

Lymphedema: 101

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Discussion

- Review of lymphatic system
- Define lymphedema
- Risk reduction practices
- Management of lymphedema
- Pre and post op breast surgery assessment with MLD demo

The background of the slide features a light blue anatomical illustration. It shows a profile of a human head and neck, with the lymphatic system highlighted in a darker blue. The lymphatic system is depicted as a network of vessels and nodes, with nodes represented by small circles and vessels as thin lines. The illustration is semi-transparent, allowing the text to be clearly visible.

Let's Review The Lymphatic System

What is the Lymphatic System?

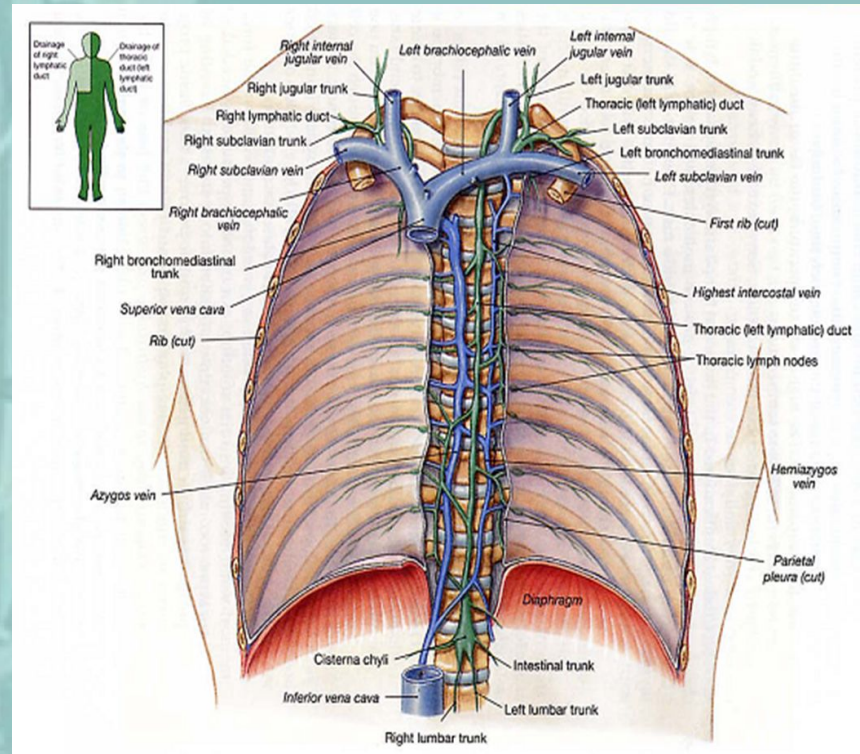
- A largely superficial, network of vessels that transport lymph (a protein rich fluid) through your body
- Maintains fluid balance
- Removes waste from the bloodstream
- Plays a key role in the immune system

• The Lymphatic System

- Is largely superficial
- For it to work effectively there must be a clear pathway
- Swelling occurs if there is blockage in pathway
- Things that block the pathway:
 - Scars
 - Muscle Tightness
 - Immobility

The Lymphatic System

- Has a close relationship with the blood circulation system
- Consists of:
 - Organs
 - Ducts
 - Nodes
- Serves different regions of the body and drain to a central location



Lymphatic Nodes

Cleanse the lymph of pathogens (chemical, organic and inorganic cells products, viruses and bacteria)

