Surgery for the Prevention and Treatment of Lymphedema

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➲ Instructions for Use

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Related Commercial/Individual Exchange Policy
- Pneumatic Compression Devices

Community Plan Policy
- Surgery for the Prevention and Treatment of Lymphedema

Medicare Advantage Policy
- Surgical Procedures

Application

UnitedHealthcare Commercial

This Medical Policy applies to UnitedHealthcare Commercial benefit plans.

UnitedHealthcare Individual Exchange

This Medical Policy applies to Individual Exchange benefit plans.

Coverage Rationale

Surgical procedures for the prevention or treatment of Lymphedema are unproven and not medically necessary due to insufficient evidence of safety and/or efficacy. These procedures include but are not limited to:

- Axillary Reverse Mapping (ARM)
- Liposuction/Lipectomy
- Microsurgical treatment
  - Lymphaticovenular/Lymphaticovenous Anastomosis
  - Lymphovenous bypass
- Vascularized Lymph Node Transfer

Definitions

Axillary Reverse Mapping: A technique that injects blue dye in the upper extremity to allow visualization and preservation of lymphatic channels and lymph nodes during axillary lymph node dissection (Jena et al., 2021).

Liposuction/Lipectomy: A procedure that uses vacuum suction to remove subcutaneous adipose tissue in certain anatomical areas (Bartow and Raggio, 2023).

Lymphaticovenular/Lymphaticovenous Anastomosis: A surgical procedure that connects small lymphatic vessels to adjacent venules to shunt excess lymphatic fluid (American Society of Plastic Surgeons).

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Lymphedema: The buildup of fluid in soft body tissues when the lymph system is damaged or blocked (National Cancer Institute, 2024).

Vascularized Lymph Node Transfer: A surgical procedure that transfers skin, fat, and lymph nodes for lymphatic reconstruction (American Society of Plastic Surgeons).

Applicable Codes

The following list(s) of procedure and/or diagnosis codes is provided for reference purposes only and may not be all inclusive. Listing of a code in this policy does not imply that the service described by the code is a covered or non-covered health service. Benefit coverage for health services is determined by the member specific benefit plan document and applicable laws that may require coverage for a specific service. The inclusion of a code does not imply any right to reimbursement or guarantee claim payment. Other policies and guidelines may apply.

CPT Code	Description
1019T	Lymphovenous bypass, including robotic assistance, when performed, per extremity
15830	Excision, excessive skin and subcutaneous tissue (includes lipectomy); abdomen, infraumbilical panniculectomy
15832	Excision, excessive skin and subcutaneous tissue (includes lipectomy); thigh
15833	Excision, excessive skin and subcutaneous tissue (includes lipectomy); leg
15834	Excision, excessive skin and subcutaneous tissue (includes lipectomy); hip
15835	Excision, excessive skin and subcutaneous tissue (includes lipectomy); buttock
15836	Excision, excessive skin and subcutaneous tissue (includes lipectomy); arm
15837	Excision, excessive skin and subcutaneous tissue (includes lipectomy); forearm or hand
15838	Excision, excessive skin and subcutaneous tissue (includes lipectomy); submental fat pad
15839	Excision, excessive skin and subcutaneous tissue (includes lipectomy); other area
15847	Excision, excessive skin and subcutaneous tissue (includes lipectomy), abdomen (e.g., abdominoplasty) (includes umbilical transposition and fascial plication) (List separately in addition to code for primary procedure)
15876	Suction assisted lipectomy; head and neck
15877	Suction assisted lipectomy; trunk
15878	Suction assisted lipectomy; upper extremity
15879	Suction assisted lipectomy; lower extremity
38999	Unlisted procedure, hemic or lymphatic system
49906	Free omental flap with microvascular anastomosis

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Description of Services

Lymphedema is a chronic, progressive, and often incurable disease in which there is impaired drainage of interstitial fluid through the lymphatic system that results in the accumulation of fluid and hypertrophic fat. There are two types of Lymphedema. Primary Lymphedema, in which there is abnormal development of the lymphatic system, and secondary Lymphedema, which is caused by damage to the lymphatic system from trauma, infections, and cancer surgeries and radiation. It is characterized by nonpitting swelling of an extremity (that typically excludes the fingers and toes) or trunk. It is associated with wound healing impairment, recurrent skin infections, and decreased quality of life.

The first-line treatment of Lymphedema is conservative management with complete decongestive therapy, which is a combination of compressive garments, skin hygiene, limb compression, manual lymphatic drainage, and exercise. Pneumatic compression may also provide additional improvement when used adjunctively. In individuals whose Lymphedema is not controlled by complete decongestive therapy, surgical procedures such as Liposuction/Lipectomy, subcutaneous excision, and microsurgical procedures such as lymphovenous bypass and Vascularized Lymph Node Transfer have been proposed (Kareh and Xu, 2020; National Cancer Institute, 2019). Lymphovenous bypass is a super-microsurgical technique in which an anastomosis is created between the congested lymphatic vessel and a vein to improve lymphatic fluid transport.

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Axillary Reverse Mapping is a technique that is used during lymph node dissection in which a dye is injected into the upper arm to identify the lymphatics and lymph nodes that are primarily draining that extremity. It is hypothesized to help the surgeon identify and potentially preserve those lymph nodes or, in some cases, remove the lymph nodes but preserve the lymphatics of the upper arm.

Clinical Evidence

Axillary Reverse Mapping

While promising, many studies on axillary reverse mapping (ARM) involve relatively small cohorts of individuals, short follow-up periods, and inconsistent mapping and nodal dissection techniques and lack standardized outcome measures. These limit the generalizability of the results; make it difficult to assess the long-term efficacy and risks, particularly regarding lymphedema development over time; and make it complex to draw definitive conclusions regarding the safety, efficacy, and long-term outcomes of ARM for preventing lymphedema, as well as noninferior oncological outcomes.

Kumar et al. (2026) conducted a prospective case-control study to evaluate the role of ARM in participants who were undergoing modified radical mastectomy (MRM) for breast cancer. The study included 100 participants: 50 underwent MRM with ARM, and 50 underwent standard MRM. ARM was performed using methylene blue dye to identify arm-draining lymphatics during axillary lymph node dissection (ALND). Participants were followed up for 3 and 6 months and 1 year, and lymphedema was assessed by measuring arm circumference. The ARM group had a lower mean number of lymph nodes removed than the non-ARM group (11.42 vs 12.67; $p = 0.0088$). At all follow-up time points, the ARM group had slightly smaller mean increases in arm circumference than the non-ARM group; however, these differences were not statistically significant (all $p > 0.05$). Ten participants in the non-ARM group developed early postoperative grade 1 lymphedema, whereas no cases were reported in the ARM group. No axillary recurrences were observed during the 1-year follow-up period. The authors concluded that ARM may reduce the severity of lymphedema but does not completely prevent it. The study did not demonstrate statistically significant differences in arm circumference outcomes between groups. This study is limited by the relatively small sample size, short 1-year follow-up period, potential confounding from chemotherapy and radiotherapy received by most participants, use of arm circumference measurements rather than more sensitive methods for detecting lymphedema, and concerns regarding lymphatic crossover that may affect oncological safety. Larger studies, with longer follow-up, are needed to better determine its effectiveness.

Tokocin et al. (2026) conducted a retrospective cohort study to evaluate the association between ARM, breast cancer–related lymphedema (BCRL), and oncological outcomes in older women who were undergoing ALND for invasive breast cancer. The study included 138 women, with a median age of 72.5 years, who underwent ALND between 2018 and 2024, including 72 patients in the ARM group and 66 patients in the standard ALND group. Individuals were followed up for a mean of 46.5 ±8.8 months, and lymphedema was assessed using blinded circumference measurements and bioimpedance spectroscopy. Baseline demographic, clinicopathologic, and treatment characteristics were comparable between groups. Patients in the ARM group had a lower incidence of clinically relevant lymphedema (grades 2-3) than patients in the non-ARM group (18.1% vs 60.6%; $p < 0.0001$). In comparison, rates of subclinical lymphedema (grade 1) were similar between groups (31.9% vs 27.3%; $p = 0.55$). The overall incidence of any lymphedema was also lower in the ARM group (50.0% vs 87.9%; $p < 0.0001$). A Kaplan-Meier analysis demonstrated better clinically relevant lymphedema-free survival in the ARM group (log-rank $p = 0.00019$). In a multivariable Cox regression analysis, ARM was associated with a lower incidence of clinically relevant lymphedema (adjusted hazard ratio, 0.22; 95% CI, 0.11-0.44; $p < 0.0001$). Recurrence rates were similar between groups (8.3% vs 10.6%; $p = 0.776$), and no significant differences were observed in locoregional recurrence or distant metastasis rates. The authors concluded that ARM is technically feasible as an adjunct to ALND and that patients who underwent ARM had lower rates of clinically relevant lymphedema without evidence of compromised oncological outcomes. The authors suggested that ARM should be considered in appropriately selected, older adults who are undergoing ALND. This study has several limitations, including a retrospective design; nonrandomized group allocation; potential selection bias; a single-center setting; a focus on an older patient population, which may limit generalizability; and the absence of patient-reported outcome measures that directly assessed symptom burden or quality of life (QOL). Larger, prospective studies that include longer follow-up and patient-reported outcome measures are needed to further evaluate the long-term effectiveness and safety.

Boczar et al. (2026) conducted a systematic review of clinical studies that evaluated ARM to prevent lymphedema during breast cancer treatment. Five studies met the eligibility criteria and totaled 501 individuals. Reverse mapping was performed using radiography or single-photon emission computed tomography/computed tomography to identify lymphatic drainage of the arm during ALND and radiotherapy, allowing the preservation of noncompromised lymphatic tissue. With sentinel lymph node biopsy, ARM was used in one study to identify individuals who were at a high risk of lymphedema. The primary end point was incidence of lymphedema. In the only comparative cohort study included (n = 60), the results

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showed that the lymphedema incidence was 33% (five of 15) with nodes removed normally vs 9% (four of 45) with selective axillary dissection (AD) using reverse mapping (p = 0.035). The authors concluded that the use of ARM to prevent lymphedema is feasible and may provide valuable information for breast cancer treatment. These results are limited by the small number of eligible studies, limited overall sample size, heterogeneity in ARM techniques and treatment approaches, and limited comparative evidence, as only one study directly evaluated ARM against standard care. Additional high-quality research that addresses these limitations, as well as oncological outcomes is needed.

