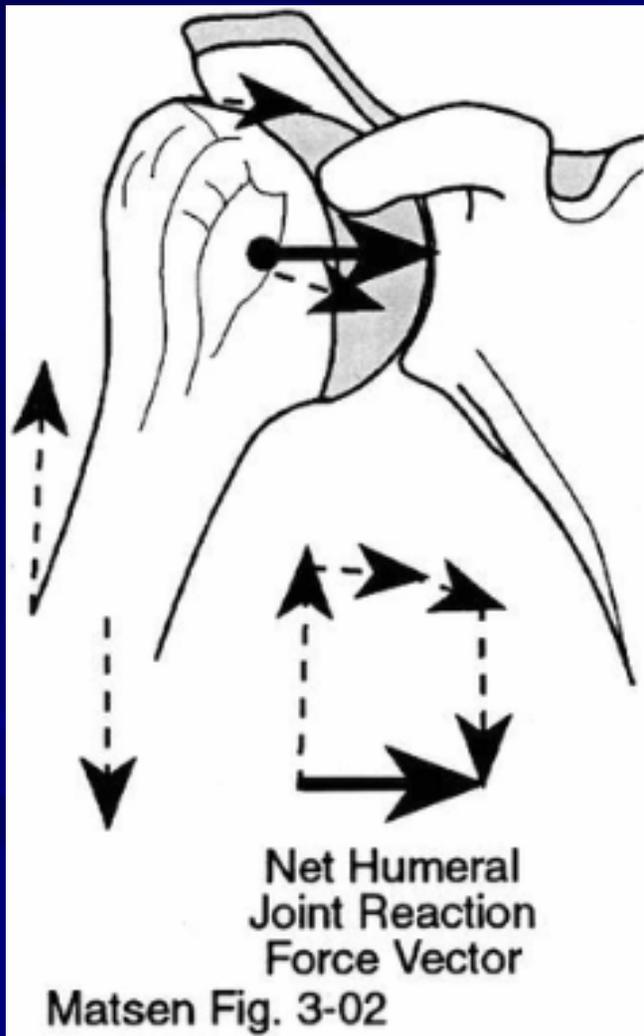
Bursa

- Subacromial and subdeltoid bursa
 - Thin sac-like structure
 - Lubricate motion between rotator cuff and overlying CA arch



Rotator Cuff Balance

- Proper function depends upon balance between all muscle and ligament forces around the shoulder



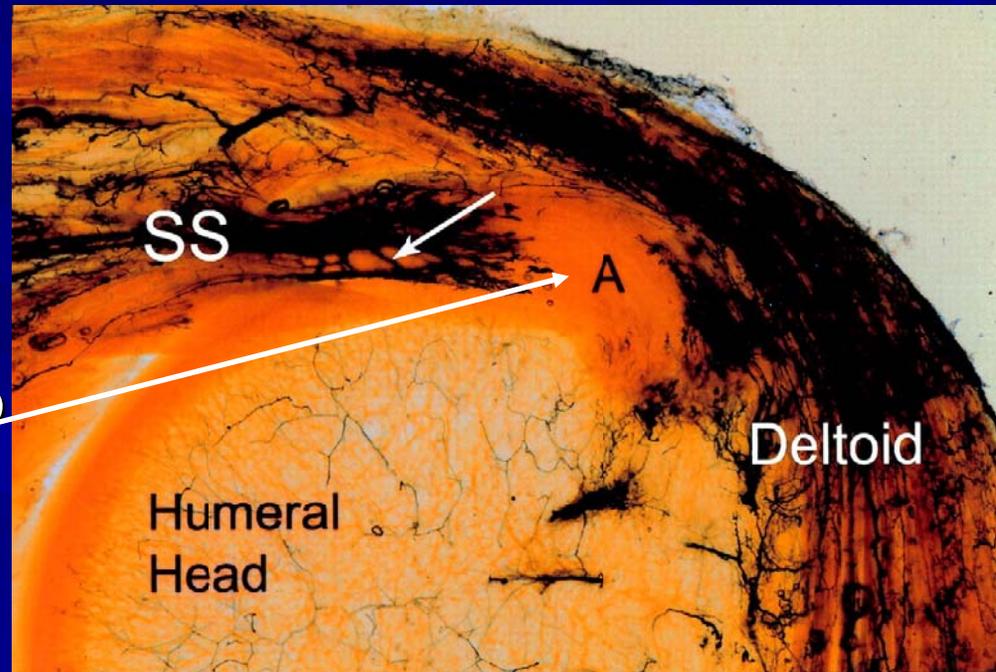
Why Tears Occur

- Tendon connective tissue weakens with age and disuse
 - Weakened tendons require less force to disrupt
- Repetitive and / or substantial loads



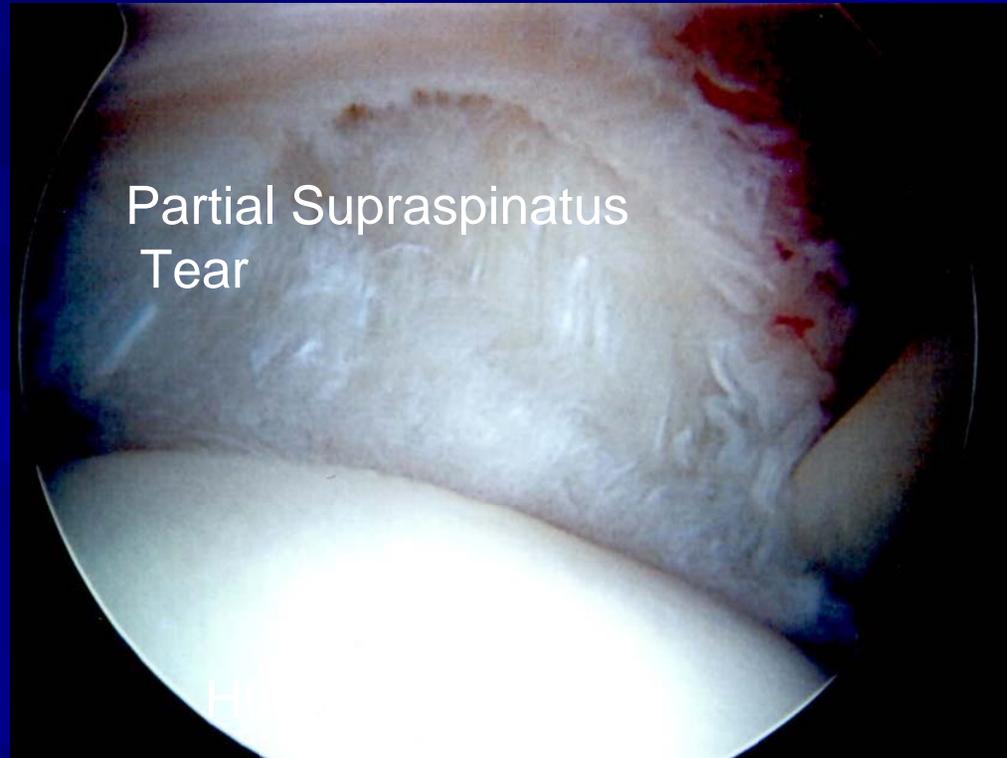
Tendon Degeneration

- Age-related changes
 - Decreased vascularity at the tendon attachment to the bone
 - Leads to weak tendon that tears easily



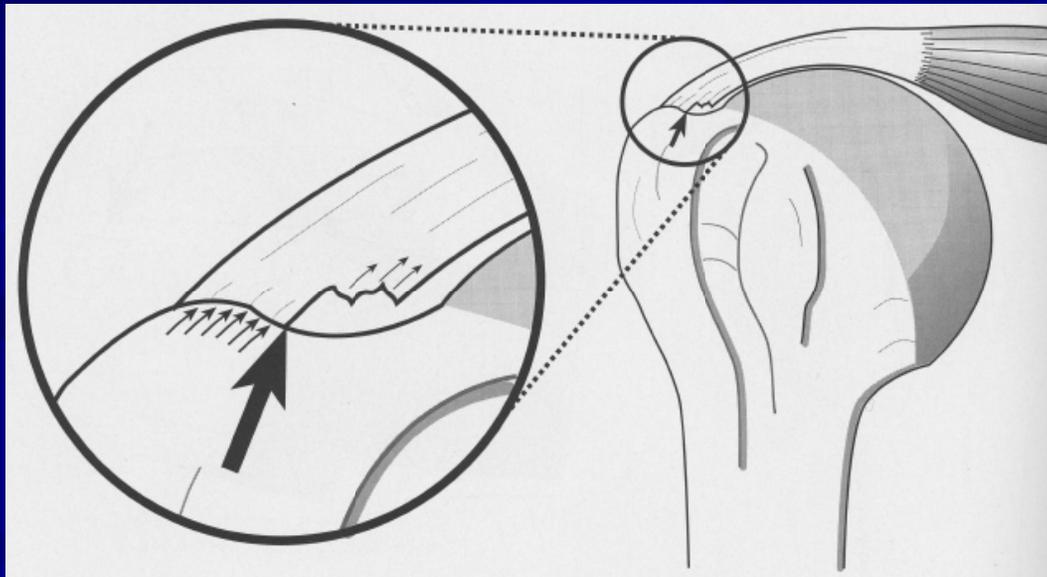
Rotator Cuff Tears

- Tears begin where the stresses are the greatest
 - Tendon fibers fail a few at a time or all at once
 - Arm may be at rest
 - Torn fibers retract when torn



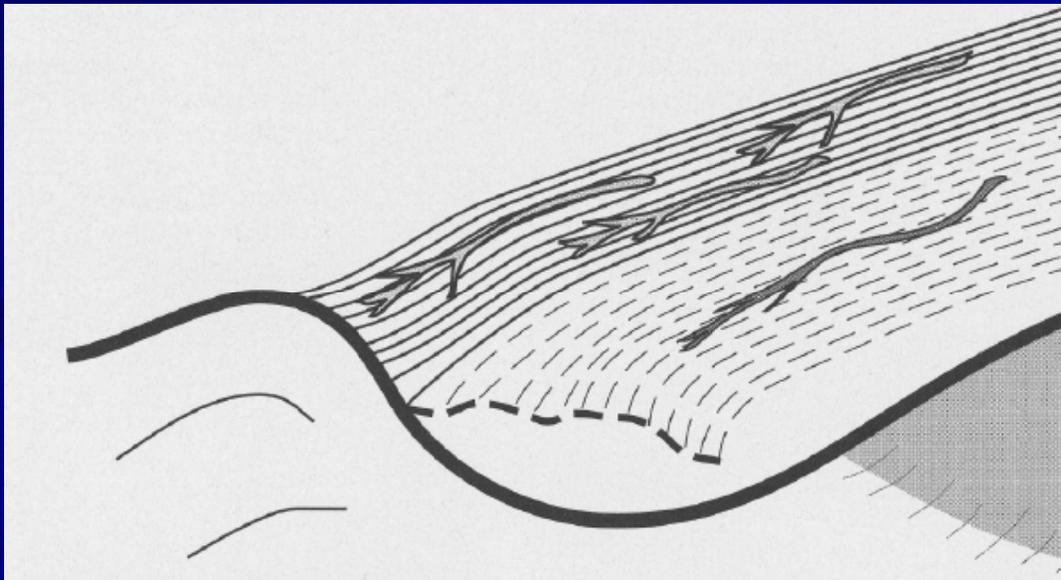
Consequences of rupture

- Increasing loads applied to the intact fibers
- Muscle fibers become detached from the bone resulting in weakness



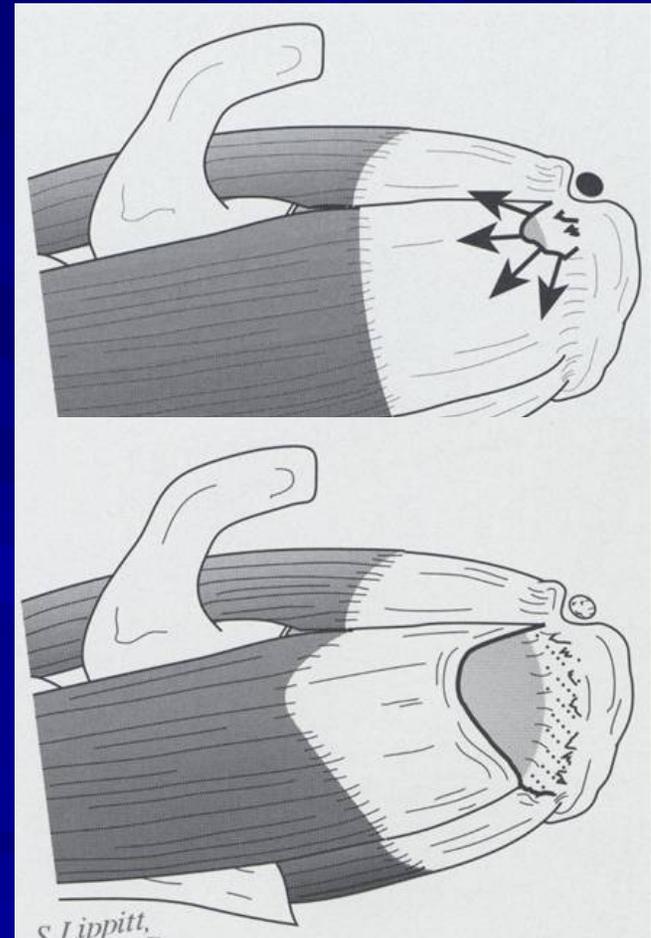
Consequences of rupture

- Retracted cuff fibers place additional tension on remaining microcirculation compromising cuff viability
- Increasing amounts of tendon are exposed to joint fluid which prevents tendon healing



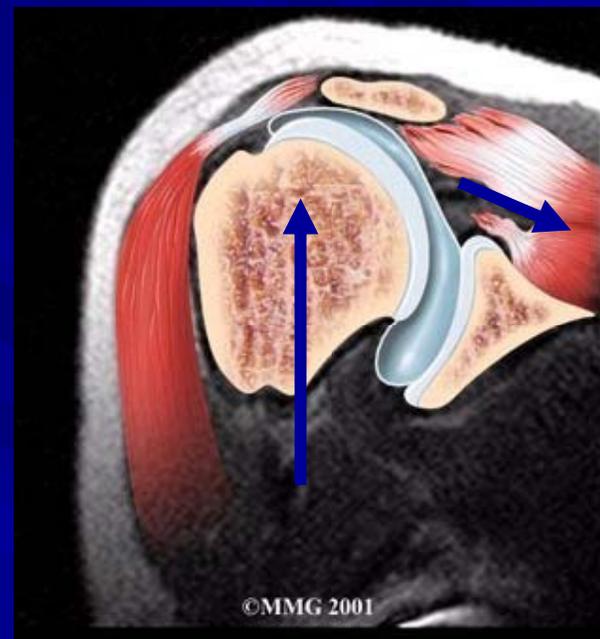
Full Thickness Tears

- Loads are concentrated at the margins of the tear
- Further tearing occurs with smaller loads
- *Partial tears become complete*
- *Smaller tears become large*
- *Large tears eventually become unfixable*



Progressive Tearing

- Spacer effect of the cuff is lost
- Humeral head displaces superiorly
- Biceps tendon eventually ruptures



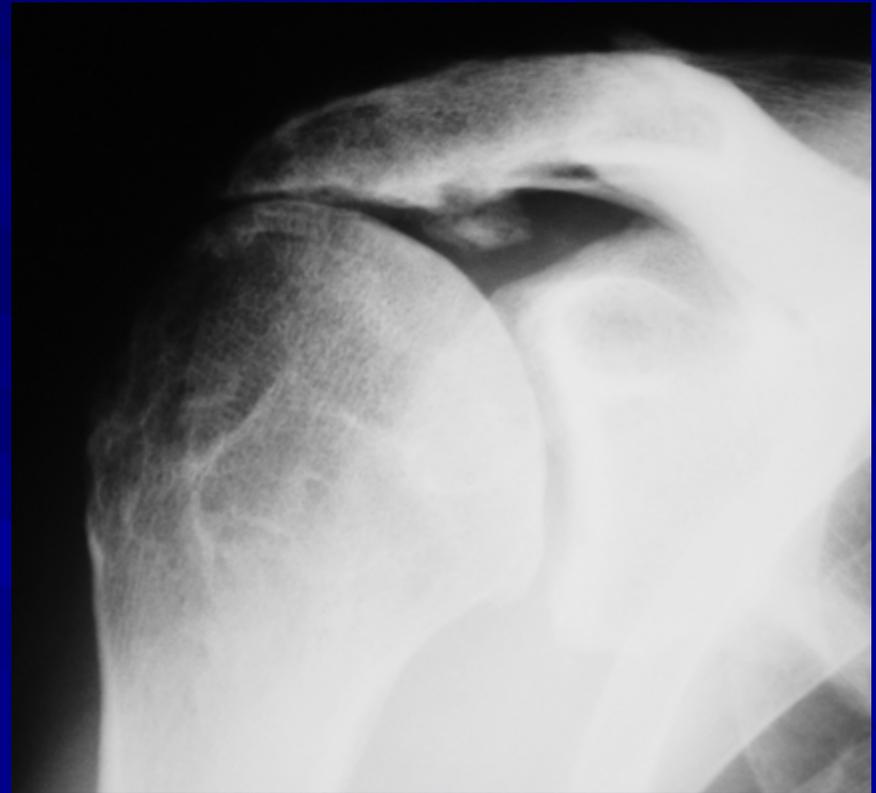
Early Cuff Failure

- Compression of the humeral head is less effective
 - Deltoid pulls head upward
 - Upward pull of the deltoid results in cuff abrasion & further cuff damage



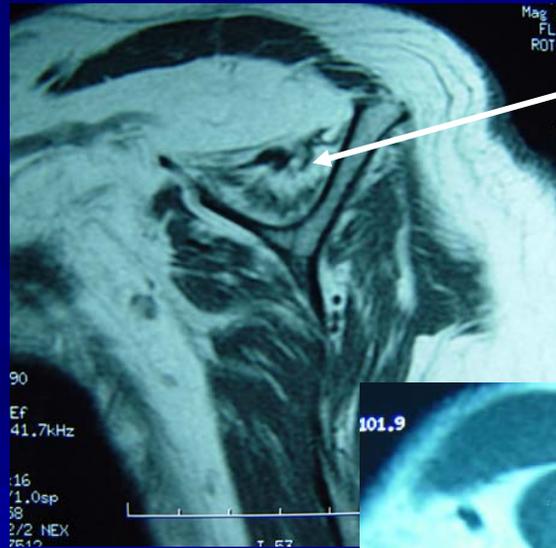
Chronic Cuff Failure

- Humeral head forms a joint with the arch above
- Secondary joint disease occurs called *cuff tear arthropathy*



Chronic Cuff Tears

- Muscle atrophy
- Fatty infiltration of muscle belly
- Tendon retraction
- Bone osteoporosis
- Loss of muscle and tendon excursion
- Irreversible
- Progressively worse



Fatty infiltration with muscle wasting



Healthy muscle, no fat stripes

Prevalence of Rotator Cuff Tears

- Cadaver studies 7-40%
- MRI & Ultrasound studies
 - 34% of asymptomatic individuals
 - 54% of asymptomatic individuals over 60y
- Ultrasound study
 - 13% of asymptomatic individuals: 50-59y
 - 51% of asymptomatic individuals: over 80y



Prevalence of Rotator Cuff Tears

- 40%: no history of strenuous physical labor
- 50%: no history of trauma
- Frequently bilateral
- Many heavy laborers never get cuff tears

Healing Potential

- None without surgery
 - Cuff tears never heal spontaneously
 - Without a blood supply, there is never any chance a cuff healing spontaneously
- 40% progress to larger tears
- 51% of asymptomatic RCT become symptomatic



Patient History

- Important things to know
 - Chronic symptoms or acute exacerbation
 - Stiffness, loss of motion
 - Weakness (when)
 - Functional impairment
 - Catching, crepitus, grinding
 - Treatments and response



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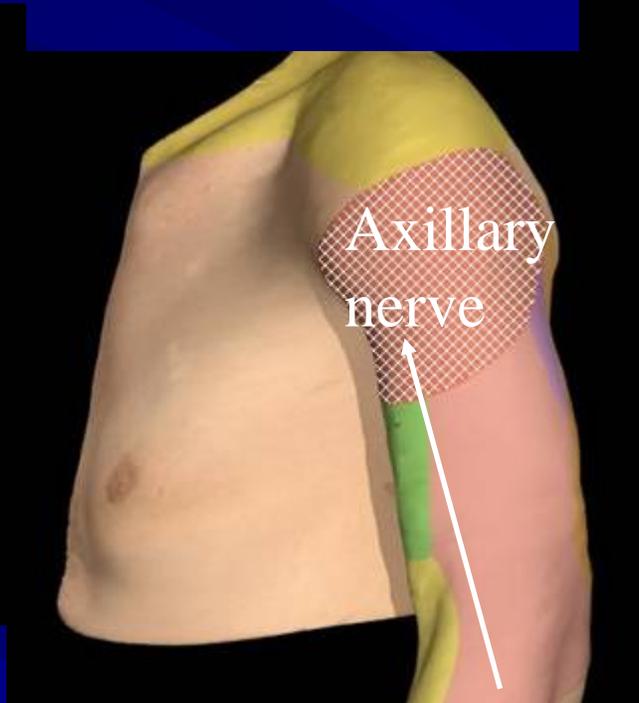
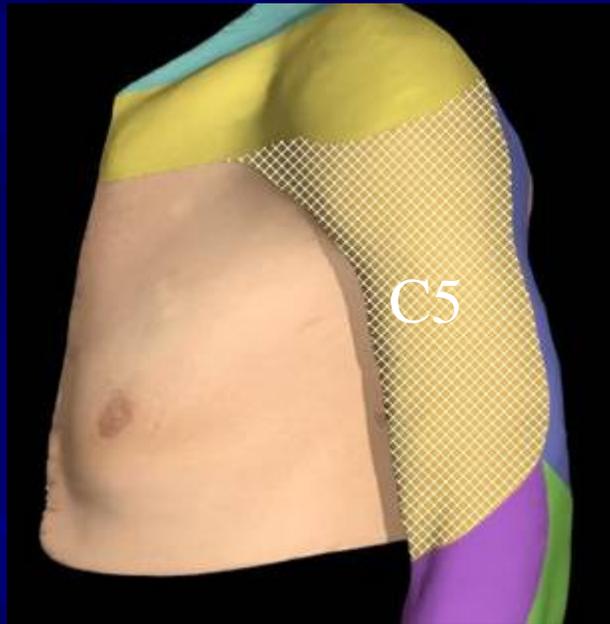
Shoulder Pain with Cuff Tears

- Rotator cuff pain
 - Constant ache
 - Varies with activity
 - Night pain
 - Wake up with position change
 - May be severe
 - Constant or intermittent



Rotator Cuff Shoulder Pain

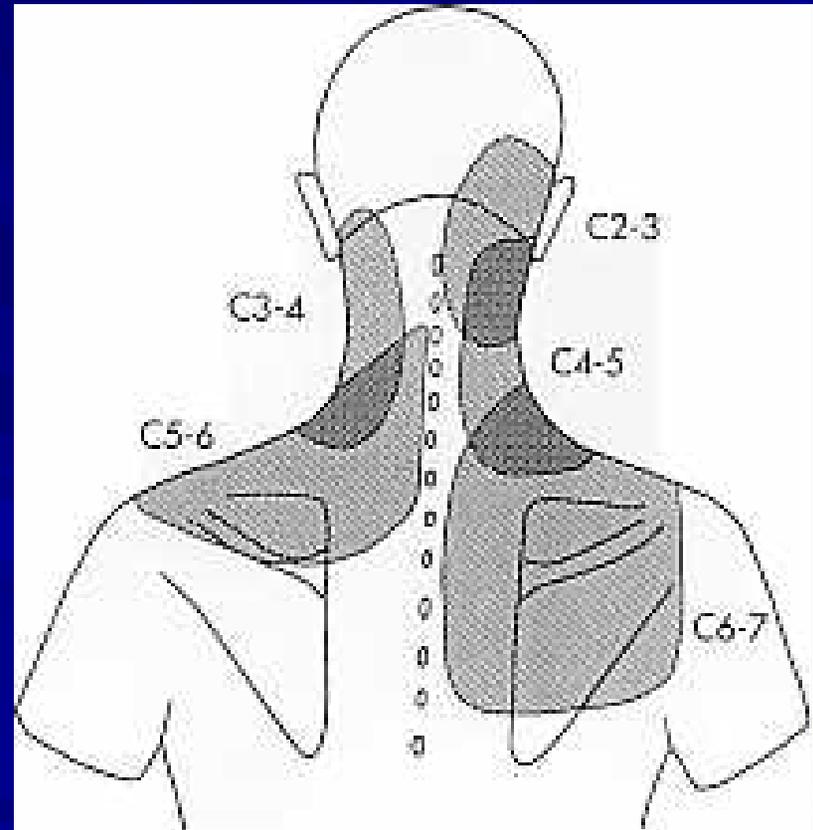
- Deep, dull, diffuse ache



The pain from rotator cuff pathology is often referred to the outer part of the shoulder. Sometimes as far as the elbow.

