

THE "SPORTS" ELBOW



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ANTERIOR ELBOW

- BICEPS TENDONITIS
- PRONATOR SYNDROME
- JOINT EFFUSION
 - GOUT
 - OA
- RADIAL HEAD FRACTURE
- OA
- ANTERIOR CAPSULE SPRAIN



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POSTERIOR ELBOW

- Olecranon bursitis
- Triceps tendonitis
- Olecranon stress fracture
- OA
- Posterior Impingment



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MEDIAL ELBOW

- Medial epicondylitis
- Cubital tunnel
- UCL sprain
- Valgus overload syndrome



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LATERAL ELBOW

- Lateral epicondylitis
- Radial head fracture
- OCD
- Radial tunnel syndrome



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FUNCTIONAL ANATOMY – ELBOW



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FUNCTIONAL ANATOMY – ELBOW



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EXAMINATION OF THE ELBOW

- INSPECTION
- NEUROVASCULAR EXAM
- ACTIVE/FUNCTIONAL RANGE OF MOTION
 - TOUCH SHOULDER WITH FINGERS
 - SUPINATE / PRONATE
 - EXTEND IN SUPINATION
- PALPATION
- STRENGTH TESTING AGAINST RESISTANCE
- ASSESS MEDIAL AND LATERAL COLLATERAL LIGAMENTS



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ELBOW

- ELBOW FLEXION TEST (CUBITAL TUNNEL)
 - ELBOW FLEX, WRIST EXTENDED, ULNAR N SYMPTOMS
- VARUS/VALGUS STRESSING
 - (NEUTRAL AND 30 DEG)
- MILKING MANEUVER
 - ELBOW FLEXED >90, OTHER ARM UNDER, GRASP THUMB AND "MILK" WHILE PALPATING UCL

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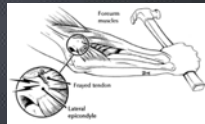
CASE



- 50 YEAR OLD MAN WHO SPENT THE WEEKEND WASHING THE WINDOWS OF HIS HOUSE AND PRUNING THE BUSHES. HE DEVELOPED LATERAL ELBOW PAIN BY SUNDAY AFTERNOON AND IT HAS NOT GOTTEN BETTER WITH HIS WORK FOR THE PAST TWO DAYS. HE DESCRIBES PAIN WHEN TRYING TO TURN THE KEY IN THE CAR, OPEN DOORS OR TYPING ON THE COMPUTER. IBUPROFEN DOES NOT HELP A LOT.

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LATERAL EPICONDYLITIS (TENNIS ELBOW)



- RELATED TO ACUTE AND CHRONIC USE OF THE WRIST EXTENSOR AND SUPINATOR MUSCLES.
- SYMPTOMS: PAIN AT THE LATERAL EPICONDYLE.
- EXAM: PAIN INCREASED WITH RESISTED EXTENSION/SUPINATION OR PASSIVE FLEXION/PRONATION (STRETCH TESTS). ALSO PAIN WITH RESISTED LONG FINGER EXTENSION.



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TESTS FOR THE ELBOW

- COZEN'S TEST
 - RESISTED WRIST EXTENSION
- GOLFER'S ELBOW TEST
 - RESISTED WRIST FLEXION
- POLK TEST
 - PICKING UP A BOOK PALM DOWN (LAT EPI), PALM UP (MED EPI)
- MILL'S TEST
 - ELBOW EXTENDED, FOREARM PRONATED PASSIVE PALMAR FLEXION = PAIN AT LAT EPI
- MAUDSLEY'S TEST
 - PAIN WITH RESISTED MIDDLE FINGER EXTENSION
- GRIP STRENGTH
 - 10% DECREASE REPORTED 90% SPECIFICITY LAT EPI

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LATERAL EPICONDYLITIS – ORTHOTIC

- FIVE RCTS (N PER GROUP 7-49) WERE INCLUDED. VALIDITY SCORE RANGED FROM 3-9 POSITIVE ITEMS OUT OF 11. SUBGROUP ANALYSES WERE NOT
- PERFORMED DUE TO THE SMALL NUMBER OF TRIALS, THE LIMITED NUMBER OF INCLUDED TRIALS PRESENT FEW OUTCOME MEASURES AND LIMITED LONGTERM
- RESULTS, POOLING WAS NOT POSSIBLE DUE TO LARGE HETEROGENEITY AMONGST TRIALS.
- NO DEFINITIVE CONCLUSIONS CAN BE DRAWN CONCERNING EFFECTIVENESS OF ORTHOTIC DEVICES FOR LATERAL EPICONDYLITIS, MORE WELL-DESIGNED AND
- WELL-CONDUCTED RCTS OF SUFFICIENT POWER ARE WARRANTED.

