

Primary Health Care Initiatives (PHCI) Project
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Abt. Associates Inc.

COMMON FRACTURES, STRAINS, AND SPRAINS

LEARNING OBJECTIVES

- Understand the mechanism of injury of the most common presenting musculo-skeletal injuries
- To be able to distinguish between injury to tendon, muscle, ligament, and bone; or combinations of these
- Describe the management and treatment of the most common musculo-skeletal injuries
- Understand when to refer an injury to a specialist for more definitive diagnosis and treatment

TEACHING STRATEGIES

- Use didactic, lecture-style teaching for only the basic elements of the topic
- Use case presentations (ideally presentation of personal cases) to highlight significant learning points
- Emphasize the proper examination technique and evaluation of an injury
- Demonstrate on a participant or willing patient the proper examination of the joint or area involved

LEARNING POINTS

- Definition of sprain and strain
 - Sprain – injury to ligament around a joint
 - Strain – injury to muscle, tendon, or muscle-tendon unit (includes tendonitis)
- Overuse injury
 - Generally chronic or subacute
 - Caused by repetitive, forceful movements that overstress capacity of muscle, tendon, and occasionally bone
 - Repeated microtears of tendon tissue, with inflammatory attempts to repair tears
 - Results in chronic inflammation, fibrous tissue, susceptibility to repeated injury
- Principles of Treatment (applicable to most all)
 - Identify and modify overuse or traumatic movement
 - RICE (Rest, Ice, Compression, Elevation)
 - Anti-inflammatory medication (NSAID)
 - Occasionally physiotherapy
 - Occasionally local injection of dilute corticosteroid
 - Suspected fracture should be splinted until seen by specialist or definitive treatment

Upper extremity

- Overuse and degenerative injuries

Elbow - Lateral epicondylitis

- Examination of elbow - demonstration
- Mechanism – repeated extension of elbow and supination of wrist (tennis players, forceful use of screwdriver or hammer)
- Micro-trauma to extensor carpi radialis brevis at insertion on lateral epicondyle
- Symptoms – most painful in early AM (on extension of arm), with resisted supination
- Painful for months, with remissions – average 7 – 10 months
- Recent studies show no single treatment is curative – many treatments suppress symptoms until natural resolution occurs
- Treatment – RICE, anti-inflammatory medication (NSAID), local steroid injection around insertion

Elbow - Medial epicondylitis

- Similar to lateral epicondylitis, but different muscles and mechanism
- Overuse of flexors of fingers and wrist, found in forceful gripping motions (use of hammer or carrying of heavy loads)
- Natural history and treatment same as for lateral epicondylitis

Shoulder - Rotator Cuff

- Examination of shoulder - Demonstration
- Most common upper extremity problem of older age
- Mechanism – repeated, forceful abduction and rotation of shoulder
- May begin with fall, minor trauma, or forceful lifting, but persists with normal daily activity
- Most common tendon injury to supraspinatus, under acromion
- Pain with abduction – “catch” at 45 degrees
- Supraspinatus tendon may become calcified, thickened – inflammation may extend into shoulder bursa (bursitis)
- Occasionally inflammation noted also in long head of biceps (bicipital tendonitis)
- Treatment – RICE, anti-inflammatories
- Mobilization exercises of shoulder (wall crawling, pendulum) very important to prevent gradual fibrosis of capsule and “frozen shoulder”

- Upper Extremity Traumatic Injuries

- FOOSH (Fall on Outstretched Arm)

- Wrist – fracture of carpal navicular (scaphoid)

- Examination – demonstrate wrist and snuffbox exam
 - Most common injury of FOOSH in young people
 - Pain in anatomic snuff box is hallmark
 - Most important – initial X-rays may not show fracture until 10 – 14 days later
 - Should generally be referred to specialist for followup
 - Must treat with thumb spica cast until X-ray negative at 10 – 14 days, or if fracture apparent, until complete healing (minimum of 3 months)

- Danger of not immobilizing immediately is non-union of navicular bone, with secondary severe osteoarthritis of the wrist.

Forearm – fracture of distal radius

- Very common fracture in elderly (osteoporosis) and in young boys
- Often requires reduction because of dorsal angulation of distal radius
- Should be referred for reduction and casting
- Often results in stiff wrist in elderly patients – they do not regain full wrist flexion

Elbow – dislocation of radial head in young child

- Common problem in children less than 4 years of age
- Caused by pull or lifting of child by hand – causes dislocation of radial head at elbow because of immature development of radius
- Child does not use arm, holds it with hand in pronation
- Can be easily reduced at PHC, especially within first 1 – 2 days by forceful supination of wrist with extension of elbow
- Demonstrate reduction maneuver

Shoulder – Acromio-clavicular separation

- Examination – demonstrate clavicle and acromio-clavicular exam
- Caused by fall directly onto shoulder with tear of acromio-clavicular ligament and coraco-clavicular ligament
- Partial tears very common – cause pain but no instability
- Even complete A-C separations may not cause pain unless patient is heavy physical laborer
- Can be treated at PHC, unless patient is heavy laborer or athlete
- Treat with sling for 4 – 8 weeks

Shoulder – fracture of clavicle

- Very common fracture in young children (sometimes seen in difficult deliveries in neonates)
- Tender over fracture site – usually middle or distal part of clavicle
- Usually good healing with complete remodeling – will have prominent lump at fracture site for several months
- Can be treated at PHC
- Treat with figure-8 bandage for 3 – 4 weeks – parents should be instructed to watch for numbness of hand, circulation changes

