IMMEDIATE LYMPHATIC RECONSTRUCTION

Mélina Deban
Surgical Oncologist

Peter Davison
Plastic Surgeon

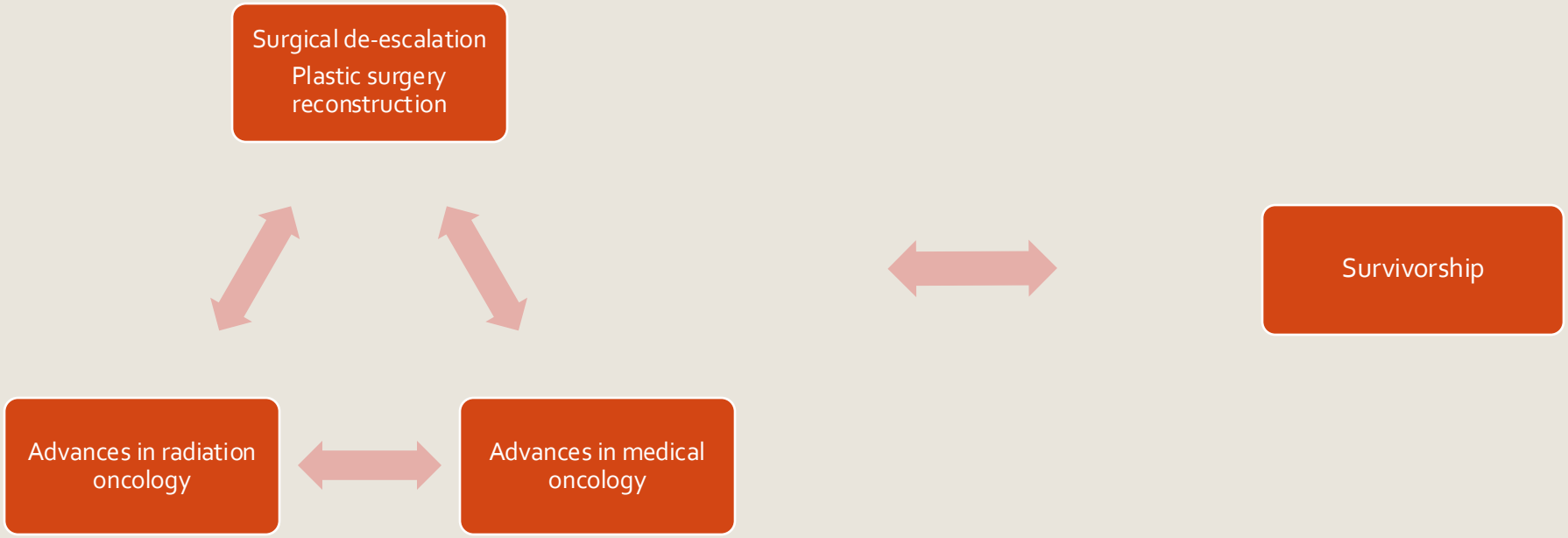
BCCA summit, November 22, 2024

Land acknowledgement

- We would like to acknowledge that we are gathered today on the traditional, ancestral, and unceded territory of the Coast Salish Peoples, including the territories of the Musqueam, Squamish, and Tsleil-Waututh Nations.

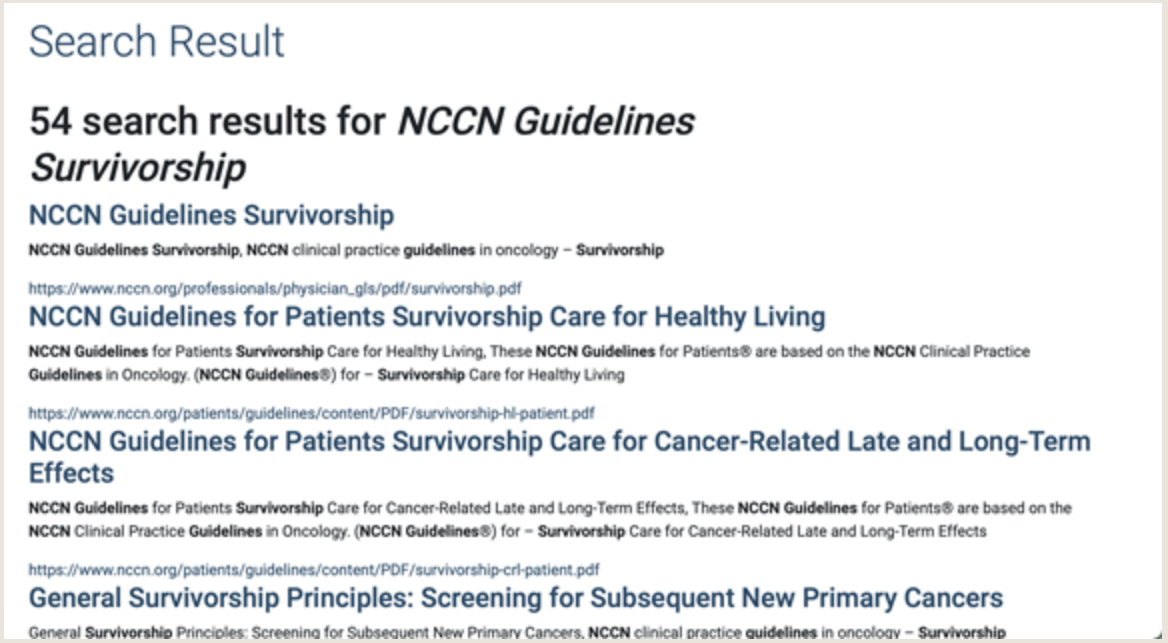
Introduction

Improvement of survivorship is a multidisciplinary endeavor…



Introduction

… and an increasingly addressed topic


Search Result

54 search results for *NCCN Guidelines Survivorship*

NCCN Guidelines Survivorship

NCCN Guidelines Survivorship, **NCCN** clinical practice **guidelines** in oncology – **Survivorship**

https://www.nccn.org/professionals/physician_gls/pdf/survivorship.pdf

NCCN Guidelines for Patients Survivorship Care for Healthy Living

NCCN Guidelines for Patients **Survivorship** Care for Healthy Living, These **NCCN Guidelines** for Patients® are based on the **NCCN** Clinical Practice **Guidelines** in Oncology. (**NCCN Guidelines**®) for – **Survivorship** Care for Healthy Living

https://www.nccn.org/patients/guidelines/content/PDF/survivorship-hl-patient.pdf

NCCN Guidelines for Patients Survivorship Care for Cancer-Related Late and Long-Term Effects

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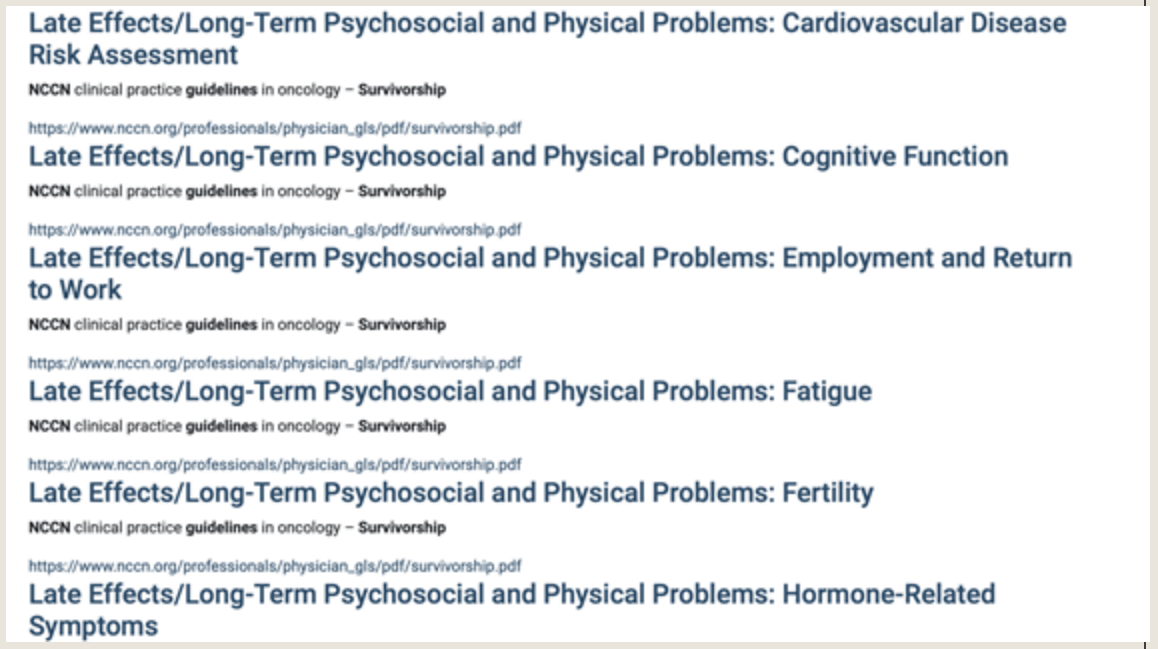
https://www.nccn.org/patients/guidelines/content/PDF/survivorship-crl-patient.pdf

General Survivorship Principles: Screening for Subsequent New Primary Cancers

General **Survivorship** Principles: Screening for Subsequent New Primary Cancers, **NCCN** clinical practice **guidelines** in oncology – **Survivorship**


Late Effects/Long-Term Psychosocial and Physical Problems: Cardiovascular Disease Risk Assessment

NCCN clinical practice **guidelines** in oncology – **Survivorship**

https://www.nccn.org/professionals/physician_gls/pdf/survivorship.pdf

Late Effects/Long-Term Psychosocial and Physical Problems: Cognitive Function

NCCN clinical practice **guidelines** in oncology – **Survivorship**

https://www.nccn.org/professionals/physician_gls/pdf/survivorship.pdf

Late Effects/Long-Term Psychosocial and Physical Problems: Employment and Return to Work

NCCN clinical practice **guidelines** in oncology – **Survivorship**

https://www.nccn.org/professionals/physician_gls/pdf/survivorship.pdf

Late Effects/Long-Term Psychosocial and Physical Problems: Fatigue

NCCN clinical practice **guidelines** in oncology – **Survivorship**

https://www.nccn.org/professionals/physician_gls/pdf/survivorship.pdf

Late Effects/Long-Term Psychosocial and Physical Problems: Fertility

NCCN clinical practice **guidelines** in oncology – **Survivorship**

https://www.nccn.org/professionals/physician_gls/pdf/survivorship.pdf

Late Effects/Long-Term Psychosocial and Physical Problems: Hormone-Related Symptoms

Survivorship assessment

- Includes:
  - Cardiac health
  - Anxiety, depression, trauma and distress
  - Cognitive function
  - Fatigue
  - **Lymphedema**
  - Pain
  - Hormone-related symptoms
  - Sexual health
  - Fertility
  - Sleep disorder
  - Healthy lifestyle
  - Immunization and infections
  - Employment/return to work

NCCN, 2024

Lymphedema

- Burden of lymphedema
  - Physical
  - Psychological
  - Social
  - Economical
  - Etc.
- Best way to decrease risk of lymphedema = avoid ALND
  - SLNB: less than 5%
  - ALND: 20-30%

Credit: C. Temple-Oberle, C. Webb

De-escalation of axillary surgery

	NSABP B-32	ALMANAC	IBCSG 23-01	ACOSOG Z0011	AMAROS
ALND	NR	13%	13%	13%	13%
SLNB	NR	5%	4%	2%	6%

So is lymphedema incidence really as high as the usually quoted 20-30%?

