ELBOW ARTHROSCOPY FOR LATERAL EPICONDYLITIS

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DISCLOSURES

The following relationships exist:
1. Royalties and stock options
   - None
2. Consulting income
   - Smith & Nephew
3. Research and educational support
   - Arthrex
   - Mitek
   - Smith & Nephew
4. Other support
   - None

Lateral Epicondylitis

INTRODUCTION

- Most common elbow condition
- Lateral elbow pain
- 30 – 50 year olds
- Dominant arm
- Insidious onset
Lateral Epicondylitis

INTRODUCTION
- Tendinosis of ECRB origin
- Histopathology
  - Vascular proliferation
  - Hyaline degeneration
  - “Angiofibroblastic hyperplasia”

INTRODUCTION
- History
  - Repetitive gripping
  - Pain localized just below the lateral epicondylox
  - Gradual in onset
  - Weakness complaints
  - Difficulty lifting

INTRODUCTION
- Physical exam
  - Tenderness over the ECRB origin
  - Pain reproduced with resisted wrist and finger extension
  - Grip strength often decreased
Lateral Epicondylitis

NON-OPERATIVE TREATMENT

- Therapy
- Modalities
- Activity modifications
  - Workplace
  - Sport

Counterforce bracing
- Transfers ECRB origin
- Well tolerated

Local corticosteroid injections

Extensive organized exercises

PRP injections

Surgical indications
- Pain that interferes with daily activity and occupation
- Failure of non-operative treatment for 6 months
Lateral Epicondylitis

GOALS OF SURGERY

- Resect pathological tissue
  - Tendinosis (ECRB, EDC)
- Address any intra-articular pathology
- Minimize morbidity

OPEN RESECTION (NIRSchL)

1) Split between ECRL and extensor aponeurosis
2) Resect ECRB origin
3) Decorticate lateral epicondyle

Excellent results

- Nirschl
  - 95% – 97% success
- Jobe
  - 88% - 93% success
Arthroscopic Treatment

Why convert to arthroscopic approach for lateral epicondylitis release?

- Less pain
- Faster recovery
- Easier rehabilitation
- Intra-articular pathology
  - Synovitis
  - Radiocapitellar plica

Arthroscopic Treatment of Lateral Epicondylitis

WHY CHANGE?

- Peart et al, Am J Orthop 2004
  - Compared arthroscopic and open release
    - Level III cohort study
    - 46 open vs. 29 arthroscopic
    - Arthroscopic patients had faster return to work and less therapy
  - 8 published level IV case series
    - Outcomes of arthroscopic release
    - 189 patients
      - 174 (92.1%) good to excellent
      - Only 1 complication (0.5%)
        - “Forearm paresthesia”
Arthroscopic Treatment of Lateral Epicondylitis

- Baker et al, JSES 2000
  - 37 patients
  - 94% success
  - RTW 2 weeks!
  - No complications

- Baker et al, AJSM 2008
  - 30 patients
  - Follow-up 11 years
  - 87% satisfied
  - Reliable long term results

Arthroscopic vs. Open Tennis Elbow Release

Solheim et al (Arthroscopy, 2013)

- Level III comparison of open and arthroscopic release
  - 80 open
  - 225 arthroscopic
- Follow-up 4 years
- Failure rate no different
- No major complications
- Excellent outcomes higher in arthroscopic group (78% vs 67%)

Arthroscopic Treatment of Lateral Epicondylitis

ANATOMY

- ECRB
  - Beneath ECRL
  - Blends with capsule
Arthroscopic Treatment of Lateral Epicondylitis

ANATOMY
- Lateral Ulnar Collateral Ligament
  - Inferior to ECRB
  - Below equator of radial head

SURGICAL TECHNIQUE
- Prone or lateral position preferred
  - Better posterior access
  - Easier flexion and extension
- Proximal medial portal
  - 1-2 cm anterior and proximal to medial epicondyle
  - Confirm ulnar nerve in groove

- Visualize
  - Coronoid process
  - Trochlea
  - Radial head
  - Capsitellum
  - Lateral capsule
- Look for other pathology
  - Radiocapitellar arthrosis
  - Synovial plica
Capsule classification
- Type I – normal
- Type II – horizontal rent
- Type III – complete rupture of capsule

