Main Menu

1 Introduction
click here

2 Muscular Disorders
click here

3 Bone Disorders
click here

4 Joint Disorders
click here

5 Genetic Musculoskeletal Disorders
click here

6 Other Connective Tissue Disorders
click here

7 Neuromuscular Disorders
click here

Musculoskeletal System Conditions

Injuries to muscles, bones, joints, ligaments, tendons, tendinous sheaths, bursae are hard to see on radiographs and MRI

Massage therapists are well equipped to assess these

Bones

Terrific resilience, support and weight bearing capacity combined with a light weight construction that provides a boney framework that protects vulnerable organs and provides leverage for movement

Wolff's law

Bone is living tissue that remodels according to the stresses that are placed upon it

Structure

Calcium, phosphorus on collagen matrix: concentric circles with holes for blood vessels

Long bones are spiraled

Shaft is hollow

Resilience, efficiency, lightweight construction

Osteoblasts (bone builders) and osteoclasts (bone clearers) under hormonal control

pt 1

Back Next

Muscles

Specialized thread like cells that with electrical and chemical stimulation have the power contract while bearing weight

Massage moves fresh, highly oxygenated blood, while flushing old, toxic and stagnant interstitial fluid out

Function: pull bony attachments together

_____

Aerobic combustion: work with adequate supply of oxygen; clean burning energy

_____

Anaerobic combustion: without adequate supply of oxygen; produces lactic acid, a nerve irritant

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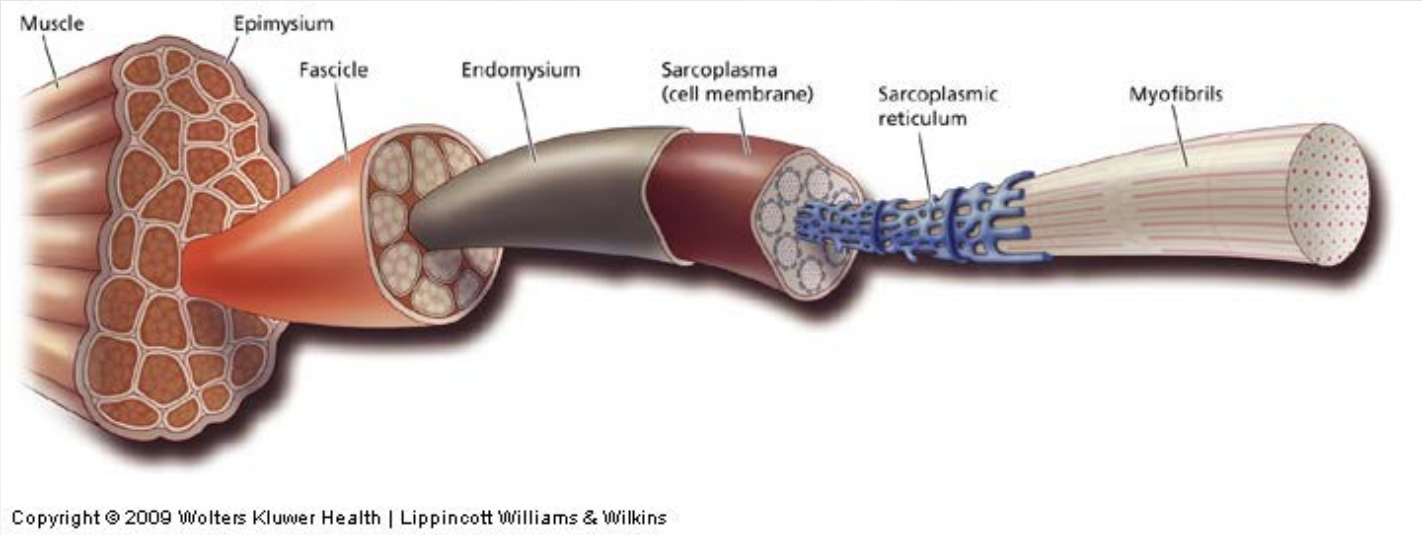
Delayed Muscle Soreness (DOMS) caused by increase of lactic acid; and/or calcium leakage from sarcomeres



pt 1

Back Next

Joints

Allows movement between bones, providing the fulcrum that bones can use ; constructed so that no rough surfaces ever touch

Organized into three classes:

Synarthroses (immovable, i.e. cranial)

Amphiarthroses (slightly movable, i.e. between vertabrae)

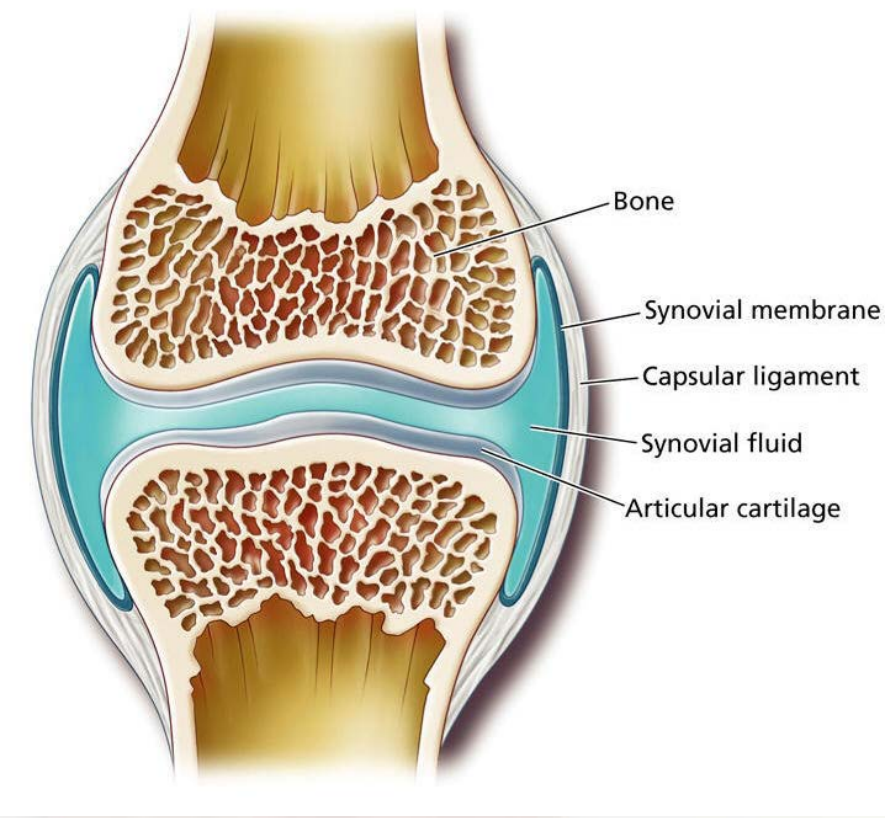
Diarthroses (freely movable, i.e. knee); most vulnerable to injury

Other Connective Tissue:

Tendons, tendinous sheaths, ligaments, bursae

General Connective Tissue Problems:

overuse, stress, cortisol, poor sleep: everything is interrelated



Muscular Disorders

Fibromyalgia

Myofascial Pain Syndrome

Myositis Ossificans

Shin Splints

Spasms, cramps

Strains

pt 2

Back Next

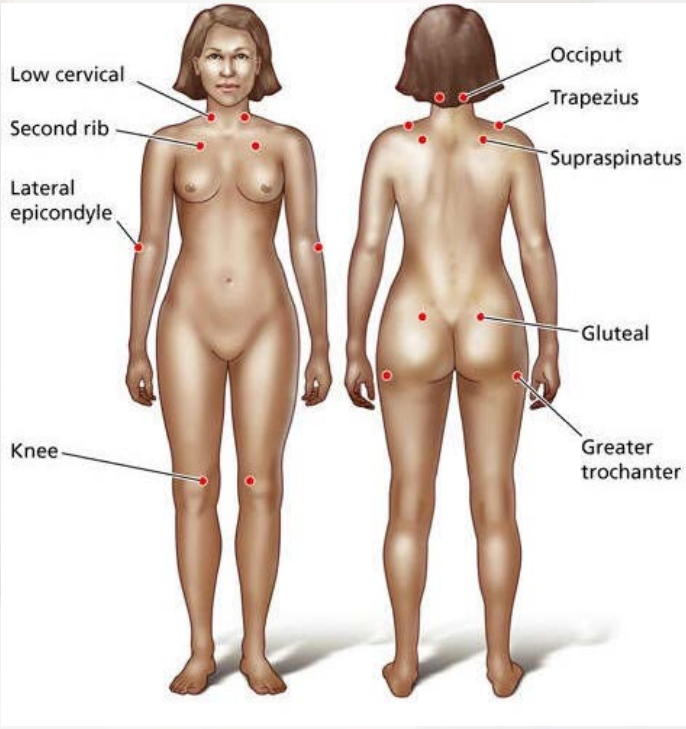
Fibromyalgia

Syndrome involving chronic pain in muscles, tendons, ligaments, and other soft tissues, along with other symptoms; frequently seen with chronic fatigue syndrome, irritable bowel syndrome, S migraine headaches, sleep disorders, and several other chronic conditions

Demographics

2–3% of the U.S. population

85–90% of diagnoses are in women



Etiology

Not well understood. Consistent factors include…

Sleep disorder: little or no stage IV sleep

Fatigue: may be related to sleep; could also be mitochondrial inefficiency

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Pain: may be related to neurotransmitters, esp. high substance P and nerve growth factor levels

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Tender points: Develop in all four quadrants of the body

Other issues: oxidative stress, free radicals, inefficient hypothalamic-pituitary-adrenal (HPA) axis, aspartame use, others

more Fibromyalgia

Signs and Symptoms	Diagnosis	Complications	Treatments	Massage
Widespread pain in shifting locations; can range from a deep ache to burning and tingling Tender points: nine predictable pairs of these are distributed among all quadrants of the body Stiffness after rest Poor stamina Sensitivity amplification and low pain tolerance	Rule out similar diseases (challenging!) Diagnostic criteria: Chronic pain for a minimum of 3 months 11/18 tender points are active (elicit diffuse pain with digital pressure of about 4 kg) Tender points must be distributed all over body Persistent fatigue Sleep not refreshing; awaken with morning stiffness	Depression, difficulty with relationships and jobs, poor quality of life	Education Patient controls nutrition, sleep, exercise, stress Medications Guaifenesin Tricyclic antidepressants Drugs for restless leg syndrome (?)	Can be safe and appropriate within tolerance of client Avoid ice Avoid overtreatment Don't treat tender points like trigger points

Myofascial Pain Syndrome

The development of trigger points

Etiology

Trigger points:

Microscopic injury leading to pain spasm cycle

Energy crisis: sustained involuntary contraction of isolated group of sarcomeres

- At neuromuscular junction (NMJ), *central trigger point*
- At tenoperiosteal junction, *attachment trigger point*
- May also involve folded, dehydrated collagen

Contraction causes a knot or taut band

- Myofibers need more fuel
- Ischemia prevents blood from flowing into area
- This is adenosine triphosphate (ATP) energy crisis

Pain-sensitizing chemicals are released; muscle tightens; more acetylcholine is released at NMJ; neutralizing enzymes can't get near; this causes small, involuntary, painful contraction

Neurons become demyelinated, may contribute to referred pain pattern (Fig. 3.4)

Satellite points form

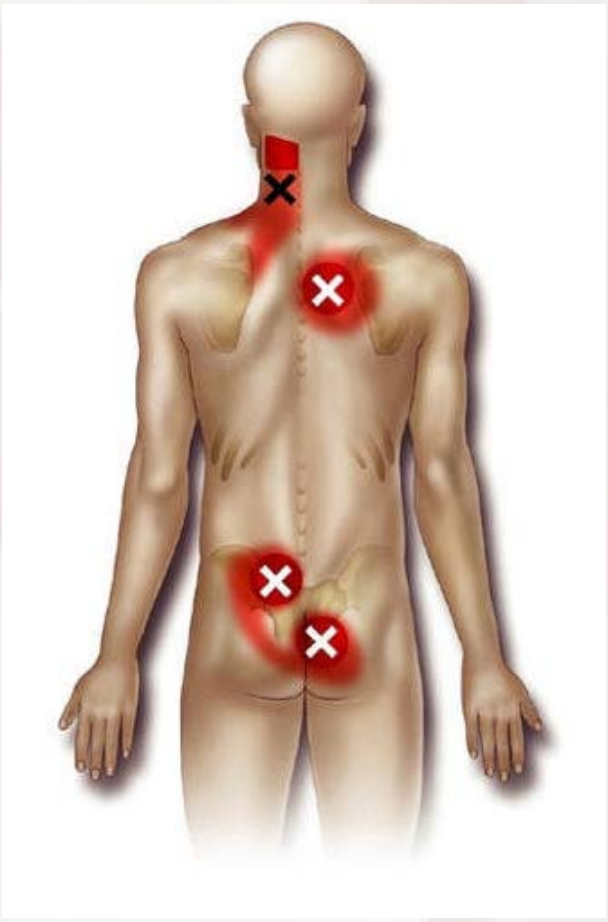
Points may be active or latent

Demographics

Affects men and women about equally

May be more prevalent with age

Precise incidence is not known



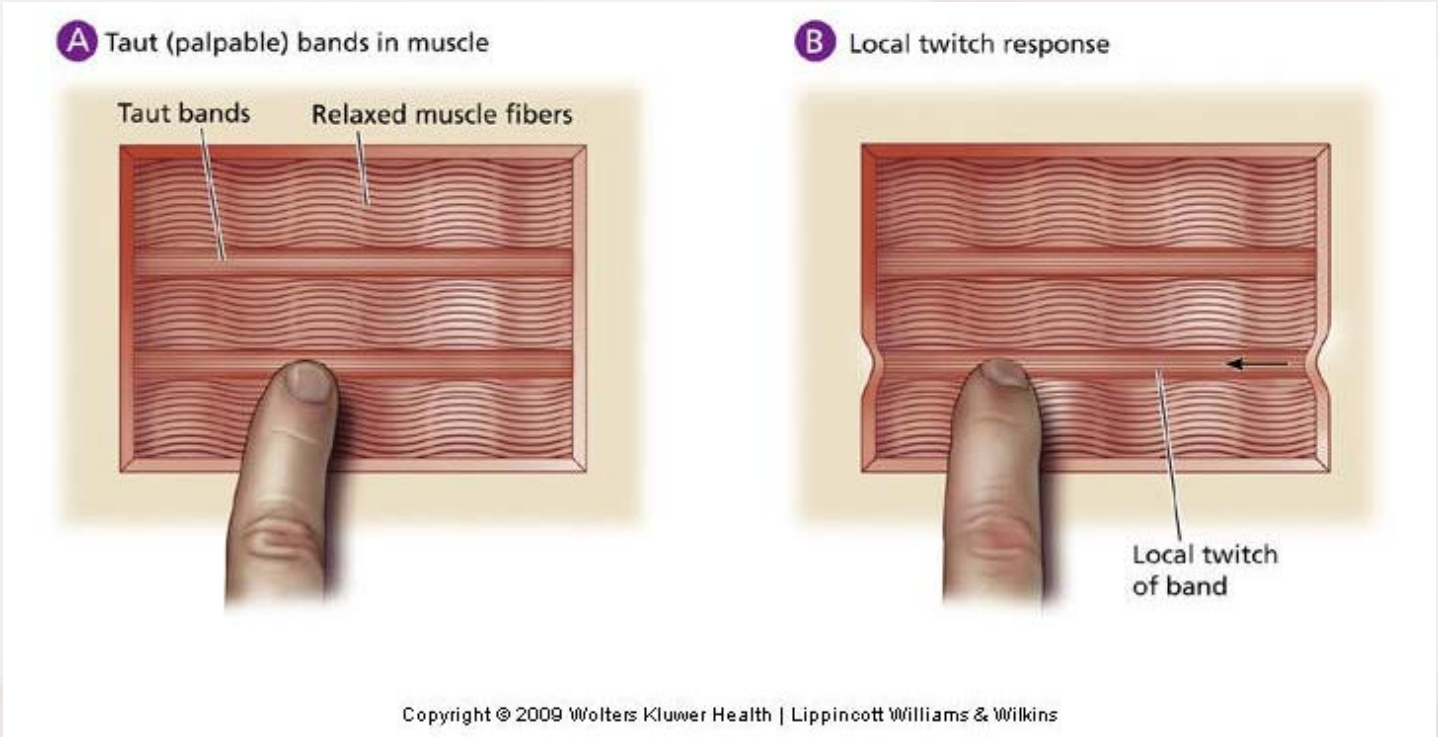
pt 2

Back

Next

more Myofascial Pain Syndrome

Signs and Symptoms	Diagnosis	Treatments	Massage
Taut bands or nodules Predictable trigger point map Referred pain pattern Regional pain	No consistent criteria; most people have some trigger points	Eradicate trigger points: Vapo-coolant spray Injections of anesthetic Dry needling Botox to interfere with acetylcholine release Acupuncture	Indicates massage Sustained ischemic pressure is traditional Short, pulsing pressure may be more effective



pt 2

Myositis Ossificans

Muscle inflammation with bone formation; *Heterotopic ossification* is more accurate: formation of osseous tissue outside of normal areas

