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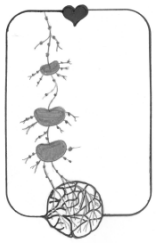
Lymphedema Management of the Orthopedic Patient

Jan Bruckner, PT, PhD, CLT-LANA


Course Description

- This three-hour course examines ways to use lymphatic therapy techniques to manage patients with orthopedic problems, such as joints replacements, fractures, sprains, and strains.
- Topics include:
  - Anatomy and physiology of the human lymphatic system
  - Manual lymphatic drainage (MLD)
  - Compression
  - Elevation
  - Diaphragmatic breathing
  - Therapeutic exercise
  - Kinesiotaping
  - Skin care
- Program planning
  - Problems
  - Short term goals
  - Long term goals
  - Treatment plan
- Case studies to illustrate the application of the material presented.

CONTINUED

Behavioral Objectives

- The participant will be able to describe at least three ways the anatomy and physiology of a normal human lymphatic system function to control swelling and remove metabolic waste.
- The participant will be able to list two ways to identify swelling caused by infection from lymphedema.
- The participant will be able to describe at least three ways lymphedema management techniques can help reduce swelling, reduce pain and increase range of motion in patients with orthopedic problems.
- Given a case study of a patient with an orthopedic problem, the participant will be able to outline an appropriate therapy program including a problem, at least two short term goals, at least two long term goals, and at least two interventions

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What is Lymphedema and Why should I Care?

- Lymph– water, bacteria, metabolic waste
- Lympedema – swelling caused by lymph
- Excessive lymph – inflammatory
- Delays healing
- Increases pain
- Decreases AROM, AAROM, PROM, function

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Arguments for Integrating Lymphedema Techniques into Care for Patients with Orthopedic Conditions

- Evidence-based practice→ lit review
- Practice-based evidence→ a clinical view

CONTINUED

What does the literature say?

- Canata GL et al 2017
- Cohen MD 2011
- Ebert JR et al 2013
- Kim SM et al 2015
- Lessiani G et al 2015
- Majewski-Schrage T, Snyder K 2016
- Pichonnaz C et al 2016
- Pichonnaz C et al 2015
- Vairo GL et al 2009

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A Clinical Perspective

- My own clinical experiences
  - THA
  - TKA
  - Carpal tunnel syndrome repair
  - Trigger finger repair
  - Elbow debridement

CONTINUED

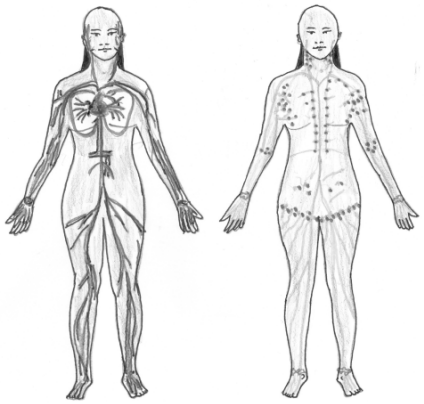
A Brief History Lesson

- Mesenteric lymphatics: Aselli in 1622
- Lymphatic system: Rudbeck and Bartholinus in 1650's
- Definitive monograph on human lymphatic system: Mascagni in 1787
- Lymphatic physiology: Drinker and Field in 1933

Lymphatic System Anatomy: Two Different Circulation Systems

Blood Circulatory System

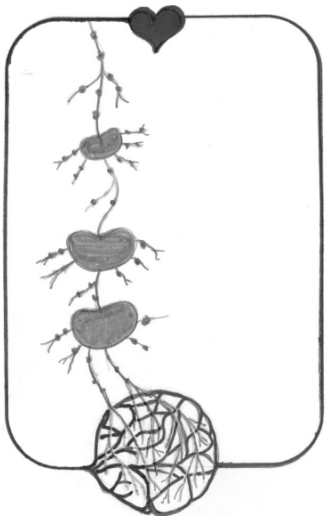
- Has a heart to pump blood
- Blood cells circulate
  - Heart to lungs
  - Lungs to heart
  - Oxygenated blood cells
  - Oxygen+ to body cells
  - Deoxygenated cells return
  - Cycle repeats