Zeng et al. (2025) conducted a retrospective cohort study to evaluate risk factors for postoperative lymphedema in patients with breast cancer and to assess the association between ARM, lymphedema, and postoperative QOL. The study included 232 patients who underwent AD; 54 developed lymphedema, and 178 did not. Patients were also grouped according to whether they underwent ARM (mapping group, n = 133) or standard surgery (control group, n = 99). The results using multivariable logistic regression showed that chemotherapy [odds ratio (OR), 4.063; 95% CI, 1.870-8.827; p < 0.001] and radiotherapy (OR, 3.358; 95% CI, 1.635-6.896; p < 0.001) were associated with increased odds of postoperative lymphedema, while ARM was associated with lower odds (OR, 0.322; 95% CI, 0.149-0.694; p = 0.004). The distribution of lymphedema stages differed between groups (χ^2 = 18.153; p < 0.001), with a higher proportion of patients in the ARM group classified as stage 0 lymphedema (86.46% vs 63.67%). Patients in the ARM group had higher scores on the Quality of Working Life Questionnaire for Cancer Survivors (71.04 ±12.31 vs 68.26 ±8.37; p = 0.041), Breast Cancer Survivors Resilience scale (23.89 ±6.32 vs 21.56 ±5.41; p = 0.003), and Strategies Used by People to Promote Health scale (85.65 ±12.57 vs 81.21 ±6.52; p = 0.001). The authors stated that these differences were statistically significant. The authors concluded that chemotherapy and radiotherapy were associated with postoperative lymphedema and that ARM may be beneficial for reducing lymphedema risk and enhancing postoperative QOL. Limitations of these findings include the retrospective design, potential biases associated with record-based data collection, lack of long-term follow-up, and possible variation in ARM effectiveness related to surgical technique and patient anatomy. Furthermore, a higher percentage of patients in the ARM group had stage 0 lymphedema. Additional research is needed that addresses these limitations.

Fan et al. (2025) conducted a systematic review and meta-analysis to evaluate the QOL with and oncological outcomes of ARM used for the prevention of lymphedema in individuals with breast cancer. Seven randomized controlled trials (RCTs) and observational studies, which comprised 1,820 individuals, were included; 866 individuals were included in the ARM group, and 954 were included in the control group (individuals without ARM). A random-effects model showed that there was a significant difference in QOL between the two groups that favored ALN, with no significant difference in shoulder dysfunction or hematoma. Four of the studies assessed the number of retrieved lymph nodes, and there was no difference in the number. There was also no difference in the number of positive lymph nodes in the three reporting studies. The authors concluded that ARM reduces the incidence of upper limb lymphedema; however, regarding oncological outcomes, the existing tracing technology cannot guarantee the correct identification of the lymphatic system between the breast and arm, leading to an increased risk of metastasis in retained nodes. Additional multicenter RCTs are needed to further evaluate the efficacy and safety of ARM.

Co et al. (2022) conducted a systematic review and pooled analysis of RCTs to evaluate the role of ARM compared with that of conventional AD in breast cancer surgery. The primary objective was to compare the postoperative lymphedema rate. The secondary aim was oncological safety, as shown by the possibility of ARM nodal metastasis and axillary recurrence rate. Five RCTs, which comprised 1,696 individuals with comparable demographics, were included. Among them, 802 individuals received ARM, and 894 received AD. The majority of the individuals had invasive ductal carcinoma with T2 tumor staging and N1 nodal metastasis. All included RCTs used methylene blue as the mapping agent, with two using additional radioisotope and fluorescent detection as secondary mapping. The number of ARM-detected nodes varied from one to three. Lymphedema measurement was either limb circumference or volumetry. The results showed an overall lower rate of postoperative lymphedema in the ARM individuals across all RCTs. The pooled lymphedema rate in the ARM group was 4.8% compared with 18.8% in the AD group. The axillary recurrence rate was identical in the two groups at 1.03%, and all occurred in one RCT (which included most of the individuals in this systematic review) at 37 months, with no other RCTs reporting a recurrence in follow-up ranging from 6 to 33 months. The authors concluded that these results show that ARM is feasible and noninferior to AD. These results are limited by one RCT providing the majority of the individuals (1,191); additionally, there was a wide range of follow-up on oncological safety, differing outcome measurements for lymphedema improvement, and variations in ARM technique. Further high-quality research that focuses on standardized procedures and oncological outcomes is needed.

Abbaci et al. (2022) reported the results of the ARMONIC clinical trial that assessed the ARM technique in a large cohort of participants and analyzed the predictive clinical factors for ARM lymph node metastasis. The study was conducted to determine whether fluorescence signal intensity in ARM nodes could be a predictive factor of subsequent lymphedema. Overall, 109 participants received mastectomy and ALND for primary cancer. Prior to mastectomy incision, indocyanine green (ICG) was injected intradermally in the ipsilateral upper extremity in the second interdigital space and then on the

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inner face of the elbow. The presence of ICG was then detected with a near-infrared fluorescence camera. After mastectomy and during ALND, fluorescent lymph nodes were identified by the surgeon, removed separately, and isolated from the rest of the axillary lymph nodes for pathological examination. The results showed that fluorescent lymphatic ducts were visible in the forearm in more than 83% of participants and in the upper arm in more than 66% prior to mastectomy incision. ARM lymph nodes were not detected in six participants. Of the 103 participants who had a successful ARM procedure, 55 had metastatic axillary lymph nodes in the final histology, and 20 had metastatic ARM lymph nodes. Overall, 18 participants had both metastasis-positive ARM nodes and ALND. Two participants had only metastatic ARM lymph nodes but not in the rest of the axillary lymph nodes. Of all 223 ARM lymph nodes, 195 had no tumor cells, three had isolated tumor cells, three had micrometastases, 15 had macrometastases, and seven had macrometastases with extracapsular invasion. The authors concluded that although the ARM procedure identifies lymph nodes, signal intensity may not be a reliable diagnosis tool to consider for the conservation of the arm lymph node. Participants were not followed up long term to assess the correlation with signal intensity and subsequent lymphedema.

Guo et al. (2021), in a 2021 systematic review and meta-analysis of RCTs, assessed the effectiveness of ARM during ALND in preventing BCRL as the primary outcome. The secondary outcomes were oncological safety and shoulder movement. Five RCTs were included, which totaled 1,659 individuals. A total of 786 individuals received ARM of the nodes and lymphatics during ALND, and 873 received conventional ALND (control). The follow-up time ranged from 6 to 37 months. Three studies used blue dye alone, one study combined blue dye and fluorescence, and one combined blue dye with a radioisotope. Assessment of lymphedema was measured with volumetrics in three studies, and two used arm circumference measurement. In the five included RCTs, the individuals had clinical stage II or III. All five had a low to moderate risk of bias. The results showed that in the group that received ARM and ALND, 37 individuals developed arm lymphedema, and 164 developed lymphedema in the control group. Two studies reported oncological safety (determined by the metastatic rate of ARM nodes) and shoulder movement profiles, and both showed no significant differences between the two groups. The authors concluded that while ARM can reduce the risk of BCRL, there is a risk of upper limb lymph node metastasis, and further high-quality research is needed.

Surgical Treatments

Late-stage lymphedema may not respond to standard complex decongestive therapy (CDT), and several types of surgical interventions are being investigated. These include liposuction, vascularized lymph node transfer (VLNT), and lymphaticovenous anastomosis (LVA). LVA and VLNT have also been investigated for the prevention of lymphedema, and for that indication, they are done at the time of the index procedure. This is often called Lymphatic Microsurgical Preventive Healing Approach (LYMPHA). These techniques are very specialized, and there is significant variability in individual characteristics and lack of uniformity in outcome measures. High-quality studies that include longer-term follow-up are necessary to assess the safety, efficacy, and durability of these treatments.

Jungbauer et al. (2025) conducted a systematic review and meta-analysis to evaluate the long-term outcomes of LVA and VLNT in individuals with secondary lymphedema. The included studies described the surgical technique, stratified outcomes by affected limb (upper vs lower extremity), and provided preoperative vs postoperative comparison data and at least 24 months of postoperative follow-up. The review followed PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines and included 23 studies that involved 648 limbs, of which 216 underwent LVA, and 432 underwent VLNT. The weighted average age was 56.3 years, and 99.9% of individuals were female. The primary outcomes were annual cellulitis incidence (events/year) and limb circumference (percent change), which were analyzed separately for the upper and lower extremities using random-effects models (limited data on LVA prevented an equivalent meta-analysis). For LVA, the pooled mean reduction in annual cellulitis episodes was -1.13 events per year (95% CI, -1.70 to -0.57) in upper extremity lymphedema and -1.32 events per year (95% CI, -2.08 to -0.55) in lower extremity lymphedema. VLNT was associated with pooled reductions in annual cellulitis episodes of -2.43 events per year (95% CI, -3.36 to -1.50) for upper extremities and -1.38 events per year (95% CI, -2.11 to -0.65) for lower extremities. Studies of VLNT reported pooled reductions in limb circumference of 42.7% (95% CI, 36.7%-49.7%) in the upper extremities and 21.98% (95% CI, 19.8%-24.4%) in the lower extremities. The authors concluded that both LVA and VLNT were associated with lower cellulitis rates during long-term follow-up and that studies of VLNT reported reductions in limb circumference, suggesting that these procedures may have a role in treatment algorithms for selected individuals with secondary lymphedema. Limitations include the relatively small number of eligible studies, predominance of observational study designs, and limited reporting of long-term outcomes beyond cellulitis and limb circumference; additional high-quality, comparative studies are needed to confirm long-term benefits.