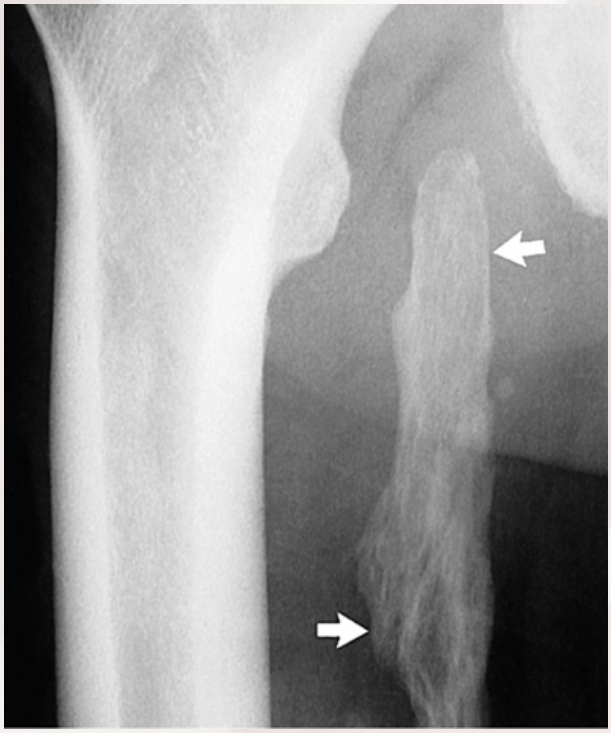
Etiology

Most common is myositis ossificans traumatica: blunt injury with bleeding between muscle sheaths

- May be connected by a stalk to nearby bone tissue or periosteum
- Hardens at periphery, stays soft inside
- May involve osteoblasts released from damaged periosteum

Other forms associated with immobility or bone abnormalities:

- Spinal cord injury, Paget disease, hip replacement surgery



more Myositis Ossificans

Signs and Symptoms	Treatments	Massage
Bruised sensation, then area feels hard and tender	Rest and isolate injury to prevent excessive bleeding	Local contraindication
Range of motion is limited	Stretch to improve range of motion (ROM) post acute stage	Work within tolerance around edges
Pain subsides, leaving a hardened mass (body eventually reabsorbs it)	Surgical removal if necessary; can recur	

pt 2

Back Next

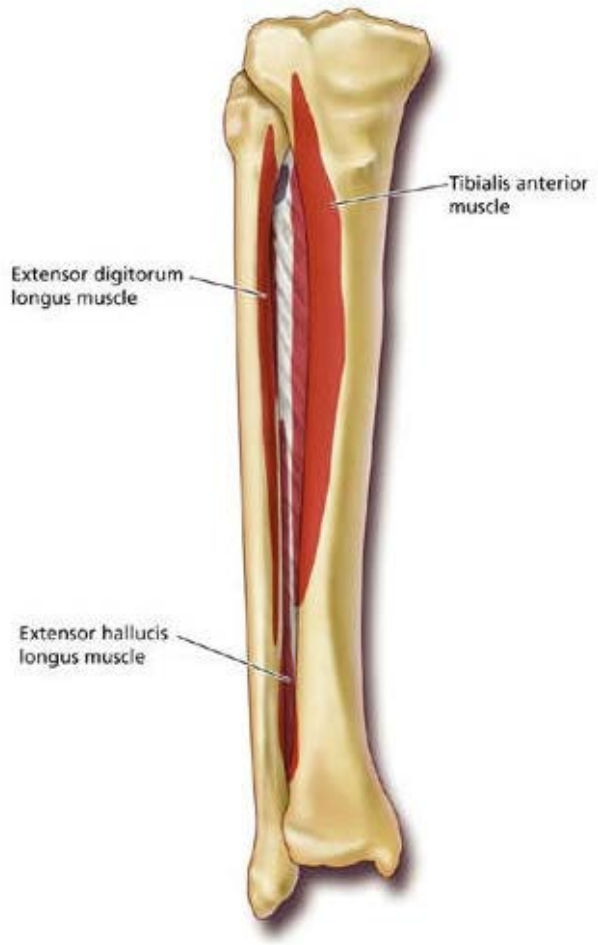
Shin Splints

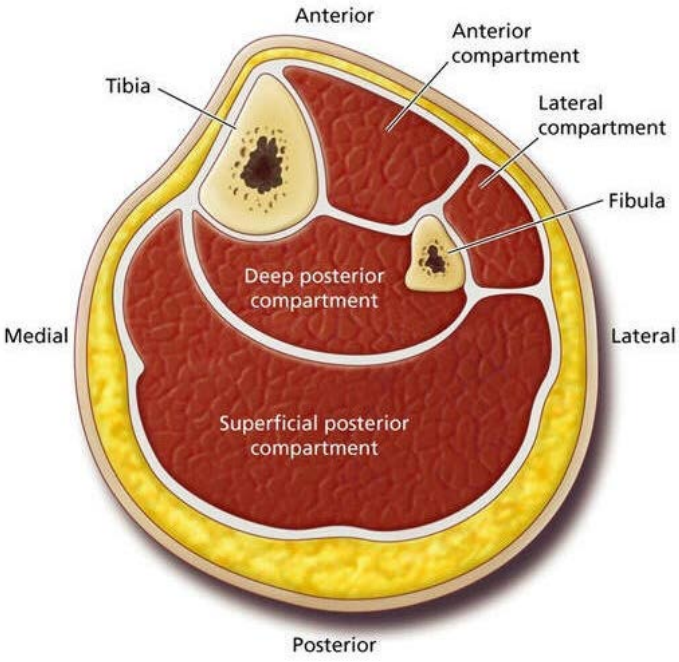
Umbrella term for variety of lower leg problems

Etiology

Anatomy review

- Lower leg muscles attach whole length of the bones
- Muscles are contained in four tight compartments
- If feet don't absorb, shock is translated into the lower leg
- Chronic overuse or misalignment
- Exercise without cooling down period
- Lower leg trauma
- All lead to edema inside compartments





more Shin Splints

Signs and Symptoms	Treatments	Massage
Mild or severe pain Worse with muscle activity Lower leg injuries Tibialis anterior, tibialis posterior injury Medial tibial stress syndrome Periostitis Stress fractures Chronic compartment syndrome Acute compartment syndrome	Reduce activity Improve equipment (shoes, running surfaces, etc.) and training practices Hydrotherapy Steroid injection For acute compartment syndrome: surgery to split fascial sheaths	May indicate massage if no acute inflammation is present Can stretch lower leg muscles better than other interventions: good preventative Stress fractures, compartment syndrome need medical attention

Spasms, Cramps

Involuntary contraction of voluntary muscle; Cramps are strong, painful, acute (charleyhorse); Spasms may be chronic

Massage

Indicated, with caution

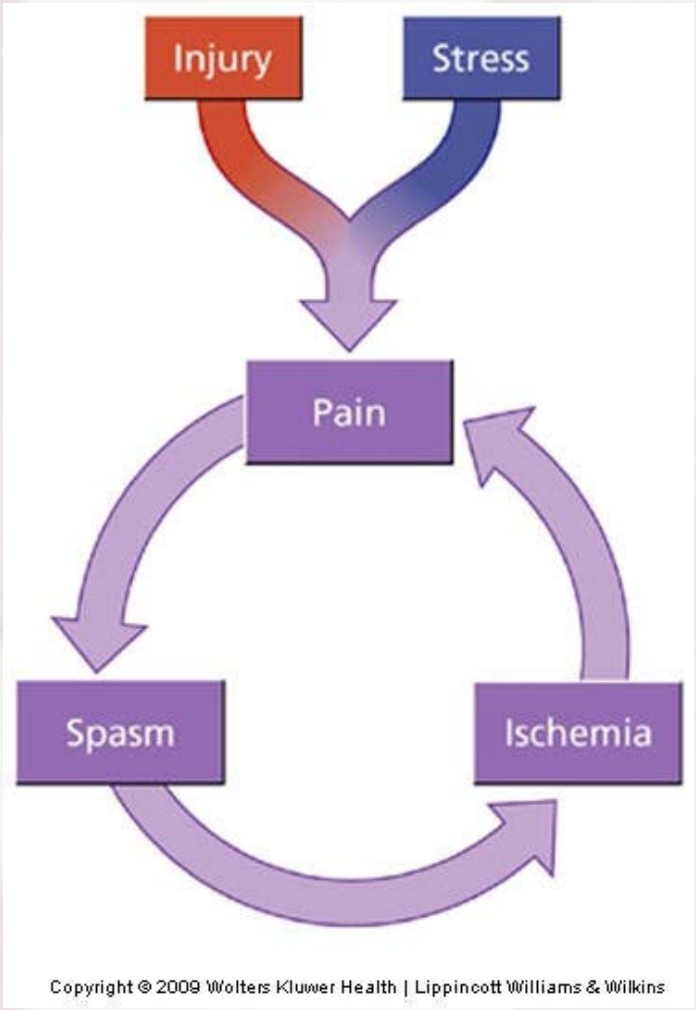
Watch for contraindicating conditions

Respect splinting mechanism

Etiology

Four main contributing factors:

- Nutrition
- Ischemia
- Exercise-associated muscle cramping
- Splinting



pt 2

Back

Next

Strains

Injury to muscle-tendon unit, with emphasis on muscle damage

Massage

Indicated, with caution

Watch for contraindicating conditions

Respect splinting mechanism

Etiology

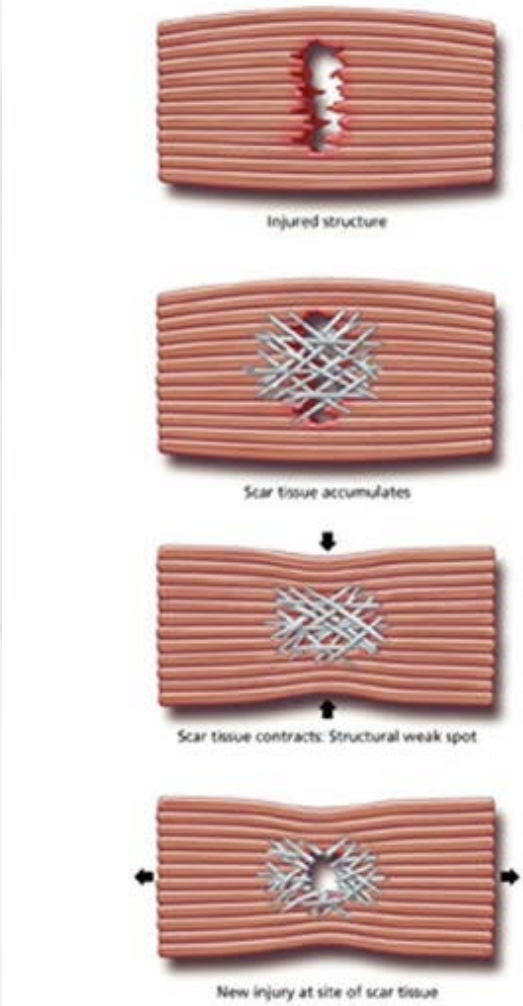
Can be specific trauma

Chronic cumulative overuse

Myofibers are torn, fibroblasts lay down scar tissue

Graded by severity:

- First degree: mildly painful, no functional limit
- Second degree: moderate injury
- Third degree: rupture, possibly avulsion fracture



more Strains

Signs and Symptoms	Treatments	Massage
Mild to intense local pain Pain exacerbated by resisted movement or passive stretching Usually no palpable heat or swelling Scar tissue may accumulate, leading to Impaired contractility Adhesions	Get an accurate diagnosis Control inflammation: RICE, PRICES Rehabilitate damaged tissues Prevent further injury	Can be extremely useful to shorten recovery time, improve quality of healing tissue

Bone Disorders

Avascular Osteonecrosis

Fractures

Osteoporosis

Paget Disease

Postural Deviations

pt 3

Back Next

Avascular Osteonecrosis

Blood supply to bone is impeded; bone and blood vessels disintegrate, not replaced; high risk of fractures, arthritis, joint collapse

Demographics

30–50 years old

10,000–20,000 diagnoses/year in United States

Leads to 50,000 hip replacement surgeries/year

Legg-Calve-Perthes disease is in boys 3–12 years old

Etiology

Head of femur is most vulnerable

- Emboli of blood clots, fat cells, nitrogen bubbles block arterioles
- Venous congestion also causes damage

Often a complication of other disorders

- Decompression sickness
- Lupus or other autoimmune disease (steroids)
- Pancreatitis
- Hemophilia
- Sickle cell disease
- Alcoholism

more Avascular Osteonecrosis

Signs and Symptoms	Diagnosis	Treatments	Massage
Joint pain during movement Becomes present at rest Looks like osteoarthritis Joint collapse	Radiography, bone scans, computed tomography not useful early Magnetic resonance imaging (MRI), biopsy, bone stress test for early detection	Depends of age, cause Nonsurgical: braces, crutches; electrical stimulation of bone Surgery: decompress medullary canal; remove dead tissue; reshape or rebuild joint	Locally contraindicates massage May be helpful for postural, movement compensations