Produce lymphocytes

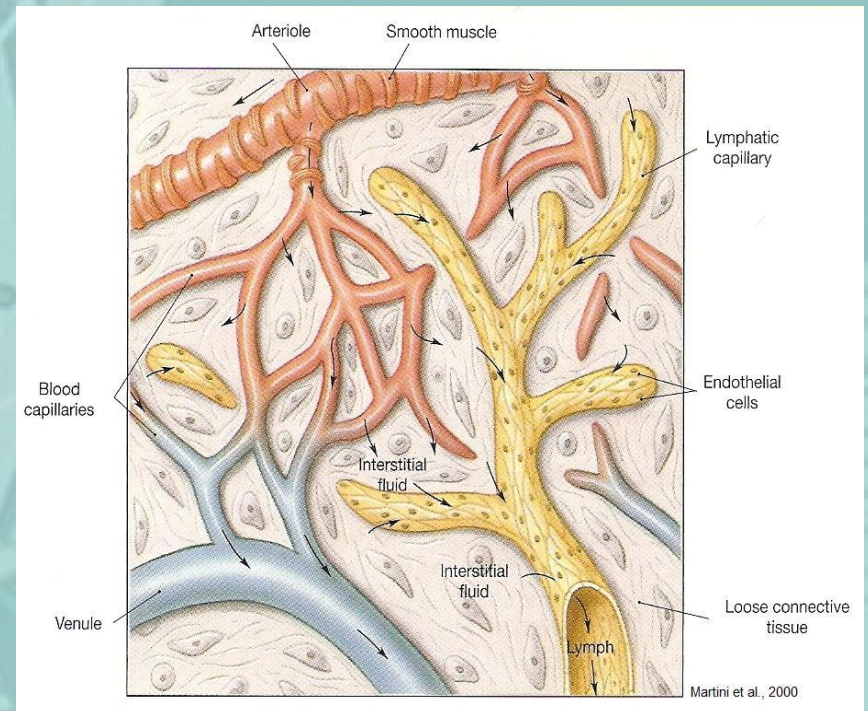
Human body contains around 600-700

Lymph vessels can regenerate but nodes cannot

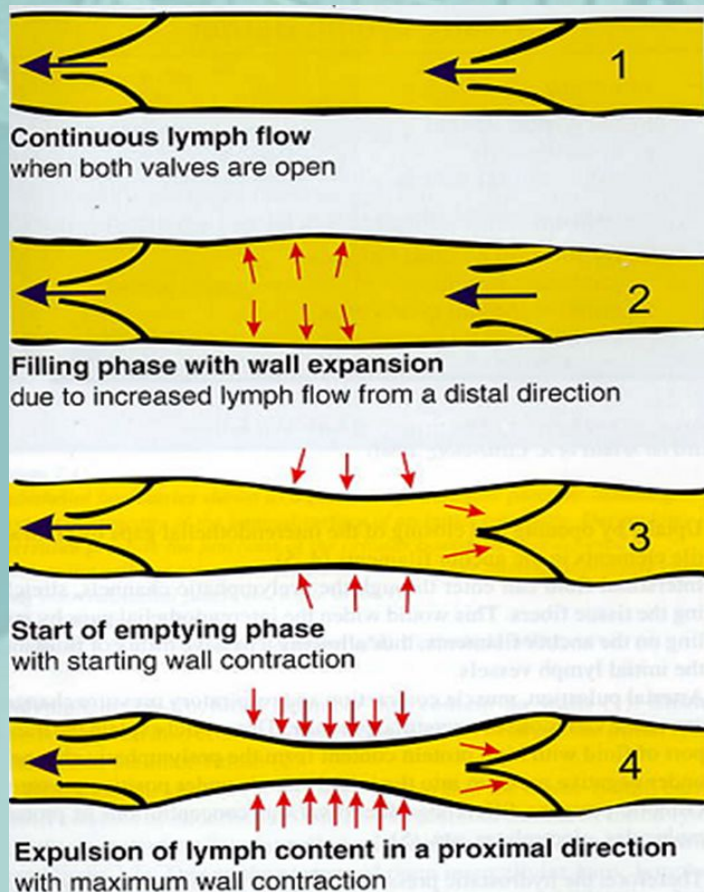


Function of the Lymphatic System

- Drains fluid from the tissues to the blood stream
- Blood and lymph filtration
- Immunity which fights infection
- Fluid balance
- Protein circulation



What moves lymph?



- Pressure changes both:
 - A. Internal:
 - Muscle contraction
 - Arterial pulsation
 - Deep breathing
 - B. External:
 - Manual Lymphatic Drainage (MLD)
 - Bandages

What is Lymphedema?

Note tendons and knuckles on left hand are not visible. Skin is tight and less mobile on back of hand.



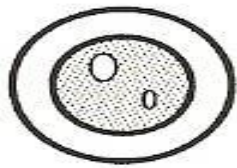
Tendons, knuckles and blood vessels are visible on right Non-LE hand. Skin is wrinkly and easily moved.



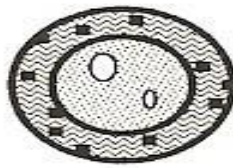
Lymphedema Types

Primary	Secondary	
Congenital	Benign	Malignant
<ul style="list-style-type: none">- Sporadic ~90%- Hereditary ~10%- Occurs with Syndromes	<ul style="list-style-type: none">- Infection- Trauma- Surgery	<ul style="list-style-type: none">- Primary Tumour- Recurrence

Stages of Lymphedema

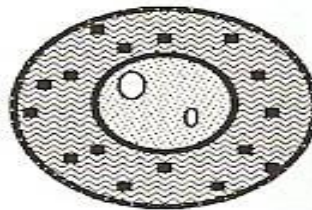


Normal



Protein-rich
edema
(tissue
penetration)

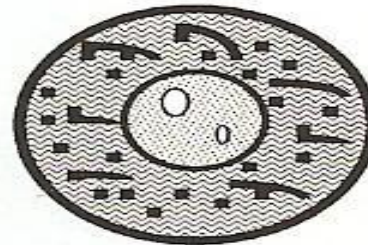
Ia



Protein-rich
edema
+ volume
increase

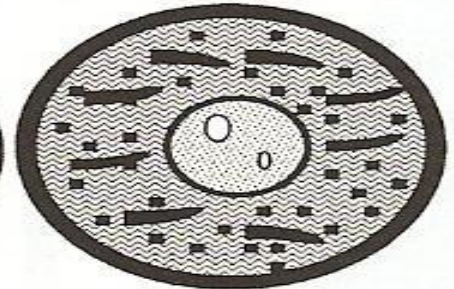
Ib

Stage I



Protein-rich
edema
+ volume
increase
+ fibrosis
+ starting skin
alterations

Stage II



Protein-rich
edema
+ volume
increase
+ fibrosclerosis
+ severe skin
alterations

Stage III

Risk Factors for Lymphedema

Surgery with node dissection

Radiation

Infection in watershed area for affected nodes

BMI >30

Chemotherapy

Ultimately you are trying to reduce lymphatic load
and increase transport capacity

Shaitelman et al, 2014

Secondary Lymphedema

The Traffic Jam



The Highway

- Picture your lymphatics as a highway
- The highway normally functions well to move vehicles (lymph fluid)
- The system fails when we increase traffic i.e. rush hour, or decrease lanes i.e. construction

The Traffic Jam

- Increased Lymph or “Vehicles” can be caused by:
 - Infection
 - Extremes of Temperature
 - Stress
 - Illness
 - Obesity (BMI>24)

The Traffic Jam

Decreased Capacity or “Construction” can be caused by:

- Surgery
- Radiation
- Scars and adhesions
- Muscle Tightness
- Cording/Decreased Range of Motion

Muscle Dysfunction

- Transportation of fluid in the lymphatic system, is driven by muscle contraction and release
- Muscle dysfunction can be caused by:
 - Pain
 - Tightness
 - Edema
- This can compress the lymphatic system causing swelling

Signs and Symptoms of Infection

- Redness
- Itchiness
- Warm/Hot skin
- Rash
- Fever/Malaise

Prevent Skin Infection

Practice proper skin and nail care by avoiding:

- Cuts, nicks, cracks and scrapes
- Sunburns
- Bug bites



How We Treat

Low-Level Laser Therapy: What is it?