Shahj PA, et al. Cochrane Database of Systematic Reviews (1)CD001821, 2002.

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COMPARATIVE EFFICACY AND SAFETY OF NONSURGICAL TREATMENT OPTIONS FOR ENTHESOPATHY OF THE EXTENSOR CARPI RADIALIS BREVIS

LATERAL EPICONDYLITIS – TREATMENT

- LIAN J, ET AL. AJSM 47(12):3019-3029, 2019.
- 36 RCT, 11 DIFFERENT MODALITIES, 2746 PATIENTS
 - AT SHORT-TERM FOLLOW-UP ONLY CSI IMPROVED PAIN BUT THEN WAS WORSE THAN PLACEBO AT LONG-TERM FOLLOW-UP. AT MIDTERM FOLLOW-UP LASER THERAPY AND LOCAL BOTOX INJECTION IMPROVED PAIN. AT LONG-TERM FOLLOW-UP ESWT PROVIDED PAIN RELIEF. LASER THERAPY WAS THE ONLY INTERVENTION TO IMPROVE GRIP STRENGTH. ALL MODALITIES INCREASE THE ODDS RATIO OF ADVERSE EVENT.
- COMPARISON OF THE EFFECTS OF SHORT-DURATION WRIST JOINT SPLINTING COMBINED WITH PHYSICAL THERAPY AND PHYSICAL THERAPY ALONE ON THE MANAGEMENT OF PATIENTS WITH LATERAL EPICONDYLITIS.
 - KACHANATHU SJ, ET AL. EUR J PHYS REHABIL MED, 55(4):488-493, 2019 AUG.
 - RCT SHOWED THAT BRACING IN ADDITION TO PHYSICAL THERAPY FOR SHORT DURATION IS EFFECTIVE IN DECREASING PAIN INTENSITY MORE SO THAN PHYSICAL THERAPY ALONE.
- PREDICTORS FOR OUTCOME IN ACUTE LATERAL EPICONDYLITIS.
 - HOLMEDAL O, ET AL. BMC MUSCULOSKELET DISORD, 20(1):375, 2019 AUG 17.
 - MOST CONSISTENT PREDICTOR FOR REDUCED TREATMENT SUCCESS ALL TIME POINTS WAS HIGH PAIN-FREE FUNCTIONAL INDEX SCORE SIGNIFYING MORE PAIN ON EVERY DAY ACTIVITIES. REING ON PAIN

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KIND OF PAIN LATERAL EPICONDYLITIS

- SHOWS IMPROVEMENT IN QUICKDASH, VAS, GRIP STRENGTH
- SALINE INJECTION
 - IMPROVED DASH AT 6 MOS, VAS AT 6 AND 12 MOS.
- IONTOPHORESIS
 - RDBCT SUPERIOR TO GALVANIC CURRENT
- DEEP FRICTION MASSAGE
 - RCT 6 MOS F/U IMPROVED VAS, DASH AND GRIP STRENGTH
- PRP
 - COMPARISON OF PLATELET RICH PLASMA AND CS IN THE MGMT. OF LAT EPI. META-ANALYSIS OF RCTS.
 - XU Q, ET AL. INTERNATIONAL JOURNAL OF SURGERY 67:37-46, 2019 JUL.
 - 7 RCT 515 PTS. PRP GAVE SIGNIFICANT SUPERIOR PAIN SCORES AT 6 MOS COMPARED TO CSI.