Unfortunately, yes…

Incidence of unilateral arm lymphoedema after breast cancer: a systematic review and meta-analysis

Tracey DiSipio, Sheree Rye, Beth Newman, Sandi Hayes

Lancet Oncol 2013; 14: 500–15

Summary

Background The body of evidence related to breast-cancer-related lymphoedema incidence and risk factors has

- 2013, Systematic review and meta-analysis, 72 studies
  - Women with axillary lymph node dissection (18 studies): 19.9% (95% CI 13.5-28.2)
  - Women with sentinel lymph node biopsy (18 studies): 5.6% (95% CI 6.1-7.9)

	Strong evidence	Moderate evidence	Weak evidence	Inconclusive evidence
Demographics				
Children in care aged ≤14 years*	..	..	1 (OR 0·2)	..
High income*	..	..	2 (OR 0·2–0·5)	..
Age†‡	..	..	..	7 (OR 0·4–3·3)
Education*	..	..	..	1 (HR 1·5)
Disease and treatment				
Axillary lymph node dissection†§	9 (OR 1·3–6·7; RR 2·7; HR 2·5–2·6)	..	..	..
Greater number of lymph nodes dissected†	6 (OR 1·0–2·1; HR 1·2)	..	..	..
Mastectomy†	3 (OR 2·7–7·4)	..	..	..
Higher number of metastatic lymph nodes*	..	3 (OR 1·1–2·8: RR 2·0)	..	..
Radiotherapy†	..	5 (OR 1·7–3·8; HR 1·3)	..	..
Receiving chemotherapy*	..	5 (OR 1·6–2·0; HR 1·4–3·7)	..	..
Axillary radiotherapy	..	..	5 (OR 0·1–7·7; HR 0·1; RR 2·7)	..
Higher stage of disease	..	..	..	1 (OR 2·5)
Postoperative infection	..	..	..	2 (OR 6·7–32·5)
Treatment on the dominant side*	..	..	..	4 (OR 0·2–4·7; RR 2·9)
Lifestyle and behaviours				
Higher body-mass index†‡	14 (OR 0·1–5·5; HR 1·4; RR 5·5)	..	..	..
Did not participate in regular physical activity*	..	2 (OR 2·1–6·1)	..	..
Had blood pressure readings taken on the treated side*	..	..	1 (OR 3·4)	..
Had not done preventive self-care activities	..	..	1 (OR 12·4)	..
Presence of at least mild upper-body symptoms*	..	..	1 (OR 2·3–3·1)	..
Presence of comorbidities*	..	..	2 (OR 1·6; HR 0·1)	..
High blood pressure before breast cancer	..	..	..	1 (OR 2·3)
Occupation requiring a high level of hand use (eg, computer programmer)	..	..	..	1 (OR 2·1–4·6)
Not receiving pretreatment education of lymphoedema	..	..	..	1 (OR 2·2)

Data are number of articles (range of summary statistics). HR=hazard ratio. OR=odds ratio. RR=relative risk. *Evidence includes one level two (prospective cohort) study. †Evidence includes at least two level two (prospective cohort) studies. ‡Evidence includes one randomised clinical trial. §Evidence includes at least two randomised clinical trials.

***Table 3*: Summary of possible risk factors from multivariable analyses for the development of breast cancer-related lymphoedema**

Challenges in lymphedema assessment

- Multiple definitions, no standardized/uniformly accepted one…
  - Armer et al., 2005
  - 200 cc limb volume change
  - 10% circumference limb volume change
  - 2 cm difference in limb circumference
  - Self-reported signs and symptoms
- In the context of studying lymphedema, we alter its natural history
  - "The Uncertainty Principle" – studying immediate lymphatic reconstruction impacts the natural history of breast cancer related lymphedema. Yakaback, S. and Temple-Oberle, C., 2023, Breast

De-escalation of axillary surgery

- After neoadjuvant chemotherapy
  - Dual-tracer
  - More than 2 sentinel lymph nodes

	NSABP B27	ACOSOG Z1071	SENTINA	SN FNAC	GANEA 2
N	428	687	592	153	307
Stage	T0-3N0-1	T0-4N1-2	N0-2	T0-3N1-2	pN1
ID rate	85%	93%	80%	88%	80%
FNR overall	10.7%	12.6%	14.2%	8.4%	11.9%
FNR dual-tracer	9.3%	10.8%	9%	5.2%	NR
FNR >=2 LN	NR	9.1%*	NR	5%	7.8%

* >= 3 LN

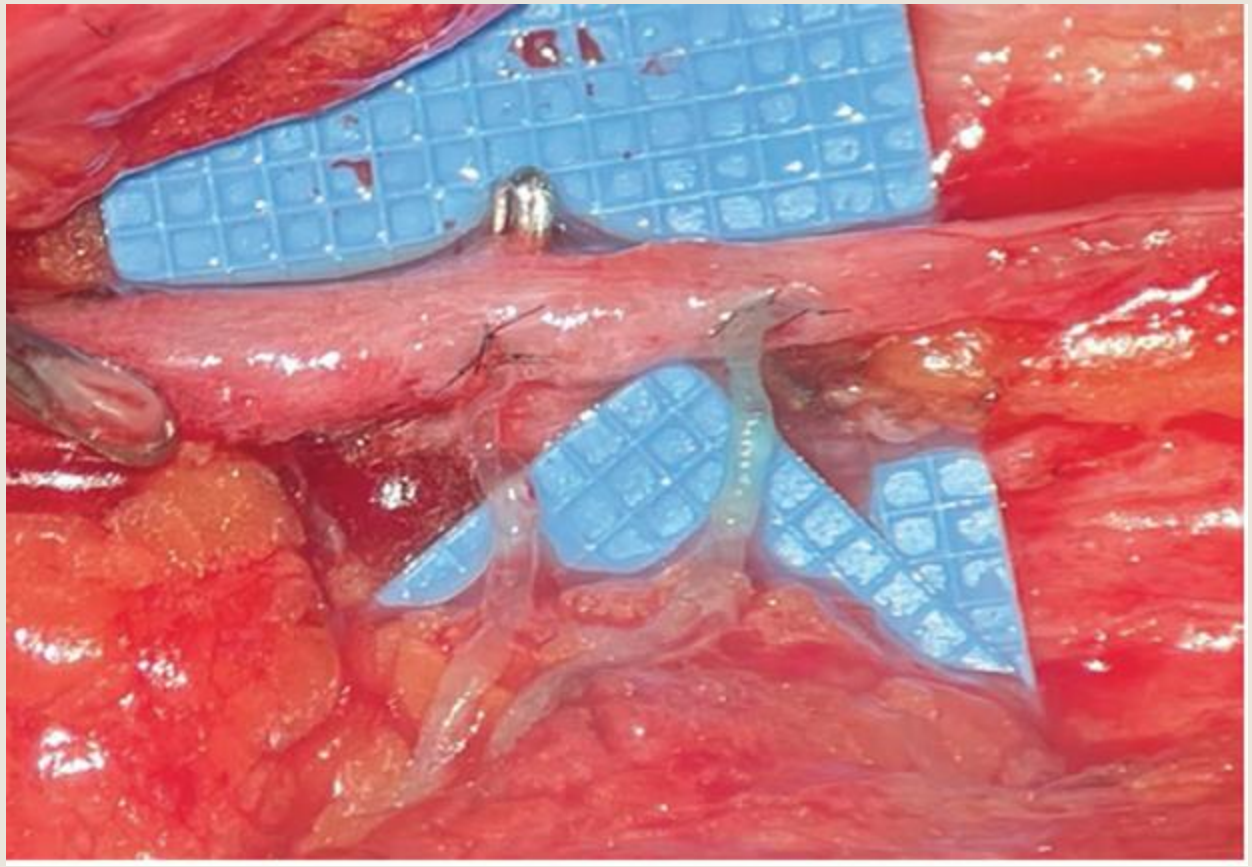
ALND

- Some patients still need an ALND…
  - Upfront surgery with clinically positive nodes
  - Patients with residual disease after neoadjuvant chemotherapy
  - Patients presenting with advanced nodal disease (N2/3), even after good response with neoadjuvant chemotherapy
  - Inflammatory breast cancer

How we do we mitigate their risk of lymphedema?

Immediate Lymphatic Reconstruction (ILR)