Mitochondrial stimulation by low-level laser light activates its chromophores to increase the rate of ATP production → ultimately *reducing pain*

This accelerates oxidative metabolism to help with tissue repair, which will decrease inflammation and swelling, and will decrease pain signalling through nerve regeneration



Low-Level Laser Therapy: Research

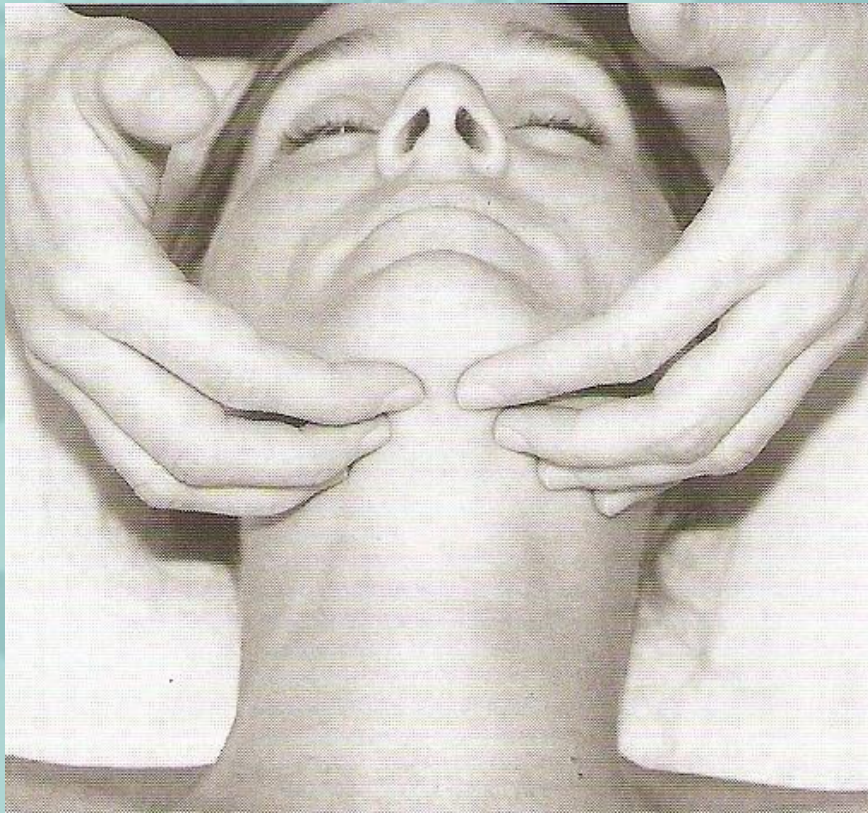


Produces a clinically significant reduction in limb volume and pain immediately after the conclusion of low-level laser treatments

Low-Level Laser Therapy: How it Works

- Mitochondrial stimulation by light activates its chromophores to increase rate of ATP production
 - 660nm → ATP-pathway (**accelerates healing**)
 - 905 nm → NO pathway (**reduces inflammation**)
- lipid absorption pathway (**eliminates pain**)

Complex Decongestive Therapy



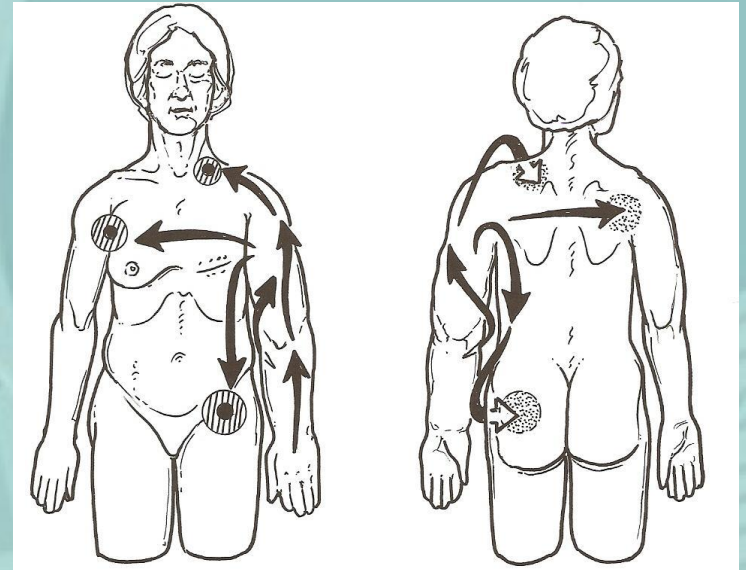
Manual Lymphatic Drainage

(Liao, 2012 and Donaghue et al, 2017)



Watersheds

- Superficial Lines that divide the body into sections
- Lymph within these sections flow in a general direction
- Lymph flows away from watershed lines, towards nodes
- These watersheds or boundaries are used in MLD to re-route fluid



Anastomoses

A Connection Between Two Vessels

- Knowledge of the watersheds are useful when creating anastomoses with MLD
- Areas where vessels from separate merge to allow an alternate pathway for lymph
- MLD encourages the flow of lymph to other, healthy nodes (THE DETOUR)

Complex Decongestive Therapy

- Combined therapy with 4 components:
 - MLD
 - Compression therapy
 - Skin Care
 - Exercise

