SPRAINS

Fiona Rattray & Linda Ludwig

Pg.305

SPRAINS

- **A sprain is an overstretch injury to a ligament.**
- Ligaments are composed of flexible, noncontractile connective tissue. They occur in bands around a synovial joint, blending into the periosteum and joining bones together.
- Ligaments add stability to the connective tissue joint capsule.
- They are named according to the bones they attach to and their anatomical position.

CAUSE

- The cause of a sprain is a trauma-related sudden twist or wrench of the joint beyond its normal ROM.
- **Contributing factors**: congenital ligamentous laxity (hypermobility), history of previous sprains, altered biomechanics that place stress on the ligament and joint, Connective Tissue pathologies such as RA.

THREE LEVELS OF SEVERITY

- **Grade 1, Mild or First degree sprain**: Minor stretch, and tear to the ligament. No instability on passive relaxed testing. The person can continue with the activity with some discomfort.
- **Grade 2, Moderate or second degree sprain**: Tearing of the ligament fibres. The degree of tear is variable from several fibres to the majority of the fibres. There is a snapping sound at the time on injury and joint gives way. The joint is hypermobile, however stable on passive relaxed testing. The person has difficulty continuing the activity due to P.

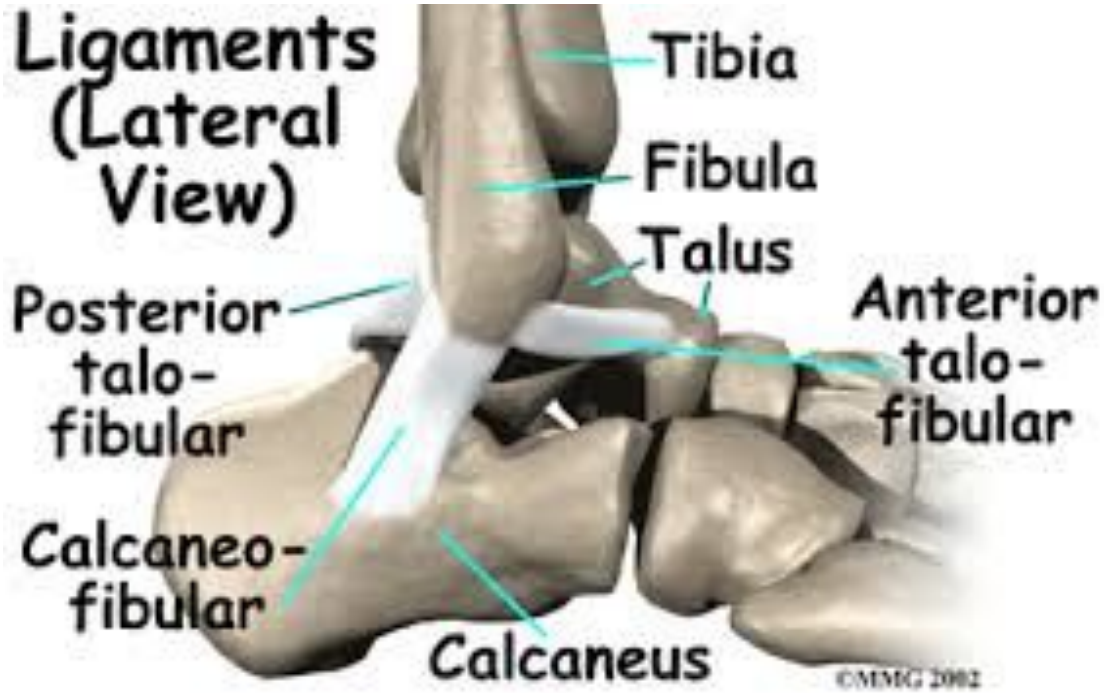
THREE LEVELS OF SEVERITY

- **Grade 3, Severe or third degree sprain**: There is complete rupture of the ligament itself, or an avulsion fracture as the bony attachment of the ligament is torn off while the ligament remains intact. Snapping sound and the joint gives way. There is significant instability with no end point on passive relaxed testing. The person cannot continue the activity due to P and instability. P is present in the acute stage, the chronic sprain may be painlessly hypermobile in the direction the ligament is intended to stop the movement.

JOINT EFFUSION

- Occurs when the injury is severe enough to inflame the synovium, increasing the production of synovial fluid and causing the joint capsule to swell.
- Effusion is primarily composed of synovial fluid and is intrascapular.
- Hemarthrosis, or bleeding into the synovial space.
- Edema may occur in the extracapsular space.
- Ligaments are moderately vascularized, and heal slowly.
- Adhesions form between the sprained ligament and nearby structures, painfully limiting ROM controlled by the ligament and predisposing the joint to further injury.