Non Rotator Cuff Shoulder Pain

- Pain to the *back* of shoulder upper back or neck
- Pain to top of shoulder
 - Think arthritis of the neck
- Pain *beyond* the elbow
 - Think pinched nerve in the neck



Timing of Pain

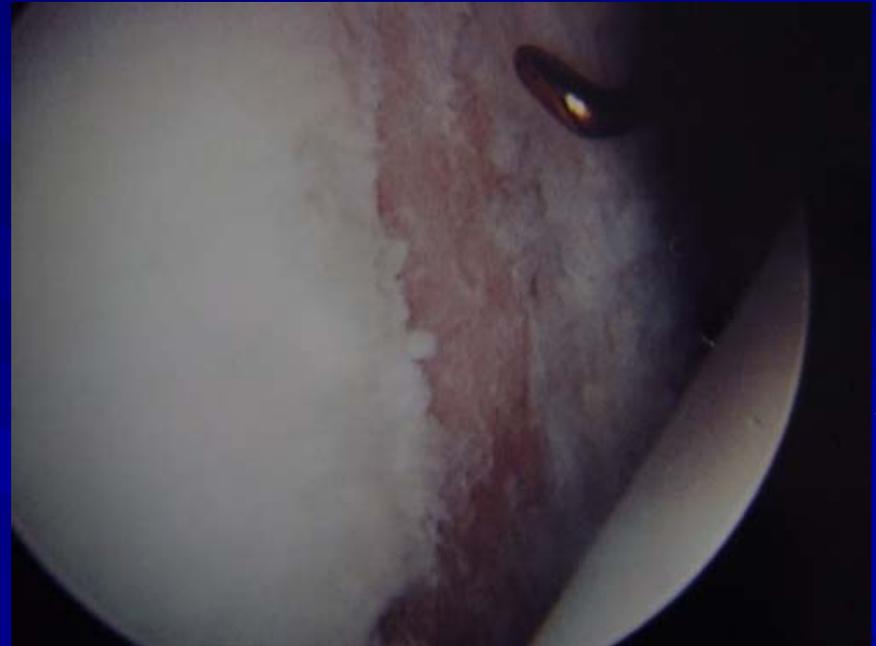
■ Rest Pain (constant)

- Synovitis
(Inflammation of the joint)



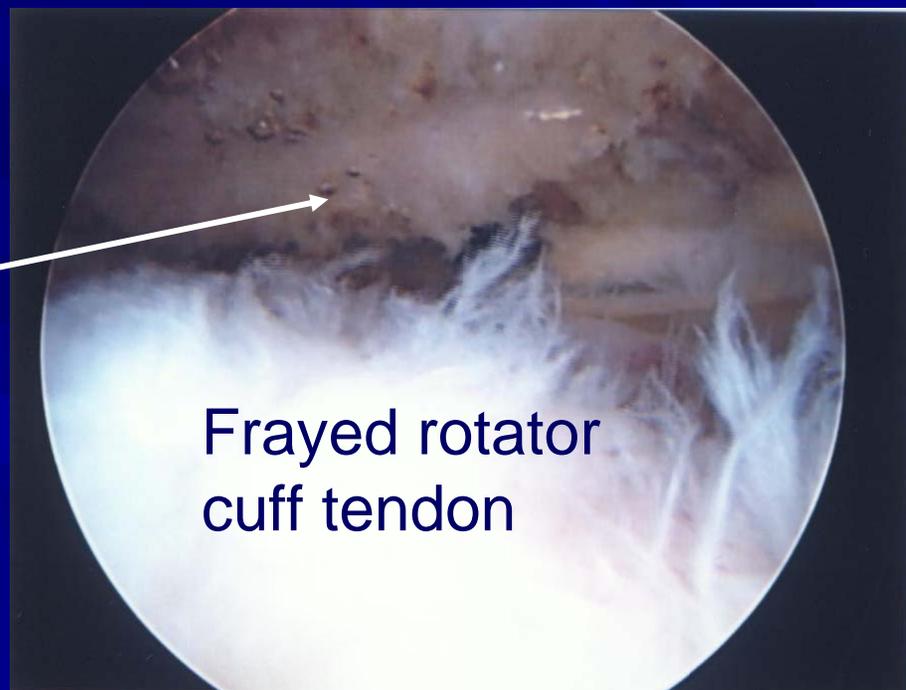
Timing of Pain

- Pain in mid range of motion
 - Arthritis - Damaged joint surface
 - Inflamed irregular joint surface
 - Inflamed tissues



Timing of Pain

- Pain at the end of the range of motion
 - Impingement pain
 - Bone spurs
 - Pinched and stretched tissues around the shoulder joint



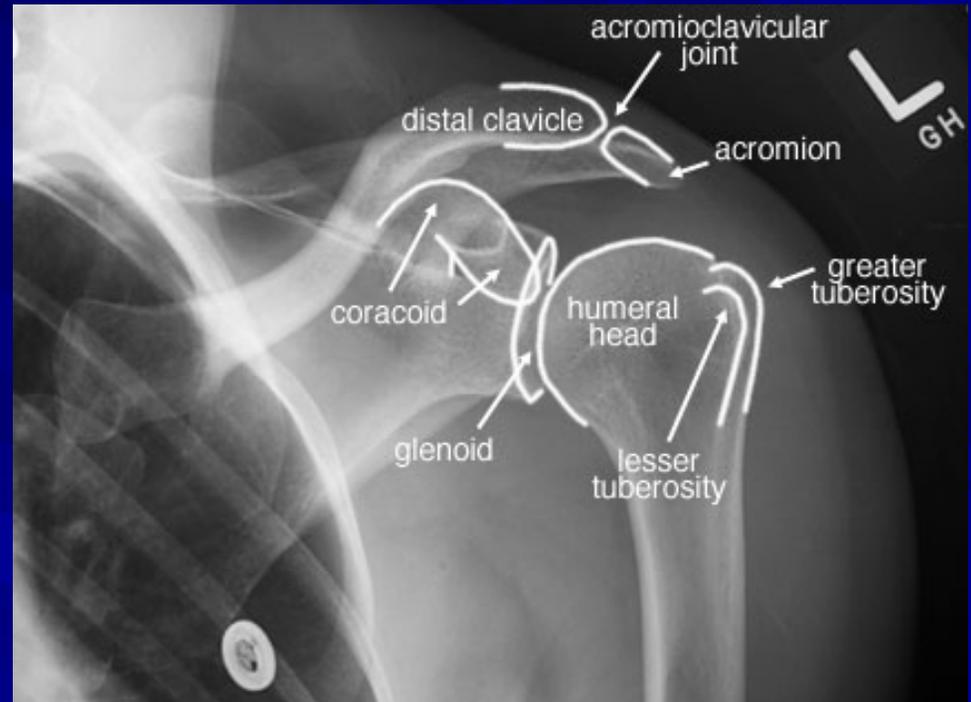
Radiographs

- Acromial shape
- Position of humeral head
- AC arthritis
- Calcific tendinitis
- Glenohumeral arthritis
- Destructive lesions



1 & 2: AP in Scapular Plane

- 2 Views: IR, ER
- Calcium deposits
- Greater tuberosities: excrescences, cysts



1 & 2: AP in Scapular Plane

- 2 Views: IR, ER
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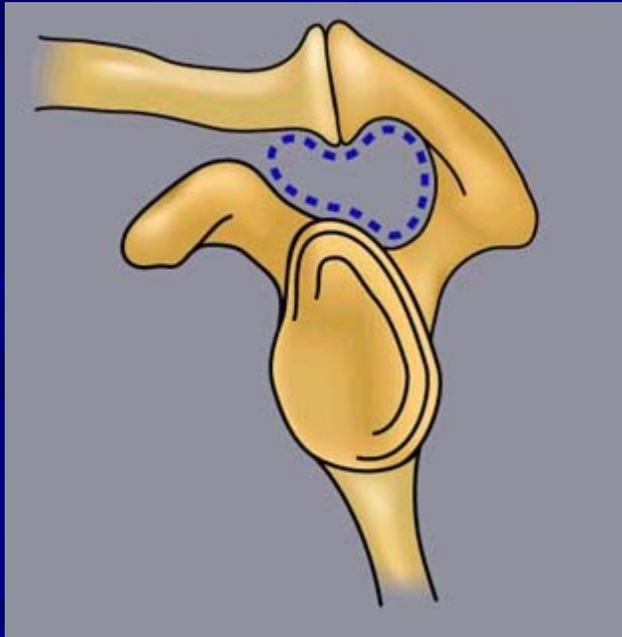
3: Axillary View

- Evaluate GH joint & tuberosities
- Glenoid version
- Joint space narrowing
- Os acromiale
 - This is an anatomic variation best seen on this special view



4: Outlet View

- Evaluate subacromial space
- Acromial shape and thickness



5: 30° Caudal Tilt View

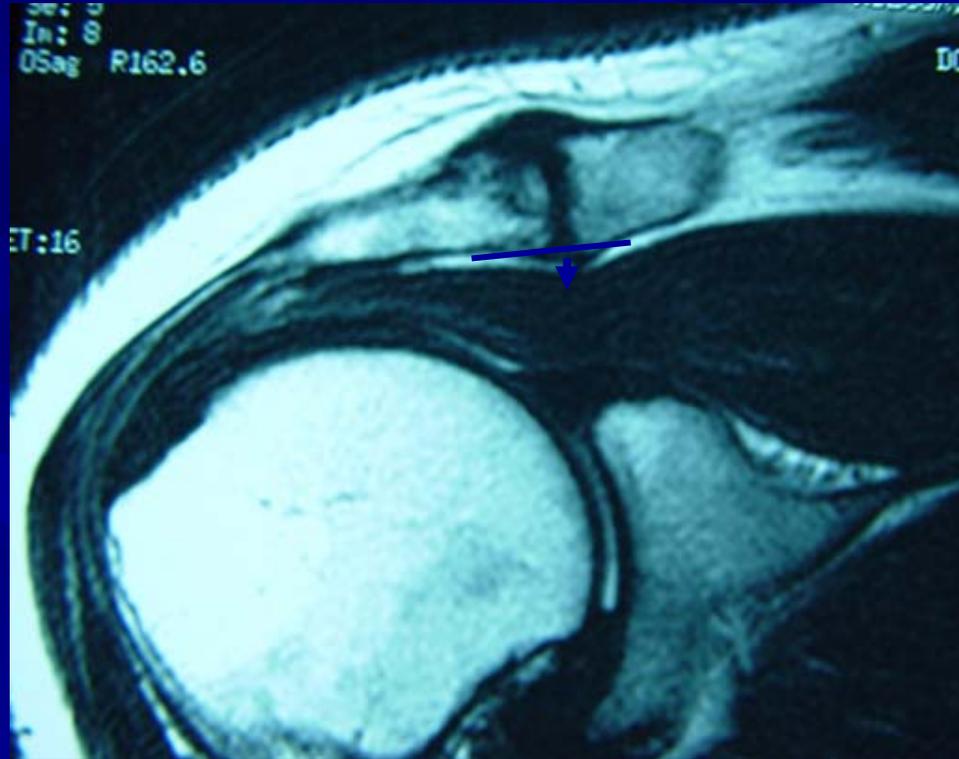
- AP view with a 30° caudal tilt
- Demonstrates anterior acromial projection



Tendon Imaging

■ MRI

- 90% accurate in diagnosing *complete* RC tears
- 70% accurate in diagnosing *partial* RC tears
- These data may vary. It depends on who is reading the MRI.



This spur is pushing on the rotator cuff causing “impingement”.



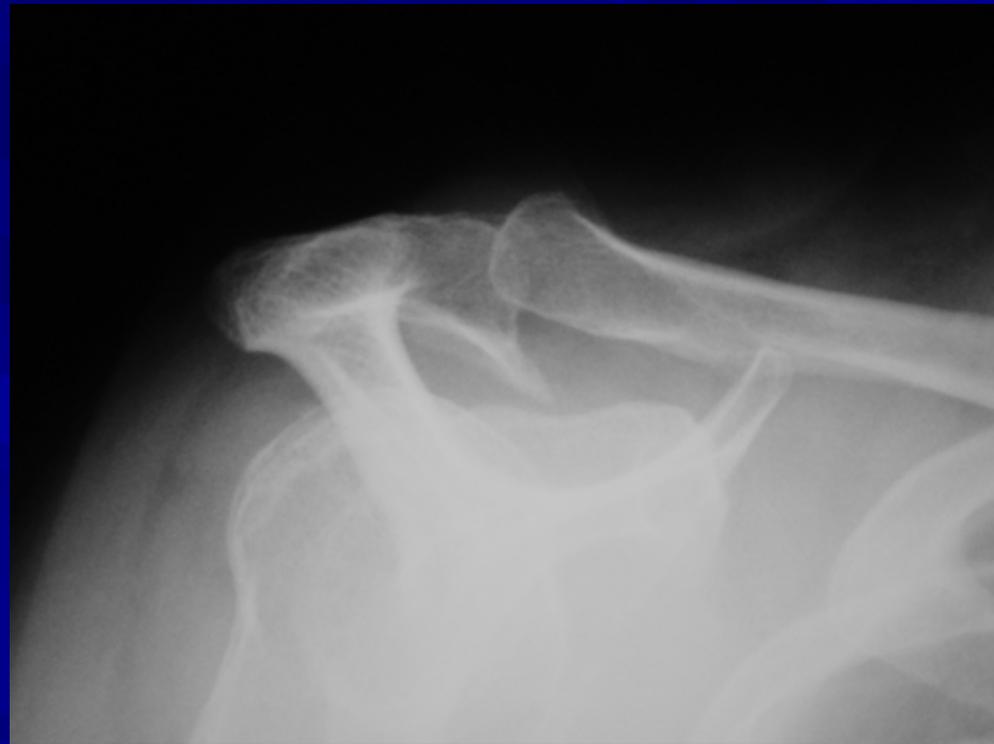
Nonoperative Treatment

- Helpful in ~50% (33-92%)
- Acute rupture
 - 75% may have reduced pain with therapy
 - But the tendon tear will never heal without surgery.
- Chronic pain (>6 months)
 - poor response with therapy



My Approach

- Chronic pain, no or minimal weakness
 - PT for 3-6 weeks
 - MRI if not improving in 4-6 weeks
 - MRI after 6 weeks if improving but @ plateau
 - MRI if still in pain but patient does not want surgery



My Approach

- Acute pain, weakness
 - Office evaluation
 - X-rays
 - Injection
 - MRI
 - May be age dependent



Analyzing the Data

- If the weakness and pain are inconsistent with MRI findings
 - Look for other causes
 - C spine, nerve injuries
 - Consider multiple causes
 - Older patients with dislocations
 - Concurrent cuff tears, brachial plexus injuries, or axillary nerve injuries



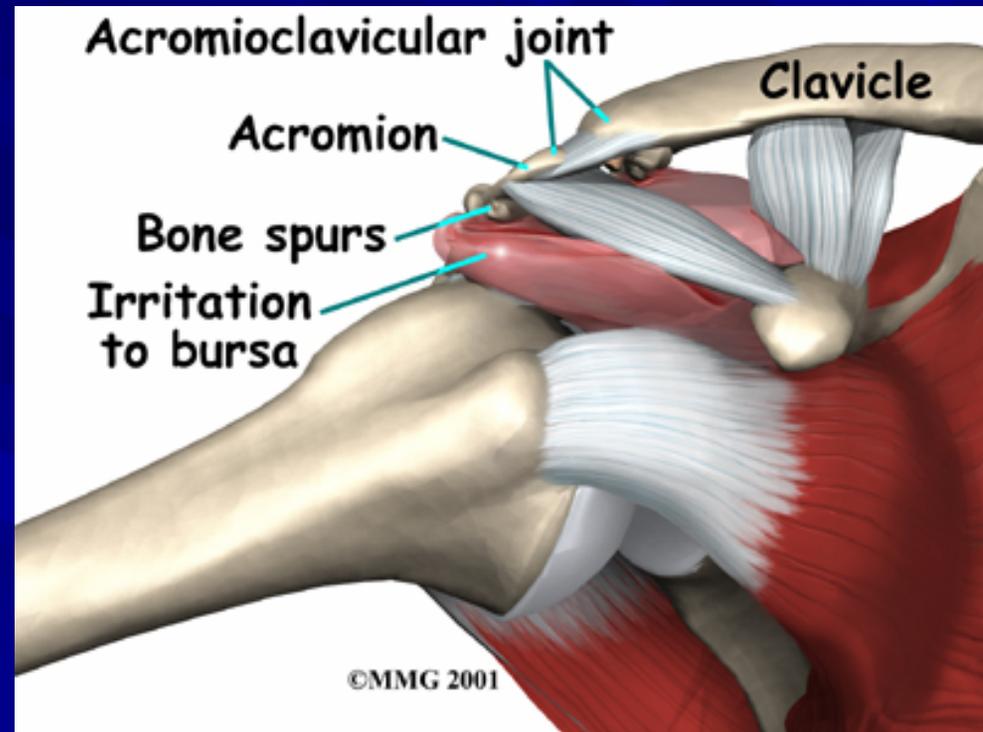
Surgical Indications

- Patient dependent
- Impingement syndrome & Partial tears
 - Pain with functional impairments
 - Failure to respond to nonoperative treatment
- Chronic tears
 - Consider 3-4 months of nonsurgical treatment
- Acute tears
 - Best results if repaired within 3 weeks

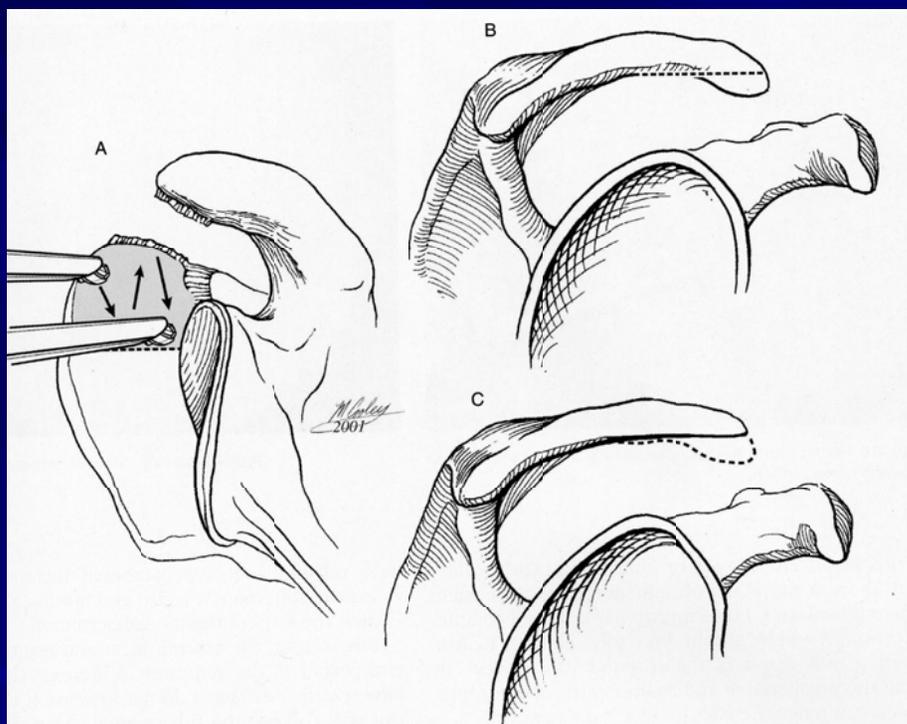


Arthroscopic Acromioplasty

- Relieves impingement between the CA arch & the cuff
- Performed with arthroscopic or mini-open cuff repair



Technique of Arthroscopic Acromioplasty

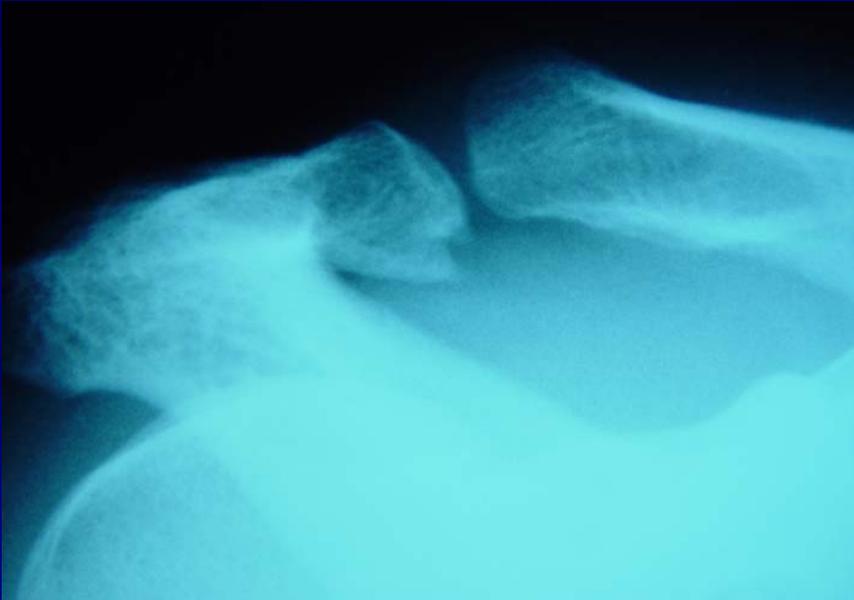


- Bone spurs can be removed through small arthroscopic incisions by using a motorized burr.



Post-op Arthroscopic Acromioplasty

- Sling for 1-2 days
- Begin active motion immediately
- Advance as tolerated



Post-op Arthroscopic Acromioplasty

- Anticipated post-op goals
 - 1 month: Full motion (range 1-4 weeks)
 - 12 weeks: 75% functional recovery
 - 6 months: Full recovery



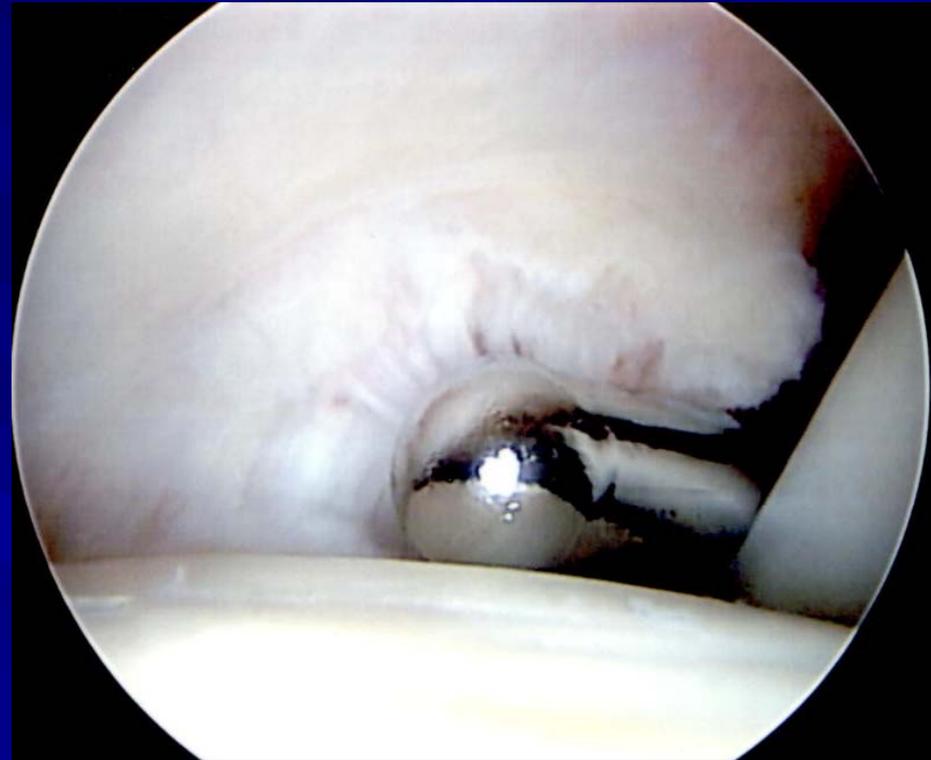
Surgery for Partial Thickness Tears

- Debridement alone
- Debridement and acromioplasty
- Acromioplasty, excision of damaged tendon with primary repair



Partial RCT: Debridement Alone

- Young athletes and workers
- Failed nonoperative therapy
- Tears related to overuse not impingement
- 80-85% success



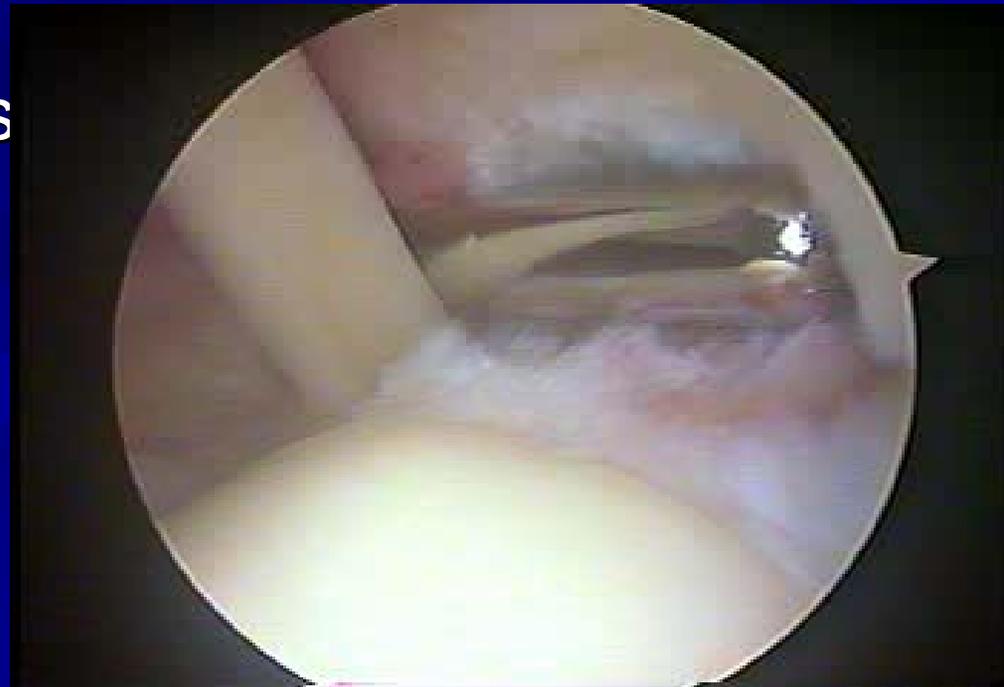
Partial Tendon: Debridement & Acromioplasty

- Older patients
- Partial tear is debrided if **<50%** tendon thickness
 - Remove free flaps of torn tendon edge
- Remove the bone spurs
 - Performed arthroscopically



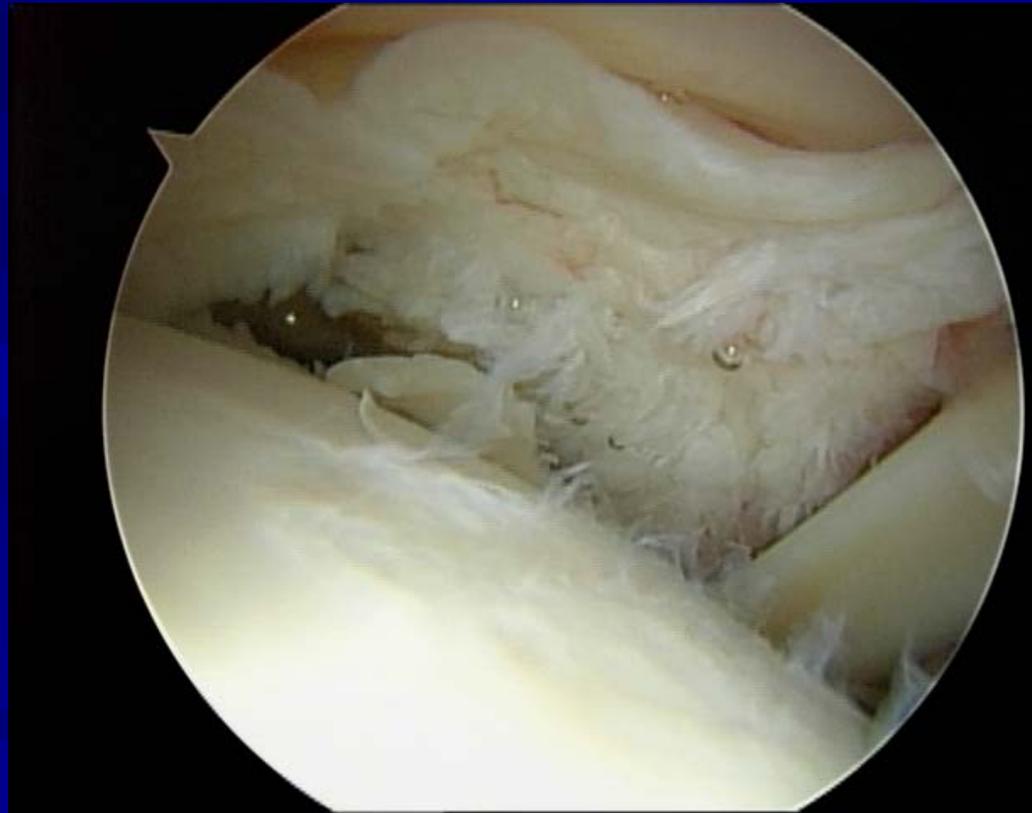
Partial Tendon Tears: Acromioplasty, Excise and 1^o Repair

- For tears **>50%** tendon thickness
- Post-op treat same as a full thickness RC repair