Skin Care

- Practice proper hygiene
- Moisturize daily
- Avoid trauma in effected limb
- Injections, vaccinations, small cuts/bites, blood pressure and IV access, sunburns



Compression/Garments

- Compression is effective in reducing and maintaining limb volume
- Compression garments should be replaced every 6 months or when worn out
- Should be prescribed by a CLT

Compression/Bandaging



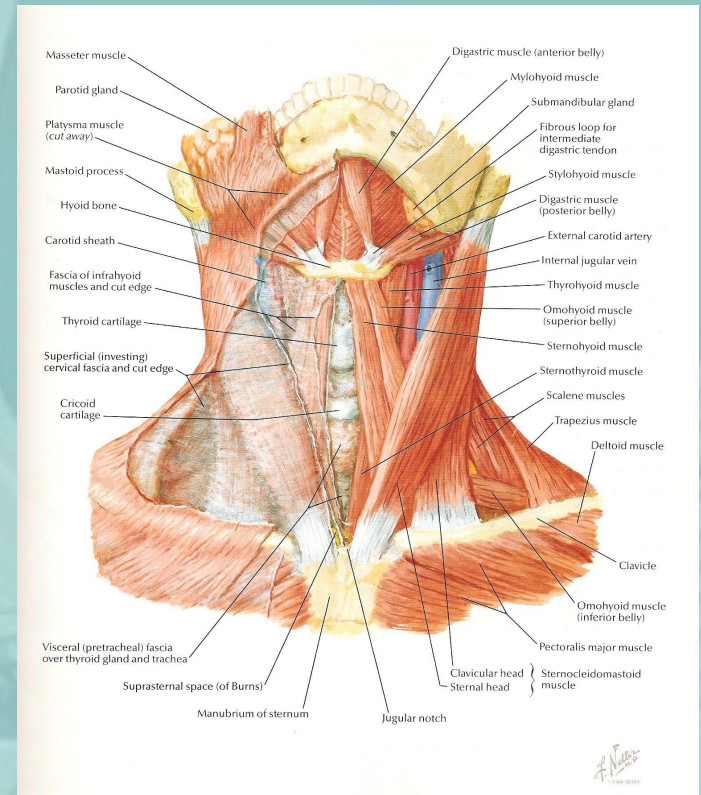
Coban



A two layer cohesive compression bandage system that is designed to be applied at full stretch for reducing swelling

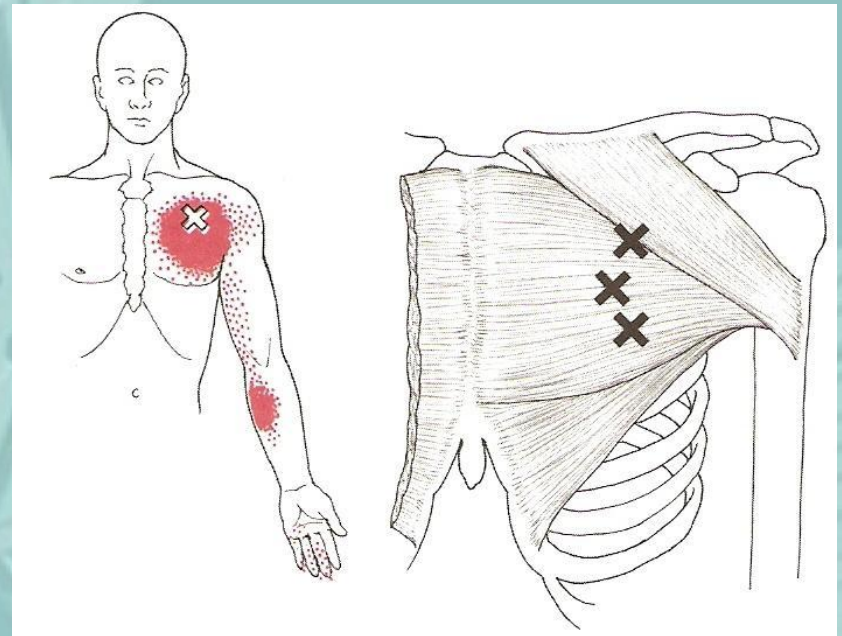
Anatomy (Fascia)

- Fascia is a thin cover over tissue
- Separates superficial tissue from deep tissue and muscles
- During surgery it is cut and disrupted
- Post surgery it often becomes restricted



