

Hybrid Lymphedema Surgery

Chieh-Han John **TZOU**

¹ TZOU MEDICAL., Vienna, Austria

² Medical Faculty, Sigmund Freud University, Vienna, Austria

³ Department of Plastic and Reconstructive Surgery, Hospital of Divine Savior, Vienna, Austria



Pump it up 1

**Wundmanagement kann mehr -
Hilfe zur Selbsthilfe**

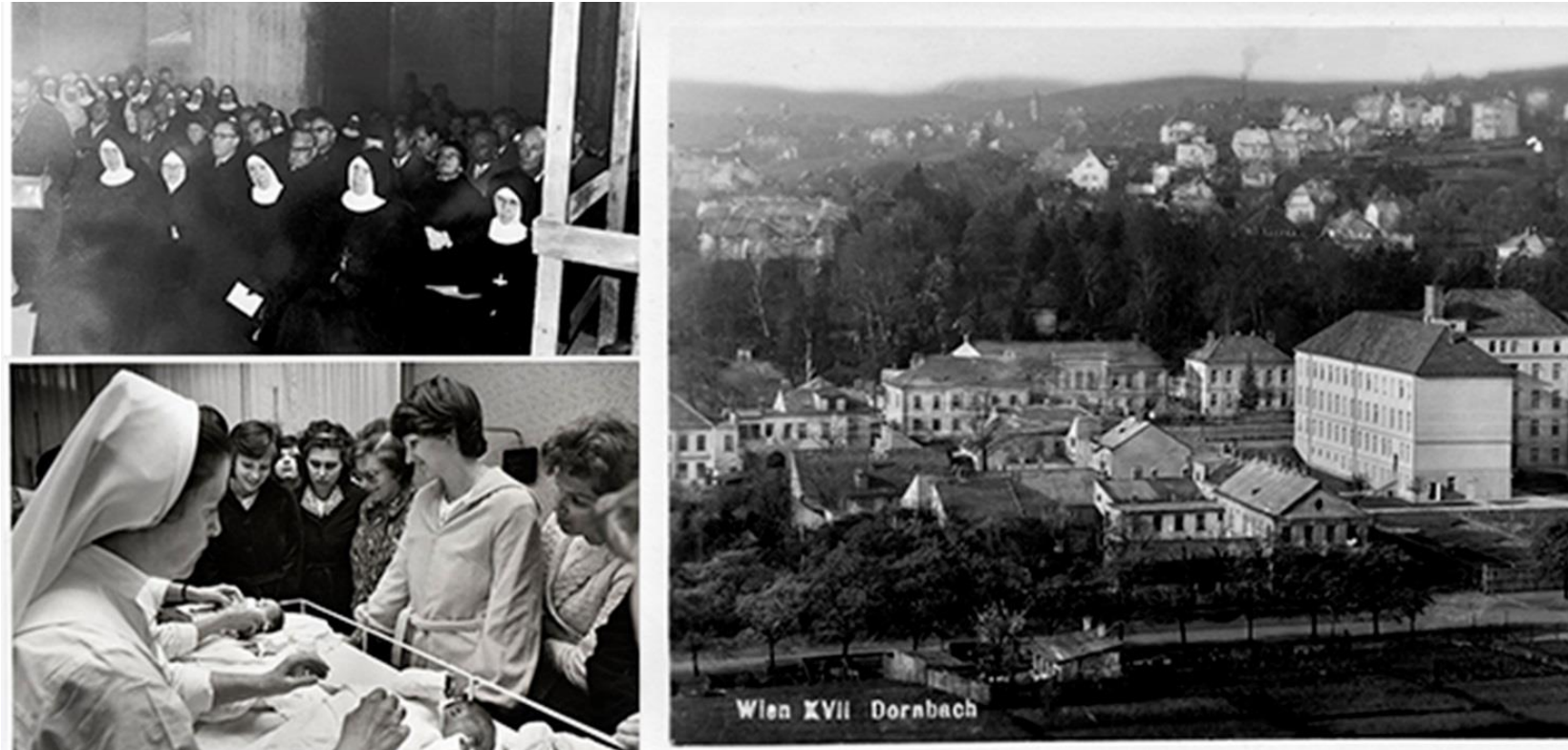
29. Okt. 2025 9 bis 17 Uhr

Disclosure

No conflict of interest.

Introduction

Hospital of Divine Savior, Vienna, Austria



Established in 1935 by Nuns of Divine Savior in Vienna, Austria

Introduction

Hospital of Divine Savior, Vienna, Austria



250 beds, 5 OR, Focus Reconstructive Microsurgery, Vascular Surgeries, General Surgery and Palliative Medicine, Medical University of Vienna, Sigmund Freud University Vienna, Semmelweis University Budapest, Hungary.

Lymphedema Surgery

Surgical Therapies of Lymphedema

- **Resective** surgical therapy
- **Reconstructive** surgical therapy = **physiologic, LVA, VLNT**

Lymphedema Surgery

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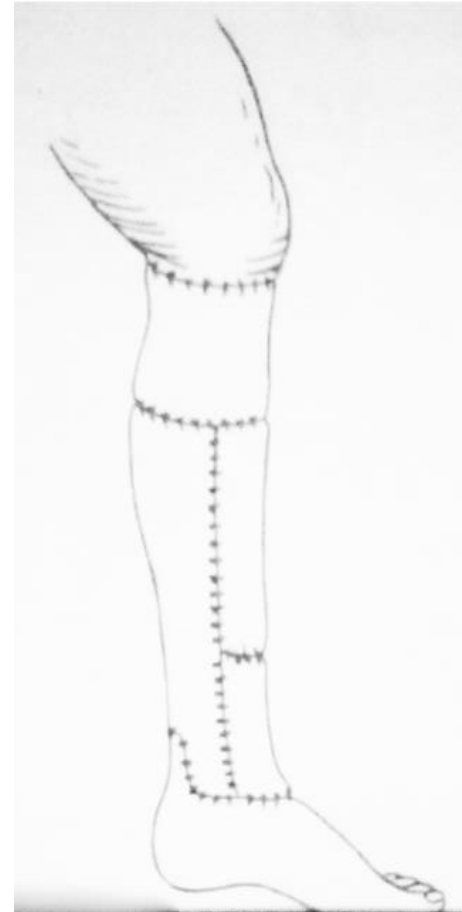
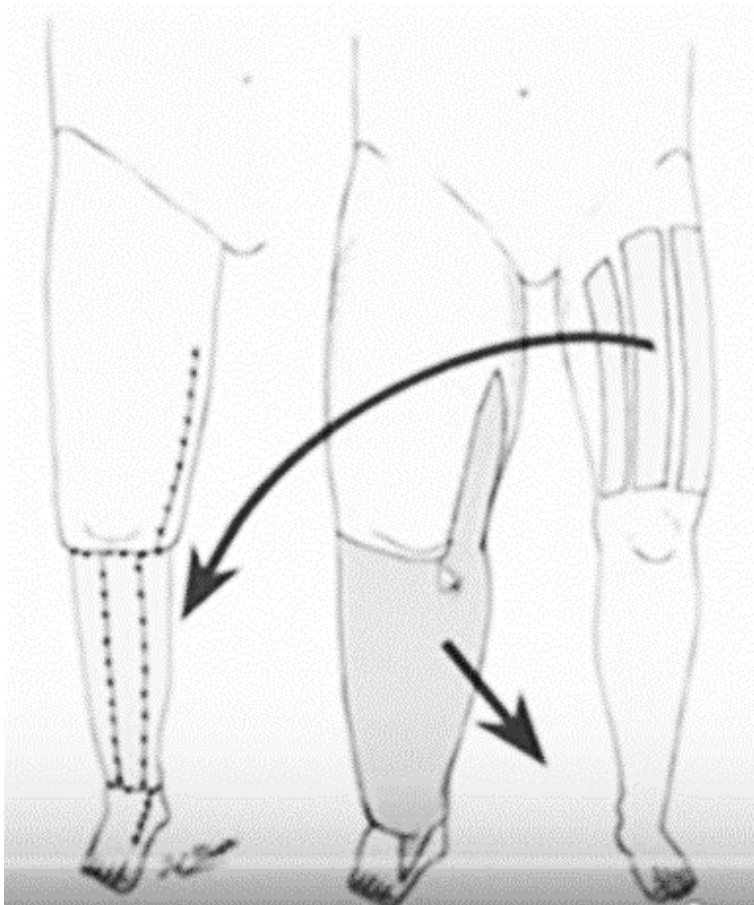
Lymphedema Surgery

Resective Lymphedema Surgery of Lymphedema

- | | |
|---------------------------|-------------------------------|
| • 1912 : Charles | Charles' Procedure |
| • 1912 : Kondoleon | Resection Deep Fascia |
| • 1918 : Sistrunk | Resection Deep Fascia, Tissue |
| • 1936 : Homan | Delayed Resection, Skin Graft |
| • 1967 : Thompson | Resection, Debulk, Skin Flap |
| • 1997 : Brorson | Liposuction DRY |
| • 2000 : Cornely | Liposculpture WET |

Resective Lymphedema Surgery

1912 Charles Resection, Skin Graft



Introduction

Resection Surgical Therapies of Lymphedema

- 1936 : Homan Delayed Resection, Skin Graft
- 1967 : Thompson Resection, Debulk, Skin Flap
- **1997** : Brorson Liposuction DRY
- **2000** : Cornely Liposculpture WET

Resective Lymphedema Surgery

1997 Brorson Liposuction DRY

Scand J Plast Reconstr Hand Surg 31: 137–143, 1997

COMPLETE REDUCTION OF LYMPHOEDEMA OF THE ARM BY LIPOSUCTION AFTER BREAST CANCER

Håkan Brorson and Henry Svensson

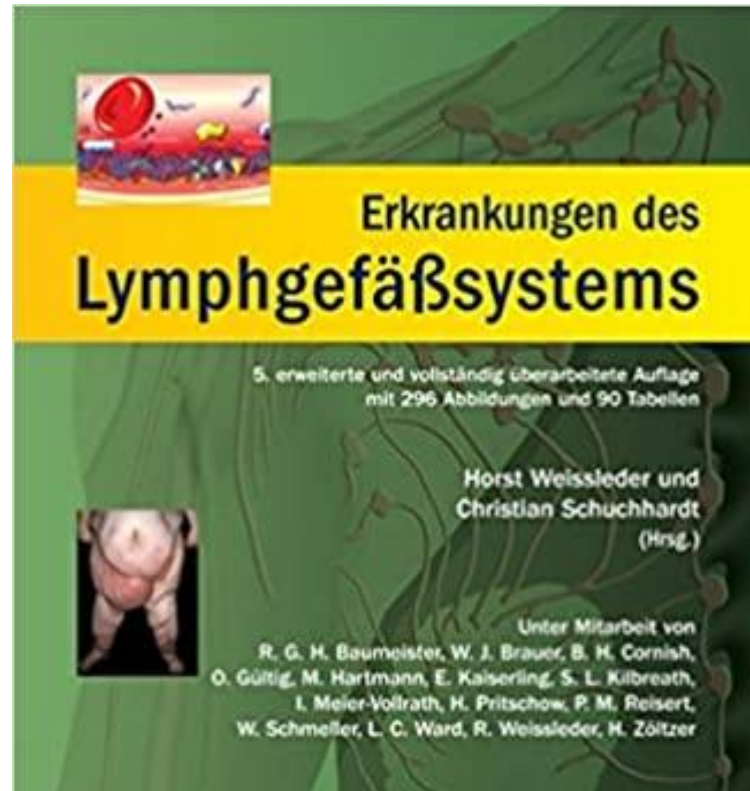
From the Department of Plastic and Reconstructive Surgery, Malmö University Hospital, Malmö, Sweden

(Submitted for publication 12 July 1996)

Brorson, H., & Svensson, H. (1997). Complete Reduction of Lymphoedema of the Arm by Liposuction After Breast Cancer. *Scandinavian Journal of Plastic and Reconstructive Surgery and Hand Surgery*, 31(2), 137–143. doi:10.3109/02844319709085480

Resective Lymphedema Surgery

2000 Cornely Liposculpture WET



Cornely, M. (2000). "Liposuktion (Liposculpture.) In: Weissleder H, Schuchhardt CH (Hrsg) Erkrankungen des Lymphgefäßsystems, 3." Aufl. Viavital, Köln S: 384-397.

Resective Lymphedema Surgery

2023 Cornely Liposculpture WET

Article published online: 2023-05-29

288 Extremity/Lymphedema: Original Article



Lymphological Liposculpture for Secondary Lymphedema after Breast Cancer and Gynecological Tumors: Long-Term Results after 15 Years

Manuel E. Cornely, MD¹ 

¹ LY.SEARCH, Cologne, North Rhine-Westphalia, Germany

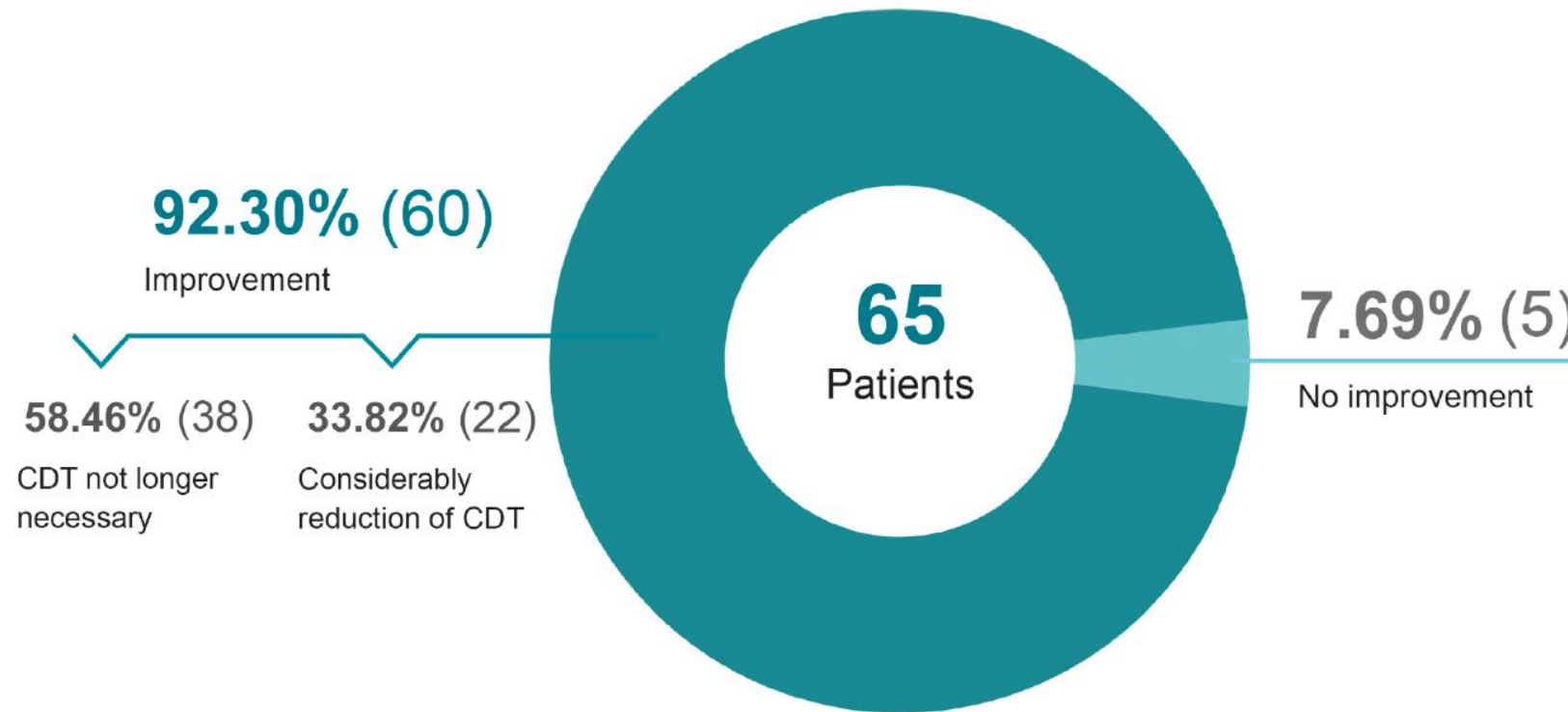
Arch Plast Surg 2023;50:288–304.

Address for correspondence Manuel E. Cornely, MD, LY.SEARCH, Biberstrasse 7, Cologne, North Rhine-Westphalia 50678, Germany (e-mail: info@cornely.org; post@lysearch.de).

Cornely, M. E. (2023). Lymphological Liposculpture for Secondary Lymphedema after Breast Cancer and Gynecological Tumors: Long-Term Results after 15 Years. Archives of Plastic Surgery, 50(03), 288-304.

Resective Lymphedema Surgery

2023 Cornely Liposculpture WET



Cornely, M. E. (2023). Lymphological Liposculpture for Secondary Lymphedema after Breast Cancer and Gynecological Tumors: Long-Term Results after 15 Years. *Archives of Plastic Surgery*, 50(03), 288-304.

Lymphedema Surgery

Surgical Therapies of Lymphedema

- **Resective** surgical therapy
- **Reconstructive** surgical therapy = **physiologic**, VLNT, LVA
- **Hybrid** surgical therapy = **resective and reconstructive**

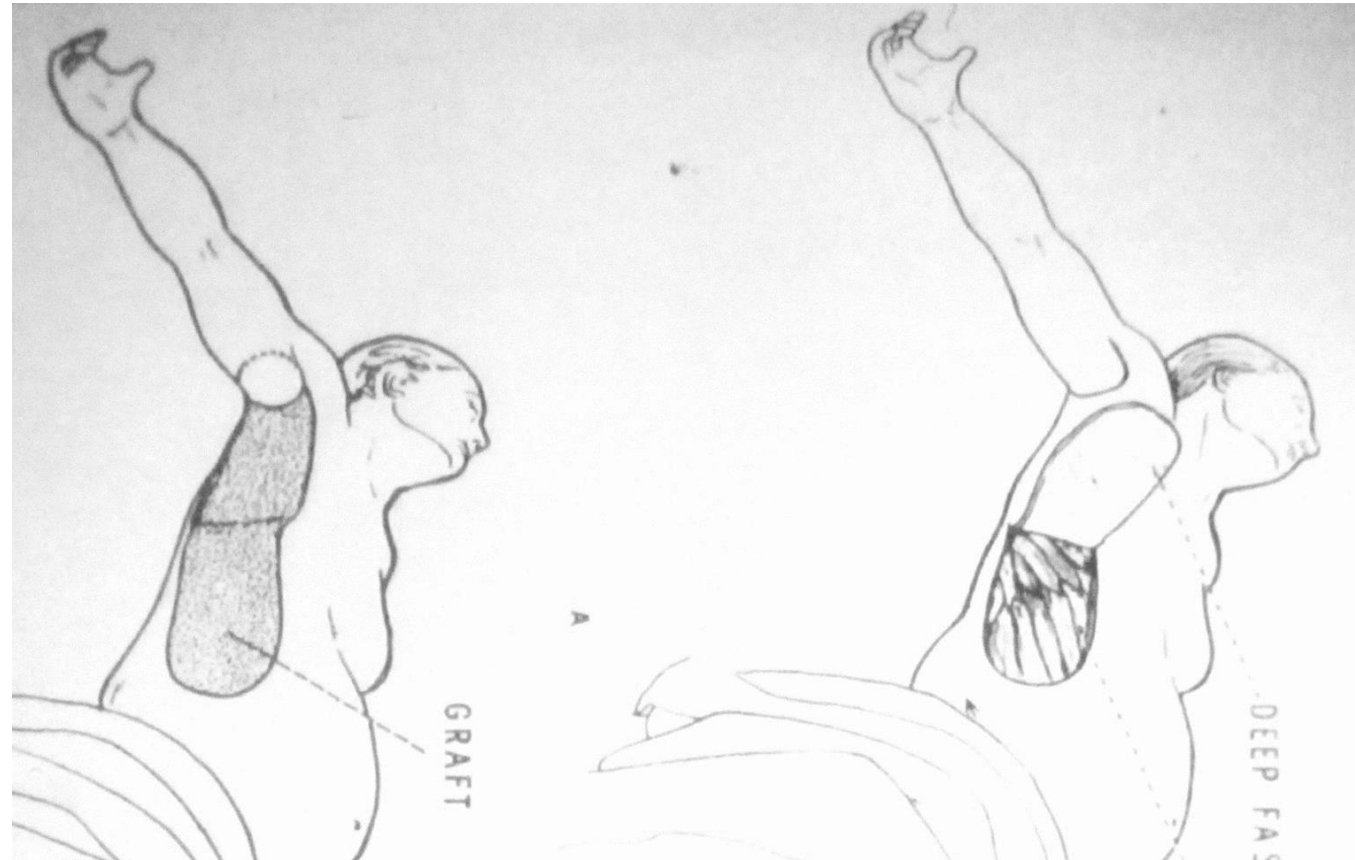
Lymphedema Surgery

Reconstructive Surgical Therapies of Lymphedema

- **1908** : Handley Silk Threads
- **1935** : Gillies Skin Flap
- **1956** : Kinmonth Omentum Flap
- **1966** : Goldsmith
- **1967** : De Los Santos
- **1987** : Kinmonth

