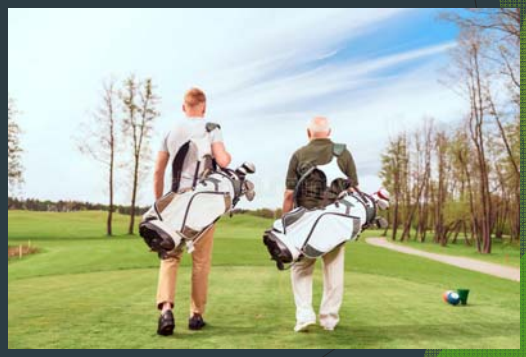
Golf Injuries

Anthony J. Ferretti, DO

- Swing mechanics
- Epidemiology
- Injuries
  - Shoulder
  - Elbow
  - Wrist
  - Low back
  - Hip
  - Knee
  - Ankle
  - Other injuries
- Prevention Strategies

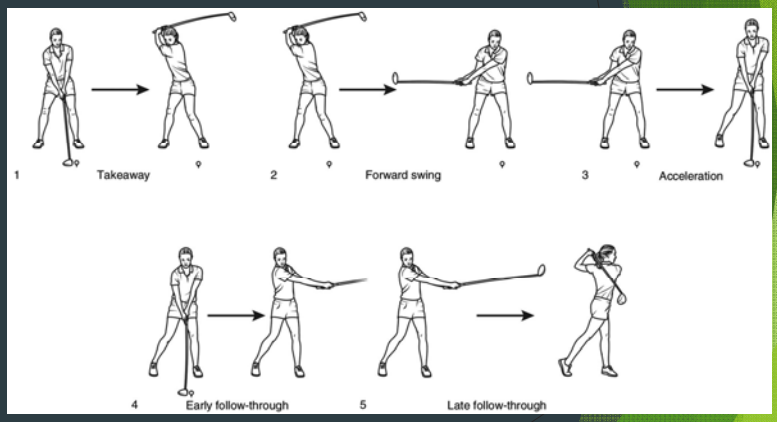
- 2009 - National Golf Foundation reported 25.6 million people in the US participate in the sport
- Enjoyed by many regardless of age, gender, socioeconomic status
- Tend to play more as age increases



www.dreamstime.com/

Swing Kinematics and Biomechanics

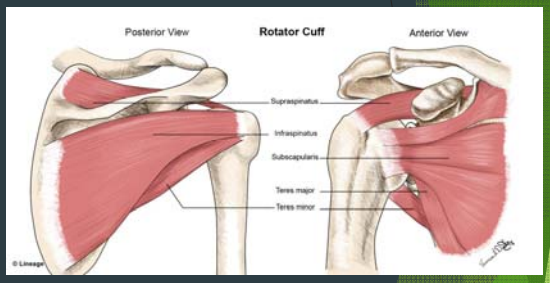
- Five phases
  - Takeaway
  - Forward swing
  - Acceleration
  - Early follow-through
  - Late follow-through



Zouzias et al, JAAOS 2018

Swing Kinematics and Biomechanics

- Rotator cuff muscles
  - Protect the glenohumeral joint
  - Contribute to rapid rotation of the shoulder
- Trapezius
  - Scapular retraction during takeaway
- Serratus anterior
  - Scapular protraction during acceleration and early follow-through



www.medbullets.com

Swing Kinematics and Biomechanics

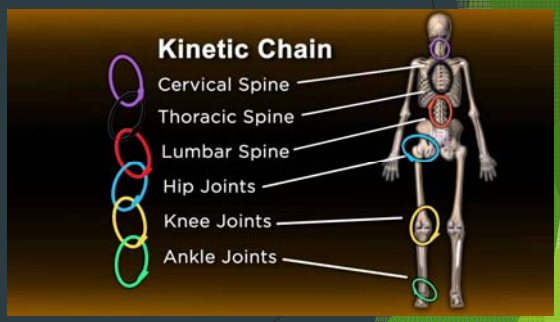
- Trunk muscles are active during acceleration
  - Gluteal musculature contributes to pushing-off and stabilization
  - Abdominal oblique muscles active throughout early follow-through