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LATERAL EPICONDYLITIS (TENNIS ELBOW)

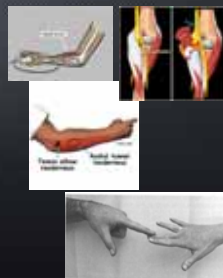
- REST FROM THE OFFENDING ACTIVITY.
 - ICE OR HEAT (WHATEVER WORKS BEST)
 - STRETCHING, THEN STRENGTHENING AS PAIN RESOLVES.
- TENNIS SPECIFIC:
 - 2-HAND BACKHAND.
 - MIDSIZE RACQUET, LESS STRING TENSION, ADJUST GRIP (TOO LARGE OR SMALL).
- COUNTERFORCE BRACE AND/OR WRIST SPLINT AS NEEDED.
- CORTISONE INJECTION IF ABOVE MEASURES FAIL.



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WHEN IS TENNIS ELBOW NOT TENNIS ELBOW?

- RADIAL TUNNEL SYNDROME
 - TRAPPING OF THE POSTERIOR INTEROSSEOUS NERVE IN THE ARCADE OF FROHSE
 - PAIN AND DIFFICULTY WITH RESISTED EXTENSION OF THE LONG FINGER WITH THE ELBOW IN EXTENSION
 - TENDERNESS 4-5 CM DISTAL TO THE LATERAL EPICONDYLE
 - +/- FINGER AND WRIST EXTENSOR WEAKNESS



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MEDIAL EPICONDYLITIS (GOLFER'S ELBOW)

- OVERALL PREVALENCE <1%, BUT ~4-8% PTS IN OCCUPATIONAL SETTINGS
- 10-20% OF EPICONDYLITIS
- MICROTRAUMA/DEGENERATION OF THE COMMON FLEXOR/PRONATOR MASS
- TYPICALLY 40-60 YO, M=F
- FLEXOR/PRONATOR TENDON CONFLUENCE OF 5 MUSCLES
 - PRONATOR TERES, FLEX CARPI RAD, FLEX CARPI ULNARIS, PALMARIS LONGUS, FLEX DIGIT SUPERFICIALIS
- ATTACHED AT MED EPI ANTERIORLY
- REPETITIVE LOADING +/- VALGUS FORCE AT THE ELBOW



ARTHRO. JAMA. 2011; 305: 2310-2318

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MEDIAL EPICONDYLITIS

- STAGED PROCESS
 - PERITENDINOUS INFLAMMATION → ANGIOFIBROBLASTIC HYPERPLASIA → REPLACEMENT OF NORMAL TENDON FIBERS AND BREAKDOWN → FIBROSIS/TEAR AND CALCIFICATION
 - SIGNIFICANT DAMAGE → INC UCL STRAIN (PARTICULARLY IN THROWING ATHLETES)
- DIFFERENTIAL DIAGNOSIS

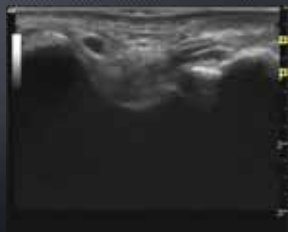
• Ulnar Neuritis	• Tendinopathy	• Ligamentous instability
• Intra-articular Pathology (OFTD)	• Capsulitis (inflammatory)	• Trauma

- COMMON IN OCCUPATIONAL SETTINGS
 - REPETITIVE FORCEFUL GRIP, MANUAL HANDLING OF LOADS >44 LBS, CONSTANT VIBRATORY FORCES AT THE ELBOW
 - ≤ 84% OF OCCUPATIONAL PTS ADDITIONAL CONCOMITANT WORK-RELATED DISORDERS
 - CARPAL TUNNEL, LAT EPI, RC TENDONITIS

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MEDIAL EPICONDYLITIS

- EVAL FOR CERVICAL RADICULOPATHY
- NOT UNCOMMON TO HAVE ULNAR NEURITIS AS WELL
 - TINEL'S
 - ELBOW FLEXION TEST (MAX FLEXION ELBOW, PRONATION, WRIST EXTENSION)
 - EVAL FOR SUBLUXATION
- XRAY
 - RULE OUT OTHER ISSUES, CALCIFICATION
- ULTRASOUND
- MRI



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MEDIAL EPICONDYLITIS

- TREATMENT
 - HELP WITH PAIN – ANALGESIC +/- NSAID
 - BRACING/TAPING
 - IF IMMOBILIZATION CAUTION WITH DURATION
 - ? ESWT
 - CSI
 - CAUTION WITH LOCATION
 - IATROGENIC EFFECTS (HYPOPIGMENTATION, LIPOATROPHY)
 - PT
 - STRETCHING/STRENGTHENING
 - DON'T FORGET SHOULDER TOO
 - MODIFICATION TO ANY EQUIPMENT, ? JOB POSITION
 - SURGERY