Reconstructive Lymphedema Surgery

1935 Gillies Skin Flap



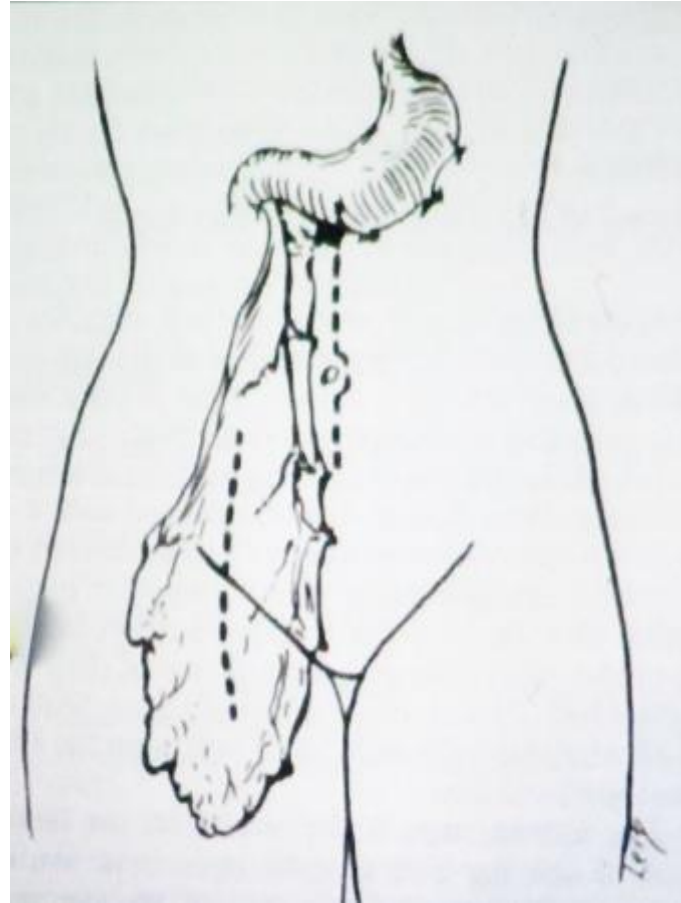
Reconstructive Lymphedema Surgery

Reconstructive Surgical Therapies of Lymphedema

- 1908 : Handley Silk Threads
- 1935 : Gillies Skin Flap
- 1956 : Kinmonth Omentum Flap
- 1966 : Goldsmith
- 1967 : De Los Santos
- 1987 : Kinmonth

Reconstructive Lymphedema Surgery

1956 Kinmonth Omentum Flap



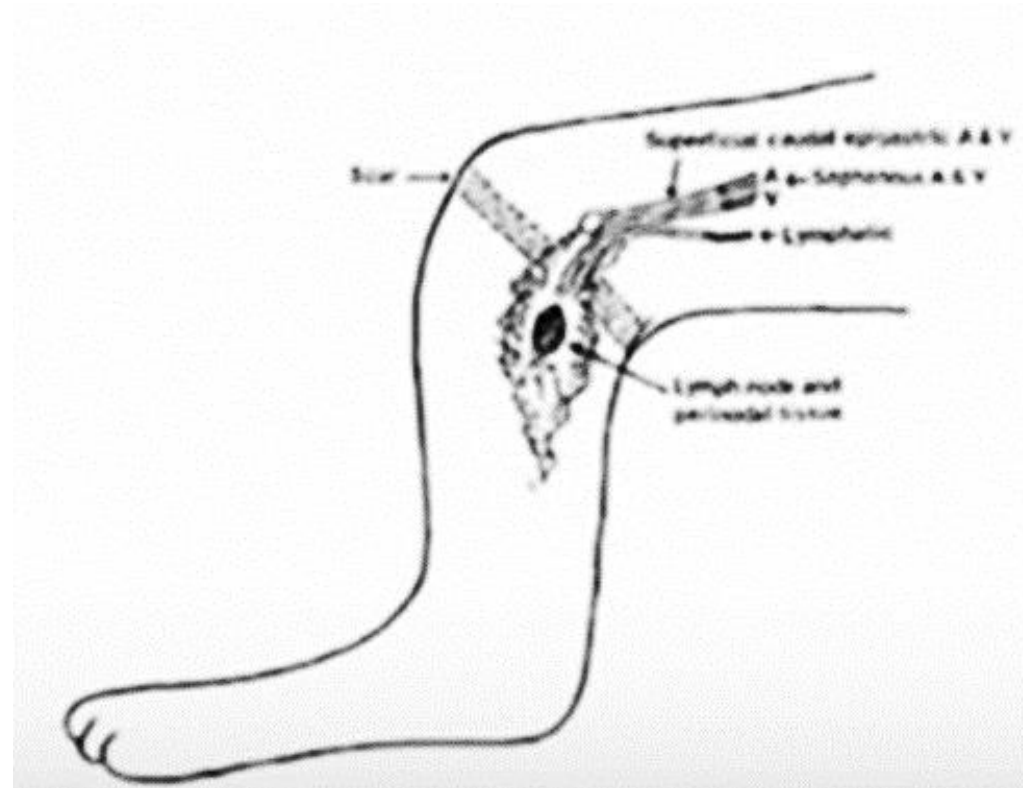
Reconstructive Lymphedema Surgery

Reconstructive VLNT Vascularized Lymphnode Flap

- 1935 : Gillies Skin Flap
- 1956 : Kinmonth Omentum Flap
- 1966 : Goldsmith Omentum Flap
- **1990** : Chen Vascularized Lymphnode Flap
- **2006** : Becker Vascularized Lymphnode Flap

Vascularized Lymphnode Transfer (VLNT)

1990 Chen Lymphnode-Flaps



Chen HC, O'Brien BM, Rogers IW, Pribaz JJ, Eaton CJ. Lymph node transfer for the treatment of obstructive lymphoedema in the canine model. *British journal of plastic surgery*. 1990;43(5):578-586.

Vascularized Lymphnode Transfer (VLNT)

2012 Cheng VLNT Submental Flap



A novel approach to the treatment of lower extremity lymphedema by transferring a vascularized **submental lymph node flap** to the ankle[☆]

Ming-Huei Cheng ^{a,*}, Ju-Jung Huang ^a, Dung H. Nguyen ^a, Michel Saint-Cyr ^b, Michael R. Zenn ^c,
Bien Keem Tan ^d, Chyi-Long Lee ^e

^a Division of Reconstructive Microsurgery, Department of Plastic and Reconstructive Surgery, Chang Gung Memorial Hospital, College of Medicine, Chang Gung University, Taoyuan, Taiwan

^b Department of Plastic Surgery, University of Texas Southwestern Medical Center at Dallas, TX, USA

^c Division Plastic Surgery, Duke University Medical Center, Durham, NC, USA

^d Division of Plastic Surgery, Singapore General Hospital, Singapore

^e Division of Gynecologic Endoscopy, Department of Obstetrics and Gynecology, Chang Gung Memorial Hospital, College of Medicine, Chang Gung University, Taoyuan, Taiwan

Cheng MH, Huang JJ, Nguyen DH, Saint-Cyr M, Zenn MR, Tan BK, Lee CL. A novel approach to the treatment of lower extremity lymphedema by transferring a vascularized submental lymph node flap to the ankle. *Gynecologic oncology*. Jul 2012;126(1):93-98.

Vascularized Lymphnode Transfer (VLNT)

Mechanism of Vascularized Lymphnode Transplantation VLNT



Cheng, M. H., et al. (2014). "The mechanism of vascularized lymph node transfer for lymphedema: natural lymphaticovenous drainage." *Plast Reconstr Surg* 133(2): 192e-198e.

Vascularized Lymphnode Transfer (VLNT)

2016 Chang Gung Memorial Hospital, Taipei, Taiwan, Prof. Cheng



Vascularized Lymphnode Transfer (VLNT)

Submental Lymphnode Flap



Surgical Anatomy of the Vascularized Submental Lymph Node Flap: Anatomic Study of Correlation of Submental Artery Perforators and Quantity of Submental Lymph Node

CHIEH-HAN J. TZOU, MD,^{1*} STEFAN MENG, MD,² TINHOFFER INES, MD,¹ LUKAS REISSIG, MD,²
URSULA PICHLER, MD,¹ JOHANNES STEINBACHER, MD,¹ IGOR PONA, MD,¹ JULIA ROKA-PALKOVITS, MD,¹
THOMAS RATH, MD,¹ WOLFGANG J. WENINGER, MD,² AND MING-HUEI CHENG, MD³

¹Division of Plastic and Reconstructive Surgery, Department of Surgery, Medical University of Vienna, Vienna, Austria

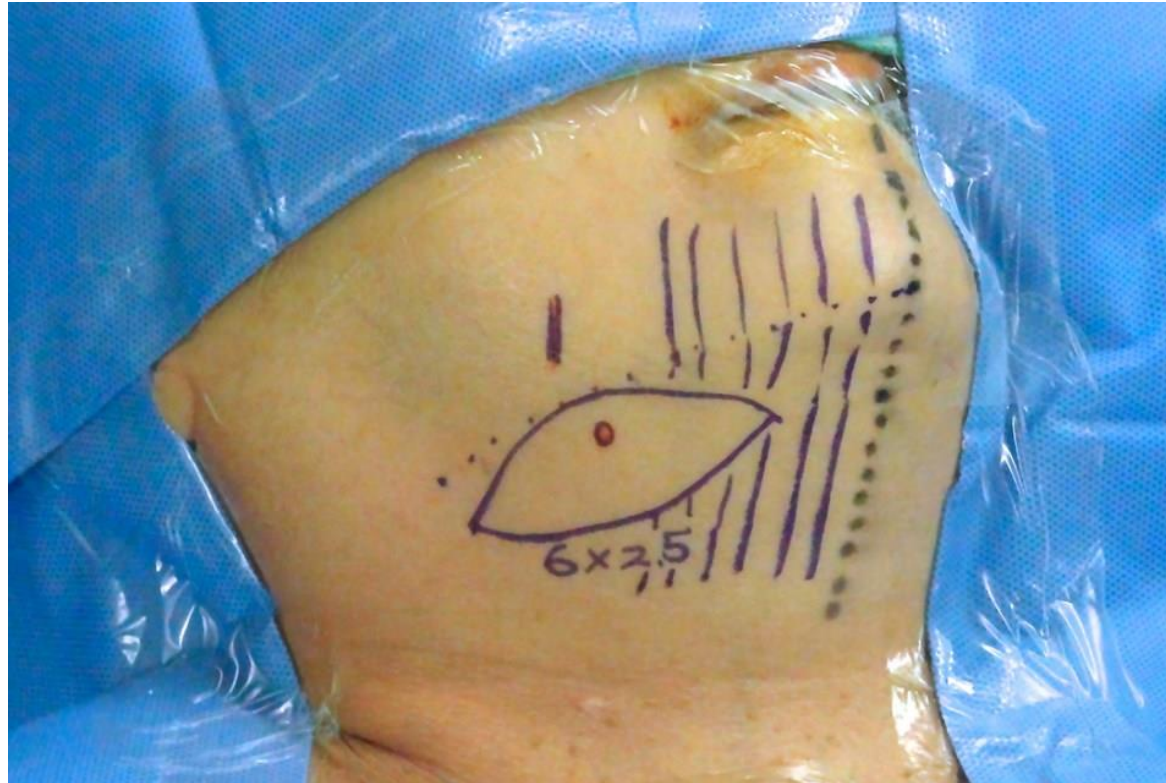
²Department of Systematic Anatomy, Institute of Anatomy, Center for Anatomy and Cell Biology, Medical University of Vienna, Austria

³Division of Reconstructive Microsurgery, Department of Plastic and Reconstructive Surgery, Center for Tissue Engineering, Chang Gung Memorial Hospital, College of Medicine, Chang Gung University, Taoyuan, Taiwan

Tzou CH, Meng S, et al.. Surgical anatomy of the vascularized submental lymph node flap: Anatomic study of correlation of submental artery perforators and quantity of submental lymph node. *Journal of surgical oncology*. Jun 23 2016.

Vascularized Lymphnode Transfer (VLNT)

Submental Lymphnode Flap



Cheng MH. <https://thoracickey.com/microsurgical-procedures-vascularized-lymph-node-transfer-from-the-submental-region/> retrieved 2021/09

Tzou CH, Meng S, et al.. Surgical anatomy of the vascularized submental lymph node flap: Anatomic study of correlation of submental artery perforators and quantity of submental lymph node. *Journal of surgical oncology*. Jun 23 2016.

Vascularized Lymphnode Transfer (VLNT)

Supraclavicular Lymphnode Flap



The Surgical Anatomy of the Supraclavicular Lymph Node Flap: A Basis for the Free Vascularized Lymph Node Transfer

JOHANNES STEINBACHER, MD,^{1,2} INES E. TINHOER, MD,^{1,2} STEFAN MENG, MD,^{2,3}
LUKAS F. REISSIG, MD,² EVA PLACHETA, MD,¹ JULIA ROKA-PALKOVITS, MD,¹ THOMAS RATH, MD,¹
MING-HUEI CHENG, MD,⁴ WOLFGANG J. WENINGER, MD,² AND CHIEH-HAN J. TZOU, MD^{1*}

¹Division of Plastic and Reconstructive Surgery, Department of Surgery, Medical University of Vienna, Vienna, Austria

²Department of Systematic Anatomy, Institute of Anatomy, Center for Anatomy and Cell Biology, Medical University of Vienna, Austria

³Department of Radiology, Kaiser-Franz-Josef-Hospital, Vienna, Austria

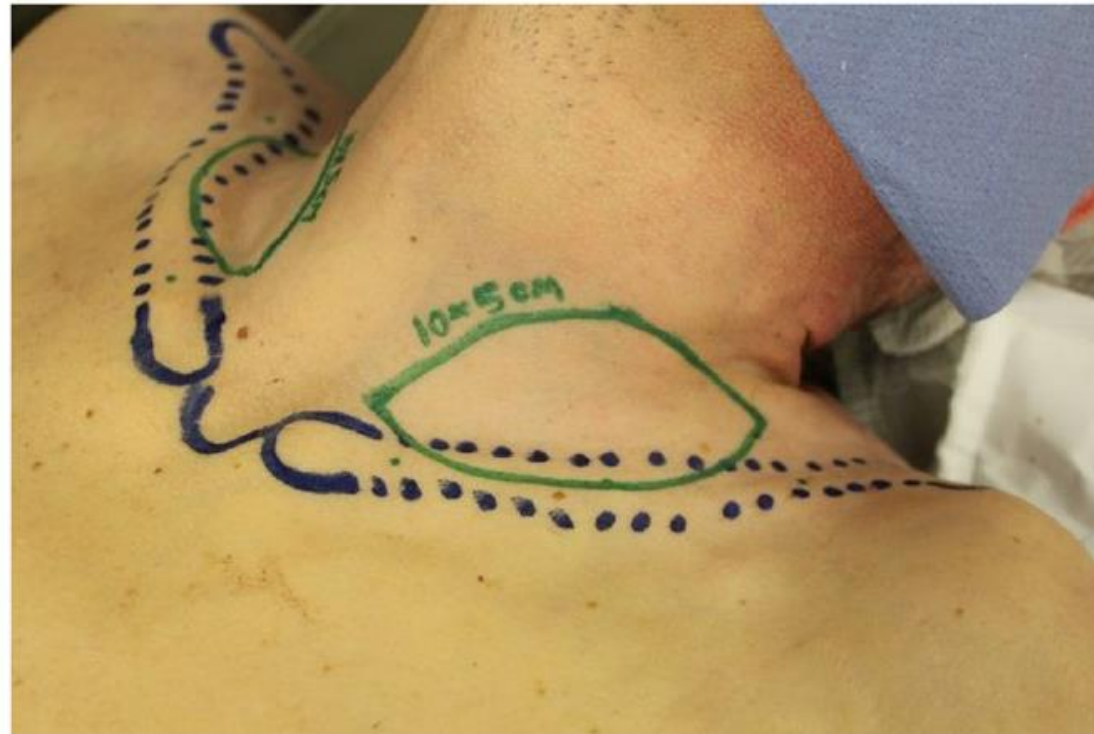
⁴Division of Reconstructive Microsurgery, Department of Plastic and Reconstructive Surgery, Center for Tissue Engineering, Chang Gung Memorial Hospital, College of Medicine, Chang Gung University, Taoyuan, Taiwan

Background: Vascularized lymph node transfer is an effective surgical method in reducing lymphedema. This study provides the first detailed

Steinbacher J, Tinhoer IE, Meng S, ... , Tzou CH. The surgical anatomy of the supraclavicular lymph node flap: A basis for the free vascularized lymph node transfer. *Journal of surgical oncology*. Jun 28 2016.

Vascularized Lymphnode Transfer (VLNT)

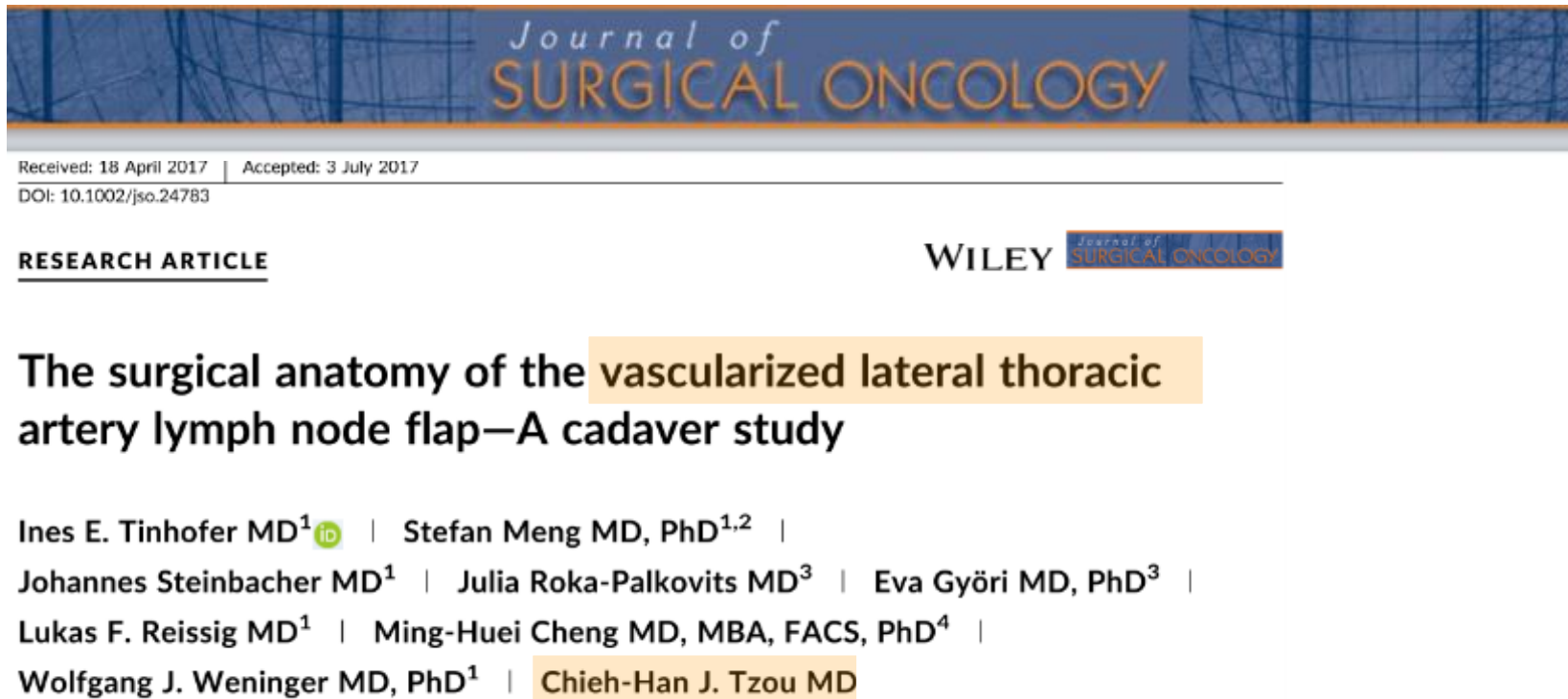
Supraclavicular Lymphnode Flap



Steinbacher J, Tinhofer IE, Meng S,... , Tzou CH. The surgical anatomy of the supraclavicular lymph node flap: A basis for the free vascularized lymph node transfer. *Journal of surgical oncology*. Jun 28 2016.