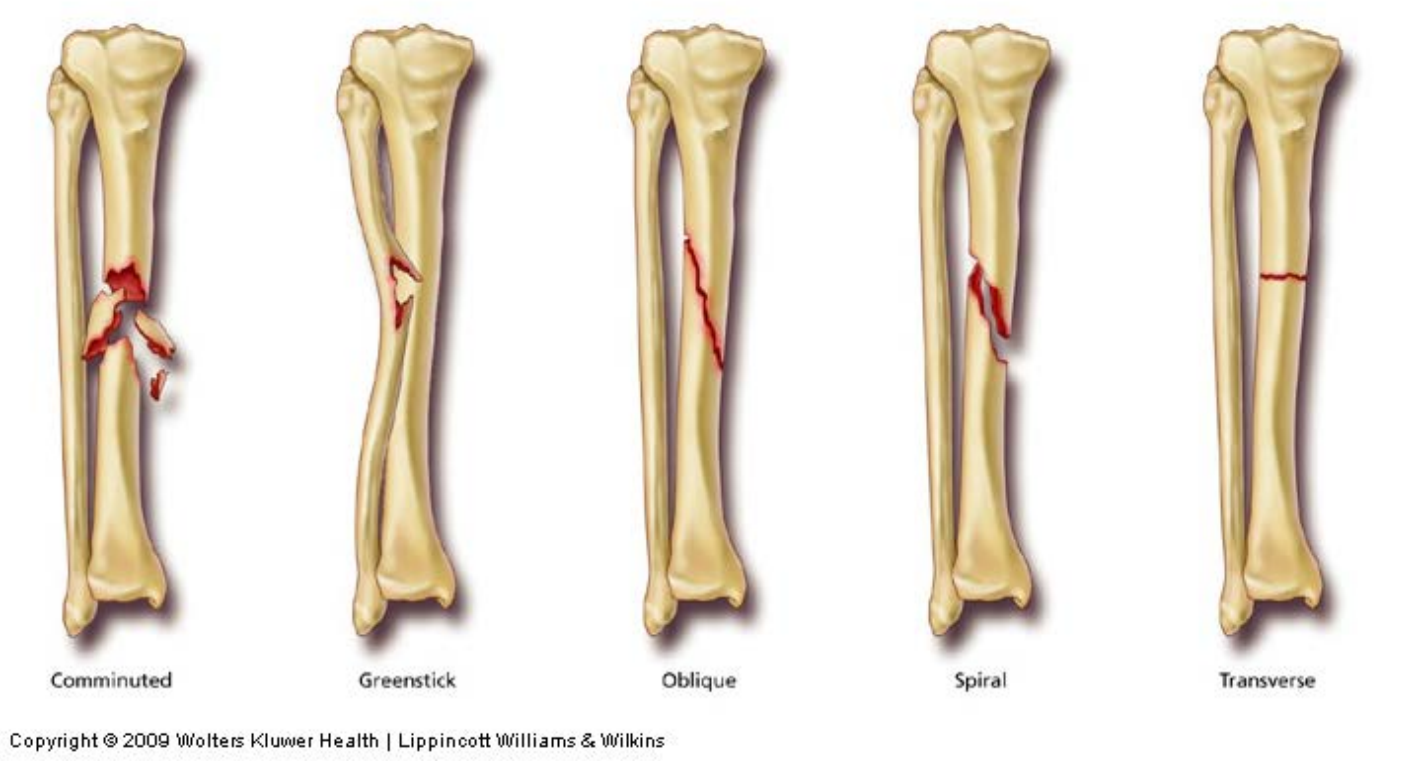
Fractures

Any variety of broken bone: Simple, Incomplete or Compound; Also stress, compression, march, greenstick, comminuted, impacted, compression, malunion, etc.

Demographics

Children > adults (high-risk behaviors)

Elderly: brittle bones, easy falls



pt 3

Back Next

more Fractures

Signs and Symptoms	Treatments	Massage
Usually obvious, may have to be found with radiography or bone scan	Usually heal well with immobilization, relief from weight-bearing or percussive stress Casts, pins or plates, reparative surgery if necessary Grafting with various substances	Common sense: locally avoid while acute; work with circulation, compensation patterns

Osteoporosis

Porous bones: calcium is removed faster than replaced

Etiology

Bone density increases until about age 30

Then bone density remains stable or decreases

Calcium consumption may have influence on bone density, but so do other factors:

- Other vitamins, minerals
- Exercise habits
- Blood pH
- Other diseases
- Medications
- Mood

Calcium absorption

- Requires acidic environment in stomach
- Requires vitamins D, K
- (Too much vitamin A can impede calcium uptake)

Calcium loss

- Sweat, urine
- Meat-based proteins cause more calcium to be excreted with urine
- Caffeine (coffee, soda)
- Medications

Demographics

8 million women, 2 million men in the United States

34 million have precursor, osteopenia (may be silent)

Women more at risk

Lower density to start with Childbearing

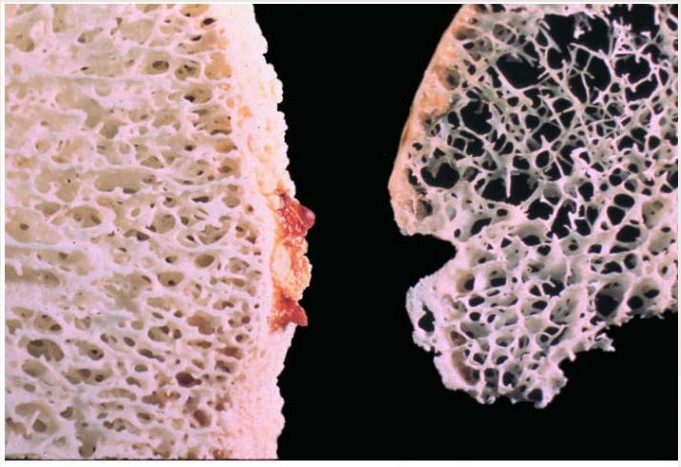
Hormone fluctuations at menopause

Most common in white and Asian women; other races can have it too

- Hyperthyroidism
- Heavy alcohol use
- Smoking
- Inflammatory bowel disease
- Hormonal imbalances
- Eating disorders

Maintaining bone density

- Osteoblasts and osteoclasts, under hormonal control
- Most activity in trabecular bone (epiphyses and vertebral bodies)
- Loss of key struts increases risk of collapse
- Calcium is used outside of bones too
- Blood clotting
- Nerve transmission
- Buffer for pH balance in blood
- Osteoporosis develops when calcium absorption/loss/maintenance balance is lost
- Vertebrae and femur especially vulnerable



more Osteoporosis

Signs and Symptoms	Diagnosis	Treatment	Massage
Silent while early Later: thinned, collapsed vertebrae, loss of height, widow's hump, back pain Complications Spontaneous fractures Hip fracture refers to head of femur Slow healing: < 1/3 return to previous activity levels	DEXA: dual X-ray absorptiometry Maybe ultrasound, CT Presence of fractures	Hormone replacement therapy can slow progression; these carry other possible risks Bisphosphates SERMS (selective estrogen receptor modulators) Exercise Diet, calcium supplements Prevention Four main steps: Get dietary calcium from absorbable sources Exercise Get vitamin D Avoid substances and behaviors that pull calcium off bone	Depends on resiliency of client Adjust for fragility, etc. Can offer important pain relief

Paget Disease

Bone is reabsorbed 50x faster than normal; replaced with disorganized fibrous connective tissue; also called *osteitis deformans*

Etiology

Osteoclasts become huge (5x larger than normal) and hyperactive

Osteoclasts are also busy but can't keep up

Bone tissue is broken down/replaced at accelerated pace

Usually in one bone only

Skull, vertebrae, pelvis, legs most often

Doesn't appear to progress from one bone to another

Cause is unknown; may involve slow-acting virus along with genetic predisposition

Demographics

About 1 million in the United States

Men > women

Especially common in whites from northwestern Europe

Family predisposition

pt 3

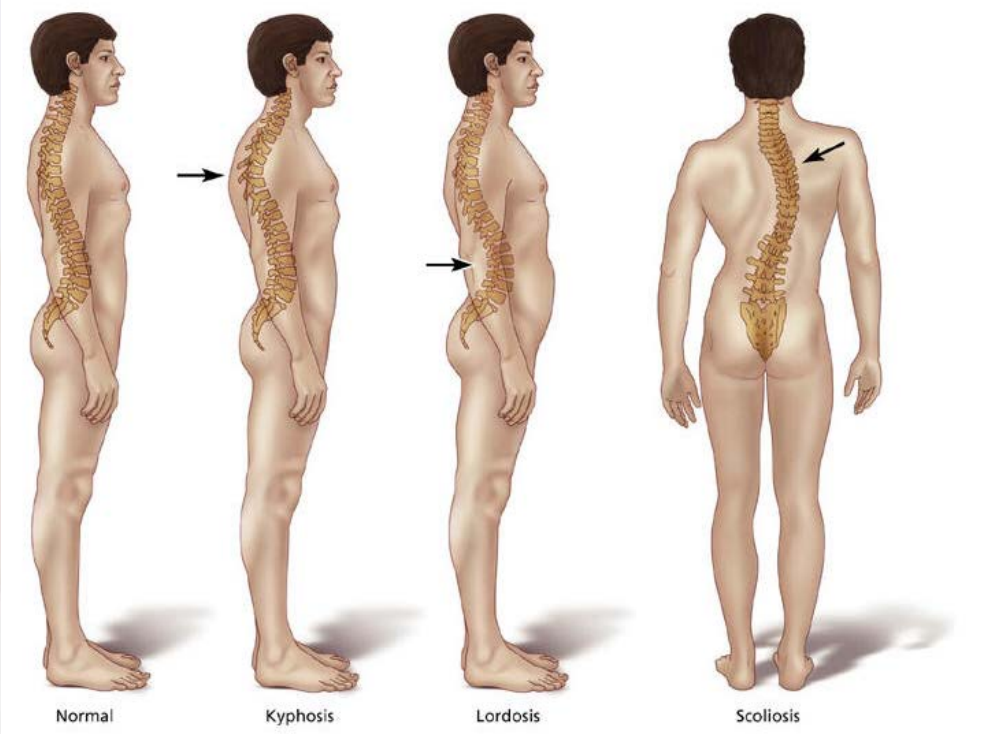
Back Next

more Paget Disease

Signs and Symptoms	Diagnosis	Treatment	Massage
No early symptoms Later: deep bone pain, palpable heat, problems related to bone changes Loss of hearing Chronic headache Pinched nerves Change in leg shape Complications Fractures Arthritis Central nervous system (CNS) problems if skull bones are affected Loose teeth with mandible Heart failure 1% develop rare but aggressive form of bone cancer	Radiography or bone scan Blood test for alkaline phosphatase indicates overactive osteoblasts	Similar to osteoporosis Exercise, physical therapy Aspirin, pain relievers Calcitonin, bisphosphates Surgery if necessary	Requires caution but probably safe for active clients Work with health care team

Postural Deviations

Overdeveloped spinal curves: Hyperkyphosis (humpback), Hyperlordosis (“wayback), Scoliosis (S, C or reverse-C curve)



Etiology

Distortions happen in multiple plains (rotoscoliosis)

Functional problem: soft tissue tension

Structural problem: bony distortion; Most cases are idiopathic; Some related to congenital problems

Cerebral palsy, polio, muscular dystrophy, osteogenesis imperfecta, spina bifida

more Postural Deviations

Signs and Symptoms	Treatment	Massage
Can be subtle or extreme Can lead to breathing problems, lung infections, heart problems Scoliosis 1–2% of teenagers Girls > boys, 7:1, usually bend to right Mild is 30°–40°, treated with exercise, chiropractic, brace, etc. Severe is 40°+, will probably progress about 1° per year; candidate for surgery Hyperkyphosis Overdeveloped thoracic curve May be congenital in young men: Scheuermann disease In older people may be related to osteoporosis, ankylosing spondylitis Surgery for 75°+ curvature Hyperlordosis Overpronounced lumbar curve:	Depends on type, age, severity	Can be especially effective for functional problems Even for others, can offer pain relief

swayback Usually muscular imbalance Can cause significant low back pain		

Joint Disorders

Ankylosing Spondylitis

Dislocations

Gout

Lyme Disease

Osteoarthritis

Patellofemoral Syndrome

Rheumatoid Arthritis

Spondylosis

Sprains

Temporomandibular Joint Disorders

Ankylosing Spondylitis

Progressive inflammatory arthritis of the spine; also called *rheumatoid spondylitis*

Etiology

Probably autoimmune, maybe triggered by bacterial infection

No antinuclear antibodies: seronegative spondyloarthropathy

Goes with Crohn disease, ulcerative colitis, psoriasis

Usually begins with chronic inflammation at sacroiliac (SI) joint on one or both sides

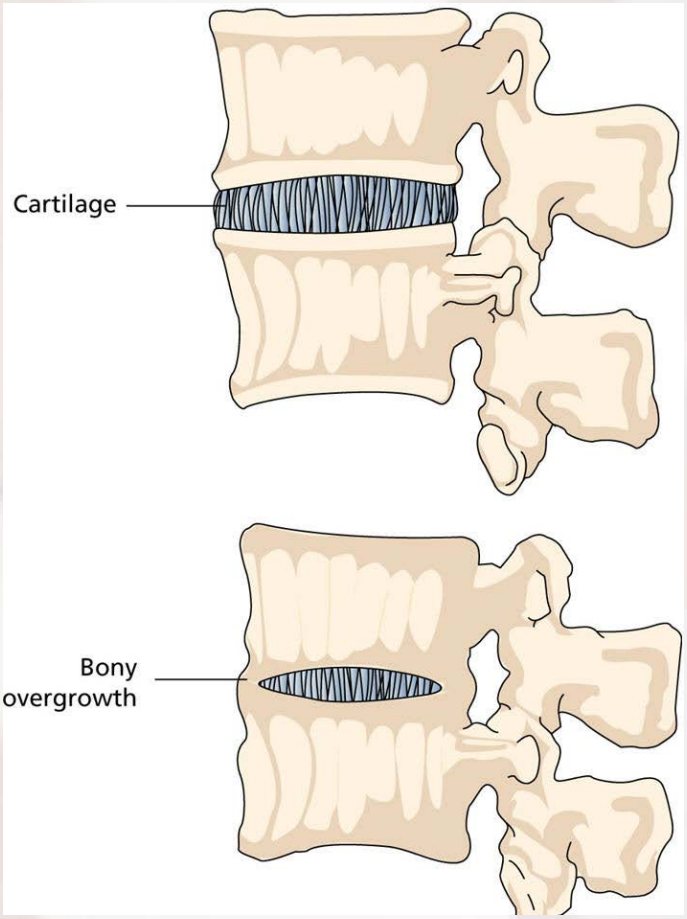
- Progresses up spine
- Joints become inflamed, cartilage degenerates, discs ossify, vertebral bodies square off
- Vertebrae fuse in flexion
- Fusions are called syndesmophytes
- Can fuse at vertebral costal joints too