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NURSEMAID'S ELBOW

- SUDDEN JERKING OF ARM IN AN EXTENDED AND PRONATED FASHION (PREVENTING A CHILD FROM FALLING; MERRY-GO-ROUND)
- HEAD OF RADIUS SUBLUXES OUT OF THE ANNULAR LIGAMENT
- MOST COMMON BEFORE AGE 4 (BEFORE OSSIFICATION OF RADIAL HEAD)
- CAN BE ASSOCIATED WITH A FRACTURE OF THE ULNA (SMALL GREENSTICK FX; MONTEGGIA FX) OR SUPRACONDYLAR FX RARELY
- EXAM:
 - CHILD WITH ELBOW PRONATED, PARTIALLY FLEXED AND HELD CLOSE
 - APPREHENSIVE TO FULL EXTENSION OR ANY SUPINATION
 - TENDERNESS ISOLATED TO RADIAL HEAD (NOT OVER ULNA)








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NURSEMAID'S ELBOW REDUCTION

- HOLD THE ELBOW FROM BEHIND WITH YOUR THUMB OVER THE RADIAL HEAD (TO PREVENT MOVEMENT OF SHOULDER AND APPLY PRESSURE TO RADIAL HEAD)
- OTHER HAND HOLDS THE WRIST AND APPLIES ROTATIONAL FORCE TO PUT THE HAND INTO SUPINATION AND THEN BENDS ELBOW INTO FLEXION
- ALTERNATIVE METHOD: HYPERPRONATION
- MAY HEAR CLICK
- SHOULD HAVE COMPLETE RETURN OF FUNCTION
 - BE SUSPICIOUS OF FRACTURE IF NOT!
- ONLY IMMOBILIZE IF REDUCTION IS > 12 HOURS AFTER SUBLUXATION
- MAY TAKE A FEW ATTEMPTS

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LATERAL EPICONDYLITIS INJECTION

- INDICATIONS:
 - LATERAL TENNIS ELBOW THAT FAILS TO IMPROVE WITH CONSERVATIVE THERAPY
- CLINICAL ANATOMY/LANDMARKS
 - RADIAL HEAD, APPRECIATED BY PRONATION/SUPINATION
 - HUMERAL LATERAL EPICONDYLE
 - EXTENSOR CARPI RADIALIS BREVIS



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LATERAL EPICONDYLITIS

- IDENTIFY LANDMARKS
 - OLECRANON
 - LATERAL EPICONDYLE
 - RADIAL HEAD
- CONFIRM DIFFERENCE BETWEEN EPICONDYLE AND RADIAL HEAD WITH SUP/PRO
- CONFIRM POINT OF MAXIMAL TENDERNESS WITH EXTENSION OF WRIST



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LATERAL EPICONDYLITIS TENNIS ELBOW

- TECHNIQUE:
 - SUPINE OR SEATED
 - ELBOW IN 90 DEGREES OF FLEXION AND PRONATED
 - AREA OF MAXIMAL TENDERNESS FOUND AT THE ANTERIOR SURFACE OF THE LATERAL EPICONDYLE
 - NEEDLE INSERTED DIRECTED AT THE ANTERIOR SURFACE OF THE LATERAL EPICONDYLE (NEAR THE COMMON EXTENSOR ORIGIN)
 - "PEPPERING TECHNIQUE"



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LATERAL EPICONDYLITIS TENNIS ELBOW

- NEEDLE SIZE AND DOSAGE:
 - 25 TO 27 GAUGE 1 INCH NEEDLE
 - .5ML OF BETAMETHASONE WITH 0.5 ML OF 1 OR 2% LIDOCAINE



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TYPES OF ELBOW INJURIES IN YOUNG THROWING ATHLETES

- ANTERIOR COMPARTMENT
 - ANTERIOR CAPSULAR STRETCHING
 - BICIPITAL TENDONITIS
 - BICEPS WEAKNESS
 - OSTEOCHONDRITIS DISSECANS
- LATERAL COMPARTMENT
 - SUPINATOR MUSCLE STRAIN
 - LATERAL APOPHYSITIS
 - ANCONEUS MUSCLE STRAIN
 - SUPRACHONDRAL FRACTURE
- POSTERIOR COMPARTMENT
 - POSTERIOR IMPINGEMENT
 - OLECRANON APOPHYSITIS
 - TRICEPS TENDONITIS
- MEDIAL COMPARTMENT
 - ULNAR COLLATERAL LIGAMENT STRAIN
 - FLEXOR MUSCLE STRAIN
 - MEDIAL APOPHYSITIS
 - ULNAR NERVE NEURPRAXIA



