WHAT IS A CENTER OF EXCELLENCE IN LYMPHATIC DISEASE?
one of the most poorly understood, relatively underestimated, and least researched complications of cancer and its treatment.

CLINICAL BURDEN

- >10 million Americans
- 1/3 breast cancer survivors
- WHO: 250 million worldwide
- #1 cancer survivor disease
- No cure
- No approved drug therapy
- Only 3 studies worldwide seeking new treatments
PATHOPHYSIOLOGY

LYMPHEDEMA
- Primary
- Secondary
PRIMARY LYMPHEDEMA

- Failure of formation
- Failure of overlap of endothelial cells (no valves)
- Failure of calcium dynamics, ability to sense nitric oxide
- 1.15/100,000 less than 20 years old

SECONDARY LYMPHEDEMA

- 99% of lymphedema
- 1/1000 individuals
- Filariasis in developing countries, breast cancer in the US

CANCER-RELATED LYMPHEDEMA

- Trauma to lymphatics
- Radiation
- Chemo (Taxol)
- Compression of lymphatics (bulk)
- Lymphatic infiltration by cancer
INCIDENCE OF BREAST CANCER RELATED LYMPHEDEMA (BCRL)

- Incidence 20-30% (5-50%)
- 1/5 patients with breast cancer
- Mean onset 14-18 months after surgery
- Factors:
  - Axillary LN dissection (20-40% risk)
  - Increased number of LNs (2-7% in SLNBx)
  - Radiation
  - No reconstruction
  - Chemotherapy

“I BEAT CANCER, I CAN’T BEAT LYMPHEDEMA”

- Significantly more hospitalizations and nearly 7X higher average healthcare charge per patient compared with cancer patients without lymphedema
- 30% of patients experience infection, warranting hospital admission for IV antibiotics within 1 year
- Each episode can result in 4 day hospitalization and >$16,000
- Patients with BCRL averaged 3 all-cause hospitalizations each year over 2 year period versus 0.5 for all other breast cancer patients without lymphedema

LYMPHEDEMA IMPACT

- Pain, heaviness, fatigue
- Decreased quality of life
- Recurrent infection
- Disfigurement
LYMPHEDEMA

- Protein rich interstitial edema
- Inflammation
- Fibrosis/scarring
- Fat deposition
- Local immune disturbances

REALITY: A HOUSE WITHOUT ITS FOUNDATION

MISCONCEPTION

- Toxin buildup is the problem
  - Toxin buildup
  - Toxin flushing
  - Toxins poisoning the body

Toxin buildup is not the problem. Instead, focus on addressing the underlying issues that contribute to lymphatic dysfunction.
GENETIC PREDISPOSITION?

STAGES OF LYMPHEDEMA

SURVEILLANCE
BIOIMPEDENCE/L-DEX

SURVEILLANCE SCHEDULE

- Pre-operative baseline
- 3 months
- 6 months
- 12 months
- 18 months
- 24 months

Sarah Gang, CLT-LANA (OT)
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CONSERVATIVE MANAGEMENT

- Decongestive Physiotherapy
- Wrapping
- Custom Sleeves
- Pneumatic Pumps

DIAGNOSIS

- Clinical Exam
- Imaging:
  - Lymphoscintigraphy
  - ICG lymphography (near-infrared fluorescence lymphography)
  - MRI lymphography
ICG LYMPHOGRAPHY STAGING

MEDICAL "CONSERVATIVE" MANAGEMENT

EARLY INTERVENTIONS

• Compression, compression, compression!
• Stretching/yoga**
• Dietary/Weight loss***
• Obesity at the time of surgery increases risk by 3-8x
• Obesity after surgery increases risk by 2-3%

*Gergich et al.
**Box et al. Breast Cancer Res and Treat. 2002
***Greene et al. NEJM
**OBESITY MANAGEMENT**

Dr. Jon Purnell, MD
Obesity medicine
Endocrinology/Cardiology

Dr. Farrah Husain, MD, FCS, FASMCS
Bariatric Surgery

Dr. Robert Martindale, MD
Surgical Nutrition

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**SURVEILLANCE AND EARLY INTERVENTION**

- Decrease infection risk
- Improve quality of life
- Decrease healthcare costs

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**CONSERVATIVE THERAPIES**

- Complete decongestive physiotherapy
- Wrapping
- Custom sleeves
- Pneumatic pumps

*Exercise under compression, skin care*
SURGICAL THERAPY

SURGICAL THERAPIES

Physiologic
- Lymphovenous bypass
- Vascularity lymph node transfer

Ablative
- Liposuction
- Direct Excision

LYMPHOVENOUS ANASTOMOSIS

- Minimally invasive
- Preop ICG: map lymphatic system on skin
- Small incisions (3 cm) over functional lymphatic and vein
- Anastomosis created to divert lymph flow to venous system

* O’Brien BM et al. 1977
* Koshima I et al. 2000
VASCULARIZED LYMPH NODE TRANSFER

- Free flap, microsurgical
- Used in fluid dominant phase (stages I-III)
- Scar release and introduction of non-irradiated, well-vascularized tissue bridging existing lymphatic channels
- VEGF-C production by healthy transplanted nodes→local lymphangiogenesis
- Improved local immunology, preventing infection of the involved limb
- Lymph nodes themselves act as a lymphatic-vascular interface
- VLNT as a “pump” for lymphatic fluid

OMENTAL VASCULARIZED LYMPH NODE TRANSFER

LIPOSUCTION
Missing:
Dr. Arpana Naik, Dr. Sarah Crandall
THANK YOU

REFERENCES

- Kunert C et al. Mechanobiological oscillators control lymph flow. Proc Natl Acad Sci USA. 2015 Sep 1; 112(35): 10938-43