Lymph Circulatory System

- No pump: no heart
- Goes only one way
- Component of immune system
- Can use diaphragm as a pump

Schematic Comparison of Blood and Lymphatic Circulatory Systems



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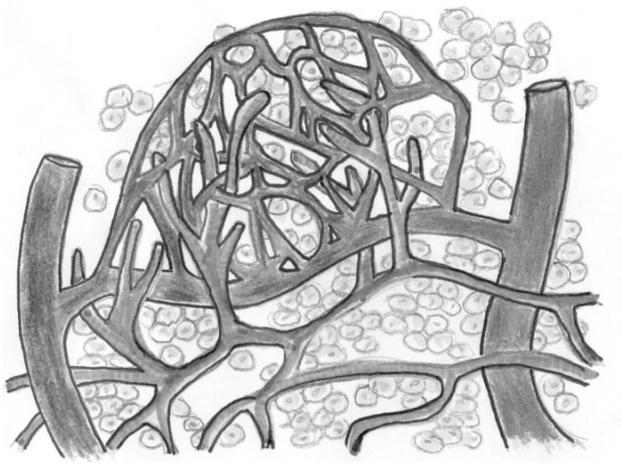
Capillary Bed



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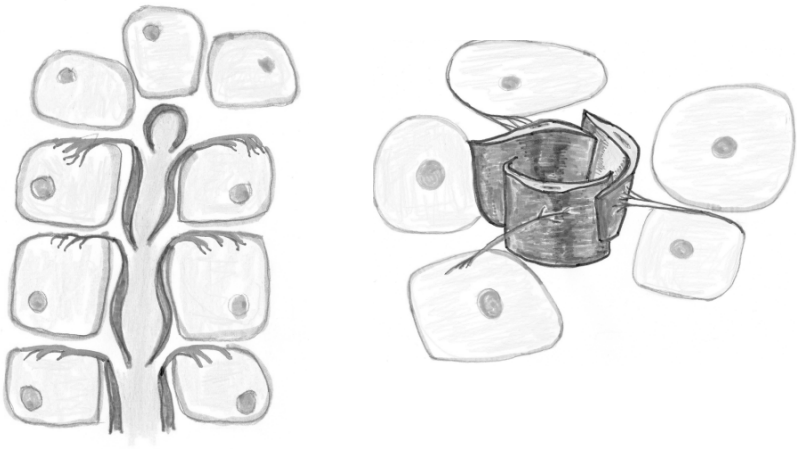
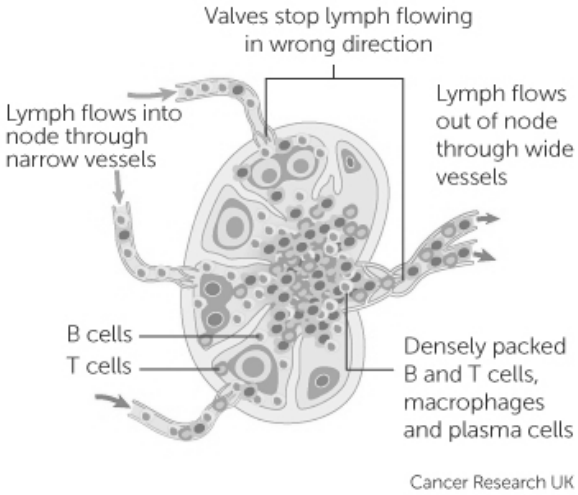
Lymph Capillary