Vascularized Lymphnode Transfer (VLNT)

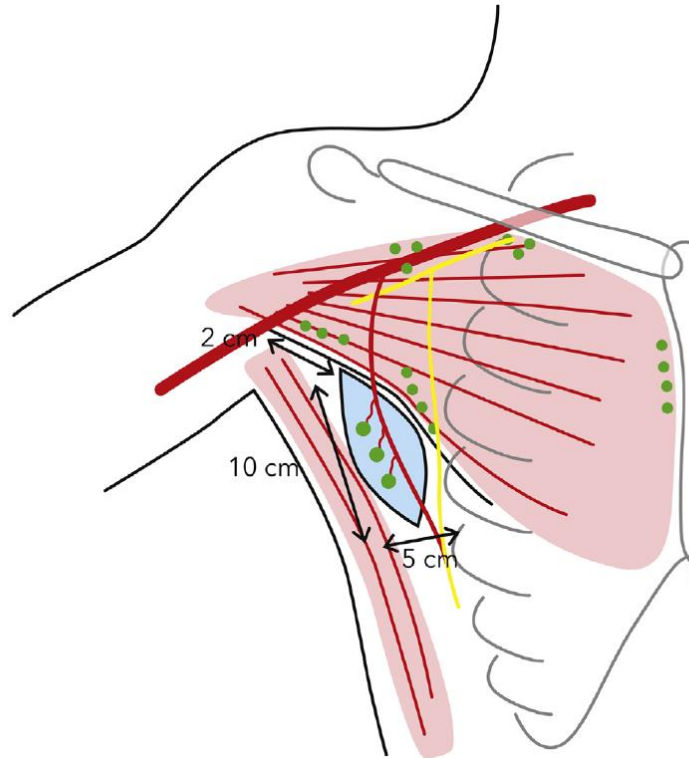
Lateral Thoracic Lymphnode Flap



Tinhofer IE, Meng S, Steinbacher J, Roka-Palkovits J, ..., Cheng MH, Weninger WJ, Tzou CH. The surgical anatomy of the vascularized lateral thoracic artery lymph node. *Journal of surgical oncology*. Dec 2017;116(8):1062-1068.

Vascularized Lymphnode Transfer (VLNT)

Lateral Thoracic Lymphnode Flap



Tinhofer IE, Meng S, Steinbacher J, Roka-Palkovits J, ..., Cheng MH, Weninger WJ, Tzou CH. The surgical anatomy of the vascularized lateral thoracic artery lymph node. Journal of surgical oncology. Dec 2017;116(8):1062-1068.

Vascularized Lymphnode Transfer (VLNT)

Retroauricular Lymphnode Flap



RESEARCH ARTICLE

Retroauricular lymph node flap: An anatomic and surgical feasibility study

! Correction(s) for this article ▾

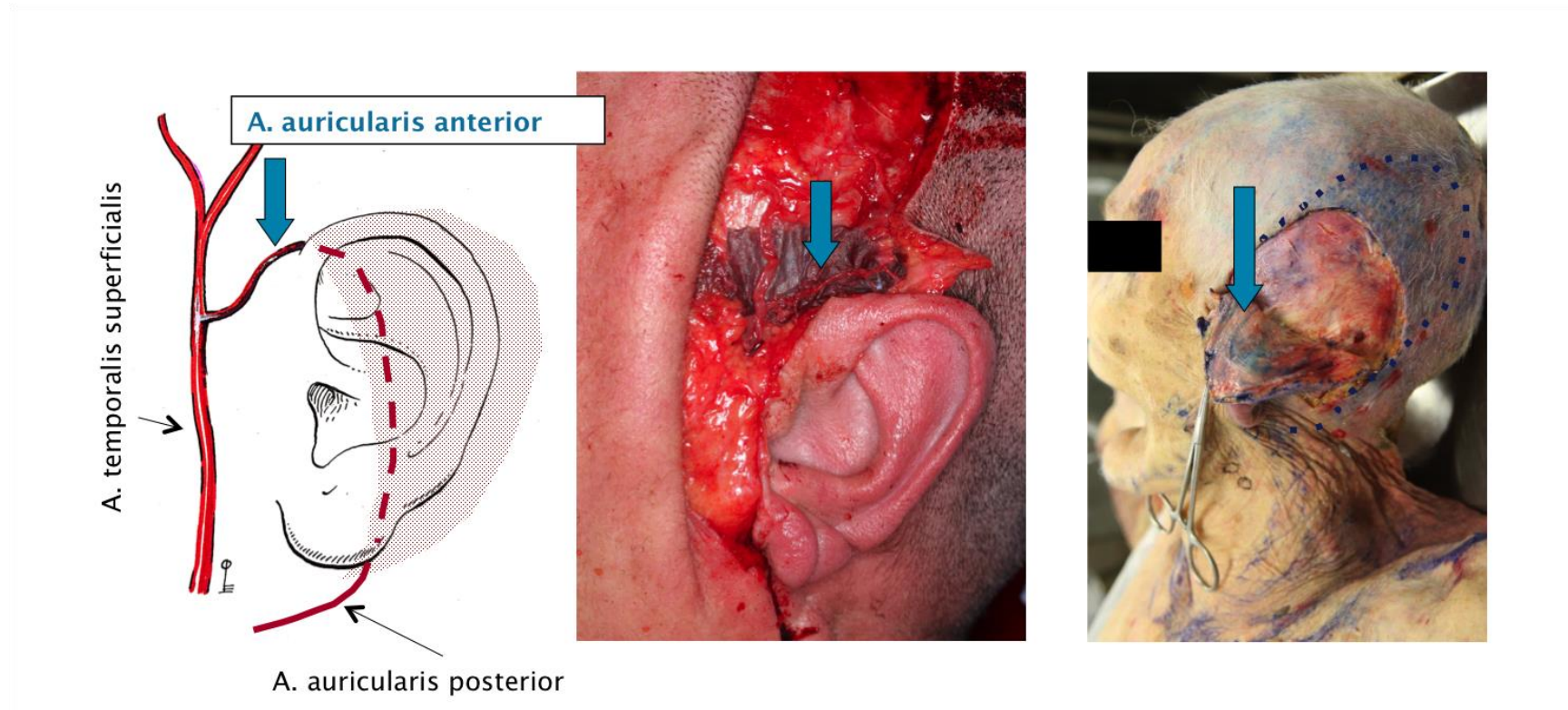
Julia Roka-Palkovits MD ✉, Christian Freystätter MD, Ines E. Tinhofer MD, Maike Keck PhD, MD, Johannes Steinbacher MD, Stefan Meng MD, Wolfgang J. Weninger MD, Ming-Huei Cheng MD, MBA, Chieh-Han J. Tzou MD, PhD

First published: 13 March 2023 | <https://doi.org/10.1002/jso.27234> |

Roka-Palkovits J, Freystätter C, Tinhofer IE, Keck M, Steinbacher J, Meng S, Weninger WJ, Cheng MH, Tzou CJ. Retroauricular lymph node flap: An anatomic and surgical feasibility study. *J Surg Oncol*. 2023 Jun;127(7):1103-1108. doi: 10.1002/jso.27234.

Vascularized Lymphnode Transfer (VLNT)

Retroauricular Lymphnode Flap



Roka-Palkovits J, Freystätter C, Tinhofer IE, Keck M, Steinbacher J, Meng S, Weninger WJ, Cheng MH, Tzou CJ. Retroauricular lymph node flap: An anatomic and surgical feasibility study. *J Surg Oncol.* 2023 Jun;127(7):1103-1108. doi: 10.1002/jso.27234.

Vascularized Lymphnode Transfer (VLNT)

Superficial Circumflex Ileum Perforator (SCIP) Flap

CLINICAL ARTICLE

MICROSURGERY WILEY

Use of the transverse branch of the superficial circumflex iliac artery as a landmark facilitating identification and dissection of the deep branch of the superficial circumflex iliac artery for free flap pedicle: Anatomical study and clinical applications

Hidehiko Yoshimatsu MD¹ | Takumi Yamamoto MD² | Akitatsu Hayashi MD³ |
Yuma Fuse MD² | Ryo Karakawa MD¹ | Takuya Iida MD⁴ |
Mitsunaga Narushima MD⁵ | Kenta Tanakura MD¹ | Wolfgang J. Weninger MD⁶ |
Chieh Han John Tzou MD^{7,8}

¹Department of Plastic and Reconstructive Surgery, Cancer Institute Hospital of the Japanese Foundation for Cancer Research,

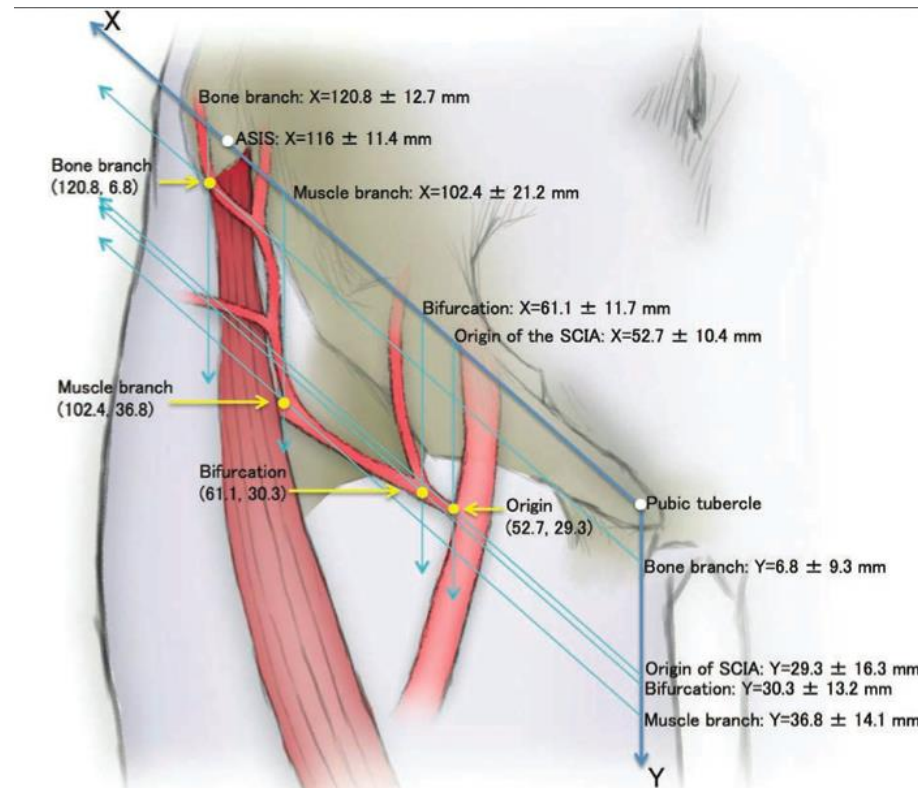
Abstract

Background: The deep branch of the superficial circumflex iliac artery (SCIA) should

Yoshimatsu, H., ..., Tzou-CHJ. (2019). "Use of the transverse branch of the superficial circumflex iliac artery as a landmark facilitating identification and dissection of the deep branch of the superficial circumflex iliac artery for free flap pedicle: Anatomical study and clinical applications." *Microsurgery* 39(8): 721-729.

Vascularized Lymphnode Transfer (VLNT)

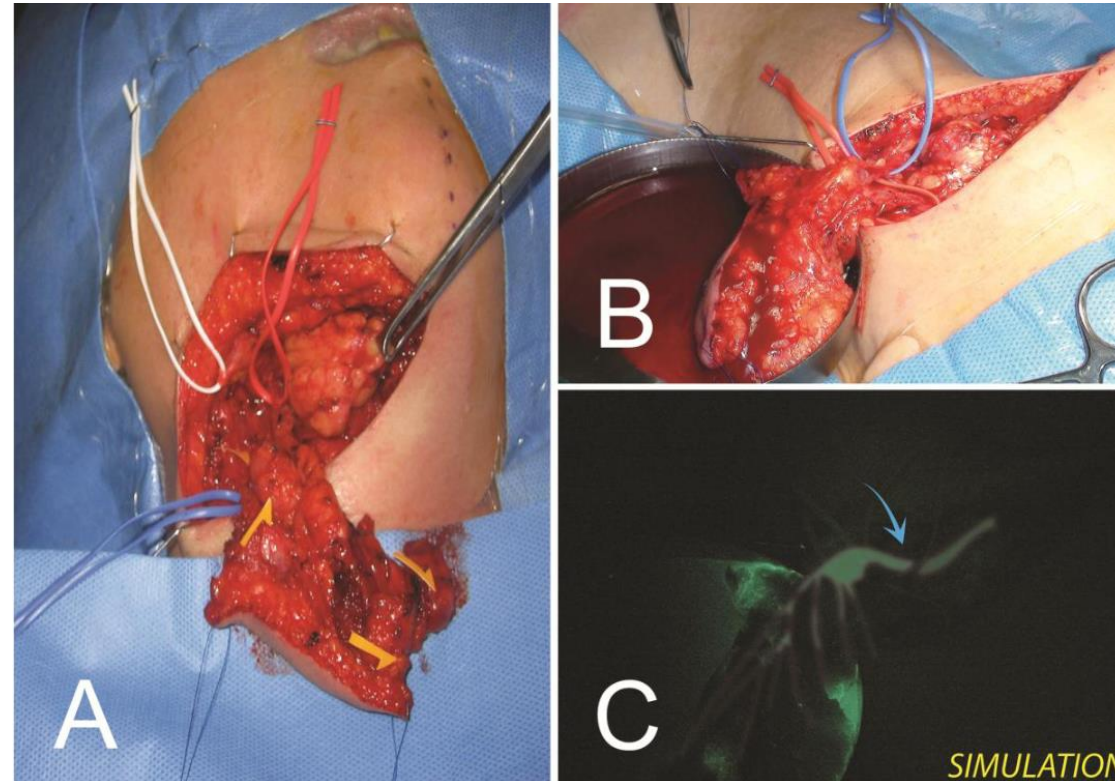
Superficial Circumflex Ilium Perforator (**SCIP**) Flap



Yoshimatsu, H., ..., Tzou CHJ. (2019). "Superficial circumflex iliac artery perforator flap: an anatomical study of the correlation of the superficial and the deep branches of the artery and evaluation of perfusion from the deep branch to the sartorius muscle and the iliac bone." *Plast Reconstr Surg* 143(2): 589-602.

Mechanism of VLNT

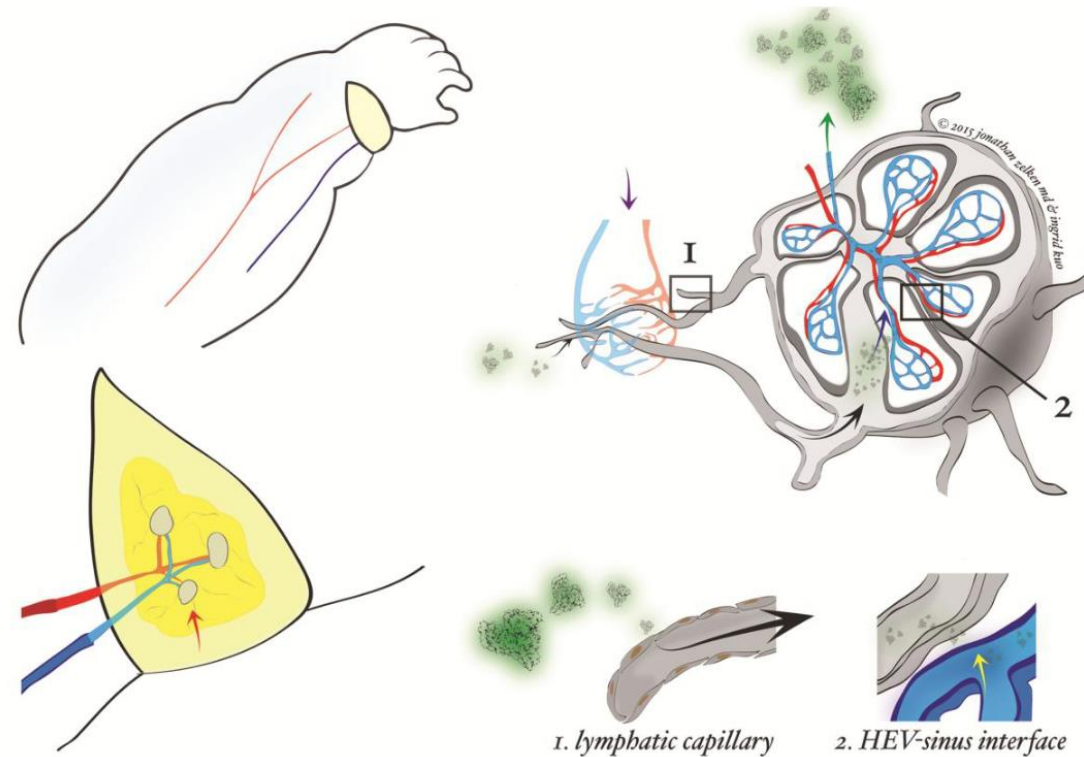
Lymphnode Flap Anatomy



Ito, R., Zelken, J., Yang, C. Y., Lin, C. Y., & Cheng, M. H. (2016). Proposed pathway and mechanism of vascularized lymph node flaps. *Gynecologic oncology*, 141(1), 182-188.

Mechanism of VLNT

Lymphnode Flap Anatomy



Ito, R., Zelken, J., Yang, C. Y., Lin, C. Y., & Cheng, M. H. (2016). Proposed pathway and mechanism of vascularized lymph node flaps. *Gynecologic oncology*, 141(1), 182-188.

