

淋巴水腫成因,預後及影響療效因子分析

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1.INTRODUCTION :

- ◉ Lymph: pure water or stream.
- ◉ Lymphedema: 15,16th century.

2.PHYSIOLOGY & ANATOMY OF LYMPHATIC SYSTEM :

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- ◉ 1. Superficial system: dermis, subcutaneous
- ◉ 2. Deep system: subfascial area, deep collector, muscle, joint, ligament, synovial fluid.

2.PHYSIOLOGY & ANATOMY OF LYMPHATIC SYSTEM :

- ◉ Lymph capillaries: wider than blood capillaries. dermis, below papillary layer.
- ◉ Precollector: diameter 150 um
從precollector 以上才有 Valve per few mm
- ◉ Collector: subcutaneous.100-600 um. Valve per few mm, muscle in the wall.
>>以上為superficial system.

COLLECTOR:

- ◉ Intrinsic contraction:6-10/min, during exercise to 10 times; ANS(SNS) and lymph load regulate frequency of contraction by pacemaker on the distal valve.
- ◉ Additional factors: skeletal m contracture, breathing, arteries pulsation, external compression (MLD).

2. PHYSIOLOGY & ANATOMY OF LYMPHATIC SYSTEM :

- ◉ Lymph nodes: 600-700 LN, majority in abdomen (intestine), tonsils, thymus, spleen. 2-30 mm in diameter. 100 resistant of thoracic duct. 絕大多數 lymphatic water load 在 lymph node 回到血液循環
- ◉ Lymph trunk:
- ◉ Thoracic duct >> Lt subclavian vein.
- ◉ Rt upper ¼ >> Rt subclavian vein.

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LYMPH LOAD:

- ◉ Lymphatic protein load: main function of the lymphatic system; 75-100g/day, ultrafiltration and diffusion.
- ◉ 90% micromolecular protein >> vein.
- ◉ 10% macromolecular protein >> lymph capillary.

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LYMPH LOAD:

- ◉ Lymphatic water load: net ultrafiltration. 2.5 liter/day >> 經由 Lt & Rt subclavian vein 回到右心房.
4-8 liter/day >> 經由 reabsorbed into lymph node then enter blood circulation.
Transport capacity 為 10 倍 basal lymph flow.
- ◉ Lymphatic cell load: immune cells; lymphocyte, macrophage, granulocyte, red blood cell, and Langerhans cell.
- ◉ Lymphatic fat load: 小腸 lymph vessels. Chylomicrons 分子比較大, 只能靠 lymphatic system 運輸.

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3. PATHOLOGY OF EDEMA :

- ◉ Edema: Unusual swelling of tissue due to excessive amount fluid in interstitium.
- ◉ "Simple" Lymphoedema: mechanical (low output) failure of lymphatic system >> reduced transport capacity.
- ◉ Lymphoedema: sign of lymphatic system & defense overwhelmed (Földi, 1969).

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- ◉ Low-output failure: transport capacity (a)
- ◉ Combination form: decreased transport capacity and increased lymphatic load (b)

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4. CLASSIFICATION OF LYMPHEDEMA BY CAUSATION:

- ◉ 1. Primary (idiopathic):
most in woman
congenital (newborn) / praecox (<35 y/o) / tardum (>35 y/o)
aplasia/dysplasia / malformation/sclerosis of LN.
- ◉ 2. Secondary:
 - ◉ traumatic / lymphangitis / artificial
 - ◉ iatrogenic: lymphadenectomy, radiation
 - ◉ malignancy: lymphoma, metastatic tumor.

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BREAST CANCER

- 1st leading cause of secondary lymphedema in developed countries.
- Axillary lymphadenectomy
- Radiation

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PREDISPOSING FACTORS FOR BREAST CANCER RELATED LYMPHEDEMA (BCRL)

- Radiation to the axillary lymph nodes
- Lymphadenectomy
- Type of surgery (MRM Vs BCS)
- ALND Vs SLND
- BMI: >30 Vs <25. Helyer L.K.2010
- African American. Kwan.2010

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- Pecking: 96% breast cancer pt post-o/p 3 years>>severe disturbance in functional isotope lymphoscintigraphy.

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5.L.E.DIAGNOSIS : A. CLINICAL SYMPTOMS & SIGNS

- Heavy sensation, tightness
- Unilateral, asymmetrical bil(lower limbs)
- Color of skin: normal, cyanosis>>malignant.
- Not painful: pain>>malignant, plexopathy.
- Not ulceration: malignant, radiation, combination of CVI.
- Stemmer sign(+): finger & toe metatarsal bone dorsal side.

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5.L.E.DIAGNOSIS :

- b. Circumference: >2 cm (upper limb), 3.5 cm (lower limb).
- c. Volumetric measurement:
200 ml; >10 (5) %(upper limb), 5%(lower limb).