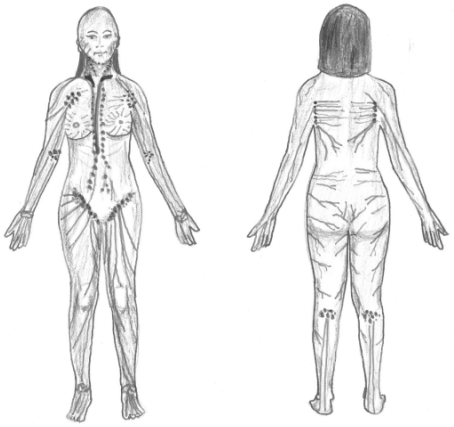


Lymph Node



Lymph Node Chains and Clusters

Suprclavicular
Deltoideopectoral
Axillary
Cubital
Inguinal
Popliteal



Also important landmarks:
•Right Supraclavicular fossa-where right lymphatic duct empties into Jugular vein
•Left Supraclavicular fossa- Where Thoracic duct empties into Vena Cava

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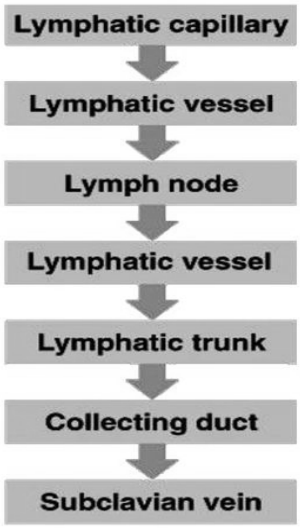
Organization of Lymphatic System



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Lymphatic System Physiology

- Diffusion- “always goes downhill”
- Osmosis- permeable membrane
- Lymph node damage- blocked drain
- Lymphangions have muscles and valves to help move lymph fluid through system

What can go wrong and how to track down the pathology?

- Where is the swelling: proximal or distal to the surgical site?
- What is the orientation of the surgical site?
- What type of surgical procedure did the patient have? Could lymph nodes been traumatized during the procedure?
- Is there a pattern to the swelling? In territories of specific nodes?

Differential Diagnosis: Acute Infection vs Lymphedema

Infection	Lymphedema
Red- rubor	Normal color
Painful- dolor	Not usually painful
swollen - tumor	Pitting or non-pitting swelling
heat - calor	Not usually hot

Stages of Lymphedema

Stage Zero	Stage One
No clinical signs Patient says, "Something is wrong" Blockage seen on imaging	Swelling present but resolves on its own Swelling, when presents, exhibits pitting
Stage Two	**Stage Three**
Swelling does not resolve on its own Patient needs lymphedema management Pitting edema → hard edema	Chronic elephantiasis lobules hyperkeratosis Wounds and lymph leakage

Ready? Set? CDT!
Complete Decongestive Therapy 101

LOTION HEP

PATIENT EDUCATION

COMPRESSION

Manual Lymphatic Drainage (MLD)

- Keep it simple- stationary circles
- Practice on yourself- gentle, superficial stationary circles under your eyes from your nose to your temple- great way to get rid of bags under eyes!
- Youtube.com videos
- Which lymph nodes are blocked?
- Which lymph nodes chains/clusters can help decongest the fluid?
- Elevate effected area – guide fluid downhill
- Use good body mechanics- this may take some time

Prepare Extremity for Drainage

- "Short neck"- to utilize head and neck nodes
  1. Brush top of chest a few time
  2. Stationary circles in supraclavicular fossa
  3. Stationary circles over deltoid region
  4. Stationary circles over lavator scapula region
  5. Downward circles from superior nuchal line through cervical spine
  6. Repeat steps in reverse: 5,4,3,2,1

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Diaphragmatic Breathing

- Place hand on patient's abdomen below xiphoid process (attachment for diaphragm)
- Have patient inhale through the nose, purse lips and exhale through the mouth
- "Smell the roses, blow out the candle"
- Only abdomen should rise and fall
- If patient does chest breathing, try a cough, a laugh, or more pressure with quick stretch on abdomen
- Explain to patient that the lymphatic system has no heart-like pump. The main Thoracic Duct goes right through the diaphragm so this kind of breathing turns the diaphragm into a pump.