Maybe this is where ILR finds a home…

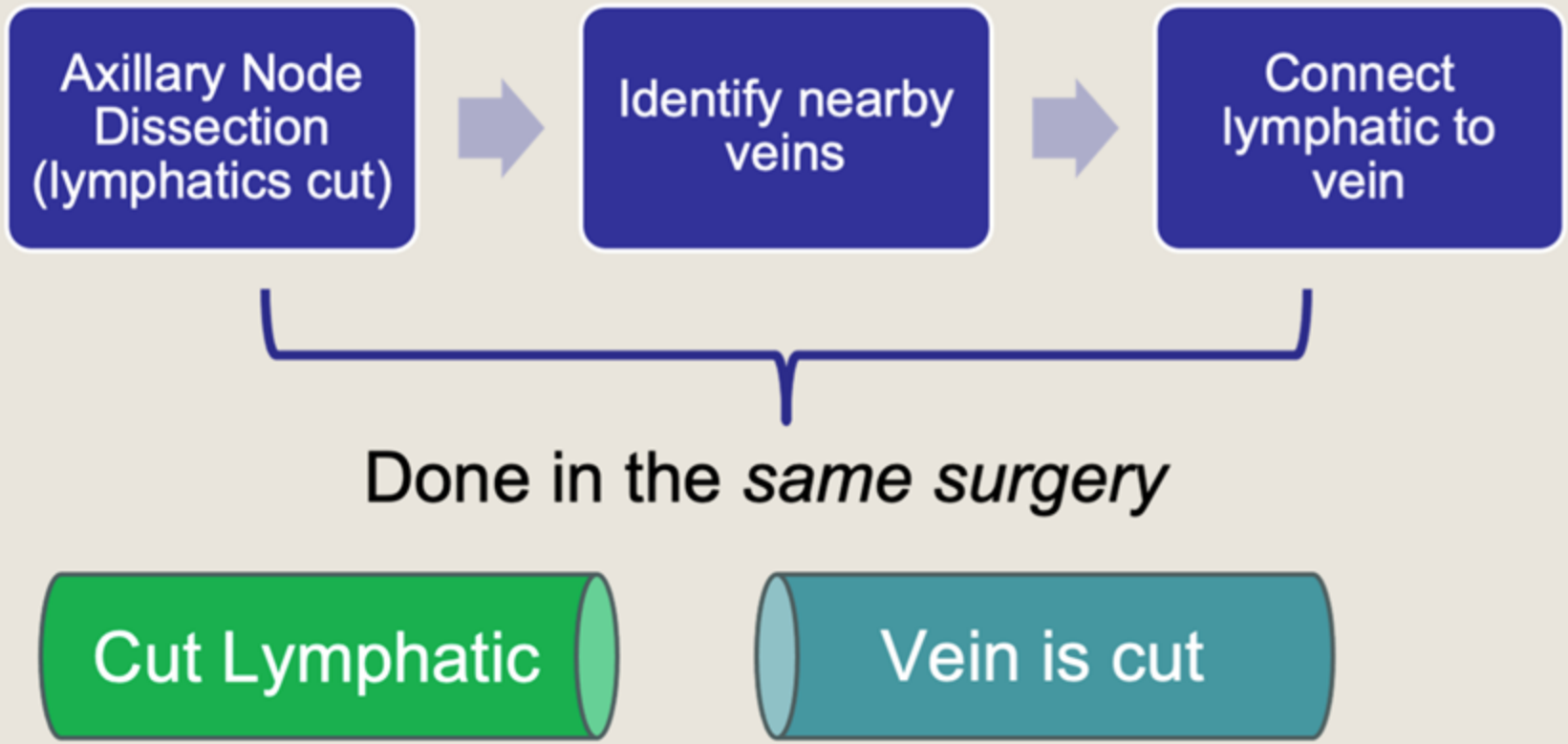


ILR/LVA

- Why don't we reconnect **Arm lymphatics** cut during ALND, to the **Venous system**?
  - LYMPHATIC RECONSTRUCTION
    - LYMPHA (Lymphatic Microsurgical Preventive Healing Approach)
    - **ILR (Immediate Lymphatic Reconstruction)**
    - LVA (Lymphovenous anastomosis)
    - LVB (Lymphovenous Bypass)
- First described by Boccardo and colleagues in 2009

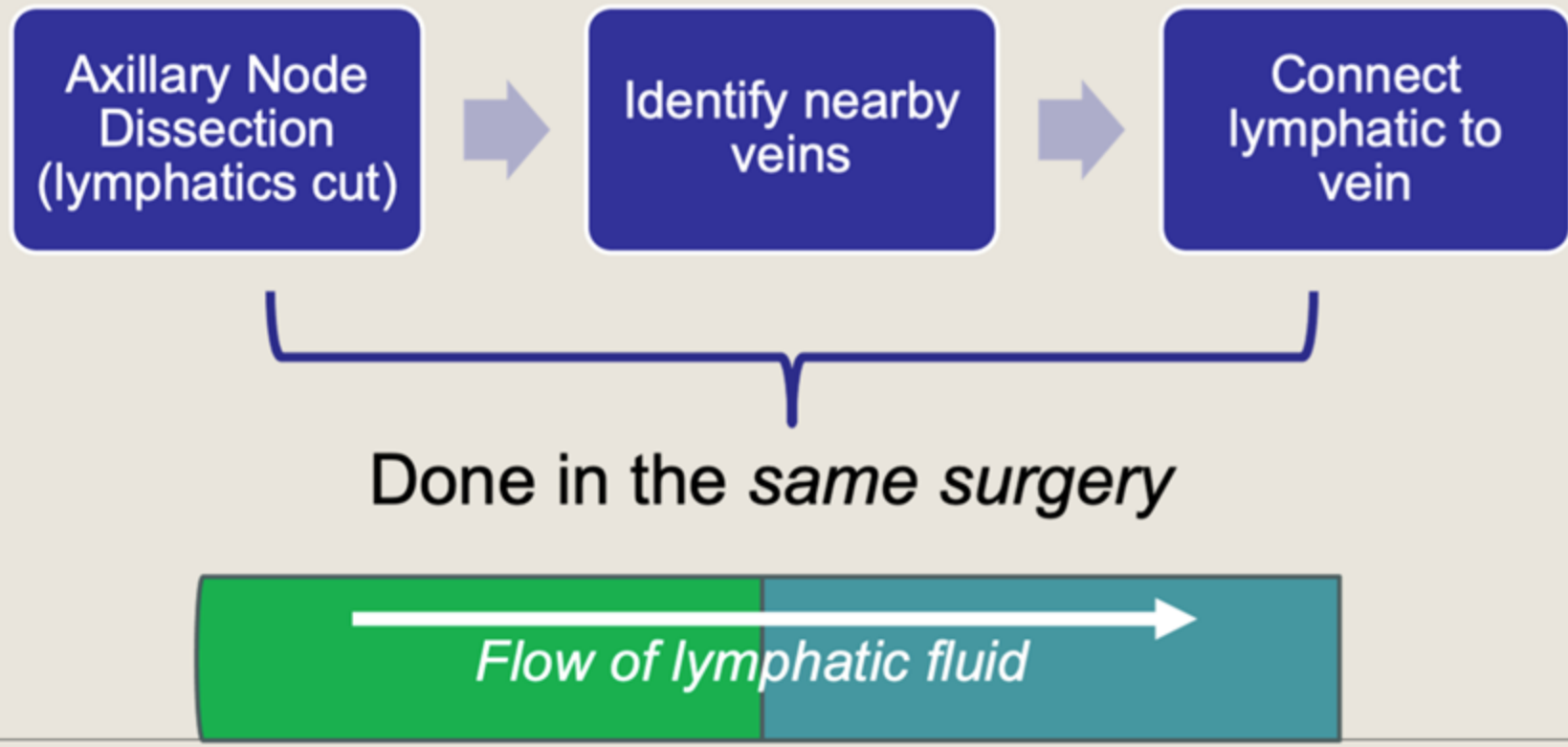
Can we Prevent Lymphedema?

Immediate Lymphatic Reconstruction



Can we Prevent Lymphedema?

Immediate Lymphatic Reconstruction



Principle

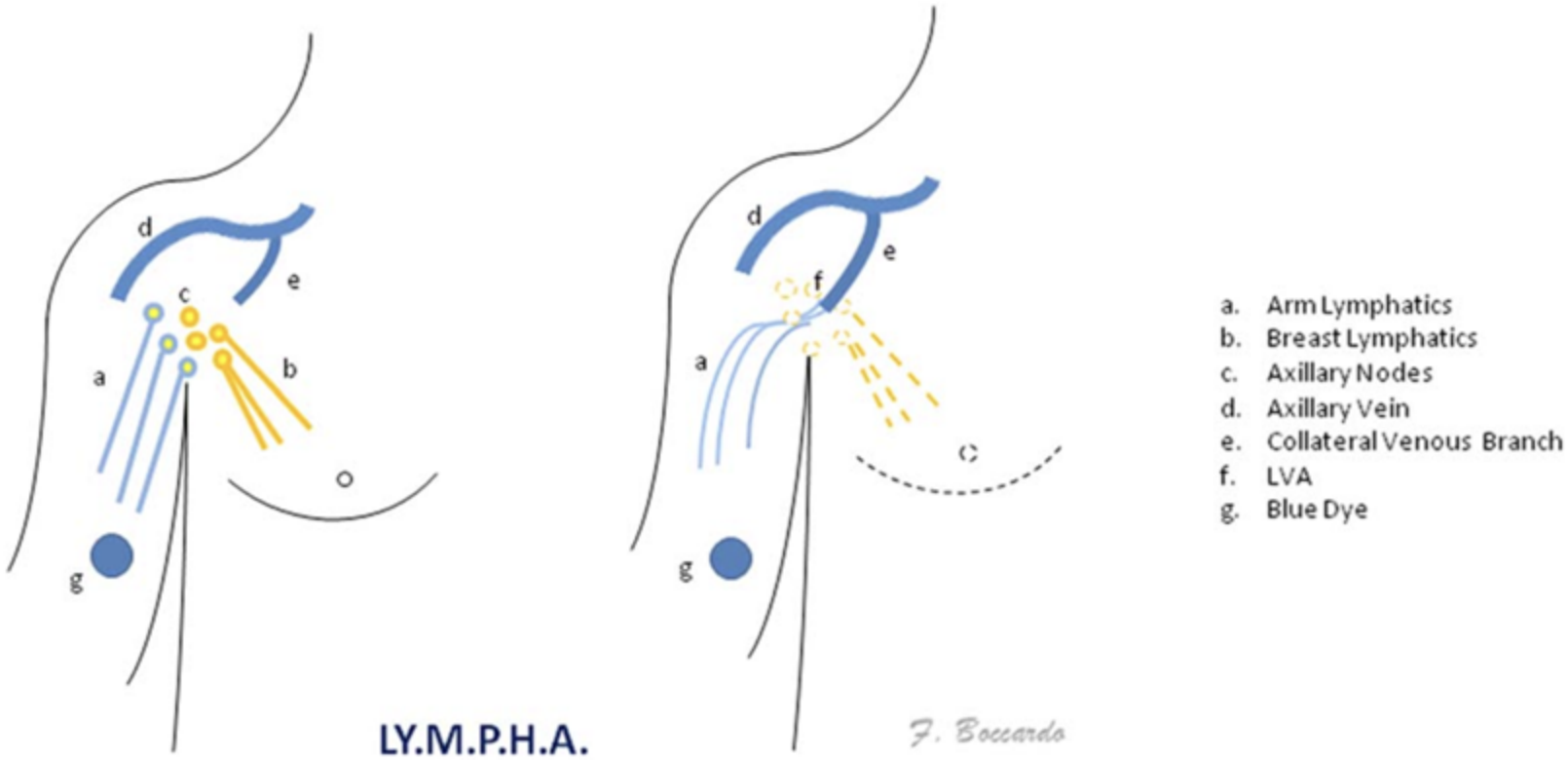
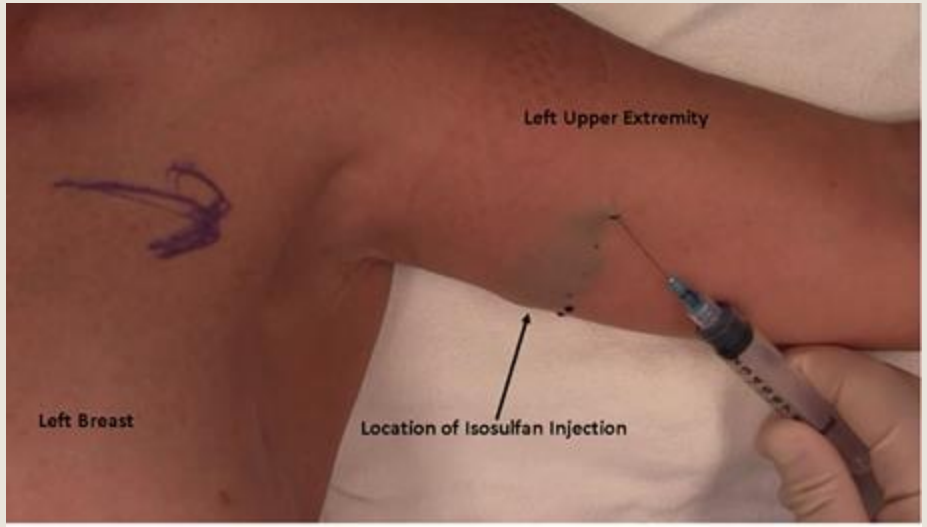