Mechanism of VLNT

Lymphnode Anatomy

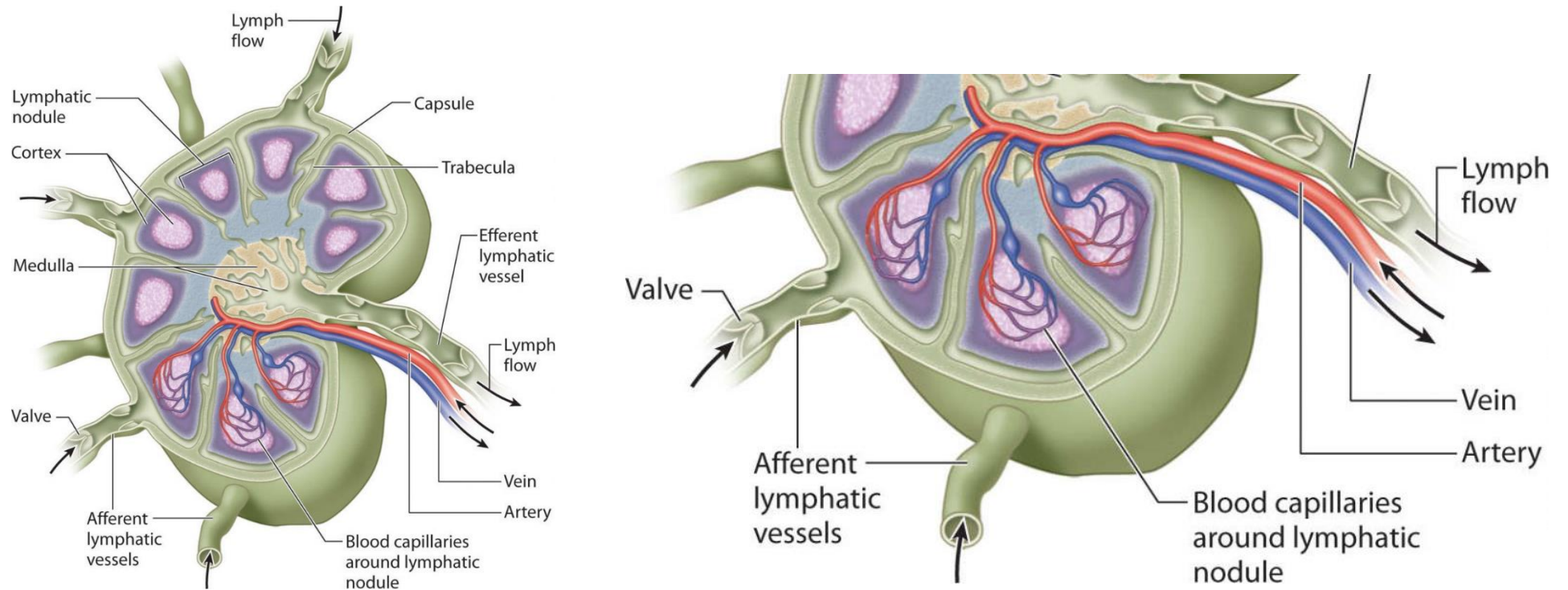


Figure Source: <https://www.anatomynote.com/human-anatomy/cell-and-tissue/lymph-node-anatomy-in-detail/>

Pfeiffer, F., et al. (2008). "Distinct molecular composition of blood and lymphatic vascular endothelial cell junctions establishes specific functional barriers within the peripheral lymph node." *European Journal of Immunology* 38(8): 2142-2155.

Lymphedema Surgery

Surgical Therapies of Lymphedema

- **Resective** surgical therapy
- **Reconstructive** surgical therapy = **physiologic**, VLNT, LVA
- **Hybrid** surgical therapy = resective and reconstructive

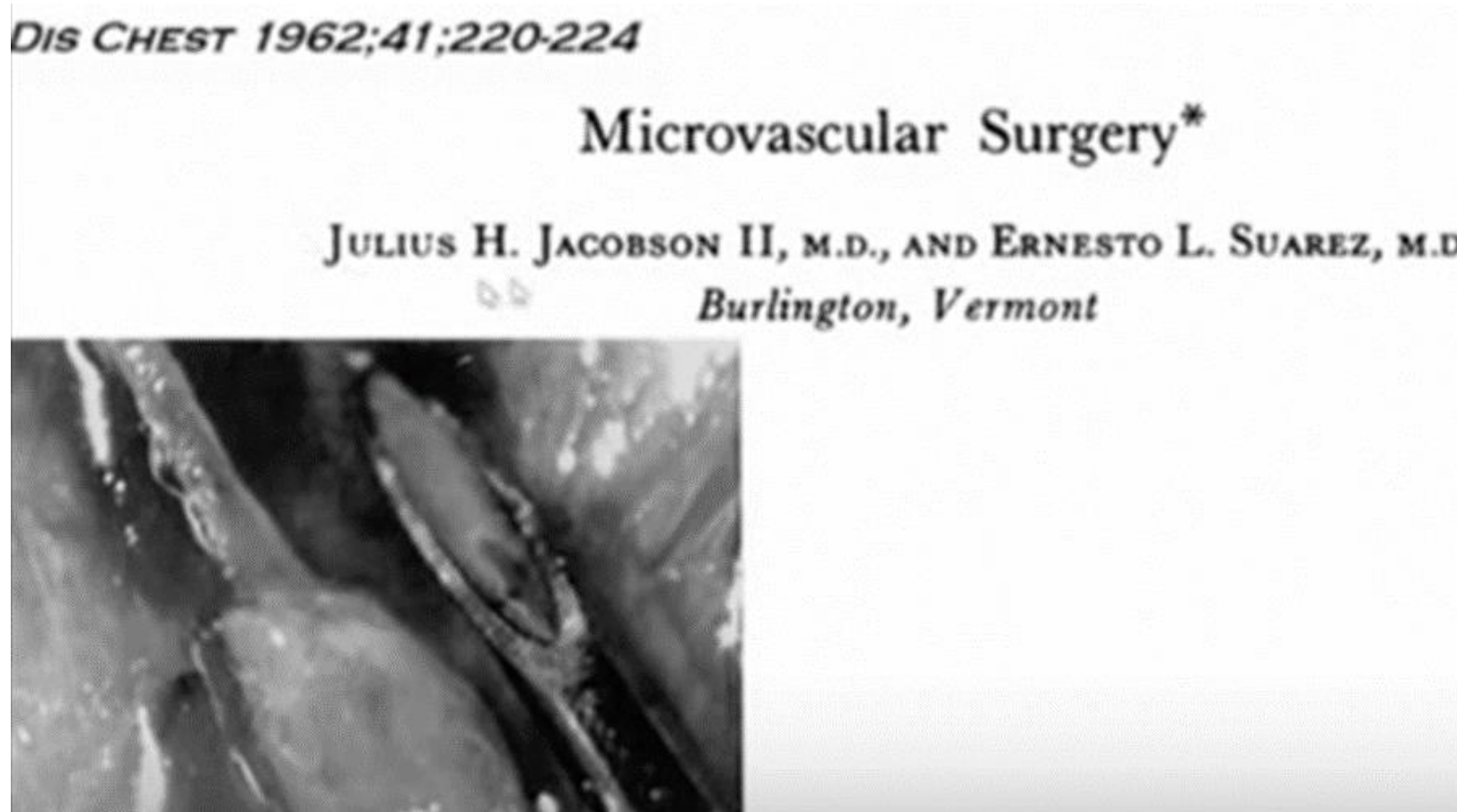
Lymphovenous Anastomosis (LVA)

Reconstructive Microsurgical Therapies of Lymphedema

- **1960** : Jacobson Lymphovenous Anastomosis
- **1966** : Nielubowicz Lymphnode Vene Anastomosis
- **1969** : Yamada Lymphovenous Anastomosis
- **1976** : Gloviczki Lymphovenous Anastomosis
- **1977** : O'Brien Lymphovenous Anastomosis
- **1978** : Debny Lymphovenous Anastomosis

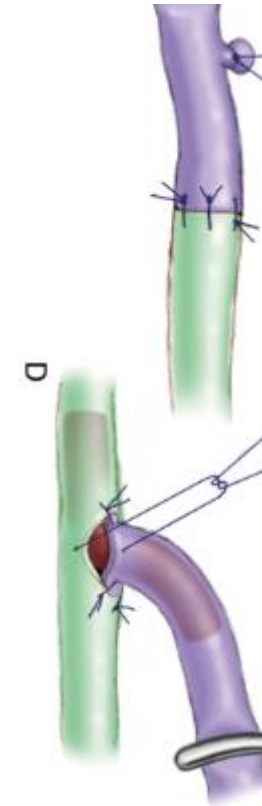
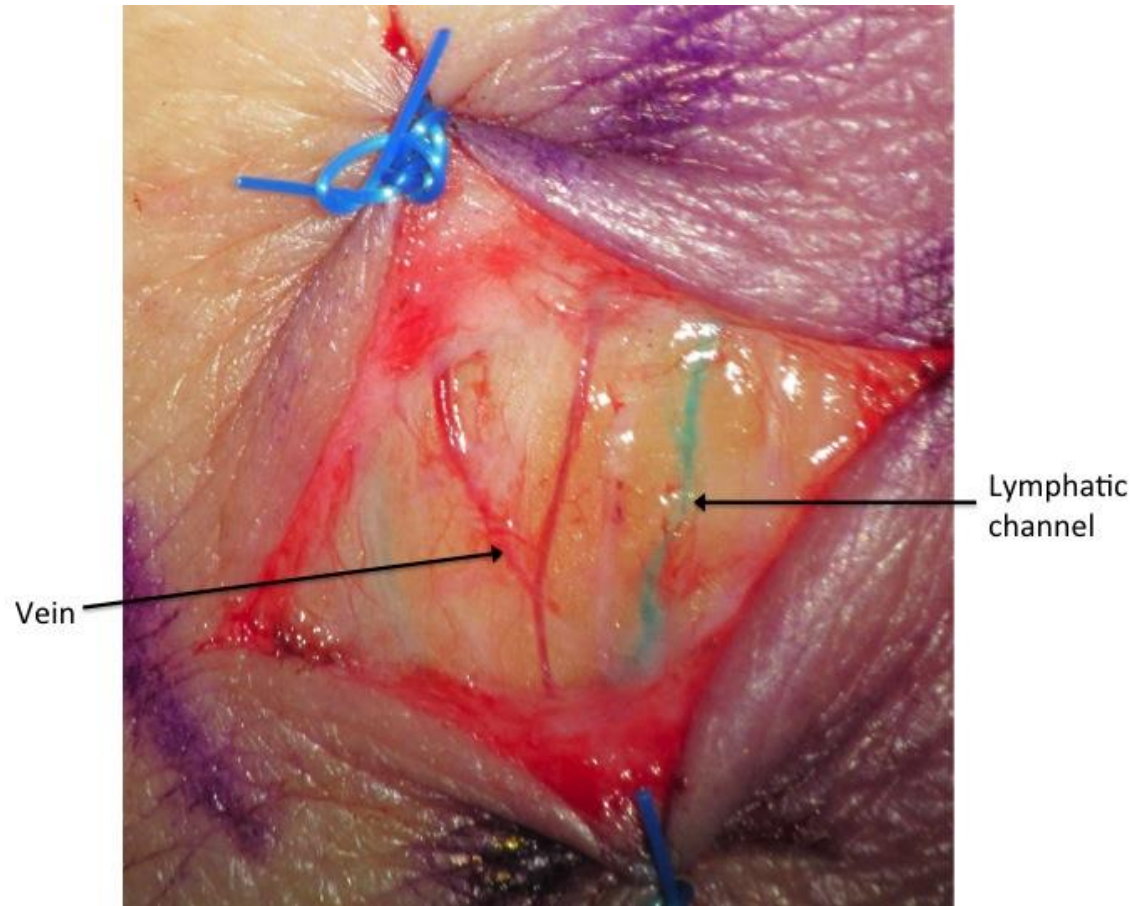
Lymphovenous Anastomosis (LVA)

1960 Jacobson Lymphovenous Anastomosis Dogs



Lymphovenous Anastomosis (LVA)

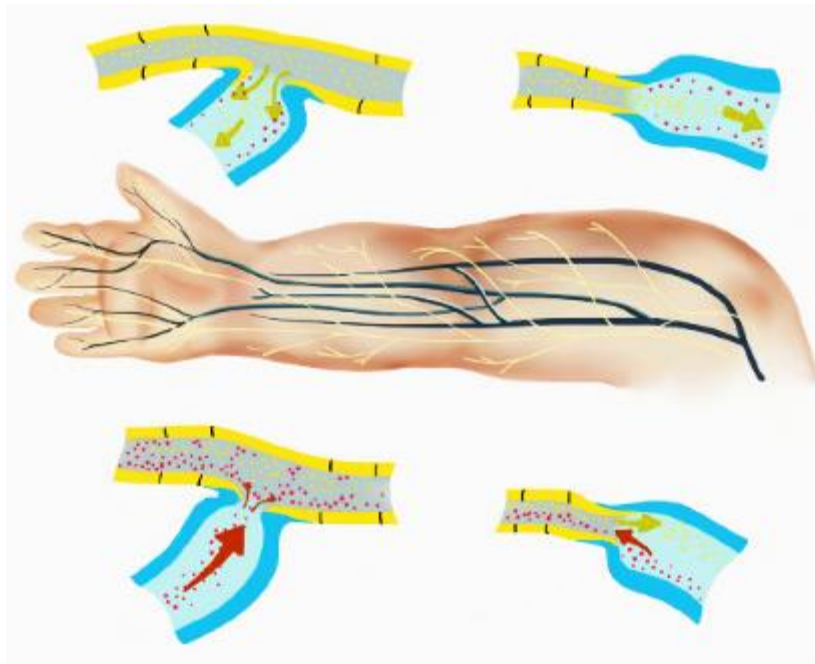
1969 Yamada Lymphovenous Anastomosis



Lymphovenous Anastomosis (LVA)

Reconstructive **Super-Microsurgical** Therapies of Lymphedema

2000 : Koshima



Subdermal lymphatics to
subdermal venules

Super-Microsurgery
 $\varnothing < 0.8 \text{ mm}$

Rationale
Venous pressure is low in
subdermal venules

Koshima I, Inagawa K, Urushibara K, Moriguchi T. Supermicrosurgical lymphaticovenular anastomosis for the treatment of lymphedema in the upper extremities. *J Reconstr Microsurg.* Aug 2000;16(6):437-442.

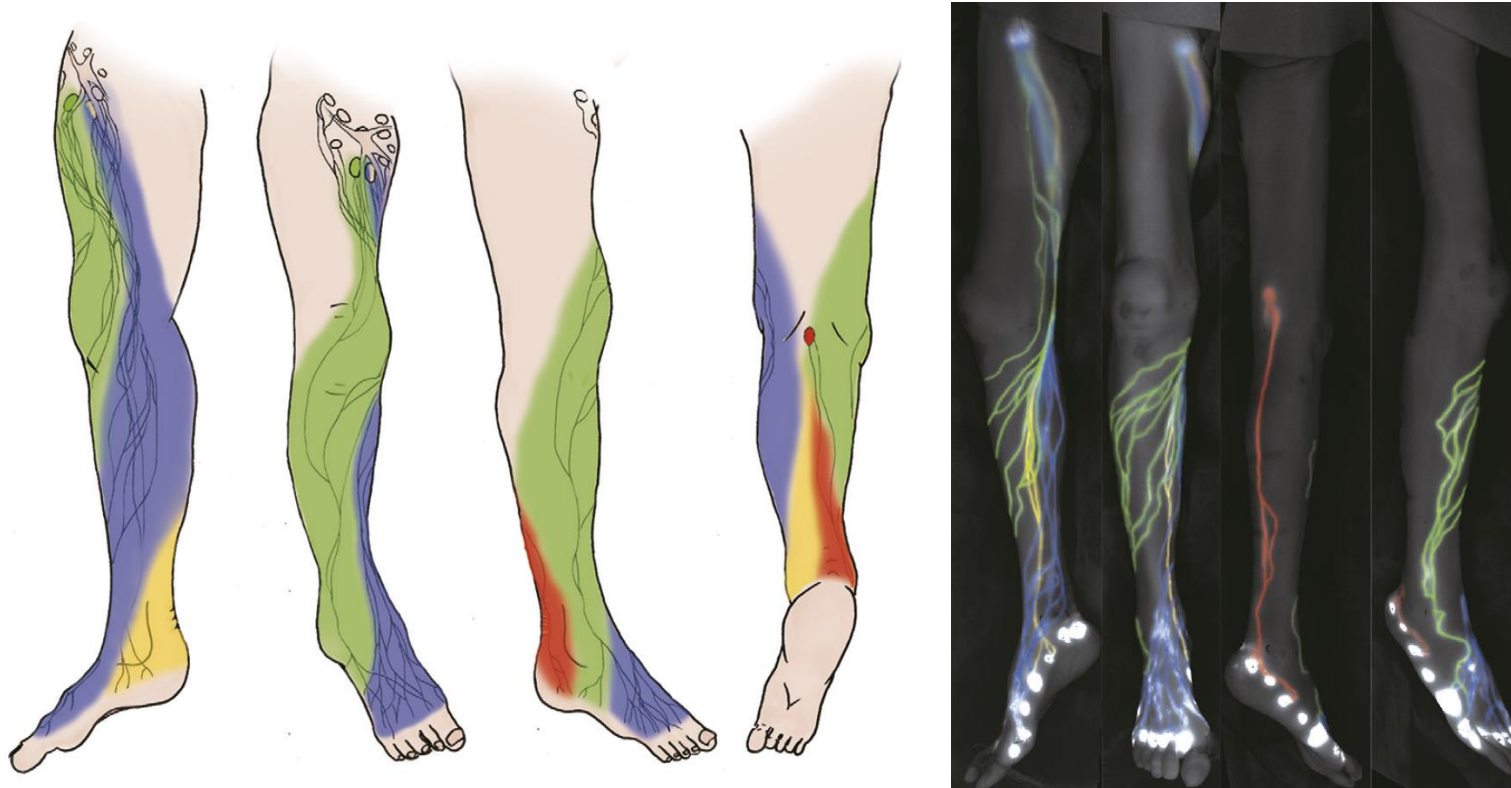
Lymphovenous Anastomosis (LVA)

2015 University of Tokyo, Japan, Prof. Koshima



Reconstructive Lymphedema Surgery

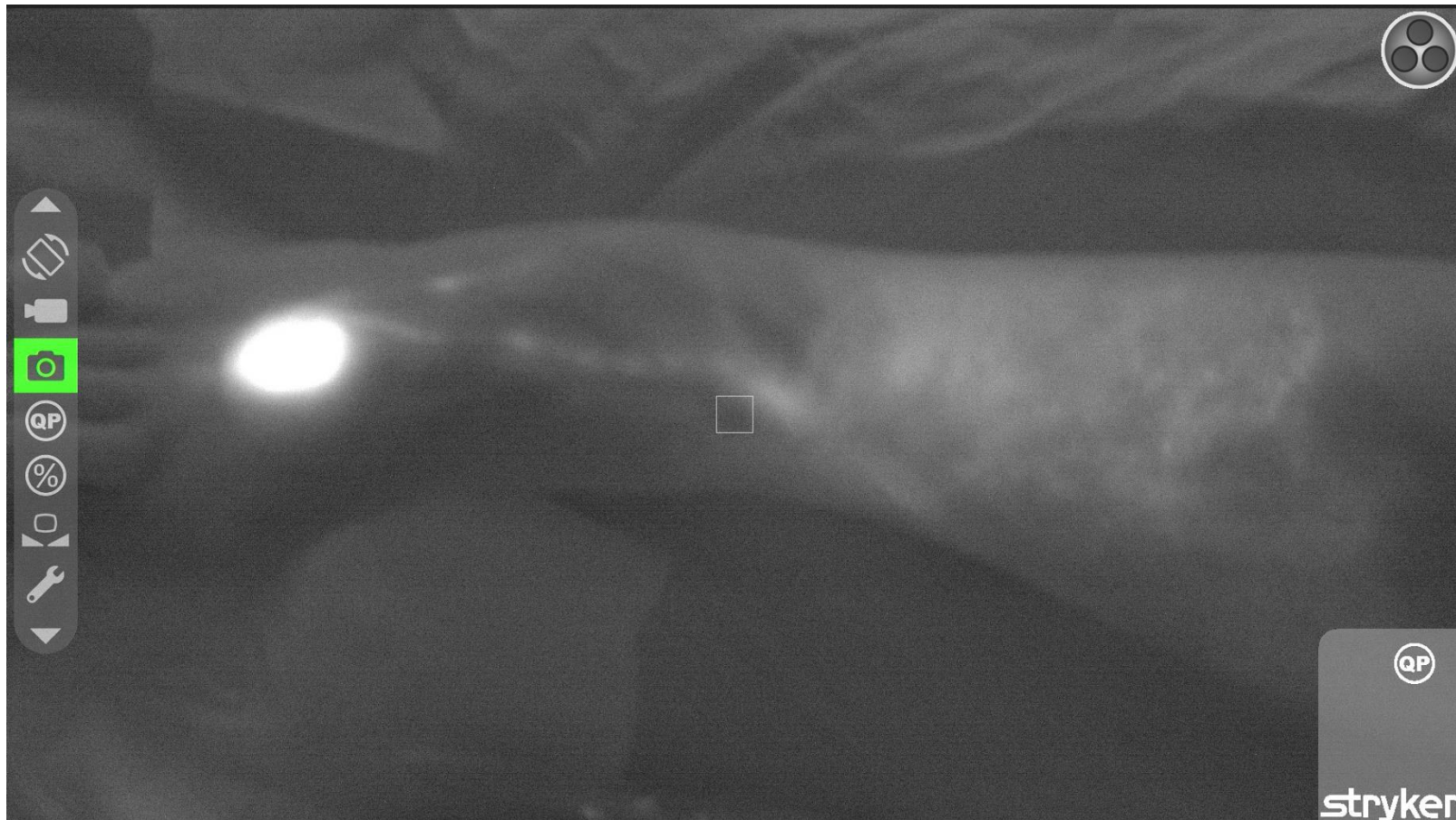
Radiologic Diagnostic – Image of Reality



Shinaoka, A., et al. (2020). "Lower-limb lymphatic drainage pathways and lymph nodes: a CT lymphangiography cadaver study." *Radiology* 294(1): 223-229.