Baker et al JSES 2000

Surgical Technique
- Anterolateral portal
  - Localize using spinal needle

Arthroscopic Treatment of Lateral Epicondylitis

Arthroscopic Resection
- Create window in capsule
- Exposes the ECRL and ECRB
Arthroscopic Treatment of Lateral Epicondylitis

**SURGICAL TECHNIQUE**
- Goal
  - Release tendon
  - Debride tendon
- Dissection directly on bone just lateral to articular surface
- Work from proximal to distal

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Arthroscopic Treatment of Lateral Epicondylitis

**SURGICAL TECHNIQUE**
- Arthroscopic retractor may be helpful
  - Improves “working room”
  - Protects vital structures

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Surgical Technique

- Many variations of arthroscopic release
- “Bayonet” technique
  - 221 consecutive patients
    - 5 year period
    - Technique published 2014
  - Sharp release of ECRB origin
    - #15 blade “Bayonet”
  - Arthroscopic resection of detached ECRB
Bayonet Technique

- “Tennis elbow portal”
  - Very proximal and adjacent to ECRB origin
  - Localized with spinal needle
  - Knife blindly releases ECRB origin
  - Arthroscopic shaver resects ECRB tendon

Bayonet Technique

- No major complications
  - 221 consecutive cases
  - 3 minor complications
    - Portal drainage
    - Responded to po antibiotics
- Potential advantages
  - Quick
  - Complete release of ECRB
  - Simplified resection of diseased tissue
  - 30° arthroscope
  - No retractor necessary

ARTHROSCOPIC RELEASE

BAYONET TECHNIQUE
Arthroscopic Treatment of Lateral Epicondylitis

POSTOPERATIVE PROTOCOL

- No specific limitations or restrictions
- PT for stretching and gentle strengthening
- RTW as tolerated
  - Several days to 3 months

Advantages of Arthroscopic Release

- Common extensor tendon not divided or taken down
- Allows for thorough intra-articular evaluation and treatment
- Patients’ recoveries enhanced
  - Less pain
  - Shorter rehab periods
- Cosmetically superior

Summary

- Arthroscopic lateral epicondylitis release effective
  - Excellent long term results
  - Complication rate very low
- Technique well defined and reproducible
  - Arthroscopic retractor helpful
  - Avoid lateral collateral ligament
  - Conversion to open release simple if technical difficulties arise
ARTHROSCOPIC MANAGEMENT OF ELBOW INSTABILITY

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COI

- Royalties: none
- Stock: none
- Consultant: DePuy Mitek, Smith & Nephew, Exactech, rotation medical

PLRI

- Dysfunction of the RUHL complex
  - Radio-ulnolhumeral ligament
  - Annular ligament
  - Lateral collateral ligament
DIAGNOSIS

- Lateral instability causes impairment of ADL
- Shift and pop with supination
- Exam: PLRI (prone) chair lift, IR push-up

Anterior View

- Abnormal radial head shift on the capitellum
- Laxity of the annular ligament: it will be "dropped down"

ANTERIOR VIEW
View of posterolateral gutter

- Lateral gapping of olecranon
- Entire forearm “moves away”
- Easy to “drive through” to medial side

ACUTE DISLOCATION

ARTHROSCOPIC REPAIR

- If we can see it we can fix it!
- Requires a 3D conception of where the ligaments are and how they need to be repaired
- Current equipment allows very precise anatomical restoration
DISTAL REPAIR: 1st anchor

DISTAL REPAIR: 1st stitch

LATERAL REPAIR: 2nd stitch
LATERAL REPAIR: 2\textsuperscript{nd} anchor

CONTINUE REPAIR

OUTSIDE VIEW / RETRIEVAL
FINAL VIEW: CHECK A/P

POST VIEW FINAL

FINAL VIEW: CHECK A/P

ANT VIEW FINAL

ADVANCED: TERRIBLE TRIAD FRACTURE AND LIGAMENT REPAIR
TERRIBLE TRIAD: RADIAL HEAD

TERRIBLE TRIAD: CORONOID

TERRIBLE TRIAD: CORONOID
**TERRIBLE TRIAD**

Ligament repair
- Localize the RUHL avulsion site (view from posterior)
- Establish anchor insertion portal (lateral)
- Retrograde suture retrieval
- Tie down to repair ligaments