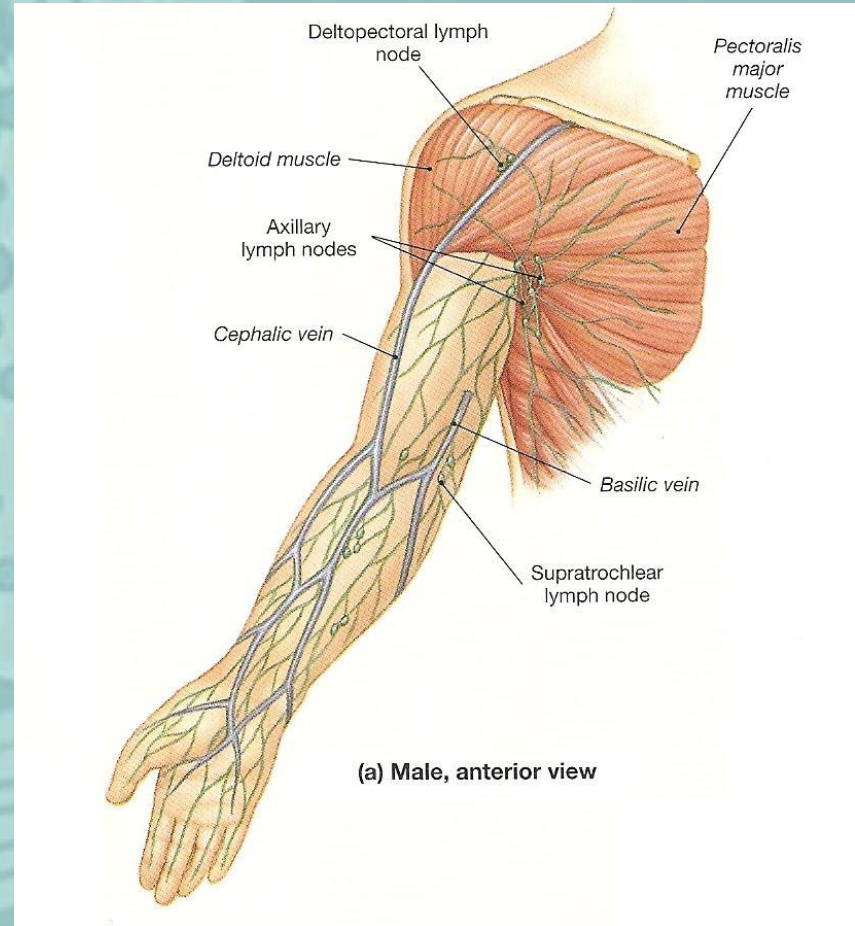
Trigger Point

- An irritable spot usually within a tight band of muscle tissue or fascia
- Painful on compression
- Can refer pain or tenderness to other areas
- Can cause muscle or movement dysfunction



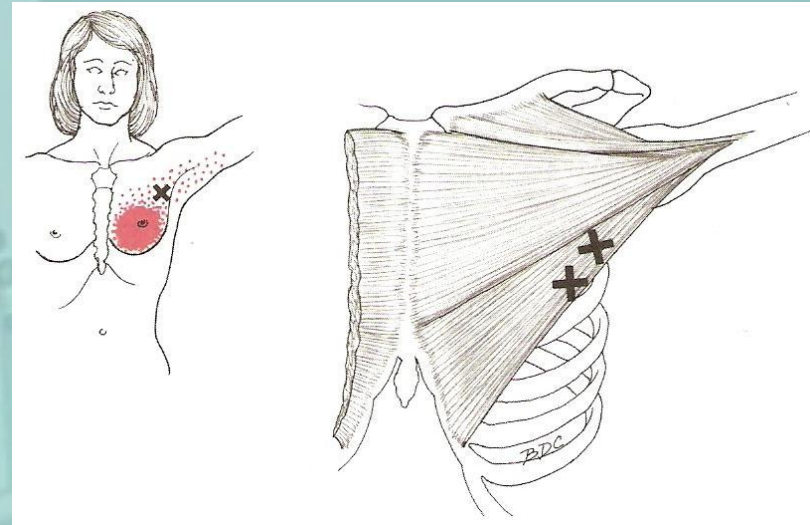
Key Muscles

- pectoralis major/minor
- rhomboid major/minor
- intercostals
- subscapularis
- trapezius
- scalenii
- diaphragm

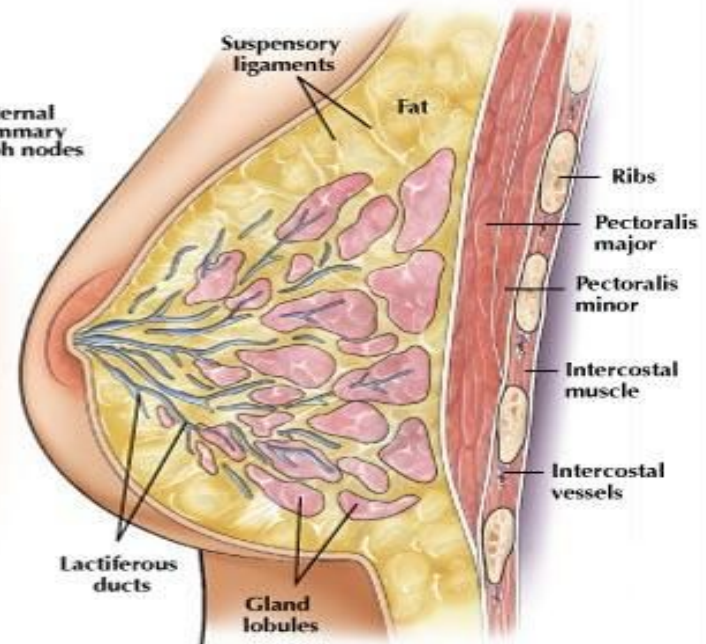
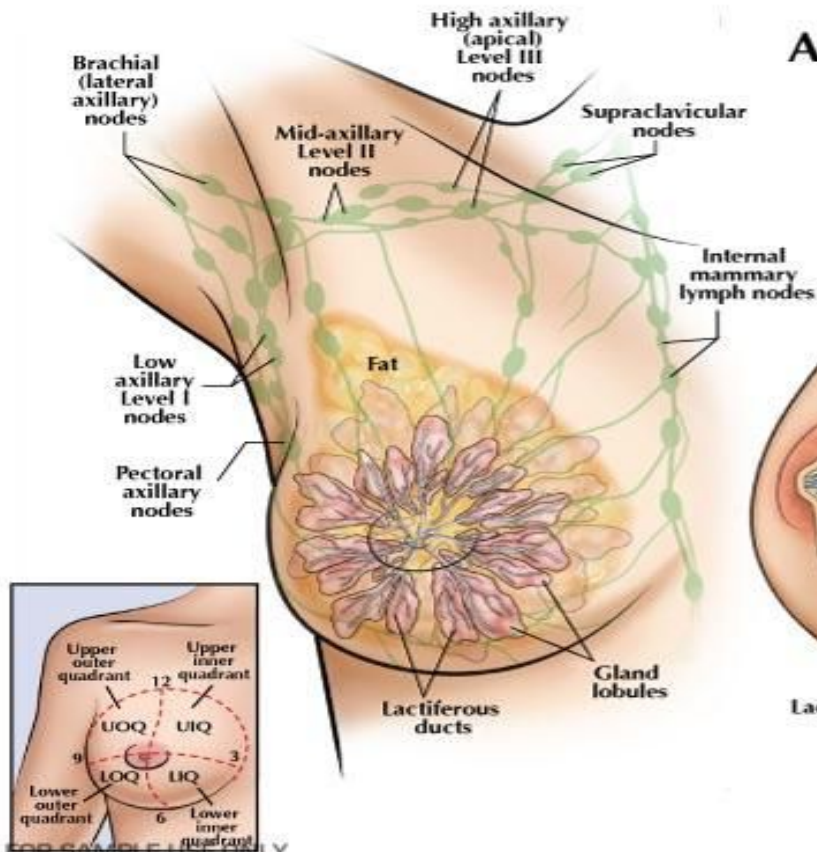