Seidenstuecker et al. (2024) conducted a retrospective cohort study that compared VLNT and LVA in patients with chronic BCRL. The study included 105 patients who were treated between 2015 and 2022, of whom 96 completed the minimum 24-month follow-up. Overall, 58 patients underwent VLNT, and 47 underwent LVA. Prior to the operation, those in the VLNT group had more severe lymphedema, which was demonstrated by significantly larger circumferential measurements at the wrist ($p = 0.024$) and greater differences between affected and unaffected arms at the thumb saddle

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joint (p = 0.022), wrist (p < 0.001), wrist +10 cm (p = 0.040), and wrist +20 cm (p = 0.019). During the 24-month follow-up, both VLNT and LVA were associated with improvements in arm circumferences. Relative reduction rates were 2.64 ±4.64 in the VLNT group and 2.14 ±2.25 in the LVA group; however, this difference was not statistically significant (p = 0.711). By 24 months, no significant differences in arm circumferences remained between the two groups. Patients with larger preoperative arm circumferences appeared to experience greater improvements after surgery. Postoperative complications occurred in 11 of 58 patients (19.0%) in the VLNT group and in none in the LVA group. Most complications were minor (63.6%), including seromas (8.6%), hematomas (1.7%), and erysipelas that were treated with antibiotics (1.7%). More severe complications included fat necrosis (3.4%), partial flap loss (1.7%), and total flap loss (1.7%). The authors concluded that both VLNT and LVA were safe procedures associated with improved outcomes in patients with chronic BCRL. Furthermore, VLNT may offer greater improvement in individuals with more advanced lymphedema but may be associated with a higher risk of postoperative complications. Limitations include the retrospective design; lack of patient-reported outcome measures; absence of randomization; potential selection bias, as patients who were undergoing VLNT had more advanced disease at baseline; and reliance on circumference measurements that may not fully capture QOL outcomes. Additional studies that address these limitations are needed to validate these findings.

Cho et al. (2024) conducted a systematic review to evaluate the evolving role of lymphatic surgery in breast reconstruction in individuals who are at risk of or affected by BCRL. The review followed PRISMA guidelines and included 184 studies published through 2023 that examined therapeutic lymphovenous bypass (LVB) and preventive lymphatic procedures such as immediate lymphatic reconstruction (ILR), prophylactic LVB, LYMPHA, VLNT, and combined breast and lymphatic reconstruction. The review found that publications on lymphatic surgery in individuals with breast cancer increased substantially from an average of 4.4 articles per year between 2010 and 2016 to 21.1 articles per year thereafter. Among the 184 included studies, VLNT was the most frequently reported procedure (31.0%), followed by preventive lymphatic surgery (PLS; 27.2%), therapeutic LVB (20.1%), and combined breast and lymphatic reconstruction (9.2%). Most studies were low-level evidence, with 40% classified as level III, 22% as level IV, and only 5% as level I. The review identified an increasing number of publications on PLS since 2020 and growing interest in combined breast and lymphatic reconstruction approaches. Although many studies reported favorable outcomes with procedures such as LVB, VLNT, and PLS, these findings should be interpreted cautiously due to substantial heterogeneity in study designs and outcome measures, as well as the predominance of lower-level evidence. Additional prospective, randomized studies are needed to establish best practices and strengthen clinical recommendations.

Gaxiola-García et al. (2024) conducted a systematic literature review on the surgical management of primary lymphedema. Data were extracted from 55 articles, totaling 485 individuals with primary lymphedema, to evaluate the outcomes of LVA (n = 177) and VLNT (n = 82) and of tissue removal procedures such as suction-assisted lipectomy (n = 102) and excision (n = 124). Seven reported results for the upper extremity lymphedema, and 53 reported results for the lower extremity. The average follow-up was 24.74 months and was reported in 47 studies. In the results for LVA, 24 studies reported outcomes in 177 individuals and showed that the most common stage treated with LVA was International Society of Lymphology II (130). The surgical outcomes were not homogeneously reported, but in most studies, an improvement in the Lower Extremity Lymphedema Index, QOL, and lymphedema symptoms, as well as a reduction of the cross-sectional area, episodes of cellulitis, need for compression garments, and circumferential measures, were described. The overall complication rate was 1%. The most common complications were several episodes of a lymphatic fluid leak in one individual and failure of the anastomosis. There were 12 articles, which comprised 82 individuals, that reported results for VLNT. These results showed inconsistent outcome reporting, with some stating that the average circumference reduction rate ranged from 17.2% to 61%, tonicity was reduced by 6.8%, and episodes of cellulitis decreased by 2.67 to three times per year during a follow-up that ranged from 16 to 63 months. Most studies reported increased QOL. The overall complication rate was 13% and included hematoma, venous congestion or thrombosis, and microsurgical revisions. Regarding suction-assisted lipectomy, the results in 102 individuals across eight studies showed a mean reduction of original excess volume from 71.9% to 94%. Several articles reported a reduction in cellulitis episodes and an improvement in QOL. The overall complication rate was 11% and included limited liposuction in certain areas, skin necrosis, significant blood loss, cellulitis, decubitus ulcers, and temporary peroneal nerve palsy. Overall, 15 studies reported the outcomes of excisional procedures in 124 individuals. These results showed individuals with stage III or advanced disease. Several different excisional techniques were used across studies, and the results showed a significant reduction in the size of the lower extremity, improvement of symptoms, and a reduction in the episodes of lymphangitis and cellulitis over a follow-up period that ranged from 1 to 60 months. Poor cosmetic results were frequently reported, and the overall complication rate was 46%. These included injury of the internal saphenous nerve, blood loss requiring transfusion, delayed wound healing, dermatosis, skin graft loss, presence of crevices and pits, chronic ulceration, need for scar revision and release, seroma, amputation, skin necrosis, hypertrophic scarring, and focal wound tenderness. The authors concluded that primary lymphedema is amenable to surgical treatment and that the currently performed procedures have effectively improved symptoms and QOL in this population. This review is limited by a lack of comparison to standard nonsurgical treatment, as well as inconsistent staging and reporting of outcomes. Further high-quality research is needed to validate these findings.

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Chang et al. (2020), in a 2021 systematic review and meta-analysis that was sponsored by the American Association of Plastic Surgeons, examined the published evidence to assess the efficacy and safety of surgical treatment of lymphedema, as well as prevention of secondary lymphedema of the upper extremity and lower extremity lymphedema, and developed consensus statements and recommendations. The treatment of lymphedema included LVB, vascular lymph node transplant, and liposuction, and comparators included surgery and compression therapy. For the prevention of secondary lymphedema, LVB was included, with no surgery as the comparator. Studies included RCTs, observational studies, and retrospective cohort and case-controlled publications. The case series that reported relevant pre- and postoperative outcomes were also included. Overall, 71 articles, representing 66 studies, were included; of these, 43 were case series. For liposuction, based on very low-quality evidence, the results showed that the combination of liposuction and controlled compression therapy reduced limb volume significantly more than controlled compression therapy alone in individuals with stage I to III (International Society of Lymphology) upper extremity lymphedema. In studies that compared LVB with compression therapy in the upper extremity and lower extremity, the results showed decreased limb volume compared with compression therapy alone. Almost half of the 81 individuals were able to stop using compression garments, and the three case series reported a significant reduction in episodes of cellulitis. VLNT was reported in four studies in 300 individuals and compared VLNT with physical therapy. These results showed significant reductions in arm volume, pain, heaviness, and overall function in individuals who underwent VLNT compared with physical therapy alone. In five studies, VLNT was combined with compression garments and CDT, and the results showed significant reduction in circumference, with reduced incidence of cellulitis. The authors concluded that there is evidence to support surgical treatments in reducing the severity of upper extremity and lower extremity lymphedema but that none are a cure. No consensus was reached on which procedure is more effective. This consensus review is limited by a high degree of heterogeneity among the procedures' studies and combinations thereof. The authors also noted that the meta-analysis has several limitations: only two RCTs were included. The majority of the studies that were included were observational studies, which are at a high risk of bias, and the conclusions that can be drawn from these studies are limited. Additional well-designed research that includes more objective outcome reporting and longer follow-up is needed to validate these findings.

Liposuction/Lipectomy

Chen et al. (2025) conducted a systematic review and meta-analysis to evaluate the outcomes of liposuction-based treatments for lymphedema, including stand-alone liposuction and liposuction combined with physiological procedures such as LVA or VLNT. The review included 52 studies that involved 2,334 individuals, with a mean follow-up of 26.6 months. Overall, the results showed that liposuction-based interventions were associated with a pooled excess volume reduction of 92.44% (95% CI, 91.33%-93.54%). Stand-alone liposuction was associated with a pooled reduction of 99.74% (95% CI, 98.03%-101.46%), whereas combined liposuction-based approaches were associated with a pooled reduction of 87.31% (95% CI, 84.75%-89.86%). Similar reductions were observed for lower extremity lymphedema (91.08%; 95% CI, 89.57%-92.59%) and upper extremity lymphedema (92.83%; 95% CI, 91.44%-94.22%) independently. Four studies that involved 339 individuals contributed to the infection meta-analysis, which showed an overall reduction in infection episodes of 0.95 (95% CI, 0.85-1.05). After exclusion of two outlier studies, the pooled reduction was 1.30 (95% CI, 1.00-1.60), with low heterogeneity (I^2 = 0%). However, the authors cautioned against interpreting these infection findings due to the limited number of eligible studies and variability in definitions and follow-up. QOL outcomes were assessed using several validated instruments, and studies commonly reported improvements in appearance, symptoms, function, and emotional well-being following treatment. The authors concluded that liposuction-based therapies were associated with substantial reductions in limb volume and may reduce infection episodes while improving QOL. This systematic review and meta-analysis is limited by the predominance of observational studies and case series, substantial heterogeneity in study design and outcome measures, variation in follow-up duration and compression protocols, and limited quantitative synthesis for infection and QOL outcomes. Standardized methodologies and long-term studies are needed to optimize treatment strategies and strengthen the evidence base.