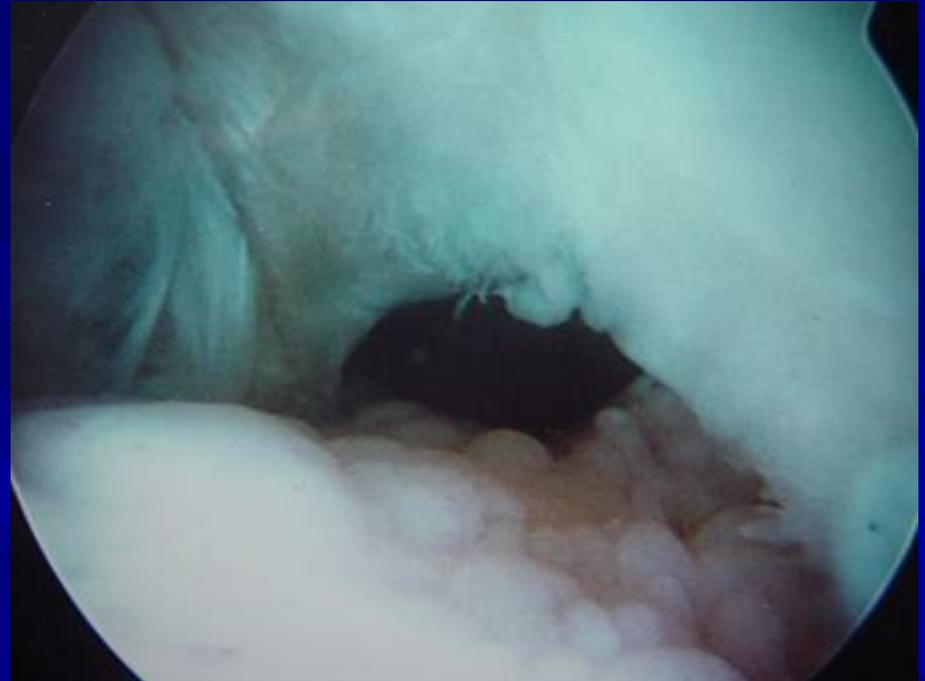
Full Thickness Cuff Tears

- Arthroscopic repairs
- Mini-open repairs
- Open repairs



Arthroscopic Cuff Repair

- Arthroscopy allows for a more complete evaluation of the joint and tendon
- Removal of bone spurs
- Rotator cuff repair using anchors



Arthroscopic Cuff Repair

■ Advantages

- Improved joint assessment, incl. biceps
- Improved tendon mobilization
- Decreased surgical trauma to deltoid
- Faster rehabilitation (in first 3 months)



Arthroscopic Cuff Repair

■ Advantages

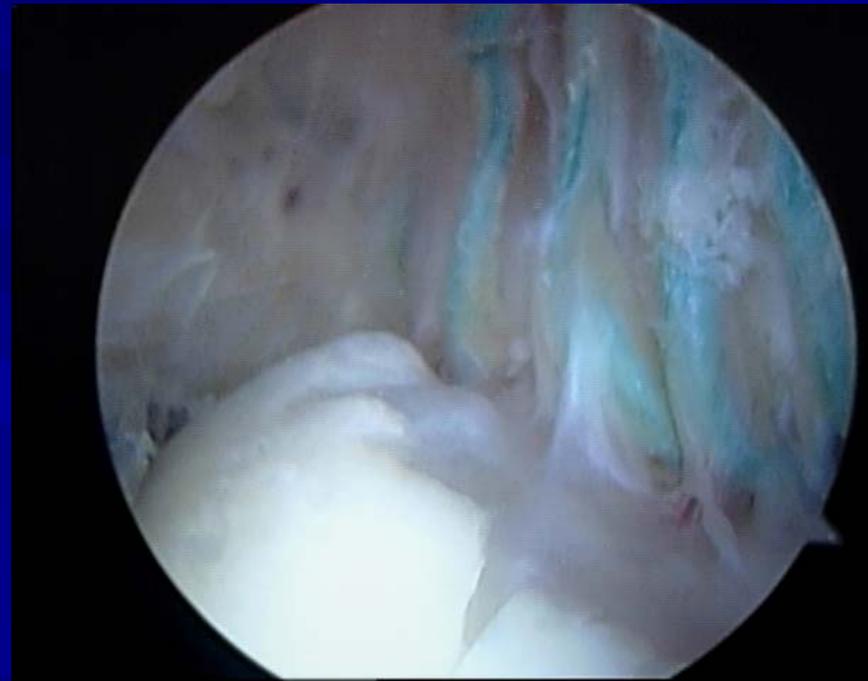
- Earlier return to function
 - 6 weeks to heal, 6 months for overhead work
- Less Pain
 - No evidence of this
- Shorter hospitalization
 - Every cuff repair goes home the day of surgery
- Cosmetic
 - Multiple smaller incisions vs. one incision



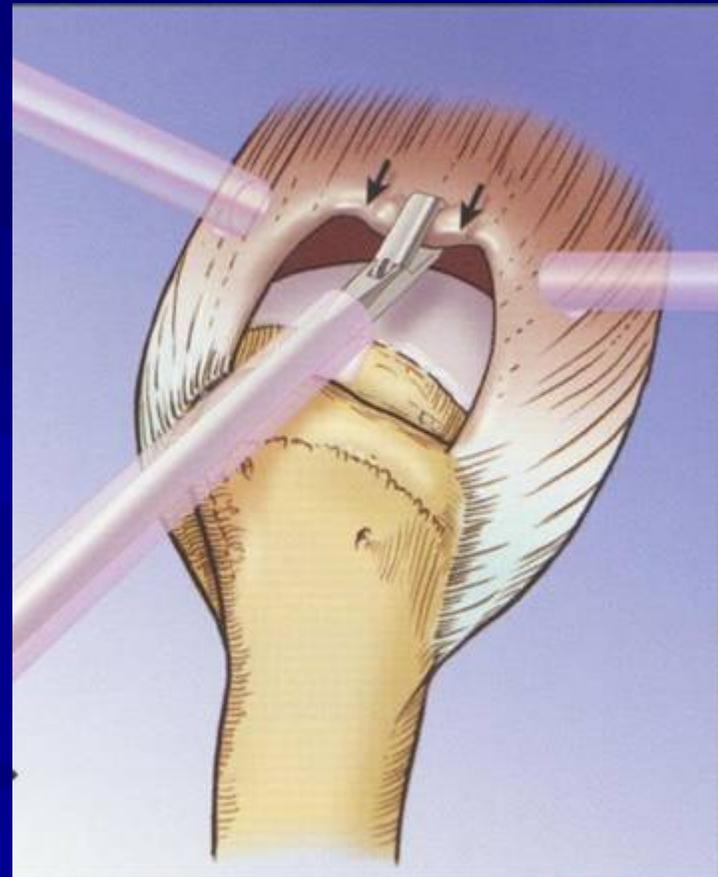
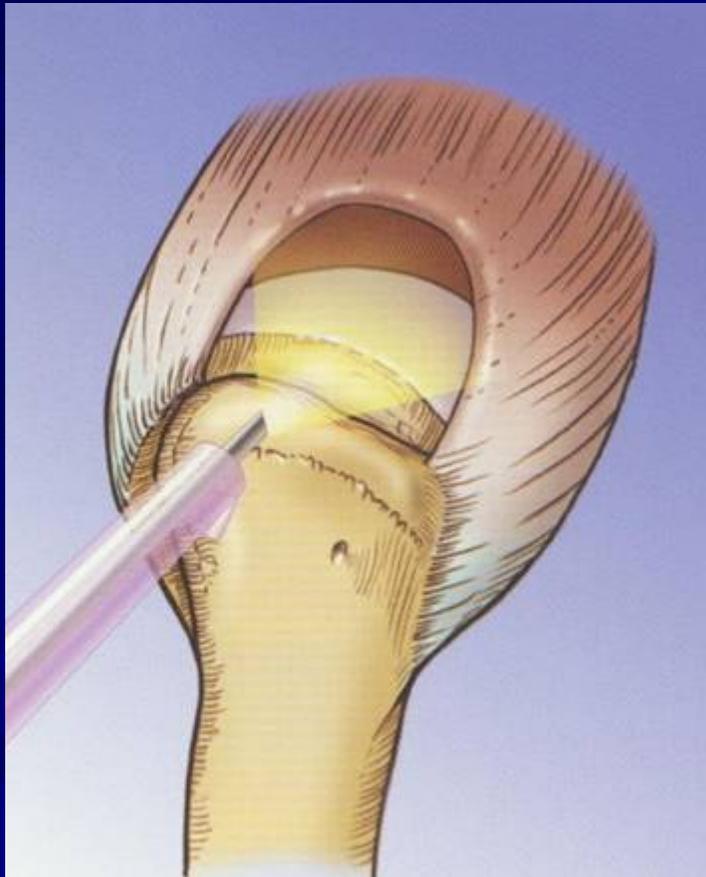
Arthroscopic Cuff Repair

■ Disadvantages

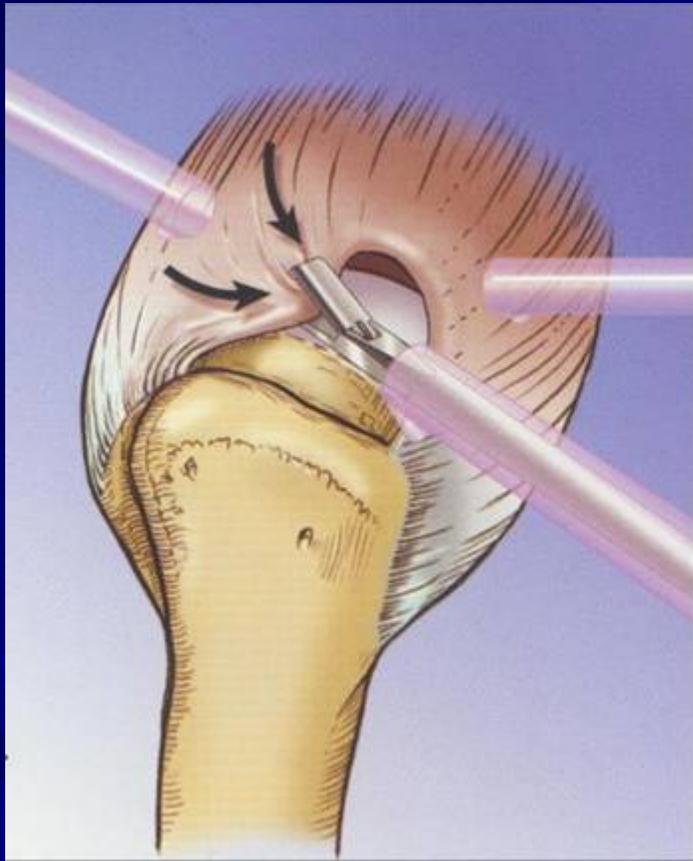
- Longer operative time
- Cannot place tendon gripping sutures
- Anchors less secure in weak bone
- Anchors are costly
- No studies have proven the long term results to be superior to open or mini-open repairs



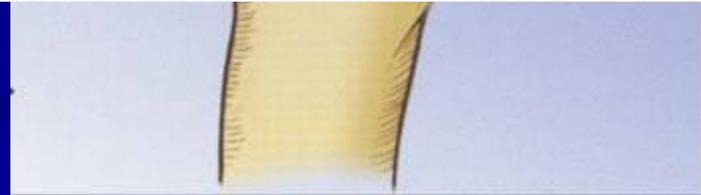
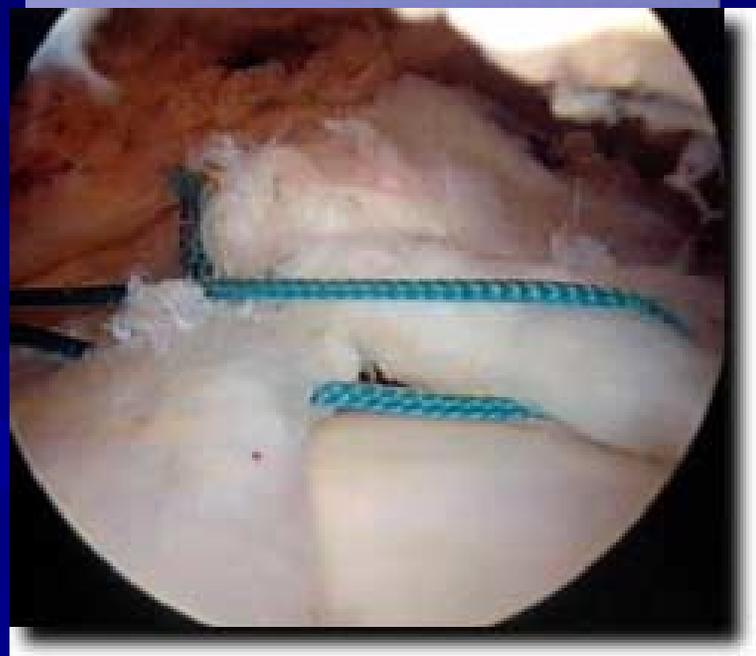
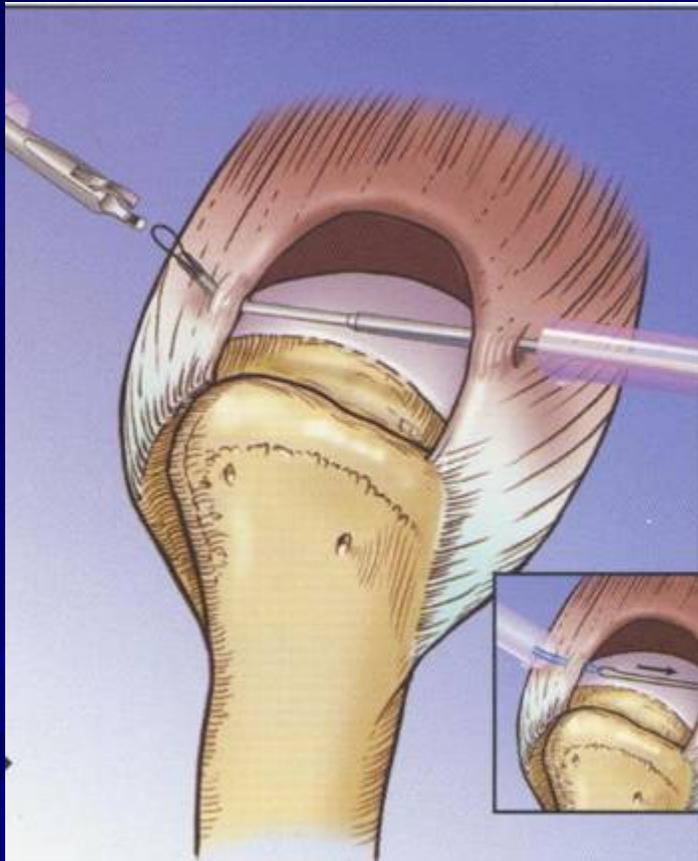
Arthroscopic Cuff Repair



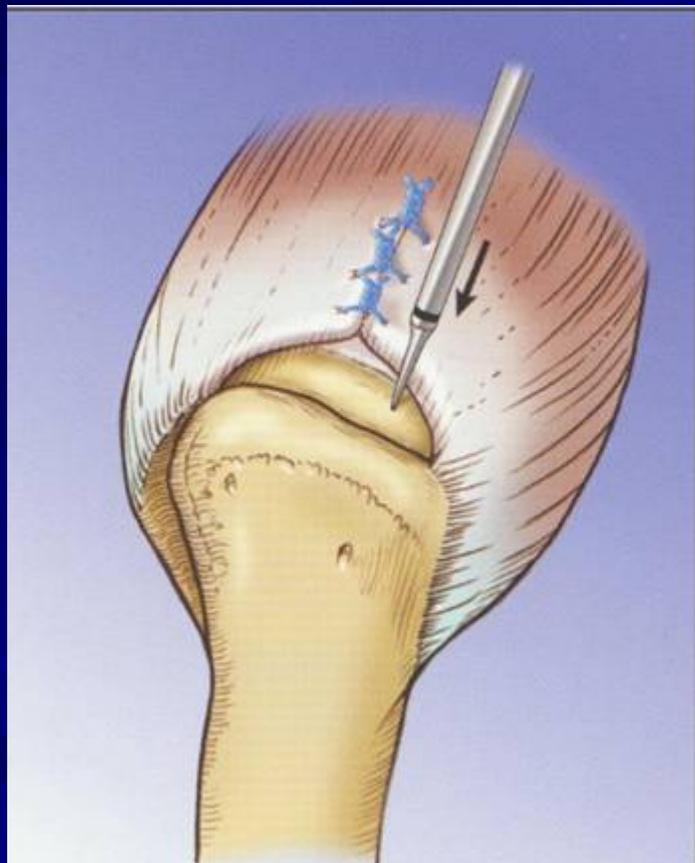
Arthroscopic Cuff Repair



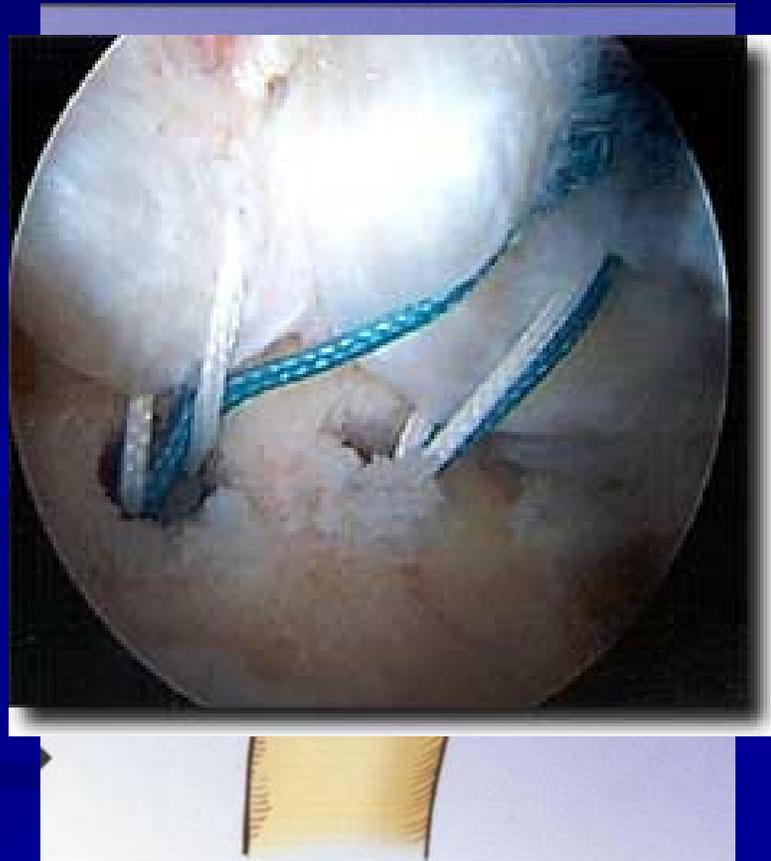
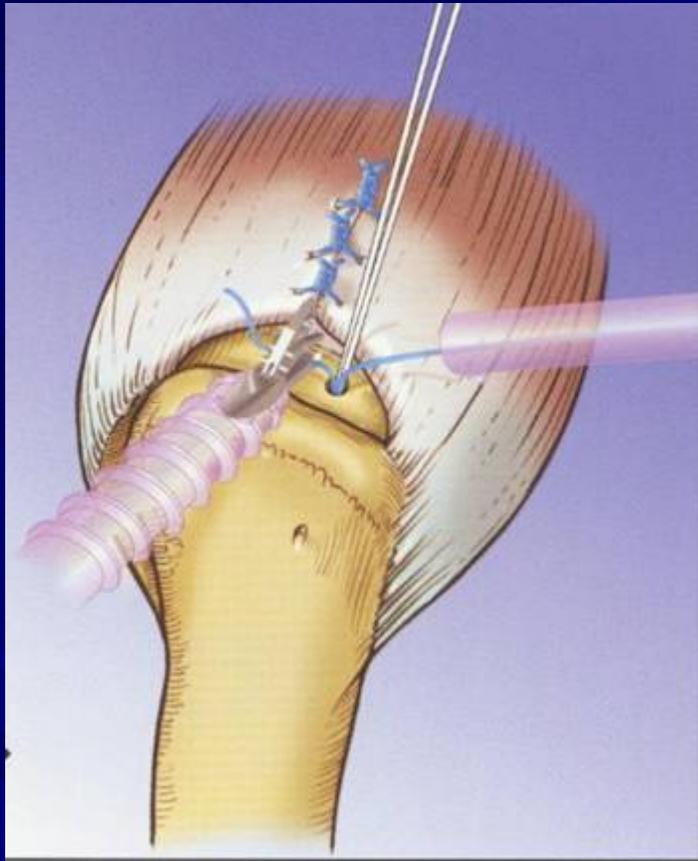
Arthroscopic Cuff Repair



Arthroscopic Cuff Repair



Arthroscopic Cuff Repair



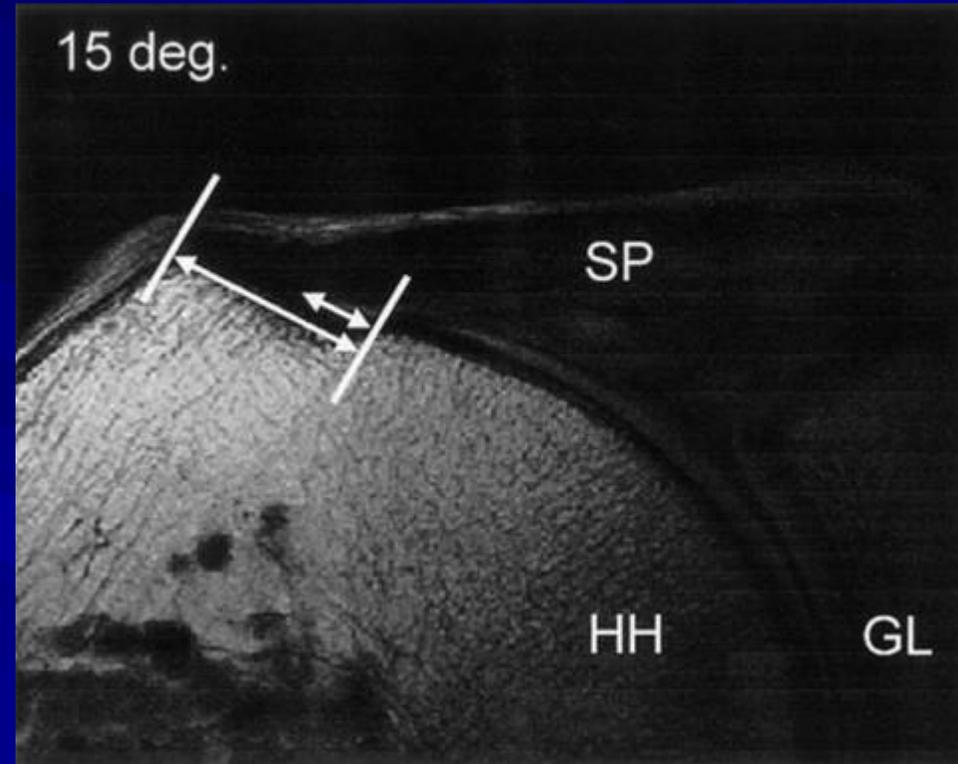
Mini-open Cuff Repair

- Arthroscopic joint and tendon evaluation
- Arthroscopic bone spur removal
- Cuff repaired through 3 cm skin incision
- Deltoid fibers are split, not detached
- Cuff repaired with “tendon gripping” sutures
- *Double row repair* of tendon to bone using anchors and bone tunnels

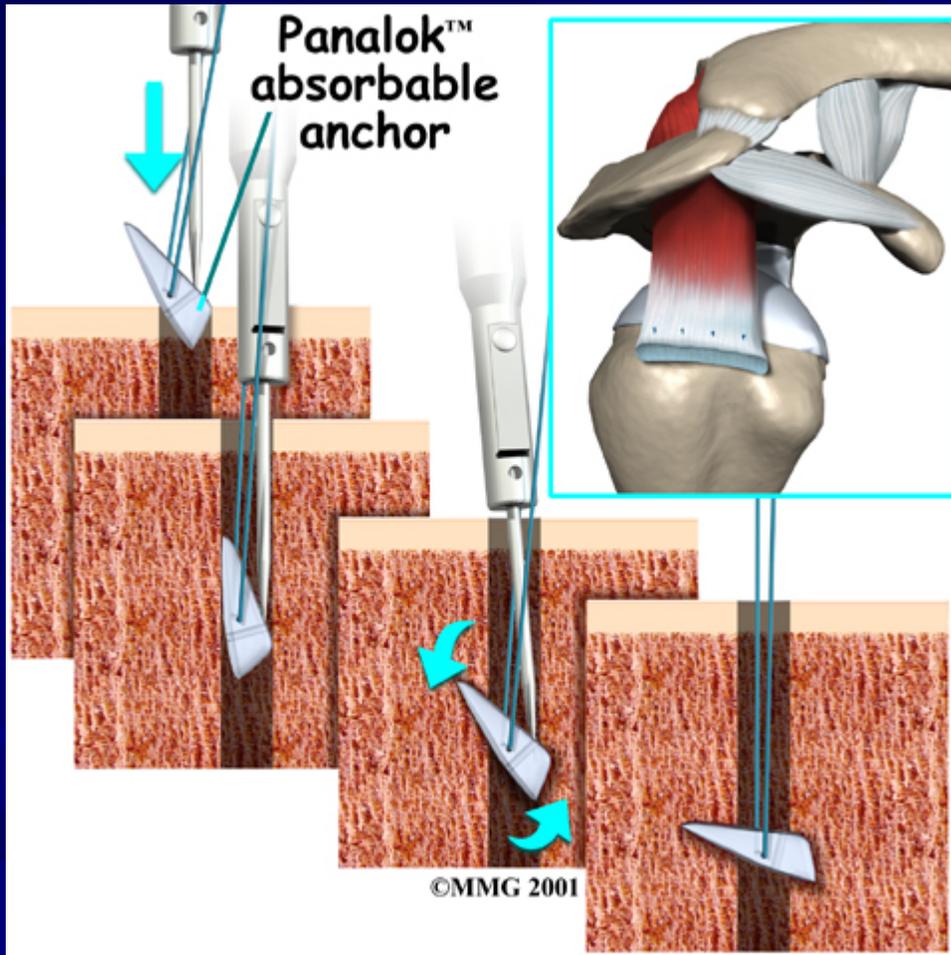


Mini-open Cuff Repair

- Gold standard
- Allows double row repair
- Suture anchors *with* bone tunnels provide strongest repair with best restoration of RC footprint (Andrews AJSM, 2003)



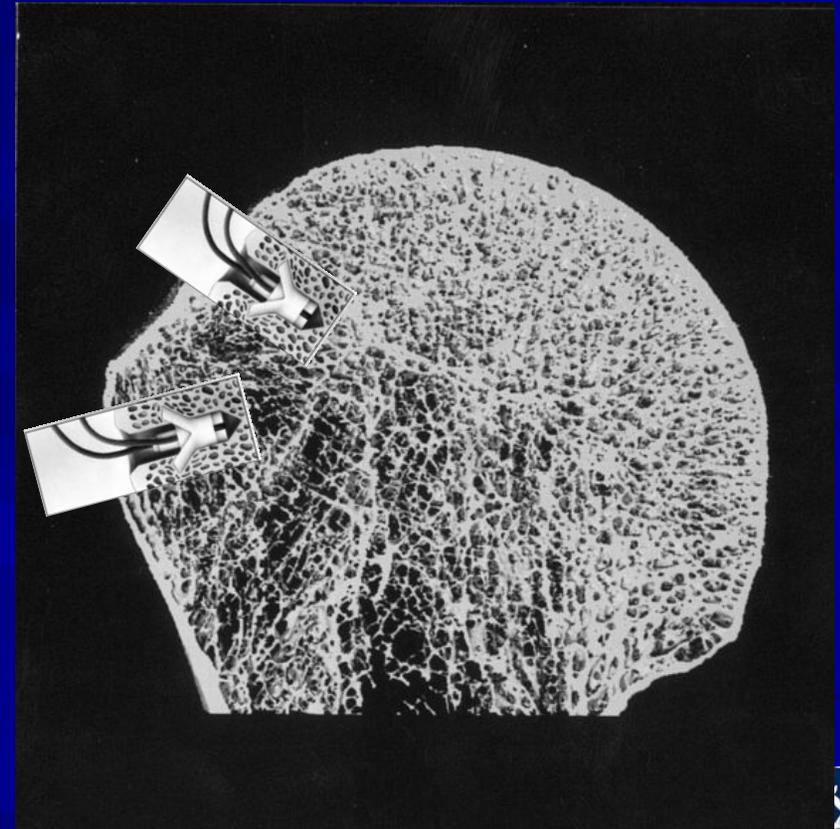
Suture Anchor Fixation



- Dependent on the quality of bone
- Anchors have a limited pull-out strength from bone