Lymph Vessel Pathways

- Lymph vessels can become trapped in tight tissues and fascia
- Specifically, a lymph vessel from the breast may travel through a portion of the chest muscle to the lymph nodes



ANATOMY OF THE BREAST

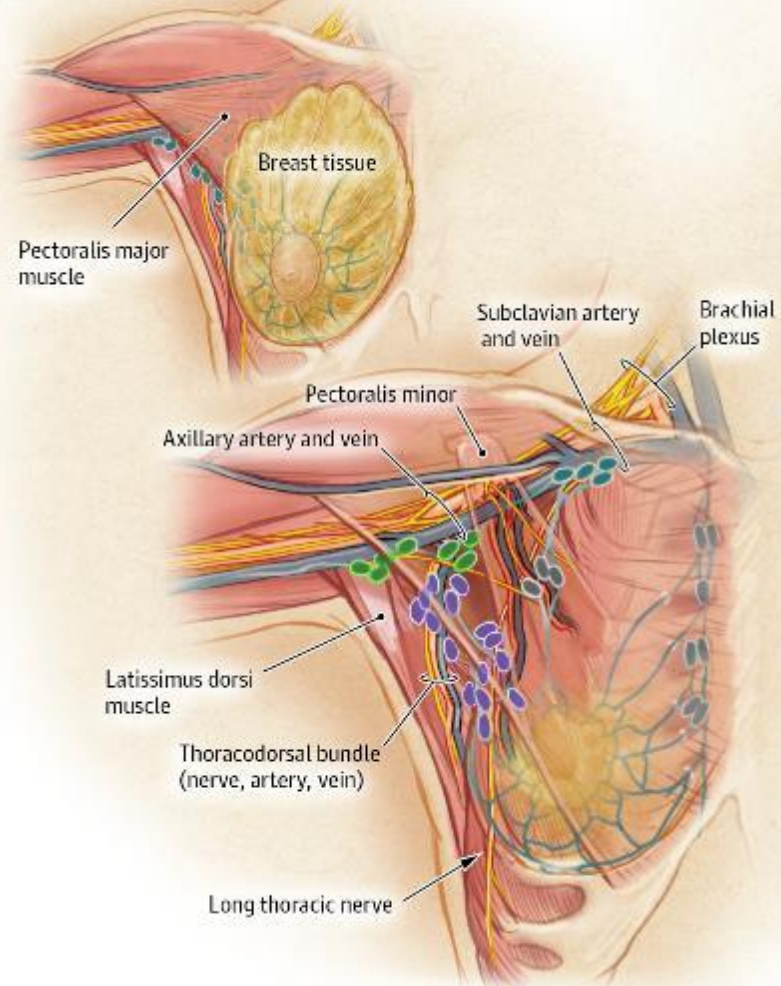


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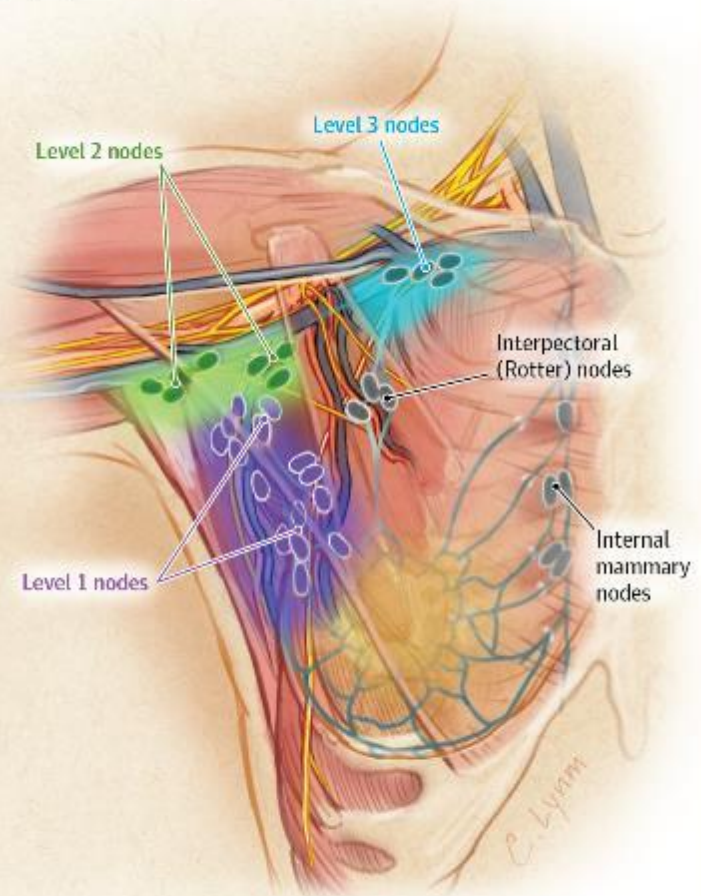
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A Anatomical landmarks of the axilla



