CPGs for the Knee Ankle/Foot

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Outline of Talk

• Knee Ligament Sprain
• Meniscal and Articular Cartilage Lesions
• Ankle Sprains
• Heel Pain

Knee Ligament Sprain

• Knee Stability and Movement Coordination Impairments: Knee Ligament Sprain

• Authors: David Logerstedt, Lynn Snyder-Mackler, Richard Ritter, Michael Axe, Joe Godges

• JOSPT; 40(4):2010

Knee Ligament Sprain

• ICD10
  — S83.4: Collateral ligaments
  — S83.5: ACL/PCL
  — S83.7: multiple ligaments/meniscus

• Clinical Course – Good Review

Knee Ligament Sprain

• Risk Factors for non-contact ACL tears
  — Environmental
    • Level 2: increase shoe-surface interaction for higher traction may increase risk
  — Anatomical
    • Level 2: ↑BMI, narrow notch width, increased joint laxity (KT-2000) (relative risk, 21.3)
    • Difficult to modify

Knee Ligament Sprain

• Risk Factors for non-contact ACL tears
  — Hormonal
    • Level 2 evidence females more predisposed to ACL injury during preovulatory phase of menstrual cycle.
    • Hormonal intervention not warranted
  — Neuromuscular
    • Loading pattern of dynamic knee valgus or strong quadriceps activation is risk position
    • Most modifiable risk factor
Knee Ligament Sprain

• Imaging - The Ottawa Knee rule
  – Age 55 or older
  – Isolated tenderness of patella
  – Inability to flex knee to 90 degrees
  – Inability to bear weight immediately and in the ED for 4 steps regardless of limping

• Clinical exam appears to be as accurate as MRI in dx of cruciate and collateral lesions of the knee

Knee Ligament Sprain

• Outcome Measures
  – Validated Patient-report outcome measure (Grade B)
    • Knee Outcome Survey-ADLS (Level I)
    • Knee Injury and OA Outcome Score (KOOS) (Level I)
    • Lysholm Knee Scale (Level II)
    • Cincinnati Knee Rating Scale (Level II)
    • Tegner Activity Level Scale (Level V)

Knee Ligament Sprain

• Outcome Measures
  – General health questionnaire
    • SF-36 (10 min) – discriminate between injury classification stages at baseline and detect changes with treatment over time.

Knee Ligament Sprain

• Activity Limitation Measures
  – Functional Performance Tests (Grade C)
    • Single Leg Hop Test (High ICC)
      – ACL only
        » SLH for distance
        » SL triple crossover hop for distance
        » SL triple hop for distance
        » SL 6-m timed hop

Knee Ligament Sprain

• Intervention: Early WB
  – Early WB can be used following ACL reconstruction without incurring detrimental effects on stability or function – Grade C
  – MCL – Level V
    • Isolated MCL tear – WB to tolerance
    • Following repair- NWB for 3 weeks (2006)
  – PCL – Level V
    • PWB recommended 2-4 wks following sx (1999)
Knee Ligament Sprain

- **Intervention – Knee Bracing**
  - Use of functional brace appears to be more beneficial than not in patients with **ACL deficiency**  
    - Grade C  
  - Postop knee bracing appears to be more beneficial than not following ACL sx – **Grade B**
  - Conflicting evidence on use of functional knee bracing following ACL reconstruction – **Grade D**
  - Knee bracing can be used for patients with acute PCL injuries or severe MCL injuries – **Grade F – Expert Opinion**

Knee Ligament Sprain

- **Interventions – Immediate vs. Delayed Mobilization**
  - Immediate mobilization is suggested following ACL reconstruction (Grade B)
  - Improved ROM
  - Reduce pain
  - Limit adverse changes to soft tissue
  - Accelerate Program (Grade B)
  - Knee extension, early WB appears safe
  - No evidence regarding early return to sports.

Knee Ligament Sprain

- **Interventions – Cryotherapy (Grade C)**
  - Immediate post-op knee pain

Knee Ligament Sprain

- **Interventions – Therapeutic Exercise**
  - **Open and Closed Chain Exercise (Grade A)**
    - 4 studies presented
    - OC better with IK knee ext torque (Tagesson et al., 2008)
    - No difference in joint laxity, outcome scores, functional performance (Perry et al. 2005, Trees et al., 2005)
    - Combination group maintained sporting activity at 2.5 compared to CC only (Trees et al., 2005)
    - SR (5 studies) by Wright et al. 2008. Findings inconclusive due to poor study qualities.