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**TERRIBLE TRIAD**

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**RECONSTRUCTION WITH GRAFT**

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VIEW OF GRAFT

Postop Protocol

- Splint 1st week
- Brace 60-90 for 2 weeks
- Brace 30-90° for 2 weeks
- Brace 0- full for 2 weeks
- Progressive therapy for 6 weeks
- Return to activity @ 4 months

RESULTS

- Dzugan, et al: 52 pts: PLRI
  - Acute: 10 Patients: AC score > 190
  - Subacute 12 pts: AC score 188, 1 failure
  - Chronic 30 Pts: AC score 180, 3 failures
SUMMARY

- Elbow arthroscopy is beneficial in instability
- Most lateral instability can be managed by arthroscopy
- Elite athletes may do better with early reconstruction
- Poor tissue quality, especially in revision cases, may require grafting

THANK YOU

Ref: AANA book series: The elbow and wrist: Elsevier
ARTHROSCOPY FOR RHEUMATOID ARTHRITIS OF THE ELBOW

ADVANCED ELBOW ARTHROSCOPY VUMED WEBINAR SEPTEMBER 2014

Graham JW King MD, MSc, FRCSC

ROTH | MCFARLANE HAND & UPPER LIMB CENTRE ST. JOSEPH’S HEALTH CARE LONDON

DISCLOSURES

I receive royalties and am a consultant for Wright Medical Technology and Tornier Inc.

RHEUMATOID ARTHRITIS PATHOLOGY

- Synovitis
- Cartilage destruction
- Bony erosions/deformity
- Secondary capsular contracture
MAYO CLASSIFICATION

DISEASE PROGRESSION

SYNOVECTOMY INDICATIONS

- Synovitis not responsive to medical Rx
- Pain, stiffness, loss of function
- Mayo Stage I & II, IIIa in younger patients
SYNOVECTOMY
CONTRAINDICATIONS

• Inadequate medical management
• Severe articular cartilage loss or bony deformity
• Mayo Stage III and IV

ALTERNATIVE PROCEDURES

• Open synovectomy
  – Extra-articular pannus, severe stiffness, extensive synovitis, lack of arthroscopic experience
• Interposition arthroplasty
  – Advanced articular cartilage loss, younger with pauciarticular disease
• Total elbow arthroplasty
  – Advanced articular cartilage loss, older and lower demand

ARTHROSCOPY ADVANTAGES

• Less postop pain
• Improved articular visualization
• Better cosmesis
• Decreased morbidity/faster recovery
• Less stiffness
ARTHROSCOPY PROBLEMS
- Close proximity of neurovascular structures to capsule and portals
- Complex anatomy
- Congruent joint
  - limits distraction
  - small capsular volume
  - small working space
- Elbow arthroscopy experience often limited

PATIENT EVALUATION
- Skin quality
- Ulnar nerve location and function
- Elbow and forearm motion
- Elbow stability

TECHNIQUE
- General anaesthesia
- Prone or lateral decubitus
- Avoid antecubital pressure
TECHNIQUE

- General anaesthesia
- Prone or lateral decubitus
- Avoid antecubital pressure
- Sterile Tourniquet

57 Y/O FEMALE RA
40 – 125°, INTRACTABLE SYNOVITIS

TECHNIQUE

- Release or transpose ulnar nerve if symptomatic or severe loss of flexion
- Resect synovium
- Debride osteophytes
- Excise radial head if symptomatic and restricting forearm rotation (rare)
- Capsulectomy if motion limited
ARTHROSCOPIC SYNOVECTOMY

10 DAYS POSTOP
30 – 135°, MINIMAL PAIN

52 Y/O FEMALE RA
30 – 140°, PAINFUL ROTN 50 - 50°, SYNOVITIS
**POSTOP MANAGEMENT**

- Synovectomy alone – outpatient
- Synovectomy, capsulectomy and debridement – admit for CPM and pain control with axillary block

**SPLINTING**

- Extension splint
  - Worn at night
  - Frequently remolded
- Flexion Cuff
  - Daytime use
  - Frequently adjusted