Suture Anchor Fixation



This osteoporosis is common in older patients, larger chronic tears and may not provide strong tendon repairs

Post-op RC Repair

- Usually 6 weeks of limited arm use regardless of repair method
- Often require 2-4 months of formal physical therapy followed by home exercises
- Can take 12-18 months to reach maximum improvement



Rotator Cuff Repair Results

- Good to excellent
 - 85% - 95%
- Good-excellent pain relief
 - 78%
- Risk of rerupture
 - Large (2+ tendon tears)
 - 40%
 - Smaller tears
 - 10-20%
 - Severely retracted tears
 - 66%



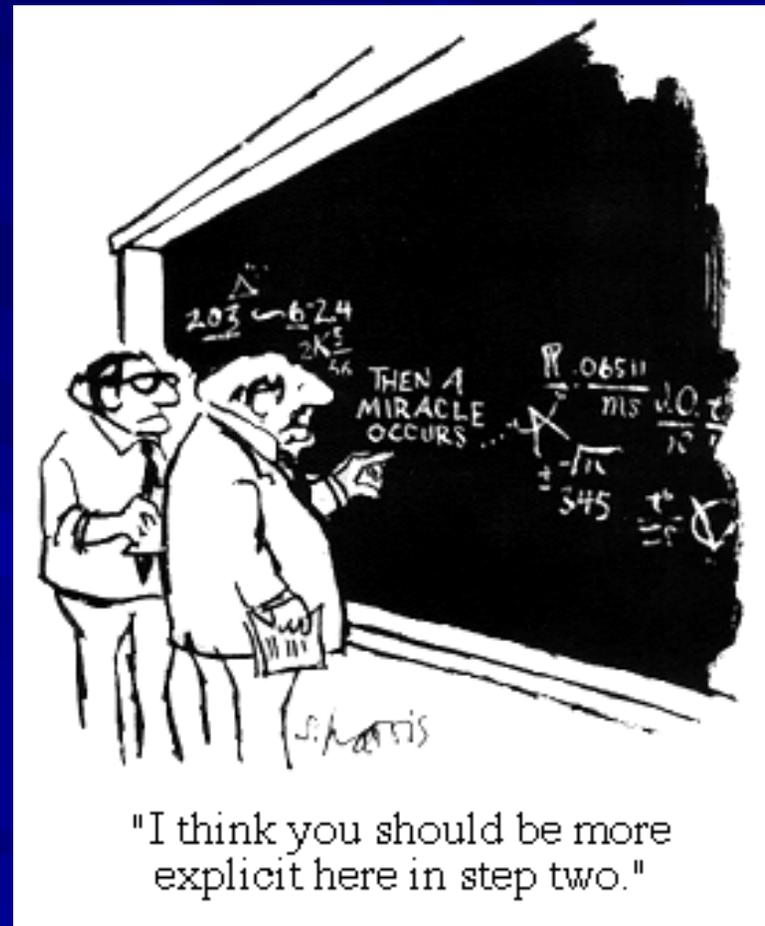
Factors Affecting Outcomes

- Tear size (most important)
 - Affects recovery of strength (85-90% recovery)
- Age (>65)
- Pre-op function (inability to abduct > 100°)
- Larger tears and chronic retracted tears are more likely to rerupture



Complications of Cuff Repair

- Rerupture
- Stiffness
- Infection
- Deltoid detachment
- Nerve injury
 - Weakness, numbness



Arthroscopy Without Repair

- Arthroscopic cuff debridement & limited acromioplasty
- Smaller tears get better pain relief
- No improvement with overhead activity and strength
- Beneficial in older low demand patients

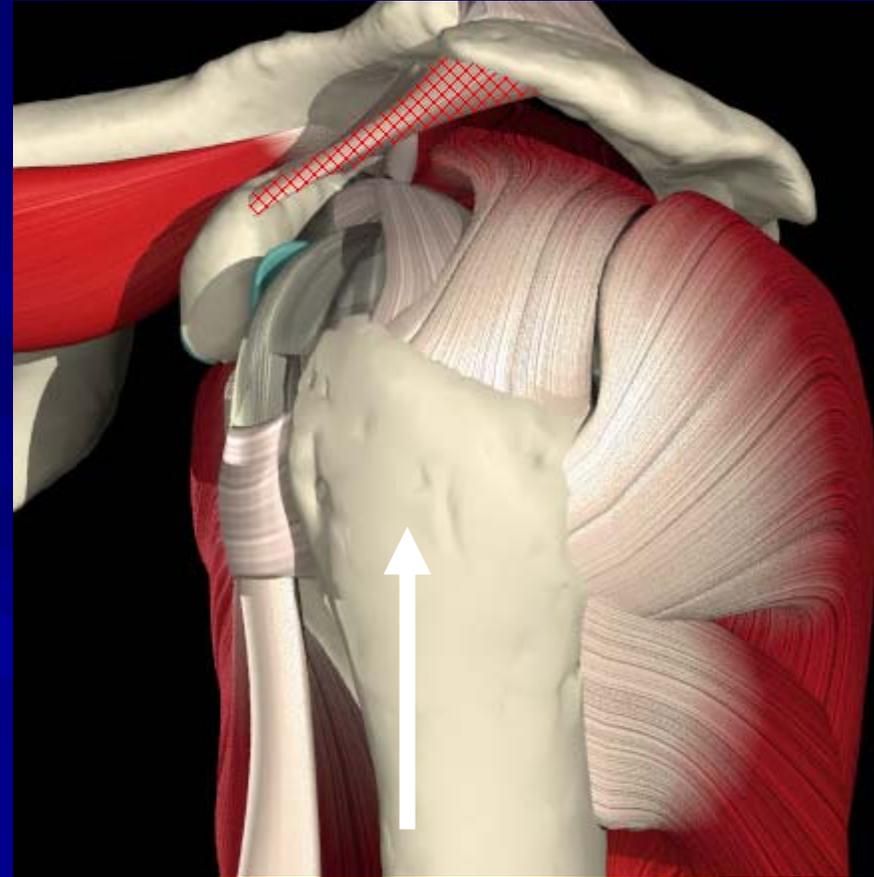


Open Surgery Without Repair

- Open cuff debridement
- Better results with intact biceps, deltoid and no prior surgery
- 50-80% Improved comfort and function
- Preserve the CA arch
 - Avoids humeral head escape



Why Preserve the CA Arch?



If the CA arch is disrupted, the head of the humerus escapes up through the defect and pain and limited motion result.



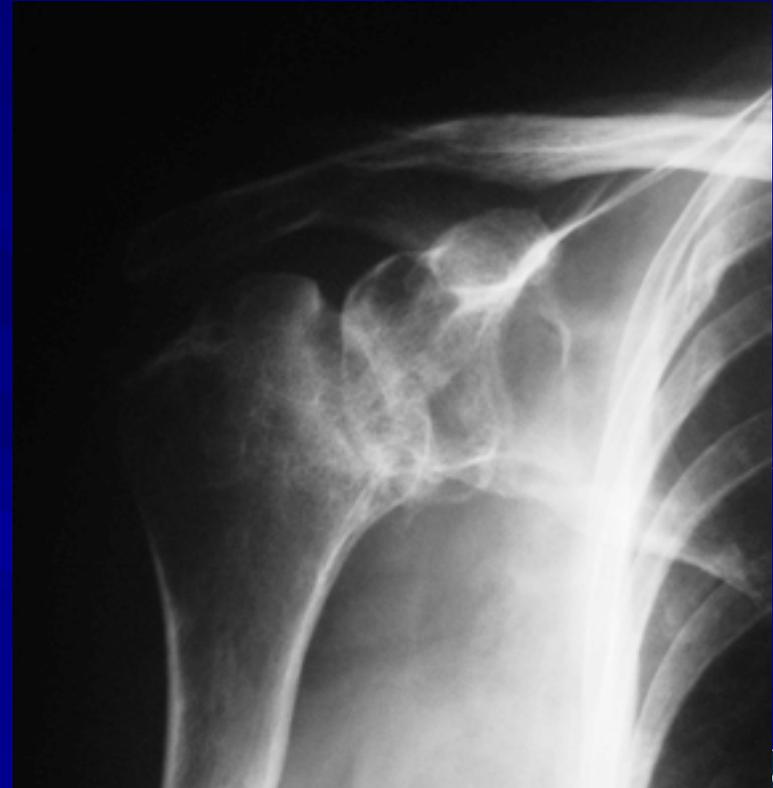
Biceps Tenotomy

- Indicated in older low demand patients with irreparable cuff tears
- Unconcerned about biceps bulge
- Relieves pain from the impinged or dislocated biceps
- Minimally invasive, palliative, minimal rehab



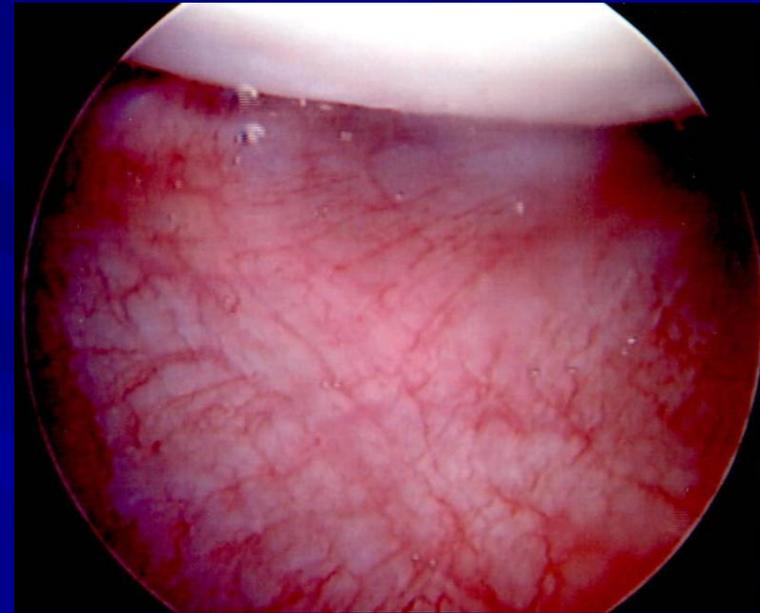
The Stiff Shoulder

- Not associated with cuff tears alone
- Consider
 - Adhesive capsulitis / Frozen shoulder
 - Shoulder arthritis
 - Missed shoulder dislocation
 - Fracture or post traumatic deformity



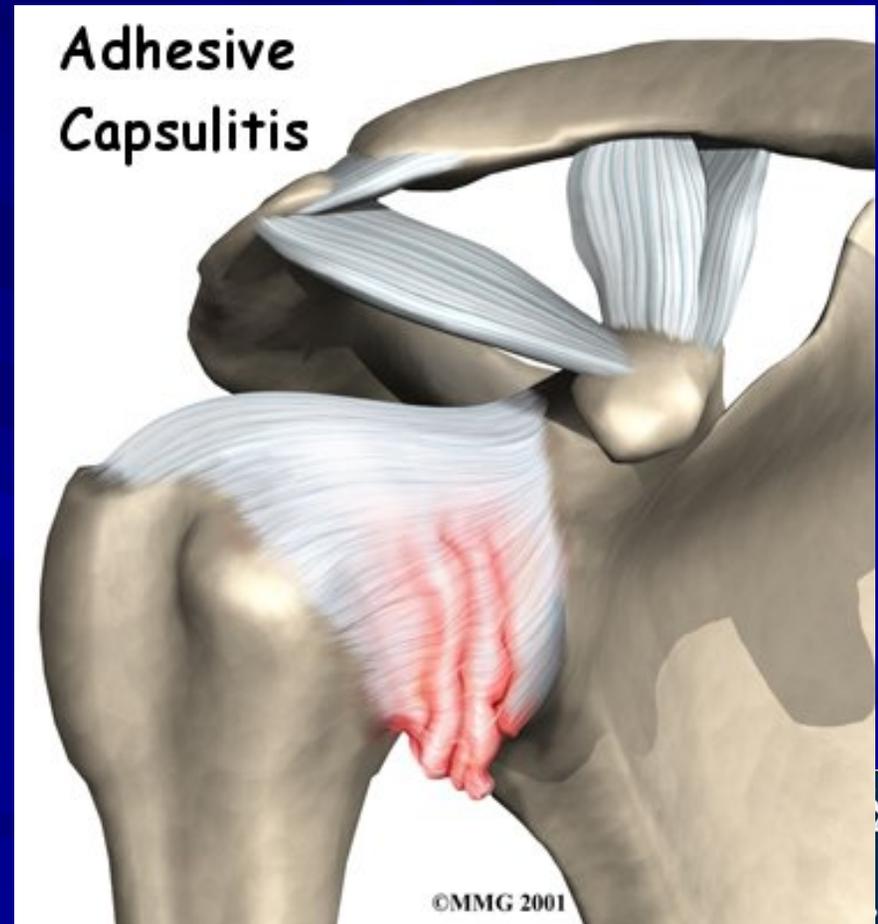
The Stiff Shoulder

- Frozen Shoulder = Adhesive Capsulitis
- Cause is Unknown
 - May be autoimmune
 - May occur after injury, fracture or surgery
 - Related to intense inflammation causing pain and decreased use of the shoulder leading to stiffness



The Stiff Shoulder

- Reduced motion even with help lifting the arm
 - As if the motion is “blocked”
- Pain at night and with daily activities
- X-rays and MRI usually normal



Shoulder Stiffness

- Not associated with cuff tears alone
- Full active and/or passive motion is present even if painful
- Consider
 - Adhesive capsulitis / Frozen shoulder
 - Glenohumeral arthritis
 - Missed posterior dislocation
 - Fracture or post traumatic deformity

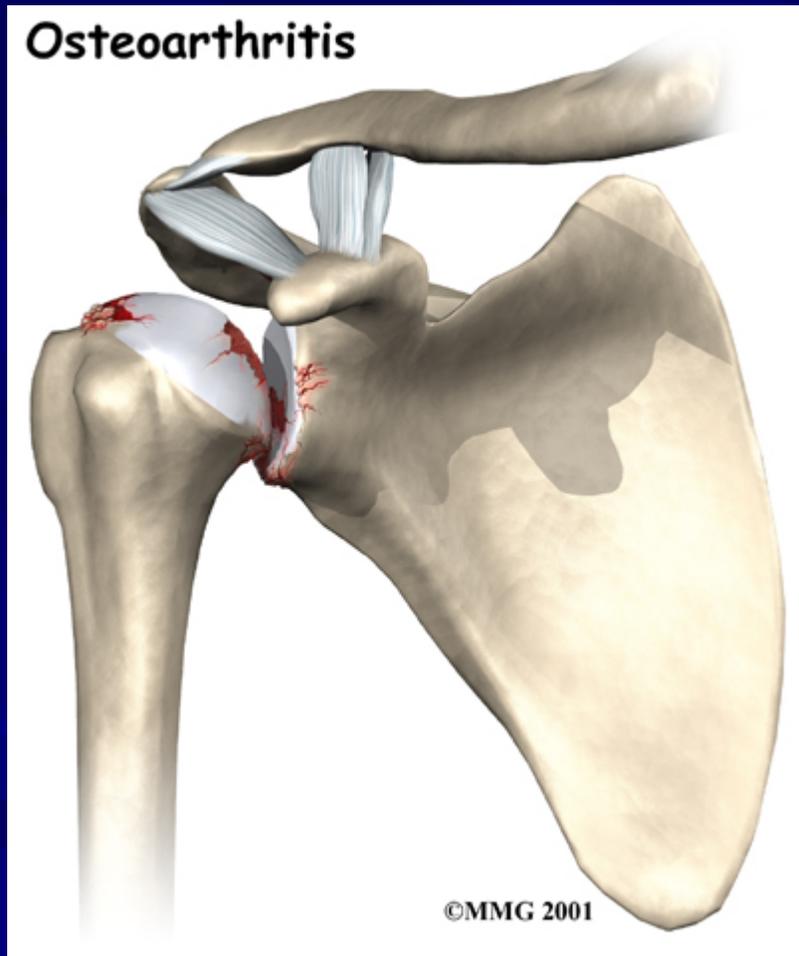


Frozen Shoulder

- Recovery is slow – May take many months
- Anti-inflammatory meds and stretching exercises
- May benefit from cortisone injections
- Surgical treatment may help and involves arthroscopy to remove the scarred joint capsule



Shoulder Replacement



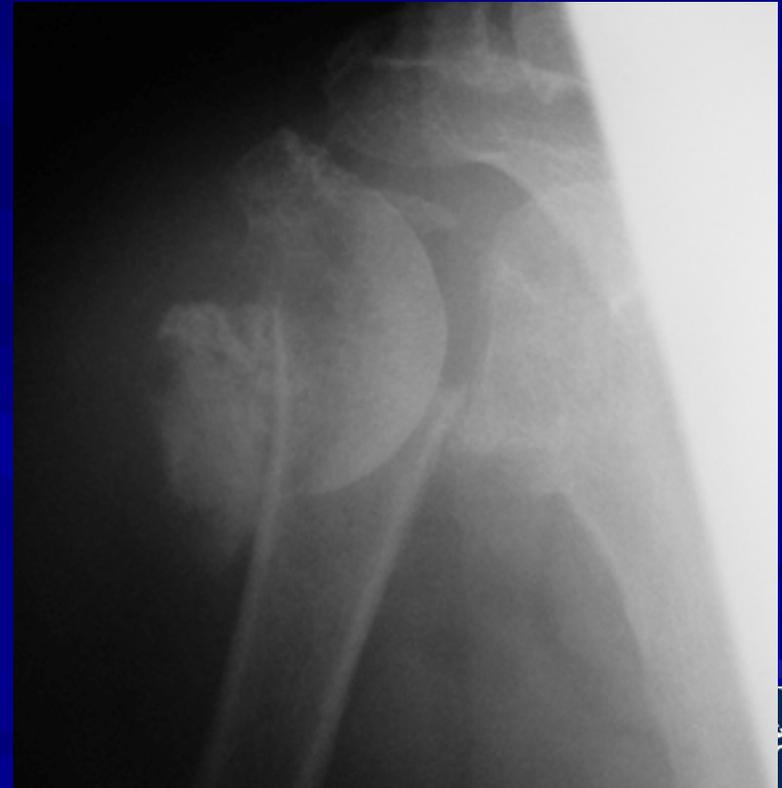
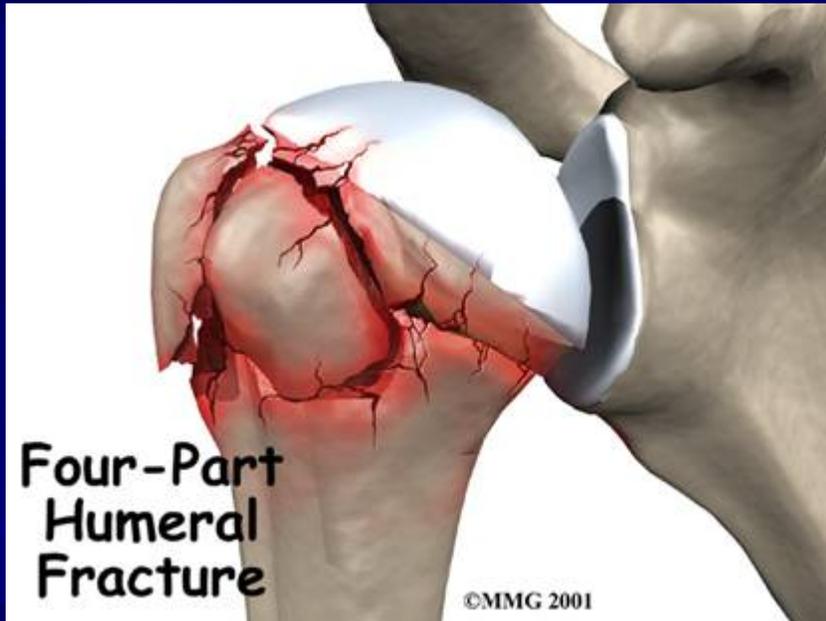
■ Arthritis

- Wear and tear
- Multiple dislocations
- Rheumatoid arthritis

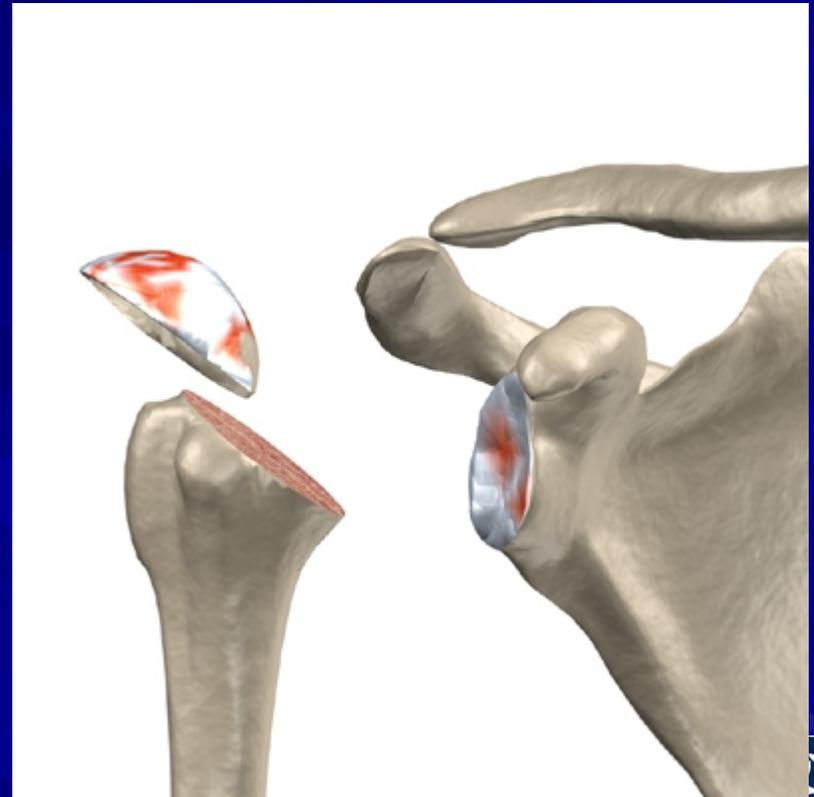
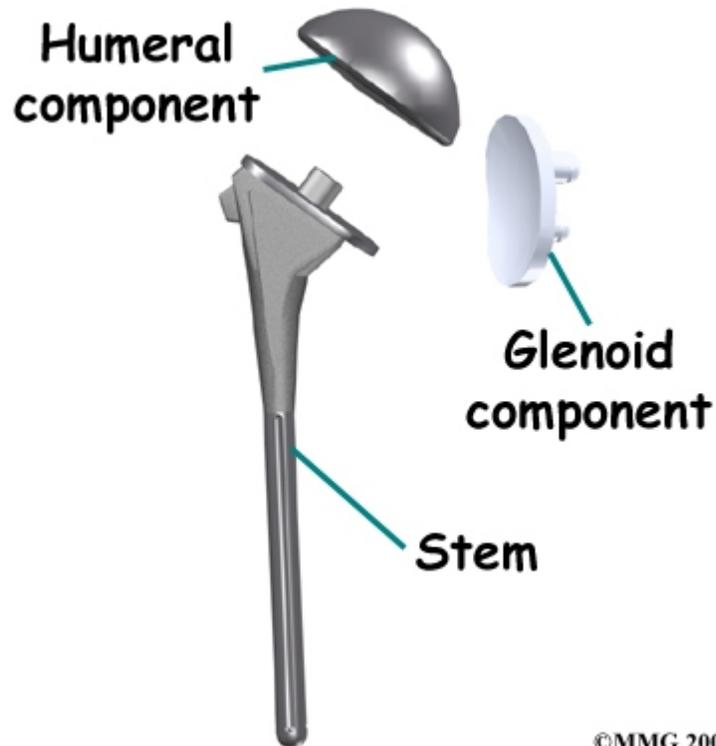


Shoulder Replacement

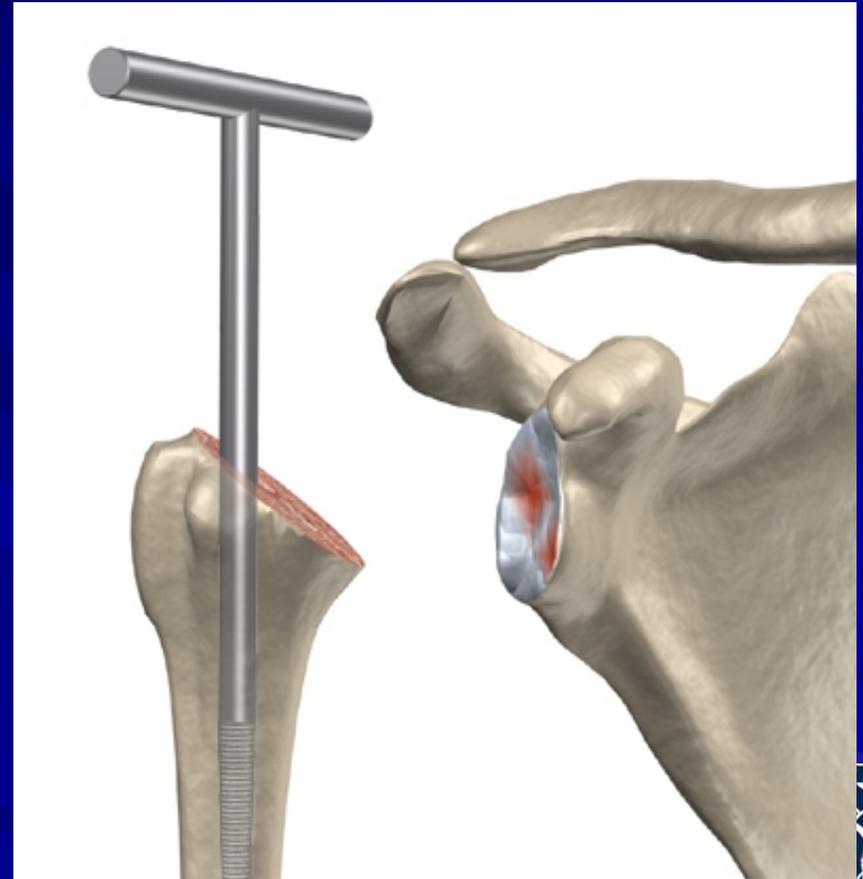
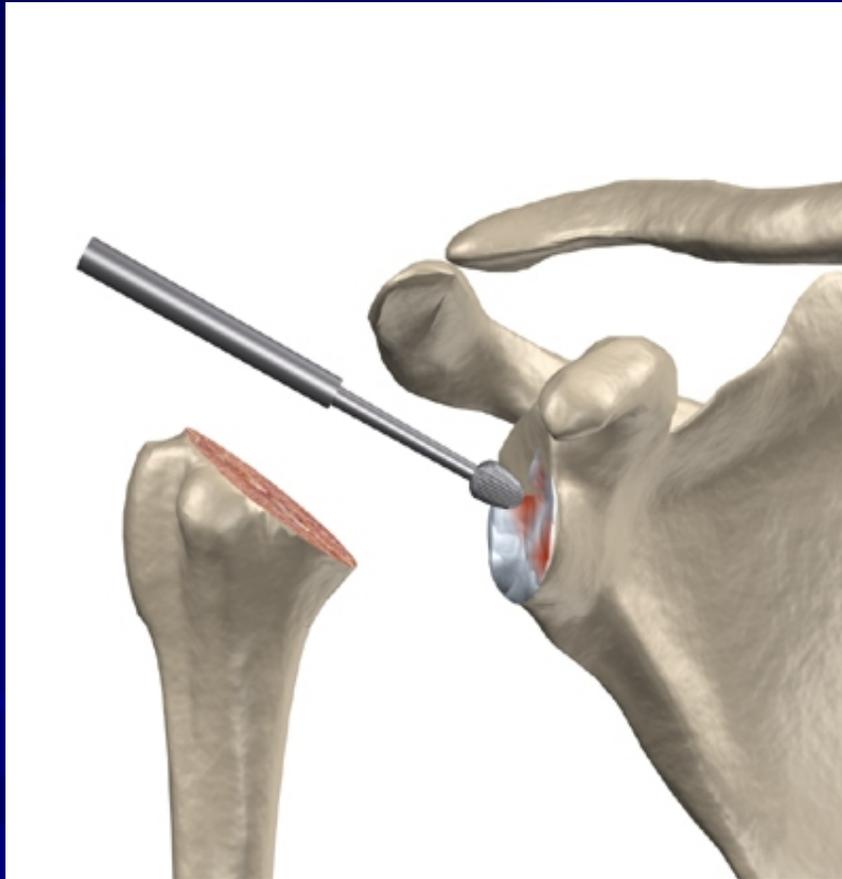
■ Fractures