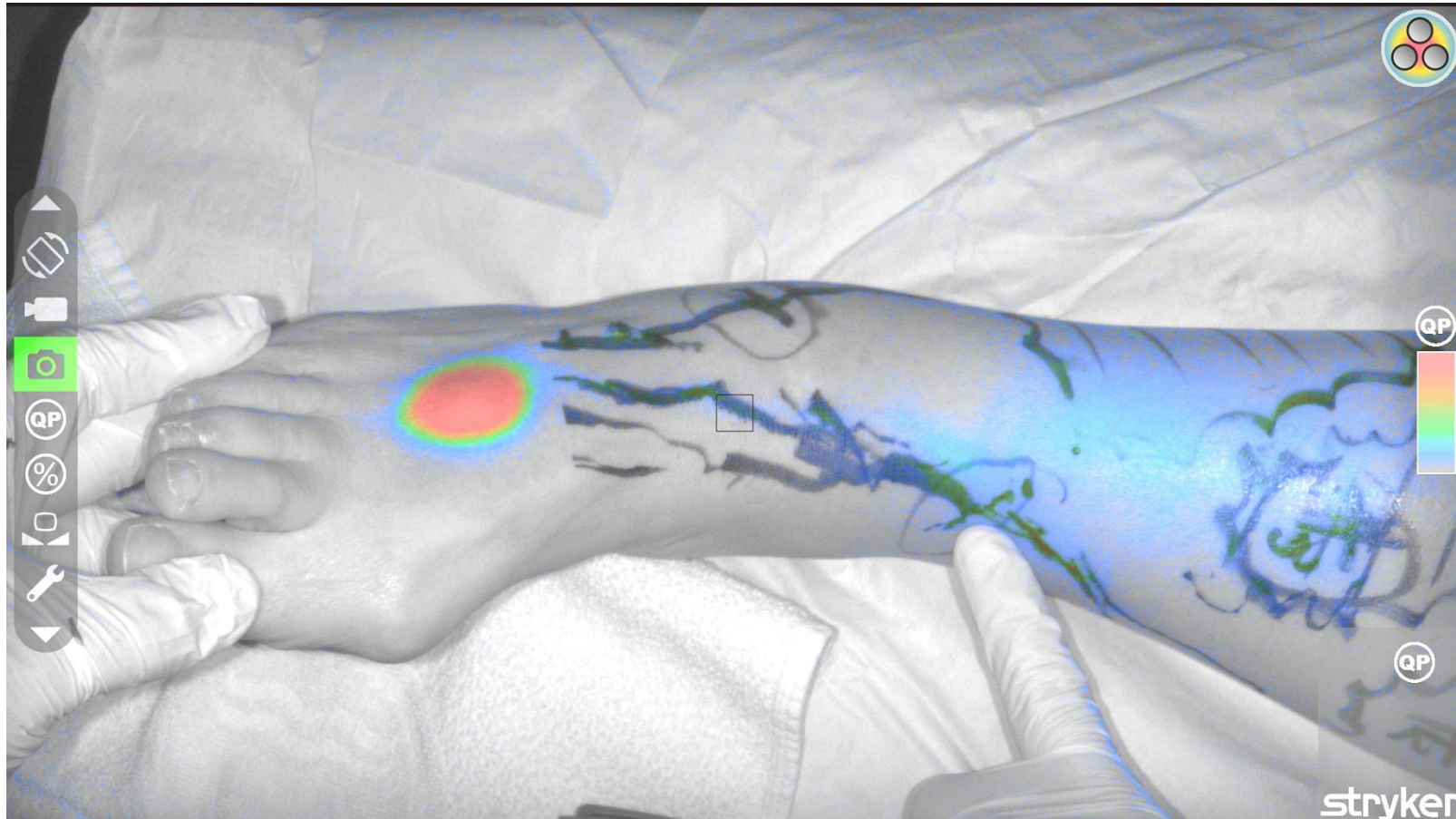
Reconstructive Lymphedema Surgery

Preoperative ICG diagnostic of lymphatics



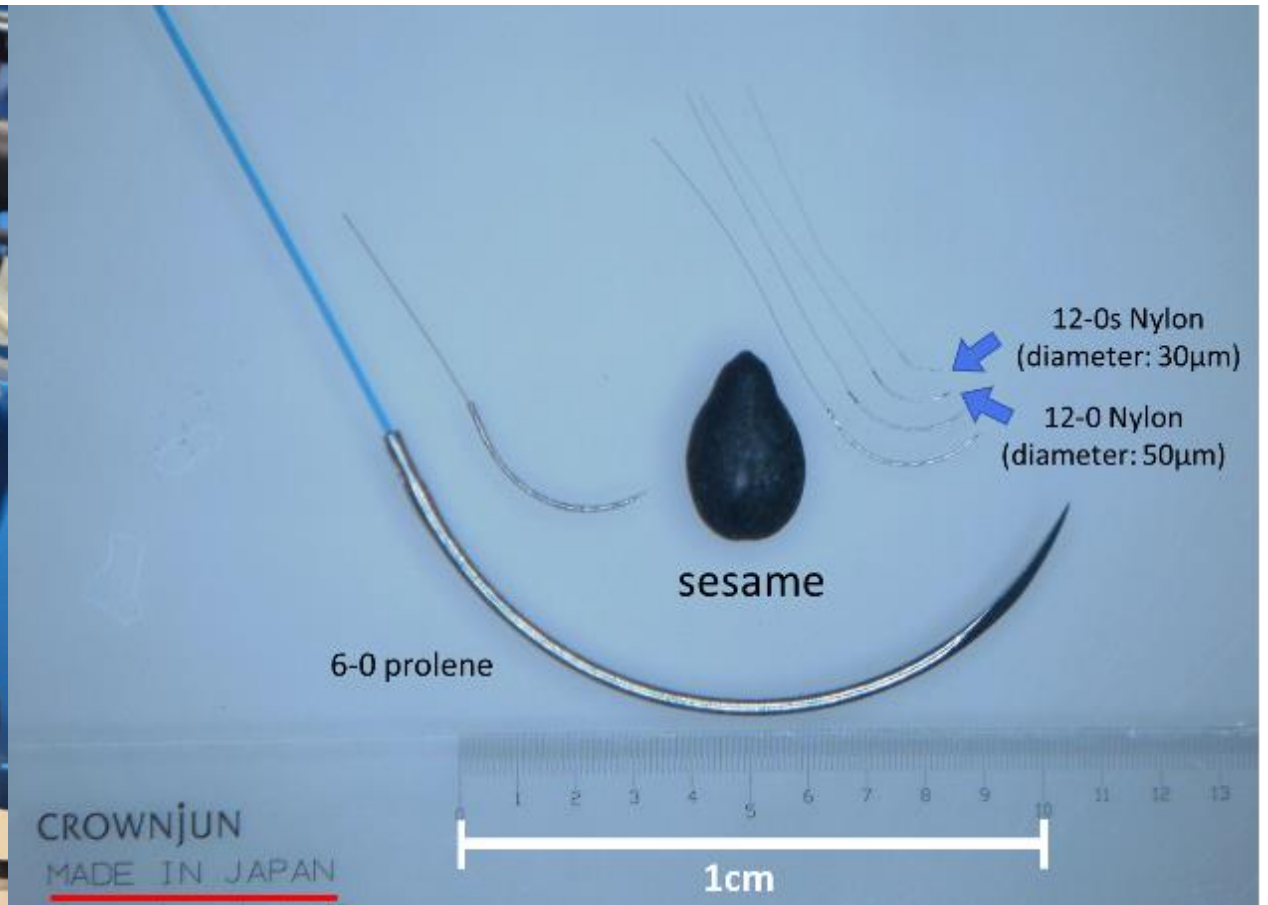
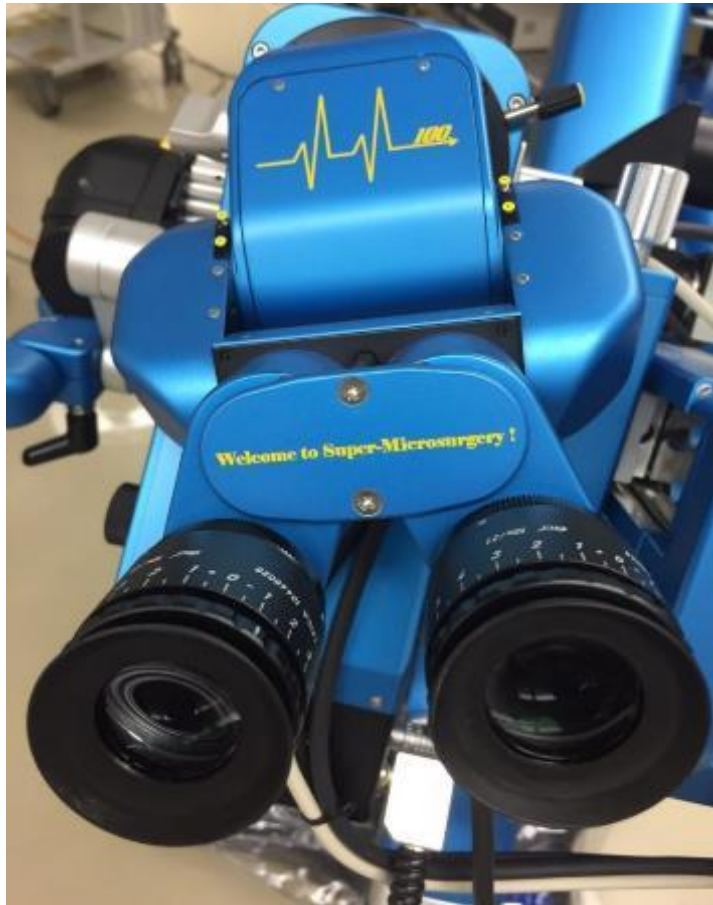
Reconstructive Lymphedema Surgery

Preoperative ICG diagnostic of lymphatics



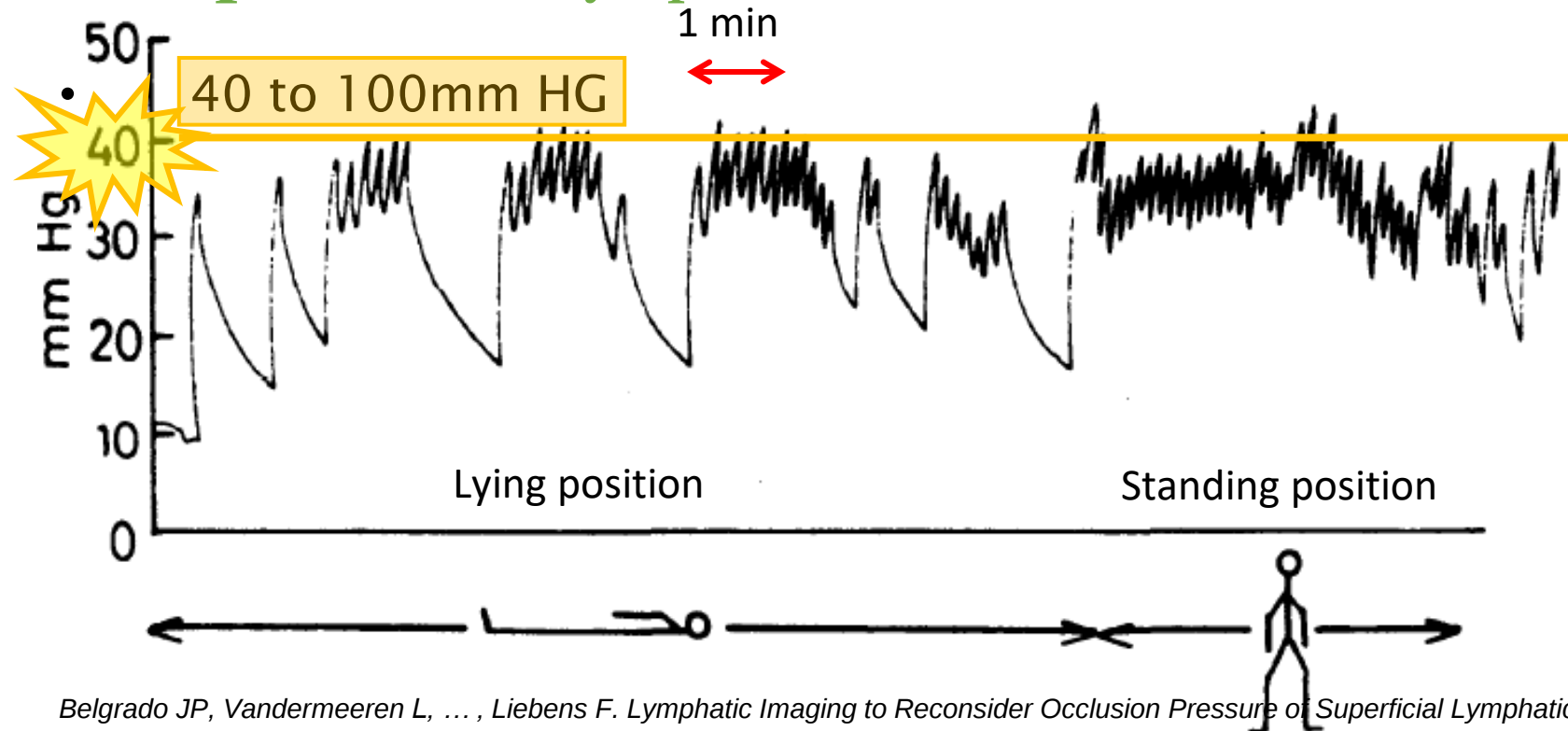
Reconstructive Lymphedema Surgery

Super-Microsurgery Instruments



Mechanism of LVA

Intraluminal pressure of lymphatic vessels

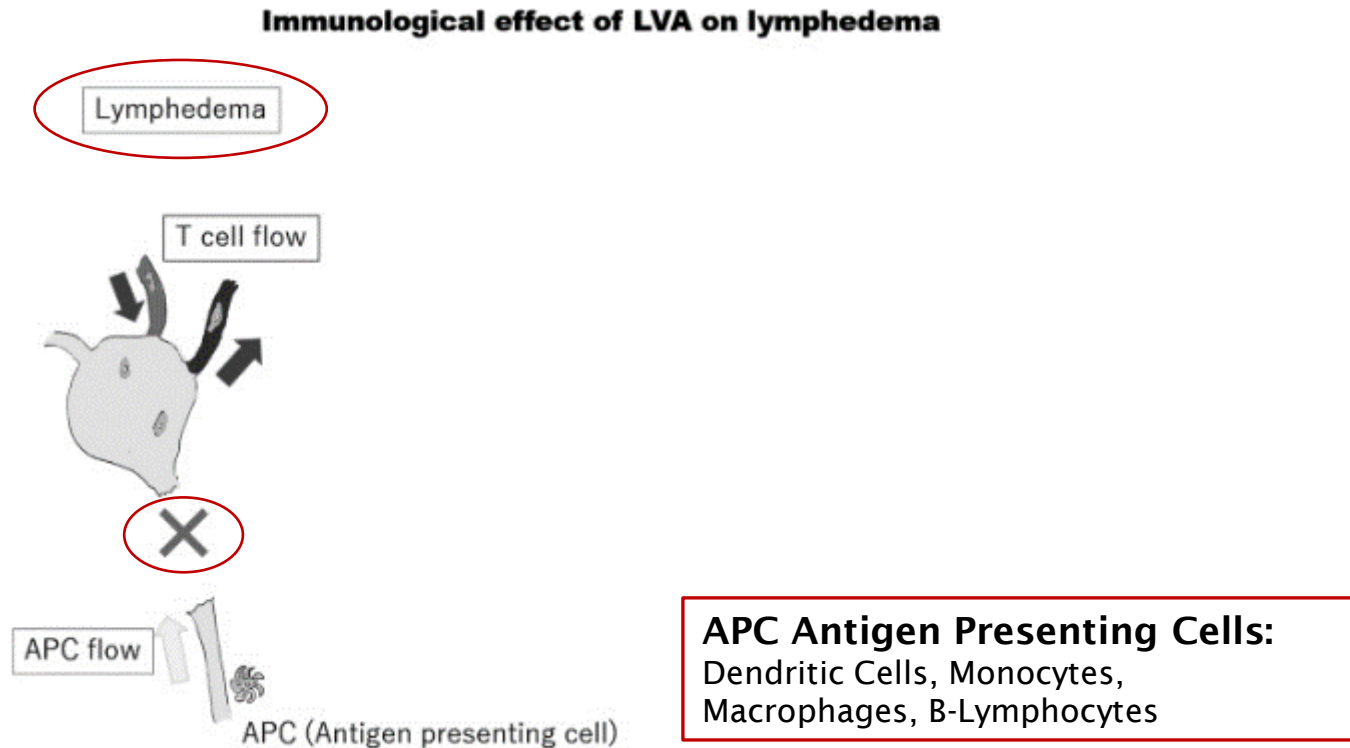


Belgrado JP, Vandermeeren L, ... , Liebens F. Lymphatic Imaging to Reconsider Occlusion Pressure of Superficial Lymphatic Collectors in Upper Extremities of Healthy Volunteers. *Lymphatic research and biology*. Jun 2016;14(2):70-77.

Olszewski WL, Engeset A. Intrinsic contractility of prenodal lymph vessels and lymph flow in human leg. *The American journal of physiology*. Dec 1980;239(6):H775-783.

Mechanism of LVA

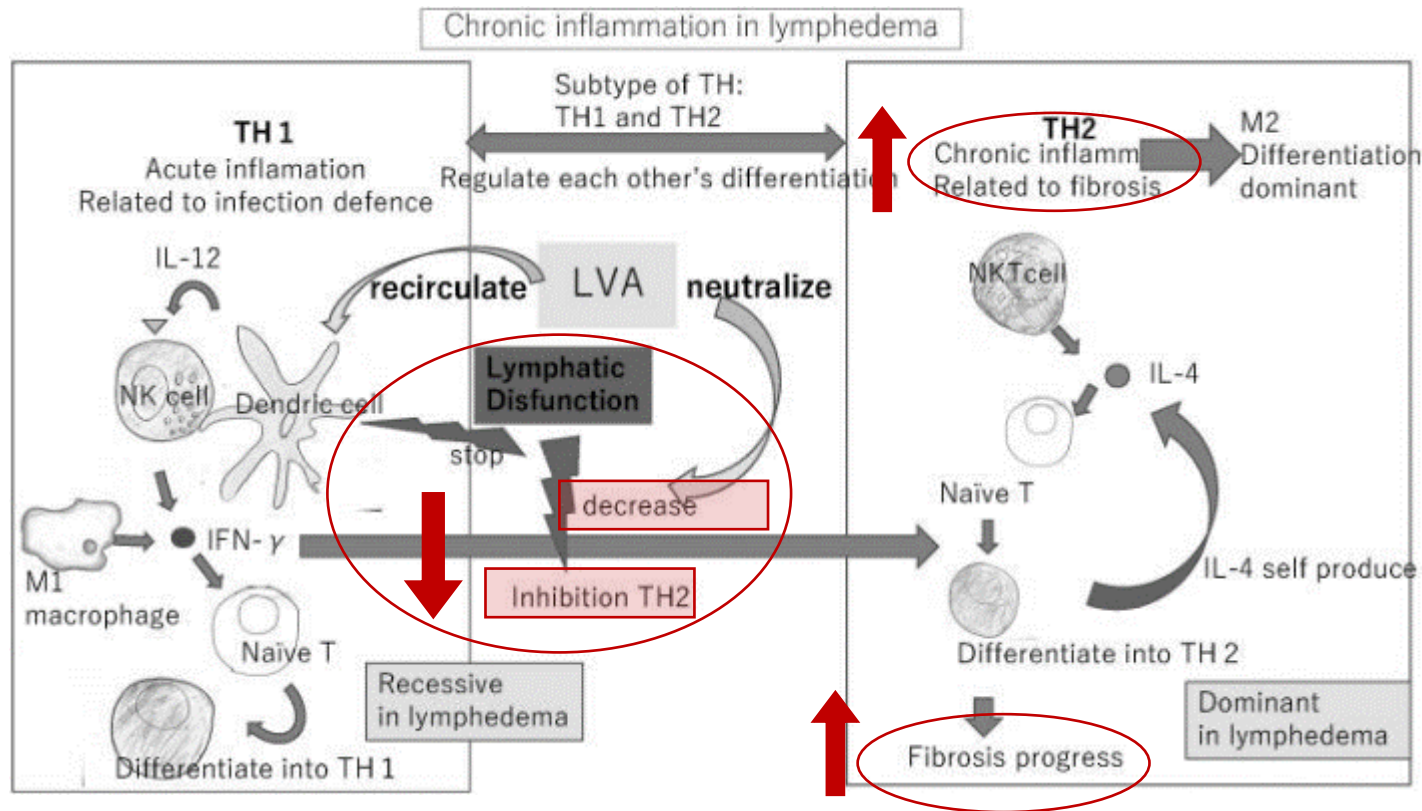
Immunological Effect of **reconstructive lymphedema surgery**



Yoshida, S., et al. (2019). "Lymphovenous Anastomosis Aids Wound Healing in Lymphedema: Relationship Between Lymphedema and Delayed Wound Healing from a View of Immune Mechanisms." *Advances in wound care* 8(6): 263-269.