Xin et al. (2022) conducted a retrospective observational study of the therapeutic outcomes of tumescent liposuction for cancer-related lower extremity lymphedema. The study included 62 patients who had unilateral cancer-related lymphedema of the lower extremity, had stage II or stage III disease, received liposuction only, and wore compression stockings post operation; patients were followed up for more than 3 months. Half of the patients were in stage III lower extremity, and a third had a history of recurrent superficial skin infections. The results showed that the appearance of the lymphedematous extremity significantly improved by 3 months post operation. The preoperative, postoperative, and 3-month follow-up percent volume reductions were 43.2% ±23.7%, 5.5% ±12.2%, and 11.6% ±18.4%, respectively. The percent volume reduction at the postoperative and 3-month follow-ups had significantly decreased compared with preoperative measurements, but it significantly increased at the 3-month follow-up compared with that immediately post operation. At the 3-month follow-up, patient-reported outcomes of feelings of heaviness and fatigue of the affected limb were alleviated; however, feelings of stiffness, tenderness, and tightness had worsened. There were no significant differences in pain, numbness, and weakness reported. The authors concluded that liposuction has a positive effect on

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treating cancer-related lymphedema of the lower extremity. This study is limited by the retrospective, single-arm design; lack of comparison group; and short follow-up period.

A 2020 Hayes Health Technology Assessment, updated in 2022, reported on the use of liposuction plus compression therapy for reductive treatment of moderate to severe, nonpitting, primary or secondary lymphedema of the upper and lower extremities in adults, as well as adults with head and neck cancer treatment–related lymphedema. The evidence included studies that reported on the efficacy of lymphatic function, limb size and volume reduction, changes in annual skin infections, changes in shoulder joint range of motion, and patient-reported changes. An overall low-quality body of evidence suggests that liposuction plus controlled congestive therapy or CDT is associated with greater limb size reduction, lower risk of infection, and improved patient-reported outcomes compared with controlled congestive therapy or CDT alone in individuals with upper extremity lymphedema or lower extremity lymphedema that has not responded adequately to conservative therapies. The overall conclusion of this report is that liposuction plus compression therapy for the reductive surgical treatment of lymphedema has potential but unproven benefit.

Forte et al. (2019a) conducted a comprehensive systematic review of 13 studies that reported on the outcomes of lipoaspiration followed by controlled compression therapy (n = 10), as well as the differences in the outcomes in individuals who were treated with compression therapy only (n = 3), for the treatment of lymphedema of the upper extremity. The majority of individuals were at stage II or stage III disease. The results showed that all studies demonstrated a potential benefit in volume reduction in those with chronic lymphedema up to 5 years post operation. Two studies showed a decrease in infections and cellulitis. In the three studies that compared liposuction plus compression with compression alone, the results showed a statistically significant difference in volume reduction at the 12-month follow-up, with postoperative reductions in individuals with lipoaspiration and controlled compressive therapy of 103%, 115%, and 113%, compared with the group that was treated with controlled compressive therapy alone, which had reductions of 50%, 54%, and 47%. No studies showed major surgical complications. The authors concluded that lipoaspiration is better suited in later stages of disease (stage II and III) when controlled compression therapy alone is ineffective. This study is limited by the heterogeneity between studies regarding the measurement tool used, follow-up of results, and protocol established.

Forte et al. (2019b) conducted a systematic review of the results of eight studies (case series) that reported on the outcomes of liposuction for the treatment of lymphedema of the lower extremities after compression therapy. Overall, 191 individuals with primary or secondary lymphedema, most stage II or III, were included. The results showed that all studies reported volume reduction following lipoaspiration. One study reported a difference in volume reduction depending on the cause of lymphedema; the study showed a reduction of 79% in individuals with primary lymphedema at the 24-month follow-up, and a volume reduction of 101% was found in those with secondary lymphedema. All studies reported improvement in function and QOL and decreased infections. The authors concluded that lipoaspiration followed by controlled compression therapy has the potential to improve lymphedema in individuals with stage II or stage III disease when controlled compression therapy is ineffective. This study is limited by the lack of a comparison group and heterogeneity between studies regarding the measurement tool used, follow-up of results, and protocol established.

Microsurgical Procedures

Hahn et al. (2025), in a systematic review and meta-analysis, analyzed the results of the clinical improvement in extremity lymphedema in individuals who underwent LVA, VLNT, or a combination of the two. The included studies reported various etiologies of unilateral secondary lymphedema and clinical improvement, which was calculated by circumference or volume. Overall, 52 studies (including retrospective, prospective, and cross-sectional studies and RCTs), totaling 1,920 extremities from the same number of individuals across 15 different countries, were included. Of the 1,073 individuals who were treated for upper extremity lymphedema, 528 underwent LVA, 496 underwent VLNT, and 49 received combined treatments. Of the 847 extremities that were treated for lower extremity lymphedema, 775 underwent LVA, 72 underwent VLNT, and none received combined treatments. Lymphedema severity was assessed using various classifications such as International Society of Lymphology, Cheng Lymphedema Grade, Campisi Staging of Lymphedema, and MD Anderson Cancer Center. Overall, 11 studies did not report lymphedema severity. In the studies that reported the number of anastomoses during LVA, there was a mean of 3.39 for upper extremity lymphedema and 4.50 for lower extremity lymphedema. Studies that reported the results of VLNT for upper extremity lymphedema included donor lymph nodes harvested form the groin, gastroepiploic, submental, jejunal mesenteric, and a mix of flap types. Most studies reported postoperative care protocols, which included compression therapy, manual drainage, or both. Four studies implemented protocols in which individuals were instructed to have no compression or physical therapy. Most studies reported a ≥ 12-month follow-up. Regarding clinical improvement of lymphedema, the results showed a pooled mean clinical improvement of 36.46% (95% CI, 29.44%-43.48%), with a high degree of heterogeneity between studies. Specifically, a clinical improvement of 29.44% (95% CI, 15.58%-43.29%) was observed in the upper extremities following LVA; an improvement of 41.66% (95% CI, 34.13%-49.20%) was observed following VLNT; and an improvement of 32.80% (95% CI, 21.96%-43.64%) was observed in the one study that included upper extremity lymphedema outcomes with a

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combined VLNT plus LVA surgical approach. For lower extremity lymphedema, the pooled mean clinical improvement in lower extremity lymphedema was 34.16% (95% CI, 23.93%-44.40%), with a high degree of heterogeneity between studies. Specifically, a clinical improvement of 31.87% (95% CI, 18.60%-45.14%) was observed following LVA, as well as an improvement of 39.53% (95% CI, 19.37%-59.69%) following VLNT. Furthermore, in individuals with lower extremity lymphedema who underwent VLNT, clinical improvement was significantly different according to the donor flap type used. Donor flaps that contained gastroepiploic lymph nodes had a pooled mean clinical improvement of 43.48% (20.43%-66.52%), while those that contained submental lymph nodes improved by 19.80% (95% CI, 16.75%-22.85%) ($p = 0.005$). For both extremities, the clinical improvement was greater following VLNT than following LVA. These results showed greater improvement in individuals who had more severe lymphedema, but this was not statistically significant. This study is limited by the heterogeneity of data. Some studies did not report the body mass index (BMI) of individuals, preoperative interventions, number of anastomoses in LVA, and type and lymph node counts in donor site flaps with VLNT, which limits the ability to draw conclusions on outcomes. Additional research that includes longer-term follow-up is needed. (Meuli et al., 2023, previously cited in this policy, is included in the systematic review and meta-analysis.)

Lymphaticovenous Anastomosis/Lymphovenous Bypass

Hayes (2025) conducted a Health Technology Assessment on the effectiveness and safety of LVA for microsurgical treatment of secondary lymphedema and concluded that overall low-quality evidence shows that while LVA is reasonably safe, it provides inconsistent improvements in secondary lymphedema. Four of the five studies that were included evaluated secondary lymphedema after breast cancer surgery, and none had more than 2 years of follow-up; the two RCTs that were included had 6 months of follow-up. Furthermore, no selection criteria have been established, and there is substantial heterogeneity in the severity of lymphedema, which limits conclusions on the efficacy across all grades of disease.

In a 2025 ECRI Evidence Analysis, it was concluded that based on 11 low-quality systematic reviews, LVB appears safe and provides clinical and durable edema relief and QOL improvement in individuals with secondary peripheral lymphedema; however, the overall quality of the evidence limits the confidence in this conclusion. Furthermore, it was concluded that the benefits for other lymphedema presentations (primary, head and neck, and genital lymphedema) are unclear because relevant studies for these are also mostly low quality and variable in methodology. Large, prospective, multicenter studies are needed to validate LVB in individuals with secondary lymphedema and to more thoroughly evaluate the efficacy.

Zapata-Ospina et al. (2024) conducted a systematic review to evaluate the effectiveness of lymphovenular anastomosis LVA combined with CDT for the treatment of BCRL. The review included five studies (four prospective pre-post studies and one retrospective cohort study) that involved 2,763 individuals. Follow-up ranged from 7.8 to 120 months, with an average follow-up of 35 months. All five studies reported reductions in lymphedema after treatment. One large study, involving more than 2,600 individuals, reported reductions of more than 84% in excess limb volume and more than 91% in dermatolymphangioadenitis (acute cellulitis) episodes. Other studies reported reductions in limb circumference, although two did not find that changes in limb volume reached statistical significance ($p = 0.582$ and $p = 0.822$). Three studies evaluated QOL and reported improvements in Lymphedema Functioning, Disability, and Health (Lymph-ICF) scores following treatment. Several studies also reported reduced cellulitis episodes and decreased use of compression garments and manual lymphatic drainage after surgery. The authors concluded that the available evidence suggests that the combination of LVA and CDT may reduce limb size and improve QOL in individuals with BCRL; however, the evidence for both outcomes was rated as very low quality. Limitations of this review include the small number of studies and heterogeneity in outcome measures and follow-up periods. Furthermore, there was a lack of RCTs, small sample sizes in several studies, and very low-quality evidence according to GRADE (Grading of Recommendations Assessment, Development, and Evaluation) assessment. Additional RCTs are needed to better inform clinical practice.