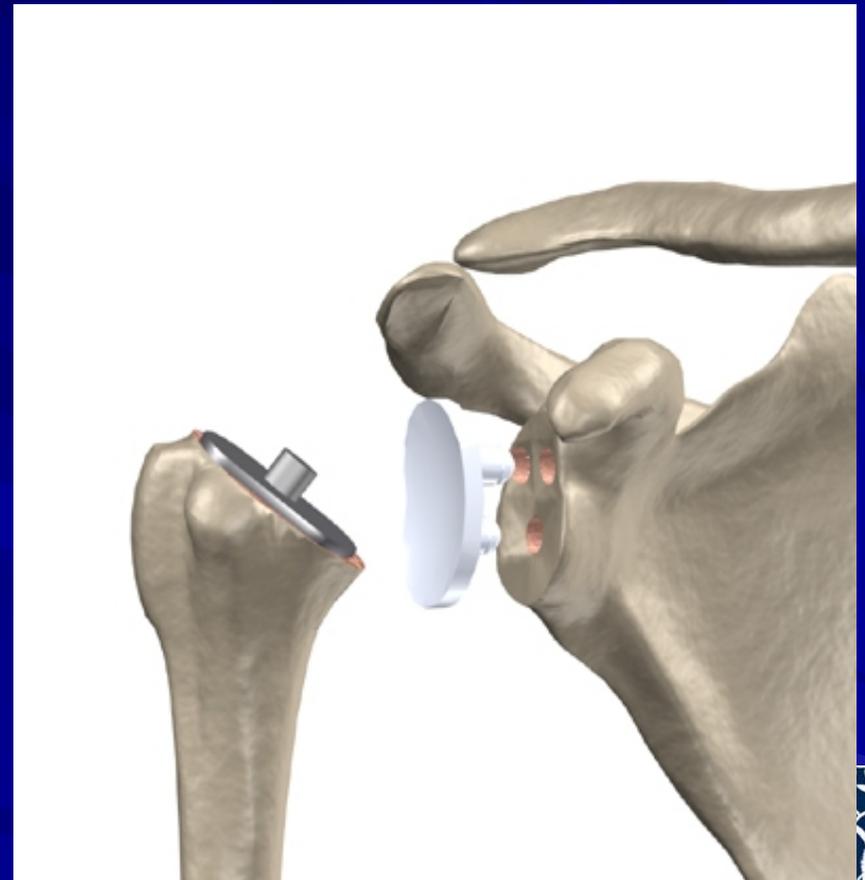
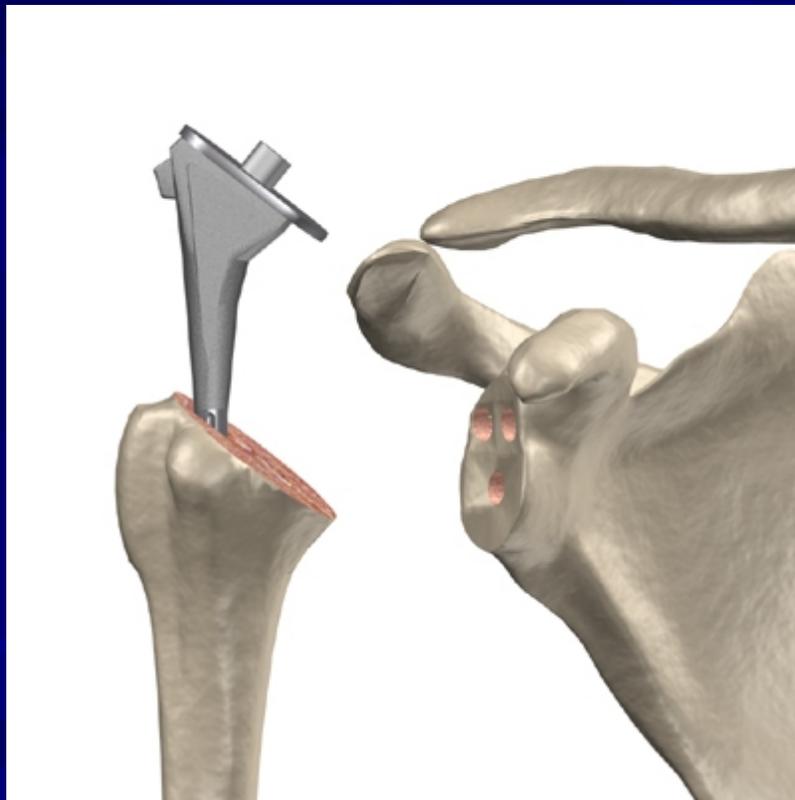
Shoulder Replacement



Shoulder Replacement



Shoulder Replacement



Shoulder Replacement



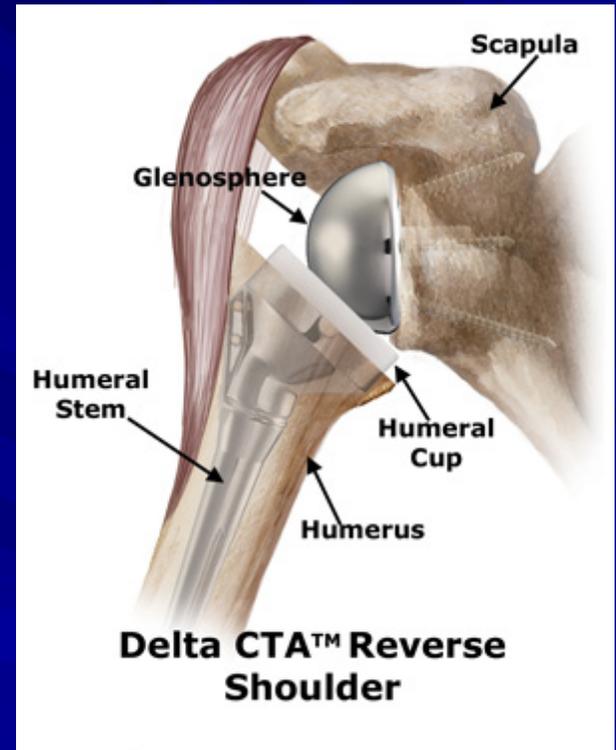
Shoulder Replacement



Arthritic Humeral Head



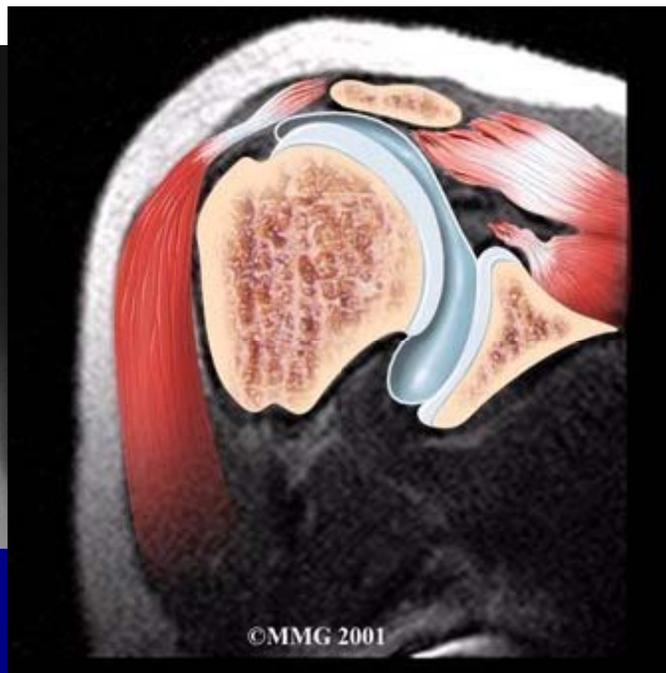
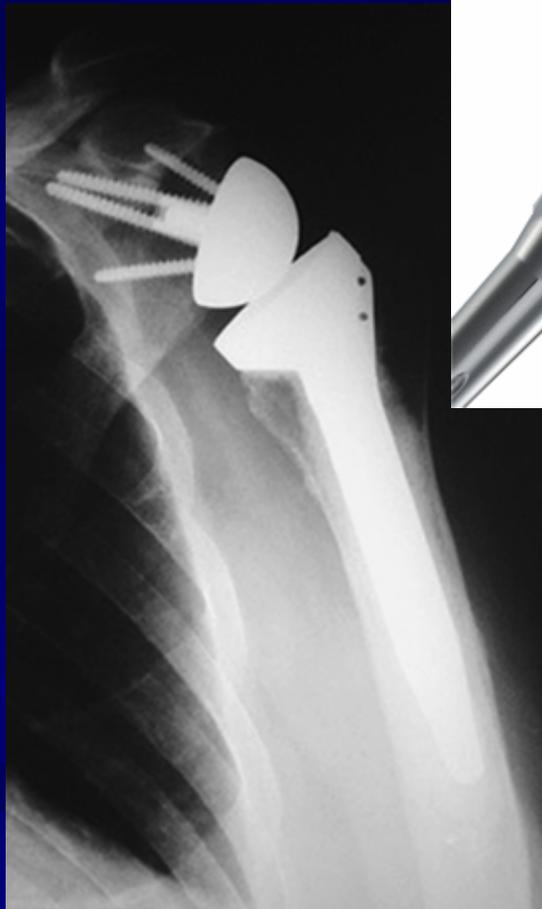
Reverse Shoulder Replacements



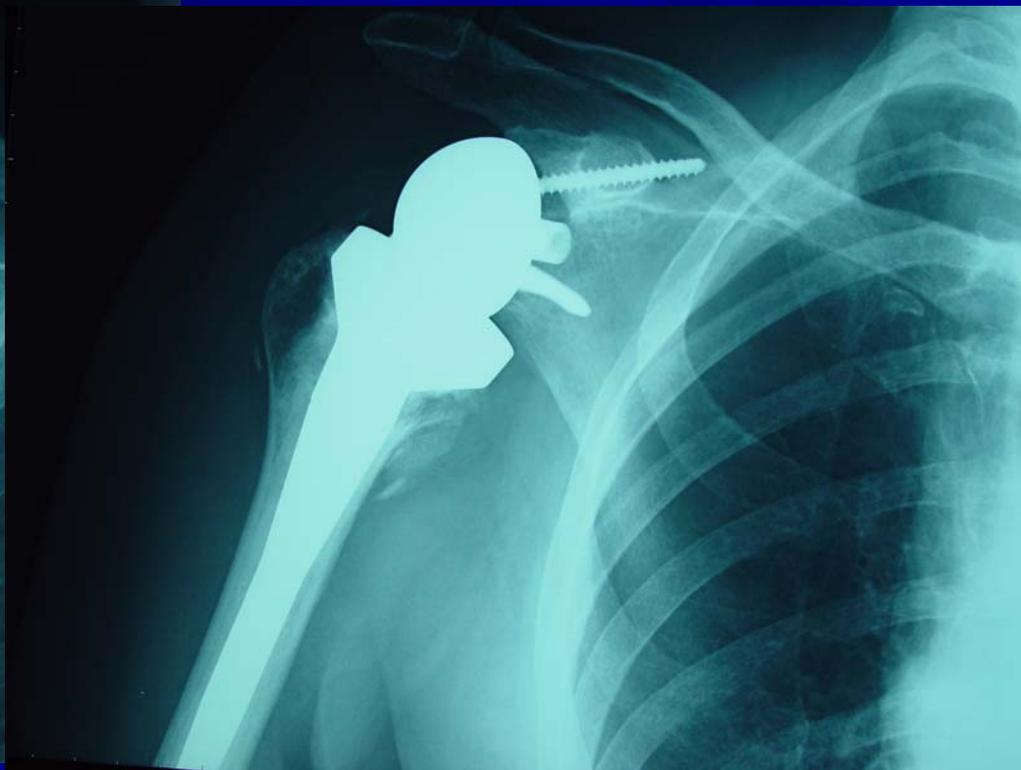
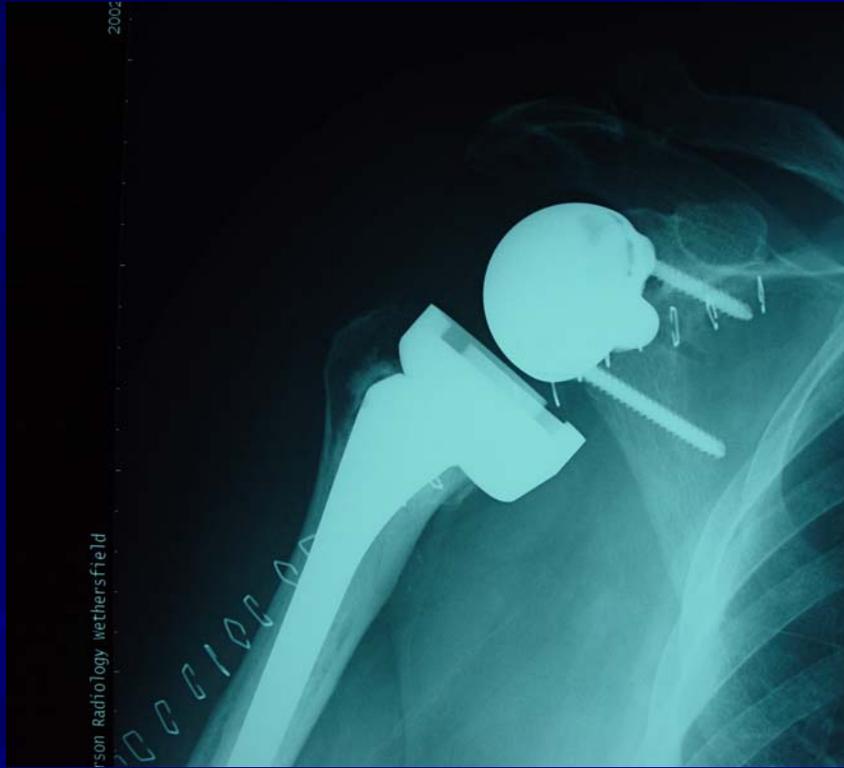
Reverse shoulder replacements are helpful when treating arthritis associated with irreparable rotator cuff tears in patients unable to lift the arm due to tendon tears.



Reverse Shoulder Replacements



Reverse Shoulder Replacement



Complications of Surgery

- Always part of pre-op discussion
- Nerve damage
 - Weakness, numbness
- Bleeding
- Infection
- Tendon rupture
- Stiffness
- Continued pain and impairment
- Stretched repair and recurrent instability



Goals of Treating Knee Osteoarthritis

- Control pain
- Optimize function including the impact of osteoarthritis on mobility and the activities of daily living
- Educate patients and families about the disease and treatment options for osteoarthritis



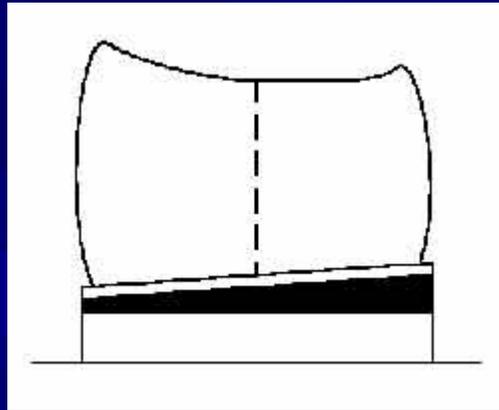
Lifestyle Changes

- Weight loss
- Exercise to reduce weight, improve strength and endurance
- Exercise improves sense of well being



Assistive Devices

- Orthotics (Lateral heel wedges)



- Shock absorbing shoes
- Cane
- Knee bracing (Unloader)



Cartilage Anti-aging Strategies

- Glucosamine and proteoglycan replacement
- Viscosupplementation
- Microfracture and “The package”
- Joint replacements



Viscosupplementation

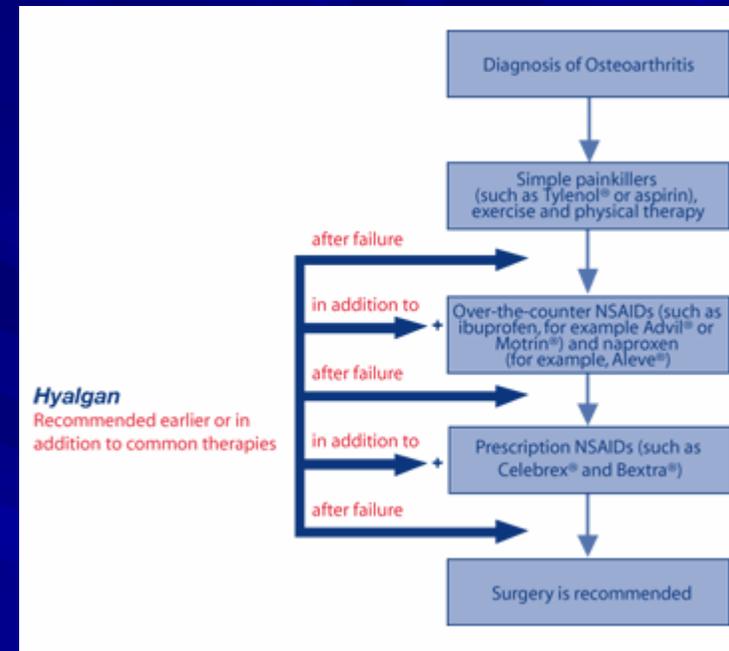
■ Hyaluronan

- Increases cartilage synthesis
- Increases chondrocyte growth and collagen biosynthesis
- Decreases cartilage degradation
- Coats nociceptors (pain generating nerve endings)
- Anti-inflammatory



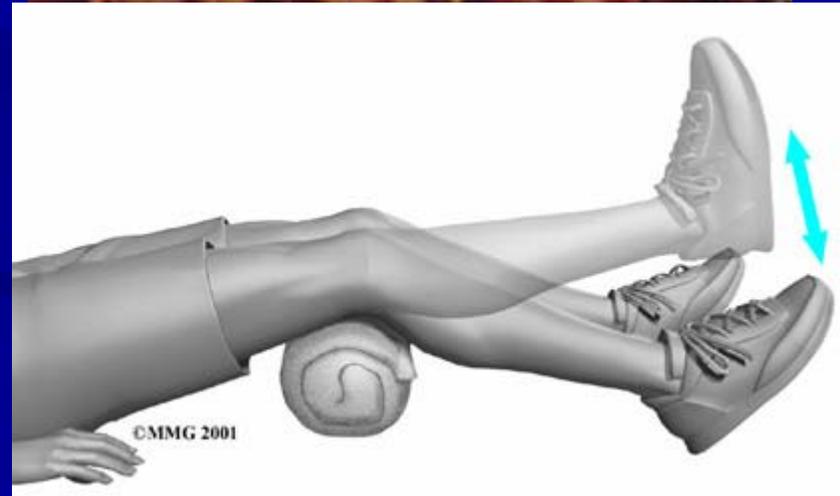
Viscosupplementation

- Injection of hyaluronic acid (substance found naturally in the joint) to increase lubrication
- Mild to moderate OA: 70-80 % improvement
- Severe OA: 50 %
- Require 3-5 weekly injections
- May last 6+ months
- May be repeated



Physical Therapy

- Resistance training
 - Over 186 studies in mature athletes
 - Enhances strength as in younger athletes
 - Better than endurance training for joint function
 - Reduced risk of falls and hip fractures
 - Eccentric loading & proper technique necessary



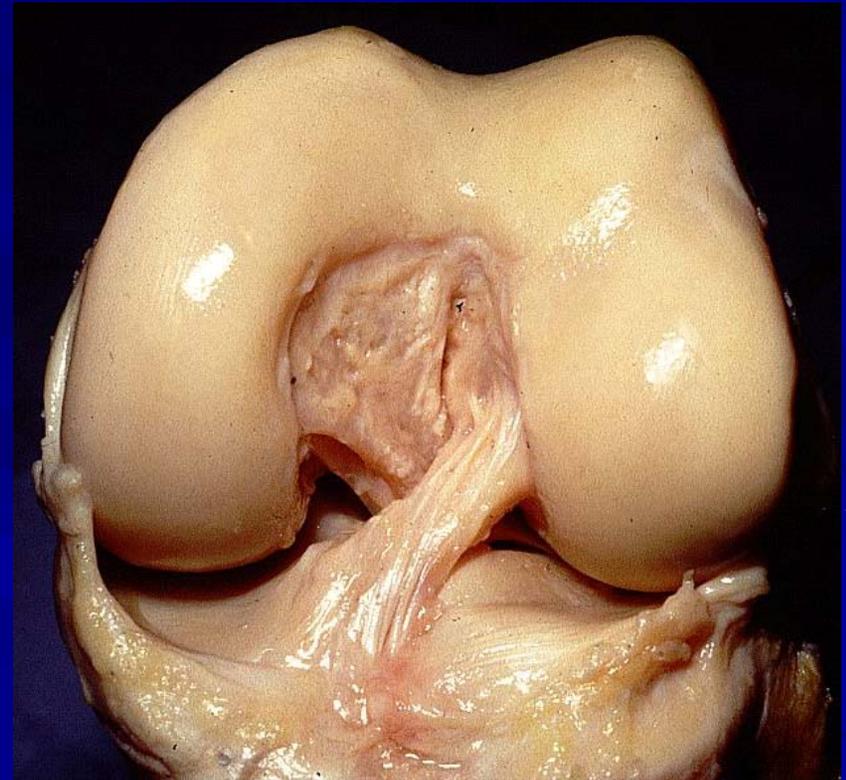
Orthopedic Evaluation

- History
 - Nature of pain, timing
- Treatment
- Medical and surgical history
- Medications
- Allergies, side effects



Orthopedic Evaluation

- Activity level
- Expectations & Goals
- Symptoms
- Examination
 - Alignment
 - Hip exam
 - Knee Exam
 - ROM
 - Meniscal signs
 - Patellar mobility



Radiographic Evaluation

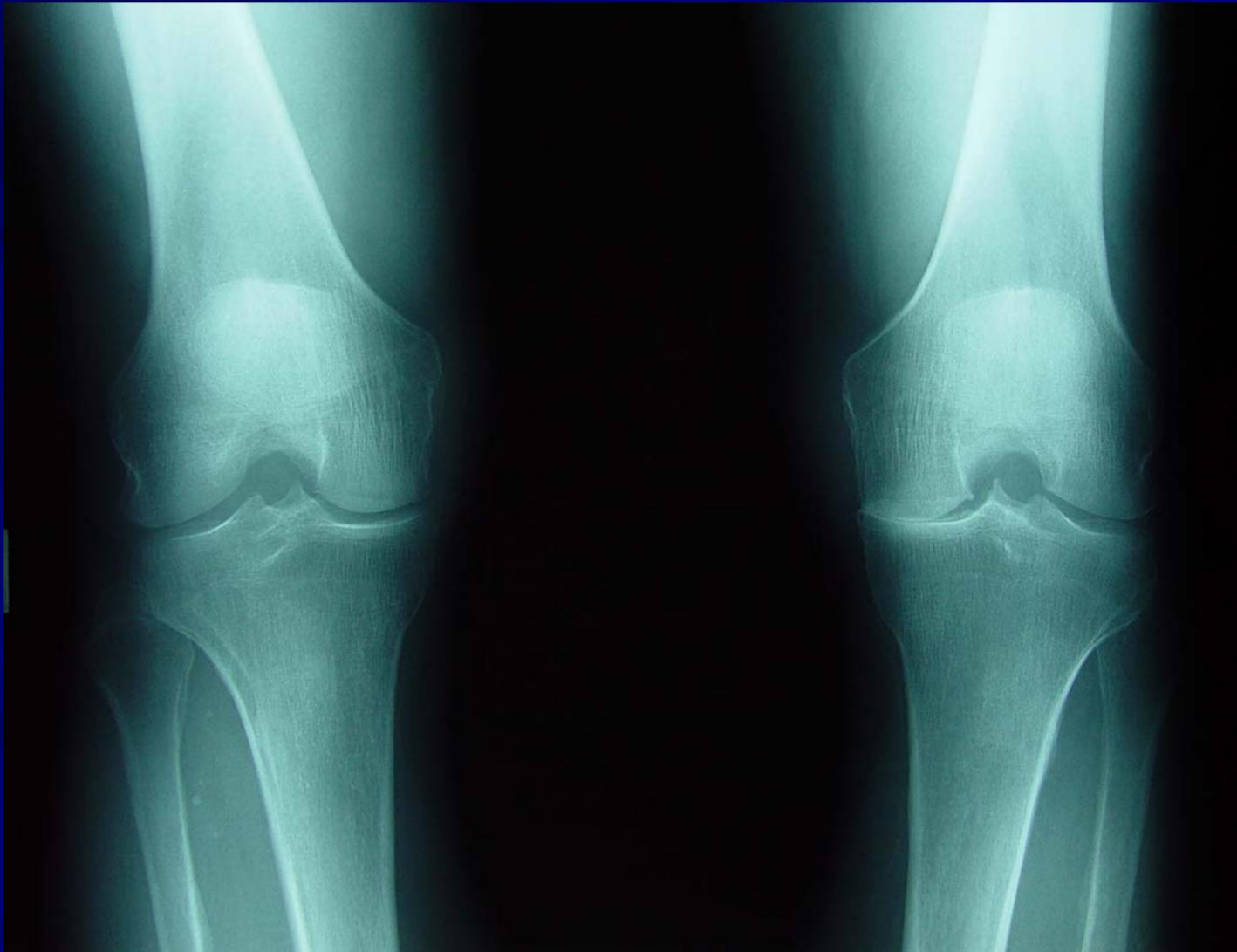
- Standing AP
- 45° flexion PA
- Lateral
- Patellofemoral