B Lymphatic drainage of the breast



Subjective Assessment

Surgical procedure including date, type, # of nodes, # of positive nodes

Medical procedures (chemotherapy, radiotherapy, hormone treatments, ovarian surgery)

Medications (including side effects)

Current activity and exercise

Fatigue

Pain (VAS scale)

Social History, work history

Past medical history

Lymphedema (treatment to date)

Objective Assessment

Posture

Range of motion (c spine, shoulder, scapular, thoracic, elbow, wrist)/muscle length testing

Circumferential measurement

Swelling of anterior, lateral and posterior chest wall and abdomen

Trigger points

Fascial glides

Strength

Cording

Vaginal health

Hand grip

Joint mobilization

Prospective Model of Care: Post-Operative and Post Reconstructive Issues

Cellulitis (10%)

Abscess

Seroma (12%)

Hematoma (4.2% for SND)

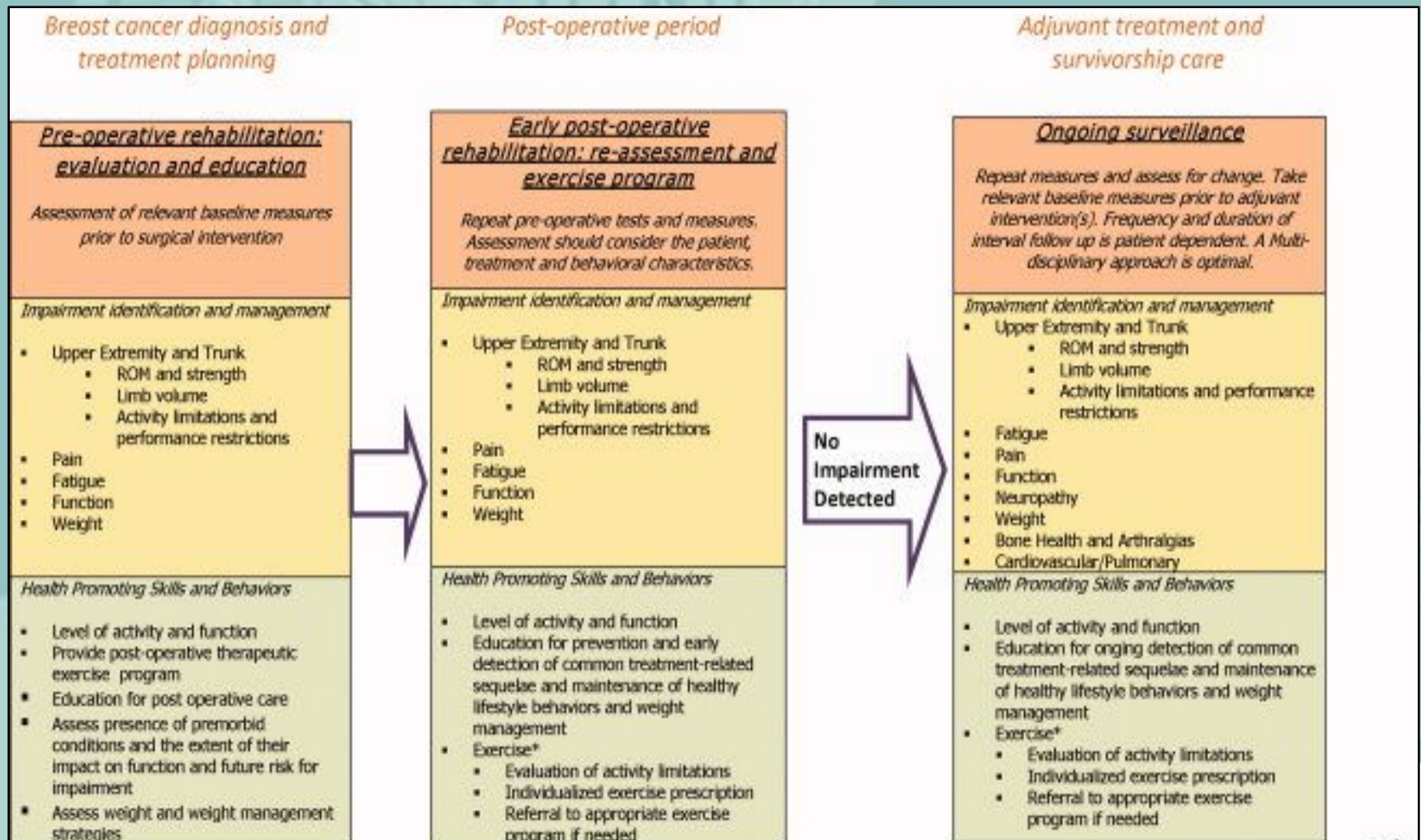
Pneumothorax

Brachial Plexopathy

Intercostal brachial nerve disruption

Mondor's disease

Model of Care



Pre-Operative Teaching

Establish baseline measures including ROM, strength, limb volume, pain and functional activities.