Figure 2. Schematic drawing of LYMPHA technique. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

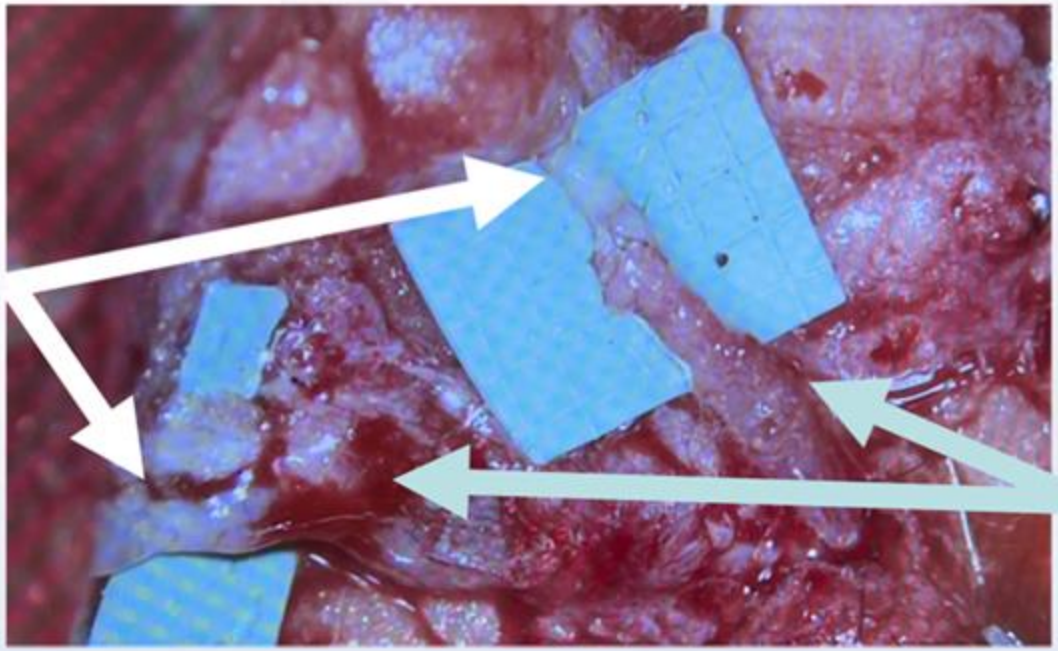
Boccardo et al., 2014, Microsurgery

Intra-Operative Technique

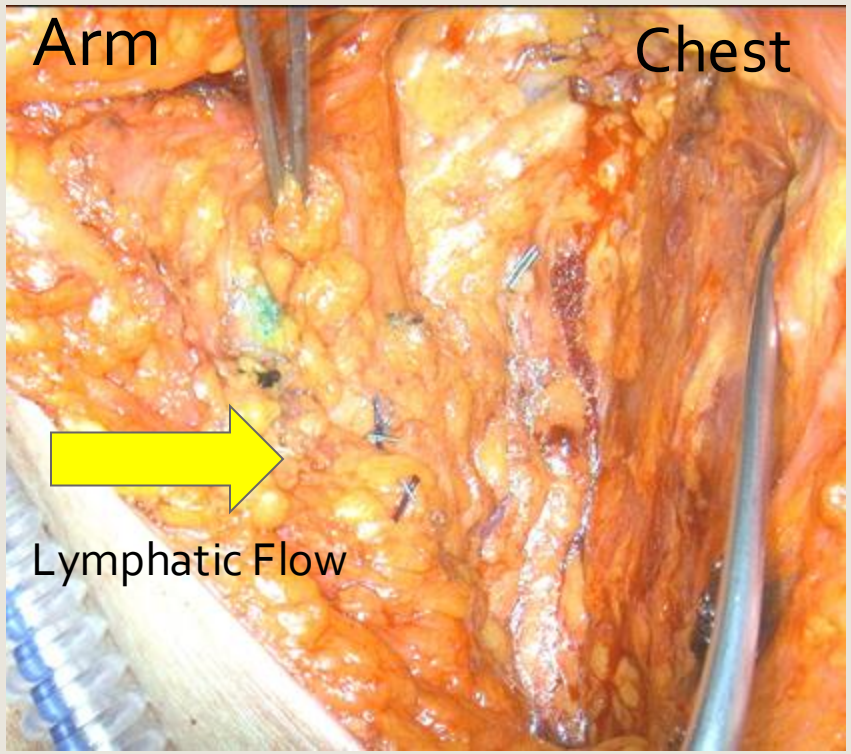


Immediate Lymphatic Reconstruction

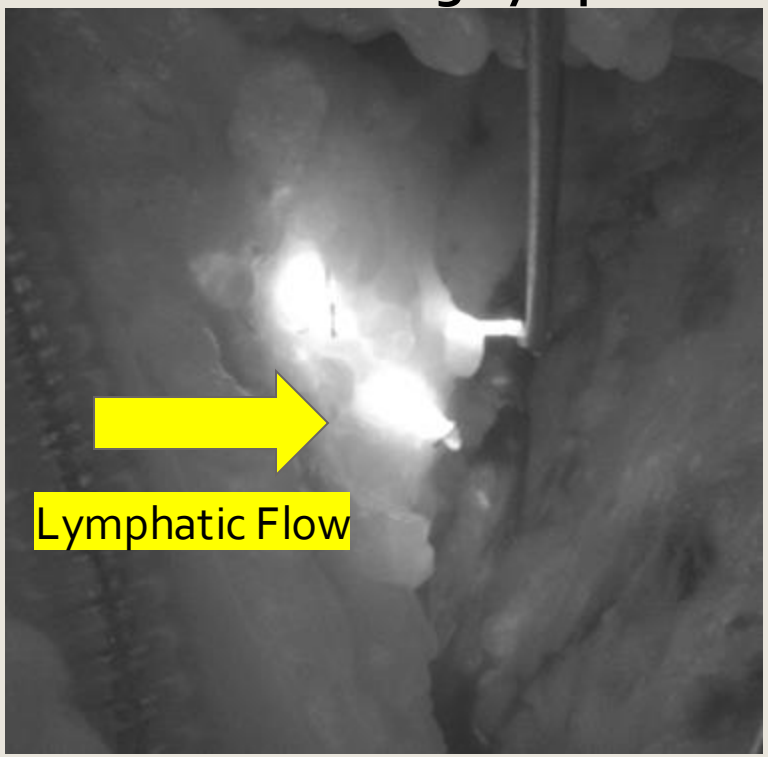
Connecting the cut lymphatics to a vein to allow the fluid to drain