Monica 1994

- d. Skin tonometry:

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5.LYMPHEDEMA DIAGNOSIS :

e. Imaging techniques:

- Lymphoscintigraphy: 確定是否有 lymphedema. function, 與MLD combined 可以預期CDP 效果
- Doppler: deep venous system
- CT, MRI and sonography:

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5. LYMPHEDEMA DIAGNOSIS :

- f. BIA (Bioimpedance analysis): accumulation of extracellular fluid, lymphedema determination:
- impedance index : R_0 unaffected/ R_0 affected >>early detection of post-mastectomy lymphedema.
- ≥ 1.139 (dominant),
 ≥ 1.066 (non-dominant)
- Betty Smoot. 2011. BIA and calculated volume(75 ml) > the most accurate assessments of existing BCRL.

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6. CLINICAL STAGE OF LYMPHEDEMA: Földi STAGE

Clinical presentation:

- Latency: can't detectable, only decreased TC (transport capacity).
- Stage 1: mild, pitting, reversible, suprafascial edema.
- Stage 2: moderate, progressive hardening, fibrosclerotic process, and fat deposition; can't be spontaneously reversible.
- Stage 3: severe, lymphostatic elephantiasis, papillomatosis, hyperkeratosis.

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LATENCY STAGE:

- The period of time between the reduction of transport capacity as the result of trauma or surgery, and the onset of lymphedema.
- Histological finding: the same as clinical lymphedema.

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7. EPIDEMIOLOGY: INCIDENCE OF BCRL

- Erickson, 2001: 20 % in breast cancer s/p ALND .
- 15-25%. Ewertz M. Review article .2011
- Self-reported lymphedema: 42-49%.

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INCIDENCE OF BCRL IN CCH

- Dec, 2002, Retrospectively, breast cancer s/p O/P, 1994- 2000, Changhua Christian Hospital.
- 570 patients, follow-up 4.3 years.
- Incidence: ≥ 2 cm, 8.2%(46/570) ; self-reported BCRL-28%(161/570).

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SENTINEL LYMPH NODE BIOPSY

- SLNB replaced the ALND in 1990, BCRL incidence is lowered to about 3-7 % in breast cancer patients.
- A. G. Wernicke et al 2011, early stage breast cancer, 10 years f/u. ALND Vs SLND=34.8% Vs 4.6%.

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LOWER LIMB LYMPHEDEMA

- Beesley V et al., 802 gynecological cancer survivors, 10% of patients were diagnosed with LLL, and a further 15% of patients reported undiagnosed “symptomatic” lower limb swelling.
- Cervical cancer:
- Uterine/Ovarian cancer:
- Melanoma

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8.TIME OF COURSE OF BCRL:

- 109 mild BCRL (0.5-2cm) >>34%-3 years, 48%-5 years, progress to more severe lymphedema. Voichita Bar.Ad.I.J.Radiation Oncology Biol.Phys.2010
- Casley-Smith: untreated BCRL progression. PEV(percentage of excess volume)=22% 2 years, 77% after 8 years diagnosis.

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TIME OF COURSE OF BCRL:

- Johansson K 2010, early stage BCRL (5%) post-therapy approach, PEV could keep at a low level for 10 years (8.1% Vs 9.0%).
- Early intervention could prevent BCRL progression and improve patient’s quality of life (QOL).

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9.COMPLICATION OF LYMPHEDEMA:

- Cosmetic, quality of life(QOL): BCRL, is one of the most distressing and debilitating complications of breast cancer treatment. Depression, anxiety, impairment for ADL and work, and poor QOL.
- Inflammatory complication; DLA(dermatolymphangioadenitis) : Olszewski
- VAD(volatile abacterial dermatitis): E. Földi
- Angiosarcoma

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10.C.D.P. FOR BCRL

- There are multidisciplinary treatment modalities for BCRL in rehabilitation. C.D.P.(Complex decongestive physiotherapy) or C.D.T. (complete decongestive therapy) is the major conservative and effective therapy for BCRL.

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THE NATURE OF COMPLEX DECONGESTIVE PHYSIOTHERAPY :

- four parts:
- skin care & treatment of any infection
- M.L.D. (manual lymphatic drainage)
- compression therapy
- exercise

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THE NATURE OF COMPLEX DECONGESTIVE PHYSIOTHERAPY :

- ◉ 2 phases:
- ◉ Decongestive(intensive) phase: skin care, manual lymphatic drainage (M.L.D.), exercise and multi-layer bandaging every day, 2-4 weeks.
- ◉ Maintenance phase : skin care, exercise, **low-stretch elastic sleeve**; MLD applied when needed.

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M.L.D.:

- ◉ Manual lymphatic drainage
- ◉ Neighboring healthy region suction the high-protein fluid from the congested area.