Mechanism of LVA

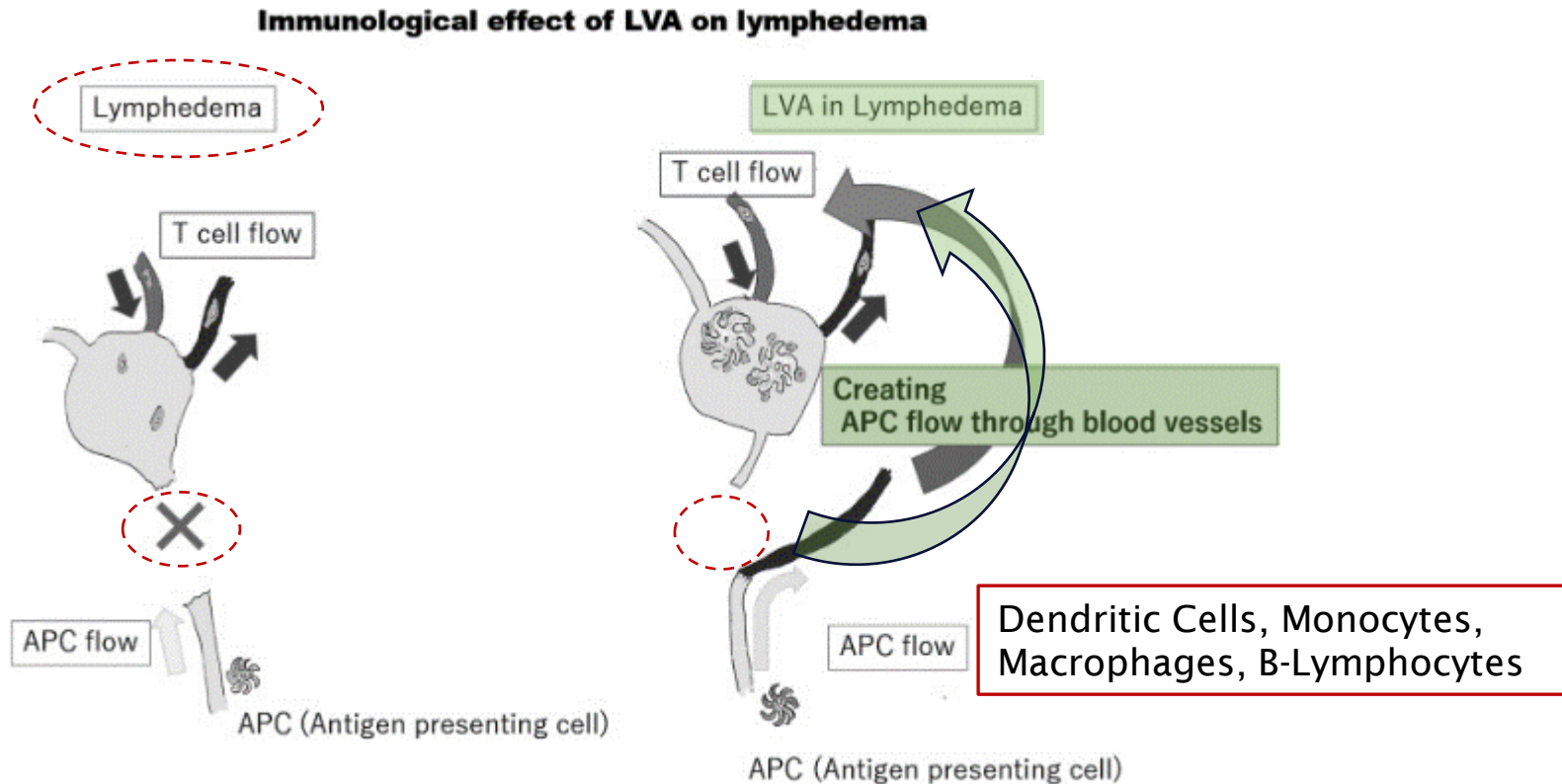
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Mechanism of LVA

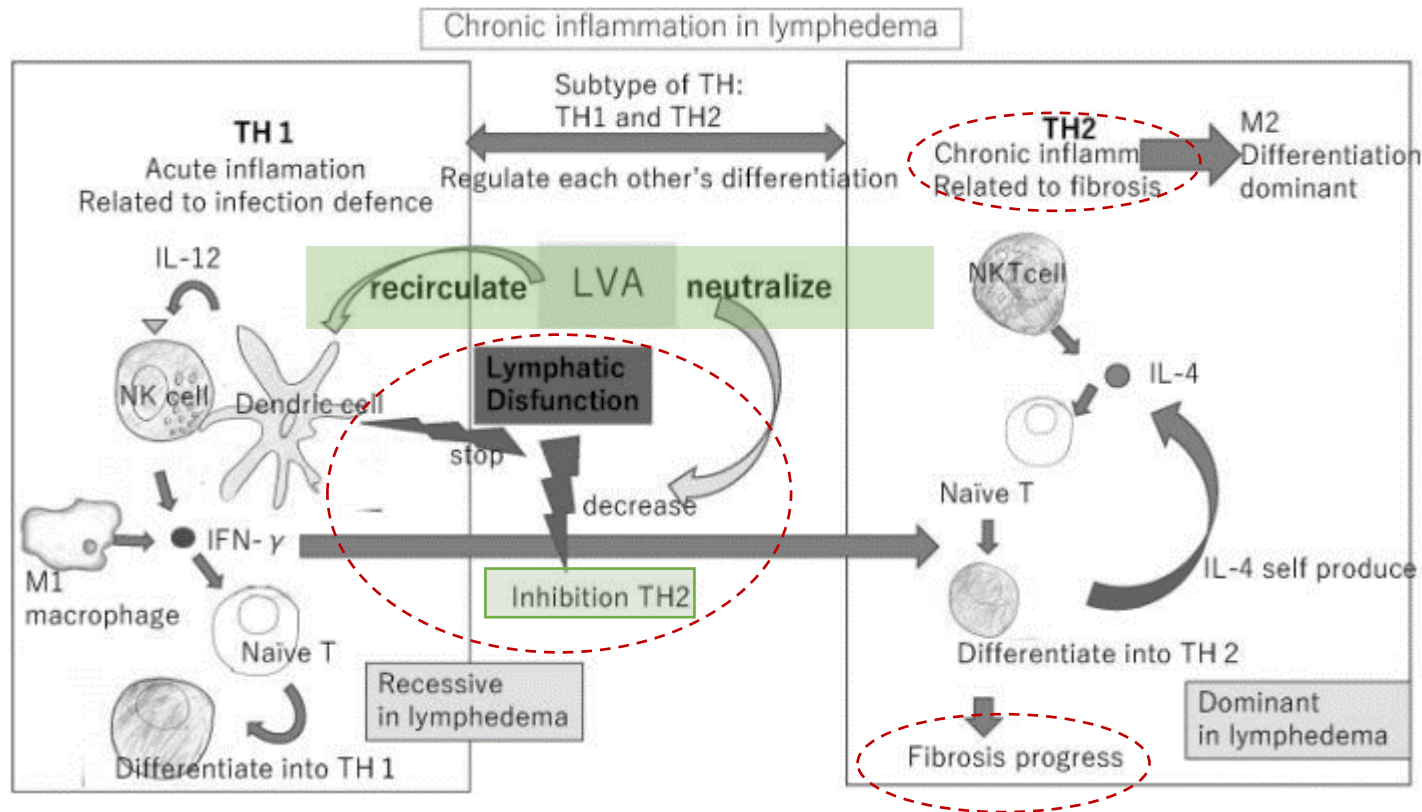
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Mechanism of LVA

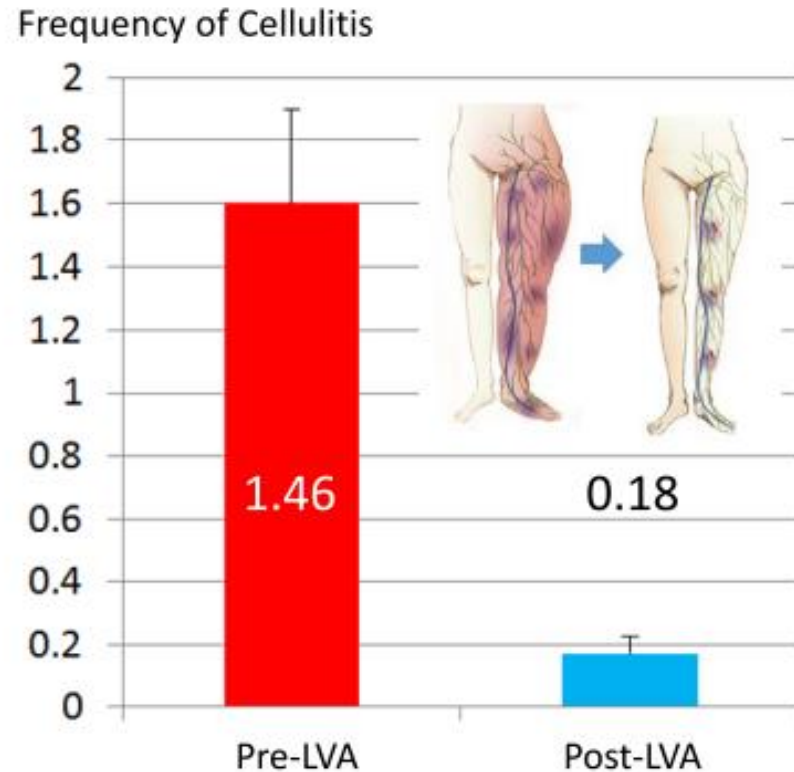
Immunological Effect of **reconstructive lymphedema surgery**



Yoshida, S., et al. (2019). "Lymphovenous Anastomosis Aids Wound Healing in Lymphedema: Relationship Between Lymphedema and Delayed Wound Healing from a View of Immune Mechanisms." *Advances in wound care* 8(6): 263-269.

Mechanism of LVA

Cellulitis in lymphedema patients



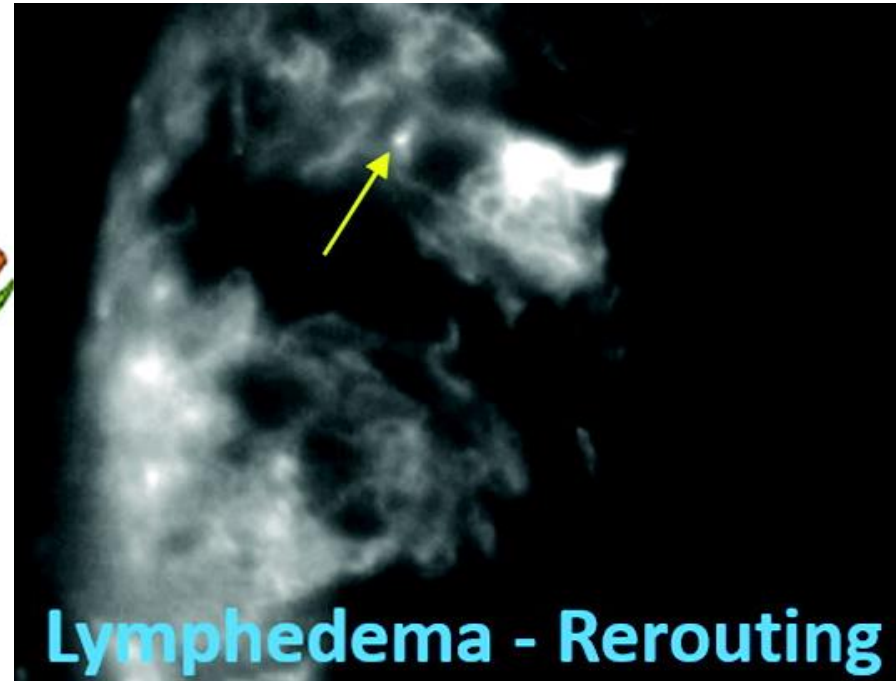
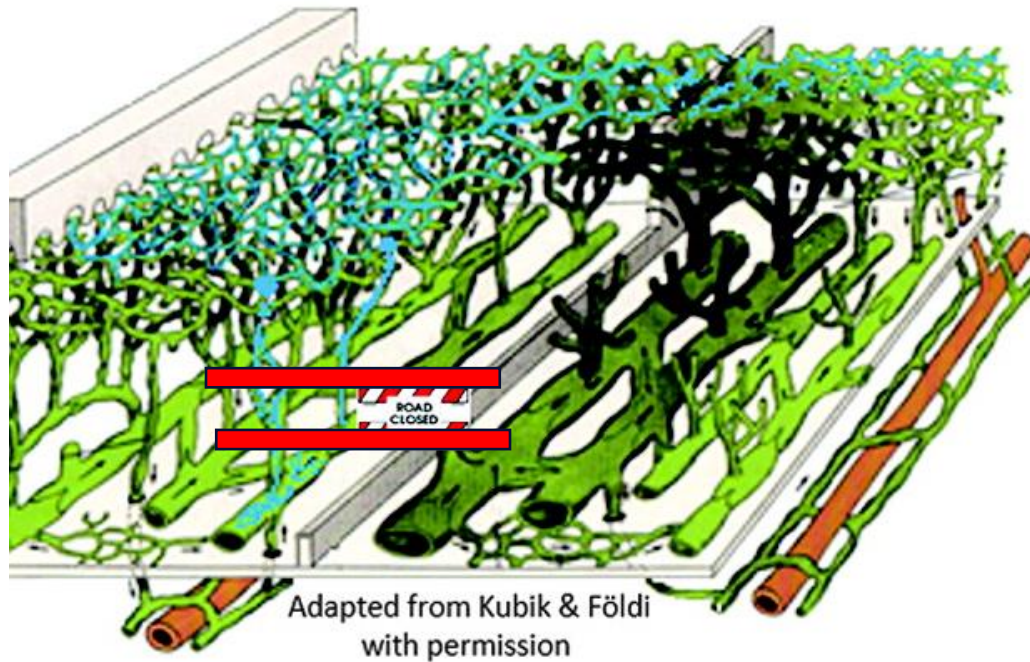
Patients
n=95 (M 6, F 89)

Primary	7
Secondary	88
Upper limb;	11
Lower limb;	84
Rd (+)	29
Rd (-)	59

Mihara M, Hara H, Furniss D, ... Ohtsu H, Gennaro P, Gabriele G, Murai N. Lymphaticovenular anastomosis to prevent cellulitis associated with lymphoedema. *The British J Surgery*. Oct 2014;101(11):1391-1396.

Reconstructive Lymphedema Surgery

Dermal Backflow of lymphatic vessels



Belgrado JP, Vandermeeren L, ... , Liebens F. Lymphatic Imaging to Reconsider Occlusion Pressure of Superficial Lymphatic Collectors in Upper Extremities of Healthy Volunteers. *Lymphatic research and biology*. Jun 2016;14(2):70-77.

Reconstructive Lymphedema Surgery

Ultrasonography in lymphedema surgery

Effective and efficient lymphaticovenular anastomosis using preoperative ultrasound detection technique of lymphatic vessels in lower extremity lymphedema.

Hayashi A, et al. J Surg Oncol. 2018.

Authors

Hayashi A^{1,2}, Hayashi N^{1,2}, Yoshimatsu H², Yamamoto T³.

Author information

- 1 Department of Plastic and Reconstructive Surgery, Asahi General Hospital, Chiba, Japan.
- 2 Department of Plastic and Reconstructive Surgery, Graduate School of Medicine, University of Tokyo, Tokyo, Japan.
- 3 Department of Plastic Surgery, Tokyo Metropolitan Bokutoh Hospital, Tokyo, Japan.

Citation

J Surg Oncol. 2018 Feb;117(2):290-298. doi: 10.1002/jso.24812. Epub 2017 Oct 23.

Multi-site lymphatic venous anastomosis using echography to detect suitable subcutaneous vein in severe lymphedema patients.

Mihara M, et al. J Plast Reconstr Aesthet Surg. 2018.

Authors

Mihara M¹, Hara H², Kawakami Y³, Zhou HP⁴, Tange S⁵, Kikuchi K⁶, Iida T⁷.

Author information

- 1 Department of Lymphatic and Reconstructive Surgery, Saiseikai Kawaguchi General Hospital, Saitama, Japan; Department of Plastic and Reconstructive Surgery, Fukuoka University, Fukuoka, Japan; Department of Plastic and Reconstructive Surgery, Nadogaya Hospital, Chiba, Japan.
- 2 Department of Lymphatic and Reconstructive Surgery,

Citation

J Plast Reconstr Aesthet Surg. 2018 Feb;71(2):e1-e7. doi: 10.1016/j.bjps.2017.10.004. Epub 2017 Oct 17.