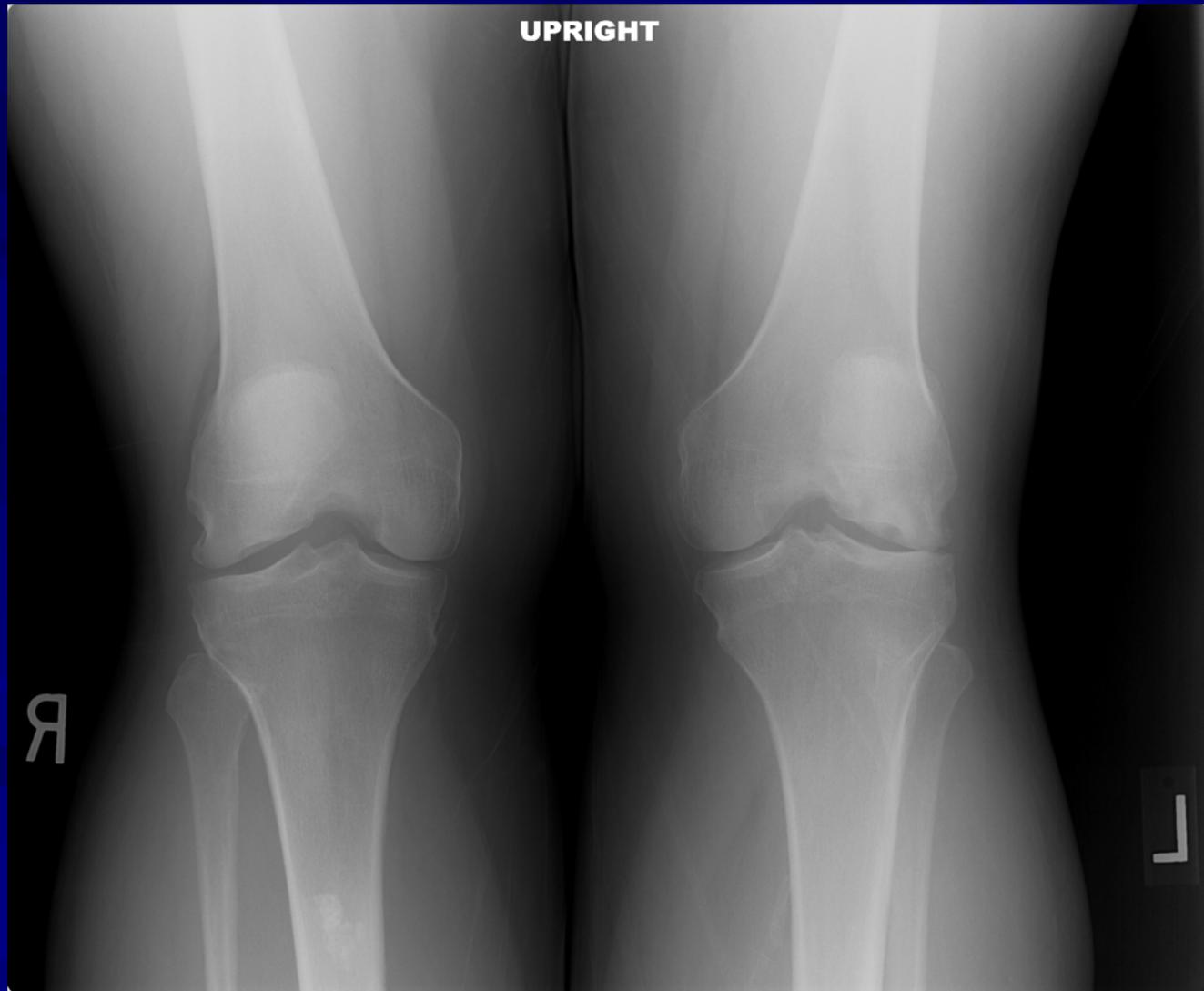
X-Rays: Standing Films- AP



X-Rays: Standing Films- PA w/ Flexion



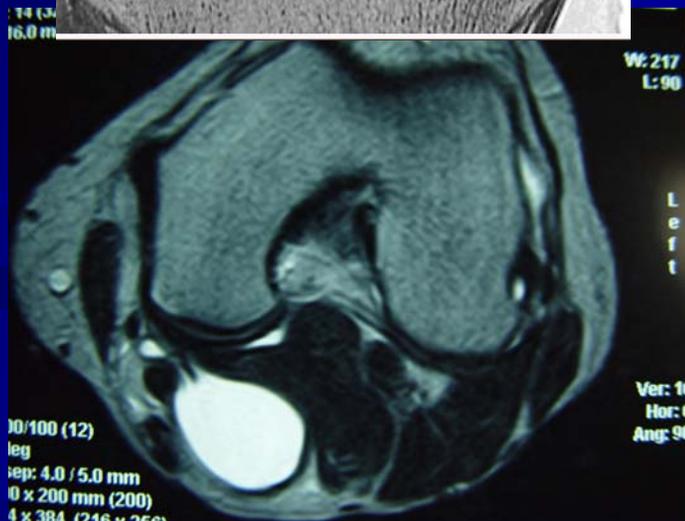
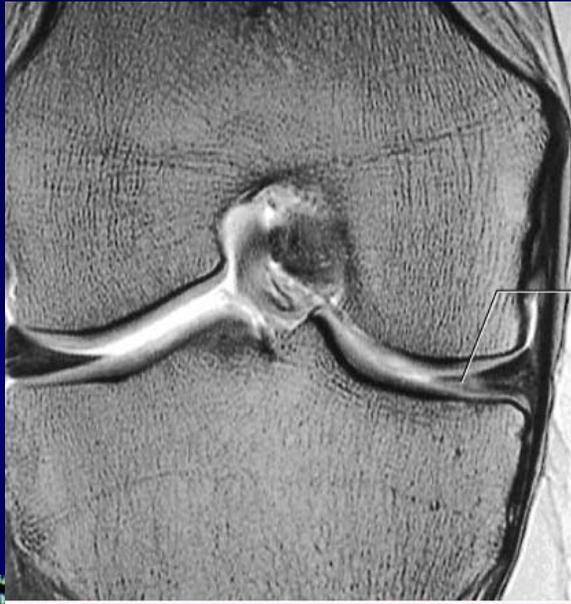
X-rays: Standing Films



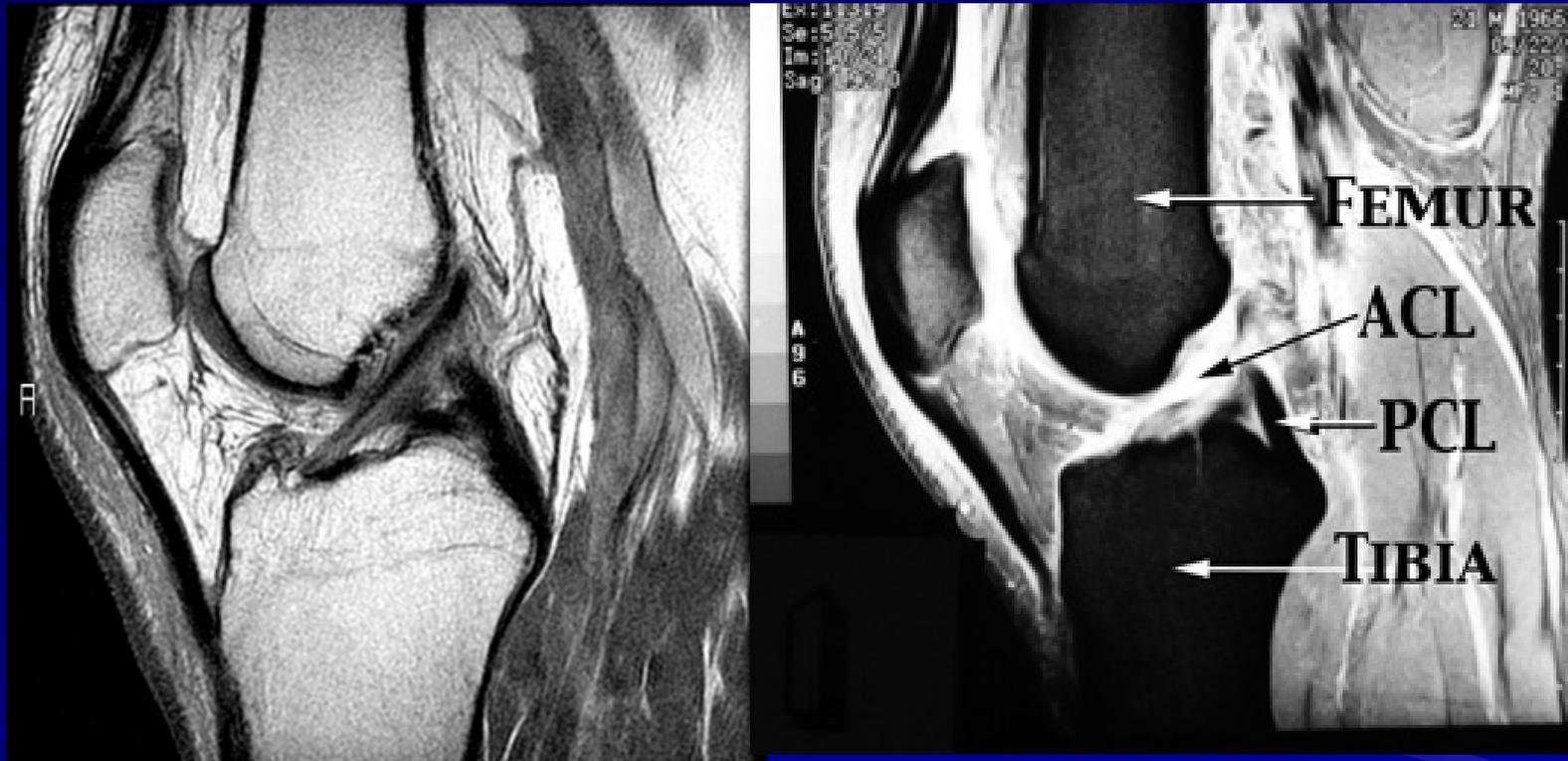
X-Rays



MRI: Meniscus Tear / Baker's Cyst



MRI: ACL Tear



Surgical Options

- Arthroscopy
 - Meniscectomy
 - Ligament reconstruction
 - Debridement
- Osteotomy
- Joint replacement

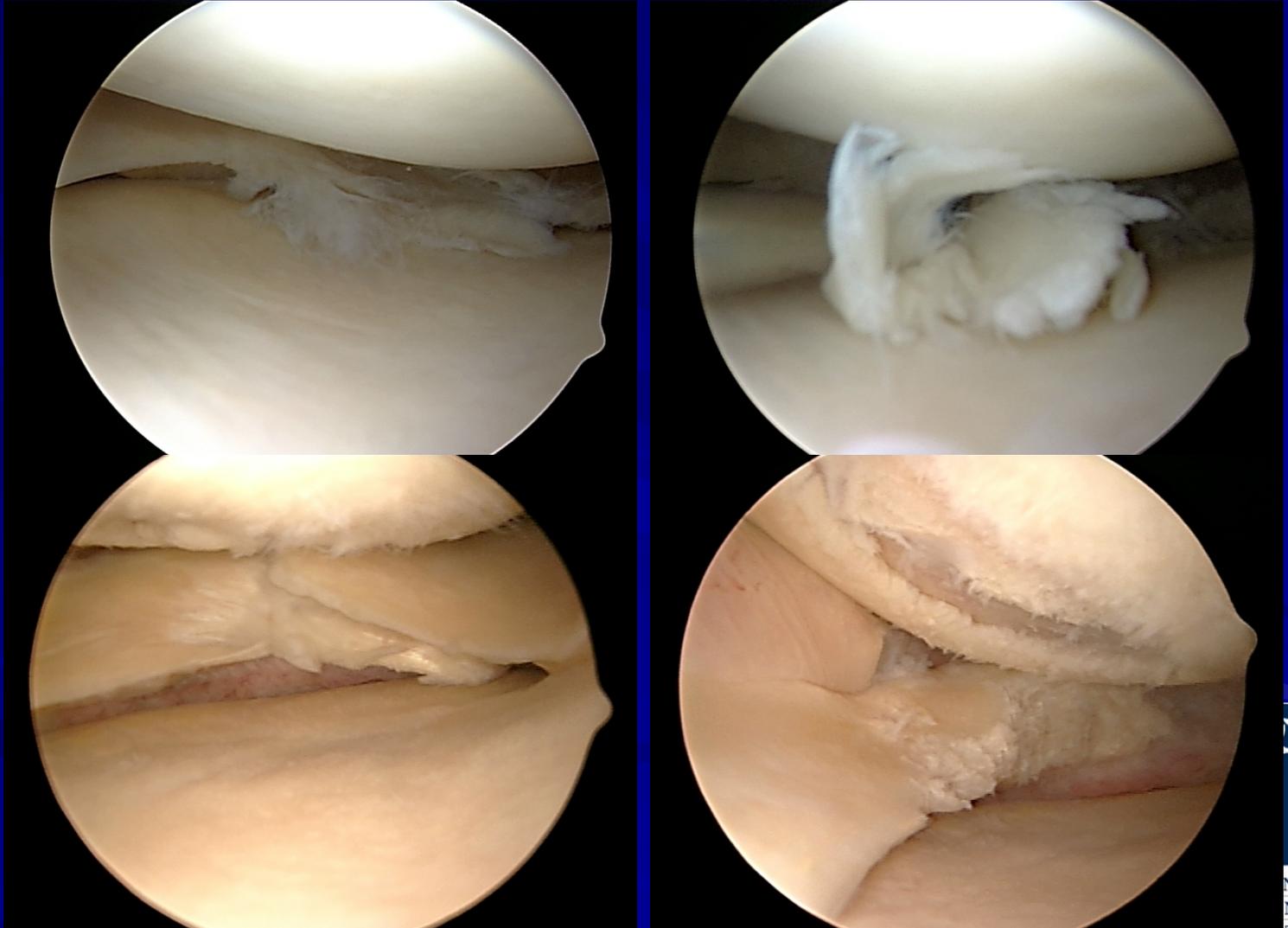


Knee Arthroscopy

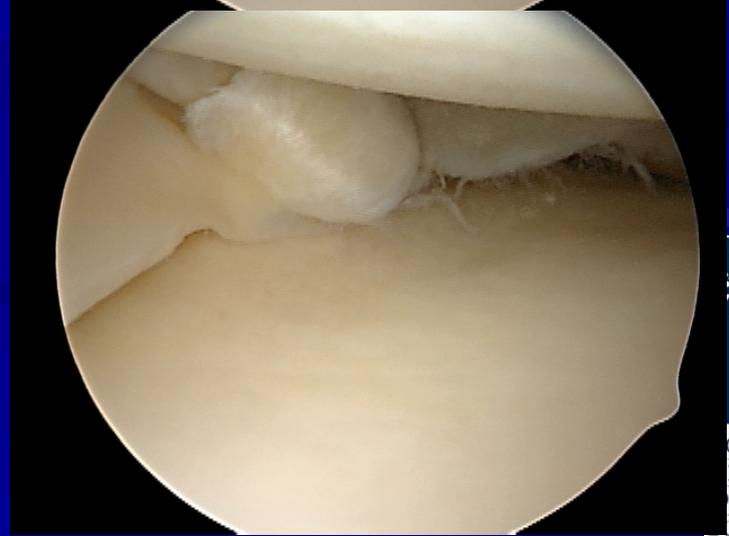
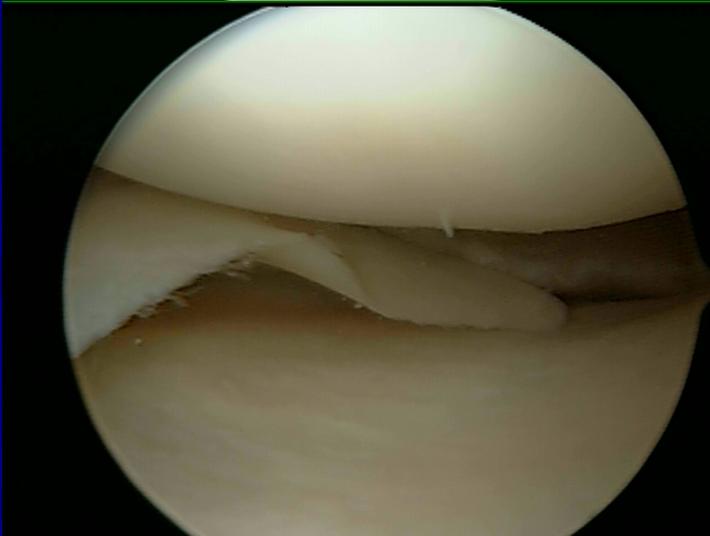
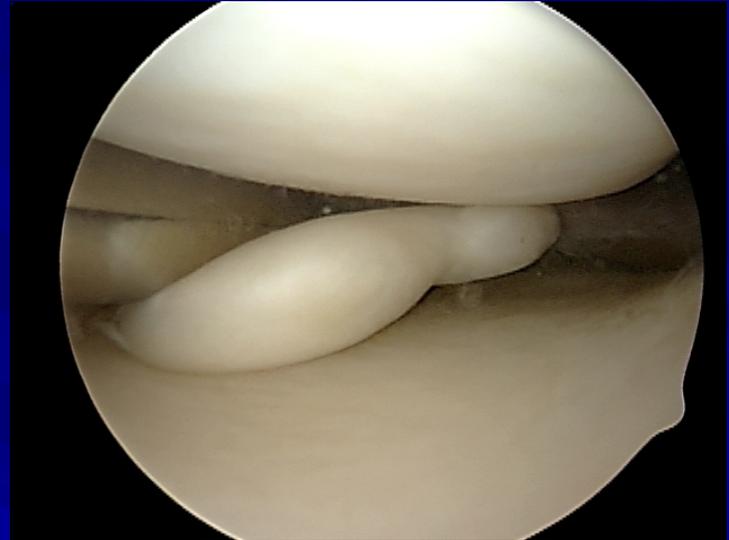
- Must address the pathology
 - Meniscus tears
 - Arthritis
 - Synovitis
 - Stiffness
 - Spurring



Knee Arthroscopy: Meniscectomy



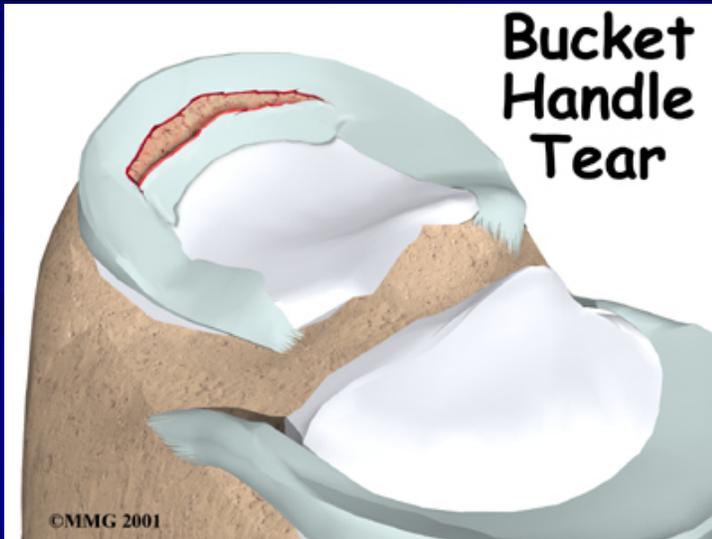
Knee Arthroscopy: Meniscectomy



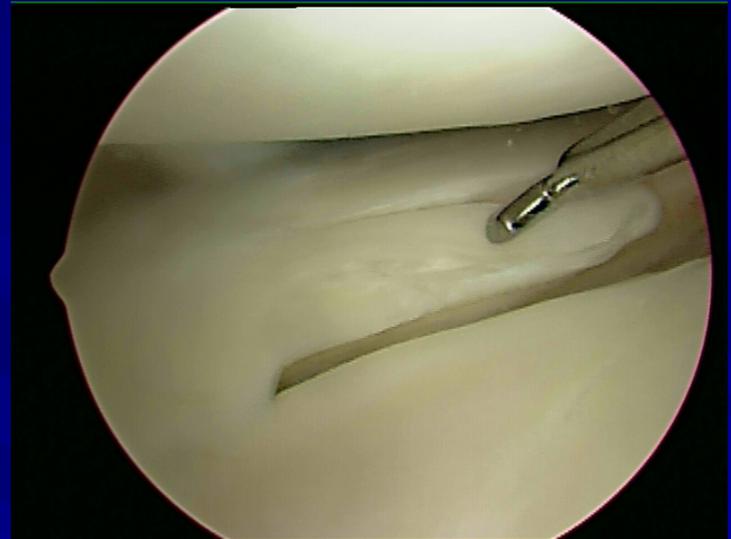
Knee Arthroscopy



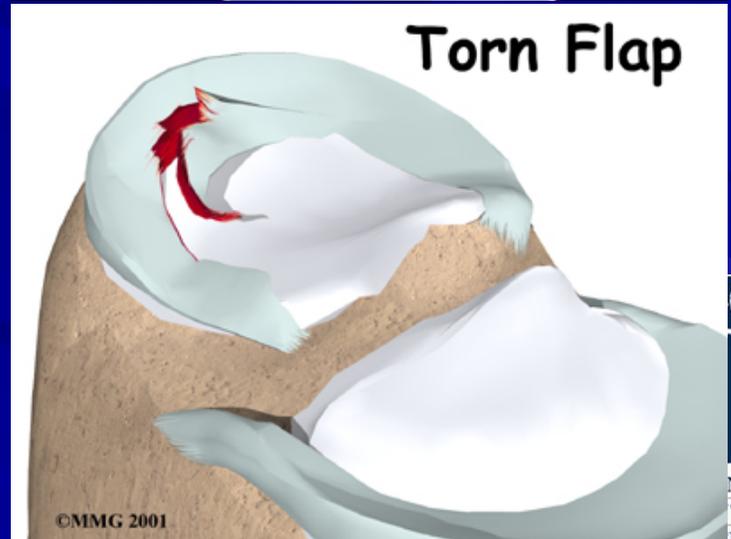
**Bucket
Handle
Tear**



©MMG 2001



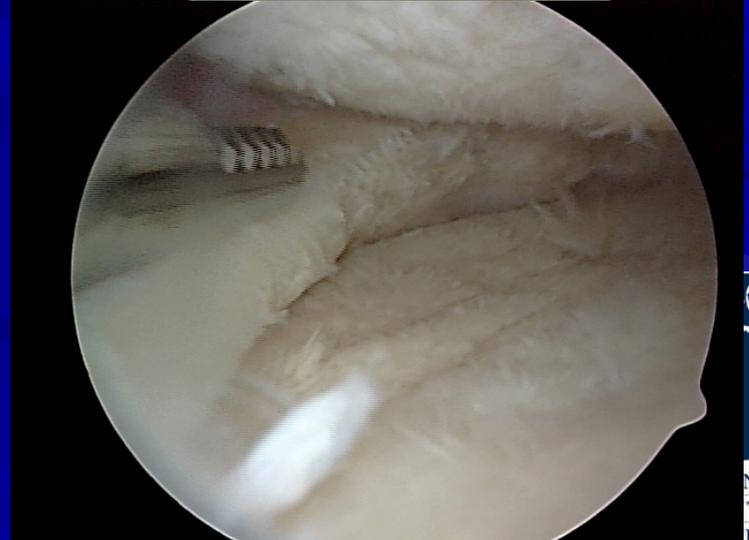
Torn Flap



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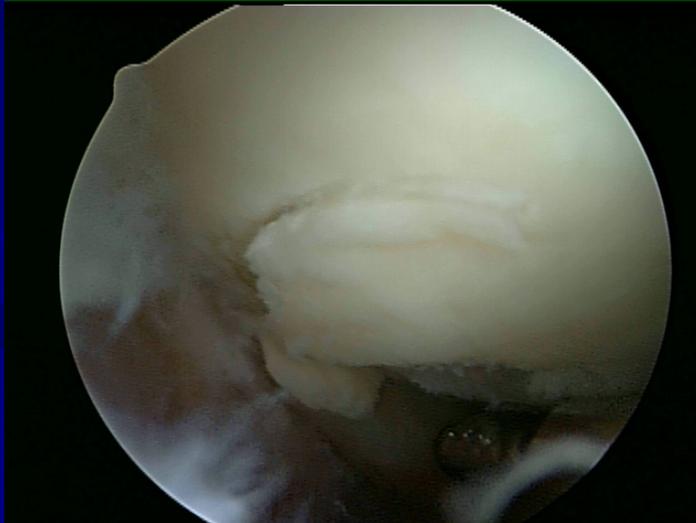
Knee Arthroscopy



CONNECTICUT
CENTER FOR
ORTHOPEDIC
SURGERY, LLC

SURGERY, LLC

Knee Arthroscopy

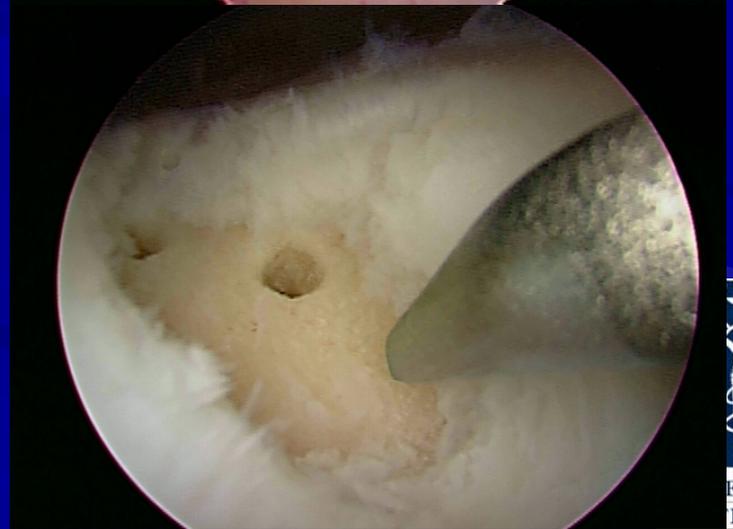
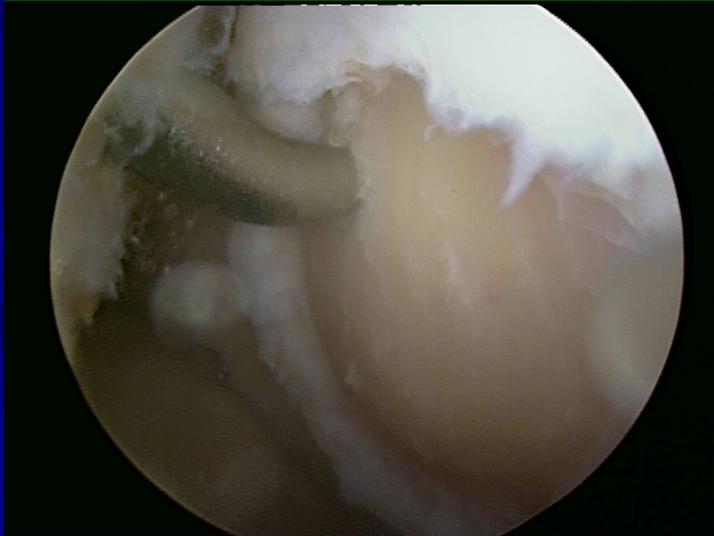
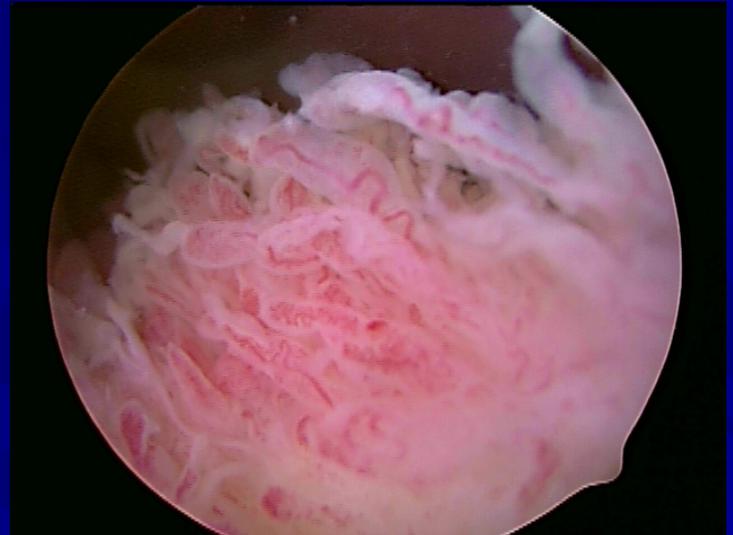
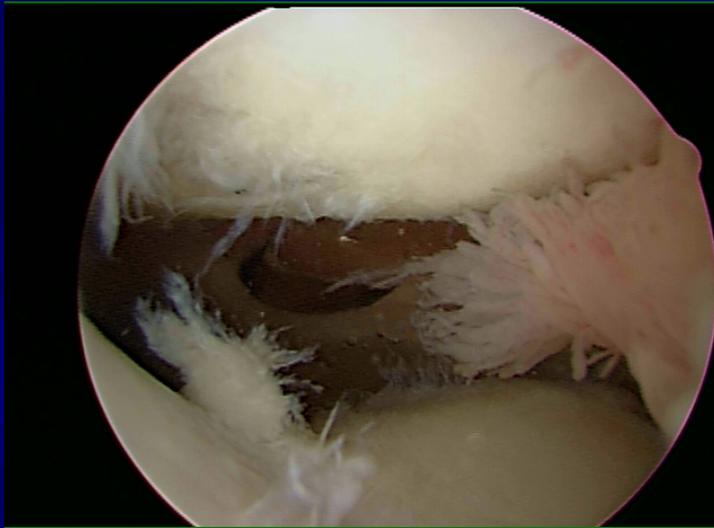