Instruction on:

- Teach exercises with progressions

- Document pre-morbid conditions

- Breathing exercises

- Postural exercises

- Management of pain

- Return to functional activities

- Lymphedema awareness

- Relaxation exercises

- Resources in the community

Axillary Web Syndrome: Cording

6-72%

Usually appears at 3-4 weeks post-operative

Defining characteristic is visible web in axilla of overlying palpable cords that become taut and painful with abduction

Always present in the axilla but can extend into the antecubital fossa and into thumb

Yeung et al, 2015; Moskovitz et al, 2001

Axillary Web Syndrome



Presence of palpable and visible cords in axilla with abduction

+/- Pain

+/- decreased shoulder ROM
esp. abduction and HBH

Scar Management



Assessment:
Depth of scar
Length of stretch
Amount of stretch

Persistent Pain Syndrome (Post-mastectomy pain syndrome)

Any pain that last beyond
the normal healing
timeline

Tends to be neuropathic
in nature: burning,
tingling, pins and
needles, lancinating,
shock like (evidence is
starting to refute this)

4-56% of people even 3
years after surgery



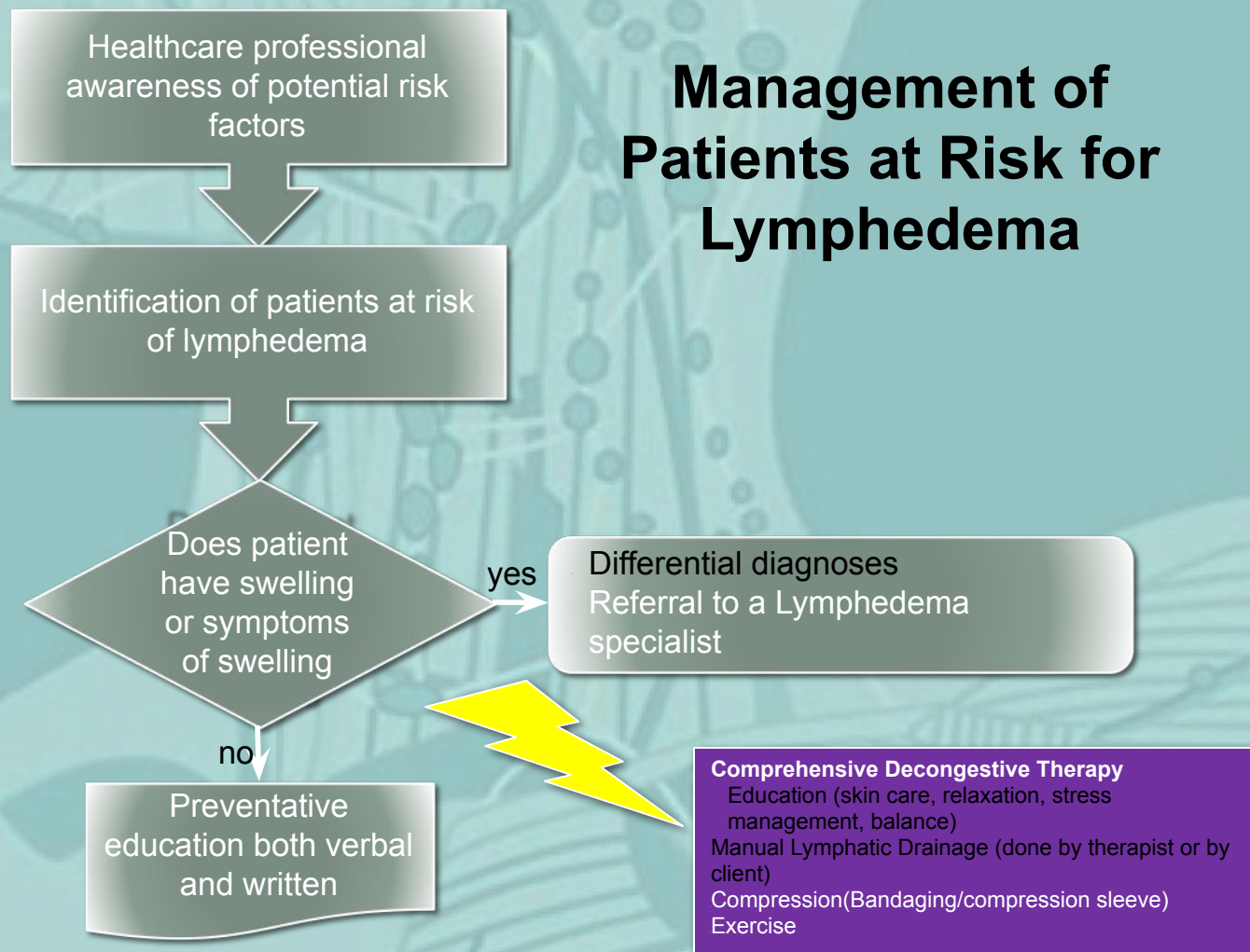
Delicate Balancing Act

Allow
time for
healing

Minimize
stiffness



Management of Patients at Risk for Lymphedema



PTs/RMTs

Can help:

- Increase mobility
- Decrease adhesions, muscle/tissue tightness
- Prepare client for surgery
- Treat existing swelling
- Prevent complications and improve post surgical outcomes

Recommendations

- Ensure referral to a specialized physiotherapist
- Know the signs and symptoms of infection/complication/lymphedema
- MLD
- Scar mobilization
- Myofascial release and treatment of tight muscles
- Mobilization of joints

Recommendations

- “A physiotherapist with lymphedema experience should be available for all patients who experience swelling or discomfort.”
(NHS)
- Every person undergoing node dissection should have access to a pre-operative assessment and post-operative treatment by an experienced lymphedema physiotherapist

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