COMMON SPRAINS



- There are 3 joints that are commonly sprained: Ankle, knee, and wrist.
- Other jts that are prone to sprains: AC joint, humeroulnar jt, and all jts in the digits.
- Ankle ligaments most commonly injured are anterior talofibular ligament, calcaneofibular ligament and calcaneocuboid ligament.

COMMON SPRAINS

- The most common mechanism of injury is an **inversion sprain.**
- An eversion sprain, is less usual. The deltoid ligament on the medial side is at risk due to its strong nature. The tibial attachment is more common to avulse, than for the ligament to rupture.

COMMON SPRAINS

- An ankle sprain that does not resolve in the expected time frame, and remains swollen and painful may have associated osteochondral fracture. The client should than be referred to their physician.
- The knee, medial and lateral collateral ligaments, also anterior and posterior cruciate ligaments can be sprained.
- Medial collateral is the most frequently injured.
- Collateral ligaments can directly be treated, due to their extracapsular location.
- Cruciate ligaments are deep and are not directly accessible to massage techniques.

COMMON SPRAINS

- The wrist ligaments can be sprained, these all include the palmer radiocarpal, dorsal radiocarpal, ulnar and radial collateral and intercarpal ligaments.
- The most common mechanism of the injury to the wrist is forced hyperextension.

SYMPTOM PICTURE ACUTE

- **Grade 1**: Minor stretch to the ligament.
- P is mild and is local to the injury site at rest and activity that stresses the ligament.
- Minimal local edema, heat, and bruising.
- Joint is stable.
- The client can continue activity.
- **Grade 2:** There is tearing of some or many fibres of the ligament.
- Snapping noise and the joint gives way.
- The P is moderate at rest and with activities that stress the ligament.
- Moderate local edema, heat, and bruising are present.
- Joint instability is slight, and the client has difficulty continuing ADL's.

SYMPTOM PICTURE ACUTE

- **Grade 3**: There is complete rupture of the ligament or an avulsion fracture of the ligament attachment.
- There is a snapping noise.
- P may be intense or mild at rest.
- Marked local edema, heat, bruising.
- A hematoma may be present or jt effusion of the jt capsule is damaged.
- The jt is unstable.
- The client cannot continue the activity.

SYMPTOM PICTURE
EARLY SUB-ACUTE

- **Grade 1**: The sprain is stable.
- **Grade 2** : Sprain is hypermobile yet stable, **Grade 3** is unstable with ligamentous testing.
- Bruising is black and blue.
- P, edema, and inflammation are still present.
- Adhesions are forming around the injury.
- Protective mm spasm is decreasing, TPs in compensatory structures are developing.
- ROM is reduced.
- There is loss of proprioception at the jt.

SYMPTOM PICTURE
LATE SUB-ACUTE

- The bruising changes to yellow, green, brown.
- P, edema, and inflammation are diminishing.
- Adhesions are maturing around the injury.
- Protective mm spasm is replaced by increased tone of the mm crossing the jt.
- ROM is reduced.
- There is loss of proprioception of the joint.

SYMPTOM PICTURE CHRONIC

- There is P local to the ligament only if its stressed.
- Bruising is gone.
- Adhesions have matured around the site.
- Hypertonicity and TP's are present.
- Full ROM of the jt is restricted.
- Chronic edema may remain local.
- The tissue may be cool due to ischemia.
- There is loss in proprioception at the joint.
- Mm weakness or disuse atrophy may be present.
- **Please read Observations and palpation on Pg.312

TESTING

- **Acute:** AF ROM of the proximal, affected, and distal jts are performed.
- **Acute SOT's:** Ballotable patella & Minor effusion test for knee swelling. Other testing is CI'd in the acute stage.
- **Early & Late sub-acute**: AF ROM of the proximal, affected, and distal jts.
- PR ROM is performed slowly, testing the most painful range last. Reduced ROM may indicate a mm spasm end feel or an empty end feel.
- AR isometric testing reveals that the mm's crossing the affected jt are strong and painless with a strictly ligamentous injury. Potential P at the lesion site.
- **Early & Late SOTs:** Ligamentous stress test

TESTING GRADES

- **Grade 1**: Sprain is painful local to the ligament on overpressure at the end of passive range. The joint end feel is stable.
- **Grade 2**: Sprain is painful local to the ligament on overpressure at the end of passive range. The joint end feel is hypermobile but stable. This may also be described as joint laxity with a firm end feel.
- **Grade 3:** Sprain may or may not be painful local to the ligament on overpressure at the end of passive range. The joint end feel is hypermobile and unstable. This may also be described as joint laxity without a firm end feel. The ligament is ruptured. The nerve receptors, that register pain are not stretched by the testing procedure and the joint is painlessly hypermobile.