Intra-Operative Technique

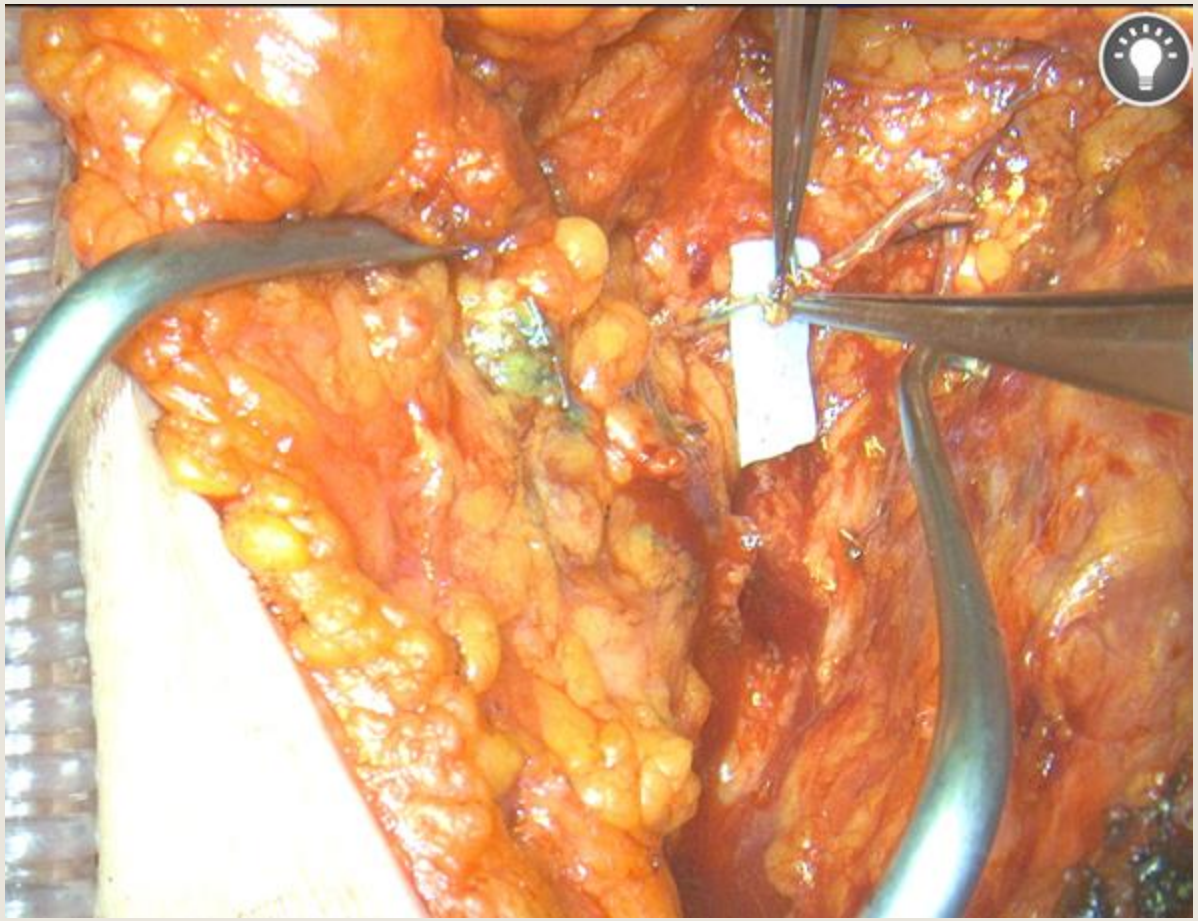


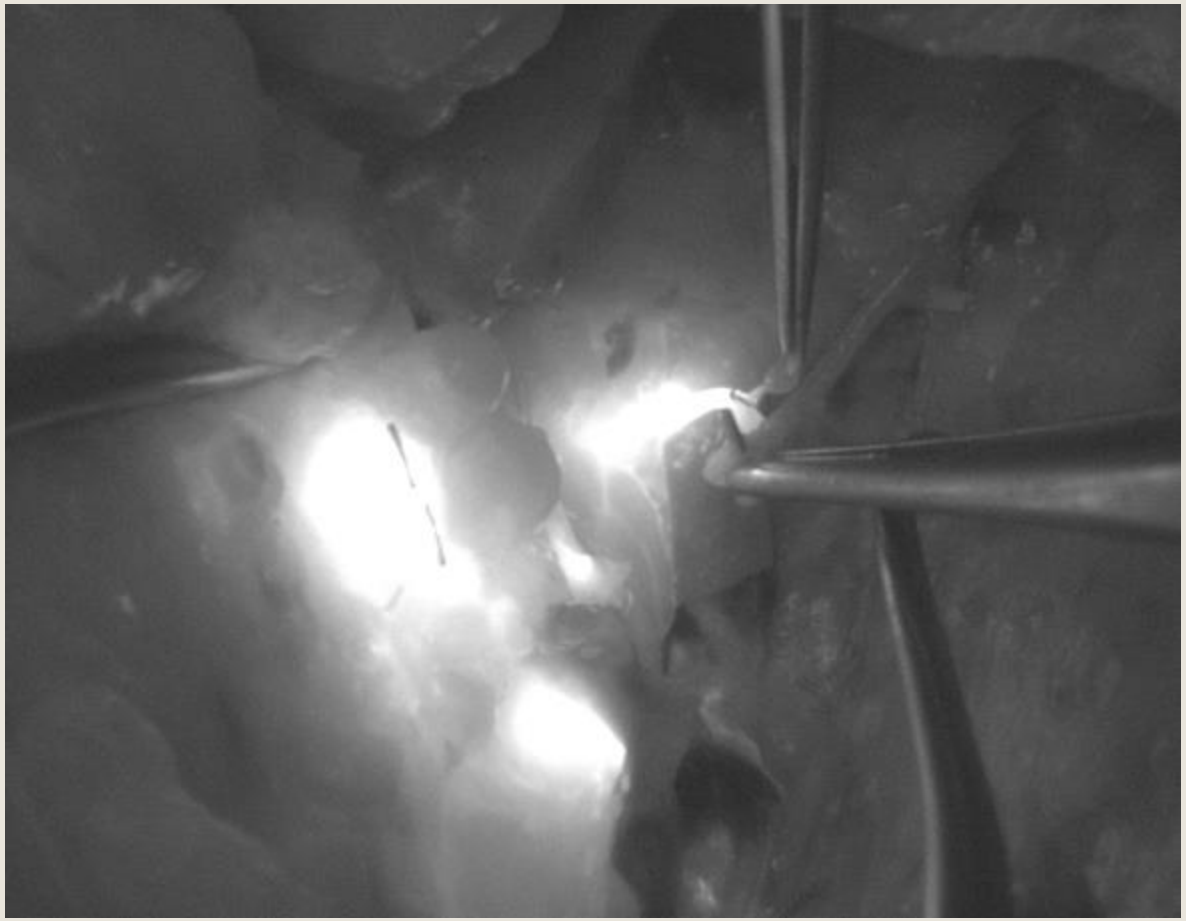
ICG Filter showing Lymphatics



Intra-Operative Technique

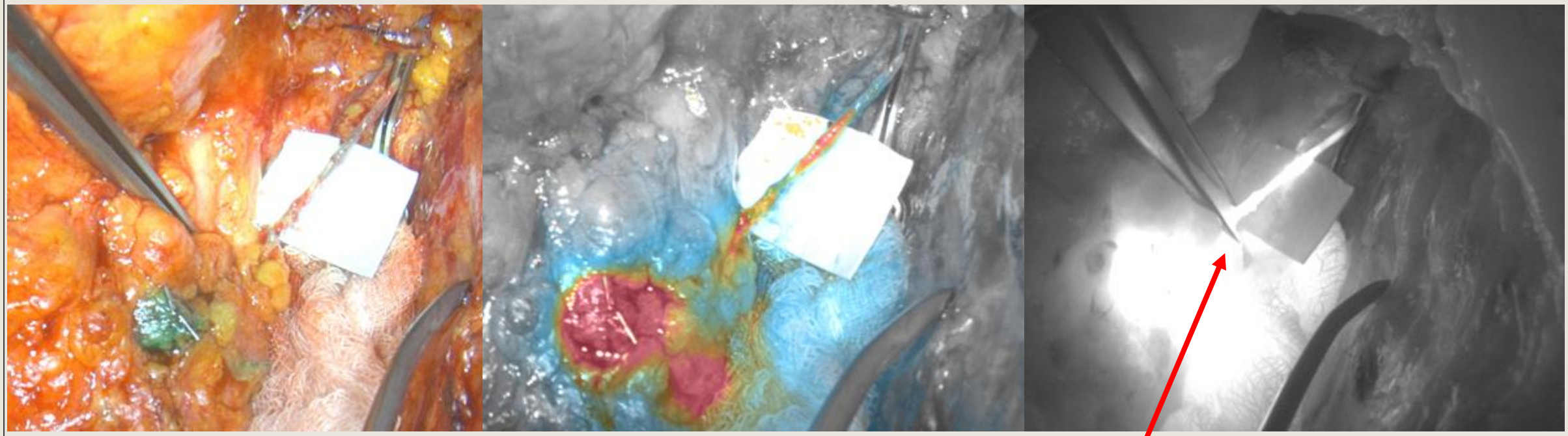
Micro-Anastomosis L -> V





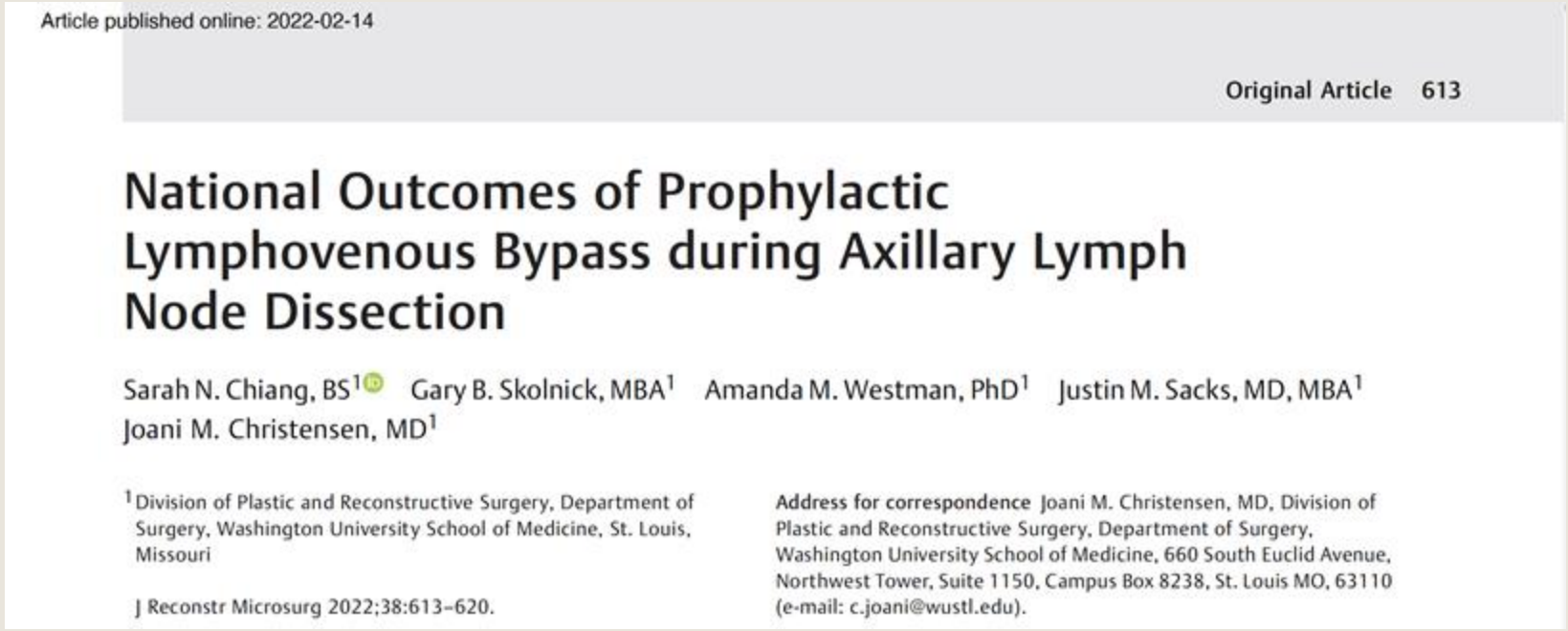
Intra-Operative Technique

ICG Flowing into Vein and beyond



Anastomosis here, Flowing Left to Right

Outcomes



Article published online: 2022-02-14

National Outcomes of Prophylactic Lymphovenous Bypass during Axillary Lymph Node Dissection

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[1] Division of Plastic and Reconstructive Surgery, Department of Surgery, Washington University School of Medicine, St. Louis, Missouri

Address for correspondence Joani M. Christensen, MD, Division of Plastic and Reconstructive Surgery, Department of Surgery, Washington University School of Medicine, 660 South Euclid Avenue, Northwest Tower, Suite 1150, Campus Box 8238, St. Louis MO, 63110 (e-mail: c.joani@wustl.edu).

J Reconstr Microsurg 2022;38:613–620.

