1 36th Annual Workers’ Compensation Seminar
   Kansas Department of Labor
   Division of Workers’ Compensation
   Overland Park Convention Center

2 Optimal Management of Upper Extremity Orthopaedic Problems
   - Bernard F. Hearon, M.D.
   - Clinical Assistant Professor, Department of Surgery
   - University of Kansas School of Medicine – Wichita
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3 www.drhearon.com
   education > residents’ file
   outline & references
   slide summary

4 General Considerations
   - Injury causation
   - Referral timing & location
   - Diagnostic imaging
   - Consultant choice
   - Setting expectations
   - Restrictions & impairment

5 Specific Problems
   - Carpal tunnel syndrome
   - Cubital tunnel syndrome
   - Injured shoulder evaluation
   - Subacromial impingement
   - Rotator cuff tears

6 Injury Causation
   - Determined by history and exam
   - Occupational medicine specialist knows workplace best
   - Orthopaedist may clarify causation
   - Legal challenges delay medical treatment

7 Key Questions
   - Did the injury occur at work?
   - Are the symptoms aggravated by work?
   - Was there a pre-existing injury?
   - Was there a pre-existing medical illness?

8 Timing & Location of Orthopaedic Referral
   - Emergency room
   - Minor emergency center
   - Urgent in-office consultation
   - Elective in-office consultation
9 Major Orthopaedic Emergencies
   Immediate Operative Treatment
   - Open fractures
   - Open dislocations
   - Crush injuries
   - High-pressure injection injuries
   - Closed dislocations

10 Minor Orthopaedic Emergencies
   Minor ER Treatment
   - Closed dislocations
   - Closed fractures
   - Tendon & nerve lacerations
   - Tendon & ligament ruptures
   - Joint sprains & muscle strains

11 Urgent Consultation
   Time Critical Operative Treatment
   - Tendon & nerve lacerations (< 1 wk)
   - Closed fractures (< 3 wks)
   - Acute tendon ruptures (< 3 wks)
   - Acute ligament ruptures (< 3 wks)
   - Closed dislocations after reduction
   - Constant paresthesia

12 Elective Consultation
   Less Time Critical
   - Musculoskeletal pain
   - Joint sprains
   - Muscle strains
   - Intermittent paresthesias
   - Shoulder injuries (not RCTs)

13 Shoulder Soft Tissue Injuries
   - Physical exam to assess RC
   - XR to r/o fracture or dislocation
   - Supportive treatment
   - Observation & serial examination
   - May resolve in 4 to 6 weeks
   - MRI may be deferred

14 Diagnostic Imaging
   - Appropriate radiographs are first step
   - Computed digital radiographs are best
   - Recommendations at drhearon.com
   - Advanced studies: MRI, MRA, CT, US
   - Orthopaedist determines advanced study

15 Orthopaedic Consultants
   - Should be Board certified
• Subspecialty fellowship trained
• Subspecialty certified (hand, sports)
• University-based consultants
• Appropriate physician assistant role

16 Practice Red Flags
• Limited appointment availability
• Limited consultant encounter
• Low rate of nonoperative treatment
• High rate of revision surgery
• High impairment ratings

17 Setting Expectations
• Discuss all treatment options
• Establish outcome expectations
• Engage patient in decision process
• Physical therapy, work conditioning
• Return to work is not guaranteed
• Alternative work, vocational training

18 Impairment & Work Restrictions
• AMA’s Guides should be used as a guide
• Impairment may not correlate w/restrictions
• Work restriction may avoid re-injury
• Patient w/o impairment may need restriction
• Pt w/impairment may not need restriction

19 Carpal Tunnel Syndrome

20 Epidemiologic Risk Factors
• Obesity
• Hypothyroidism
• Diabetes (14–30%)
• Pregnancy (50%)
• Renal disease
• Inflammatory arthritis
• Gender (women > men)
• Advanced age (> 50 yrs)
• Genetic factors

21 Occupation May Be Risk Factor
• Increased incidence in certain occupations
• Positional stress – dental hygienists
• Mechanical stress – beef handlers / cutters
• Vibration stress – sheet metal mechanics
• Repetitive stress – production workers
• Keyboarding is not causative