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ELBOW OSSIFICATIONS



Ossification Centers
6 at the elbow
Appear, then fuse at different ages
Appear in distinct order:
Capitellum
Radius
Internal (medial) epicondyle
Trochlea
Olecranon
External (lateral) epicondyle

Ages they appear are variable but the standard answer is 1-3-5-7-9-11 years.

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TYPICAL HISTORY

- MEDIAL ELBOW AND PROXIMAL FOREARM PAIN OCCURRING A FEW DAYS AFTER THROWING TO FIRST BASE FROM THIRD OR SHORTSTOP OR AFTER PITCHING
- PAIN ABATES WITH REST BUT RETURNS WITH THROWING
- USUALLY BEST "SKILL" PLAYER



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INJURY MECHANISM

- OVERHAND THROWING SUBJECTS THE ELBOW TO FORCES OF TENSION, COMPRESSION, SHEAR, AND TORSION
- TWO MAIN STAGES ARE ACCELERATION, AND FOLLOW THROUGH



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THROWING INJURIES TO ELBOW

- ACCELERATION PHASE
 - VALGUS FORCE GREATEST
 - CAUSES MEDIAL TENSION STRESS
 - ULNAR COLLATERAL LIGAMENT AND EPICONDYLE
 - AND LATERAL COMPRESSION STRESS
 - RADIOCAPITELLAR JOINT
- RELEASE/DECELERATION PHASE - ELBOW FLEXORS STRESSED.
- FOLLOW-THRU PHASE - HYPEREXTENSION JAMS OLECRANON INTO FOSSA.



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LITTLE LEAGUER'S ELBOW "SYNDROME?"

- MEDIAL ELBOW STRESS INJURY IN YOUNG OVERHEAD ATHLETES
- RECURRENT MICROTRAUMA OF THE ELBOW JOINT
 - DELAYED OR ACCELERATED GROWTH OF THE MEDIAL EPICONDYLE (MEDIAL EPICONDYLAR APOPHYSITIS).
 - TRACTION APOPHYSITIS (MEDIAL EPICONDYLAR FRAGMENTATION).
 - MEDIAL EPICONDYLITIS



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LITTLE LEAGUER'S ELBOW

- 9-14 YEAR-OLD PITCHERS
- SYMPTOMS
 - PAIN WITH ACTIVITY (PARTICULARLY ACCELERATION)
 - CLICKING, CATCHING, LOCKING
- PHYSICAL EXAM
 - PAIN W VARUS/VALGUS STRESS
 - TENDER @ MEDIAL EPICONDYLE
- X-RAYS
 - NARROWING OF LAT JOINT SPACE
 - SEPARATION MEDIAL EPICONDYLE



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LITTLE LEAGUE ELBOW

- TRACTION AT GROWTH PLATE OF MEDIAL EPICONDYLE (WEAKER THAN UCL).
- SYMPTOMS: INSIDIOUS ONSET OF MEDIAL ELBOW PAIN, OFTEN UNREPORTED
- EXAM: TENDER AT EPICONDYLE
- X-RAYS: MAY SHOW WIDENING AT GROWTH PLATE (COMPARE WITH IMAGES FROM OTHER ELBOW)
- TREATMENT: REST AND ICE, GRADUATED THROWING AFTER PAIN FREE 3-4 WEEKS OR LONGER. CONSIDER SURGERY IF DISPLACED.