Jonis et al. (2024; included in the Hayes 2025 Health Technology Assessment) reported the 6-month interim results of a prospective multicenter RCT on the health-related QOL in participants with BCRL who were undergoing LVA compared with CDT. Overall, 100 adult women who had unilateral BCRL with early-stage lymphedema and viable lymphatic vessels were included. In total, 92 completed the 6-month follow-up and were included in these results. Overall, 46 participants were randomly assigned to receive LVA, and 46 received conservative treatment. The primary outcome measure was health-related QOL, which was measured by the Lymph-ICF questionnaire. The secondary outcomes were volume difference (measured by water displacement), the Upper Extremity Lymphedema index, and daily use of compression garments after 3 and 6 months. Eligibility for LVA was determined by near-infrared fluorescence imaging. During surgery, viable lymphatic collecting vessel and similarly sized adjacent recipient venules were identified in the subdermal plane, and an end-to-end anastomosis was performed and patency confirmed with a surgical microscope. Between one and five anastomoses were performed in a lymphedematous arm. For the primary outcome, the results in the LVA group showed that the mean difference in the total score of the Lymph-ICF between baseline and follow-up after 3 and 6 months was 8.93 ±22.71 ($p > 0.05$) and 8.57 ±22.56 ($p > 0.05$), respectively. For physical and mental function, a decrease of more

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than 10 points was observed after 3 and 6 months, which is statistically significant. There were no differences in the Lymph-ICF score in the CDT group. No relationship was found between the total score of the Lymph-ICF and preoperative ICG stage, amount of anastomosis, lymphedema onset, and BMI. For the secondary outcomes, the mean absolute difference in limb circumference in the LVA group was 3.65 ±7.24 (p = 0.002) after 3 months and 1.84 ±14.6 (p = 0.497) after 6 months. In the CDT group, the mean absolute difference was 3.30 ±31.57 (p = 0.521) and -0.84 ±14.6 (p = 0.189) after 3 and 6 months, respectively. After 3 months, 17% of participants in the LVA group had completely discontinued compression garments, and this increased to 21.3% at 6 months. During the same time frames, 21.7% partially discontinued use. There was no statistically significant differences in volume reduction or limb circumference between the two groups. At 6 months, five cases of erysipelas occurred in the CDT group, and three occurred in the LVA group. No serious adverse events were reported. The authors concluded that LVA results in an improvement of physical and mental function in individuals with BCRL and that these interim results are promising. Studies that include larger numbers of individuals and longer follow-up are needed to validate these findings.

Gupta et al. (2021) conducted a systematic review to analyze the outcomes of LVA for primary or secondary upper extremity lymphedema in various stages. Overall, 16 studies, totaling 349 individuals and 244 upper limbs, were included. The authors reported the results of postoperative limb circumference/volume reduction and differential, as well as patient-reported improvements in QOL and symptoms. Studies on filariasis-related lymphedema were excluded. The results showed, among 14 studies that reported on objective improvements, 11 stratified outcomes by upper extremity, and improvements were seen in more than 90% of the individuals. Seven studies reported on the results based on the Campisi Staging of Lymphedema, and two reported that LVA resulted in better outcomes when done in the earlier stages. The authors concluded that LVA is a safe and effective emerging treatment for upper extremity lymphedema that is refractory to decompressive treatment and that large, controlled studies are required to validate these findings, which are limited by a lack of comparison to contemporary comparison groups that are undergoing a different intervention.

Vascularized Lymph Node Transfer

Shah et al. (2026) conducted a systematic review and meta-analysis to evaluate the effectiveness and safety of VLNT for lower extremity lymphedema and to assess whether donor site selection influences outcomes. Following PRISMA guidelines, the authors identified 25 eligible studies that comprised 395 individuals, of whom 70.3% were female. Most studies were retrospective and included individuals with secondary lymphedema, primarily related to gynecologic cancers. The meta-analysis found that VLNT was associated with reductions in limb circumference and limb volume, as well as a lower frequency of cellulitis. Average circumference reduction rates were 24.9% above the knee, 29.6% below the knee, 15.8% above the ankle, and 25.4% for the entire limb. Limb volume decreased by an average of 25.3%. Studies using gastroepiploic donor site flaps reported greater circumference reduction than those using submental flaps, both above and below the knee (both $p < 0.001$). Cellulitis outcomes also improved, with annual cellulitis incidence decreasing significantly after surgery (mean difference, -1.88 episodes per individual per year; 95% CI, -2.48 to -1.28; $p < 0.001$). Patient-reported outcomes generally showed improvement in QOL and functional measures. The overall adverse event rate was 16.3%, with venous congestion being the most common complication. A subgroup analysis showed that studies using gastroepiploic donor site flaps reported greater circumference reduction than studies using some alternative donor sites. The authors concluded that VLNT appears to be a safe treatment option that is associated with improvements in limb circumference, limb volume, and cellulitis outcomes in individuals with lower extremity lymphedema. Limitations include the retrospective nature of all included studies, substantial heterogeneity, variability in outcome reporting, potential publication bias, limited availability of RCTs, and inconsistent availability of patient-reported outcomes. Further prospective, comparative research is needed to confirm these findings and guide donor site selection.

Li et al. (2021) completed a systematic review and meta-analysis of intra-abdominal VLNT for the treatment of lymphedema. The primary outcomes were circumference/volume reduction, episodes of cellulitis reduction, and lymph flow assessment. The secondary outcomes included donor and recipient site complications. Overall, 21 studies (one nonrandomized controlled trial, three retrospective cohort studies, five prospective case series, and 12 retrospective case series) with omental/gastroepiploic, jejunal, ileocecal, and appendicular donor sites, totaling 594 individuals, met the inclusion criteria. The results showed that the mean reduction in circumference and volume rate ranged from 0.38% to 70.8%. A significant reduction in infectious episodes was reported in 10 studies. The pooled donor site complication rate was 1.4%, and the pooled recipient site complication rate was 3.2%. No donor site lymph dysfunction was reported. The authors concluded that low-quality evidence suggests that there is improvement in lymphedema following intra-abdominal VLNT. However, they also noted that these results were of low quality, with great heterogeneity across almost all data. Further research, with high-quality randomized trials, is needed to confirm these findings.

Ward et al. (2021) conducted a systematic review and meta-analysis to evaluate the effectiveness of VLNT in reducing upper extremity and lower extremity volume and cellulitis episodes in individuals with cancer treatment–related lymphedema. Overall, 31 studies, totaling 581 individuals in whom VLNT was the sole therapeutic procedure for cancer treatment–related lymphedema, that reported limb volume, frequency of infection episodes, and/or lymphedema-specific

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QOL data were included. The results showed that for the upper extremity, after VLNT, the pooled circumferential reduction rates were 42.7% above the elbow and 34.1% below the elbow. For the lower extremity, there was a circumferential reduction rate of 46.8% above the knee and 54.6% below the knee. In addition, individuals experienced approximately two fewer cellulitis episodes per year and had improved lymphedema-specific QOL scores. The authors concluded that VLNT reduces limb volume and cellulitis and improves QOL; however, most studies that were analyzed were of low quality, had limited to small numbers of individuals, and lacked long-term follow-up. Furthermore, there was an overall high degree of heterogeneity across all studies as it related to VLNT, and further methodologically rigorous RCTs that include standardization of reporting are required.

Hayes (2020; updated 2022) conducted a Health Technology Assessment on lymph tissue transfer for the physiological microsurgical treatment of lymphedema and concluded that an overall low-quality body of evidence shows that lymph node transer and vascularized lymph node transfer are associated with better limb size reduction and improved patient-reported outcomes compared with other modalities. However, most of the limitations in the evidence are to be expected, given the difficulties of conducting RCTs of complex, individualized microsurgical procedures in a highly heterogeneous condition such as lymphedema. Despite the lack of well-designed controlled trials and weaknesses in the design of the available studies, the current evidence suggests a benefit of LNT in selected individuals with lymphedema who have not responded adequately to standard nonsurgical therapies.

Preventive Microsurgical Procedures/Immediate Lymphatic Reconstruction/ Lymphatic Microsurgical Preventive Healing Approach

Brown et al. (2026) conducted a meta-analysis of prospective clinical trials to evaluate the effectiveness of ILR in preventing lymphedema following lymph node dissection. The review included nine prospective studies that were published between 2011 and 2024, involving 791 individuals; 460 underwent ILR, and 331 served as non-ILR controls. The mean follow-up duration was 20.6 ±4.8 months, and individuals who were undergoing ILR received an average of 1.9 ±0.4 lymphatic anastomoses. The pooled incidence of lymphedema at 12 months was 9% (95% CI, 1%-16%) in the ILR group compared with 29% (95% CI, 11%-46%) in the non-ILR group. ILR was associated with a 69% reduction in the odds of developing lymphedema (OR, 0.31; 95% CI, 0.19-0.51), 58% reduction in relative risk (RR; RR, 0.42; 95% CI, 0.26-0.68), and absolute risk reduction of 17% (RR, -0.17; 95% CI, -0.27 to -0.08). The authors concluded that ILR was associated with lower incidence, odds, and risk of lymphedema in prospective studies, with approximately 21 months of follow-up, and that ILR may represent a promising preventive strategy for individuals who are at high risk of lymphedema. The authors noted that additional long-term, prospective studies are needed. Limitations include the relatively short follow-up duration, heterogeneity in surgical techniques and lymphedema assessment methods, predominance of nonrandomized prospective studies, and uncertainty regarding the long-term durability of ILR benefits beyond the available follow-up period. Additional research that addresses these limitations is needed.