22 Clinical Diagnosis
• Median paresthesia aggravated by grasping
• Nocturnal paresthesia, morning numbness
Symptoms relieved by shaking the hand
Grip weakness, hand fatigue
Median nerve compression is provocative

23 Electrodiagnostic Testing
May confirm diagnosis
Quantifies disease severity
Serves as a preop baseline
Results may be normal

24 NC–Stat (NeuroMetrix)
Office tool to confirm diagnosis
Economical and convenient
Use in those w/median paresthesia
False positives in asymptomatic pts
Not for systemic neuropathies

25 Nonoperative Treatment
Splinting better than no treatment (3 months)
Oral steroids helped up to 8 weeks
Steroid injection may help for 6 months and has prognostic significance
Ultrasound may be beneficial

26 Carpal Tunnel Release Techniques
Open CTR
Endoscopic CTR

27 Endoscopic Versus Open Technique
ECTR better for earlier RTW, grip strength
ECTR higher risk neurapraxia, revision surgery
No difference in risk of major nerve injury
No clinical difference in long–term outcome

28 My Preferred Technique is Open

29 Postoperative Protocol
Immediate digital motion
Wrist motion in 2–3 days
Sutures out at 2 weeks
Doctor–patient therapy
Full activity / MMI 6–12 weeks

30 Outcome Comparison
Most experts say W/C status predispose to negative outcome
Higgs (1995) reported significantly more W/C pts had residual symptoms and changed jobs
Braun (1999) reported no difference in functional recovery rates in pts with or w/o attorney
Depends on study focus – subjective or objective

31 Cubital Tunnel Syndrome

32 Etiologic Factors
Idiopathic
Intrinsic anomalies
Trauma
Post-traumatic deformities
Elbow osteoarthrosis
Ganglia, tumors
Post-operative
Heterotopic ossification
Elbow instability

33 Occupation May Be Risk Factor
- Repetitive elbow flexion – cashiers, assembly workers, construction workers
- Mechanical compression – truck drivers
- Vibration exposure – laborers
- Post-traumatic ulnar nerve subluxation

34 Clinical Diagnosis
- Paresthesia in ulnar distribution
- Achiness medial elbow / forearm
- Paresthesia progresses to constant
- Loss of pinch & dexterity
- Elbow flexion test is provocative
- Ulnar nerve subluxation w/flexion

35 Electrodiagnostic Testing
- Permits confirmation of diagnosis
- Quantifies severity of disease
- Serves as preoperative baseline
- May be normal w/nerve subluxation

36 Nonoperative Treatment
- Avoid provocative position, activity
- Pressure-absorbing elbow pad
- Figure-of-eight towel at night
- Night splint w/elbow flexed 60 deg
- 50% improve if symptoms are mild

37 Operative Indications
- Intermittent ulnar paresthesia for 6 months
- Constant ulnar paresthesia
- Symptomatic ulnar nerve subluxation
- Demonstrable ulnar motor weakness
- Sensory loss in ulnar distribution
- Positive electrodiagnostic test

38 Ulnar Nerve Decompression Techniques
- Simple in situ decompression
- Arthroscopic-assisted decompression
- Medial epicondylectomy (King & Morgan)
- Subcutaneous transposition (Curtis)
- Submuscular transposition (Learmonth)
- Intramuscular transposition (Adson)
Transmuscular transposition (Dellon)

39 Intraneural Ulnar Nerve Pressure Related to Technique for Cubital Tunnel Decompression
Dellon et al., JHS 1994, 19A: 923–30
- 50 fresh human cadavers
- Pressures measured at different nerve locations and in varying degrees elbow flexion
- All surgical techniques elevated pressure except anterior transmuscular transposition
- True for all sites in all positions of elbow flexion

40 Anterior transmuscular transposition of the ulnar nerve in lateral decubitus position for cubital tunnel syndrome

41 Lateral Decubitus Position
- General anesthesia
- Bean bag stabilization
- Padded arm support
- Sterile tourniquet
- 2.5 x loupes
- Surgeon standing

42 Advantages of Lateral Decubitus
- Familiar position
- Frees first assistant
- Avoids medial antebrachial cutaneous nerve
- Best view ulnar nerve
- Allows open carpal tunnel release

43 Transpose Nerve Under Fascial Flaps

44 Postoperative Protocol
- Drain removed 3 days postop
- Neoprene compression sleeve
- Early active elbow ROM
- No elbow stiffness
- Formal therapy not required
- Full activity / MMI at 3 months