**RESULTS: ARTHROSCOPIC SYNOVECTOMY**

- Horluchi JBJS 2001
- 71% good to excellent results 2 years
- 43% good to excellent results at 8 years
- 100% and 71% good to excellent results for Mayo/Larsen grade I and II elbows at 2 & 8 yrs
**OPEN vs ARTHROSCOPIC SYNOVECTOMY**

- Tanaka, JBJS 2006
- Mayo grade I and II elbows
- Arthroscopic outcome equal to open surgery overall
- Recurrent synovitis more common with arthroscopy while stiffness/ankylosis more frequent with open surgery
- MEPI 50 preop; 78 at 4 years; 67 for scope and 71 for open surgery at 13 years

**COMPLICATIONS**

- Nerve injury – posterior interosseous, ulnar, median
- Inadequate synovectomy
- Recurrent stiffness
- Synovial fistula

**SYNOVECTOMY FOR RA**

- Useful procedure – not the starter elbow
- Patients with less articular damage on disease modifying drugs best candidates
- Increasing role with more aggressive approach to joint preservation
Osteochondral lesions about the elbow

The following relationships exist:

- Royalties: Biomet, Arthrex
- Consulting: Arthrex, Acumed, Synthes
- Other: Elsevier

Osteochondritis Dissecans

- Lateral compression injury in the throwing athlete
- Increased load at the radiocapitellar joint during valgus stress - late cocking and early acceleration
### Osteochondritis Dissecans

- Described by Koenig in 1888
- **Osteochondritis** - meaning inflammation of the joint surface
- **Dissecans** - meaning to separate
- Currently accepted that inflammation does not play a role
- More accepted theories include microtrauma and disruption of local vasculature

### Osteochondritis Dissecans vs. Panner’s Disease

- Lateral compression at the radiocapitellar joint can also result in **Panner’s disease**
- Panner’s disease first described in 1927
- Radiographic fissure and fragmentation of capitellum
- 90% boys less than 10 years of age

### Panner’s Disease

**Treatment**
- Alleviation of symptoms
- Reduction in elbow activities
- Immobilization for 3 - 4 weeks/anti-inflammatory medications
- Symptoms may persist for several months but long-term prognosis excellent
Osteochondritis Dissecans

**Lesion**
- Fissuring, size & fragmentation entire capitellum
- Natural history is typically regeneration and reconstitution of the capitellum
- No residual deformity is seen

**Natural History**
- Focal lucency surrounded by subchondral sclerosis
- Classic semilunar demarcation called the “crescent zone”
- Localized lesion may remain in situ or detach

**Classification of OCD of Capitellum**
- IA Intact/Stable - no loss of subchondral stability
- IB Intact/Unstable - impending collapse subchondral bone
- II Open/Unstable - cartilage fracture/partial displacement
- III Detached - loose fragments within the joint

**Intact Stable lesions**: non-surgical - activity modification
- 6/7 heal Takahara, JBJS 2007

**Surgical indications**: persistent symptoms

**Surgical management**: excision of loose bodies or partially attached lesions
- Abrasion chondroplasty or subchondral drilling
- Internal fixation/osteochondral grafts - results variable

Panner’s disease

**Natural History**
- Focal lucency surrounded by subchondral sclerosis
- Classic semilunar demarcation called the “crescent zone”
- Localized lesion may remain in situ or detach

OCD
Retrograde Drilling

Lesion debridement and microfracture

14 yo, 3 y h/o pain. Failed rest. Mechanical symptoms
Results of treatment - long-term followup:

- Bauer: 31 patients - 50% incidence of impaired motion/pain at 23 years F/U (23 with surgery)
- Takahara: 53 patients - 50% limitation of elbow function at 13 year F/U (18 with surgery)

Bauer et al, CORR, 1992  
Takahara et al, CORR, 1999

**Arthroscopic treatment**
- 10 baseball players (ave. age 13.8 yrs)
- Symptoms and objective findings correlated poorly with the radiographic grade of the lesion
- Overall excellent results
- Follow-up 3.9 yrs average
- Only 4 patients returned to organized baseball