- ACS NSQIP database, **ALND with and without ILR**
- 2013 to 2018: **45,057** ALND alone vs **255** with ILR
- ILR increased OR time (288 vs 147min). **Added ~ 2h+**
- No diff in reoperation, wound dehiscence, infection

Outcomes

LYMPHATIC MICROSURGICAL PREVENTING HEALING APPROACH (LYMPHA) FOR PRIMARY SURGICAL PREVENTION OF BREAST CANCER-RELATED LYMPHEDEMA: OVER 4 YEARS FOLLOW-UP

FRANCESCO BOCCARDO M.D., Ph.D.,[1]* FEDERICO CASABONA M.D.,[2] FRANCO DeCIAN M.D.,[3] DANIELE FRIEDMAN M.D.,[4] FEDERICA MURELLI M.D.,[4] MARIA PUGLISI M.D.,[4] CORRADO C. CAMPISI M.D.,[5] LIDIA MOLINARI M.D.,[1] STEFANO SPINACI M.D.,[1] SARA DESSALVI M.D.,[1] and CORRADINO CAMPISI M.D., Ph.D., F.A.C.S.[1]

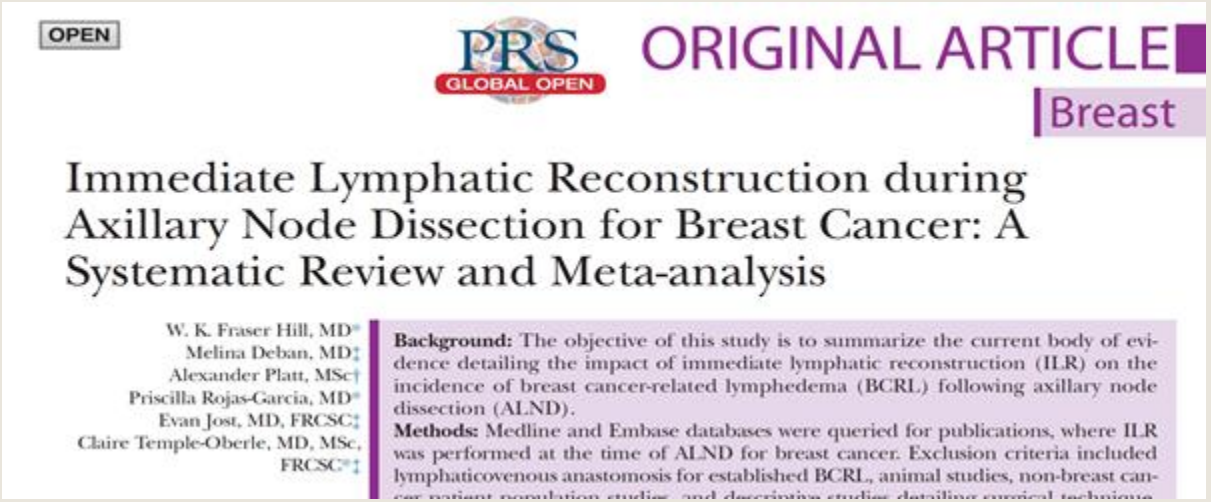
- July 2008 to December 2012, 78 patients ALND**, 74 ILR**
- **3 patients had lymphedema** (8-12 months postop)
- RT caused edema in 8 patients, transient in 5, permanent in 3

Table 3. Lymphedema Rate

Techniques	Lymphedema rate (%)
LYMPHA	4.05
Sentinel node	6–13
Axillary dissection	13–65

Outcomes

- **Systematic review and meta-analysis**
  - Risk Ratio of 0.22, **Favors ILR**
  - Number needed to treat = 4



OPEN

PRS GLOBAL OPEN

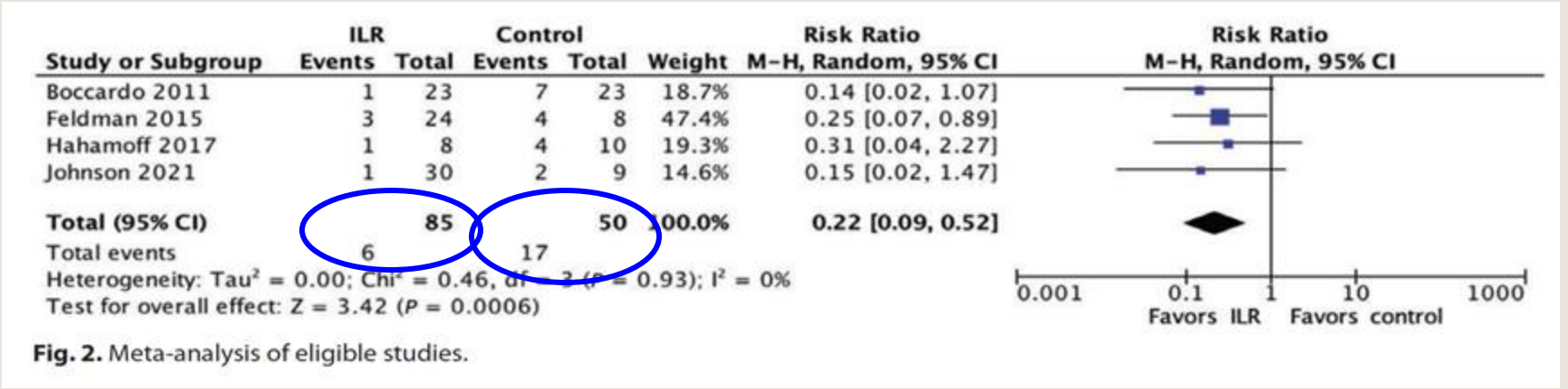
ORIGINAL ARTICLE

Breast

Immediate Lymphatic Reconstruction during Axillary Node Dissection for Breast Cancer: A Systematic Review and Meta-analysis

W. K. Fraser Hill, MD
Melina Deban, MD
Alexander Platt, MSc
Priscilla Rojas-Garcia, MD
Evan Jost, MD, FRCSC
Claire Temple-Oberle, MD, MSc, FRCSC

Background: The objective of this study is to summarize the current body of evidence detailing the impact of immediate lymphatic reconstruction (ILR) on the incidence of breast cancer-related lymphedema (BCRL) following axillary node dissection (ALND).
Methods: Medline and Embase databases were queried for publications, where ILR was performed at the time of ALND for breast cancer. Exclusion criteria included lymphaticovenous anastomosis for established BCRL, animal studies, non-breast cancer patient population studies, and descriptive studies detailing surgical technique



Study or Subgroup	ILR Events	ILR Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI
Boccardo 2011	1	23	7	23	18.7%	0.14 [0.02, 1.07]
Feldman 2015	3	24	4	8	47.4%	0.25 [0.07, 0.89]
Hahamoff 2017	1	8	4	10	19.3%	0.31 [0.04, 2.27]
Johnson 2021	1	30	2	9	14.6%	0.15 [0.02, 1.47]
Total (95% CI)		**85**		**50**	**100.0%**	**0.22 [0.09, 0.52]**
Total events	6		17			

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.46$, df = 3 ($P = 0.93$); $I^2 = 0\%$
Test for overall effect: $Z = 3.42$ ($P = 0.0006$)

Risk Ratio M-H, Random, 95% CI

0.001 0.1 1 10 1000

Favors ILR Favors control

Fig. 2. Meta-analysis of eligible studies.

Outcomes

- Prospective observational study
- 66 patients underwent ARM & ILR
  - Lymphedema: 44 % Control, vs. 6% Intervention

Reverse Lymphatic Mapping and Immediate Microsurgical Lymphatic Reconstruction Reduces Early Risk of Breast Cancer–Related Lymphedema

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Nicole K. Le, M.D.
Ellen Robertson, M.D.
Amanda Zimmerman, M.P.H., M.D.
Tina Tavares, R.N.
Thanh Tran, M.P.H.
Christine Laronga, M.D.
Nicholas J. Panetta, M.D.
Tampa, Fla.

Background: Breast cancer–related lymphedema is a progressive disease that poses tremendous physical, psychosocial, and financial burden on patients. Immediate lymphaticovenular anastomosis at the time of axillary lymph node dissection is emerging as a potential therapeutic paradigm to decrease the incidence of breast cancer–related lymphedema in high-risk patients.
Methods: Eighty-one consecutive patients underwent reverse lymphatic mapping and, when feasible, supermicrosurgical immediate lymphaticovenular anastomosis at the time of axillary lymph node dissection at a tertiary care cancer center. Patients were followed prospectively in a multidisciplinary lymphedema clinic (plastic surgery, certified lymphatic therapy, dietary, case management) at 3-month intervals with clinical examination, circumferential limb girth mea-

Table 4. Comparison of Retrospective Control Group (Axillary Lymph Node Dissection) with Intervention Group (Axillary Lymph Node Dissection, Reverse Lymphatic Mapping, and Immediate Lymphaticovenular Anastomosis)

	Retrospective Control Group (ALND and no RLM or ILVA) (%)	Intervention Group (ALND, RLM, and ILVA) (%)	*p*
No. of patients	66	66	
Mean age, yr	51	53	0.30
Mean BMI, kg/m^2	29	29	1.00
Radiation therapy	60 (91)	46 (70)	0.004
Development of lymphedema	29 (44)	4 (6)	<0.0001

ALND, axillary lymph node dissection; RLM, reverse lymphatic mapping; ILVA, immediate lymphaticovenular anastomosis; BMI, body mass index.

Table 3. Characteristics of Patients Who Developed Lymphedema Despite Immediate Lymphaticovenular Anastomosis

Patient	Age (yr)	BMI (kg/m^2)	Neoadjuvant Chemotherapy	Adjuvant Radiation Therapy	Adjuvant Chemotherapy	Onset of Symptoms (mo)
1	45	25		✓	✓	5
2	41	42	✓	✓		14
3	37	40	✓	✓	✓	5
4	54	24	✓	✓	✓	5

BMI, body mass index.

Outcomes - RCT

ASA PAPER

Efficacy of Immediate Lymphatic Reconstruction to Decrease Incidence of Breast Cancer-related Lymphedema

Preliminary Results of Randomized Controlled Trial

Michelle Coriddi, MD,✉ Joseph Dayan, MD,* Emily Bloomfield, NP,* Leslie McGrath, NP,* Richard Diwan, MS,* Jasmine Monge, BS,* Julia Gutierrez, BA,* Stav Brown, MD,* Lillian Boe, PhD,† and Babak Mehrara, MD**

- **RCT, Randomized in OR,** 1:1. ILR or no ILR
- Preliminary results, 72 enrolled in each arm
- Goal is 24-month follow up. Currently 99 patients with 12-month f/u
- BCRL defined as **10% relative volume change**
- **BCRL 9.5% in ILR group and 32% in control group**
- ILR group: higher QOL, improved lymphatic function

Recommendations

Multinational Association of Supportive Care in Cancer (MASCC) clinical practice guidance for the prevention of breast cancer-related arm lymphoedema (BCRAL): international Delphi consensus-based recommendations

Henry C. Y. Wong,[a,k] Matthew P. Wallen,[b,k] Adrian Wai Chan,[c,k] Narayanee Dick,[b] Pierluigi Bonomo,[d] Monique Bareham,[e,f] Julie Ryan Wolf,[g] Corina van den Hurk,[h] Margaret Fitch,[i] Edward Chow,[j,l] and Raymond J. Chan,[b,l,] on behalf of the MASCC BCRAL Expert Panel and the Oncodermatology and Survivorship Study Groups*

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[b]Caring Futures Institute, College of Nursing and Health Sciences, Flinders University, Adelaide, Australia
[c]Department of Clinical Oncology, Tuen Mun Hospital, Hong Kong S.A.R, China
[d]Department of Radiation Oncology, Azienda Ospedaliero-Universitaria Careggi, University of Florence, Italy
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[f]South Australia Lymphoedema Compression Garment Subsidy Advisory Group, South Australia, Australia
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- For patients at high risk of BCRL:
- **prophylactic compression sleeves,**
- **prophylactic lymphatic reconstruction** should be offered.

Impact of Radiation?

- What is the impact of RT on the anastomosis?