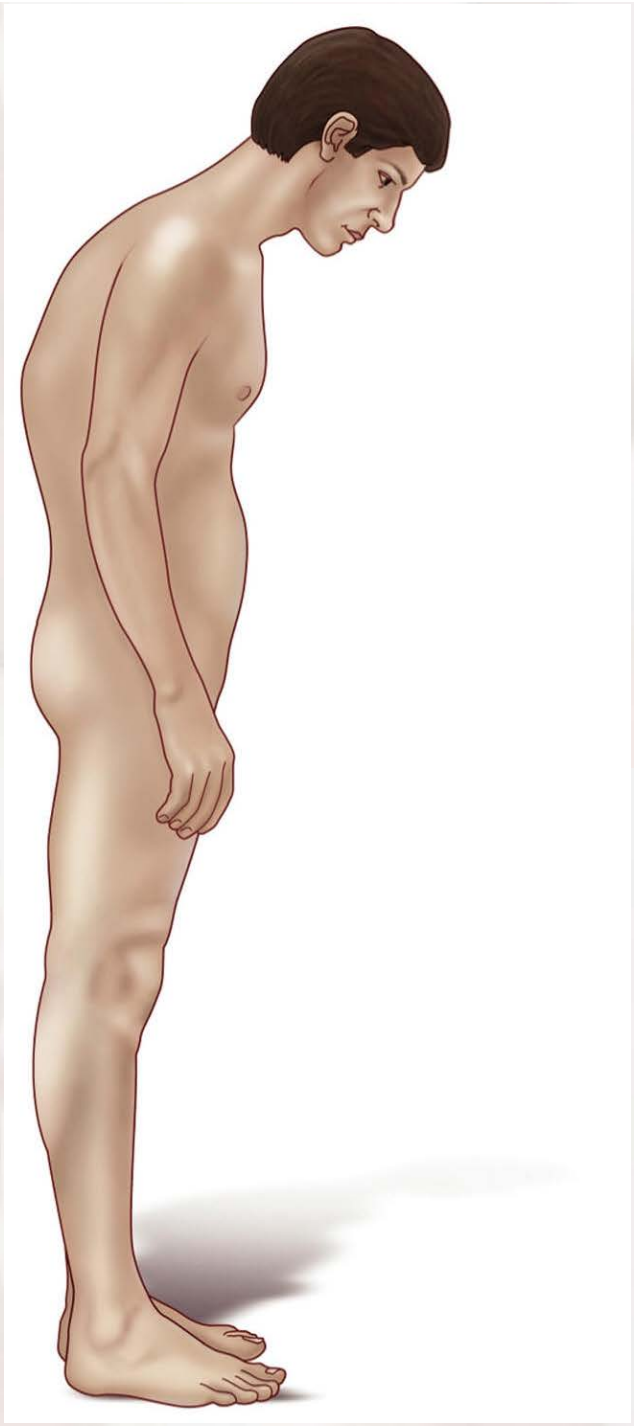
Demographics

Inherited disorder; Usually appears in men 16–35 years old

1% of U.S. population

Men > women 3:1





pt 4

Back Next

more Ankylosing Spondylitis

Signs and Symptoms	Treatment	Massage
Starts as low back pain May refer into buttocks, legs: looks like disc problem Immobility at spine, hips Flare and remission During flare: general malaise, iritis, fever Complications Vertebral fracture Peripheral nerve pressure, cauda equina syndrome Loss of lung capacity, pneumonia, other lung infections Inflammation of eyes, heart, kidneys, other organs Diagnosis Observable symptoms Blood tests Radiography May take a long time to confirm,	Exercise to maintain function Physical therapy (PT) for spine strength, posture Painkillers, anti-inflammatories Immune-suppressants (DMARDS: disease-modifying antirheumatic drugs) Surgery	Work with caution around inflammation Work with health care team, while subacute Work to help maintain spine function

esp. in women		

pt 4

Back Next

Dislocations

Bones in a joint are separated to that they no longer articulate; Other soft tissue damage too

Etiology

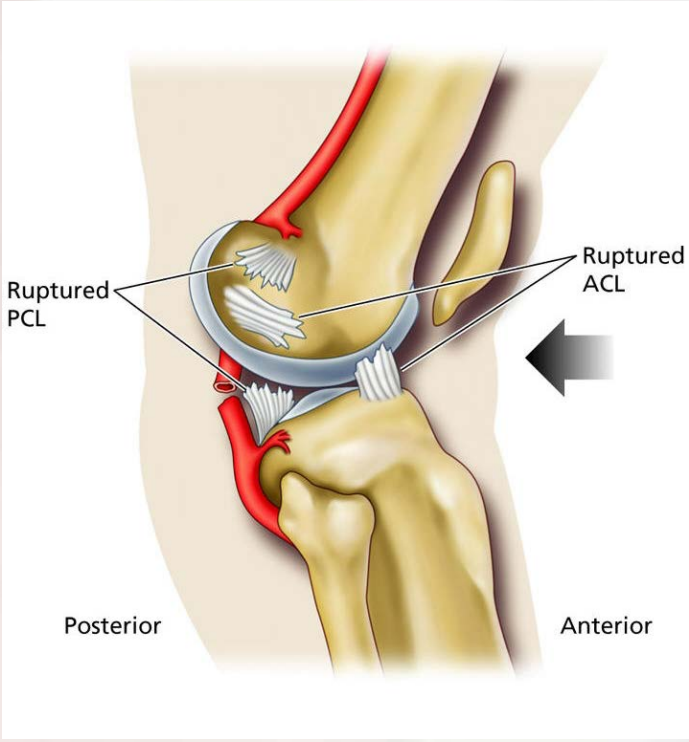
Usually significant force

Shoulder most often

Fingers

Congenital weakness in connective tissues (Marfan, Ehlers-Danlos)

Hip dysplasia may be present at childbirth, can lead to osteoarthritis in adulthood



pt 4

Back Next

more Dislocations

Signs and Symptoms	Treatment	Massage
Swelling, discoloration, loss of function, pain Complications Fibrosis, scar tissue Damage to blood vessels, other structures Ligament laxity Subluxation, spontaneous dislocation, osteoarthritis	For large joints: immediate reduction Radiography to rule out fracture Splinting, exercise, PT Other interventions: ligament-shortening surgery, thermal capsulorrhaphy, proliferant injections	Avoid while acute; in subacute stage work for scar tissue resolution, improved ROM Be careful about positioning of lax joints

Gout

Chemistry-based inflammatory arthritis

Etiology

Uric acid is not extracted

Metabolic gout: kidney function is normal; uric acid levels are high

Renal gout: uric acid is normal; kidneys are impaired

Both: Kidneys are compromised and uric acid levels are high

May be triggered by:

Binge eating, drinking, surgery, sudden weight loss, infection

Uric acid accumulates, crystallizes

Usually around great toe

Usually sudden onset

Tophi may develop later (deposits of sodium urate)

Risk Factors

High-purine diet (red meat, organ meats, shellfish, alcohol, lentils, mushrooms, peas, asparagus, spinach)

Obesity

Sudden weight changes

Alcohol consumption

Demographics

Men > women 10:1

Women tend to be postmenopausal

1 million + in the United States

Hypertension

Some blood disorders

One attack may be followed by others with increasing frequency

pt 4

Back Next

more Gout

Signs and Symptoms	Treatment	Massage
Sudden onset, usually at feet Extremely painful inflammation May cause fever May cause punched-out formation in bone Kidney stones, renal failure, high blood pressure, cardiovascular disease: all interrelated Diagnosis Pain profile Distinguish from pseudogout for chemical accuracy Aspirated fluid shows uric acid crystals	Drugs: Pain relief (not aspirin) Anti-inflammatories Metabolism/uric acid management Hydration Losing weight Changing diet	At least local contraindication; no ice! Get information on cardiovascular/kidney health

Lyme Disease

Infection with spirochete Borrelia burgdorferi; Two species of deer ticks: Ixodes scapularis, Ixodes pacificus

Etiology

Ticks live about 2 years

In spring/summer of first year they crawl onto bushes and stems to find a warm-blooded host

Pick up B. burgdorferi from deer or other mammals; pass on to humans

Slow-growing bacterium that invades several types of tissues

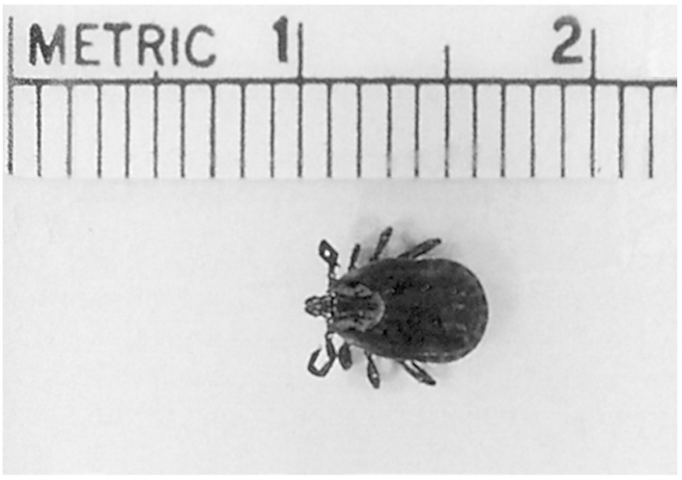
Demographics

Montana is only state with *no* Lyme disease reported

90% cases in Northeast and mid-Atlantic, Wisconsin, Minnesota

At risk: work and play in grassy or wooded areas

20,000 diagnoses/year in the United States; also in Europe and Asia



more Lyme Disease

Signs and Symptoms	Treatment	Massage
Stages Early local disease Symptoms appear 7–30 days after tick bite. Bull's-eye rash , high fever, fatigue, night sweats, stiff neck, headache. (Often no rash is present; looks like flu, mononucleosis) Early disseminated disease Systemic symptoms develop: Cardiovascular: irregular heart beat, dizziness Neurological: headaches, Bell palsy, numbness, tingling, forgetfulness General: debilitating fatigue Late disease Infection of one or more joints: knee, elbow, shoulder. Usually three joints or fewer. Can cause permanent damage. Looks like rheumatoid arthritis. Symptoms usually last weeks to months, then subside Some get progressively worse	Antibiotics, long course for slow-growing bacteria (up to 12 months) Prevention Long sleeves, pants Light-colored clothing Insect repellants Examine skin Remove ticks with tweezers, take to doctor (if removed within 24 hours, risk of infection is very low)	Contraindicated when joints are acutely inflamed Be careful about neurological/circulatory complications Know what ticks look like if working in endemic area

Diagnosis		
Difficult to be accurate		
Blood tests identify exposure, not whether symptoms are related to current infection		
False negatives		
Other tick-borne diseases		

Osteoarthritis

Synovial joints (especially weight bearing); Usually due to age, wear and tear; Also called *degenerative joint disease*

Etiology

Precarious environment inside joints; once damage occurs, it is difficult to reverse

Cartilage

- Articular cartilage: small number of chondrocytes with proteoglycans that attract water
  - Arrangement varies by regions
  - Superficial (in joint space)
  - Intermediate
  - Deep (attaches to bone)
- Resistance to shearing and compressive forces

Chondrocytes are active all through life, replacing and rebuilding surface

- Don't migrate to areas of damage
- When cartilage is damaged, chondrocytes make less fluid and collagen
  - Cartilage degrades
  - Osteocytes in epiphyses become active: bone spurs, may be cystlike cavities under cartilage

Causes

Age: dry, prone to injury

Overweight: stress on knees, hips

Demographics

Most common type of arthritis

20 million to 40 million in the United States

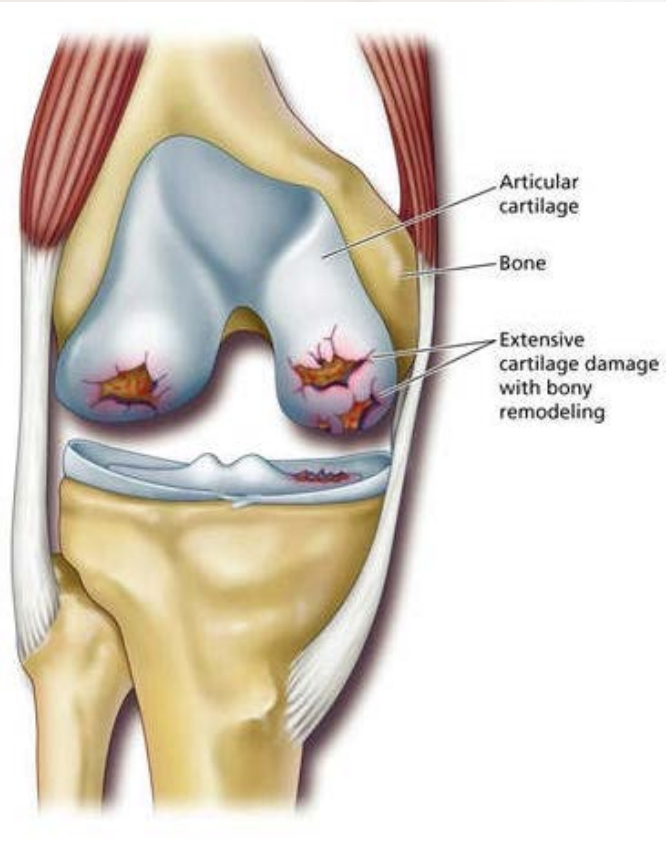
Men about equal to women; women have it more severely

Leading risk factors:

Age

Overweight

Massage therapists: take care of saddle joint!



Lax ligaments: unstable joints

History of trauma, arthroscopic surgery

Repetitive pounding stress

Others: Hormonal imbalance, nutritional deficiency, trigger foods, etc.