45 Procedure of choice for primary or recurrent ulnar nerve entrapment (or subluxation) at the elbow is transmucular transposition

46 Evidence-Based Treatment of Cubital Tunnel Syndrome
- Three randomized, controlled clinical trials
- Nabhan (2005): No difference SD vs SQT
- Gervasio (2005): No difference SD vs SMT
- Biggs (2006): No difference SD vs SMT
- Chung now does simple decompression as procedure of choice due to simplicity, potential faster recovery
Simple decompression of the ulnar nerve at the elbow may result in late ulnar nerve subluxation requiring operative treatment.

Shoulder Problems
- Injured shoulder evaluation
- Subacromial impingement
- Rotator cuff tears

Injured Shoulder Evaluation
- History & physical exam
- Plain radiographs
- Non-operative treatment
- Orthopaedical consultation
- MRI if initial treatment fails

Do shoulder patients insured by workers’ compensation present with worse self-assessed function and health status?
Viola et al; J Shoulder Elbow Surg 2000; 9:368–72
- Answer is “Yes” for all 12 diagnoses studied
- 1063 consecutive shoulder pts
- Two questionnaires on general health
- W/C group reported significantly lower function
- Study controlled for patient age and gender

Frontal Shoulder Views Are Not Helpful
Shoulder Views Must Be Orthogonal
Overutilization of shoulder magnetic resonance imaging as a diagnostic screening tool in patients with chronic shoulder pain
- Retrospective study 101 pts, 104 shoulders
- Atraumatic chronic shoulder pain
- 41% pts had MRI before shoulder evaluation
- 90% over-utilization rate for MRI
- No difference in outcome with or w/o early MRI

MRI Quality Matters
Esaote E-scan Provides High Quality Images
Low Field MRI in Upper Extremity Imaging
- Low field (< 0.2T) magnets are FDA approved
- Lower cost & maintenance, suitable for office
- E-scan 0.2 T MRI by Esaote (Italy)
- High quality images comparable to high field
- Radiologists should establish imaging protocols

Post-Traumatic Subacromial Impingement
Common after shoulder injuries
Fall is usual injury mechanism
Anatomy may predispose some patients
Subacromial injection may be effective
Subacromial decompression if no better

58 Arthroscopic subacromial decompression is treatment of choice for subacromial impingement

59 Postoperative Protocol
- Supervised physical therapy
- Immediate passive ROM
- Progress to active ROM
- Strengthening at 5 weeks
- Full activity / MMI 2–3 months

60 Anterior acromioplasty: Effect of litigation and workers’ compensation
- 75 pts rx w/acromioplasty for impingement
- 49% had filed work comp claims
- 97% good or excellent result and 91% RTW
- W/C group took 14.2 weeks RTW
- Non W/C group took less than 5 weeks RTW

61 Arthroscopic Acromioplasty: A Comparison Between Workers’ Compensation and Non–Workers’ Compensation Populations
- Consecutive series 106 pts (40 W/C, 66 not)
- No difference in mean outcome scores
- Significant difference in RTW (13.7 vs 9.1 wks)
- Higher work demand > delayed RTW in both

62 Rotator Cuff Tears
- Most common in middle-aged men
- Traumatic vs degenerative dilemma
- Partial–thicknes vs complete
- Full–thickness are small, moderate or massive
- Nonoperative treatment temporizes

63 Arthroscopic repair is standard of care for rotator cuff tears

64 Postoperative Protocol
- Supervised physical therapy
- Protection Phase – Passive ROM
- Motion Phase – Active ROM
- Strengthening Phase – Isotonics
- Full activity / MMI at 6–12 months
65 Repair of the rotator cuff: A comparison of results in two populations of patients
• 103 consecutive rotator cuff repairs
• W/C 24 patients, non W/C 79 patients
• 42% W/C pts returned to full activity
• 94% non W/C pts returned to full activity
• Time to RTW not significantly different (6 mo)

66 Patients with Workers’ Compensation Claims
Have Worse Outcomes After Rotator Cuff Repair
• 125 patients (39 W/C pts, claim pending)
• Evaluated w/outcome measures 1 yr postop
• W/C status associated w/worse outcome
• Analysis controlled for confounding factors