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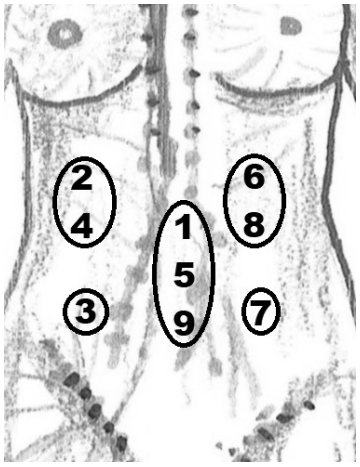
Deep Abdominal Stimulation

Do deep stationary circles in abdominal areas in order indicated to the right



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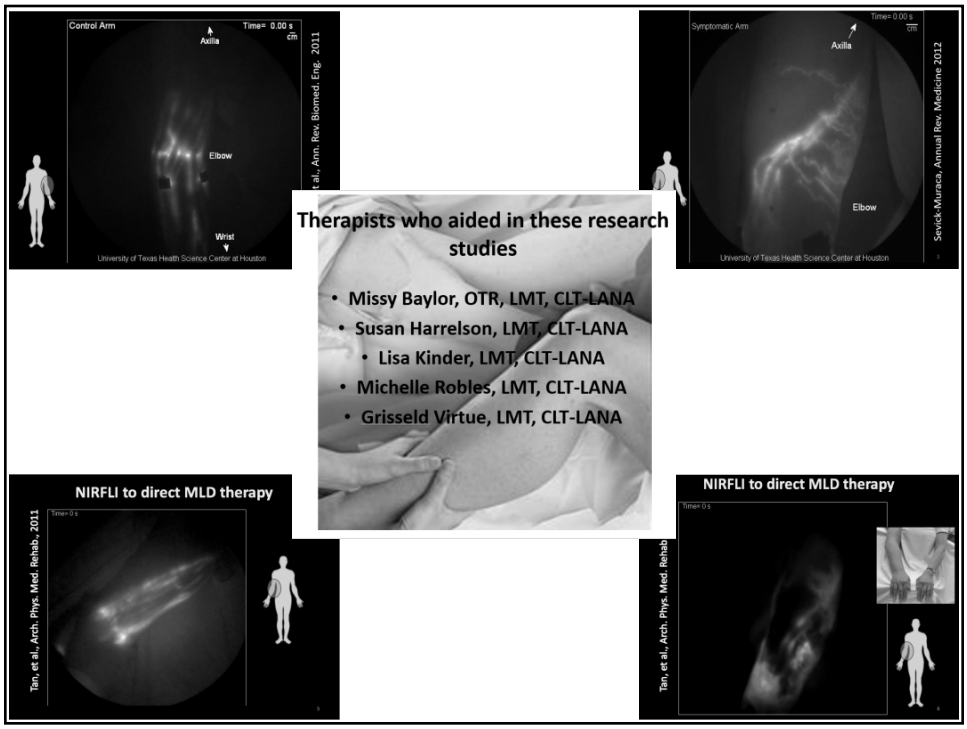
NIRF Imaging of MLD

https://www.youtube.com/watch?v=eZ17htUhlMU
https://www.youtube.com/watch?v=YmwC0A3PWhM



Compression Therapy

- Reduction phase
- Maintenance phase
- Mechanical pumps
- Wear garments while exercising to contain lymph fluid

Skin care

- Regular inspection of surgical site
- Good moisturizing creams/lotions
- May have to apply moisturizer BID
- Protective clothing; against sunburn, etc.
- Can combine with massage

CONTINUED

Elevation

- Gravity is our friend
- Use it during treatment session
- Advise patient to elevate area when not in treatment
- Get creative- elevate foot of bed?
- For best results- must be above heart

CONTINUED

Therapeutic Exercise

- Untangling the HEP paradox
- AROM
- AAROM
- Lymphatic capillaries connected by filaments to skins cells to help remove swelling
- Get creative- wiggle while you work ….