Swing Kinematics and Biomechanics

- Forearm muscle activity differs between amateur and professional golfers
  - Extensor carpi radial brevis
    - Active in lead arm during acceleration phase in amateurs, forward swing phase in professionals
    - Active in trail arm during acceleration phase in amateurs and professionals
  - Pronator teres
    - Increased activity in lead arm in professionals compared to amateurs (pull the golf club with lead arm rather than push with trailing arm)
  - Flexor carpi radialis
    - Active in lead arm during forward swing in amateurs and acceleration in professionals
    - Active in trail arm during forward swing in both
  - Flexor carpi ulnaris
    - Active in forward swing in lead and trail arm in both

Swing Kinematics and Biomechanics

- Similar to baseball swing, experience rotational velocities about the hip in a closed kinetic chain during swing phase
  - Hip extensors
  - Hip abductors
  - Adductor magnus
  - Hamstrings



Swing Kinematics and Biomechanics

Epidemiology

- Overall incidence - 15.8 injuries per 100 golfers
- Most commonly overuse injuries, followed by injuries related to poor swing mechanics
- Gosheger et al – increased risk of injury in golfers who hit more than 200 balls or played 4 or more rounds per week
- 46.2% of injuries sustained during swing, 23.7% at point of ball impact
- Low back > elbow/forearm > shoulder/upper arm > foot/ankle
- Professional golfers more likely to be injured compared to amateurs
- Most common reason for hospital admission:
  - Adults – struck by golf ball
  - Children – struck by golf club

Shoulder

www.amateurgolf.com

- Subacromial impingement
  - Can lead to rotator cuff tendinitis or partial tears
  - Presents as pain at the extremes of motion
  - Nonsurgical management
    - NSAIDs, physical therapy, cortisone injections
  - Surgical management
    - Acromioplasty, rotator cuff repair
    - Vives et al – 26/29 golfers returned to prior level of play at 3 year follow up after undergoing surgery

Shoulder

- Internal impingement
  - Commonly seen in overhead athletes, also in golfers
  - Humeral head and rotator cuff impinge against glenoid and labrum
  - Can result in rotator cuff tears, labral tears, and articular cartilage lesions of the humeral head

Shoulder

- Acromioclavicular (AC) joint pain
  - Causes by repetitive adduction of lead shoulder during takeaway
  - May be associated with anterior glenohumeral instability and hitting a large number of balls per day
  - Nonsurgical management
    - Physical therapy
    - Swing modification
    - Steroid injections
    - Mallon and Colosimo – 34/35 golfers with shoulder pain (53% AC joint pain) returned to competition with nonsurgical management
  - Surgical management
    - Distal clavicle excision

www.myorthodoc.com

Shoulder

- Glenohumeral instability
  - Caused by repetitive microtrauma to capsulolabral tissues during shoulder turn
  - Can be anterior or posterior
  - May experience a painful "popping" or "clunking" sensation during swing
  - Nonsurgical management
    - Physical therapy with rotator cuff and scapular stabilizer strengthening
  - Surgical management
    - Arthroscopic or open capsular plication or labral repair

Shoulder

- Superior labral tears (SLAP lesions) and biceps pathology
  - Pain in lead shoulder during takeaway or forward swing
  - Isolated biceps tendinitis – pain during late follow through
  - Nonsurgical management
    - Physical therapy
    - NSAIDs
    - Cortisone injections in glenohumeral joint and biceps tendon sheath
  - Surgical management
    - Arthroscopic labral debridement vs. repair
    - Biceps tenotomy or tenodesis