	Le, 2023	Coriddi, 2023	Johnson, 2019	Weinstein, 2019
N ILR (vs not)	252 (vs 29)	72 (vs 72)	32	66
F/U (months)	NR	12-24	11.4	8.3
Adjuvant RT (axillary)	82%	90% (88%)	88% (82%)	70%
Lymphedema post ILR (vs not)	4.8% (vs 24.1%)	9.5% (vs 32%)	3.1%	6%

Impact of RT

Lymphedema Incidence After Axillary Lymph Node Dissection

Quantifying the Impact of Radiation and the Lymphatic Microsurgical Preventive Healing Approach

Anna Rose Johnson, MPH, Sarah Kimball, MD,† Sherise Epstein, MD, MPH,*‡ Abram Recht, MD,§ Samuel J. Lin, MD, MBA,* Bernard T. Lee, MD, MBA, MPH,* Ted A. James, MD, MS,|| and Dhruv Singhal, MD**

- 19 studies
  - 3 RCT, 5 prospective, 11 retrospective
  - Median follow-up ranging from 6 to 119 months
- 3035 patients

TABLE 4. Differences in Pooled Incidence Rates of LE by Type of Intervention

Intervention *a*	Incidence of LE (*n*)	Intervention *b*	Incidence of LE (*n*)	$\lvert a_n - b_n \rvert$, %	*P*
ALND	14.1% (200/1419)	ALND with RLNR	33.4% (504/1510)	19.3	<0.001
ALND	14.1% (200/1419)	ALND with LYMPHA	2.1% (1/48)	12.0	0.029
ALND with RLNR	33.4% (504/1510)	ALND with RLNR and LYMPHA	10.3% (6/58)	23.1	0.004

Impact of RT

- Buchan et. al (Cleveland Clinic, Ohio), 2021, J of Plastic, Reconstructive & Aesthetic Surgery
  - 15 patients post ALND + ILR and repeat ICG lymphography
  - 15.6 months from surgery, 11.3 months from RT
  - Linear lymphatic transit in 12 patients (all had RT), none had lymphedema
    - 7/12 showed linear ICG flow from the arm to axilla

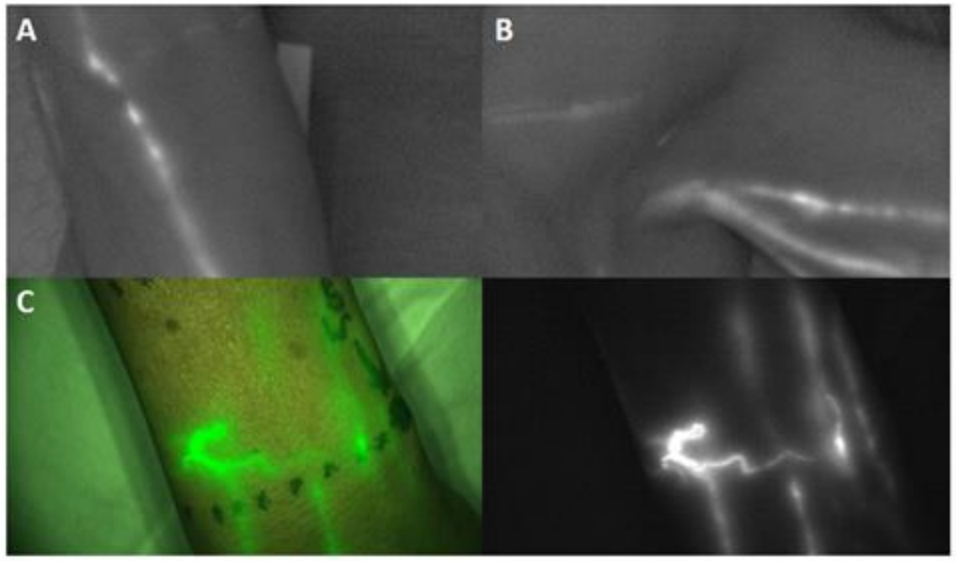


Figure 2 Repeat ICG lymphographic studies taken during second-stage reconstructive procedures. (A) Linear flow through radial forearm. (B) Linear flow into the left axilla (anterior view). (C) Mostly linear flow with localized area of lymphatic ectasia in radial forearm.

Oncologic safety

Oncologic safety of axillary lymph node dissection with immediate lymphatic reconstruction

Hope M. Guzzo[1] · Stephanie A. Valente[1] · Graham S. Schwarz[2] · Ayat ElSherif[1] · Stephen R. Grobmyer[3] · Cagri Cakmakoglu[2] · Risal Djohan[2] · Steven Bernard[2] · Julie E. Lang[1] · Debra Pratt[1] · Zahraa Al-Hilli[1]

- Between 2016 and 2020, 137 patients underwent ALND + ILR
- Median follow-up of 32.9 months
- No axillary recurrence
- One local recurrence in breast and axillary skin (had declined adjuvant treatment)
- 16 patients (12%) developed distant metastasis

Oncologic safety

- Retrospective review between 2020-2022
- 32 patients with breast cancer and ALND, 34 patients with breast cancer, ALND and ILR
- Average follow-up period 21.8 months

Is Immediate Lymphatic Reconstruction on Breast Cancer Patients Oncologically Safe? A Preliminary Study

Ying-Sheng Lin, MD, MPH*
Chen-Hsiang Kuan, MD, PhD†

Background: In breast cancer patients receiving axillary lymph node dissection

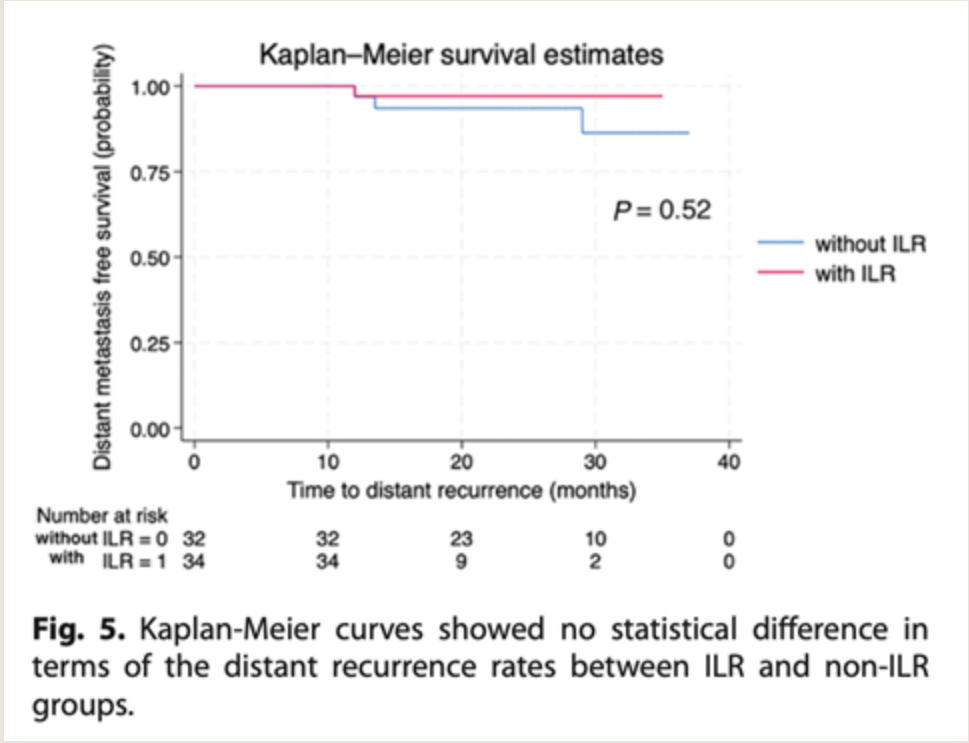
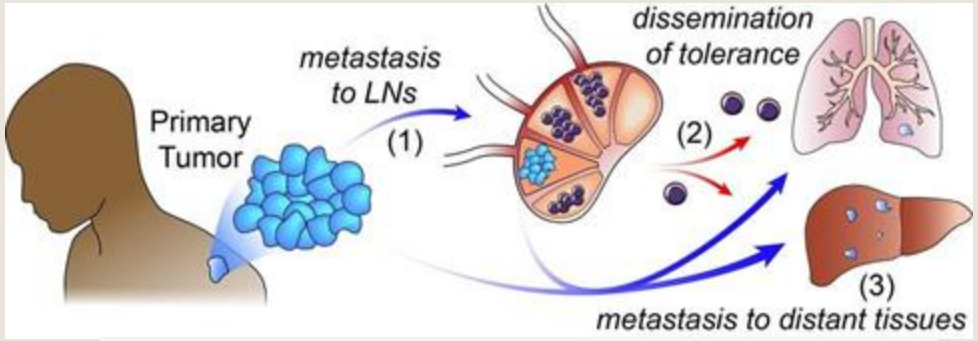


Fig. 5. Kaplan-Meier curves showed no statistical difference in terms of the distant recurrence rates between ILR and non-ILR groups.

Oncologic safety

- Small studies, short follow-up
- But…
- Lymphatics from arm
- Nodal disease systemic therapy, radiation
- Anastomosis of lymphatics to vein unlikely to spread disease further

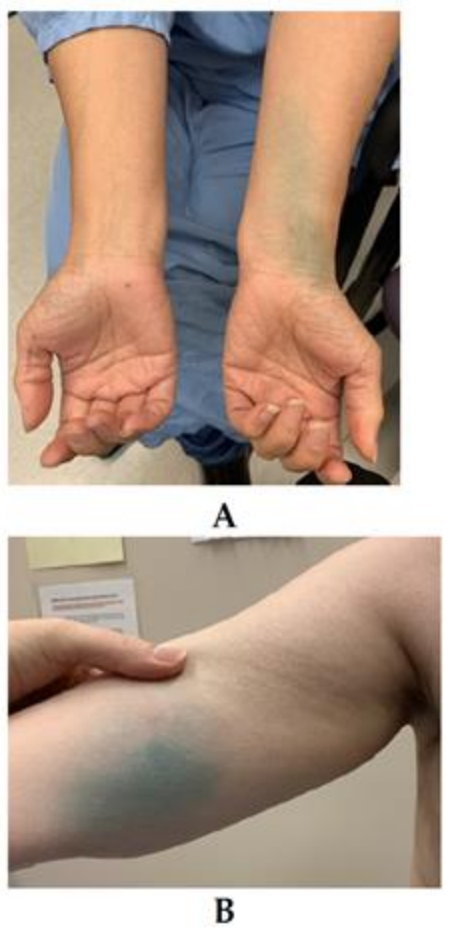


Credit: Nathan Reticker-Flynn, Ph.D., NCI, 2022

ILR at UBC

- Patient selection
  - Inclusion criteria: **all ALND 18 yo and above**
  - Exclusion criteria: Metastatic, surgery during pregnancy, **allergy to blue dye**, ASA 4 and above,
    - **Intraoperative conversion** to ALND, previous ALND
  - Relative Exclusion: **BMI > 35**, age > 80

  - Important for patients to know:
  - Permanent tattooing where patent blue is injected
  - Longer procedure under general anesthesia
  - Postop: **No shoulder Abduction > 90 degrees for 2 weeks**



Postoperative follow-up

- Lymphedema Clinic at UBC
  - Multidiscipline. We're integrating PT for measurements and a Physiatrist.
- **Additional Follow-up**: 6 months, 12 months, 3 years, 5 years, 10 years
- Circumferential arm measurements (Manual or with Perometer)
- Bioimpedance
- ICG lymphography
- Patient-reported outcomes

UBC Results to date

Summary of breast cancer patients who have received ALND with ILR from January 1, 2024, to October 31, 2024.