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Patient Education

- Getting the buy-in
- Wearing compression
- Elevating effected limb
- Following HEP
- Protecting against infection
- Skin care
- Self-MLD – YouTube videos

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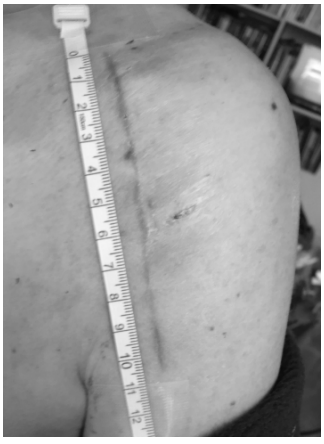
Kinesiotaping

Scar management

Edema control



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Set Up Your Program

- Protocols from Orthopedist
- Add lymphedema management
- Get surgeon to sign off
- Watch the compliments roll in ;-)

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Scar Management

- Not just for cosmesis
- Friction massage
- Kinesiotape
- Creams and lotions
- Reestablish lymphatic pathways

Edema Management

- MLD
- Compression
- Elevation
- Therapeutic exercise
- Skin care

Evaluation is the Key!

- SOAP note format? EMR?
- Pain rating
- Description of surgical site
- Girth measurements
- PROM, AROM, MMT
- Functional assessments: ADLs, iADLs
- LE – gait analysis
- UE – it depends…

Realistic Short Term Goals

- Good lymphedema treatment gets good results in one session
- Better patient compliance with less pain, more function, more understanding of healing process
- May be set by insurance company
- Work with what is available

The Long Term Goal Challenge

- How long will the rehab take until patient is satisfied with results?
- Be honest – "It may take up to a year"
- Provide alternatives when insurance coverage ends – "Try this exercise class"

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Tx Plan or Let's Make a Deal

- What does the patient want to achieve in therapy?
- How much pain is acceptable to achieve patient's goal?
- Will the patient really do the HEP?
- Consider cognitive impairments, if any
- I always make the plan with the patient and have the patient sign off first- before I write it all down and send plan to referring physician

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Case Study 1: TKA

- 66 y o male w/ hx of OA right knee; s/p TKA: pain 9/10; ® knee AROM 30^{o}-80^{o}; MMT: ® quads 1/5; ® hamstrings 1/5; pitting edema from mid-thigh to foot; patient walking with straight cane in right hand; Gait analysis: slow gait velocity, ® lateral trunk lean, ® stance phase: no heel strike, no foot flat, WB'ing only on forefoot; uneven cadence→ short stance phase on right foot. Well-healed surgical scar.

- Problems: pain, limited ROM, muscle weakness, pitting edema from thigh to foot, needs a walker not a cane, multiple gait deviations, has wife dress him, wears slipper on ® foot
- STGs: resolve lymphedema (Stage 2) with CDT asap; scar management, follow TKA protocol
- LTGs: D/C with cane in 8 weeks; pain 0-2/10, ® knee AROM WNL, ® quads and hamstrings 4/5, (I) dressing w/ skin care and donning shoes and socks
- Plan: consider kinesiotape, massage, and lotion for scar management, CDT for edema, TKA protocol

Case Study 2: THA

- 87 y o male s/p THA for OA ® hip, had home care PT for 8 weeks, pain 4-5/10 w/ Percocet, ® PROM WFL, MMT all ® hips muscles 3+/5, except Glu. medius 3-/5; using leg lifter, long handled shoehorn, and long handled sponge for ADLs, wife manages all iADLs, pitting edema from ® groin to toes, Gait analysis: patient using RW, has Gluteus medius gait deviation.