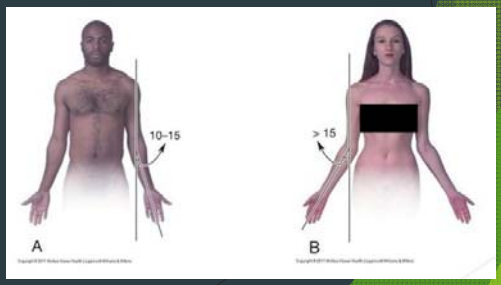
Shoulder

- Glenohumeral arthritis
  - Seen uniquely in golf due to elderly population
  - Shoulder arthroplasty successful in this population
  - Jensen and Rockwood – 23/24 patients with total shoulder replacement returned to golf at mean 4.5 months postoperatively (mean age of 52 years)

www.arthrex.com

Elbow

- Most commonly overuse injuries
- Strain from gripping club too tightly
- Trauma from hitting the ball "fat" or hitting through heavy rough
- Females may be at greater risk secondary to increased carrying angle



www.quora.com

Elbow

- Lateral epicondylitis
  - Caused by hitting the ground firmly at impact and over-gripping the club
  - Tenderness at the origin of the extensor carpi radialis brevis
  - Pain with resisted long finger extension
  - Nonsurgical management
    - Limit play
    - NSAIDs
    - Physical therapy
    - Cortisone/PRP injections – varied results
    - Forearm straps/wrist splints
    - Change in equipment – stiffer shaft, wider grip
  - Surgical management
    - Extensor origin debridement and reattachment

www.orthobullets.com

Elbow

- Medial epicondylitis
  - "Golfer's elbow" – though much less common than lateral epicondylitis
  - Caused by hitting the ball fat, repetitive hitting of artificial mats, pushing the club through swing with trail arm
  - Tenderness at the flexor-pronator origin
  - Nonsurgical management
    - Rest
    - NSAIDs
    - Physical therapy
    - Bracing
    - Injections
  - Surgical management
    - Debridement of common flexor origin and repair

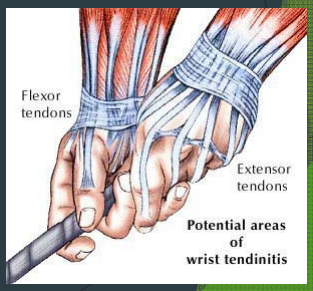
www.flexxline.com

Wrist

- Most common in the lead wrist
- Amateurs hitting the ball "fat"
- Professionals hitting the ball out of very heavy rough or off firm ground
- Overuse injuries

Wrist

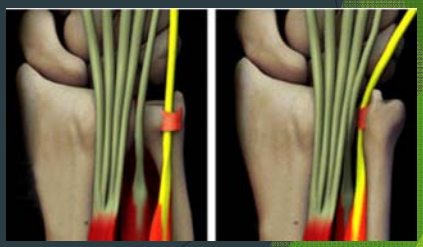
- Tendinitis
  - Commonly involves the flexor carpi ulnaris and extensor carpi ulnaris
  - Top of takeaway phase when lead wrist moves into extensive radial deviation
  - Nonsurgical management
    - Rest
    - NSAIDs



www.drbadia.com

Wrist

- ECU instability
  - Caused by forceful impact of the wrist when striking the ground before the ball
  - Results in disruption of ECU tendon sheath
  - Painful snapping sensation with wrist supination, ulnar deviation, and flexion
  - Nonsurgical management
    - Rest
    - Splinting wrist in extension, radial deviation, and supination
  - Surgical management
    - Repair of ECU tendon sheath



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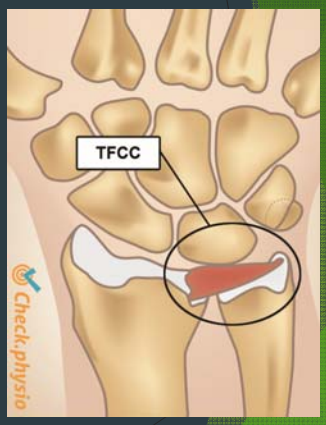
Wrist

