Ulnar Nerve Issues in Throwers

I, John Conway MD, do not have relevant financial relationships to be discussed, directly or indirectly, referred to or illustrated with or without recognition within the presentation, but have industry relationships as follows:

Arthrex Inc. - Royalties

My full disclosure is in the AAOS Database

The Kinetic Chain

Posture
Balance
LE Weakness
LE Tight Muscles
Hip Motion
Lumbo-Pelvic-Hip
Core Stability
TFN / Flexibility
Scapula
Shoulder Motion
Humeral Torsion

Adapted from Groppel / Kibler
Ulnar Nerve Issues

1. Making the Diagnosis
2. Primary ulnar nerve neuropathy
3. Avoiding ulnar nerve complications with MUCL surgery
4. Ulnar neuropathy after MUCL surgery
5. Revision ulnar nerve surgery

Thoracic Outlet Compression

Dead Arm, Fatigue
Vague Pain - Biops, FA
Cramping, Fasciculation
Pain, Buzzing, Tingling, Numbness (2,3,4,5 fingers)
Congestion, Fullness
Loss of Pulse on Exam
Reproduction of Symptoms

Ulnar Nerve - Great Imitator

Especially in Young Athletes
Vague Medial or PM Pain
Usually Zone 1
Clumsiness
Lost Command
Sometimes:
Buzzing or Numbness

Presentation:
MUCL, VEO, Stress Fx
Examination

Position and Mobility
Normal, Type A, Type B

Subluxation
Ulnar Nerve & Triceps

Tenderness – zone specific
Zone 1  Pathognomonic
Zone 2, 3  Less specific

Neurotension signs

Examination

Position and Mobility
Normal, Type A, Type B

Subluxation
Ulnar Nerve & Triceps

Tenderness – zone specific
Zone 1  Pathognomonic
Zone 2, 3  Less specific

Neurotension signs

Examination – Tests

Percussion Test
Flexion Test ± Compression (3 min)
Deep Flexion Press Test (3 sec)
Shoulder IR Test (SIRT) (10 sec)
Modified SIRT (5 sec)
Scratch Collapse

Childress et al COOR 1975
Type ‘A’

Childress et al COOR 1975
Type ‘B’

Ochi JHS Am 2011; Ochi JSES 2012
Hand Findings

- Clawing (Lubricals)
- Froment Sign (Ad Poll)
- Wartenberg Sign (Interossei)
- Weakness
- Sensory Changes
- Atrophy

EMG / NCV

Always request:
- Comprehensive study
- Proximal assessment
- Roots, BP, TOS
- Above / Below NCV
- Short Segment INCV
  Inc. Sensitivity
- Contralateral NCV

EMG / NCV

Baseball Players

- Dom NCV > ND NCV
  Wei APM Rehab 2005
- Above Elb. > Below Elb
- 55 m/sec is rarely Normal for a Baseball Player

Gabel JBJS 1990, Adelaar JHS 1984
Short Segment Incremental NCV

Significantly more sensitive than routine NCV
Localizes site of conduction delay
Potentially alters treatment
Azriel MNv 2003
Herman MNv 2001
Campbell MNv 1992

MRI – UN Appearance

NOT DIAGNOSTIC
Oval or round structure
Surrounded by fat
Intermediate signal on all sequences
Vessels
T1 Hypointense
T2 Hyperintense
Increased UN signal common in healthy pitchers

Structural Bands

Arcade of Struthers
Inter-brachial Ligament
Anconeus Epitrochlearis
Cubital Tunnel
Retinaculum
FCU Aponeurosis
FCU / FDS Aponeurosis
Deep Flexor-pronator Retinaculum
Structural Bands

- Arcade of Struthers
- Inter-brachial Ligament
- Anconeus Epitrochlearis
- Cubital Tunnel
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Zone 1
Zone 2
Zone 3
Structural Bands

- Arcade of Struthers
- Inter-brachial Ligament
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Vascular Supply

- Brachial Artery
  - Superior and inferior ulnar collateral arteries
- Radial Artery
  - Posterior ulnar recurrent artery

Cutaneous Nerve Branching Patterns

- Cross at or prox to ME: 61%
- Cross distal to ME: 100%

Lowe Pi Recon Surg 2001
Race, Saldana JHS 1991
Dellon Mackinnon JHS 10B 1985
Ulnar Nerve Neuropathy Post MUCL