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MEDIAL EPICONDYLE AVULSION



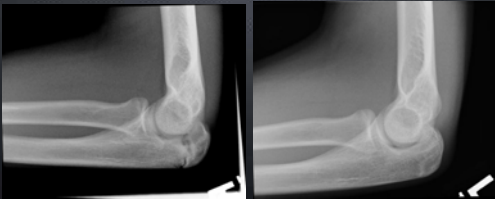
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ELBOW EXTERNAL OBLIQUE



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OLECRANON



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ULNAR COLLATERAL LIGAMENT STRAIN/TEAR

- CAUSED BY VALGUS STRESS OF THROWING.
- SYMPTOMS/EXAM: MEDIAL ELBOW PAIN, WORSE WITH VALGUS STRESS (DONE AT 30°). MAY SEE LAXITY. MILKING MANEUVER HELPFUL.
- TREATMENT: NO THROWING, ICE AND NSAID'S UNTIL PAIN GONE.
 - REHAB EXERCISES
 - GRADUATED THROWING PROGRAM
 - SURGERY IS LAST RESORT



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RADIOCAPITELLAR CHONDROMALACIA

- DUE TO COMPRESSION FORCES CREATED BY VALGUS STRESS OF THROWING.
- SYMPTOMS: LATERAL ELBOW PAIN; CAN LEAD TO OCD AND LOOSE BODIES.
- EXAM: TENDER AT RC JOINT. CREPITUS WITH SUP/PRONATION
- TREATMENT: SAME AS FOR UCL INJURY



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OSTEOCHONDRITIS DISSECANS CAPITELLUM

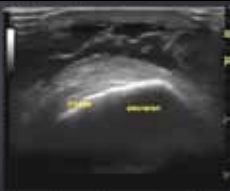
- RESULT OF CHRONIC COMPRESSION FORCES.
- SYMPTOMS: LATERAL ELBOW PAIN, OFTEN WITH CLICKING OR LOCKING.
- EXAM: TENDER AT RC JOINT AND WITH SUPINATION-PRONATION. LACK OF EXTENSION.
- X-RAY: FLATTENING AT CAPITELLUM, CRATER WITH LOOSE BODY.
- TREATMENT: REST (6-18 MOS.). LAST RESORT IS DRILLING CAPITELLAR DEFECT OR REMOVE LOOSE BODY.



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OLECRANON BURSTITIS

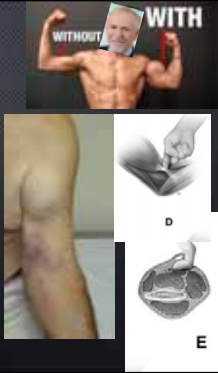
- SYNOVIUM-LINED SAC ALLOWING GLIDING OF SKIN OVER OLECRANON
- FLUID IN THE BURSA
 - SEROUS – ASEPTIC OLECRANON BURSTITIS
 - SANGUINOUS – TRAUMA
 - PURULENT – INFECTION, GOUT, RHEUMATOID
- SEPTIC MOST COMMONLY CAUSED BY STAPH AUREUS
- SAYEGH PERFORMED SYSTEMATIC REVIEW (PRISMA GUIDELINES)
 - 29 STUDIES, 1278 PTIS INCLUDED
 - ASEPTIC- ASPIRATION IN ALL BUT ONE STUDY
 - COMPARED WITH SEPTIC BURSTITIS, HIGHER COMPLICATION RATE W/ASEPTIC
 - SURGICAL MGMT, LESS LIKELY TO RESOLVE VS CONSERVATIVE CARE (IN EITHER) WITH A HIGHER COMPLICATION RATE
 - CSI FOR ASEPTIC ASSOC. W/INC OVERALL COMPLICATIONS, SKIN ATROPHY
 - ASPIRATION DID NOT INCREASE RISK OF BURSAE INFECTION FOR ASEPTIC BURSTITIS



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DISTAL BICEPS TENDONITIS/TEAR

- Classically avulsion from the bicep tuberosity
- Dominant arm, M>F, 5th decade
 - Incidence 2.55/100k persons/yr.
 - 3% of all bicep ruptures
- Partial tears can occur
- Mechanism: rapid, forced extension of the forearm w elbow flexed → pop, weakness
 - Women ? more attrition and more in 6th decade
- Risk: anabolic steroid, Cushing's, oral steroids, tobacco use, aging
- Test: Hook (lateral), Passive Pronation Test, Biceps crease
- Loss of 27-60% supination strength, 21-30% flexion strength



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THANK YOU!



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