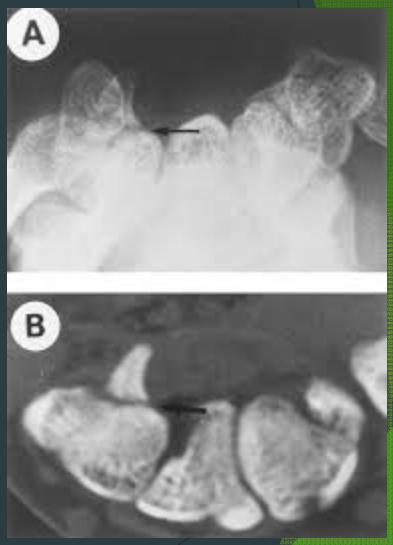
- Triangular fibrocartilage complex (TFCC) tears
  - Caused by repetitive rotation about the wrist
  - Ulnar-sided wrist pain, palpable click with forearm rotation
  - Nonsurgical management
    - Rest
    - Immobilization
    - NSAIDs
    - Steroid injections
    - Physical therapy
    - Taping/bracing during play
  - Surgical management
    - Wrist arthroscopy with debridement vs. repair



www.physiocheck.co.uk

Wrist

- Hook of hamate fractures
  - Caused by forceful strike to the ground with club
  - May also present with stress fracture
  - Seen in hand holding the end of club
  - Point tenderness over the hook of hamate
  - Obtain radiographs (carpal tunnel view) and possibly CT
  - Nonsurgical management
    - Wrist immobilization
    - Rest
  - Surgical management
    - Excision of hook of hamate



Fujioka et al, Journal Hand Surgery, 2000

Low Back

Low Back

- Most common source of injury
- Swing produces large asymmetric loads in the spine and back musculature
  - Compressive loads equivalent to 8x body weight
  - Cumulative loads lead to insidious onset of pain
- Injuries may include muscle strains, herniated nucleus pulposus, vertebral body and pars interarticularis stress fractures, spondylolisthesis, and facet arthropathy

www.taipeitimes.com

Low Back

- Low back pain more common on the trail side
- Risk of low back pain is influenced by type of golf swing
- Modern swing
  - Large shoulder turn, restricted hip turn
  - Increased torsional loads, lateral bending, and hyperextension of spine
- Classic swing
  - Increased hip turn, erect follow-through
  - Less torque on spine, less low back pain

McHardy et al, Sports Med 2006

Low Back

- Management of low back pain
  - Ice
  - Rest
  - NSAIDs
  - Stabilization exercises
  - Active stretching
  - Pre-round activation and mobility of scapular, trunk, and hip musculature
  - Post-round flexibility programs for low back and hip muscles

www.breakingeighty.com

Low Back

- Early rehabilitation after back injury
  - Core strengthening
  - Breathing exercises
  - Functional Movement Screen
    - Used to identify poor movement patterns placing players at risk for injury
- Late rehabilitation
  - Scapular and hip stabilization
  - Training on unsteady surfaces

www.strongergolf.co.uk

Low Back

- Compression fractures
  - May be seen in older females with osteoporosis
  - Secondary to stress at the thoracolumbar region during swing

www.massgeneral.org

Hip

- Low incidence of hip injuries secondary to golf
- Mainly due to overuse
- Vad et al. - correlation between limited lead hip internal rotation and history of low back pain in professional golfers
- Injuries include chondral defects, labral tears, loose bodies, arthritis