Knee Arthroscopy: Microfracture

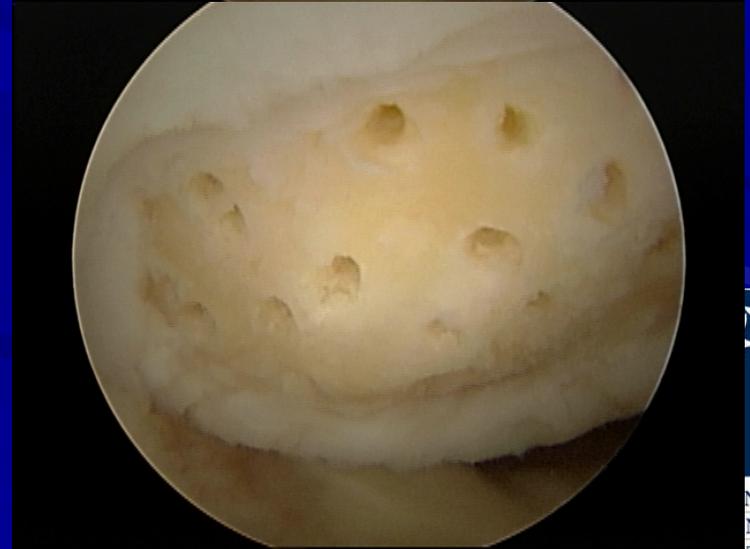
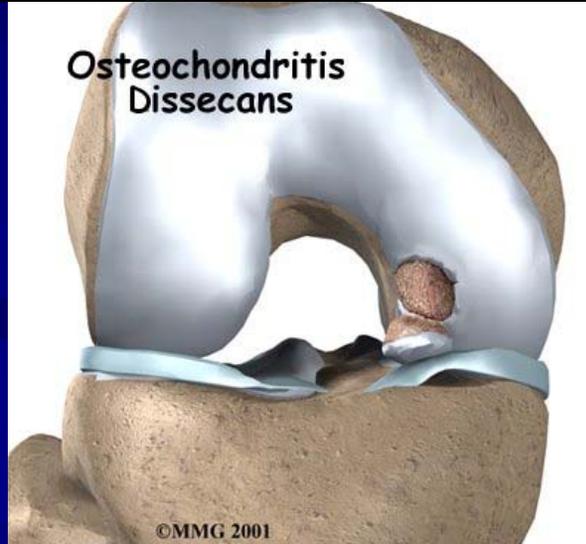
- Full thickness joint cartilage defects
- Unstable full thickness lesions
- Osteoarthritis with proper knee alignment
- Not for partial thickness defects



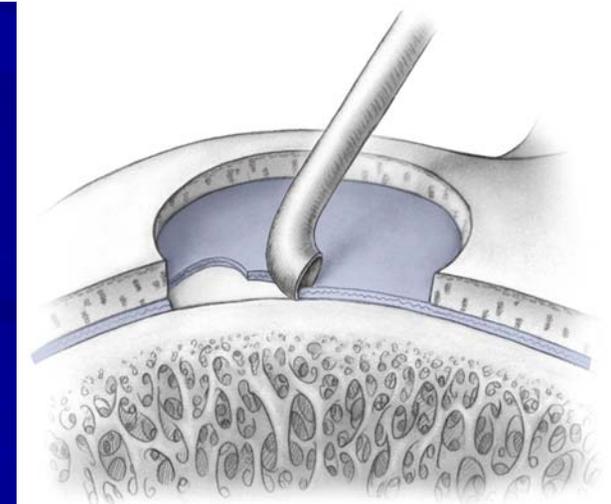
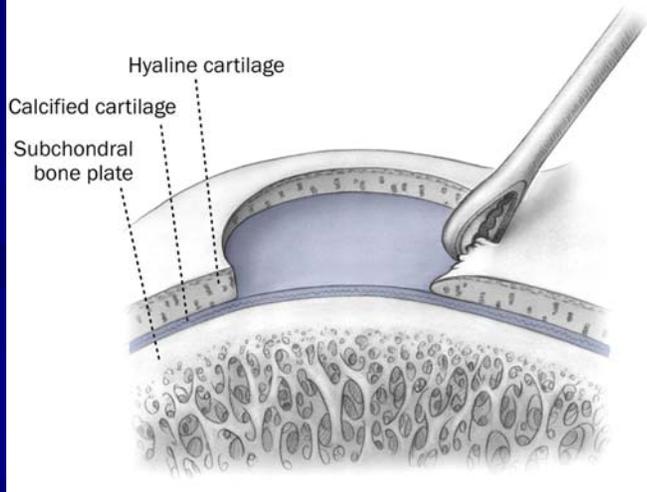
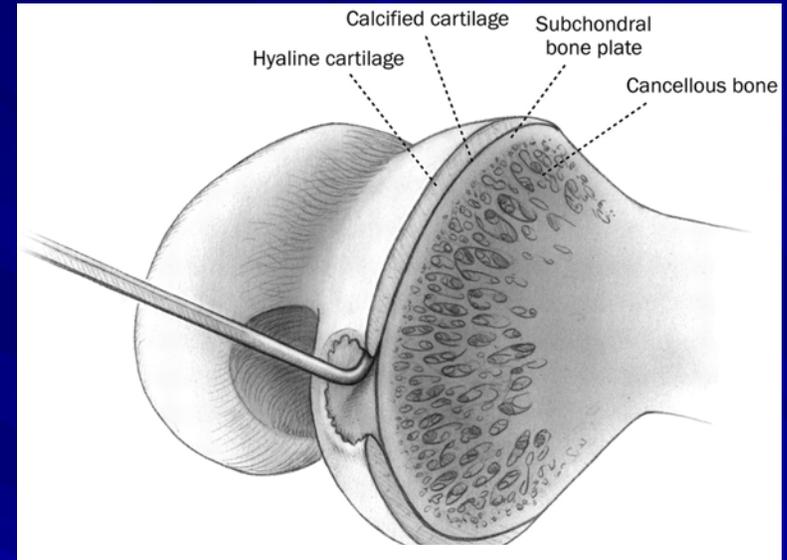
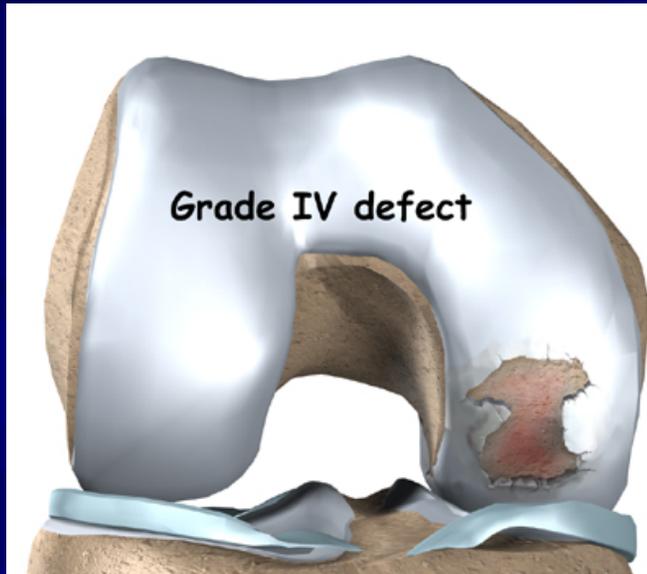
Knee Arthroscopy



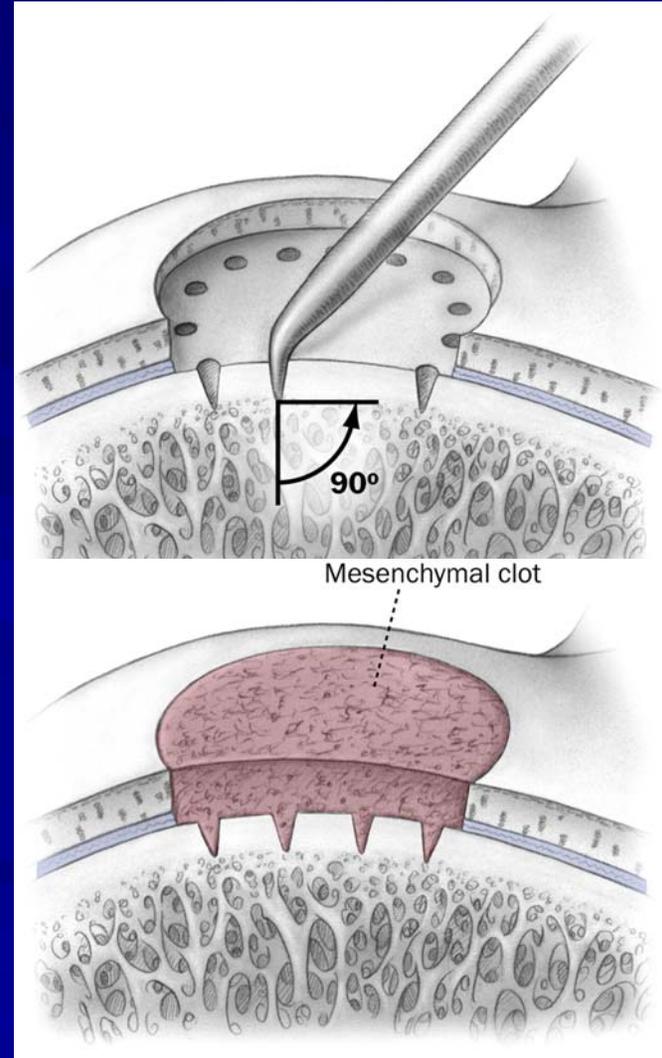
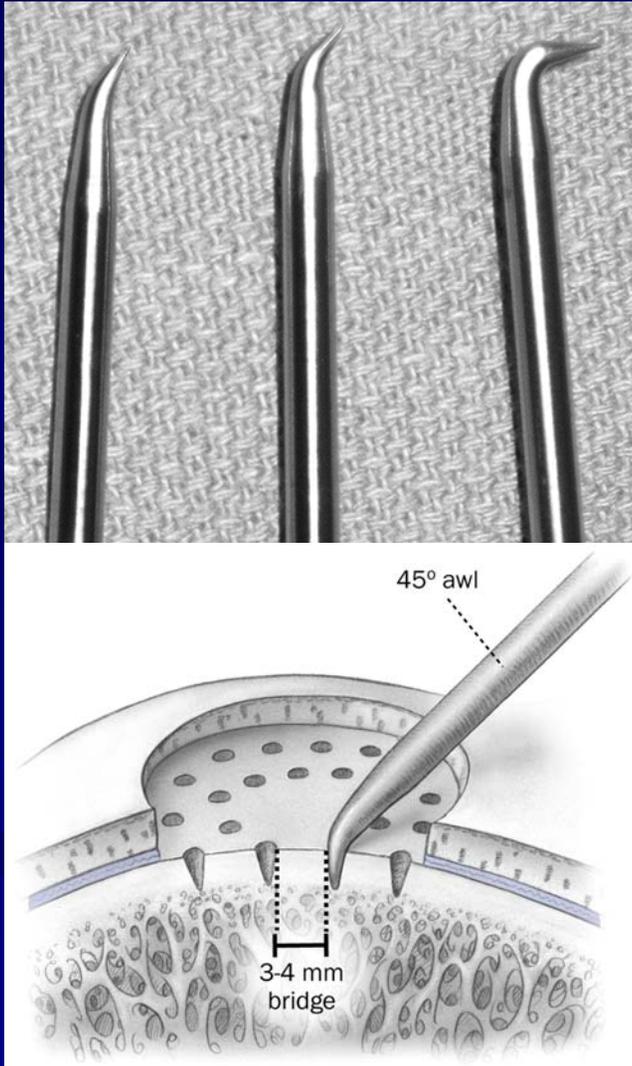
Knee Arthroscopy



Knee Arthroscopy



Knee Arthroscopy



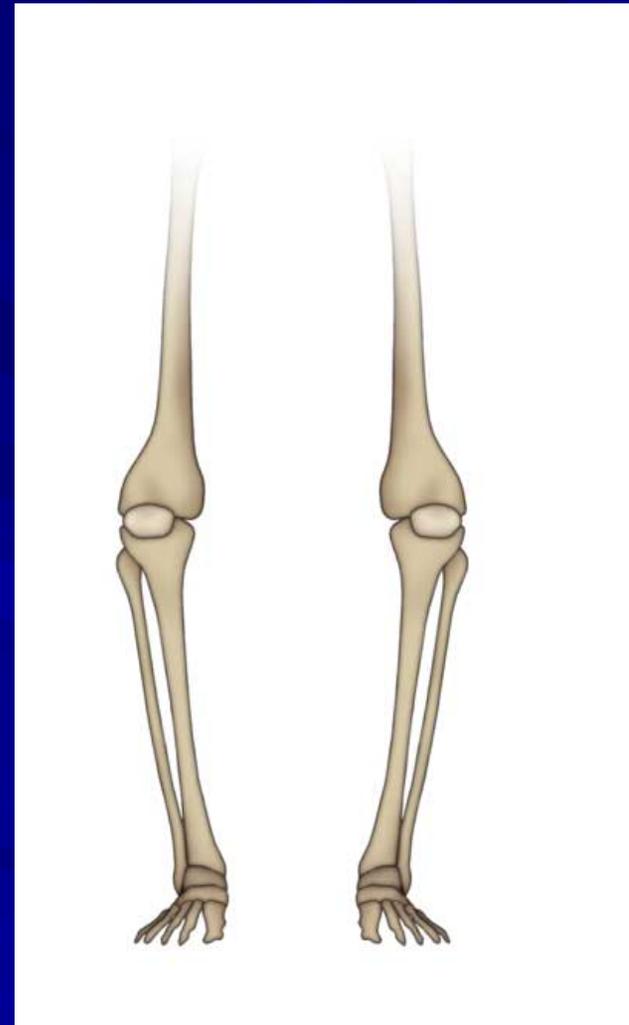
Results of Microfracture

- Significant improvement, 11 years follow up (Arthroscopy, 2003)
- Compared to ACI (Cartilage reimplantation)
 - No difference in cartilage histologically
 - ACI had higher failure rate due to higher re-operation rate



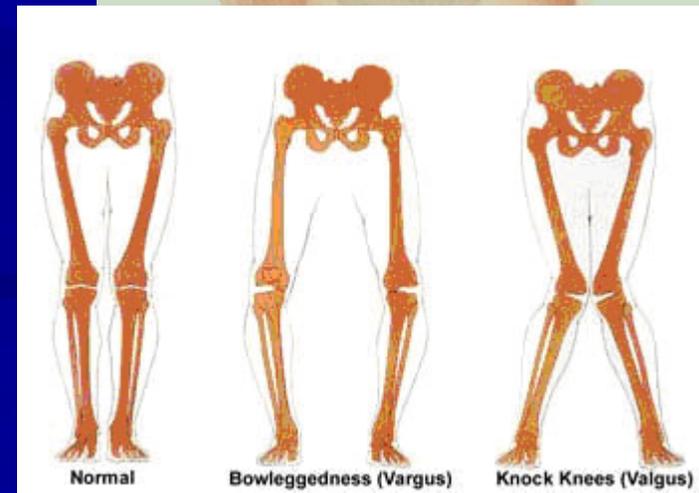
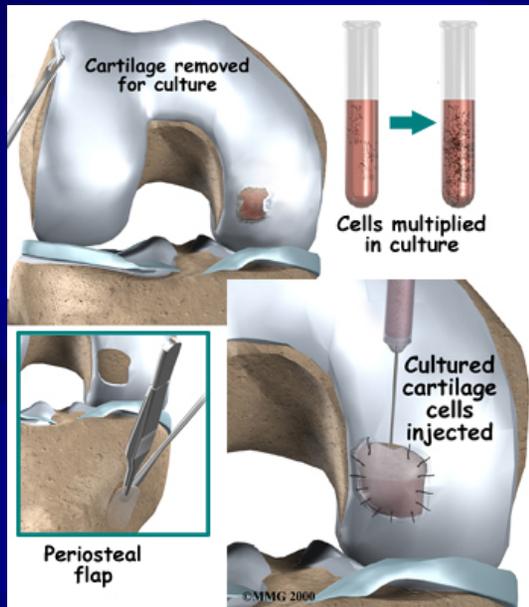
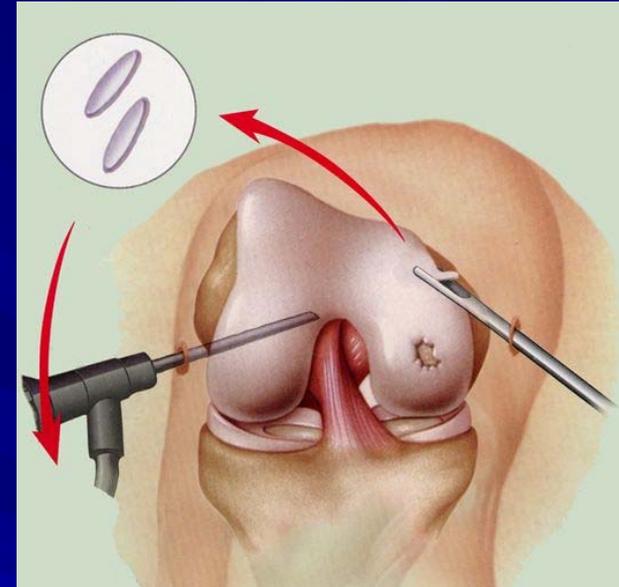
Microfracture: Predictors of Outcome

- Poorer results in certain patients
 - Increased age
 - Malalignment
 - Higher BMI (obesity)
 - Rim height (condition of adjacent cartilage)
 - Proper technique and rehabilitation

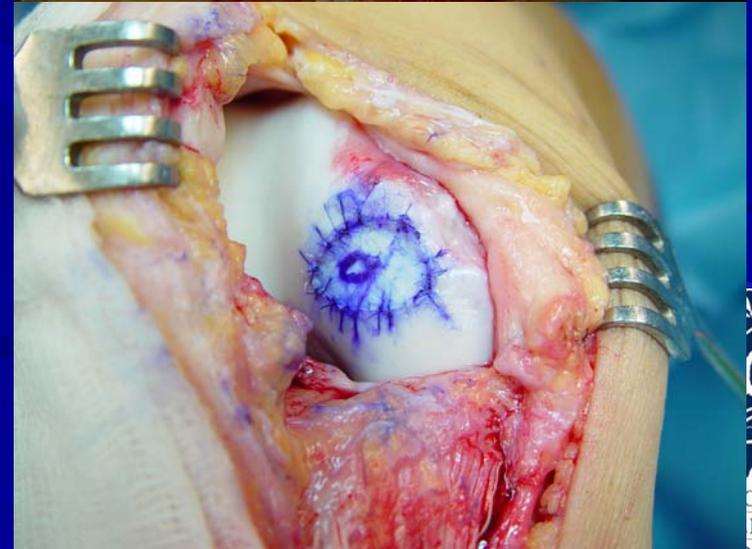
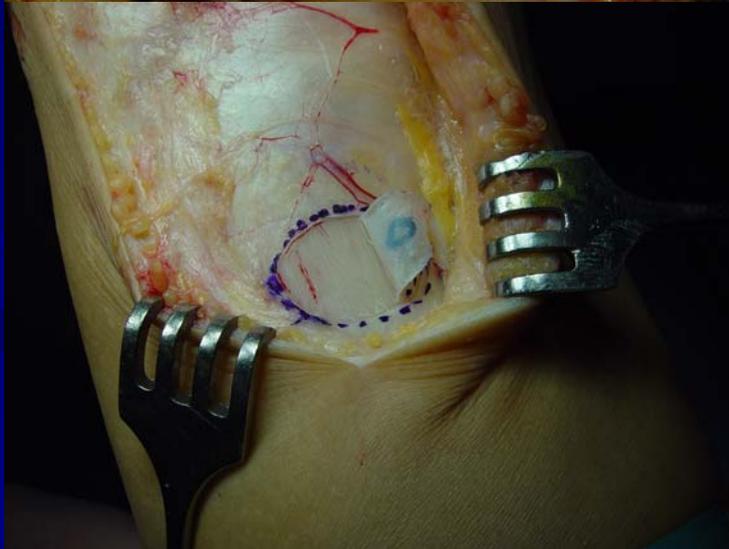
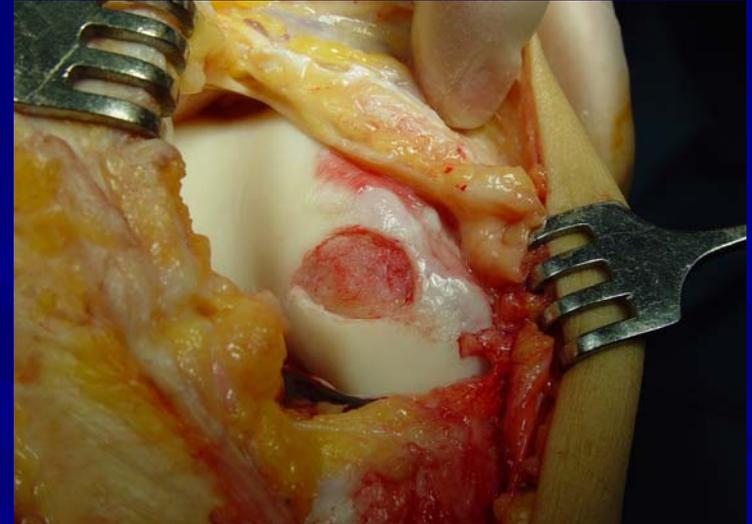
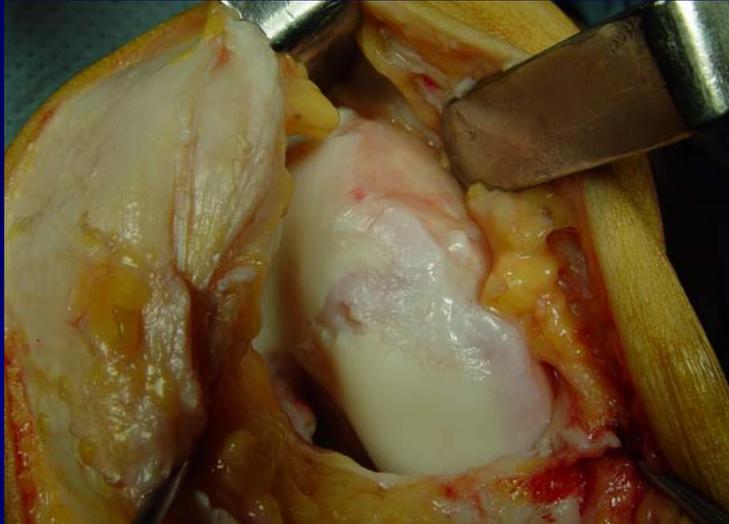


Autogenous Cartilage Implantation

- Focal cartilage defects
- Intact meniscus
 - Meniscus transplant
- Normal alignment



Autogenous Cartilage Implantation



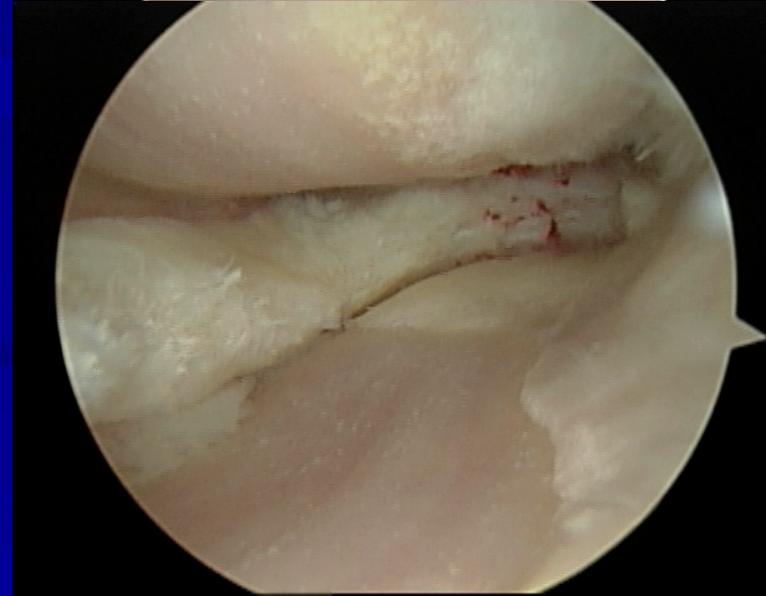
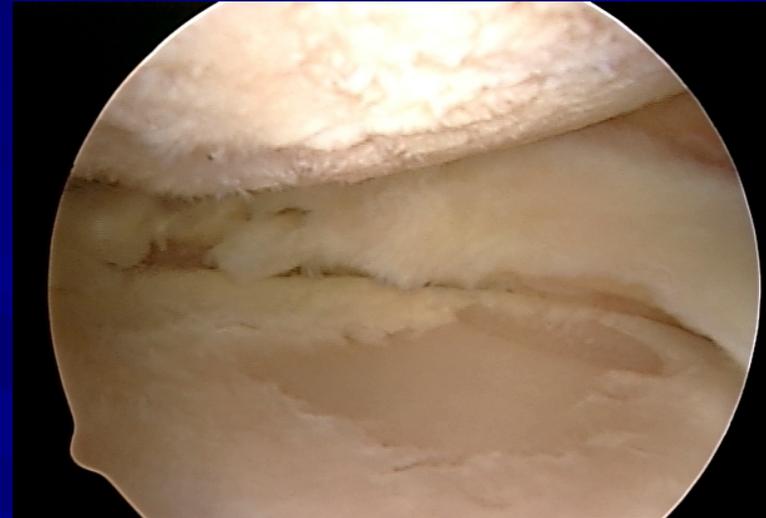
Goals of Surgery

- Relief of joint pain and symptoms
- Improved range of motion
- Elimination of mechanical symptoms
- Be realistic: Better not perfect
- Accept longer recovery
- Accept need for PT, NSAIDs, Viscosupplementation
- Buy time before the total knee replacement



Arthroscopy & Microfracture in the Degenerative Knee

- Different than in non degenerative knees
 - Surrounding cartilage is thinned
 - Dense, sclerotic bone
 - Joint scarring and contractures
 - Synovitis
 - Osteophytes (Bone Spurs)



Knee Arthroscopy: Treatment “Package”

- Insufflation
- Removal of unstable cartilage
 - Meniscus tears
 - Flaps from joint surface
- Removal of infrapatellar and suprapatellar plica or scar
- Synovectomy
- Open spaces to restore biomechanics
- Removal of osteophytes to improve ROM
- Avoid microfracture in DJD with malalignment



Knee “Package” Results

- 60-70% of patients see improvement
- 30-40% see little to no improvement
- Results may depends on
 - Degree extent of arthritis
 - Body mass index (obesity)
 - Alignment
 - Age and activity
 - Rehab program



Total Knee Replacement

- >50% of patients over 65 have at least one joint with OA
- Over 250,000 TKA performed annually
- Excellent survival and function in >90% at 10-20 years



Total Knee Replacement

- Benefits to continuing exercise after total knee replacement
 - Bone health
 - Reduced obesity
 - Psychological health
 - Cardiovascular health



Total Knee Replacement

- Risk of *excess activity*
 - Increased wear of polyethylene
 - Increased rate of early revision



Recommended Activity after TKR

- Light aerobics
- Stationary cycling
- Bowling
- Croquet
- Ballroom dancing
- Jazz dancing
- Walking
- Square dancing
- Golf
- Horseshoes
- Shooting
- Shuffleboard
- Swimming



Recommended Activities with Experience after TKR

- Cycling (road)
- Canoeing
- Hiking
- Rowing
- Speed walking
- Skiing (cross country & stationary)
- Tennis (doubles)
- Weight machines

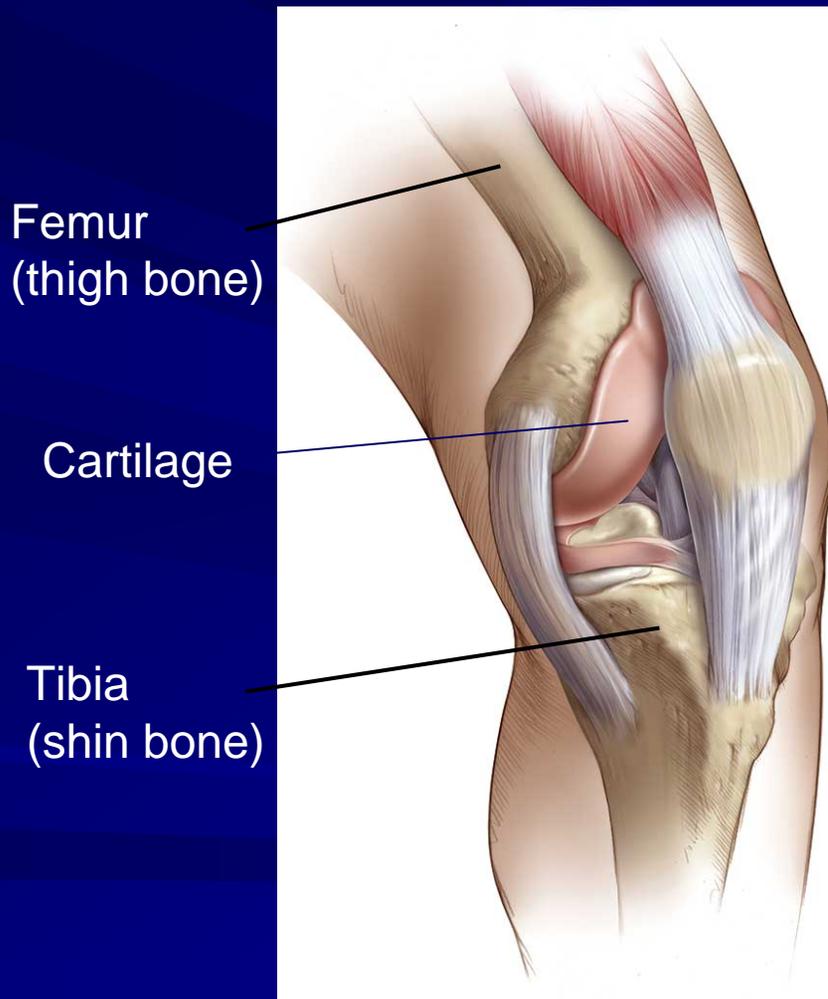


Not Recommended Activities after TKR

- Aerobics (high impact)
- Baseball and softball
- Basketball and Football
- Gymnastics
- Handball
- Hockey
- Volleyball
- Jogging
- Racquetball
- Squash
- Rock climbing
- Soccer
- Tennis (singles)



Knee Osteoarthritis – What does it look like?