Byrd and Jones, AJSM, 2002

**Osteochondral Autograft**
- 10 athletes (mean age 14.3 yrs)
- Cylindrical osteochondral bone plugs - lateral femoral condyle (OATS technique)
- Open approach - 2 or 3 plugs (5-8mm)
- All with bony union at 3 months
- Results - excellent 8  poor 2

Shimada et al, CORR, 2005
Osteochondritis Dissecans

**Osteochondral Autograft Transplantation**
- 9 baseball players
- Mean age 13.6
- Follow-up 3.5 yrs
- Kocher’s interval approach
- Osteochondral grafts 10mm harvested from the intercondylar notch of the lateral femoral condyle or lateral patellofemoral joint
- Cased for 2 weeks
- 6 of 9 returned to previous sport level

Yamamoto et al, AJSM, 2006

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Osteochondritis Dissecans

**Osteochondral Transplantation to Treat Osteochondral Lesions in the Elbow**
- Retrospective review 7 patients grade II/IV lesions (5 capitellum, 1 trochlea, 1 radial head)
- Single osteochondral autograft from knee (9-11mm)
- Mean 5 year follow-up:
  - 3/7 pain free
  - 7/7 graft incorporation on follow up MRI and no arthritis on radiographs
  - Normal range of motion in all patients
  - All improved and satisfied with procedure
  - No permanent donor site complications
  - All returned to sporting activity without limitation post-operatively

JBJS 2007; 89:2188-94

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Osteochondritis Dissecans

- 12 patients (mean age 14.5 yrs)
- Follow-up 3.2 years
- Arthroscopic management: partially detached debrided to bleeding cancellous bone
- No attempt to drill underlying bone - no short-term advantage seen in this study
- 11 patients with minimal symptoms and highly satisfied

Ruch et al, Arthroscopy, 1998
• Retrospective review of 106 patients with OCD of the capitellum

• Treatment:
  - Non-operative: 36
    - 75% with mild to severe pain and limitation of activity
  - Fragment excision: 55
    - 35% with mild to severe pain and only 50% returned to competitive sports
  - Fixation or reconstruction: 15 (12 fixation/bone graft, 3 osteochondral autograft)
    - 14 patients with mild to severe pain, only 1/3 returned to competitive sports

• Author Treatment Recommendation:
  - Stable lesions: open physes, grade I lesion, Normal ROM
    - Activity modification and rest (6/7 Stable lesions healed with rest)
  - Unstable lesions: closed physes, grade II/III lesion, >20° contracture
    - Treat surgically (specific treatment depends on size, grade, and location of lesion)

**Osteochondritis Dissecans**

- 27 female gymnasts (age 9-16 years) with 41 arthroscopic surgeries
- Average 15.5 years (0.5-7)
- Arthroscopic debridement and retrograde drilling
- 2 patients antegrade drilling and grafting with intact cartilage surface (failed both required repeat arthroscopy)
- 76% of athletes returned to sport
- 40% bilateral
- No differences were seen in lesion size between athletes able or not able to return to sport

Bartkiw, Hastings, Nassar ASSH annual meeting 2012

**Conclusions**

- The best treatment is prevention and early detection
- Arthroscopic debridement is effective treatment of partial or loose lesions
- Adjunctive autograft transplantation may help but not shown to be better than simple debridement
- Extra-articular drilling can be considered for patients with capitellar OCD and stable lesions
THANK YOU!
Elbow Arthroscopy for Arthritis

Scott P. Steinmann M.D.
Professor of Orthopedic Surgery
MAYO CLINIC

Disclosure – consultation from Arthrex, Elsevier, Acumed, Biomet, Synthes
Royalty - Biomet, Arthrex

Elbow Arthroscopy

- Becoming a more common procedure
- Indications evolving
- Continuing advancement in techniques
ELBOW ARTHROSCOPY

New techniques:
- Contracture release
- Treatment of arthritis

with this... a potential for neurovascular injury

Neuroanatomy

- Fear of nerve injury is what makes us most hesitant (appropriate)
- Clearly under reported - only a few cases in the literature
- I have heard of every nerve injured (by good surgeons)