Back Next

more Osteoarthritis

Signs and Symptoms	Treatment	Massage
Deep pain, stiffness; especially without warmup or with overuse At fingers: phalangeal epiphyses widen At distal interphalangeal joints (DIPs): Heberden nodes At proximal interphalangeal joints (PIPs): Bouchard nodes Diagnosis Physical examination, patient history Rule out other causes of joint inflammation; radiography not conclusive	Goals: reduce inflammation, limit or reverse damage Nonsteroidal anti-inflammatory drugs (carry some risks) Topical applications: camphor, menthol, capsaicin Exercise: within pain tolerance for three goals: • Improve and maintain healthy range of motion • Increase stamina and lose weight • Improve the strength of muscles surrounding affected joints Nutritional supplements: Glucosamine and chondroitin sulfate • Popular and show results for mild to moderate arthritis • Glucosamine may affect insulin levels in diabetic patients • Made from the shells of shellfish (watch for allergies) • Chondroitin may affect blood clotting Arthroscopic procedures:	Can be useful to reduce pain, ease muscle tension; Doesn't rebuild damaged cartilage

- Proliferant injections
- Corticosteroid injections
- Synovial fluid withdrawal
- Joint lavage and debridement

Joint replacement surgery: 256,000 knee replacements, 117,000 hip replacements per year

Procedures in development: numerous strategies are in development:

- Cartilage paste
- Drill into epiphyses to stimulate cartilage growth
- Transplant osteochondral plugs
- Others

Patellofemoral Syndrome

Patellar cartilage is damaged: precursor of osteoarthritis at the knee; also called jumper's knee; anterior knee pain syndrome; overuse syndrome

Etiology

Two main contributors

- Overuse/overloading;
- Percussive activity with twisting, jumping
- Poor alignment;
- Especially with overweight, poor footwear, uneven surfaces, muscular imbalance

more Patellofemoral Syndrome

Signs and Symptoms	Treatment	Massage
Pain at anterior aspect of knee Stiffness after immobility Difficulty with walking, especially down stairs Crepitus Diagnosis Can be difficult; looks like patellar tendinitis (which responds to massage)	Change activity Physical therapy: Quads, hams, tensor fascia latae (TFL), deep lateral rotators Ice Nonsteroidal anti-inflammatories (NSAIDs) Orthotics Knee brace, taping	Irritation is inside joint capsule; not in reach for massage; can address pain, stiffness, tension, alignment

Rheumatoid Arthritis

Autoimmune attack on synovial membranes; can involve inflammation elsewhere too

Etiology

Immune system attacks synovial membranes

- Can affect other areas: blood vessels, serous membranes, skin, eyes, lungs, liver, heart)

B cells, T cells, antibodies, inflammatory chemicals are present in joint during flare

- Synovial membrane thickens, swells
- Fluid accumulates
- Inflamed tissue releases enzymes that erode cartilage
- Deformation of joints

Demographics

3.1 million in the United States

Women > men, 3:1

Mostly 20–50 years old, can be in children

more Rheumatoid Arthritis

Signs and Symptoms	Treatment	Massage
Flare and remission Prodrome: malaise precedes sharp, specific joint pain Rheumatic nodules Joints are hot, painful, stiff • May improve with gentle movement • Knuckles in hands, toes, ankles, wrists Bilateral, may not be symmetrical Complications During flares • Rheumatic nodules on the sclera • Sjögren syndrome • Pleuritis • Carditis or pericarditis • Hepatitis • Vasculitis • Raynaud syndrome, skin ulcers, bleeding intestinal ulcers, and internal hemorrhaging. • Bursitis and anemia, esp. with childhood onset Between flares: • Dislocations • Ruptured tendons	Goals • Reduce pain • Limit inflammation • Stop damage • Improve function First-line drugs: NSAIDs, steroids, cyclo-oxygenase-2 inhibitors (with exercise, hydrotherapy, PT, occupational therapy [OT]) Second-line drugs: biological response modifiers, immunosuppressant drugs Other: diet, exercise, stress-reduction Surgery if necessary	Avoid circulatory massage while acute Between flares work for pain reduction, improved ROM, lower muscle tension

Collapse at C1-C2

Diagnosis

History, radiography, blood test for rheumatoid factor

At least four of these:

- Morning stiffness that lasts at least 1 hour
- Arthritis in three or more joints
- Involvement of PIPs, metacarpophalangeal joints (MCPs), DIPs
- Bilateral
- Positive serum rheumatoid factor
- Rheumatoid nodules

Radiographic evidence

Spondylosis

Osteoarthritis at spine; Age-related changes of the vertebrae, discs, joints, and ligaments of the spine

Etiology

Osteophytes grow on vertebrae

- Can be on vertebral bodies or facets
- Can put pressure on nerve roots or spinal cord

Intervertebral joints analogy with synovial joints:

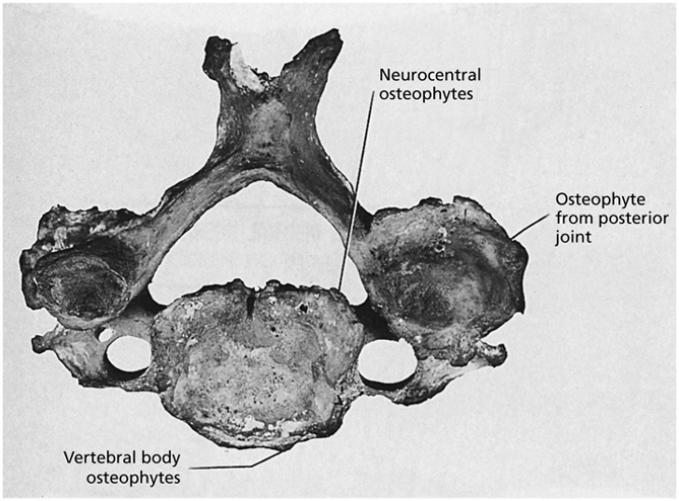
- Vertebral bodies = articulating bones
- Annulus fibrosis = capsular ligament
- Nucleus pulposus = synovial fluid
- Shearing and compressive forces wear on cartilage, disc thins, bone spurs develop

Not all osteophytes cause pain (radiography not definitive for cause of pain)

Age contributes to ossification of anterior longitudinal ligament, posterior longitudinal ligament, ligamentum flavum

- DISH (diffuse idiopathic skeletal hyperostosis) may cause gradual painless loss of ROM

More typical development of arthritis at facets, SI joint, costovertebral joints



more Spondylosis

Signs and Symptoms	Treatment	Massage
May be silent Painless progressive loss of ROM Pain if nerve roots are compressed Spinal cord compression: pain, loss of bowel/bladder control Complications Spreading problems in the spine Nerve pain Secondary spasm Blood vessel pressure Spinal cord pressure Diagnosis Radiography, MRI	Anti-inflammatories, exercise, massage, acupuncture, hydrotherapy Locally injected steroids, surgery	Caution for nerve irritation, positioning, muscle splinting

Sprains

Torn ligaments

Etiology

Linearly arranged collagen fibers link bone to bone

- Injured when some fibers are ripped
- First, second, third degree (rupture)

Repair: laying down new collagen fibers

- Begins disorganized and weak
- Aligns according to weight-bearing force
- Without stress during healing, scar tissue remains weak and disorganized

Distinguishing Features

Sprains are injured ligaments, not muscles or tendons

Sprains are more serious than strains and tendinosis

Sprains tend to swell

more Sprains

Signs and Symptoms	Treatment	Massage
Acute Stage Pain, heat, redness, swelling, loss of function Significant swelling, esp. if connected to joint capsule Anterior talofibular ligament is most commonly sprained Subacute Stage Inflammation subsides 24–48 hours later, depending on severity Some injuries go back and forth, depending on usage Complications Masking symptoms especially of minor fractures Repeated injury, with poor-quality healing Ligament laxity collagen has poor rebound; can lead to osteoarthritis	RICE (rest, ice, compression, elevation) PRICEMMM (protection, rest, ice, compression, elevation, medicine, mobility, modalities)	Indicated when subacute for improved circulation, scar tissue formation, stiffness

Temporomandibular Joint Disorders

Collection of signs and symptoms associated with jaw problems; also called TMD: **t**emporo**m**andibular joint **d**isorders

Etiology

TMJ has huge mobility:

- Elevation, depression, retraction, protraction, side flexion
- Joint capsule stretches

Fibrocartilage disc can get injured (video clip 1)

Muscles develop trigger points

Causes

May be initiated by fall or motor vehicle accident (MVA): jawlash

Can be spontaneous, connected to stress, bruxism

Symptoms and causes can be circ

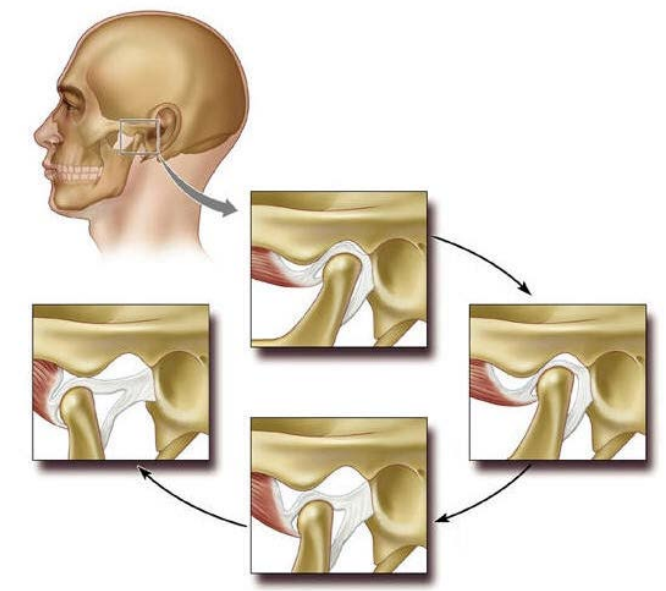
Other factors

- Misalignment at jaw, bite
- Hormonal sensitivity?
- High overlap between ligament laxity and heart valve problems: connective tissue quality issues?
- Frequently seen with fibromyalgia, chronic myofascial pain syndrome, irritable bowel syndrome

Demographics

An estimated 10 million in the United States (not all seek help)

Women > men



more Temporomandibular Joint Disorders

Signs and Symptoms	Treatment	Massage
Jaw, neck, and shoulder pain Limited range of motion Popping in the jaw Locking of the joint Grinding teeth (bruxism) Ear pain Headaches Chronic misalignment of cervical vertebrae Diagnosis Differentiate from myofascial pain syndrome, other tension patterns that cause pain in face and head Sprain of ligament that attaches stylomandibular joint to base of the skull: also called Ernest syndrome Trigeminal neuralgia Occipital neuralgia Osteomyelitis MRI, radiography, electromyography, clinical examination can yield information	Nonsurgical: Hot/cold; PT, ultrasound, massage, anti-inflammatories, local anesthetics, splints, proliferant injections Surgical: dissolve adhesions and scar with injections; arthroscopic surgery; joint replacement	Can be useful to interrupt the process before permanent damage occurs Reduce muscle tension, improve awareness, address referred pain patterns

on cartilage damage, muscle function, subluxation		

Back Next

Genetic Musculoskeletal Disorders

Ehlers-Danlos Syndrome

Margan Syndrome

Muscular Dystrophy

Osteogenesis Imperfecta

Ehlers-Danlos Syndrome

Group of genetic disorders leading to connective tissue weakness

Etiology

Genetic mutation affects collagen, elastin, other extracellular matrix of connective tissues

- Hypermobility of joints
- Chronic joint pain
- Delicate skin
- Poor wound healing

Most common form passed through autosomal dominant genes: if one parent is a carrier, each child has a 50% chance of developing EDS

Other types are recessive: both parents must carry the gene

Demographics

Rare: about 50,000 in the United States, but many with mild form

Men = women

No racial predisposition

more Ehlers-Danlos Syndrome

Signs and Symptoms	Treatment	Massage
Depends on genetic anomaly Easy bruising; poor wound healing; frequent joint dislocations; eye problems (detached retina, myopia); mitral valve prolapse Rarely: extreme postural deviations, baggy skin Several types: Classic EDS Hypermobility EDS Vascular EDS Kyphoscoliosis EDS Arthrochalasia EDS Dermatosparaxis EDS Diagnosis Genetic testing not always conclusive Family history with signs and symptoms Mild EDS may not be identified, but children can have it in more extreme form: genetic counseling is important	Treated by symptom Education to preserve joint function Skin care Special care with dental work High-risk pregnancy High doses of vitamin C may improve some connective tissue strength	Appropriate if heart is healthy and joints not stretched too far Delicate skin, easy bruising

Marfan Syndrome

Genetic mutation causes production of dysfunctional fibrillin

Etiology

Faulty protein fibers → connective tissues are weak

Musculoskeletal system, meninges, heart, aorta, eyes most at risk

Demographics

200,000 in the United States have Marfan or a related disorder

Usually passed from parent to child

25% = spontaneous mutation

more Marfan Syndrome

Signs and Symptoms	Treatment	Massage
Ranges from mild to severe • Musculoskeletal system anomalies: long fingers and toes, arms and legs; protruding or sunken sternum; postural deviations • Cardiovascular system anomalies: aortic and mitral valves may collapse → heart problems; risk of aneurysm, aortic dissection • Eye disorders: myopia, dislocated lens, detached retina • Nervous system anomalies: stretched, weakened dura mater: dural ectasia • Other symptoms: stretch marks, hernias, flat feet, spondylolisthesis, and hammertoes Diagnosis No simple genetic test • Clinical examination, family history, observation	By symptom • Beta blockers to reduce force on aorta • Blood pressure medication • Prophylactic antibiotics to protect heart valves • Surgery to correct spine, thorax, heart valves if necessary	Can be appropriate with care for delicate tissues, high risk of heart/aorta problems Work with health care team

Muscular Dystrophy

Group of related diseases with genetic anomalies; Degeneration, wasting of muscle tissue

Etiology

Normal muscles use a protein, dystrophin, to help convert fat or glycogen into fuel

- The most common forms of MD involve inadequate production dystrophin
- Muscle cells atrophy and die, replaced by fat and connective tissue
- Contractures develop

Duchenne muscular dystrophy: most common: 1:3500 male babies. No dystrophin is produced

Becker muscular dystrophy: less common, less severe: 1:30,000 boys, some dystrophin is produced

Myotonic muscular dystrophy: most common adult-onset MD; myotonia, cataracts, GI dysfunction, heart problems

Other varieties

- Congenital muscular dystrophy
- Facioscapulohumeral dystrophy
- Limb-girdle dystrophy
- Emery-Dreifuss muscular dystrophy
- Oculopharyngeal muscular dystrophy

Demographics

Duchenne and Becker are X-linked

Carried by mother, passed to sons

400–600 born each year

Other types not gender specific: males = females

more Muscular Dystrophy

Signs and Symptoms	Treatment	Massage
Vary by type Duchenne and Becker are similar A toddler has difficulty walking Leg pain, waddling gait, lumbar curve, walks on toes Can also affect spine, joints, heart, lungs Most Becker MD patients die young with cardiac or respiratory failure Diagnosis Much easier to find now Blood test for creatine kinase Look for neurological problems Biopsy	Interventions to prolong activity, life expectancy Massage, PT to minimize contractures Surgery to release tight tendons, correct spine Steroids Assistive devices as necessary	Sensation is intact: massage is safe Check for circulatory health, other complications of lost movement Work with health care team

Osteogenesis Imperfecta

Group of genetic disorders that changes the quality of type I collagen fibers; Four main subtypes; (other, much rarer types)

Etiology

Type I collagen is a triple helix of intertwining procollagen fibers

OI is shortage or faulty production of type I collagen

Demographics

Type I most common: 1 in 30,000 births

Type II: 1 in 60,000 births

Type III: 1 in 70,000 births

Type IV and others: very rare

20,000–50,000 in United States have OI

Males = females

Autosomal dominant: if one parent has the gene, each child has a 50% chance of having OI

About 25% of cases spontaneous with no family history

Other Connective Tissue Disorders

Baker Cyst

Bunions

Bursitis

Dupuytren Contracture

Ganglion Cysts

Hernia

Osgood-Schlatter Disease

Pes Planus, Pes Cavus

Plantar Fascitis

Scleroderma

Tendinopathies

Tenosynovitis

Whiplash

Baker Cyst

Synovial cysts at the popliteal fossa, usually on medial side; also called popliteal cysts

Etiology

Joint capsule at knee develops a pouch

- Common in children

In adults, may be related to other joint problems:

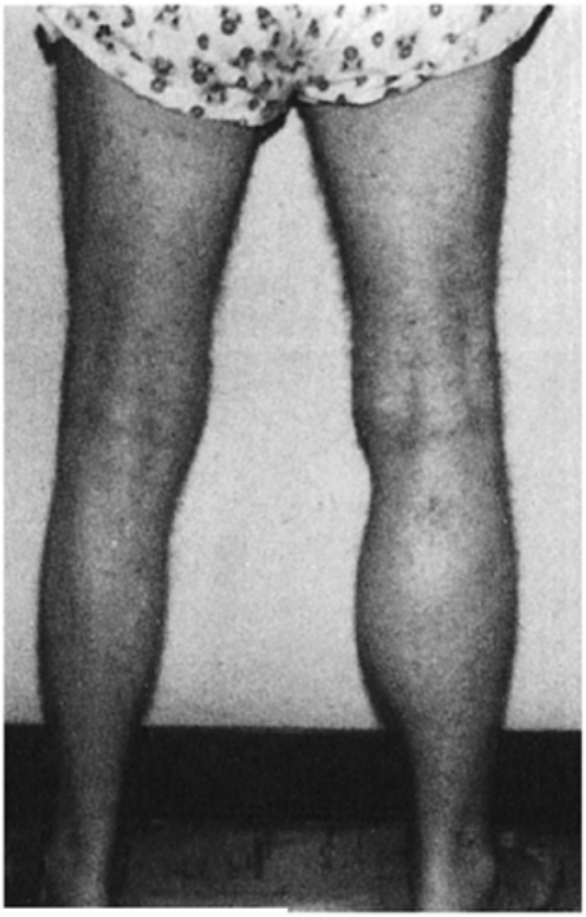
- Osteoarthritis, rheumatoid arthritis, cruciate ligament tears, meniscus tears

Complications

Could impair blood flow

- Risk of thrombophlebitis, deep vein thrombosis (DVT)

Risk of rupture, bleeding in joint, infection, posterior compartment syndrome



pt 6

Back Next

more Baker Cyst

Signs and Symptoms	Treatment	Massage
Usually silent; knee may be painful from underlying problem May feel full or tight on medial aspect of calf	Ice, NSAIDs Aspiration, cortisone shots May recur	Local contraindication; calf symptoms may be a red flag for DVT

Bunions

Also called hallux valgus: laterally deviated big toe; at little toe: bunionette

Etiology

Factors that lead to misalignment between first metatarsal and proximal phalanx of great toe:

- Pes cavus, pes planus
- Shape of the bones
- Muscle imbalance
- Footwear

Joint is distorted, bunion on top is irritated

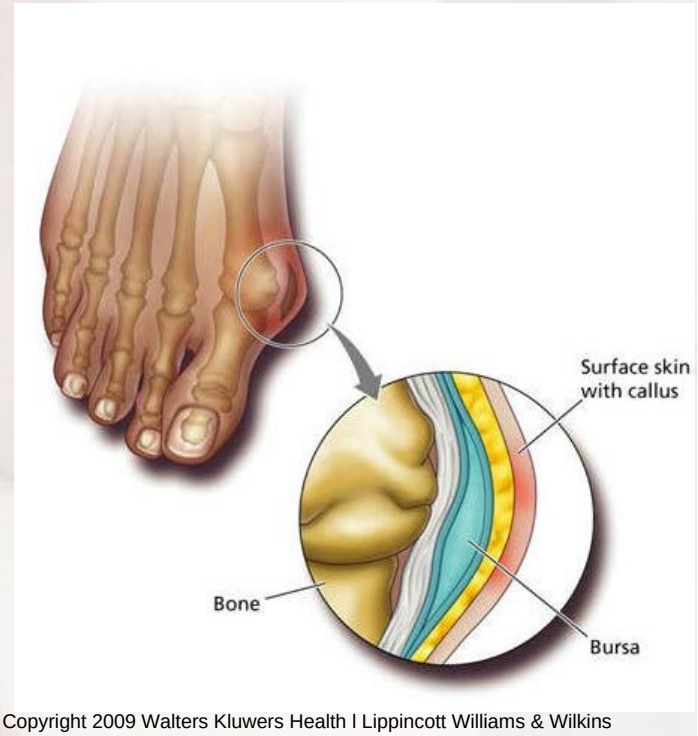
May develop bone spurs, osteoarthritis

Demographics

Women > men, 10:1

High-heeled, narrow-toed shoes

Genetic predisposition



more Bunions

Signs and Symptoms	Treatment	Massage
Lump on medial side of metatarsophalangeal (MTP) joint of great toe May be hot and painful	Remove irritants, improve footwear Massage and exercise for foot health ROM, traction, gentle friction Cortisone injection Surgical correction	Locally contraindicated when inflamed, otherwise appropriate Work with other compensation patterns, intrinsic foot muscles

Bursitis

Synovial sacs outside joint capsules become inflamed

Etiology

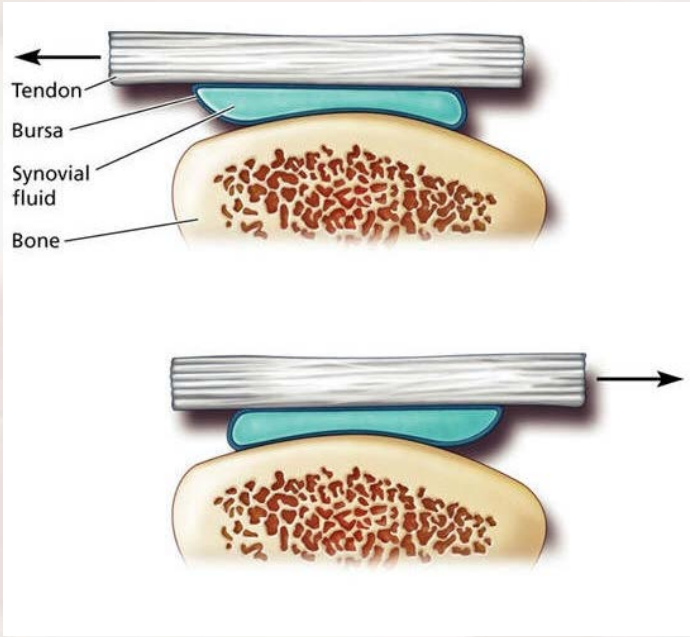
Bursae act as shock absorbers and reduce friction where tendons cross over bones

Repetitive stress irritates bursae

- Pain, limited ROM, muscle tightness

Accompanies general inflammation, gout, rheumatoid arthritis, etc.

Can be from infection, especially at knee or olecranon



more Bursitis

Signs and Symptoms	Treatment	Massage
Pain on passive and active movement Limited ROM (muscle splinting) Often no heat is palpable Diagnosis Patient history: consider other local injuries	NSAIDs, warm packs Aspiration, cortisone injection Bursectomy (may grow back) New movement patterns!	Local contraindication while acute Otherwise appropriate: work to decompress surrounding muscles Avoid infection

Dupuytren Contracture

Idiopathic shrinking and thickening of palmar fascia; also called palmar fasciitis

Etiology

Idiopathic

- Looks like excessive posttrauma scar tissue: type III collagen in palmar fascia and fingers

Collagen thickens and gets denser; living cells recede

- Flexion may be normal; extension is limited

Similar connective tissue phenomena:

- Plantar fibromatosis (Ledderhose disease) on sole of foot
- Peyronie disease under skin on shaft of penis
- Knuckle pads (Garrod nodes) at DIPs of hands

Demographics

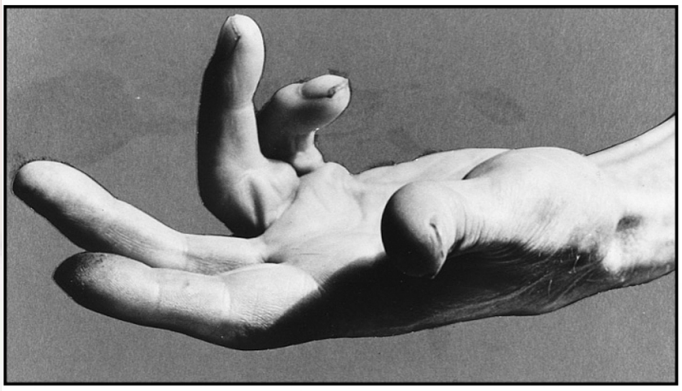
Men > women

Middle-aged, Northern European descent

Some genetic predisposition

Other risk factors:

Smoking, alcohol use, seizure disorders, type 1 and 2 diabetes



more Dupuytren Contracture

Signs and Symptoms	Treatment	Massage
Ring and little fingers affected most Begins as mildly tender bump; cord extends into palm, toward finger Bilateral about 50% of time Can be slow or fast, mild or severe Constricted nerve, blood supply may lead to amputation	Without treatment, can lead to loss of function in affected fingers Injections with cortisone, collagenase, needle aponeurotomy Surgery if necessary Recurs about one-third of time	As long as sensation is present, massage is safe; may not make significant changes May be useful post surgery to help recover function

Ganglion Cysts

Pouches on joint capsules or tendinous sheaths

Etiology

May grow with trauma or overuse; many are spontaneous

Filled with viscous fluid, may have multiple lobes

May grow in a place to interfere with movement or limit function

- Mucous cysts grow on DIPs, may distort growth of fingernail

more Ganglion Cysts

Signs and Symptoms	Treatment	Massage
Range from tiny to large Not usually painful unless irritated	Usually resolve spontaneously Cortisone injection, aspiration, surgical removal (often grow back) Don't smash with a Bible!	Local contraindication May be irritated with friction Untreated bumps need diagnosis

Hernia

Hole in abdominal wall, diaphragm

Etiology

Several factors

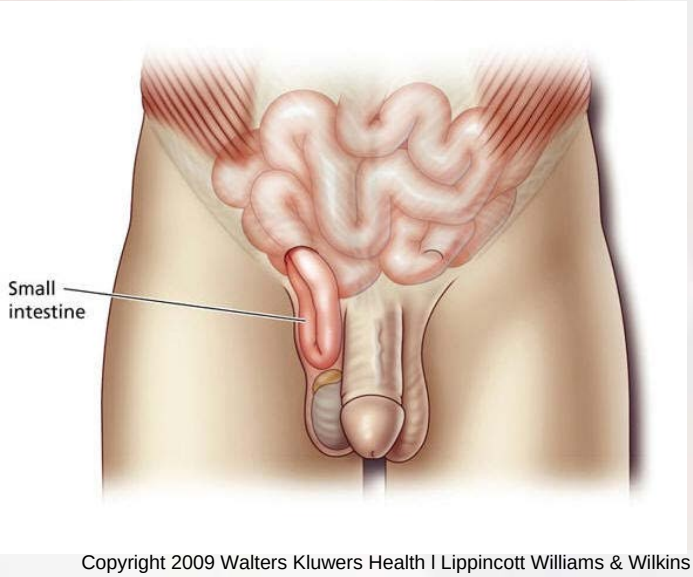
- Weakness of abdominal wall; straining; childbirth
- Small intestines can protrude, get caught and damaged
- Weak spot at inguinal canal for men

Demographics

5 million diagnosed per year

700,000 surgeries

Men with abdominal hernias > women: 7:1



more Hernia

Signs and Symptoms	Treatment	Massage
Inguinal hernia: most common variety; occur at inguinal ring Epigastric hernia: above umbilicus; linea alba splits Paraumbilical hernia: linea alba splits at umbilicus Umbilical hernia: most common in newborn babies; usually closes by age 2 Femoral hernia: Most common in women; bulge at femoral ring below inguinal ligament. Risk of strangulation is high Hiatal hernia: Diaphragmatic hiatus is stretched; stomach bulges into thorax Other hernias: at incisions, obturator, lateral aspect of rectus abdominus Complications Bigger = safer for short term (less risk of strangulation) Strangulation can lead to infection	Surgical repair Truss is temporary solution	Local contraindication at hernia and for recent surgery For past surgery, no cautions

Osgood-Schlatter Disease

Irritation and inflammation at quadriceps attachment on tibia; also called tibial tuberosity apophysitis

Etiology

Rapid bone growth, especially at tibia and femur during adolescence

- Soft tissues may not keep up
- Quads are taxed with athletics

Stress at attachment leads to pain and inflammation

Tibial tuberosity enlarges; microscopic fractures, possible avulsion

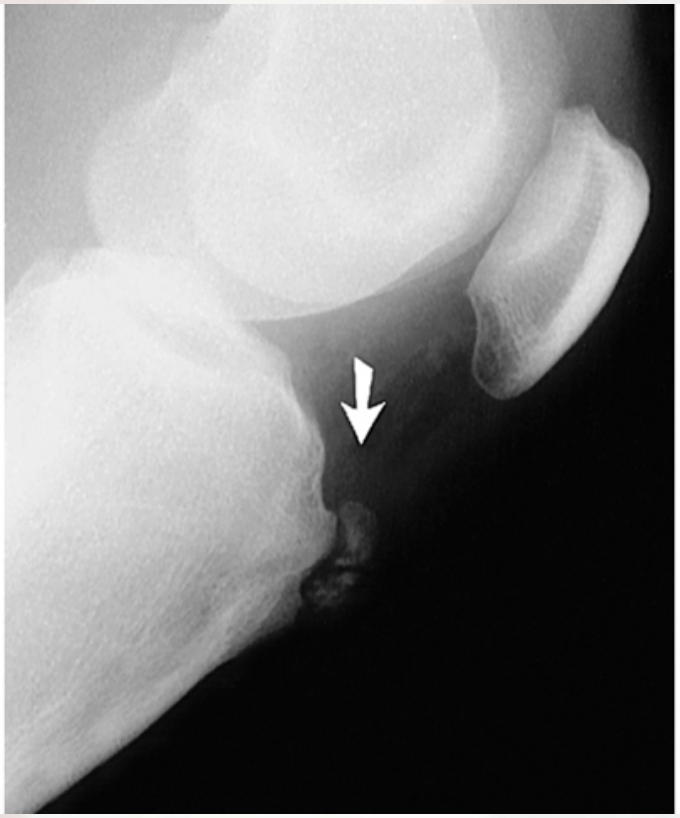
- Usually unilateral

Demographics

Usually adolescent athletes

Running, jumping sports

Boys > girls



more Osgood-Schlatter Disease

Signs and Symptoms	Treatment	Massage
Acute: tibial tuberosity is hot, swollen, painful Subacute: permanent remodeling of tibial tuberosity	Goals: reduce pain, limit damage to quad attachment Careful heating, warming up before activity Cooling down and stretching Rest if necessary Brace or cast followed by rehabilitative exercises Surgery if necessary	Locally contraindicated for circulatory massage while acute Later, work to reduce pain at knee, stretch soft tissues, promote good quality healing

Pes Planus, Pes Cavus

Pes planus = flat feet; Pes cavus = caved feet (jammed arches); Feet lack medial and lateral arches or arches don't flatten and rebound