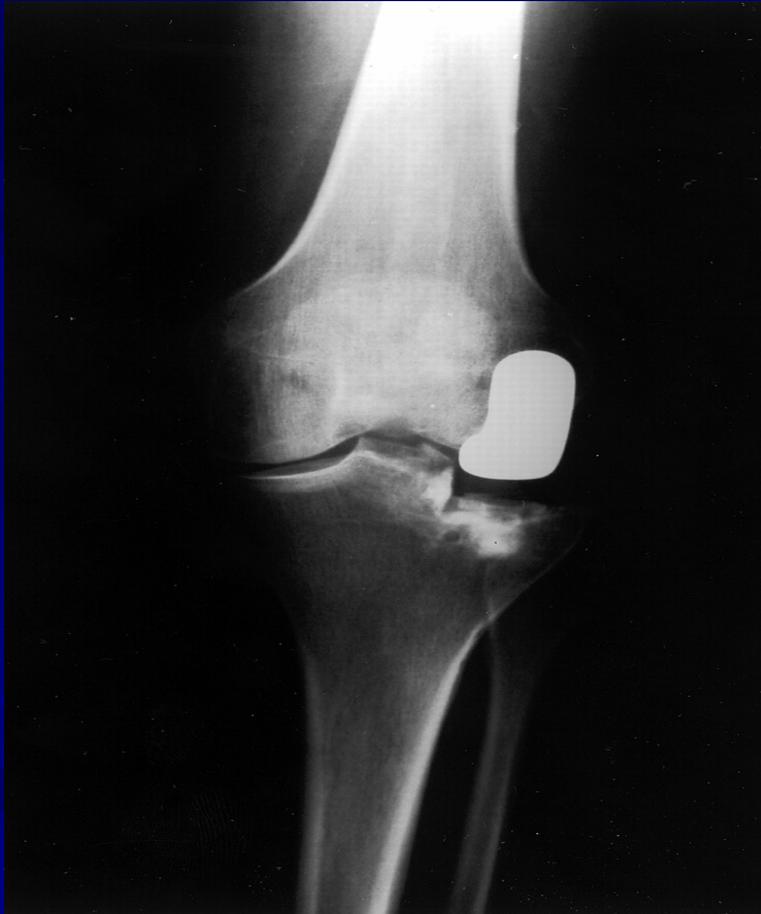
Healthy Knee



Knee with Osteoarthritis



Partial Knee Replacement



Partial Knee Replacement

■ Ideal Candidate

- Low demand patient
 - Poorer results in younger or active patients
- Minimal loss of motion (<15° flexion contracture)
- No varus or valgus malalignment, *or* easily correctable malalignment
- Minimal or no degenerative arthritis in other compartment or patellofemoral joint



Partial Knee Replacement

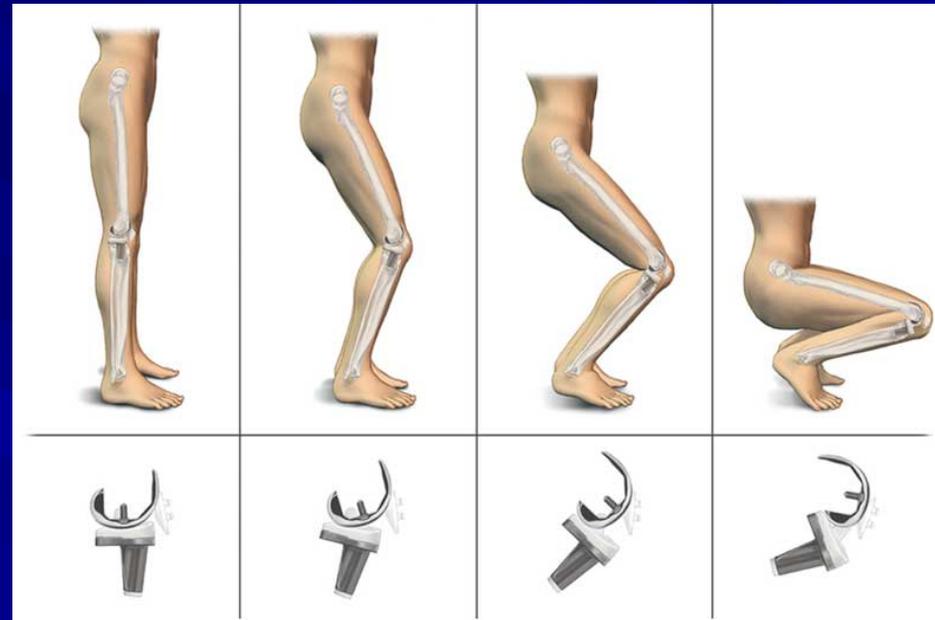
- *Potential* advantages
 - Less invasive
 - Faster recovery
 - Improved function
- Some studies support good long term results
- Other studies point to results inferior to TKR
- Long term survivorship analysis comparing TKR to UKR are not available



Knee Implants

■ High-Flex Knee Implants

- ❖ Zimmer High-Flex implants
- ❖ Allows 155° of flexion, rather than typical 125°
- ❖ Activities require good range of motion – climbing stairs, gardening, golfing, and kneeling for prayer



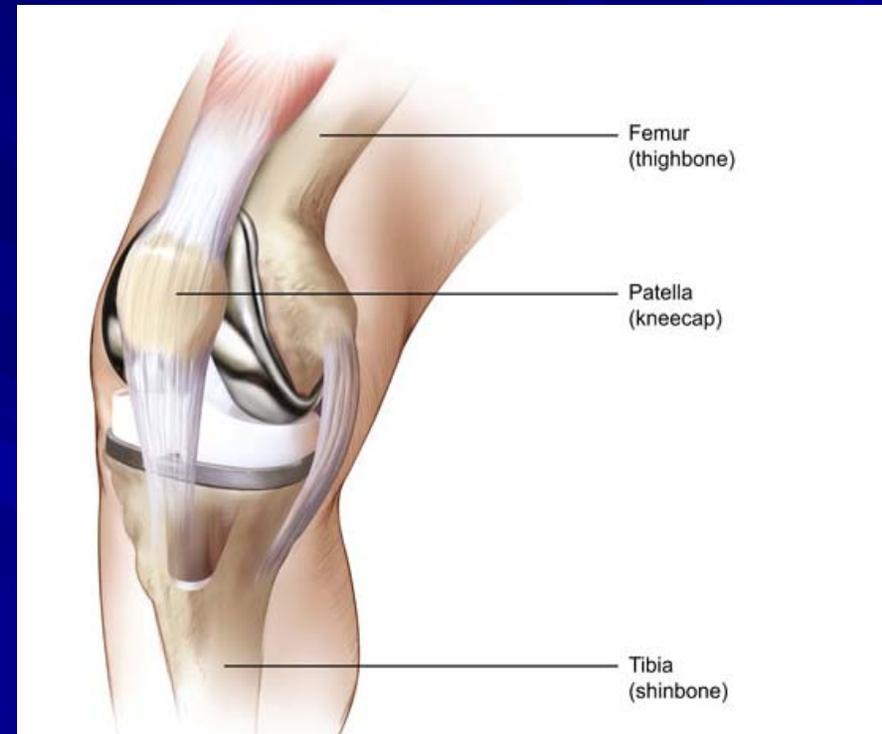
When to Consider a Knee Replacement

- You have frequent knee pain, swelling and stiffness
- Pain interferes with daily life/mobility/sleeping
- You regularly take pain relievers
- You may/may not use a cane or walker to get around
- You sometimes limp when you walk
- Knee joint damage is visible on x-ray
- You can no longer live with your pain and limitations
- All else has been tried and failed



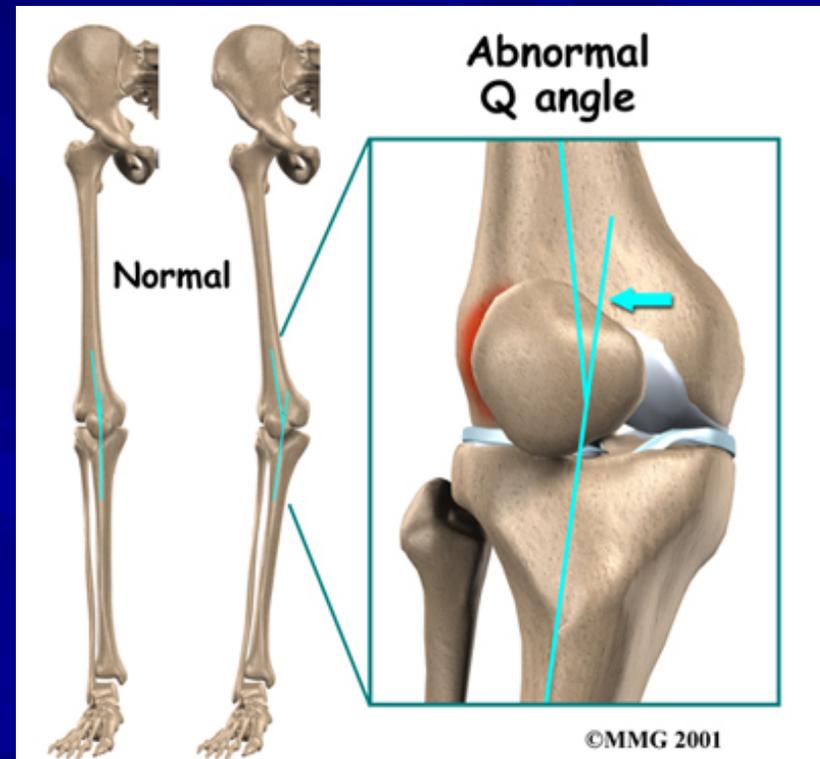
Knee Replacement Surgery

- Considered when nonsurgical interventions aren't alleviating pain
- The only long-term solution to knee pain



Women and Arthritis of the Knee

- Women account for more than 60 percent of doctor-diagnosed cases of arthritis
- Women are three times less likely than men to undergo knee replacement even though they suffer from more knee pain and resulting disability



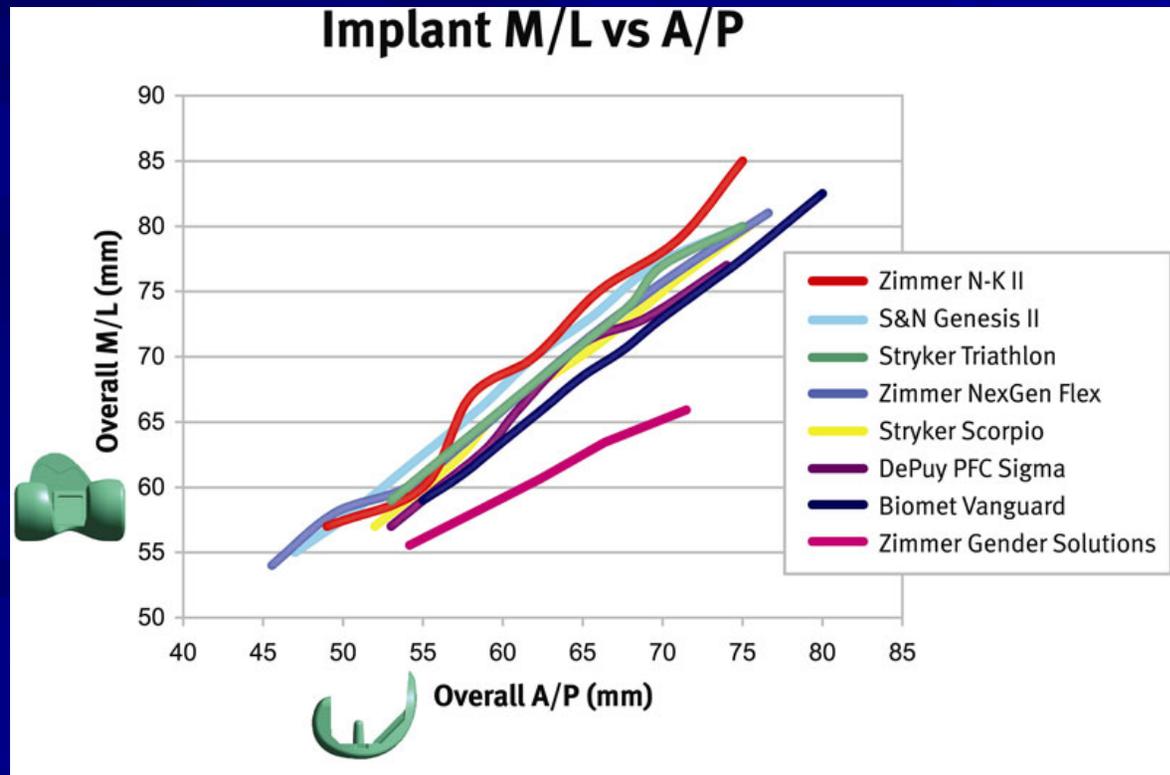
Gender Specific Knee Differences

- Improved Patellar tracking
 - Designed to accommodate the different tracking angle and function and move more like a woman's natural knee when bending and walking



Gender Specific Knee

- Knee prostheses were based on male-female average dimensions



Gender Specific Knee Differences

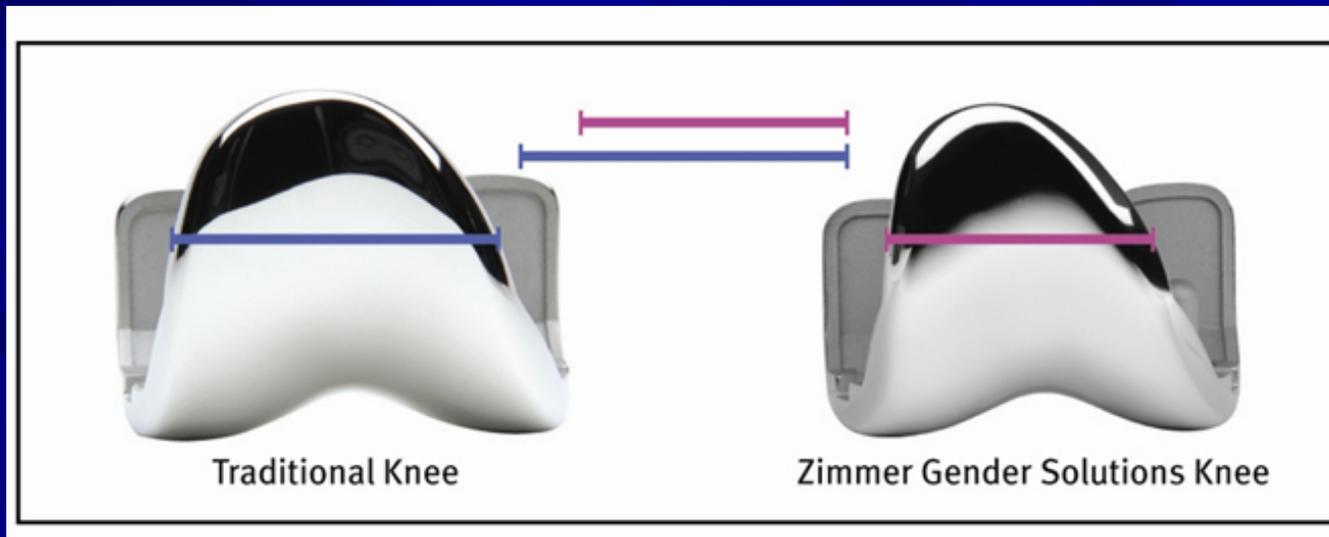
- Thinner profile
 - Knee replacement feels more natural



Gender Specific Knee Differences

■ Contoured shape

- More closely match the narrower anatomy of a woman's knee
- Helps prevent the implant from overhanging the bone and potentially pressing on, or irritating, surrounding ligaments and tendons



Total Knee Replacement

- Unicompartamental osteoarthritis in older patients
- All patients with bicompartamental and tricompartmental osteoarthritis
- Inflammatory arthritis

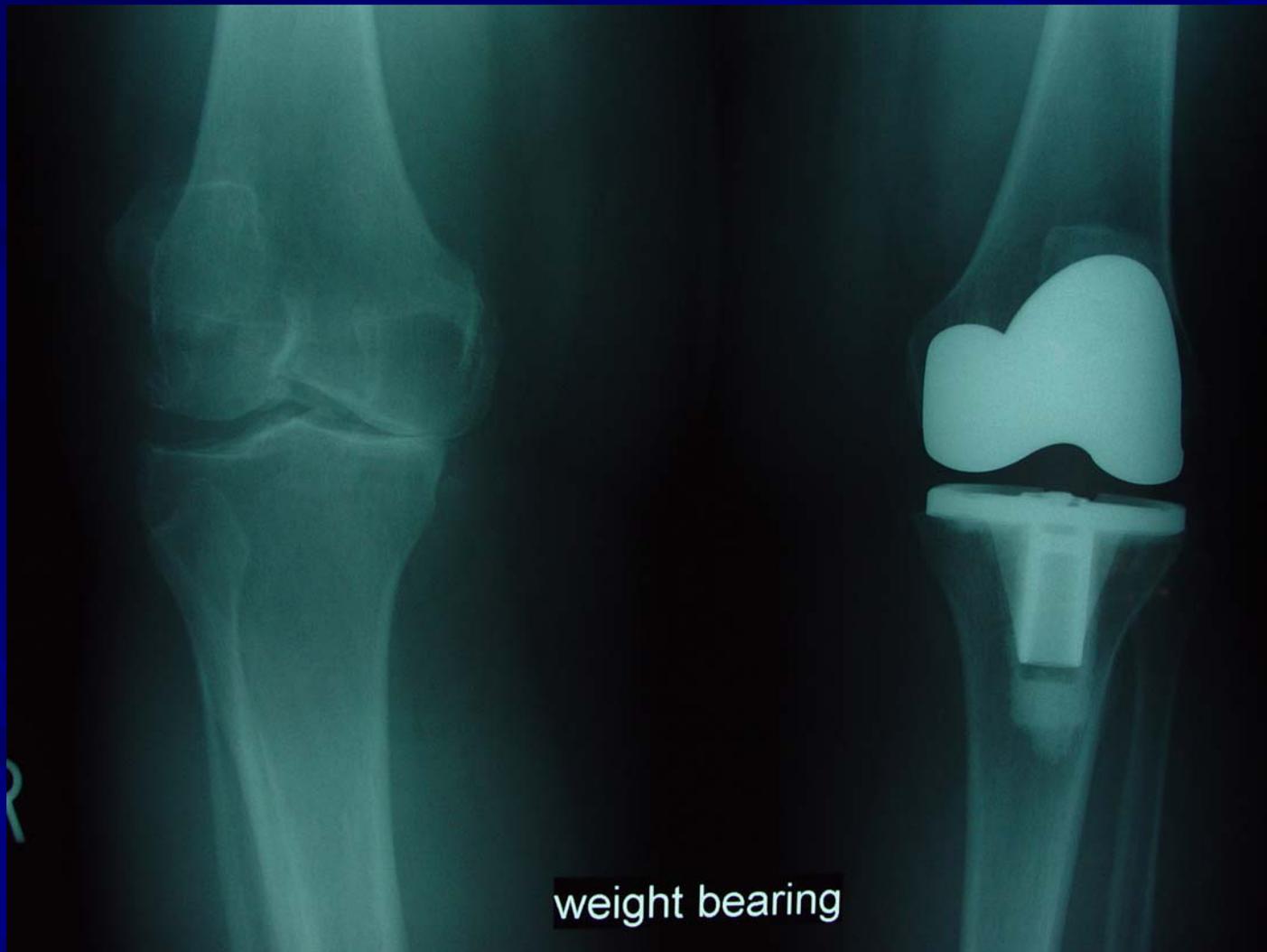


Total Knee Replacement in Younger Patients

- 1977 – 1992
- Patients < 55 years
- 94% survivorship at 18 years

Total Knee Replacement in Young, Active Patients.
Long-Term Follow-up and Functional Outcome
Diduch, D, et. al., JBJS, 79:575-82 (1997)

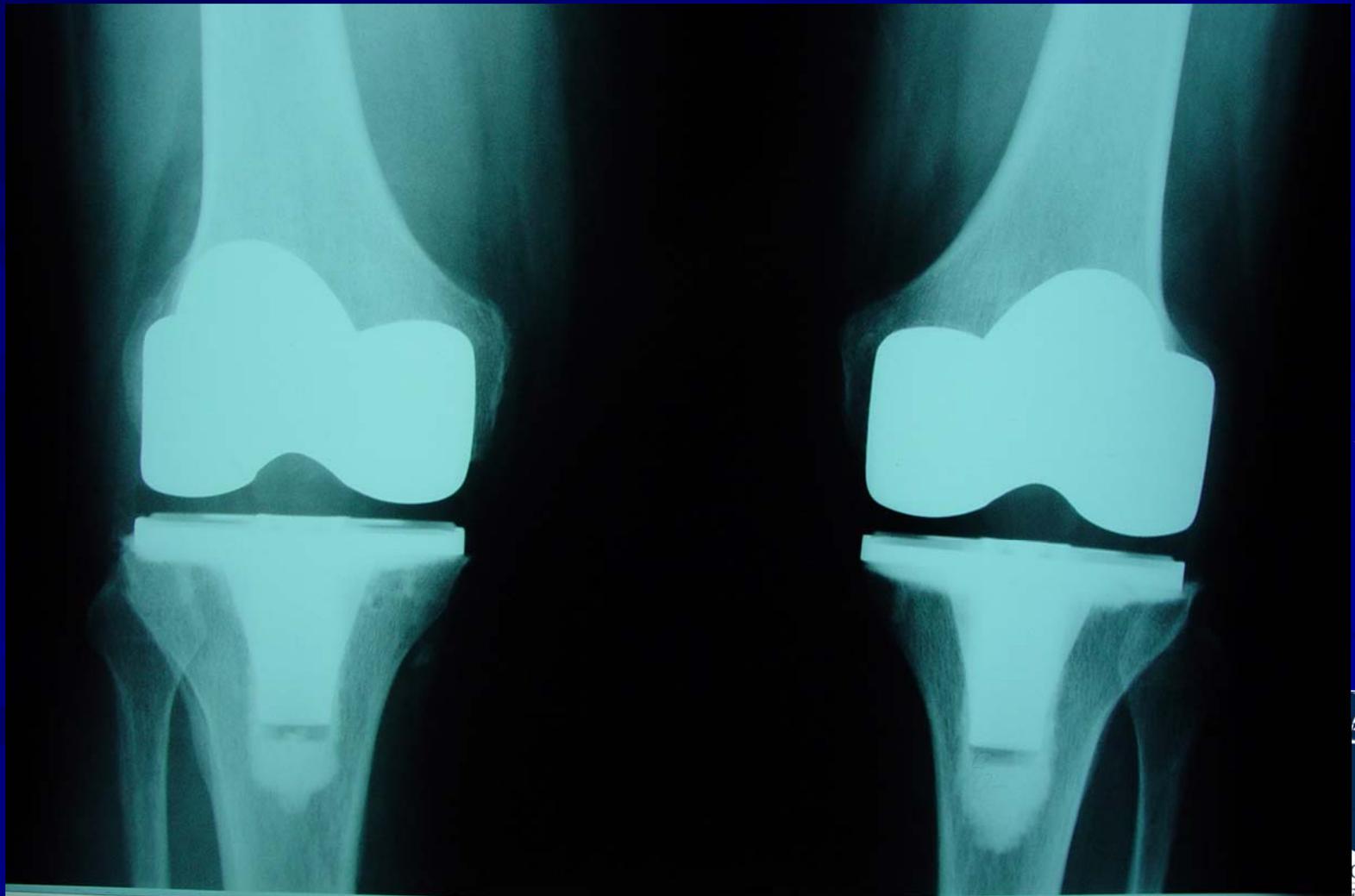
Total Knee Replacement



Total Knee Replacement



Total Knee Replacement



Complications of Surgery

- Wound complications
 - Necrosis / dehiscence
- Nerve injury: peroneal nerve ~0.58%
- Vascular injury
- Infection 2%
- Deep venous thrombosis 20-40%
- Stiffness ($< -10^{\circ}$ to 90°)
- Laxity



Complication of Surgery

- Extensor mechanism problems
 - Patellofemoral instability
 - Patellar fracture
 - Patellar component loosening
 - Tendon rupture (0.17%-2.5%)
- Fractures
- Bleeding



Thank You



Be careful out there.



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