Reconstructive Lymphedema Surgery

Ultrasonography in lymphedema surgery



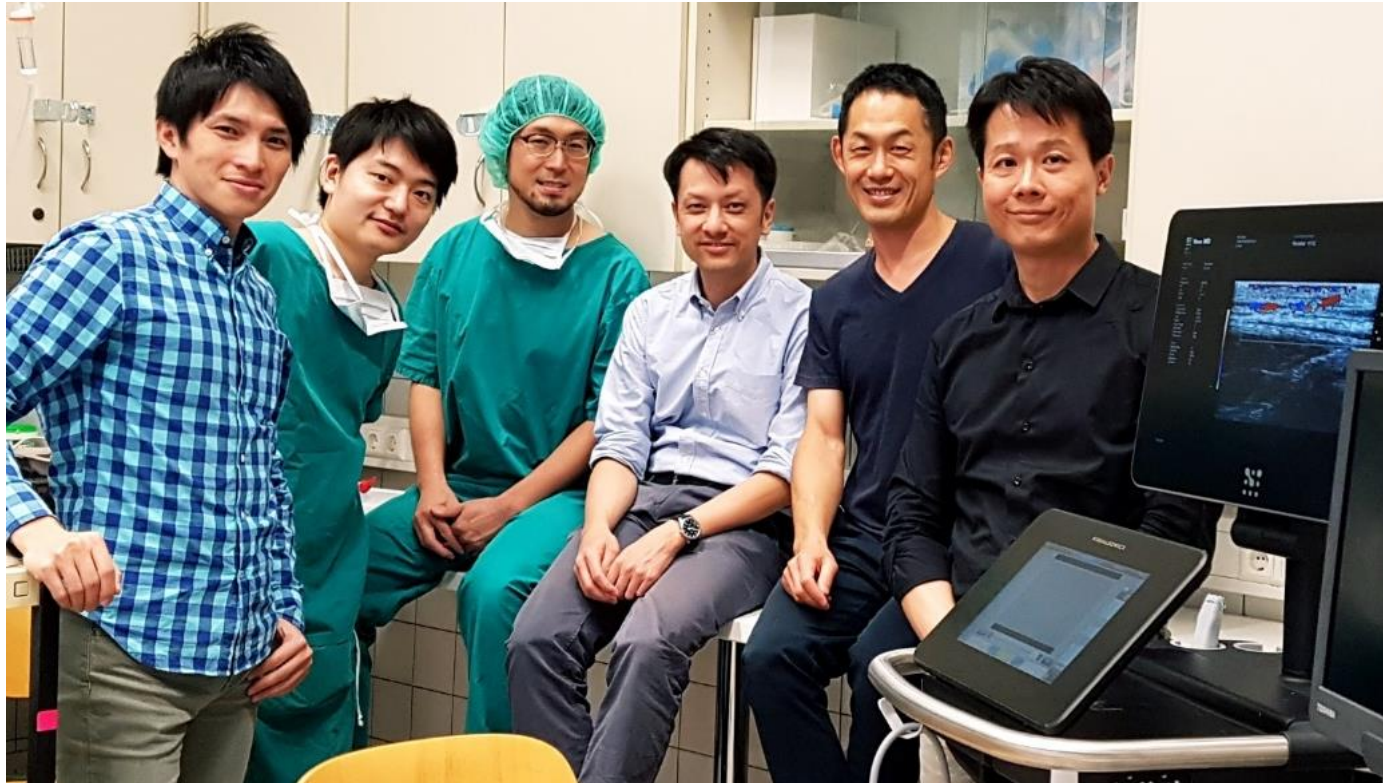
Prof. Dr. M Mihara & Prof. Dr. H Hara (2017 Tokyo, Japan),



Prof. Dr. H. Yoshimatsu & Team (2018 Vienna, Austria)

Reconstructive Lymphedema Surgery

Ultrasonography in lymphedema surgery



Dr. Hayashi, Prof. Dr. H Yoshimatsu & Team (2018 Vienna, Austria)

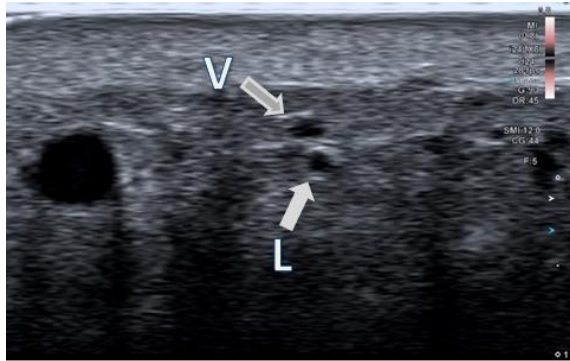
Reconstructive Lymphedema Surgery

Ultrasonography for Lymphovenous Anastomosis (LVA)

- Can we standardize **visualization** lymphatics w/o ICG ?
- How is the **reliability** of the ultrasonography ?
- How are the **parameters** of the lymphatics ?
- Can we standardize in **clinical routine** ?

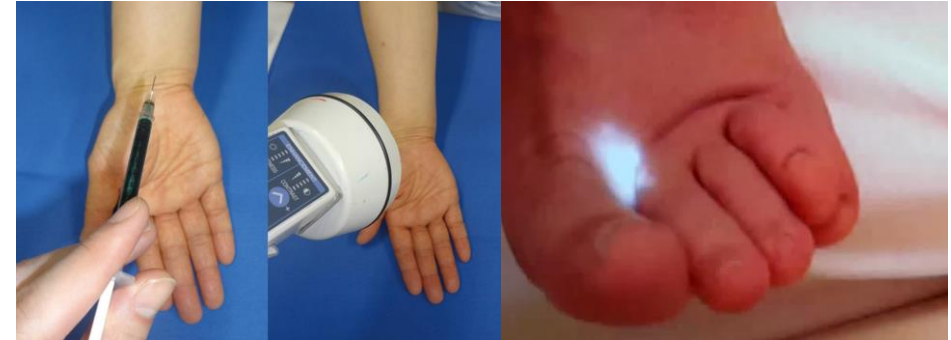
Reconstructive Lymphedema Surgery

Ultrasonography High Resolution 49Mhz



Ultrasonography Visualization

- 83% of all lymphatics
- venous outflow abnormalities:
4.6 to 15.4%

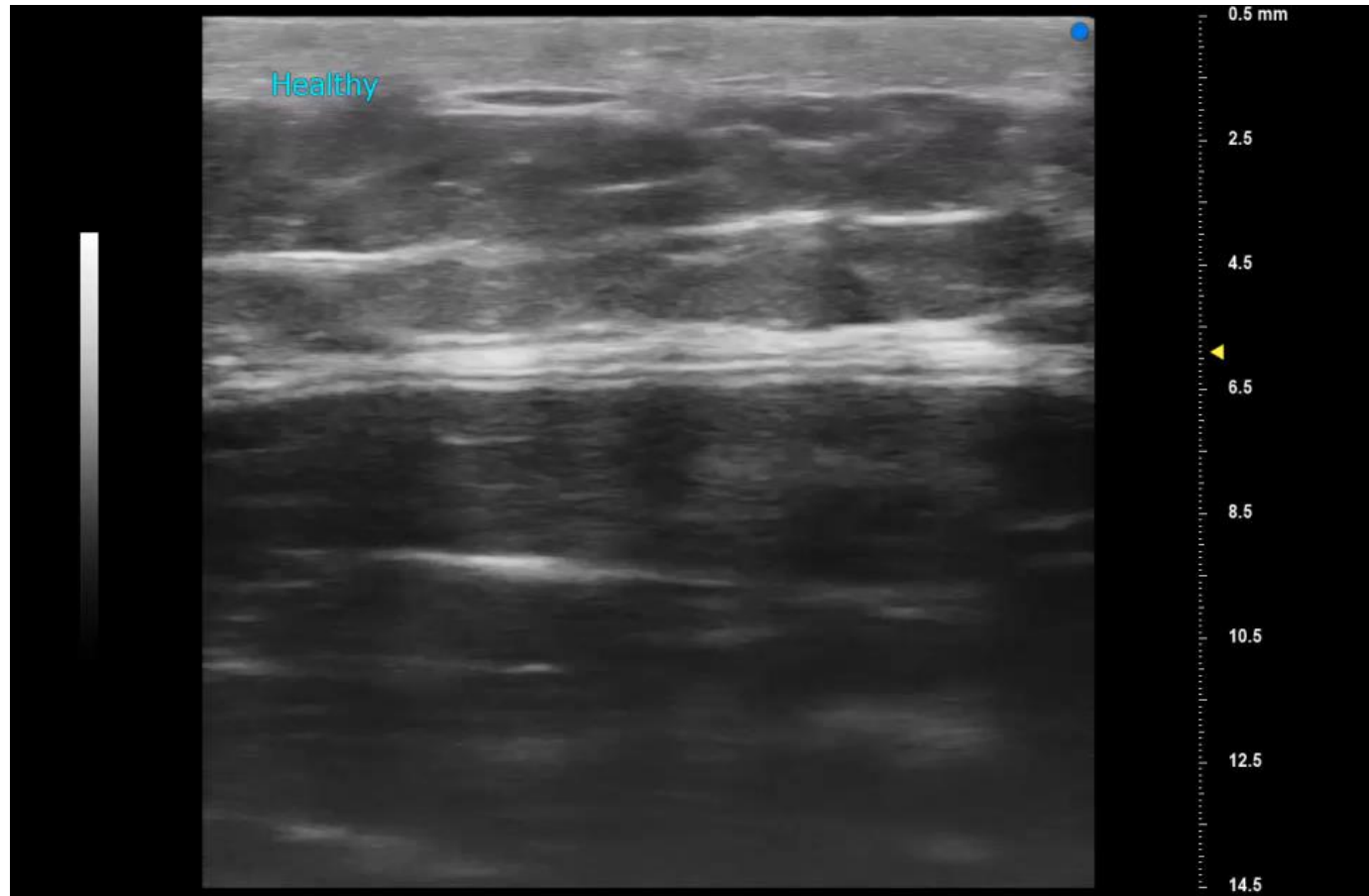


ICG Visualization

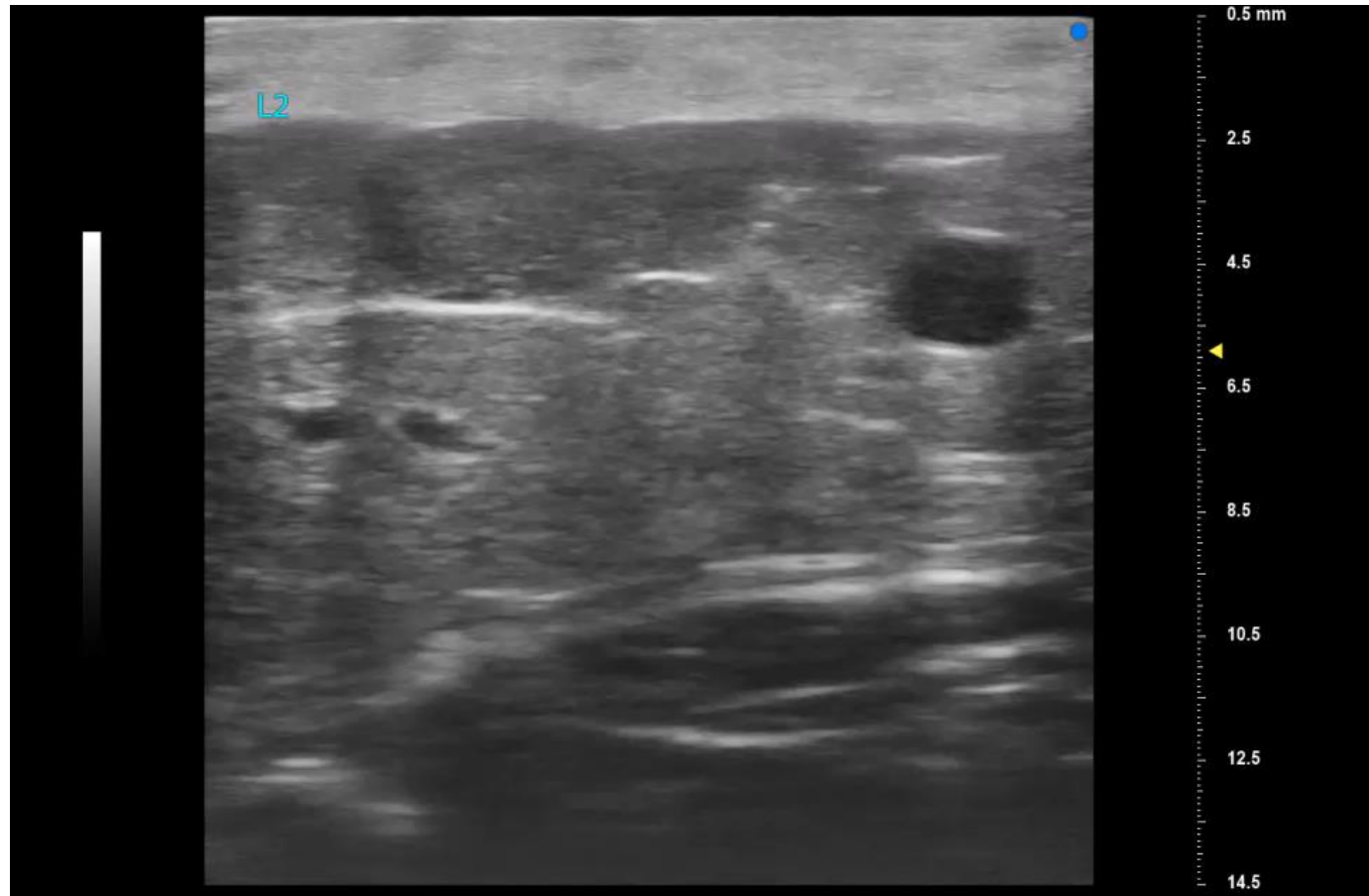
- 9,9% of all lymphatics

Czedik-Eysenberg M, ... Tzou CHJ. Exclusive use of ultrasound for locating optimal LVA JSO. 2020;121(1):51-56. doi:10.1002/jso.25728
Mohos, B. Tzou, CHJ. "Imaging Modalities for Diagnosis and Treatment of Lymphedema". Chapter in Neligan Lymphedema 2021/03.
Mohos, B. et al., Tzou, CHJ. "Long Term Ultrasound Application in Lymphatic Surgery". J Reconstr Microsurg 2022; 38(03): 238-244.

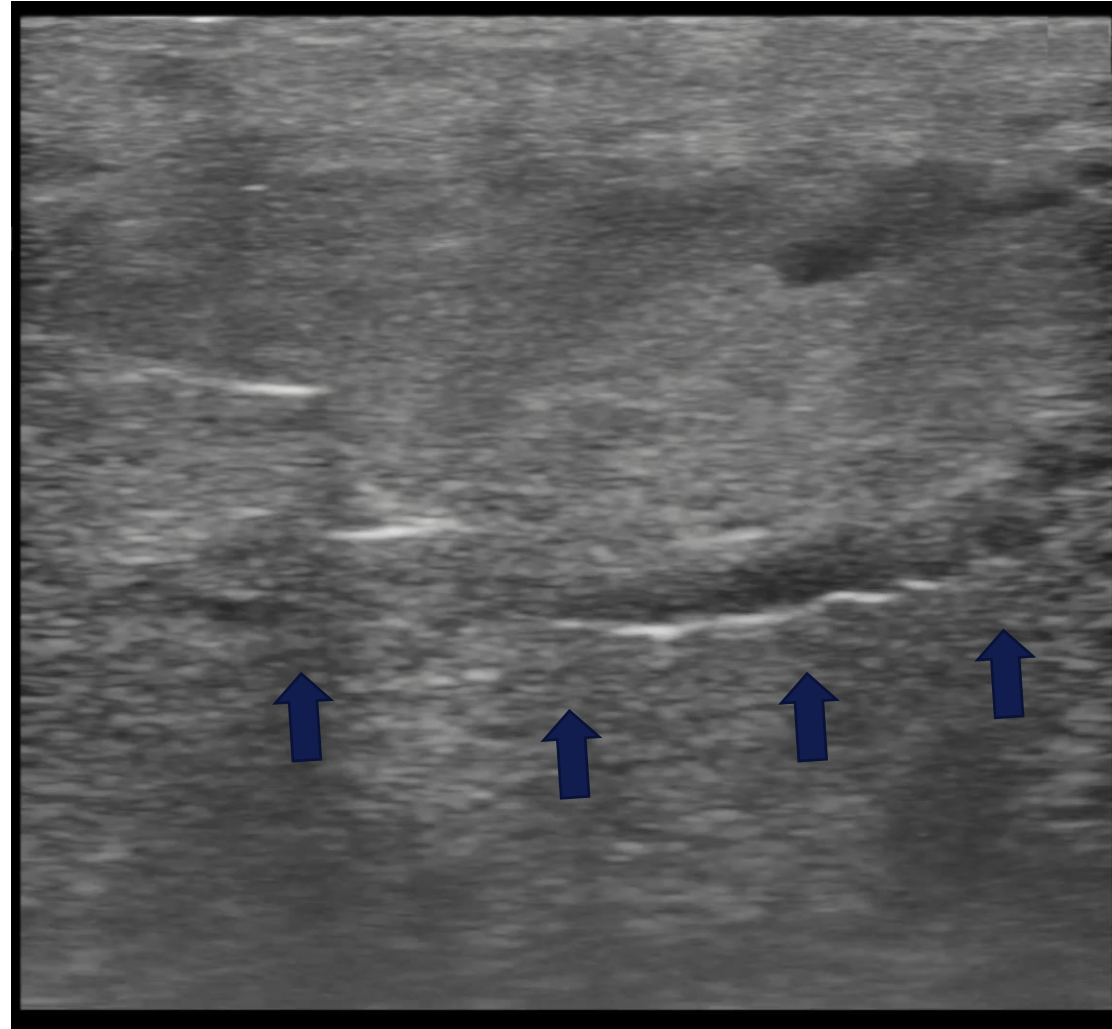
Ultrasonography High Resolution 49Mhz



Ultrasonography High Resolution 49Mhz



Ultrasonography High Resolution 49Mhz



Techniques of Lymphovenous Anastomosis (LVA)

OPEN



ORIGINAL ARTICLE

Reconstructive

“Double Barrel” Lymphaticovenous Anastomosis: A Useful Addition to a Supermicrosurgeon’s Repertoire

Zulqarnain Masoodi, MS, MCh*†
Johannes Steinbacher, MD*
Ines E. Tinhofer, MD*
Manon Czedik-Eysenberg, MD*
Balazs Mohos, MD*†
Julia Roka-Palkovits, MD*
Nina Huettinger, MD,
FEBOPRAS*
Stefan Meng, MD§¶
Chieh-Han John Tzou, MD, PhD,
MBA*||**

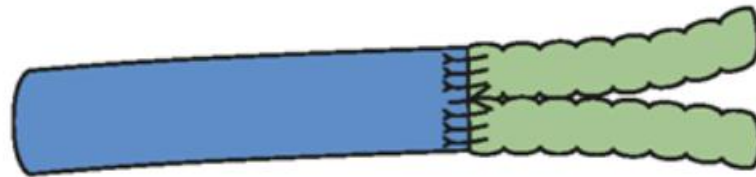
Background: Microsurgical amelioration of lymphedema has gained much traction in recent years and is now an established modality of treatment for this condition. Despite the development of many newer techniques, lymphaticovenous anastomosis still remains the most frequently carried out microsurgical procedure for lymphedema. One of the most common hurdles faced by lymphatic surgeons while carrying out a lymphaticovenous anastomosis is a mismatch in sizes of the vein and the lymphatic vessels.

Method: This article describes a novel but simple “double barrel” technique, developed by the authors for carrying out lymphaticovenous anastomosis in cases of such lymphaticovenous mismatch. Seventeen double barrel anastomoses were carried out in 12 lymphedema patients, over a 4-year period from 2017 to 2021.

Masoodi, Z., ..., Tzou, CHJ. (2022). “Double Barrel” Lymphaticovenous Anastomosis: A Useful Addition to a Supermicrosurgeon’s Repertoire.” *Plastic and Reconstructive Surgery – Global Open* 10(4): e4267.

Techniques of Lymphovenous Anastomosis (LVA)

E) Final anastomosis 2 x LVAs

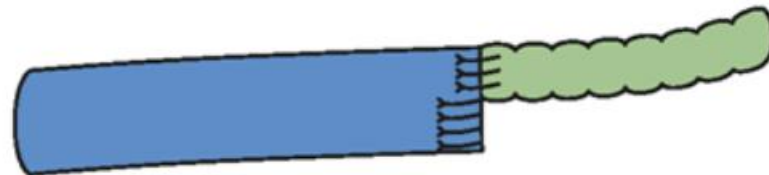


Double Barrel LVA

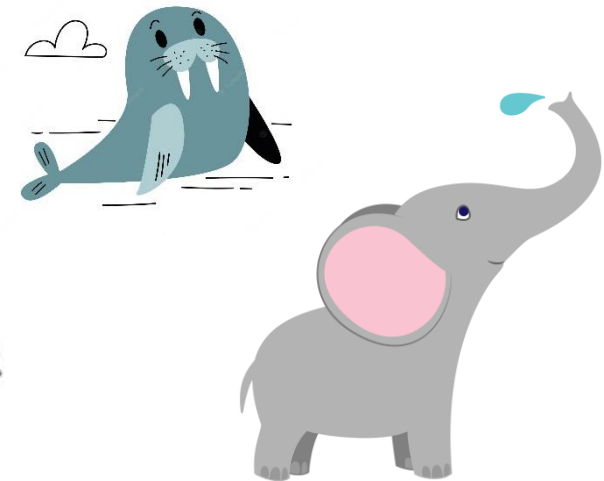
F) Alternative options



Walrus LVA



Elephant LVA



Masoodi, Z., ..., Tzou, CHJ. (2022). "Double Barrel" Lymphaticovenous Anastomosis: A Useful Addition to a Supermicrosurgeon's Repertoire." *Plastic and Reconstructive Surgery – Global Open* 10(4): e4267.