Aschen et al. (2025) conducted a systematic review to evaluate the efficacy, safety, and operative characteristics of ILR for the prevention of BCRL following ALND. Searches of PubMed, Embase, and Cochrane databases identified 18 eligible studies that were published through September 2024 and included three controlled trials, eight prospective cohort studies, and seven retrospective studies. Across 16 studies that assessed BCRL prevention, 785 individuals underwent ILR, of whom 105 (13.3%) developed BCRL at a median follow-up of 15 months. In comparison, 182 of 696 controls (26.1%) developed BCRL at a median follow-up of 14.6 months. The overall RR of developing BCRL following ILR was 0.51. The RR was 0.33 in studies with follow-up periods shorter than 18 months and 0.60 in studies with longer follow-up. The authors noted that this pattern may reflect a decline in the relative benefit of ILR over time. However, differences in study design and follow-up duration may also have contributed to these findings. The review also found that ILR was feasible in approximately 87.4% of individuals, with successful reconstruction rates ranging from 82.6% to 100%. Limited observational evidence did not identify an increased risk of cancer recurrence in individuals who were undergoing ILR, although long-term oncological safety remains an area that requires further study. Patient-reported outcomes were infrequently assessed. The authors concluded that ILR shows promise in reducing the incidence of BCRL after ALND, particularly in the short term. Limitations include the predominance of observational studies, heterogeneity in BCRL definitions and diagnostic methods, variability in follow-up duration, and lack of standardized outcome measures. There is a need for studies that include longer follow-up, standardized diagnostic criteria, and evaluation of patient-reported outcomes and the long-term efficacy and safety of this intervention.

Zurfluh et al. (2025) conducted a systematic review and meta-analysis of 74 studies, which totaled 4,692 individuals, to evaluate microsurgical treatment of lymphedema, including LVA and VLNT. The results showed that the overall effect of surgical treatment on lymphedema outcomes was statistically significant [standardized mean difference (SMD), 0.88; 95% CI, 0.40-1.35; $p = 0.0003$]. Significant improvements were also reported in QOL, including the Lymphedema Life Impact Scale (SMD, 0.86; 95% CI, 0.70-1.02; $p < 0.00001$) and Lymph Quality of Life Measure for Limb Lymphedema scores (SMD, 5.52; 95% CI, 3.28-7.76; $p < 0.00001$). Among 1,072 individuals from 19 studies, cellulitis incidence decreased significantly following surgery (SMD, 1.68; 95% CI, 1.30-2.07; $p < 0.00001$). Significant improvement was observed in

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individuals with secondary lymphedema (SMD, 0.95; 95% CI, 0.42-1.47; p = 0.0004), whereas data for primary lymphedema were limited and did not reach statistical significance (SMD, 0.34; 95% CI, -0.05 to 0.73; p = 0.08). The authors concluded that microsurgical treatment was associated with improvements in lymphedema outcomes, patient-reported QOL, and cellulitis incidence and that it may be an effective treatment option for selected individuals who have not achieved adequate relief with conservative therapy. Limitations include substantial heterogeneity across studies, variation in outcome measurements, limited data on primary lymphedema, and predominance of observational studies. There is a need for additional high-quality, prospective studies that include standardized outcome measures.

Li et al. (2025) conducted a systematic review and meta-analysis to evaluate the effectiveness of ILR in preventing BCRL following ALND. The review included 17 studies, involving 2,607 individuals, and comprised nine double-arm studies that compared ILR with ALND alone and eight single-arm studies that evaluated ILR outcomes. Overall, ILR was associated with a lower risk of developing BCRL, with a pooled RR of 0.41 (95% CI, 0.31-0.55), corresponding to an estimated number needed to treat of nine. Similar findings were observed in the double-arm (RR, 0.39; 95% CI, 0.26-0.58; p < 0.0001) and single-arm (RR, 0.43; 95% CI, 0.28-0.66; p = 0.0001) studies, with no significant difference between study designs (p = 0.75). Studies with less than 1 year of follow-up demonstrated larger effect sizes than those with longer follow-up, although the difference between these subgroups only approached statistical significance (p = 0.09). The benefit of ILR remained significant across studies with at least 2 years of follow-up; however, the pooled effect across the three studies with follow-up beyond 3 years was no longer statistically significant (p = 0.126). The authors concluded that ILR was associated with a reduced incidence of BCRL following ALND; however, the durability of this benefit beyond 3 years remains uncertain because studies with longer follow-up no longer demonstrated statistically significant effects. Limitations include the predominance of retrospective studies, moderate heterogeneity among studies (I^2 = 49%), potential publication bias, variability in surgical techniques and postoperative management, and limited availability of long-term follow-up data. Additional long-term studies are needed to determine whether ILR truly prevents lymphedema or primarily delays its onset.

Du et al. (2025) conducted a systematic review and meta-analysis to evaluate ILR for the prevention of secondary lymphedema in individuals with cancer. Included studies were RCTs or cohort studies that assessed preventive ILR performed at the time of cancer surgery or lymph node dissection and reported lymphedema incidence or risk in individuals with breast, melanoma, sarcoma, or gynecologic cancers. Overall, 42 studies, which totaled 4,539 individuals, were included, and 2,269 individuals received ILR. The interventions included LVA, LVB, and VLNT. Lymphedema was assessed most commonly by limb circumference, with some studies using volume or bioimpedance spectroscopy. Random-effects models were used to calculate pooled ORs and incidence proportions with 95% CIs in 23 comparative studies. The pooled OR for lymphedema incidence following ILR was 0.25 (95% CI, 0.17-0.36; p = 0.0044), indicating a 75% RR reduction, with moderate heterogeneity (I^2 = 51.2%). A subgroup analysis showed that the OR was 0.24 (0.15-0.37) in the upper extremity subgroup and 0.29 (0.15-0.53) in the lower extremity subgroup, but this was not statistically significant. In the follow-up times for subgroup analysis, the results showed significant differences, with those with a follow-up time of less than 1 year having an OR of 0.11 (0.06-0.19). When follow-up time was extended to 2 years, the OR was 0.19 (0.12-0.31), and in the group with a follow-up time of more than 2 years, it was 0.41 (CI, 0.25-0.67). In 19 single-arm studies, the pooled post-ILR lymphedema incidence was 7.34% (4.97%-10.71%). The subgroup analyses revealed slightly higher pooled proportions for the lower extremities compared with the upper extremities (7.87% vs 5.68%; p = 0.797). In the follow-up times for subgroup analysis, the results showed lymphedema incidence rates of 4.01% within 1 year, 9.37% between 1 and 2 years, and 20.63% beyond 2 years. The authors concluded that ILR significantly reduces the risk of cancer-related secondary lymphedema, particularly in upper extremities and the early postoperative period. There is a need for standardized surgical protocols, lymphedema assessment methods and follow-up beyond 2 years to assess long-term benefits. Other limitations include inconsistent surveillance timing and missing preoperative baseline data, which reduce the consistency and comparability of outcomes. Furthermore, the evidence is predominantly in individuals with breast cancer, which limits the generalizability of these findings to other malignancies.

Hayes (2025; updated 2026) conducted a Health Technology Assessment on ILR surgery for the prevention of BCRL. It was concluded that an overall low-quality body of evidence suggests that the procedure is reasonably safe but may not provide benefits for most individuals. Seven studies compared ILR with no ILR, and six showed a statistically significant reduction in BCRL at the 1- to 3-year follow-up. Overall, 3% to 16% of individuals who were receiving ILR developed BCRL, and 19% to 50% of individuals who did not receive ILR developed BCRL; this suggests that it may not be successful in approximately 10% and not needed in approximately 65%. No studies were identified that evaluated health outcomes for ILR at the time of breast cancer surgery vs lymphatic reconstruction performed after BCRL occurred. Two studies reported QOL and if individuals required compression garments or physical therapy. None of the validated lymphedema tools were used to evaluate severity.

Hinson et al. (2025) performed a systematic review and meta-analysis on the efficacy of immediate LVA for the prevention of secondary lymphedema. Overall, 39 studies were included, of which 17 included those that compared the rates of

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secondary lymphedema in individuals who had and had not received LVA across different oncological indications. These 17 were included in the meta-analysis. There were 3,697 individuals included in this study, with 1,722 individuals receiving immediate LVAs, while the remaining 1,975 did not and served as the control. The results showed that LVA was associated with a 69% lower risk of secondary lymphedema compared with the control group, with 78 individuals developing lymphedema compared with 692. Heterogeneity was low across the studies, which suggests consistency. In subgroup analyses based on type of malignancy, LVA was associated with a 72% reduction in risk of secondary lymphedema compared with the control group in breast surgery and a 65% reduction for dermatologic malignancies (melanoma and squamous cell carcinomas). These findings suggest that immediate LVA is beneficial in reducing the risk of secondary lymphedema after surgical treatment of a malignancy. This study is limited by the retrospective study design of the available literature, which also includes a lack of heterogeneity regarding selection of individuals, surgical techniques, and duration of follow-up. Additional prospective studies that include larger number of participants should be conducted to address the limitations.

Levy et al. (2024) conducted a retrospective review and reported the 4-year outcomes in patients who were treated with LYMPHA as lymphedema prophylaxis in their institution (Columbia University Irving Medical Center). Two groups were compared: those who received LYMPHA (n = 45) and those who did not (n = 45). All patients were women, and the LYMPHA and the non-LYMPHA groups had a similar mean age, BMI, and obesity rates. Patients received ALND, along with either complete mastectomy or breast-conserving therapy for breast cancer. A similar number of lymph nodes was removed in both groups. Follow-up times were 57 and 63 months in the LYMPHA and non-LYMPHA groups, respectively. Non-LYMPHA patients underwent complete mastectomy more frequently than those who were receiving LYMPHA but had a similar number of nodes removed during ALND. The results showed that overall, lymphedema incidence was 31.1% in the LYMPHA group and 33.3% in the non-LYMPHA group, with no significant differences in lymphedema incidences observed between the LYMPHA and non-LYMPHA groups for those with obesity, those who received radiation therapy, or those with obesity who also received radiation therapy. The authors concluded that this procedure may not prevent lymphedema long term in individuals who undergo ALND. Additional long-term studies are needed to determine the true potential of LYMPHA for the prevention of lymphedema.