Knee Ligament Sprain

- **Interventions –**
  - **Neuromuscular Reeducation (Grade B)**
    - Proprioceptive Training – single plane progressing to multi-plane power training.
    - Perturbation training (Fitzgerald et al, Phys Ther, 2000)
  - **Eccentric Strengthening (Grade B)**
    - Eccentric Ex Ergometer
      - Activity improved, no diff in effusion/jt. laxity
    - PCL – eccentric squat program
Knee Ligament Sprain

- Interventions –
  - Neuromuscular Elec Stim (Grade B)
    - 14 RCT
    - Improved IK strength
    - No correlation with functional performance
    - High intensity setting early in rehab process
      - 2500 HZ AC, 75 bursts per sec, 2 – 3 x week for 3 – 12 weeks

- More research/No recommendation
  - Graft-type used for ACL reconstruction

Meniscal / Articular Cartilage Lesions

- Knee Pain and Mobility Impairments: Meniscal and Articular Cartilage Lesions

- Authors: David Logerstedt, Lynn Snyder-Mackler, Richard Ritter, Michael Axe

- JOSPT; 40(6):2010

Meniscal / Articular Cartilage Lesions

- Risk Factors (Grade C)
  - Age
    - Severity of chondral lesions
  - ACL injury
    - High level sports participation before injury
    - Knee joint laxity after knee injury
  - Meniscal tear
    - Increase odds of having chondral lesion
      - Majority medial tibiofemoral compartment

- ICD10
  - S83.2: Tear of meniscus, current
  - M23.2: Derangement of meniscus due to old tear or injury
  - S83.3: Tear of articular cartilage, current
  - M93.2: Osteochondritis dissecans

- Outcome Measures
  - Validated Patient-report outcome measure (Grade B)
    - Knee Outcome Survey-ADLS (Level I)
    - Knee Injury and OA Outcome Score (KOOS) (Level I)
    - Lysholm Knee Scale (Level II)
    - Cincinnati Knee Rating Scale (Level II)
    - Tegner Activity Level Scale (Level V)
Meniscal / Articular Cartilage Lesions

• Activity Limitation Measures (Grade C)
  – Single limb hop test
  – 6-minute walk test
  – Timed up-and-go test

Meniscal / Articular Cartilage Lesions

• Interventions
  • Progress Knee Motion (Grade C)
    – Following surgery, early progressive knee motion is recommended
      • Kelln et al., 2009 - used cycle ergometry as ROM mode (partial meniscectomy)
        – Improved ROM, gait pattern
      • Rodrigo et al. 1994 - CPM (debridement/microfx) vs. none = 85% had satisfactory lesion grade upon second-look arthroscopy

Meniscal / Articular Cartilage Lesions

• Interventions – Progressive WB
  • Conflicting evidence on best way to use progressive WB following meniscal repair/chondral lesions Grade D
    – Irrgang & Pezzullo; Buckwalter - cartilage benefit from intermittent compression but not shear
    – Shelbourne et al., 1996 – immediate WB after meniscal repair vs. standard WB progression
      • Accelerated group – ROM, return to sport

Meniscal / Articular Cartilage Lesions

• Interventions – Progressive Return to Activity (Grade C)
  • Meniscal repair
    – Barber (1994) – no difference between accelerated vs. traditional on second look arthroscopic
    – Shelbourne et al. (1996) - standard group- delayed ROM, Quad strength, slower return to activity
    – Mariani et al. (1996) – accelerated rehab no negative results
  – Grade E – AC surgery
    • Reinold (2006) – should delay to allow full maturation of repaired AC

Meniscal / Articular Cartilage Lesions

• Interventions – Therapeutic Exercise Grade B
  – Strength training – Quads, Hams
    • PT superior over home based (Moffet et al., 1994)
  – Functional exercise
    • May hold off on torsional activities for 6 weeks following meniscal repair

Meniscal / Articular Cartilage Lesions

• Neuromuscular Electrical Stimulation
  – Can be used following meniscal or chondral injuries to increase Quad strength Grade B
  – NMES – appears to be more beneficial than volitional exercises in minimizing strength loss due to immobilization.
Ankle Ligament Sprains

- Ankle Stability and Movement Coordination Impairments: Ankle Ligament Sprains

- Authors: Martin RL, Davenport TE, Paulseth S, Wukich DK, Godges JJ

- JOSPT 2013;43(9):A1-A40

Ankle Ligament Sprains

- Risk Factors – Acute Lateral Ankle Sprain
  - Grade B – Increased risk:
    - History of previous ankle sprain
    - Do not use an external support
    - Do not properly warm-up (dynamic mvmt)
    - Lack normal dorsiflexion ROM
    - Do not participate in balance/proprioceptive prevention program when have a history of a previous injury
    - Foot type – conflicting studies