ELBOW ARTHROSCOPY

Indications:
- Undiagnosed pain
- Painful catching or locking (plica)
- Loose bodies
- Stiffness/Arthritis
- Synovectomy
- Osteochondritis Dissecans
- Lateral Epicondylitis
- Fracture
- Ulnar neuropathy?
- Biceps partial tear debridement?
ELBOW ARTHROSCOPY

- Preoperative Planning
- Standard Radiographs:
  Anteroposterior
  Lateral
  Oblique
- CT scan (3-D very good for Arthritis and Fracture workup)
Open Debridement: Still a good option

Lateral Exposure

Radial Head

Lateral Approach

Anterior

Posterior
ELBOW ARTHROSCOPY

Surgical Technique:
- General Anesthesia - preferred
- Awkward position for an awake patient
- If a block used-you will be unable to ascertain nerve status postop
ELBOW ARTHROSCOPY

Surgical Technique:
- Mark out all portals with surgical pen
- Exsanguinate with Esmarch/tourniquet
- Inject 20-25 cc saline (direct posterior or anterolateral is easiest)

Elbow Arthroscopy

Portals
- First there is no wrong portal
- Just safe portals
- Okay to start on Medial, Lateral or Posterior
- No limit on the number or portals - use what you need for the job
ELBOW ARTHROSCOPY

Surgical Portals:

**Anterolateral**
- First portal to establish
- Place a few mm distal and anterior to radiocapitellar joint sulcus
- Incision skin just anterior to RC joint
- Assume you are close to the radial nerve (4 mm)
- Blunt trocar to enter joint

Operative Steps

Elbow Arthroscopy
Anatomy Anterior Capsule

Humerus

Radial Head

Radial Nerve

Radial Nerve Anatomy

Median Nerve

Anatomy Anterior Capsule
ELBOW ARTHROSCOPY

Loose Bodies

IMPORTANT:
- Single loose body removal does not help many patients.
- Often a clue to the presence of osteophytes and arthritis.
Arthritic Treatment of Elbow Arthritis

- 41 patients with Osteoarthritis (42 elbows)
- Follow-up averaged 176.3 weeks (range: 104-272 weeks)
- 37 male, 4 female patients
- Mean age 52.8 years
- 28 dominant extremities
- Single surgeon

Adams, JSES, 2008

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Adams, JSES, 2008
Posteromedial Capsule Release

Arthroscopic Ulnar Nerve Decompression in the Setting of Elbow Osteoarthritis
Kovachevich and Steinmann, JHS, 2012

Arthroscopic Studies

- 22 patients
- 42 years, mean age
- Arthroscopic release
- ROM flexion 122° → 141°
  extension 38° → 18°

Arthroscopic debridement and capsulectomy of the contracted elbow is effective

Results are comparable with those of other reports in the literature in which both arthroscopic and open methods were used

Nguyen D, Proper SI, MacDermid JC, King GJ, Faber KJ
Arthroscopy, 2006.

Arthroscopic Studies

- Somanchi et al: Acta Orthop Belg 2008:
  - 26 patients with debridement and capsular release
  - Functional improvement in 87/5
  - Improved Elbow Functional Assessment score 48 -> 84

  - Improved pain/function at mean 6 yrs in 24 patients
  - DASH 56.01
Arthroscopic Studies

- Krishnan et al JSES 2007
  - Arthroscopic Unohumeral arthroplasty at 24 mo
  - Improvement of 73 degrees in flexion arc
  - High rate of satisfaction

- Savoie Arthroscopy 1999: Arthroscopic Unohumeral arthroplasty
  - 92% G→E results

Evidence-based indications for elbow arthroscopy

- Fair-quality evidence in the treatment of rheumatoid arthritis and lateral epicondylitis
- Poor-quality evidence for, rather than against, degenerative arthritis, osteochondritis dissecans, radial head resection and loose bodies
- Insufficient evidence for or against posterolateral rotatory instability and septic arthritis

Yoshih et al, Arthroscopy, 2012

Overview of Arthroscopy for Arthritis

- Similar results relative to open procedures
- 81-92% G-E results*
- Has not been shown to result in sooner return to work, superior outcomes
- Does not establish the superiority of this procedure over open procedures

REMEMBER:

Small Cases ...

...before Big Cases

Thank You