Chungsiriwattana et al. (2023; included in Hinson et al., 2025, and Du et al., 2025) conducted a retrospective data review in 29 patients who had melanoma or nonmelanoma of the lower extremities and underwent tumor resection with inguinal lymph node dissection (ILND); the review compared the long-term incidence of lymphedema and oncological outcomes in those who received LVA at the time of surgery with those in patients who only had surgery. Seven patients underwent immediate LVA at the groin after the ILND (intervention), and the remaining 22 patients underwent resection of the tumor and ILND (control). Outcomes were followed for up to 7 years. The results showed 12 cases of lymphedema in the control group and three in the LVA group. The intervention group had a longer median time to lymphedema occurrence than the control group (70 vs 17 months). Oncological outcomes showed that tumors recurred in 71.4% of the intervention group compared with 31.8% in the control group. Metastases occurred in five cases in the intervention group compared with eight in the control group. The overall median survival time was 44 months. The intervention group had significantly shorter 2- and 5-year recurrence-free survival and metastatic-free survival rates. The median survival time was 26 months and 82 months in the intervention and control groups, respectively. The authors concluded that while this procedure appears feasible, there was no statistically significant difference in lymphedema occurrence rates. Furthermore, there are significant concerns that LVA results in systematic spread of the original cancer via the lymphatic pathway. This study is limited by a small number of patients, and longer-term studies are needed to further evaluate LVA at the groin following ILND for preventing lymphedema of the lower extremities.

Coriddi et al. (2023; included in Hinson et al., 2025) reported the preliminary results of an ongoing RCT (ClinicalTrials.gov ID: NCT04241341) to examine the efficacy of ILR in decreasing the incidence of BCRL after ALND. Participants who were undergoing ALND were randomized in the operating room 1:1 to receive ILR (n = 72) if technically feasible or no ILR (n = 72). The ILR group underwent lymphatic anastomosis to a regional vein using microsurgical techniques; the control group had no repair, and cut lymphatics were ligated. All participants in the ILR group had a minimum of one bypass performed, with the thoracoepigastric vein most commonly used as the donor vein. There were no significant differences in baseline demographics, and most had received neoadjuvant chemotherapy, adjuvant chemotherapy, and adjuvant radiation to the chest wall or axilla. The secondary outcomes assessed the decrease in the risk of BCRL using bioimpedance and ICG lymphangiography and improved QOL in these participants. Follow-up occurred at 6 weeks, then every 6 months for 2 years following surgery. This preliminary report included 99 participants with a 12-month follow-up and 70 and 40 participants with an 18- and 24-month follow-up, respectively. At each follow-up, arm volume, bioimpedance, height, BMI, and participant-reported outcomes were measured. A lymphedema diagnosis was made if the relative volume change was ≥ 10 at 6 through 24 months, with subjective lymphedema symptoms, as well as anxiety and depression, assessed with standardized tools. The use of compression garments and/or decongestive therapy was also recorded. Repeat ICG was completed at the 12- and 24-month follow-ups. The results showed a significantly lower incidence of BCRL in the ILR group, showing 2.0%, 9.5%, and 9.5% at 12, 18, and 24 months, respectively, compared with the group that did not

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receive ILR, which was 18%, 24%, and 32% at the same follow-up. There were lower bioimpedance values and less dermal backflow, as shown by ICG at the 12- and 24-month follow-ups. The use of compression garments at the 24-month follow up was 30% in the ILR group and 43% in the control group. The subjective symptoms of lymphedema showed no significant differences and tended to worsen over time. The authors concluded that ILR at the time of ALND decreases the cumulative incidence of BCRL at a median follow-up of 18 months. The longer-term findings of this study, with 24-month follow-up in a larger cohort of participants, are anticipated but to date have not been published. While promising, the preliminary data are underpowered at 24 months, as less than 40% of the cohort completed follow up, and 24-month data were still ongoing, limiting conclusions on durability. Generalizability needs to be confirmed across surgical settings and greater surgeon experience. Standardized diagnostic criteria are also needed, with evaluation of long-term durability beyond 2 years.

Ciudad et al. (2022) conducted a systematic review and meta-analysis of the current evidence on the use of PLS for reducing the risk of cancer-related lymphedema. Overall, 24 studies, comprising 830 LVA procedures in 1,547 individuals, fulfilled the inclusion criteria. In total, 18 studies were observational studies, two were randomized controlled studies, one was a case series, and three were abstracts or conference presentations. Overall, 1,247 individuals (80.6%) underwent ALND, and 300 individuals (19.4%) underwent ilioinguinal, para-aortic, inguinofemoral lymph node dissection and/or wide tissue excision of the inguinal region (the type of cancer was highly heterogeneous). The results showed that in single cohort studies, the pooled cumulative rate of upper extremity lymphedema after ALND and PLS was 5.15%, with no significant heterogeneity across studies. The pooled cumulative rate of lower extremity lymphedema after oncological surgical treatment and PLS was 6.66%. In double-arm studies for upper limb lymphedema, the pooled analysis showed that PLS reduced the rate of lymphedema after ALND by 18.7 per 100 patients; heterogeneity was substantial and had significant clinical relevance. For lower limb lymphedema, the pooled analysis showed that PLS reduced the rate of lymphedema after ilioinguinal lymph node dissection by 30.3 per 100 patients who were treated, with no significant heterogeneity across the studies. The authors concluded that PLS is a promising treatment for the prevention of lymphedema following cancer-related lymph node dissection. This systematic review is limited by the highly heterogeneous nature of the included studies. This includes different diagnostic methods, levels, regions of lymph node dissection, and type of LVA; different follow-up periods; and individuals' characteristics such as past radiation therapy. High-quality studies are necessary to determine the outcomes and determine recommendations regarding the use of PLS.

Chun et al. (2022), in a 2022 single-arm meta-analysis, evaluated the effectiveness of ILR to prevent secondary lymphedema and provide suggestions for using the LYMPHA approach. This meta-analysis included 789 individuals across 13 studies and included upper and lower limb ILR; 10 studies addressed ILR for breast cancer ALND, and three addressed malignant melanoma inguinal lymphadenectomy. The results showed that for upper extremity lymphedema, the pooled analysis indicated that 2.75% of individuals developed lymphedema after ALND with ILR. The average pooled follow-up time was 11.6 months; the incidence of lymphedema started to increase immediately post operation at 0.92%, 2.19% at 6 months, and 2.50% at 12 months and continued to increase beyond 12 months, with the highest incident rate between 1 and 2 years. For the lower extremity following lymphadenectomy, the results showed that 3.6% of individuals developed lymphedema after inguinal lymphadenectomy with ILR for malignant melanoma treatment. The authors acknowledged that there is a limitation to LYMPHA for lower extremity ILR due to the availability of recipient veins with appropriate size, arc of rotation, and venous valvular sufficiency. The authors concluded that ILR is a promising technique to mitigate lymphedema. Future research should address standardization of techniques, focus on specific populations of individuals, and show the short-term efficacy and long-term outcomes. The findings are limited by the lack of a comparison group.

Hill et al. (2022), in a systematic review and meta-analysis, analyzed the current evidence on the effects of ILR on the incidence of BCRL following ALND. Eleven studies, totaling 417 individuals with breast cancer, met the inclusion criteria. These studies included one RCT and 10 observational studies. Four of the 11 studies with control groups could be included in a meta-analysis. The results showed that 24 of 417 individuals (5.7%) developed BCRL following ILR. A meta-analysis revealed that in the ILR group, six of 90 individuals (6.7%) developed lymphedema, whereas in the control group, 17 of 50 individuals (34%) developed lymphedema. Those in the ILR group had a risk ratio of 0.22 (CI, 0.09-0.52) of lymphedema, with a number needed to treat of four. The authors concluded that ILR can prevent BCRL; however, the findings are limited by a lack of randomization. RCTs are underway to validate these findings. ILR may prove to be a beneficial intervention for improving QOL in breast cancer survivors.

In a 2020 ECRI Clinical Evidence Assessment regarding LYMPHA for preventing lymphedema, it was concluded that based on low-quality but consistent evidence from one systematic review with meta-analysis and one nonrandomized comparative study, LYMPHA procedures that are performed during ALND reduce lymphedema rates compared with ALND alone in individuals with breast cancer. It was also concluded that larger, prospective, controlled studies are needed to verify these findings and to determine whether it improves outcomes in individuals with other cancer types who undergo lymph node dissection.

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Markkula et al. (2019) conducted a Cochrane systematic review of RCTs to assess and compare the efficacy of surgical interventions for the prevention of lymphedema in the arm after breast cancer treatment and to assess and compare with the treatment of existing lymphedemaTwo studies that involved 95 individuals reported on the effectiveness of lymphaticovenular anastomosis for the prevention of BCRL compared with nonsurgical management and showed that LVA appears to result in a reduction in the incidence of lymphedema. Both studies had an unclear risk of bias and did not report secondary outcomes. The overall certainty of the evidence was low. One study that involved 36 individuals reported on the effectiveness of VLNT in the treatment of existing lymphedema compared with no treatment and showed that in individuals with stage 2 lymphedema, there were reductions in limb volume, pain scores, heaviness sensation, and overall function. Overall, the evidence was very low. The authors concluded that there is currently not enough high-quality evidence to support the widespread adoption of lymphaticovenular anastomosis or VLNT techniques for the prevention or treatment of lymphedema. Well-designed RCTs that compare the effectiveness of surgical treatments with each other and against the current gold standard nonsurgical treatments are needed.

Head and Neck Cancer Treatment–Related Lymphedema

Imholz et al. (2025) systematically reviewed the current literature on lymphatic microsurgery in individuals with face and neck lymphedema due to head and neck cancer treatments. The included articles were eight case reports and two retrospective studies and totaled 20 individuals who were receiving different types and combinations of lymphatic reconstruction, including LVA, lymph node-to-vein anastomosis, lymph vessel transplant, and use of a tubed deltopectoral flap as a lymphatic bridge. Eight of the 10 studies that were evaluated were for LVA in the preauricular, buccal, and submandibular regions. The other types of reconstruction were limited to case reports. All studies reported an improvement in head and neck lymphedema after reconstructive surgery using different objective methods for measuring results, including facial measurements and subcutaneous thickness determination via computed tomography, and subjectively using the Lymphedema Symptom Intensity and Distress Survey, Swallowing Quality of Life, and clinician-reported outcome measures, namely the MD Anderson Cancer Center Head and Neck Lymphedema rating scale. Six studies used exclusively pre- and postoperative photographs as the objective outcome assessment to assess improved eyelid function, alleviation of symptoms, or individuals' satisfaction. The results showed that microsurgical lymphatic reconstruction is a safe and feasible treatment option for head and neck lymphedema, particularly LVA. However, all studies were of low quality, with small numbers of individuals (or case series), as well as inconsistent outcome measures, which limit the ability to draw firm long-term conclusions about durability or complications. Additional high-quality studies are needed.