Ankle Ligament Sprains

- Examination – Activity Limitation and Participation Restriction Measures Grade B
  - Ankle Sprains
    - Acute Grade I/II: 40-m walk time, 40-m run time, figure 8 run, single limb forward hop, cross over hop, stair hop = good for predicting return to sport
    - Lateral hop for distance
      - Distance travelled laterally in 3 continuous hops on single limb
      - Heel to heel
      - No more than 80% difference between sides

Ankle Ligament Sprains

- Risk Factors – Ankle Instability
  - Grade C – Increased risk:
    - Have an increased talar curvature
    - Do not use an external support
    - Did not perform balance/proprioception exercise following acute lateral ankle sprain

Ankle Ligament Sprains

- ICD10
  - S93.4: Sprain and strain of ankle
  - M24.27: Instability secondary to old ligament injury, ankle and foot

Ankle Ligament Sprains

- Examination – Outcome Measure Grade A
  - Foot and Ankle Ability Measure (FAAM)
    - 21-items ADL; 8-item sports subscale
      - Minimal clinically importance: 8 and 9 pts over 4 wks
  - Lower Extremity Functional Scale (LEFS)
    - Broad region: 20 items on activity limitation
      - Minimal clinically importance: 9 pts over 4 wks
  - Chronic Ankle Instability Scale
    - 4 subscales with 14 total items
      - MDC of 4.7 points over 1 week
Ankle Ligament Sprains

- Examination – Activity Limitation and Participation Restriction Measures Grade B
- Ankle Instability
  - Side hop* - when instability present during test
  - Figure-8 hop
  - 6 m crossover hop
  - Square hop
  - Not useful: shuttle run, single-limb hurdle, single limb hop for distance, up/down hop
  - Balance errors better predictor than time

Ankle Ligament Sprains

- Examination – Physical Impairment Measures Grade A
  - Ankle swelling
    - Figure-8
    - Valid and reliable
  - Ankle ROM
    - Passive NWB, knee extended and 45° flex
      - Valid and reliable (df > pf)
      - Can use inclinometer or toe to wall distance

Ankle Ligament Sprains

- Examination – Physical Impairment Measures Grade A
  - Talar Translation
    - Anterior Drawer
      - SN (0.58 - 0.80); SP (0.74 – 0.94)
      - 10° vs. 20°; inv/IR increased laxity in cadavers
    - Talar Tilt
      - SN (0.50); SP (0.88)
      - Ankle in df greatest tension on calcaneofib lig.
  - Joint Arthrometers - LigMaster

Soleus length test

- Standing
  - 10 cm
Ankle Ligament Sprains

- Examination – Physical Impairment Measures **Grade A**
  - Talar Inversion
    - Prone calcaneal inv/ev less reliable than Foot inv/ev

- Single limb balance
  - Force plate to measure sensorimotor deficits
  - Star excursion balance test/Y-balance
  - Wide variability of reliability scores between studies
  - Validity – best directions: AM, M, PM
  - 4 cm difference in anterior reach = 2.5 x likely to sustain LE injury (Plisky et al., 2006)
  - Females composite reach < 94% of LE length were 6.5% x likely to sustain LE injury

Ankle Ligament Sprains

- Intervention – Acute/Protected Phase
- Early WB with support – **Grade A**
  - Use external support and progressively bear weight
    - Type of support depends on severity
    - Lace-up bracing good for swelling
    - Ankle brace better for stability vs. compressive wrap

- Manual Therapy – **Grade B**
  - Lymphatic Drainage
  - Soft tissue mobilization
  - Joint mobilization

Ankle Ligament Sprains

- Intervention – Acute/Protected Phase – **Grade A**
- Physical Agents –
  - Cryotherapy – **Grade A**
    - Repeated intermittent to reduce pain, dec pain, WB
  - Diathermy – **Grade C**
  - Electrotherapy – **Grade D**
  - Low-level laser therapy – **Grade D**
  - Ultrasound – **Grade A**

- Therapeutic Exercise – **Grade A**
  - Those that received PT had better outcomes compared to those that only received conventional medical treatment.
  - Significant improvement was noted in the most functionally impaired
  - Helped alleviate recurrence rate
  - Basic exercise: ROM, PRE
Ankle Ligament Sprains

- **Intervention** – Progressive Loading/ Sensorimotor Training Phase
- **Manual Therapy** - Grade A
- Several studies Positive outcomes
- Low risk for doing harm
- **Techniques**
  - TC joint manipulation
  - AP TC mob
  - Lateral glide
  - Tib-fib joint mobilization