Lymphedema Surgery

Surgical Therapies of Lymphedema

- **Resective** surgical therapy
- **Reconstructive** surgical therapy = **physiologic, VLNT, LVA**
- **Hybrid** surgical therapy = **resective and reconstructive**

Demographic Data – Lymphology Center Vienna

Patients and Operation 2024

- **Clinic** **Consultations**
n Patients = 1320 (~ 25% primary lymphedema)
- **Operation** **LVA and VLNT**
n Patients = 573
n LVA = 2005, median = 3,5 $\triangleq$ range 3-8 LVA / per patient
n VLNT / SCIP / LYST / Omentum = 12
369 x leg lymphedema (76 x primary lymphedema, 16 x lymphocele/-fistula)
183 x arm lymphedema, 21 x genital lymphedema

Tzou, CHJ., Steinbacher, J., Czedik-Eysenberg, M.Brandstaetter, S.,Meng, S.,Obermayer, B., Grablowitz, V., Ausch, C., Cheng, MH., Hong, JP., (2020). "Institutionalization of reconstructive lymphedema surgery in Austria—Single center experience." J Surg Oncol 121(1): 91-99.

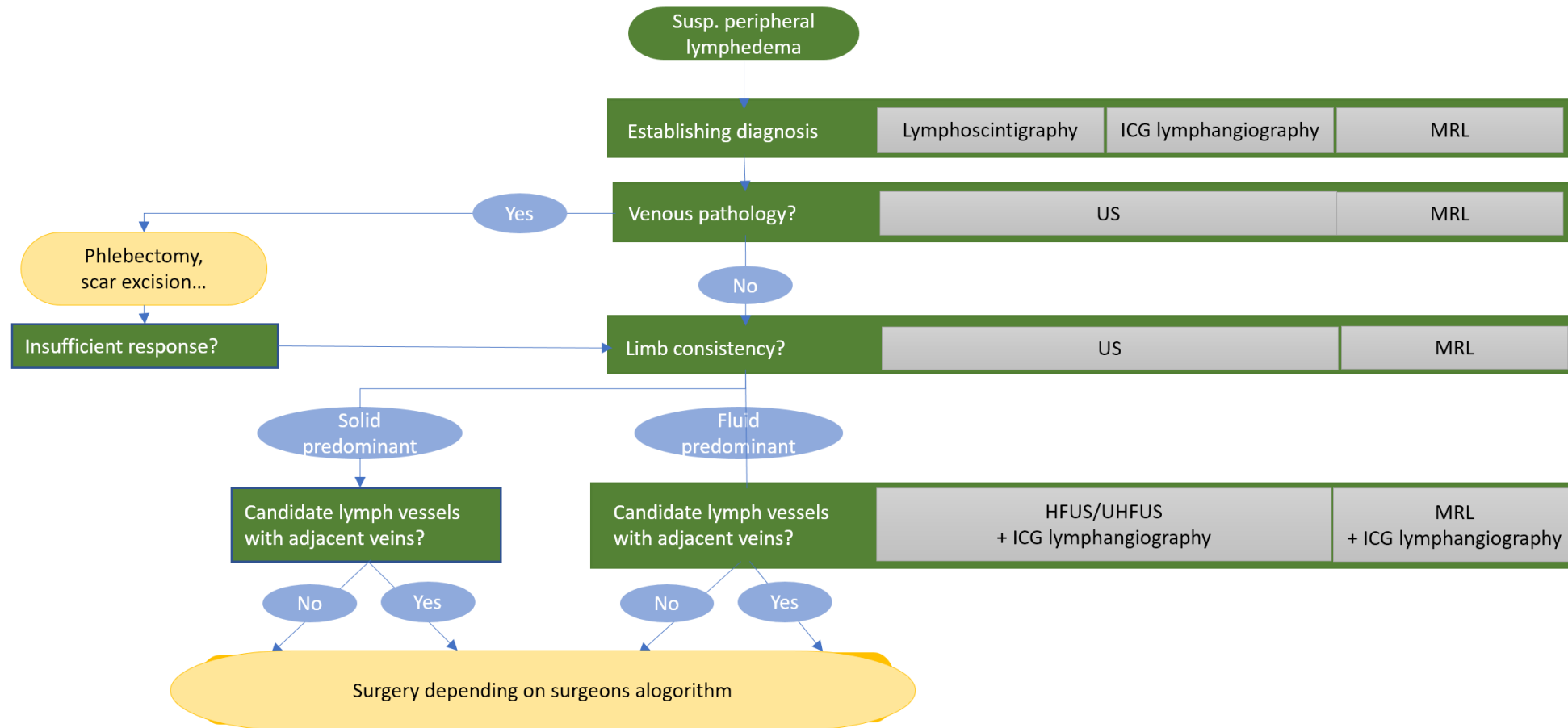
Demographic Data – Lymphology Center Vienna

Outcomes 2024

- **Clinic** **Improvement**
Reduction of circumference up to 75%
Reduction of erysipelas / cellulitis incidence
- **Clinic** **Complications**
n Patients = 12
 - hematoma of LVA site
 - flap loss of VLNT (free lymphnode flap) myocardinfarction
 - no improvements (n=12, primary lymphedema n=290, ~5 %)

Tzou, CHJ., Steinbacher, J., Czedik-Eysenberg, M.Brandstaetter, S.,Meng, S.,Obermayer, B., Grablowitz, V., Ausch, C., Cheng, MH., Hong, JP., (2020). "Institutionalization of reconstructive lymphedema surgery in Austria—Single center experience." J Surg Oncol 121(1): 91-99.

Therapy Algorithm of Lymphedema Patients



Mohos, B. Tzou, CHJ. "Imaging Modalities for Diagnosis and Treatment of Lymphedema". *Medicina* 59.11 (2023).

Mohos, B. Tzou, CHJ. "Imaging Modalities of Lymphedema". In Neligan, P. C. (2023). *Plastic Surger: 6 Volume*. Elsevier Health Sciences.

Therapy Algorithm of Lymphedema Patients

- **Lymphoscintigraphy** to confirm diagnosis of lymphedema
- **CDT** Complete Decongestive Therapy pre- and post-operative
- **Reconstruction** before Resection

ISL 0	transient	CDT (Complete Decongestive Therapy)
ISL I	reversible, mild	CDT, LVA
ISL II	moderate	CDT, LVA, Liposuction
ISL III	severe	CDT, LVA, VLNT, Liposuction

Mohos, B. Tzou, CHJ. "Imaging Modalities for Diagnosis and Treatment of Lymphedema". Medicina 59.11 (2023).

Mohos, B. Tzou, CHJ. "Imaging Modalities of Lymphedema". In Neligan, P. C. (2023). Plastic Surger: 6 Volume. Elsevier Health Sciences.

Rehabilitation

Postoperative Retrograde Manual Lymphatic Drainage

RECONSTRUCTIVE

Retrograde Manual Lymphatic Drainage following Vascularized Lymph Node Transfer to Distal Recipient Sites for Extremity Lymphedema: A Retrospective Study and Literature Review

Julia Roka-Palkovits, M.D.
Miffy Chia-Yu Lin, M.Sc.
Chieh-Han J. Tzou, M.D., Ph.D.
Ines Tinhofer, M.D.
Ming-Huei Cheng, M.D., M.B.A.

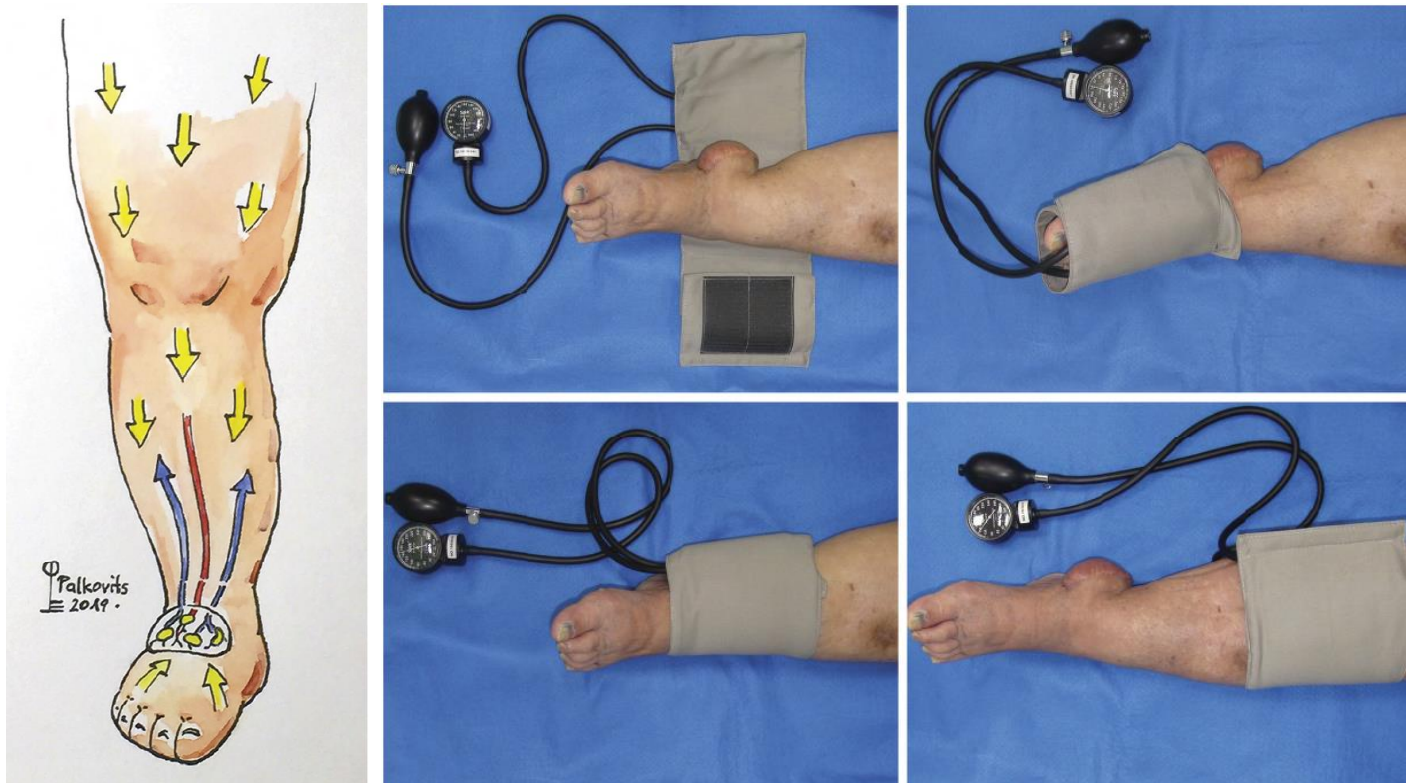
Vienna, Austria; Taoyuan, Taiwan;
and Ann Arbor, Mich.

Background: Vascularized lymph node transfer is an efficacious treatment for extremity lymphedema. This study investigated the outcome of retrograde manual lymphatic drainage for vascularized lymph node transfer to distal recipient sites. **Methods:** Lymphedema patients who underwent either complete decongestive therapy or vascularized lymph node transfer between 2013 and 2018 were retrospectively included. Retrograde manual lymphatic drainage was started with intermittent manual compression and the assistance of a sphygmomanometer and proximal-to-distal massage of the limb 1 month postoperatively. Outcomes evaluations used

Roka-Palkovits J., Lin MCY., Tzou CHJ., Tinhofer I., Cheng MH. Accepted for publication 2021/07 in PRS, Retrograde Manual Lymphatic Drainage following Vascularized Lymph Node Transfer to Distal Recipient Sites for Extremity Lymphedema: A Retrospective Study and Literature Review.

Rehabilitation

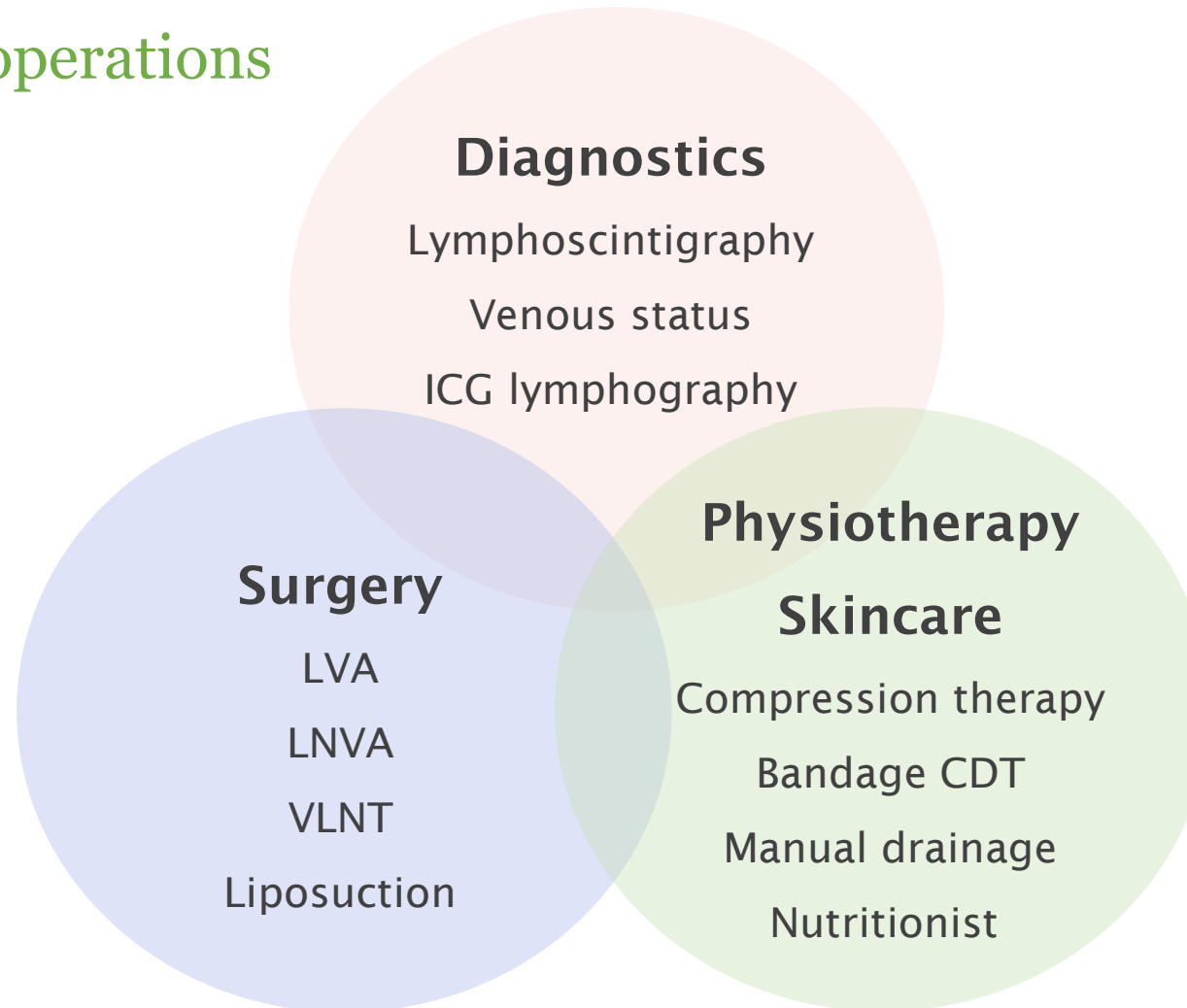
Postoperative Retrograde Manual Lymphatic Drainage

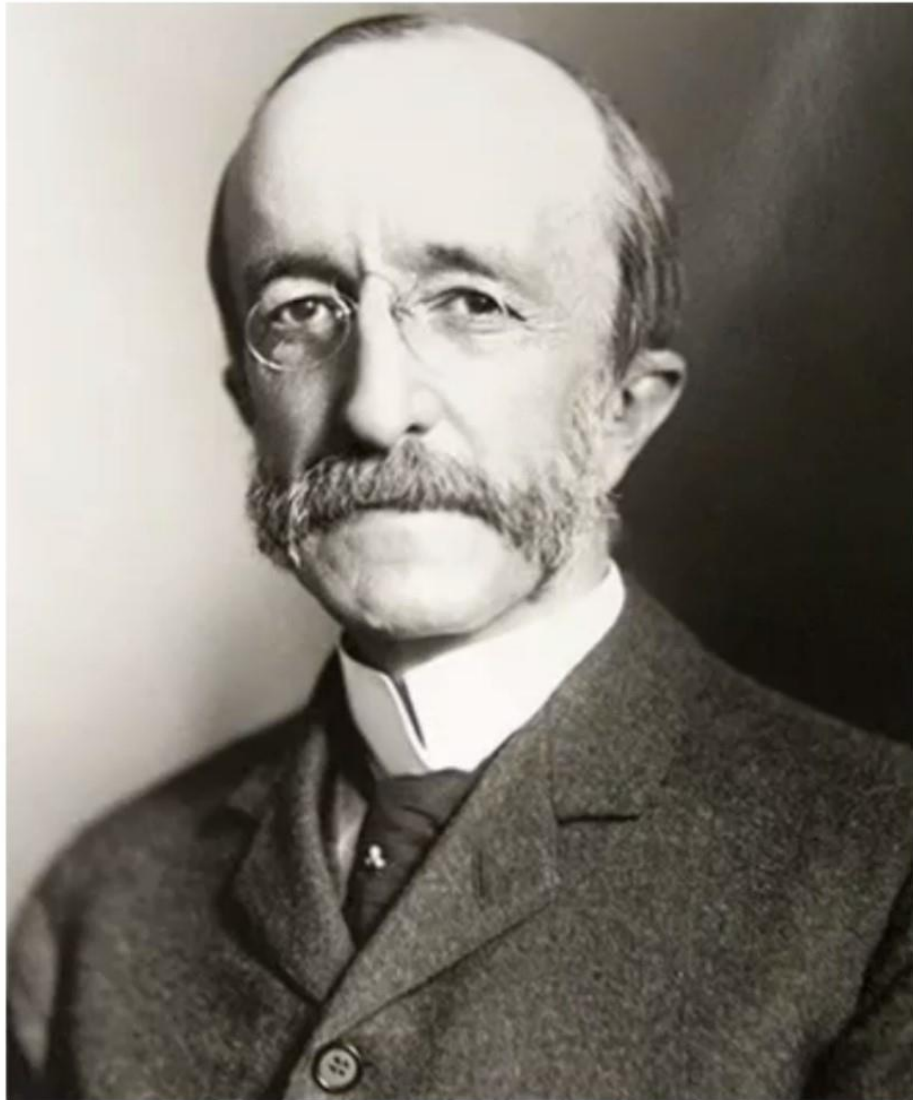


Roka-Palkovits J., Lin MCY., Tzou CHJ., Tinhofer I., Cheng MH. Accepted for publication 2021/08 in PRS, Retrograde Manual Lymphatic Drainage following Vascularized Lymph Node Transfer to Distal Recipient Sites for Extremity Lymphedema: A Retrospective Study and Literature Review.

TEAMS WORK Credits

Constructive Cooperations





**"to cure
sometimes, to
relieve often,
to comfort
always"**

Dr. Edward Livingston Trudeau

Physician & Founder of
Adirondack Cottage Sanitarium for Tuberculosis

6th VIENNA LYMPHOLOGY SYMPOSIUM

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SFU Sigmund Freud
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Chieh-Han John TZOU, M.D. Ph.D. MBA

Associate Professor of Plastic and Reconstructive Surgery

tzou@tzoumedical.com | khgh.tzoumedical.com | www.tzoumedical.com

Director of Plastic and Reconstructive Surgery

Hospital of Divine Savior, Vienna, Austria

Medical Faculty, Sigmund Freud University, Vienna, Austria

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The ZEISS logo is a blue square with the word "ZEISS" in white, bold, sans-serif capital letters.

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University

Chieh-Han John TZOU, M.D. Ph.D. MBA

Associate Professor of Plastic and Reconstructive Surgery

tzou@tzoumedical.com | khgh.tzoumedical.com | www.tzoumedical.com

Director of Plastic and Reconstructive Surgery

Hospital of Divine Savior, Vienna, Austria

Medical Faculty, Sigmund Freud University, Vienna, Austria