- Problems: pain, muscle weakness, gait deviation, pitting edema from ® groin to toes, needs adaptive equipment for ADLs
- STGs: resolve pitting edema of RLE asap, continue THA protocol already started by home care PT, eccentric control of ® Glu med to 3+/5, improve AROM sufficiently that patient will no longer need adaptive equipment for ADLs, scar management
- LTGs: D/C pt w/ straight cane, resolve gait deviation, pain 0-2/10 without medication
- Plan: scar management, Ther Ex, gait training, CDT

Case Study 3: Carpal Tunnel Syndrome

- 57 y o female s/p (L) carpal tunnel syndrome release from over-use as a computer programmer, surgical scar perpendicular to forearm since, as patient explained, “I waited too long to get it fixed and I had extensive damage.” pain 4-7/10 depending on range and activity, (L) wrist flexion and extension 45^{o} each, radial and ulnar dev. WFL, weak grasp, swelling in (L) palm and all fingers, patient came wearing cock-up splint.

- Problems: pain, swelling in (L) palm and fingers, surgical scar severs lymph vessels exiting (L) hand, restricted wrist flexion and extension, weak grasp, unable to type on keyboard
- STGs: scar management and CDT to restore lymph drainage, follow surgeon's protocol
- LTGs: may D/C patient with WHO, return to work
- Plan: scar management, CDT, CTL protocol, modify WHO in consultation with surgeon

Case Study 4: Trigger Finger Release

- 27 y o female, who works as a baker, kneading bread and squeezing icing bags to decorate cakes, developed a trigger finger in the 4th digit of her left hand, surgical site over MCP joint of 4th ray, pain 2-4/10, weak grasp, limited AROM digits 4 and 5, swelling palmar aspect of (L) hand and digits 4 and 5, patient cannot work

- Problems: pain, swelling, surgical scar, weak grasp, unable to work
- STGs: modalities for pain, resolve swelling, resolve surgical scar, strengthen grasp sufficient so patient can return to work
- LTGs: prevent development of trigger finger in 4th digit of ® hand, return to work
- Plan: scar management, CDT for swelling, compression glove, Ther Ex (prayer and reverse prayer stretching, AROM and AAROM all joints of fingers, ball squeeze, rubber band stretch, wall slides, vibration works well, too

Case Study 5: Elbow Debridement

- 56 y o male, former body builder who did so many triceps curls that he partially avulsed the ® radial collateral ligament and the common extensor tendon from the lateral epicondyle, he said that all of his exercises always hurt so he did not seek medical attention until he had difficulty bringing a coffee cup to his mouth. His surgeon debrided the elbow and sent the patient to physical therapy.

- Problems: pain 6/10, surgical scar, swelling from elbow to finger tips, limited AROM and PROM for forearm supination 30°, elbow flexion 130°, elbow extension 15°, MMT supination 1/5, radial wrist and finger extensors 2/5, patient does not know how to pace himself during workout
- STGs: scar management, edema control, Ther ex to increase AROM, PROM, muscle strength
- LTGs: return to work, return to workouts
- Plan: patient education for more appropriate working out regimes

Case Study 6: Trimalleolar Fracture

82 y o female sustained a trimalleolar ® ankle fracture after falling on an icy step in front of her house. The ankle was surgically stabilized with a plate and screws on the distal fibula and a screw on the medial malleolus. Surgeon gave patient a castboot and ordered NWB'ing for 6 weeks. Patient has a w/c and a RW, a very supportive husband and two adult, very involved daughters.

- Problems: Patient has severe pain 10/10 even with Percocet every 4-6 hours. She screams if anyone touches her ® foot and ankle. The patient as NIDDM, HTN, and an anxiety disorder. She transfers from bed to chair with Mod/Max (A) of 2 with VC for NWB on ®. The ® foot and ankle are very swollen and the surgical sites have begun to open and leak lymph fluid. Attempts at elevation, either supine on a mat or in her wheelchair using elevating legrests have been met with screams of foot pain (on the mat) or back pain in the w/c. Gentle MLD reduces the swelling but patient refuses to wear any sort of compression so the fluid returns quickly when the foot is in a dependent position. Patient also refuses to do ankle exercises or toe wiggles due to the pain. Patient has significant flexion contractures in both hips and knees so she spends her days at home in a hospital bed and is dependent in all ADLs and iADLs.