Vitale & Ahmad AJSM 2008 46% had UNT
Overall 6% Postop UN paresthesia UN Sx
UNT Obligatory 75% Excellent 9%
Non-Obligatory 89% Excellent 4%
Scope Scope 10%
No Scope 2%
Erickson AJSM 2014 70% had UNT
Overall 7.5% Postop UN paresthesia

How to Avoid UN Complications

Not doing a Transposition
Don’t Inject Steroid!! Podnar Muscle Nerve 2016
Don’t hurt the nerve!!
See, mobilize and protect the nerve, gentle retraction
Be certain the drills and sutures cannot harm the nerve

How to Avoid a Complication

Don’t do a Decompression!!
Advantages
Minimal morbidity, vascular
Disadvantages
No reduction in strain
Compression in flexion
Subluxation
Adolescent Athlete – High (23%) reoperation rate following decompression Stuz JHS Am 2012
Not in throwers (except Zone 3)
How to Avoid a Complication
Never resect the ME!!
Methods
- Total Resection
- Partial Resection
- Minimal Resection
Indications
- McGowan I, IIA
- Never in Throwers!!

How to Avoid a Complication
Never do a SM Transposition!!
Methods
- Submuscular
- Partial Submuscular
- Subfascia
Indications
- McGowan III
- Never in Throwers!!

MUCL Injury Requiring Surgery

Ulnar Nerve Symptoms

- No Symptoms
- Clear Symptoms

Maybe

- No Transposition
- Transposition
MUCL Injury Requiring Surgery

Ulnar Nerve Symptoms

- No Symptoms
- Clear Symptoms
- Maybe

No Transposition
- Transposition

How to Avoid UN Complications

Doing a Transposition
- Mobilize the Nerve from the Arcade through the deep flexor pronator retinaculum
- Protect the motor branches
- Preserve the vascular supply

11/11/2016
How to Avoid UN Complications

**Doing a Transposition**
- Mobilize the Nerve from the Arcade through the deep flexor pronator retinaculum
  - Brachial Fascia
  - Inter-brachial ligament
  - Cubital Tunnel Retinaculum
  - Anconeus Epitrochlearis
  - FCU Aponeurosis
  - Deep Flexor Pronator Retinaculum

**Motor Branches**
- Inferior Ulnar Collateral Vessels

**Inferior Ulnar**

**Courtesy Ken Yamaguchi**

How to Avoid UN Complications

**Doing a Transposition**
- Mobilize the Nerve from the Arcade through the deep flexor pronator retinaculum
- Protect the motor branches
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**Motor Branches**
- Inferior Ulnar Collateral Vessels

**Courtesy Ken Yamaguchi**

How to Avoid UN Complications

**Doing a Transposition**
- Remove the medial inter-muscular septum
- Create a linear path
- Avoid fascia slings
- Carefully close the adipose fascia
How to Avoid UN Complications

Doing a Transposition

• Remove the medial inter-muscular septum
• Create a linear path
• Avoid fascia slings
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How to Avoid UN Complications

**Doing a Transposition**
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**Subcutaneous Pocket**

**Adipose fascia**

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**Some Complications**
- Transient UN Neuritis
- Prolonged UN neuropathy
- Compressive Fixation
- Knot beneath the UN
- Sensory Neuropathy
- Sensory Neuroma
UN Sublux After Transposition
Ulnar Nerve Subluxation after Transposition Triceps Subluxation after UN Transposition Sensory Neuroma

Incomplete Transposition
Arcade of Struthers Interbrachial Ligament Anconeus Epitrochlearis CT Retinaculum FCU Aponeurosis Deep Flexor Pronator Retinaculum

Incomplete Transposition
Arcade of Struthers Interbrachial Ligament Anconeus Epitrochlearis CT Retinaculum FCU Aponeurosis Deep Flexor Pronator Retinaculum Medial Intermuscular Septum
Incomplete Transposition

Arcade of Struthers
Interbrachial Ligament
Anconeus
Epitrochlearis
CT Retinaculum
FCU Aponeurosis
Deep Flexor
Pronator
Retinaculum

PostOperative Care

Splint  3 days
Sling  2 weeks
Full AROM hourly
Therapy at Day 5
UN Neuroglide / Release
Linked Kinetic Chain Rehab

Thank You