Hayes (2020; updated 2022) conducted a Health Technology Assessment and reported on the use of liposuction plus compression therapy for the reductive surgical treatment of moderate to severe, nonpitting, primary or secondary lymphedema of the upper and lower extremities (upper extremity lymphedema or lower extremity lymphedema) in adults, as well as adults with head and neck cancer treatment–related lymphedema. A very small body of low-quality evidence in individuals with head and neck cancer–related lymphedema suggests that liposuction compared with no liposuction does have a positive impact on patient-reported subjective outcomes that are assessed 6 months after surgery.

Tyker et al. (2019) conducted a systematic review to evaluate all established treatment modalities for lymphedema that results from head and neck cancer treatment. The authors concluded that the overall poor study quality limited the ability to draw conclusions regarding the benefit of these treatments. All studies had limitations of short follow-up times, lack of blinding and randomization of individuals, heterogeneous populations of individuals, and low numbers of individuals. Large, multicenter RCTs that directly compare treatment modalities are required.

Alamoudi et al. (2018) conducted an RCT at an oncology center in a tertiary hospital setting to review the outcomes of submental liposuction in participants who have head and neck cancer and posttreatment lymphedema and to compare the outcomes with those in a control group. Overall, 21 participants met the inclusion criteria; however, one died before completing postoperative evaluation and was excluded in the final results. All participants had completed radiation therapy; 11 underwent neck dissection and radiation with or without chemotherapy, had been disease free for 1 year, and had no previous facial plastic surgery procedures. The outcome measures included participant-reported results in the form of two validated surveys: the Derriford Appearance Scale, which objectively measures psychological symptoms associated with aesthetic disfigurement and deformities, and the Modified Blepharoplasty Outcome Evaluation, which was modified from the Blepharoplasty Outcome Evaluation to meet the needs of the submental region. The surveys were completed prior to the operation, at the time of surgery, and 6 months or more post operation. The results showed that for both the Derriford Appearance Scale and Modified Blepharoplasty Outcome Evaluation scores, overall, there was a statistically significant improvement in the intervention group compared with the control group. The authors concluded that submental liposuction is safe and effective and improves QOL and self-perception in individuals with lymphedema that is secondary to head and neck radiation therapy. This study is limited by the lack of a comparison group to nonsurgical therapies, as well as a lack of objective assessment by blinded reviewers. Further research that compares liposuction in the submental region with established treatment, as well as long-term outcomes, is required to validate these findings.

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Clinical Practice Guidelines

American Association of Plastic Surgeons (AAPS)

In the 2021 consensus guidelines on the surgical treatment of lymphedema (Chang et al.), the AAPS concludes the following:

LVA and VLNT:

- There is evidence to support that LVA can be effective in reducing the severity of lymphedema (GRADE 1C), with a large number of studies demonstrating better outcomes in patients with an earlier stage of disease.
- There is evidence to support that VLNT can be effective in reducing the severity of lymphedema (GRADE 1B).
- There is no consensus on which procedure is more effective, and neither procedure is a cure for lymphedema.

Prophylactic LVB:

- Few studies show that this procedure reduces the incidence of lymphedema, and further studies that include longer follow-up are required (GRADE 1B).

Liposuction:

- Debulking procedures such as liposuction are effective in addressing the nonfluid component such as fat involving lymphedema (GRADE 1C).
- There is a role for liposuction combined with physiological procedures (physical therapy and compression), although the timing of each procedure is currently unresolved (GRADE 1C).

This guideline also states that lymphatic procedures are highly complex and that surgery should be performed at a high-volume center with training in microsurgery to lower the incidence of complications.

Additional consensus recommendations:

- A consensus on staging of lymphedema and preoperative and postoperative evaluations is needed.
- More quantitative methods for measuring fat, fluid, and physiological measures and immunologic function are required.
- There is a need for better-designed studies that include more objective reporting of outcomes and longer follow-up.

The NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) on survivorship contain a section on lymphedema diagnosis and management and lists treatment options as compression garments, manual lymphatic drainage, pneumatic compression devices, supervised progressive resistance, and range-of-motion training. It does not mention liposuction, excisional procedures, or microsurgical treatments. It also states that for select patients, consider referral to a lymphedema surgeon, in consultation with a certified lymphedema therapist and/or physiatrist who specializes in lymphedema.

American Venous Forum (AVF)/American Vein & Lymphatic Society (AVLS)/Society for Vascular Medicine (SVM)

In 2022, the AVF created a work group to develop a consensus statement regarding current practices on the diagnosis and treatment of lymphedema (Lurie et al.). The criteria for consensus panel participation included publications and presentations on lymphedema, participation with a specialty society, and significant representation of patients with lymphedema in the expert's clinical practice. Participants included academic, private, and hospital-based practice settings, as well as an international panel of experts. It was acknowledged that there is high variability in lymphedema care among experts in the field. Consensus was reached for the following treatments:

- The regular use of compression garments reduces progression of lymphedema.
- Sequential pneumatic compression should be recommended.
- Manual lymphatic drainage should be a mandatory component of the management of patients with lymphedema.

There was no consensus reached regarding surgical treatments.

International Society of Lymphology (ISL)

In a 2020 consensus document, which was updated in 2023, on the diagnosis and treatment of peripheral lymphedema, the ISL states the following:

- No treatment has undergone rigorous, randomized, stratified, long-term, controlled studies, and there remains some degree of uncertainty, ambiguity, and flexibility, along with dissatisfaction with current lymphedema diagnosis and management.
- In carefully selected patients following full evaluation, microsurgical and supermicrosurgical procedures are an adjunct to CDT or when CDT has clearly been unsuccessful.

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- Liposuction, LVA, and lymph node transfer operations, coupled with appropriate lymphedema therapy and compression, are effective when used to treat properly selected patients with lymphedema and when performed by an experienced lymphedema surgeon.
- Debulking is mainly for the treatment of the most severe forms of fibrosclerotic lymphedema (elephantiasis) and in cases of advanced genital lymphedema.
- Specialized lymphatic liposuction has been shown to be effective in completely reducing nonpitting extremity lymphedema due to excess fat deposition that does not respond to nonoperative therapy in both primary and secondary lymphedema and should be done by an experienced team that includes surgeons, nurses, occupational therapists, and physiotherapists.

National Institute for Health and Care Excellence (NICE)

A 2024 NICE guidance document titled *Lymphovenous Anastomosis During Axillary or Inguinal Node Dissection for the Prevention of Secondary Lymphoedema* states that in adults with breast cancer, LVA should only be done with special arrangements for clinical governance, consent and audit, or research. More research is needed in the areas of patient selection, QOL, longer-term outcomes for lymphedema incidence in different conditions, and limb volume safety outcomes (including survival and metastatic cancer). More research is also needed on LVA for preventing lymphedema in other cancers.

In a 2022 guidance document, NICE states that the evidence regarding the safety and efficacy of liposuction for chronic lymphedema is adequate and should only be used for patients with lymphedema that has been nonresponsive to conventional treatments. Patient selection must be done by a multidisciplinary team that specializes in managing lymphedema and should only be done in specialist centers with training and expertise in this procedure. The procedure is not curative, and effectiveness relies on lifelong wearing of compression garments.

The 2018 NICE guideline on the diagnosis and management of early and localized breast cancer was updated in 2025 and now contains a section on the nonpharmacological prevention of lymphedema in individuals who have or have had breast cancer. This guideline states that the evidence supports the use of surgical treatments in lymphedema prevention for reducing the excess limb volume, decreasing the need for conservative therapy, improving patient QOL, and improving physical function. While these studies suggest some benefit to immediate lymphovenous anastomosis during ALND, further research is needed. The committee highlights that the majority of the evidence is based on lower limb lymphedema. The small studies that looked at upper limb lymphedema failed to show efficacy.

American Society of Breast Surgeons (ASBrS)

In 2017, the ASBrS convened an international, multidisciplinary expert panel to review current data and guidelines on all aspects of lymphedema diagnosis and management and reached the following agreements:

- Combined decongestive therapy is the cornerstone of treatment.
- Emerging data on preventive surgical strategies with ARM and LYMPHA are promising and should be explored further with appropriate patients.
- LVA and VLNT may be effective for early secondary BCRL.
- Lymphatic liposuction with long-term compression is effective for severe, late-stage BCRL that is unresponsive to conservative management.

(McLaughlin et al., 2017)

In a 2022 consensus statement, updated in 2026, the ASBrS states that newer surgical techniques, such as ARM, lymphatic transfer, and lymphovenous anastomosis, are promising both for prevention and treatment of established lymphedema. However, well-designed, prospective studies, with uniform criteria for patient selection, procedure, and outcome assessment, are needed. In institutions in which these techniques are available, they should be considered whenever ALND is required.

U.S. Food and Drug Administration (FDA)

This section is to be used for informational purposes only. FDA approval alone is not a basis for coverage.

The FDA has approved a number of devices for use for liposuction. Refer to the following website for more information (use product codes MUU): http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPMN/pmn.cfm.
(Accessed May 28, 2026)

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The FDA has approved a number of near-infrared fluorescence imaging systems. Refer to the following website for more information using product codes IZI or device name: https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPMN/pmn.cfm. (Accessed May 28, 2026)

Indocyanine green is an FDA-approved injectable drug that is frequently used with near-infrared fluorescence imaging systems. Further information can be found at the following website: https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=040811. (Accessed May 28, 2026)

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Policy History/Revision Information

Date	Summary of Changes
11/01/2026	**Coverage Rationale** • Replaced reference to “Lymphaticovenous Anastomosis” with “*Lymphaticovenular*/Lymphaticovenous Anastomosis” **Supporting Information** • Updated *Clinical Evidence* and *References* sections to reflect the most current information • Archived previous policy version 2026T0636H

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