Lower Extremity

- Overuse and degenerative injuries

Foot – Heel pain

- Pain in bottom or sides of heel
- Worse on first standing in AM, and after long walking during day
- Generally caused by inflammation at insertion of plantar fascia on calcaneus (heel) - acutely tender to palpation at this point
- Treatment – foam heel pad (to protect), soft-soled shoes (running shoes), anti-inflammatories (NSAID)

- Most important part of treatment – gradual stretching (without further tearing) of plantar fascia
- Demonstrate stretching exercise

Ankle – Achilles tendonitis

- Pain in posterior calf and ankle
- Generally seen in runners or athletes in training, especially jumpers (basketball)
- Tender to palpation at insertion of Achilles tendon on calcaneus
- Treatment – RICE, anti-inflammatories (NSAID)

Knee – Patello-femoral pain

- Pain in knee, often on arising after sitting, or going down stairs or hills
- Multiple causes – may be related to micro-strain of patellar tendon, inflammation of patellar cartilage, or sometimes old meniscus injury inside knee
- Often related to relative inactivity with bursts of leg activity, and to tight leg muscles
- More common in young women, overweight older women, athletes who jump a lot
- May be tender at patellar tendon insertion, on compression of patella
- Knee exam is stable
- Treatment – RICE, anti-inflammatories (NSAID), stretching exercises

Knee – Osgood-Schlatter syndrome

- Seen most commonly in early adolescence, especially in those who run or jump a lot
- Pain and swelling over insertion of patellar tendon (anterior tibial tubercle)
- X-rays show a pulling away of bone chip at insertion of patellar tendon
- Important – will heal spontaneously with simple rest and reduction of running and jumping activities – no other treatment or referral needed!
- Generally resolves when epiphyses fuse, around 14 – 16 years of age
- Only residual may be a slightly prominent anterior tibial tubercle
- Most sensitive test of pathology – pain on internal rotation

Hip – pain on walking

- Differential diagnosis of limping child by age and associated condition:
 - Fever – septic arthritis (emergency!), transient synovitis
 - Night pain – tumor
 - Age 1 – 3 years – CDH, septic arthritis
 - Age 4 – 10 years – CDH, aseptic necrosis of femoral head (Legg-Perthes), juvenile rheumatoid arthritis, transient synovitis
 - Age 11 – 16 years – Slipped capital femoral epiphysis, overuse strain of tendons
- Because of multiple causes – most children with persistent limp should be referred for evaluation by specialist

- Traumatic Injuries to Lower Extremity

- Ankle - Ankle sprain

- Examination – demonstrate examination of ankle
 - Commonly caused by inversion and plantar flexion of ankle
 - After acute injury, should ask about immediate swelling and ambulation
 - No immediate swelling and able to ambulate initially – Grade I or mild Grade II sprain
 - Immediate swelling and unable to ambulate initially – severe Grade II or Grade III sprain or possible fracture
 - Always palpate distal fibula – some severe sprains can be associated with fracture of fibula (lateral malleolus)
 - Lateral ligament injury should be graded:
 - Grade I sprain – no instability of lateral ligaments
 - Minimal edema and bruising
 - Minimal pain with ambulation
 - Requires only simple protection (rest) for 5 – 7 days
 - Grade II sprain – moderate lateral ligament injury, but no instability to ankle
 - Moderate bruising and edema
 - Often unable to ambulate, especially after 24 hours
 - Tender over lateral and often fibular-talar ligament
 - Treated best with temporary immobilization (stiff boot, crutches, walking cast) for 7 – 14 days, then gradual mobilization
 - May be treated at PHC
 - Grade III sprain – complete tear of lateral ankle ligaments
 - Severe bruising and edema
 - Ankle feels “loose” and unstable
 - Inversion test is positive, often anterior drawer is positive
 - Treated with cast (may be walking cast after first 5 – 7 days) for 6 – 8 weeks minimum, then protection in stiff boot.
 - Should generally be referred for treatment

- Knee – Knee sprain

- Generally result of twisting injury or blow to anterior or lateral knee
 - When possible, most valuable examination is immediately after injury, before swelling and inflammation
 - Ask about “Pop” or “snap” sound with injury – highly suggestive of torn ligament, especially anterior cruciate
 - Examine knee for stability of collateral and cruciate ligaments – demonstrate examination
 - Can be graded I, II, or III as before
 - Evidence of instability – probable torn ligament (Grade III sprain) – refer for specialist treatment

- No apparent instability – probably injured ligament (Grade I or II sprain) – may be treated in PHC
- Treatment of Grade I and II sprains – RICE, immobilization (splint in extension) for 5 – 14 days.
- Follow immobilization with mobilization exercises, work toward full flexion and extension
- If still painful with activity after treatment and attempted mobilization, consider unrecognized torn ligament or damaged meniscus – refer for specialist evaluation

CRITICAL ELEMENTS FOR REFERRAL

- Overuse injury that does not respond to simple therapy and time (may be several months)
- Trauma with suspected fracture (other than toe, rib, clavicle)
- Grade III sprain of ankle or knee, with suspected or evident instability of ligaments
- Any child with a persistent limp or pain of the hip
- Night bone pain

CRITICAL ELEMENTS FOR EVALUATION OF COMPETENCE

- Demonstrate the proper examination of the wrist, elbow, shoulder, ankle, knee and hip
- Describe the mechanism of injury of the most common presenting musculo-skeletal injuries, both overuse and traumatic
- Describe the differences between Grade I, II, and III sprains
- Describe the management and treatment of the most common musculo-skeletal injuries, both overuse and traumatic
- Understand when to refer an injury to a specialist for more definitive diagnosis and treatment