Case Study 6: Trimalleolar Fracture (cont)

- STGs: prevent Stage 2 lymphedema progressing to Stage 3, prevent skin breakdown, control swelling, encourage elevation of foot and ankle, cajole use of compression to contain swelling, encourage any sort of AROM or AAROM of hips, knees, and other foot and ankle, involve the family in as much of the program as they are willing to do.
- LTGs: guarded due to non-compliance, severity of pain, inability to control swelling, prevent wounds, and co-morbidities
- Plan: When all attempts at physical therapy had failed, patient returned to her surgeon and had a trans-tibial amputation.

CONTINUED

Case Study 7: Colles fracture

- 94 y o female s/p ® Colles fracture with WHO, patient had a (L) Colles fracture 2 months prior to this episode. Pain 6-8/10; PROM ® supination 0°, wrist flexion and extension 45°, radial deviation 5°, ulnar deviation 10°, weak grasp, dependent in ADLs but has a HHA for a few hours a day to help with bathing, dressing, food preparation, laundry, cleaning and shopping. She has a surgical scar on her distal, lateral radius that has adhered deep to the bone. Her mid-forearm, wrist and hand have severe swelling.

CONTINUED

- Problems: Pt unable to use either hand due to poor outcome of earlier fx and current fx in the early healing stage, swelling in ® hand, wrist, and mid-forearm, immobile surgical scar, limited ROM, muscle weakness, dependent ADLs
- STGs: Reduce swelling with MLD, compression glove to be worn under WHO, scar management, kinesiotape, joint mobilizations to increase ROM, Ther Ex for finger dexterity, weight lifting to strengthen bones, adaptive equipment
- LTGs: Able to function at home with HHA, adaptive equipment, patient pleased w/ progress

Case Study 8: The Crushed Carpals Case

- 24 y o female assaulted by her daughter's father and sustained a fracture of her (L) femur and crushed fractures of her ® hamate, lunate, and triquetrum. ER physician sent her for surgery on her femur and she had to wait 6 weeks for the femur to heal before she could get hand therapy for the carpal fractures.

- Problems: pain 6-8/10, ® hand fisted, swollen, minimal AROM of digits 3,4,5; had weak pincer grasp between thumb and digit 2; functional pt used her (L), non-dominant hand and her 8 y o daughter helped as best as she could.
- STGs: manage swelling with compression glove, serial splinting (gutter WHO) to help open hand, MLD, Ther Ex (stretching into palmar and digit extension, prehension exercises, modalities for pain (heat at beginning of tx, ice at end, vibration in middle), HEP of prehension exercises and progressive functional activities that she could do with her daughter (making pizza dough from scratch and then having the finished pizza for dinner.)
- LTGs: Return to work, return to being a mom, pt got 100% recovery in the use of her ® hand
- Plan: To have as much fun and the least about of pain possible while getting 100% recovery

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Suggestions for Further Study

- YouTube – some of my favorites video clips
- Cont Ed courses – on lymphedema management of orthopedic problems
- Pubmed -

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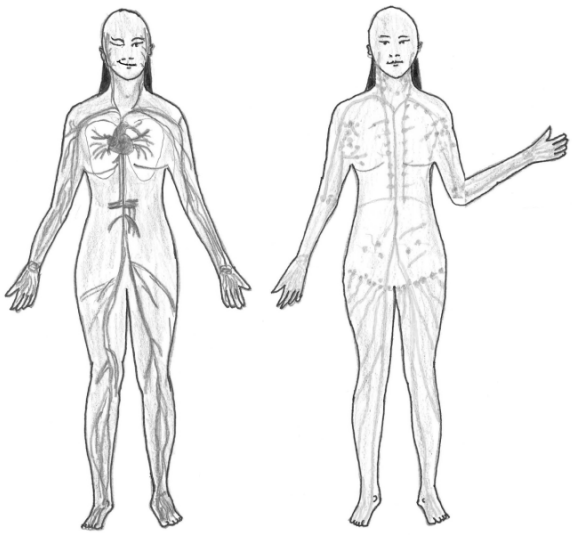
Thank You!



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