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M.L.D.:

- ◉ Lymphotomes: skin, lymphatic drainage area.
- ◉ Lt & Rt; Thoracic & abdominal lymphotomes.
- ◉ Watershed :separate lymphatic tributary regions (root area)

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COMPRESSION THERAPY

- ◉ External device (compression garment or bandage).
- ◉ Internal: expansion of a muscle that presses against a resistant layer.

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EXERCISE:

- ◉ Warm up
- ◉ Stretch exercise
- ◉ Decongestive exercise: muscle chain.

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11.影響CDP療效因子分析: 1).BCRL

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BCRL

- a retrospective analysis, 107 BCRL. 12 sessions of CDP, the duration of lymphedema was 22.4 months, 56% of BCRL occurred within 2 years after surgery.
- Lymphedema severity: baseline and post-CDP percentage of excess volume (PEV), was 27.7% and 14.9%.
- The baseline PEV was correlated with the duration of lymphedema.
- The CDP efficacy, percentage reduction of excess volume (PREV), was 50.5%, and was correlated with PEV, duration of lymphedema and age.

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BCRL

- This study showed the effectiveness of an intensive CDP interventions.
- The breast cancer therapy characteristics did not affect PEV or PREV.
- Baseline lymphedema severity was the most important predictive factor for CDP efficacy.

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PREDICTIVE FACTORS OF CDP EFFICACY

- Forder-Cordero Isabel, 2010: **PEV, compliance, autumn, and venous insufficiency.**
- Johansson K 2010, BCRL, 10 years f/u, **large PEV** at diagnosis >> exceeded large PEV during follow-up (PEV \geq 20%).

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OTHER PREDICTIVE FACTORS OF CDP EFFICACY

- Compliance to bandage
- Treatment season
- Venous insufficiency
- BMI
- Age

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LOWER LIMB LYMPHEDEMA (LLL)

- 44 patients, post-pelvic cancer LLL.
- 27 (61.4%)-cervical cancer, 9 (20.5%)-endometrial cancer, 8 (18.2%)-ovarian cancer. 18 (40.9%) patients received radiotherapy.
- Age- 62.2 y/o, 12.6 sessions of CDP.
- lymphedema duration was 34.8 months. The interval from pelvic cancer treatment to LLL development was 63.4 months.
- Lymphedema severity: baseline and post-CDP PEV were 32.9% and 18.8%.

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LOWER LIMB LYMPHEDEMA (LLL)

- The lymphedema reduction after 12.6 sessions of CDP was -55.1%.
- The key to predicting successful lymphedema treatment of LLL is the initial PEV.

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CONCLUSIONS:

- ◉ The intensive CDP program was effective and successful. We should encourage and refer patients to undergo treatment for lymphedema, even when the lymphedema is mild.

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12.The other rehabilitation methods in lymphedema :

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A).INTERMITTENT PNEUMATIC COMPRESSION

- ◉ No consensus: time, frequency(1 hour, 30 mmHg)
- ◉ Andrzej Szuba: 1).10 times, DLT Vs DLT+IPC : 26% Vs 45.3%>>30 days, no difference.
- ◉ 2).maintenance phase, DLT Vs DLT+IPC:↑32 Vs ↓89 ml.Cancer 2002

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INTERMITTENT PNEUMATIC COMPRESSION

- ◉ Haghghat S : CDT Vs CDT+IPC:43.1 Vs 37.5% >>16.9 Vs 7.5%(3 months later). Lymphology 2010.
- ◉ Feldman JL et al: In select patients, IPC use may provide an acceptable home-based treatment modality in addition to wearing compression garments. Lymphology 2012.

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B).Kinesio taping:

- ◉ Dr Kenzo Kase, in 1973, and he believed kinesio tape could help open up lymphatic pathways and keep the pathways open to improve lymphatic uptake.

KINESIO TAPING:

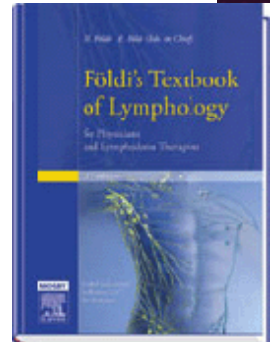
- ◉ 可以取代CDP治療嗎? 不可能.
- ◉ 因為, compression therapy是CDP治療一個很重要的元素,kinesio taping 和compression therapy相比,effect 太弱.
- ◉ 我們用嗎? Yes,用於palliative (pospice case) treatment, and trunk, proximal limb part(不易 apply bandage處)

KINESIO TAPING:

- ◎ 缺點
- ◎ Wound:
- ◎ Xerosis, pruritus:
- ◎ Expensive:不可重複使用

圖片及參考資料出處: FÖLDI'S TEXTBOOK OF LYMPHOLOGY

- ◎ Prof. Michael Foeldi &
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