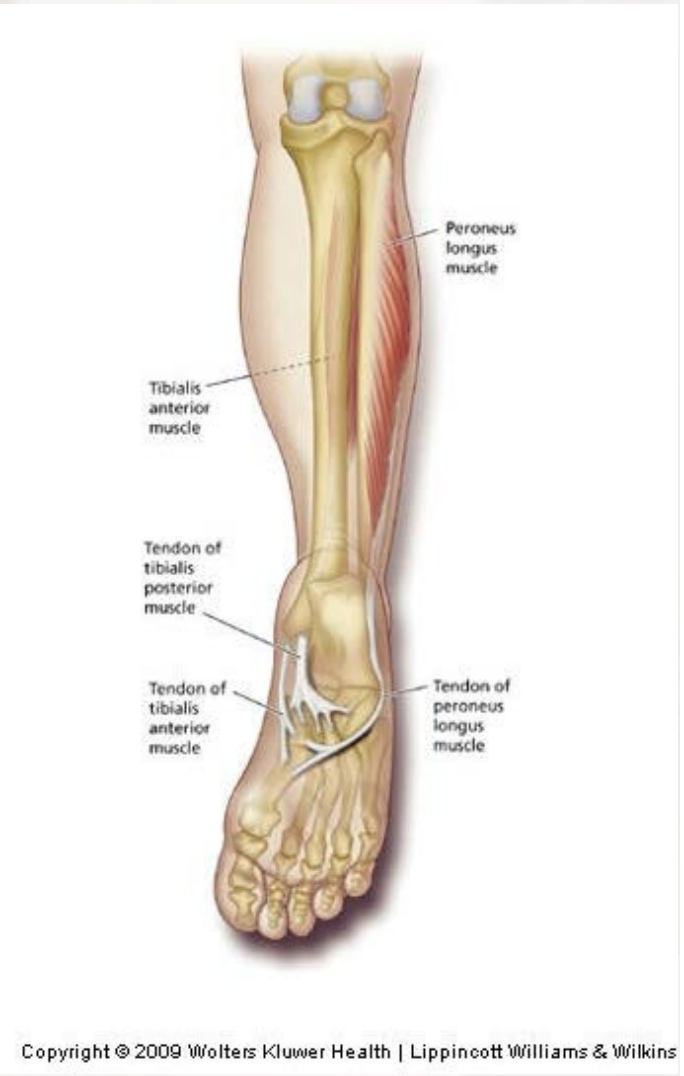
Etiology

Imbalance in forces at feet has repercussions through the rest of the body

Pes planus, cavus can be from congenital problems in bone shape; strength of foot ligaments; muscle imbalance; poor footwear

Underlying diseases that affect feet

Charcot-Marie-Tooth syndrome; muscular dystrophy; polio, cerebral palsy; neurological damage



more Pes Planus, Pes Cavus

Signs and Symptoms	Treatment	Massage
Complications Loss of shock absorption → Change in foot alignment Heel spurs Plantar fasciitis Neuromas Osteoarthritis at foot, knee, hip, SI, spine, TMJ, headaches, etc. Especially an issue with poor peripheral circulation: diabetes, etc.	Improved footwear, orthotics PT to work with peroneus longus, tibialis posterior If very extreme: surgical repair	Indicated Can improve nutrition to ligaments, relieve pain, work with compensation

Plantar Fascitis

Pain at plantar fascia; could be inflammatory or degenerative

Etiology

Plantar fascia is vulnerable to damage

- Overweight
- Worn-down shoes
- Unequal leg length
- Flat or pronated feet, jammed arches
- Tight calf muscles

Secondary to

- Gout, diabetes, rheumatoid arthritis

Fibers fray, become disorganized

- Probably not usually inflamed
- Degeneration of collagen matrix (changes treatment options)

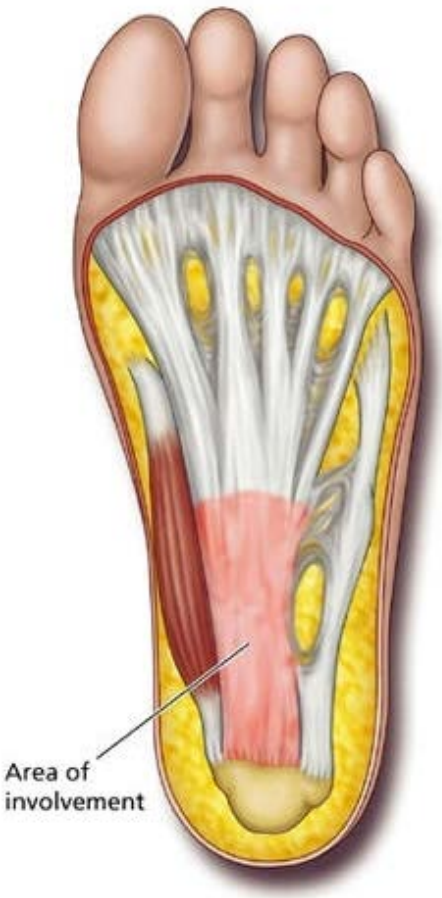
Radiography shows bone spurs (secondary, probably not causative of pain)

Demographics

2 million/year seek treatment

Men = women

Two groups more than others:
Runners (up to 10%)
Older adults who are overweight



more Plantar Fascitis

Signs and Symptoms	Treatment	Massage
Acutely painful after periods of rest, immobility Sharp, bruised feeling at anterior calcaneus or deep in arch Pain subsides with warming up, returns with fatigue	Remove tensions that reinjure plantar fascia Warm, massage foot/leg before standing Orthotics Night splint to hold foot in dorsiflexion NSAIDs, topical anti-inflammatories, massage, ice Cortisone injections: Conservative; otherwise plantar fascia may rupture Shockwave lithotripsy Surgery to divide, release damaged fascia Long-lasting condition: 6–18 months for resolution	Indicated to decrease tension in calf muscles, organize collagen within

Scleroderma

Autoimmune disease leading to production of abnormal amounts of collagen, often in skin: hard skin; Other tissues may be affected

Etiology

Immune system attacks lining of small blood vessels

- Local edema, fibroblast stimulation
- Lots of type III collagen (basis for scar tissue)

Local scleroderma: only skin is involved; may accumulate over years, then stabilize or reverse

- Morphea scleroderma: oval patches on trunk, face, extremities

Linear scleroderma: discolored line or band on a leg, arm, or over the forehead

Systemic scleroderma: blood vessel damage in skin and other organs: digestive tract, heart, circulatory system, kidneys, lungs, synovial membranes, tenosynovial sheaths

- Limited systemic scleroderma: slow onset, may infiltrate other organs
- Diffuse scleroderma: sudden onset, earlier involvement of internal organs
- Sine scleroderma: internal organs only

Causes

Unknown; some factors:

- Abnormal immune responses and chronic inflammation → excess

Demographics

About 300,000 in the United States

Women > men, 3–4:1

collagen production

Chimeric cells (genes of another person)

Chemical exposures

Viral infections

pt 6

Back Next

more Scleroderma

Signs and Symptoms	Treatment	Massage
CREST syndrome **C:** Calcinosis: accumulation of calcium deposits in the skin, especially in the fingers **R:** Raynaud phenomenon **E:** Esophageal dysmotility **S:** Sclerodactyly: hardening of the fingers **T:** Telangiectasia Other symptoms/complications: Skin ulcers, changes in pigment, hair loss, weak muscles, swollen connective tissues, lung damage, heart pain, arrhythmia, heart failure, renal failure, trigeminal neuralgia, carpal tunnel syndrome, Sjögren syndrome	Manage symptoms, complications: Drugs to manage Raynaud syndrome, kidney function, GERD, muscle and joint pain, immune system overactivity PT, OT for flexibility, especially in hands Avoid smoking, cold temperature, spicy food	Depends on resiliency of client Be careful of circulatory, kidney health Bodywork that doesn't challenge fluid flow may be beneficial

Tendinopathies

Injury, damage to tendons

Etiology

Tendons are made of type I collagen in liquid ground substance

- Some elastin fibers are woven in for stretch and rebound (limited)
- Looks hard, shiny, white

With injury:

- Collagen degenerates
- Tendon becomes weak: tendinosis

Causes

Intrinsic factors

- Direct, shearing forces through tendon
- Overuse without recovery time
- Poor flexibility
- Underlying disease
- Cortisone injection

Extrinsic factors:

- Training errors
- Poor equipment
- Fall or trauma

Damaged tendon looks dull gray or brown, soft

More liquid ground substance

Fibers are disrupted and not continuous

Fibroblasts and extra blood vessels are active

Fibroblasts produce type III fibers: thinner, weaker

Pro-inflammatory white blood cells not present: not usually inflammatory

Tenoperiosteal junction, musculotendinous junction most at risk

pt 6

Back Next

more Tendinopathies

Signs and Symptoms	Treatment	Massage
Looks like muscle strain: pain on resisted contraction, passive stretching Usually not palpably hot	Use of anti-inflammatories under question Steroids may give short-term relief, but with long-term risks Rest, ice, stretching, rehabilitative exercise, patience	Respect acute injury (lymphatic work may be beneficial) In postacute or chronic condition, can speed healing, help organize scar tissue, improve local nutrition

Tenosynovitis

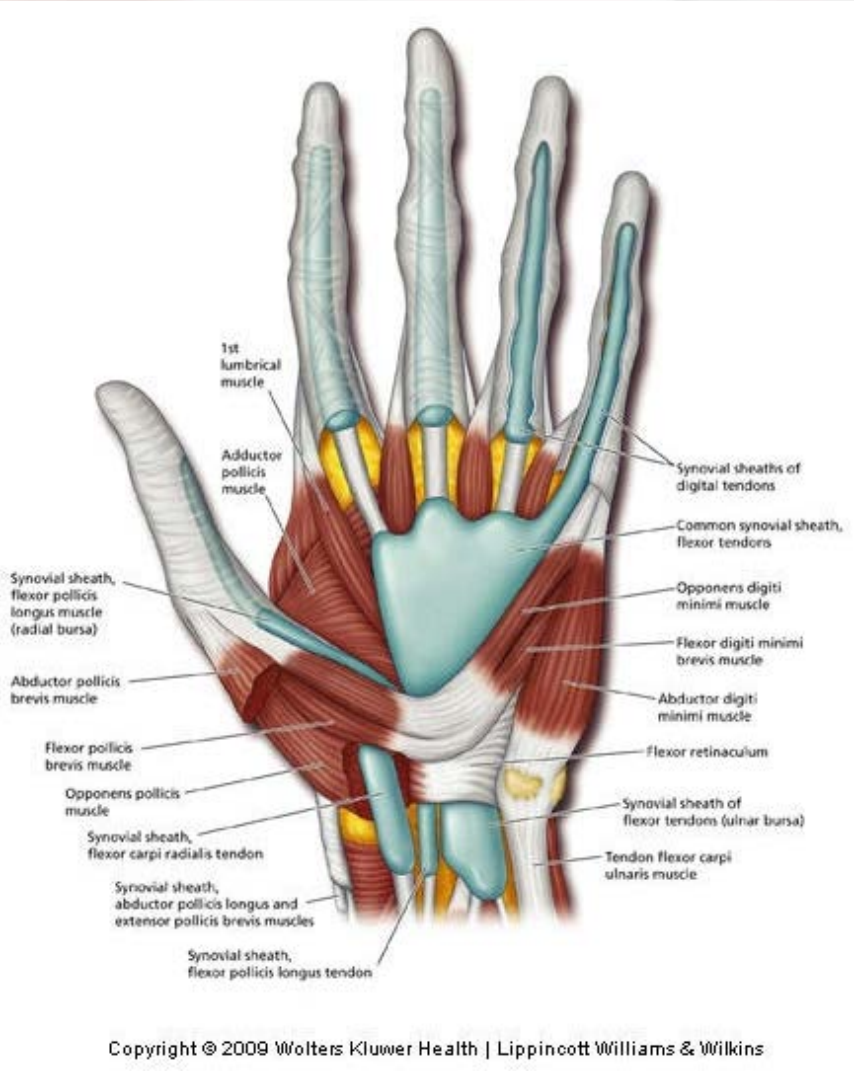
Tendons that pass through a synovial sheath become irritated and inflamed

Etiology

Tenosynovial sheath (also called epitenon) becomes inflamed, shrinks around inner tendons

- Usually related to overuse
- At the thumb: De Quervain tenosynovitis

Can occur as a complication of other diseases, especially rheumatoid arthritis, gout, diabetes



more Tenosynovitis

Signs and Symptoms	Treatment	Massage
Local pain, sometimes with heat and a palpable nodule, at base of fingers Flexion is difficult; extension even more so Crepitus, pop when joint extends	Anti-inflammatories, steroid injection, surgery to split synovium	Avoid while acute Otherwise can help improve production of synovial fluid, freedom of movement

Whiplash

Also called cervical acceleration-deceleration (CAD); Mixture of injuries with MVAs or other trauma

Etiology

Damage depends on variables: direction on impact, speed, weight of vehicles, seatbelt, etc.

- With 20 mph rear impact, force is magnified at neck; Head is propelled into flexion at 12g

Cervical muscles and ligaments can be strained

- Anterior and posterior longitudinal ligaments also at risk: unreachable

Other structures:

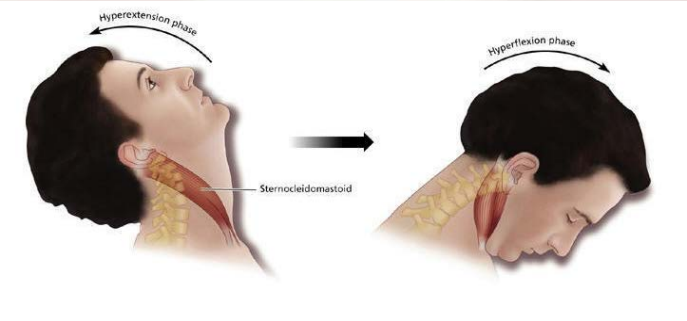
- Joint capsules at facets
- Soft tissues of neck and throat
- Intervertebral discs
- Subluxation at vertebrae
- TMJ
- Spinal cord, brain, nerves

Demographics

85% of neck pain from injury (?)