Ankle Ligament Sprains

- **Intervention** – Progressive Loading/ Sensorimotor Training Phase
- **Therapeutic Exercise and Activities** – Grade C
  - Functional exercise, unstable surfaces improves dynamic postural sway (van der Wees et al)
  - Balance retraining improves CoP excursion (Han et al)
  - IK strength (inv, ev) did not improve following strength program (Kaminski et al)
  - Hip and core strength important (McHugh et al)

Heel Pain – Plantar Fasciitis

- **Risk Factors** - Grade B
  - Limited ankle dorsiflexion
  - High BMI in non-athletes
  - Running
    - Street running, spiked shoes, cavus foot, rearfoot varus
    - High GRF, low MLA in female runners
  - Work-related WB activities
    - Time spent standing, jumping in and out of trucks
    - 4-7 years of factory work
    - Shoe rotation during work week reduced risk of pf

Heel Pain – Plantar Fasciitis

- **ICD10**
  - M72.2 – Plantar fascitis, plantar fascial fibromatosis
  - G57.5 – Tarsal tunnel syndrome
  - G57.6 – Lesion of plantar nerve/Morton’s metatarsalgia


**JOSPT 2014;44(11):A1-A33**
Heel Pain – Plantar Fasciitis

- Examination – Outcome Measures – Grade A
  - Foot and Ankle Ability Measure (FAAM)
    - Content validity, construct validity, reliability for pf
  - Foot Health Status Questionnaire (FHSQ)
    - Foot health related to quality of life (4 subscales)
  - Foot Function Index (FFI)
    - Pain scale for 17 specific instances/use of device
      - MDC = 7
    - LEFS

- Interventions – Manual Therapy – Grade A
  - Joint mobilization
    - Talar posterior glide
    - STJ lateral glide; distraction manipulation
    - TMT – A/P glide

- Interventions – Stretching – Grade A
  - Provided pain relief (1 week – 4 months)
  - Plantar fascia stretching
  - Gastroc-soleus stretching
  - Heel pads

- Interventions – Taping – Grade A
  - Antipronation Taping for immediate relief
    - Short-term: up to 3 weeks
  - Elastic therapeutic tape applied to gastroc & plantar fascia superior over US/elec stim (Tsai et al.)
Reverse 6 antipronation taping

Heel Pain – Plantar Fasciitis

• Interventions – Foot Orthoses – Grade A
  – Pre-fab or Custom orthoses to support medial longitudinal arch and cushion heel
    • Short and Long term wear
    • Especially those that respond to anti-pronation taping

Heel Pain – Plantar Fasciitis

• Interventions – Night Splints – Grade A
  – Upgraded from 2008
  – 1 – 3 months program of night splints who consistently have pain with first step in the morning
    • Posterior vs. Anterior – no difference in effect, anterior more comfortable

Heel Pain – Plantar Fasciitis

• Interventions – Physical Agents
  – Iontophoresis – Grade B
    • Dexamethasone (.4%) OR Acetic Acid (5%)
      – 2- 4 weeks pain relief/ improved function
  – Electrotherapy – Grade D
    • No improvement (Cleland et al, Stratton et al)
  – Phonophoresis – Grade C
    • Ketoprofen gel – helped with pain relief
  – Ultrasound – Grade C
    • Not recommended

Heel Pain – Plantar Fasciitis

• Interventions – Footwear – Grade C
  – rocker bottom shoe with foot orthoses
    – Fong et al. – immediate pain reduction
    – Reduce loading of the plantar aponeurosis (Lin et al.)
  – Shoe rotation throughout week

Heel Pain – Plantar Fasciitis

• Interventions – Education for Weight Loss – Grade E
  – High association between BMI and chronic plantar heel pain (Butterworth et al, 2012, Tanamas et al.,2012 )
  – Council on exercise strategies for weight
  – Refer to appropriate health care practitioner
Heel Pain – Plantar Fasciitis

• Intervention – Ther Ex/Neuromuscular Re-ed – Grade E
• Strengthening exercises and movement training for mm that control pronation and attenuate forces during WB activity

Heel Pain – Plantar Fasciitis

• Intervention – Dry Needling
  – Systematic Review by Cotchett et al., 2013
  • No significant improvement with dry needling
  – Cotchett et al., 2014 in PTJ
  • RCT of 84 clients (dry needle vs. sham)
  • VAS, FHSQ at 2,4,6,12 wks
  • Dry needling provided statistically significant reductions in plantar heel pain, but the magnitude of this effect should be considered against the frequency of minor transitory adverse events.