SOT'S

- Ankle sprain: Anterior drawer test, deltoid ligament test will test positive.
- Collateral ligament knee sprains: Valgus or varus, Apleys distraction test will test positive.
- Cruciate ligaments and menisci: Anterior-posterior drawer test, Lachman's, Mcmurrays, Bragards sign, and apleys compression tests will test positive.
- Wrist sprains: radial stress, PR wrist extension, PR wrist flexion, ulnar stress test will test positive.
- AC shear test, sacroiliac joint gapping, squish test, Gaenslen's, all of these SOT's will assess for sprains.

TESTING

- **Chronic:** AF ROM of the affected jt may be limited by any remaining pain at the end ROM.
- PR ROM: testing the painful range last, possible hypermobile end feel is present on fully stressing the affected ligament.
- AR testing: of mm's crossing the affected joint is done, potential decrease in strength with disuse atrophy.
- **SOT's**: Ligamentous stress test for the injured ligament is positive with a hypermobile end feel in a grade 2 or 3 sprain.

CONTRAINDICATIONS

- In the acute stage, testing other than AF ROM is CI'd to prevent further tissue damage.
- Avoid removing the protective mm splinting of acute sprains.
- Distal circulation techniques are CI'd in the acute and early sub-acute stages to avoid increasing congestion through the injury site.
- With grade 3 sprain that are casted, avoid hot hydro applications to the tissue immediately proximal to the cast to prevent congestion under the cast.
- With grade 3 sprains where the ligaments have been surgically repaired, do not restore full ROM of the affected joint in the direction that will stretch the repaired ligament. Where the ligaments have not been surgically reduced, joint play of the unstable joint is CI'd.
- Frictions are CI'd if the client is taking anti-inflammatories or blood thinners.

TREATMENT
ACUTE

- **Positioning**: Elevated, depends on the location of the sprain and clients comfort.
- **Hydro:** Cold
- Treat compensatory structures, DDB
- Proximal Lymphatic drainage, unidirectional effleurage
- Proximal limb is tx'd with effleurage, petrissage, O&I.
- On site work is CI'd.
- Distal work, light stroking, and mm squeezing.
- Careful mid-range passive relaxed ROM is used on the proximal jts.

TREATMENT
EARLY SUBACUTE

- **Positioning**: Elevated, depends on the location of the sprain and for client comfort.
- **Hydro**: Cold/warm
- Treat compensatory structures, DDB
- Proximal lymphatic drainage, unidirectional effleurage
- Proximal limb is tx'd with effleurage, petrissage O&I, GTO.
- Agonist contraction.
- On site work is now indicated with vibrations, gentle stroking and fingertip kneading.
- Mid-range passive relaxed ROM on proximal and distal jts.
- Distal techniques include stroking and mm squeezing.

TREATMENT
LATE SUBACUTE

- **Positioning**: Elevated, depends on the location of the sprain and the clients comfort.
- **Hydro**: Cold/hot.
- Treat compensatory structures, DDB
- Edema has now diminished, lymphatic drainage techniques are decreasing.
- Proximal limb is tx'd with Effleurage, petrissage, mm stripping, ischemic compressions.
- Frictions, stretch, Ice.
- Joint play to proximal and distal joints.
- Pain-free mid range passive relaxed ROM on the joint.
- Distal techniques are effleurage and petrissage.

TREATMENT CHRONIC

- **Positioning**: Chosen for the comfort of the client, and accessibility of the structures. The limb is elevated if edema is still present.
- **Hydro:** Deep moist heat proximal or on site.
- Treat compensatory structures, DDB.
- Fascial techniques, cross hand spread, ulnar boarder spreading.
- Proximal lymphatic drainage is indicated if edema is still present.
- Effleurage, Petrissage, mm stripping, ischemic compressions.
- Frictions, stretch, Ice.
- Joint play to proximal and distal jts.
- Passive relaxed ROM to proximal and distal jts.
- Distal limb is treated with effleurage and petrissage.

SELF-CARE

- Hydro: Chosen for the stage of healing.
- Self massage is useful for the mm's that cross the sprained joint in the sub acute and chronic stages. Skin rolling, mm stripping, and gentle frictions.
- Remedial exercise is given dependent on the stage of healing.
- In the acute and early sub-acute the client is asked to perform pain-free AROM of the proximal and distal jts to maintain ROM.
- Isometric exercises are introduced slowly progressing to isotonic.
- With a weight bearing joint, balance exercises are introduced such as a balance board.
- Stretching to maintain ROM, and the client is encouraged to return to the activities of daily living on a gradual basis.

TREATMENT FREQUENCY AND EXPECTED OUTCOME

- Shorter more frequent treatment in the acute stage.
- Treatment may progress to 1x/week in the chronic stages with re-assessment.
- Return to activity; Grade 1 sprain-4-5 days
- Grade 2 sprain-7-14 days
- Grade 3 sprain-immobilization removed at 6-8 weeks
- Total healing of a sprained ligament may take up to 6 months for full maturation of the collagen fibres.
- **Please read the same treatment on Pg.323