www.biaphysicaltherapy.com

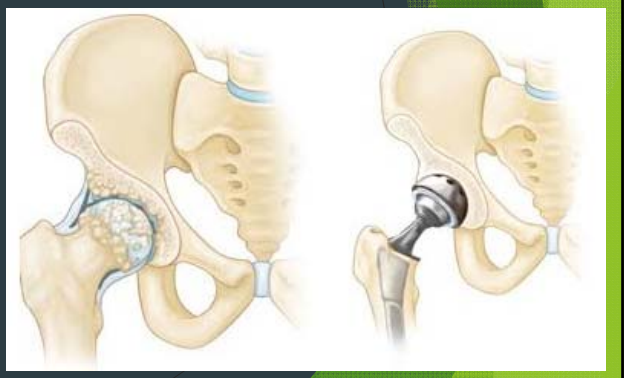
Hip

- Acetabular labral tears
  - Caused by joint stress secondary to rotational velocities about the hip
  - Groin pain, mechanical symptoms
  - Management
    - Hip arthroscopy with labral debridement vs. repair
      - Byrd and Jones – return to sport 3 months postoperatively in recreational golfers with labral damage

www.adolescenthippain.weebly.com

Hip

- Arthritis
  - Total hip arthroplasty remains treatment of choice for debilitation hip pain secondary to arthritis



www.drmrinalsharma.com

Knee

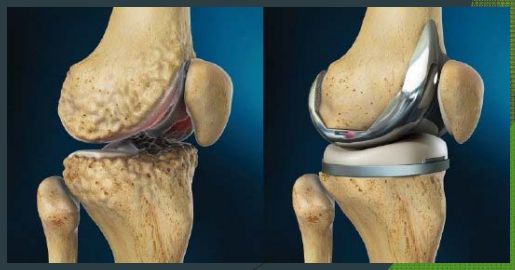
- Relatively rare in golfers
- Mainly overuse injuries and mechanical failure

Knee

- Meniscal injuries
  - Secondary to repetitive internal and external rotation of the tibia on the femur
  - Nonsurgical management
    - NSAIDs
    - Physical therapy
    - Corticosteroid/viscosupplementation injections
  - Surgical management
    - Arthroscopic repair vs. partial meniscectomy

Knee

- Arthritis
  - Total knee arthroplasty for debilitating arthritis has good results with minimal golf restrictions
  - Mallon and Callaghan – 87% golfers with a total knee replacement had no pain while playing, 35% had mild pain
    - Handicap increased by 1.9 strokes at an average of 4.7 years postoperatively (though may be secondary to increased age)



www.niramayacare.in

Ankle

- Mostly due to accidental injury
  - Slipping, tripping
- Stability of ankle joint provided by several structures
  - Static – anterior talofibular ligament, posterior talofibular ligament, calcaneofibular ligament
  - Dynamic – peroneal tendons
- Injuries include ankle sprains and tendinopathies
  - Managed with rest, ice, NSAIDs, proprioceptive training, and bracing

Head/Eye

- Extremely rare but can be serious injuries
- Majority of injuries due to being struck by club or ball
  - More common in the pediatric population
- Case reports include
  - Skull fracture
  - Cerebral contusion
  - Epidural hematoma
  - Orbital fracture
  - Optic nerve avulsion
  - Ruptured globe

www.deadspin.com

www.spygolfer.com

Stress Injuries

- Uncommon in golf
- Secondary to overuse
- Case reports have described stress fractures in the ribs, ulnar diaphysis, hook of hamate, tibia/fibula
  - Several reports of tibial stress fractures progressing to complete spiral fractures while hitting a drive

www.drdavidgeier.com

Prevention strategies

- Failure to warm up for at least 10 minutes prior to playing more than doubles risk for injury
- Preventing low back pain
  - Maintaining straight posture throughout swing
  - Controlling speed of swing
  - Reduction of shoulder range of motion and trunk angular motion
  - Lumbar flexibility and strengthening exercises
  - Lumbar corset
  - Proper fitting clubs
  - Playing consistently
  - Pushing cart as opposed to pulling
  - Using a long putter
  - Dual strap bag
  - Weight loss

www.aliexpress.com

www.brewceesgolfblog.wordpress.com

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