ALND + ILR (n=37)

ALND Sequence	
Planned ALND upfront	21 (57)
SLNB with positive LN, followed by completion ALND	16 (43)

ALND Only (n=11)

ALND Sequence	
Planned ALND upfront	6 (55)
SLNB with positive LN, followed by completion ALND	5 (45)

Demographics/Clinical Characteristics	n (%)
Median age at surgery (years)	55 (34 – 80)
Health authority	
VCH	29 (78)
FHA	5 (14)
IHA	1 (<3)
NHA	1 (<3)
Yukon	1 (<3)
Neoadjuvant treatment	
Chemotherapy	28 (76)
Hormone therapy	1 (<3)
None	8 (22)
Pathology	
IDC	25 (68)
ILC	8 (22)
DCIS	1 (<3)
Other	3 (8)
pT	
0	7 (19)
1	7 (19)
2	14 (38)
3	8 (22)
4	1 (<3)

pN	
0	11 (30)
1	11 (30)
2	10 (27)
3	5 (<14)
Grade	
1	5 (<14)
2	16 (43)
3	11 (30)
Unknown	5 (<14)
ER	
Positive	25 (68)
Negative	12 (32)
PR	
Positive	23 (62)
Negative	14 (38)
HER2	
Positive	9 (24)
Negative	28 (76)
Breast surgical procedure	
Partial mastectomy/BCS/wide local excision	11 (30)
BCS with oncoplastic approach	5 (14)
Total mastectomy	6 (16)
Skin sparing mastectomy (with recon)	8 (22)
Nipple sparing mastectomy (with recon)	3 (<8)
None	4 (11)
Breast reconstruction procedure	
Tissue expander	9 (24)
Permanent implant with bioprosthesis	2 (5)
DIEP	0 (0)
TRAM	2 (5)
Other	1 (3)
Not applicable, BCS done	15 (41)
None/not planned	8 (22)

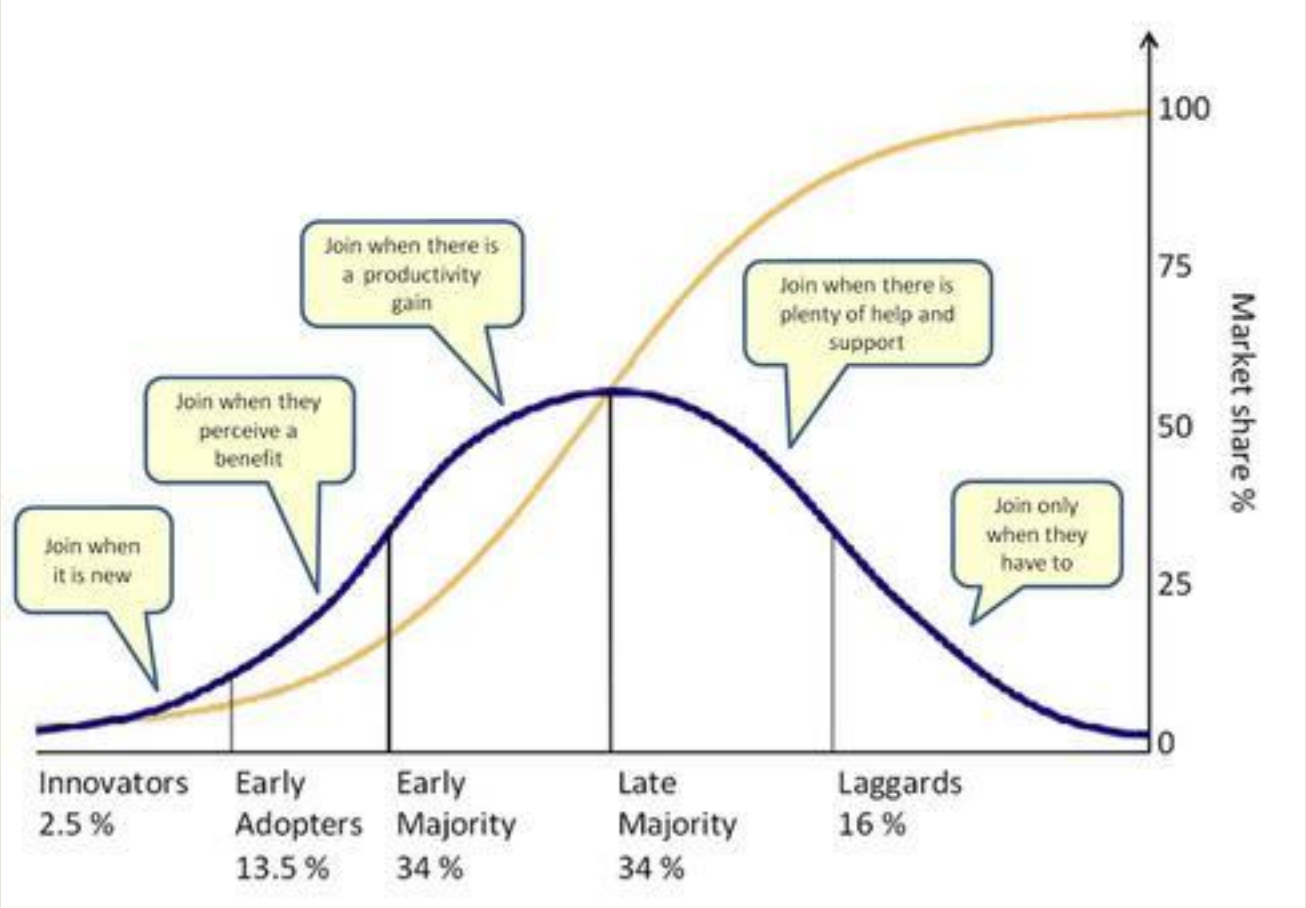
UBC Results

Large majority more than 1 Anastomosis

- Dr. Jenna Senger's group from Ohio State showed:
- **2 or more vs. 1 LVB** decreased lymphedema rates

ILR Procedure	
Type of anastomoses*	
Intussusception	34 (92)
End to end	10 (27)
End to side	3 (8)
Number of anastomoses	
1	3 (8)
2	19 (51)
3	11 (30)
4	2 (<6)
Unknown	2 (<6)
Vein used*	
Thoracoepigastric vein	16 (43)
Medial pectoral vein	6 (16)
Lateral pectoral vein	8 (22)
Thoracodorsal vein	6 (16)
Lateral thoracic vein	2 (6)
Side branch of axillary vein	8 (22)
Unnamed vein	5 (14)

Adopting change



https://www.informationweek.com/it-leadership/5-social-business-adopter-types-prepare-early

The future

ACTIVE, NOT RECRUITING

Lymphaticovenous Anastomosis as Treatment for Lymphedema

ClinicalTrials.gov ID NCT05441943

Sponsor Odense University Hospital

RECRUITING

A Study Comparing Quality of Life in Patients With Lymphedema Who Undergo Surgical Treatment Versus Non-Surgical Management

ClinicalTrials.gov ID NCT03248310

Sponsor Memorial Sloan Kettering Cancer Center

RECRUITING

The LYMPH Trial - Surgical Versus Conservative Complex Physical Decongestion Therapy for Chronic Breast Cancer-Related Lymphedema (LYMPH)

ClinicalTrials.gov ID NCT05890677

Sponsor University Hospital, Basel, Switzerland

RECRUITING

The LYMPH Trial - Surgical Versus Conservative Complex Physical Decongestion Therapy for Chronic Breast Cancer-Related Lymphedema (LYMPH)

ClinicalTrials.gov ID NCT05890677

Sponsor University Hospital, Basel, Switzerland

VGH UBC LYMPHEDEMA PROGRAM - Canadian site

RECRUITING

Added Value of Reconstructive Lymphatic Surgery to Usual Care in Lymphoedema (SurLym)

ClinicalTrials.gov ID NCT05064176

Sponsor Universitaire Ziekenhuizen KU Leuven

The future

Can ILR Reduce the Risk of Arm Lymphedema?

ClinicalTrials.gov ID NCT05742945

Sponsor National Taiwan University Hospital

Does Immediate Lymphatic Reconstruction Decrease the Risk of Lymphedema After Axillary Lymph Node Dissection

ClinicalTrials.gov ID NCT04241341

Sponsor Memorial Sloan Kettering Cancer Center

Axillary Node Dissection w or w/o LVB in Node Positive Breast Cancer Patients

ClinicalTrials.gov ID NCT05970107

Sponsor Case Comprehensive Cancer Center

LymphoVenous Anastomosis to Prevent Breast Cancer Related Lymphedema (LVARCT)

ClinicalTrials.gov ID NCT05601037

Sponsor University Hospital, Ghent

Lymphovenous Bypass Procedure Before Underarm Lymph Node Surgery in Preventing Lymphedema in Patients With Inflammatory or Locally Advanced Non-inflammatory Breast Cancer

ClinicalTrials.gov ID NCT03941756

Sponsor M.D. Anderson Cancer Center

A Study of a Comprehensive Prevention Program to Reduce Lymphedema After Axillary Lymph Node Dissection in People With Breast Cancer

ClinicalTrials.gov ID NCT06144164

Sponsor Memorial Sloan Kettering Cancer Center

QUESTIONS?

Outcomes

BREAST

A 4-Year Institutional Experience of Immediate Lymphatic Reconstruction

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Boston, MA; St. Louis, MO; and Portland, ME

Background: Up to one in three patients may go on to develop breast cancer–related lymphedema (BCRL) after treatment. Immediate lymphatic reconstruction (ILR) has been shown in early studies to reduce the risk of BCRL, but long-term outcomes are limited because of its recent introduction and institutions' differing eligibility requirements. This study evaluated the incidence of BCRL in a cohort that underwent ILR over the long term.

Methods: A retrospective review of all patients referred for ILR at the authors' institution from September of 2016 through September of 2020 was performed. Patients with preoperative measurements, a minimum of 6 months of follow-up data, and at least one completed lymphovenous bypass were identified. Medical records were reviewed for demographics, cancer treatment data, intraoperative management, and lymphedema incidence.

Results: A total of 186 patients with unilateral node-positive breast cancer

- Retrospective study, n=186 ILR
- Sept 2016 to Sept 2020. **Median Follow-up: 17 months** (6 - 49)
- BCRL defined as **10% relative volume change**
- **Radiation 87%** of patients
- N=90 full data set for and f/u; **BCRL 9% in ILR group**
- ILR group: higher QOL, improved lymphatic function