1 million cases of CAD/year from MVA

15.5 million people in the United States have had whiplash



more Whiplash

Signs and Symptoms	Treatment	Massage
Symptoms and complications interrelated Often a delay in onset of symptoms Ligament sprains Damaged facet joint capsules Misaligned cervical vertebrae Damaged discs Spasm Trigger points Neurological symptoms TMJ disorders Headaches Diagnosis MRI, CT, nerve conduction tests (hard to evaluate soft tissue damage with these) Radicular pain indicates nerve root irritation General pain suggests referral from soft tissue injury	Neck collar (as short a time as possible) Pain relievers, anti-inflammatories, muscle relaxants PT, massage to strengthen injured muscles, reduce spasm, resolve trigger points, improve quality of healing tissue, etc.	Avoid mechanical massage while acute Reflexive, energetic work may support autonomic recovery Rule out contraindicating injuries Then, look for progressive release of muscle spasm, improved connective tissue health

Neuromuscular Disorders

Carpal Tunnel Syndrome

Disc Disease

Myasthenia Gravis

Thoracic Outlet Syndrome

pt 7

Back Next

Carpal Tunnel Syndrome

Entrapment of median nerve at carpal tunnel leading to symptoms in the hand

Demographics

Affects up to 10% adults at some time

Women > men, 3:1

Etiology

Pain may be from

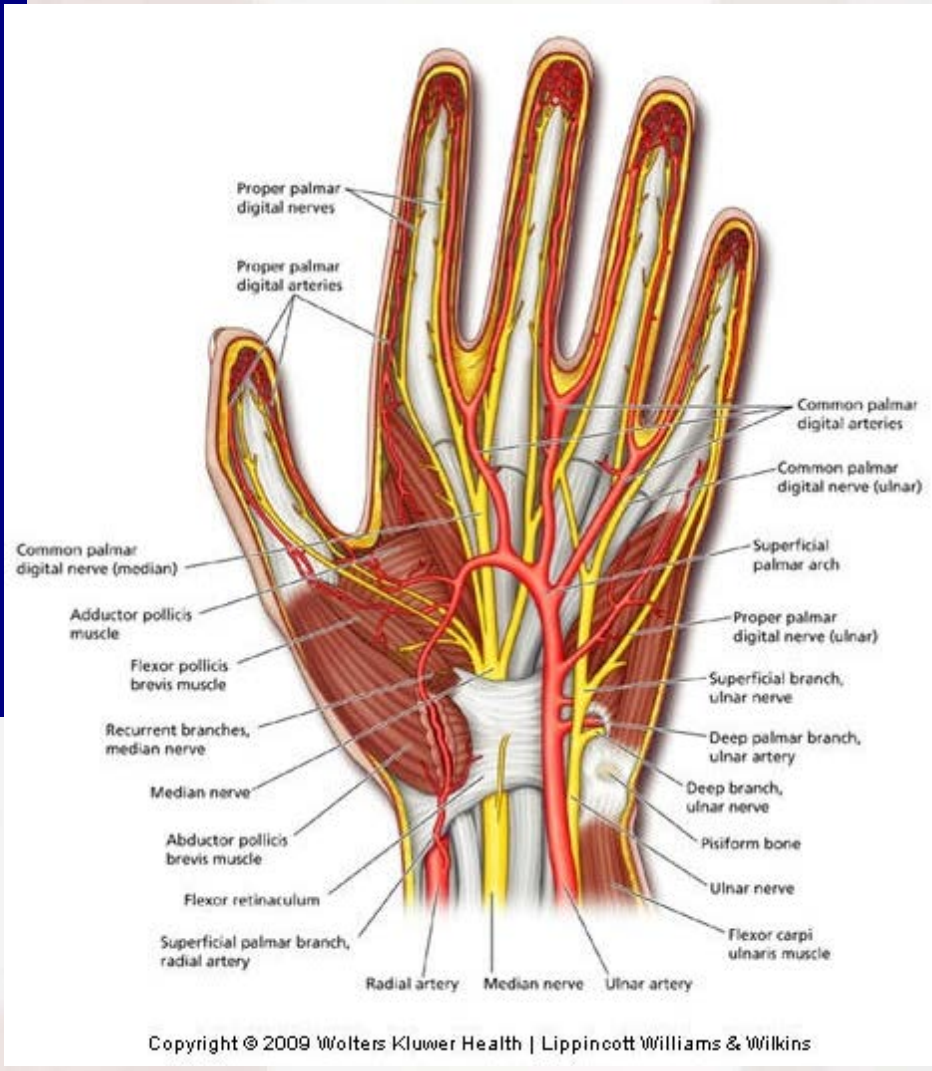
- Pressure directly on nerve
- Pressure impeding blood flow to nerve

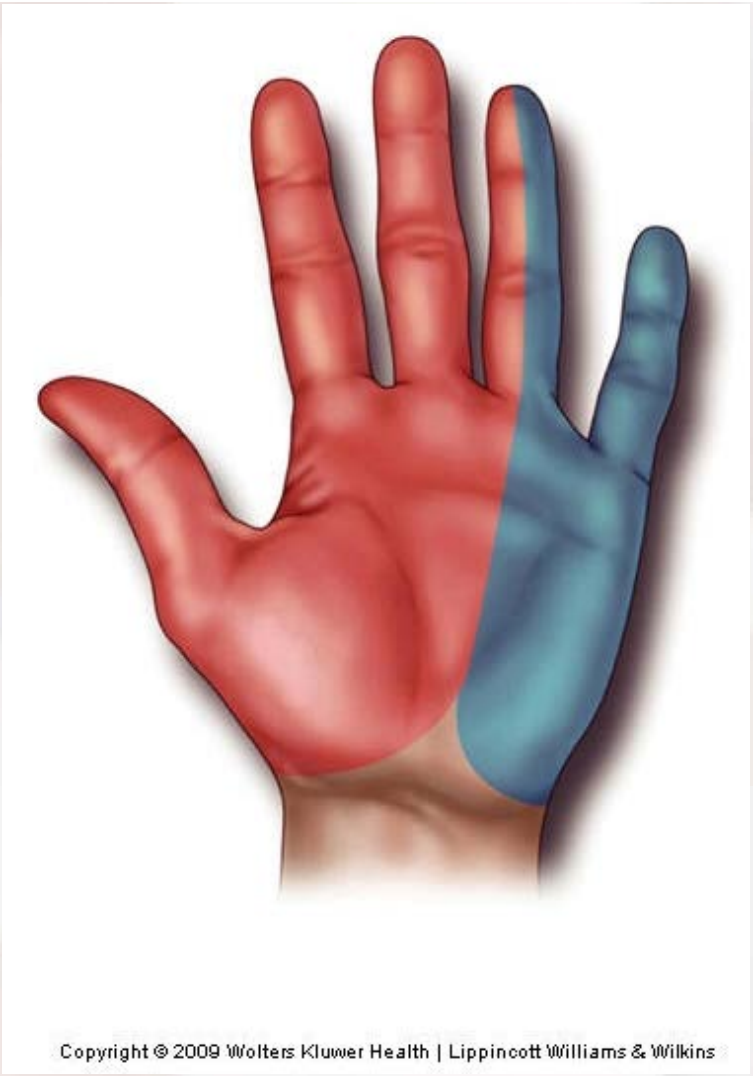
Aggravating factors

- Edema
- Subluxation of carpal bones
- Fibrotic buildup

Underlying conditions

- Diabetes, hypothyroidism, lymphedema, acromegaly, rheumatoid





pt 7

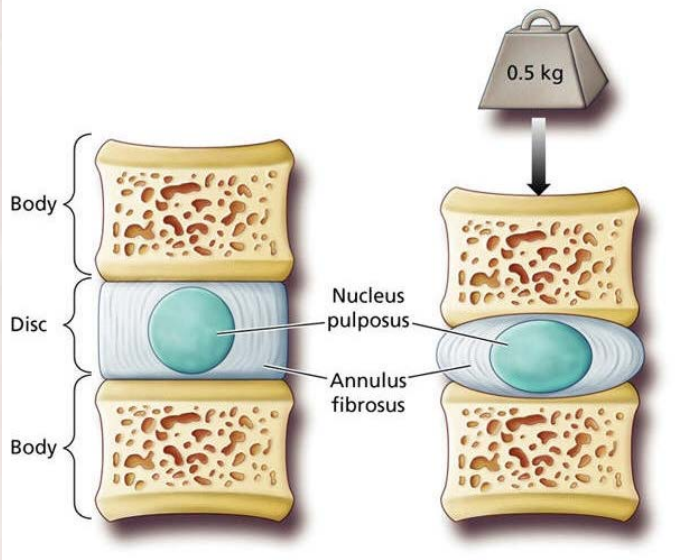
Back Next

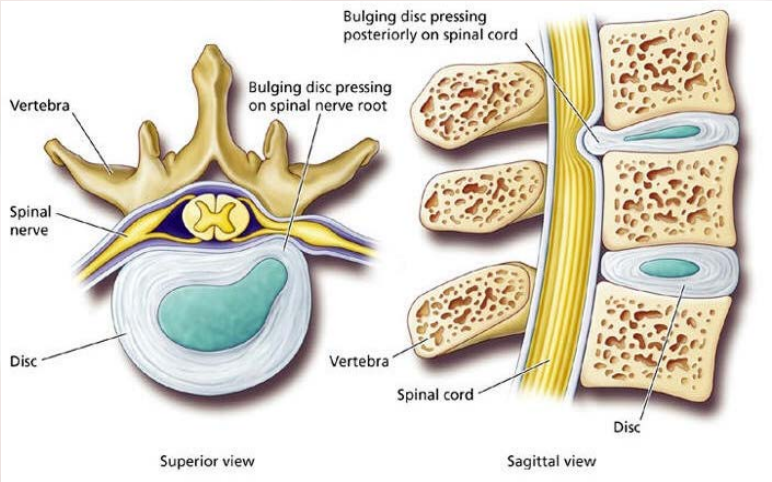
more Carpal Tunnel Syndrome

Signs and Symptoms	Treatment	Massage
Nerve signs Tingling, pins and needles, burning, shooting pain, intermittent numbness/weakness Thenar pad may atrophy May be worse at night (sleeping position) Diagnosis Description of symptoms; Tinel test, Phalen maneuver Nerve conduction test, electromyogram	Wrist splint Anti-inflammatories Cortisone injection Exercises Proliferants to tighten loose ligaments Surgery: open or endoscopic	Depends on cause Work conservatively, monitor results If work exacerbates symptoms, stop!!

Disc Disease

Collection of problems with nucleus pulposus or annulus fibrosis





Etiology

Outer layer of discs = 3 layers of annulus fibrosis

Inner center = nucleus pulposus (spherical)

Annulus fibers are strongest when tight, weakest when slack

- Nucleus needs annulus to be strong

Annulus begins to degenerate around age 20–30; nucleus begins to shrink

- Annulus can develop cracks, fissures; connecting vertebrae develop osteophytes, → spondylosis

Types of Disc Problems

- Herniated nucleus pulposus
- Bulge
- Protrusion
- Extrusion
- Rupture
- Degenerative disc disease
- Internal disc disruption

Progression

Person goes into flexion

Person jerks upright, forcing nucleus into posterior space

Nucleus breaks through annulus or annulus cracks

Damaged discs leak highly inflammatory pain-sensitizing chemicals

Discs usually protrude posterolaterally; some other forms are possible

Bulging directly posteriorly: cauda equina syndrome (medical emergency)

more Disc Disease

Signs and Symptoms	Treatment	Massage
From pressure on nerve tissue, inflammatory response May be intermittent Local and radicular pain Specific muscle weakness Parasthesia Reduced sensation Numbness Complications Spinal cord compression Cauda equina syndrome Diagnosis Damaged discs can look like ligament injury, bone spurs, tumors, infection Radiography, CT, myelogram, MRI	Goal: to allow bulging nucleus/cracked annulus to recede Chiropractic, osteopathy: manipulation to create space Bed rest, traction PT: posture, good body mechanics Medication: muscle relaxants, painkillers Other interventions: Chemonucleolysis Various types of diskectomy	Avoid while pain is acute (comes and goes) Work to create space in spine Adjust positioning, bolsters, support cushions Work with other health care providers for best outcome

Myasthenia Gravis

Grave muscle weakness—W. Erb, 1890; Autoimmune disease → degeneration/destruction of receptor sites at neuromuscular junctions

Etiology

Motor neurons contact muscles at NMJ

- Acetylcholine crosses synapse, begins muscle contraction

In MG the acetylcholine (ACh) receptor sites don't function

- ACh is released; muscle doesn't respond
- Autoantibodies attack receptor sites

Thymus is involved

Demographics

Usually women in 20s, men in 50s

14 in 100,000 in the United States

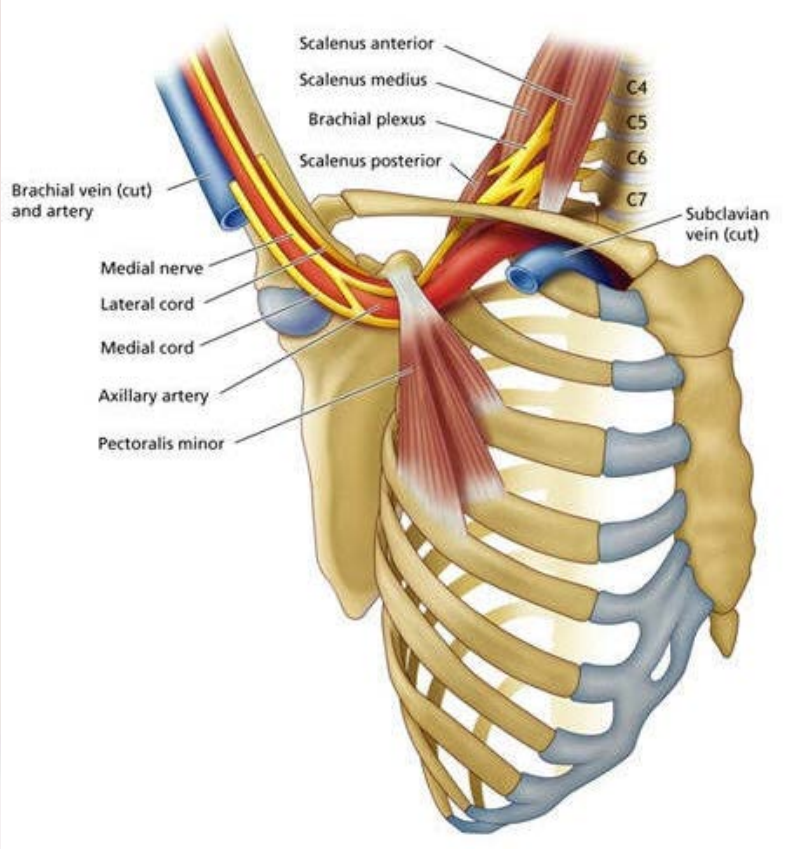
Affects 36,000 people in the United States

more Myasthenia Gravis

Signs and Symptoms	Treatment	Massage
Weakness, fatigue in affected muscles Often around eyes and lower face: ptosis, problems with eating, drinking Symptoms worse in morning, evening Slowly progressive, can affect arms, legs, respiratory muscles (this is now rare)	Goals: boost nerve transmission, suppress immune system activity at NMJ Meds keep ACh active, steroid suppress immune system Surgery may remove thymus Plasmapheresis in crisis (removes antibodies)	MG involves motor loss but not sensory deficit: massage is safe Excessive heat may aggravate symptoms; avoid Immunosuppressant drugs have risks

Thoracic Outlet Syndrome

Neurovascular entrapment; Between anterior and medial scalene; Between clavicle and first rib; Under coracoid process



Etiology

Brachial plexus is spinal nerves C5–T1

- Any impingement between neck and destination makes symptoms
- C8 and T1 contribute to ulnar and median nerves; these are most vulnerable

Axillary and subclavian veins/arteries also get pinched

- Neurological TOS (nerve impingement)
- Vascular TOS (vascular impingement)
- Disputed TOS: symptoms are present, no impingement

Contributing Factors

Cervical ribs

Muscle imbalance

Connective tissue bands

Differential Diagnosis

Cervical misalignment

Spondylosis

Rib misalignment

Other injuries

- Rotator cuff, elbow, wrist, carpal tunnel syndrome, double crush, disc disease, cervical sprain

Other factors

- Lung cancer, thrombosis

pt 7

Back Next

more Thoracic Outlet Syndrome

Signs and Symptoms	Treatment	Massage
Nerve pain: shooting, electrical pain, numbness, reduced sensation, parasthesia Vascular symptoms: feeling of fullness, cold, weakness, asymmetrical color Often worse at night, depending on sleep position Diagnosis Not all tests are accurate for all people EAST (elevated arm stress test) Wright hyperabduction test Adson test Nerve velocity conduction, electromyogram, radiography, MRI, etc.	Depends on cause (need for accurate diagnosis) Muscle atrophy/tightness: exercise, stretching (massage) Surgery for cervical rib, bone spurs	Indicated for muscle imbalance Focus on balance around the rib cage and shoulder

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