Supplementary

Table S1 Search terms and strings for Medline, Embase, Cochrane Library, Google Scholar, and ClinicalTrials.org

Databases	Search terms
Medline	1. exp Breast Cancer Related Lymphedema/
	2. Breast Neoplasms/
	3. Lymphedema/
	4. ((Breast Cancer adj3 Lymphedema*) or (breast neoplasm* adj3 lymphedema*) or (postmastectomy adj3 lymphedema*) or (post-mastectomy adj2 lymphedema*) or (secondary adj3 lymphedema*) or (iatrogenic adj3 lymphedema*) or lymphoedema*).mp. [mp=title, abstract, original title, name of substance word, subject heading rod, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
	5. 1 or 2 or 3 or 4
	6. Anastomosis, Surgical/
	7. Lymph Nodes/
	8. Lipectomy/
	9. ((Lymph* adj3 anastomos*) or LVA or (lymph node adj3 transplant*) or (lymph* transplant*) or (lymph node adj3 transfer*) or VLNT or LNT or liposuction or debulking).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identificer, synonyms]
	10. 6 or 7 or 8 or 9
	11. 5 and 10
Embase	1. exp breast cancer-related lymphedema/
	2. breast tumor/
	3. lymphedema/
	4. ((Breast Cancer adj3 Lymphedema*) or (breast neoplasm* adj3 lymphedema*) or (postmastectomy adj4 lymphedema*) or (post-mastectomy asj2 lymphedema*) or (secondary adj3 lymphedema*) or (iatrogenic adj3 lymphedema*) or lymphoedema*).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]
	5. 1 or 2 or 3 or 4
	6. anastmomsis/
	7. lymph node/
	8. lipectomy/
	9. (Lymph* adj3 anastomos*) or LVA or (lymph node adj3 transplant*) or (lymph* transplant*) or (lymph node adj3 transfer*) or VLNT or LNT or liposuction, or debulking).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]
	10. 6 or 7 or 8 or 9
	11. 5 and 10
Cochrane Library	1. MeSH descriptor: [Breast Cancer Lymphedema] explode all trees
	2. MeSH descriptor: [Breast Neoplasms] explode all trees
	3. MeSH descriptor: [Lymphedema] explode all trees
	4. (Breast Cancer Lymphedema*) or (breast neoplasm* lymphedema*) or postmastetomy lymphedema*) or (Post-mastectomy lymphedema*) or (secondary lymphedema*) or (iatrogenic lymphedema*) or (lymphoedema*)
	5. MeSH descriptor: [Anastomosis, Surgical] explode all trees
	6. MeSH descriptor: [Lymph Nodes] explode all trees
	7. MeSH descriptor: [Lipectomy] explode all trees
	8. (Lympho* anastomos*) or LVA or (lymph node transplant*) or (lymph* transplant*) or (lymph node transfer*) or VLNT or LNT or liposuction og debulking
	9. 1 or 2 or 3 or 4
	10. 5 or 6 or 7 or 8
	11. 9 and 10
Google Scholar	Using the type bar, following search string were made: (Breast Cancer Lymphedema OR Breast Neoplasm OR Lymphedema) AND (lymphovenous anastomosis OR lymphaticovenular anastomosis OR LVA OR lymph node transfer OR LNT OR VLNT OR vascular lymph node transfer OR liposuction OR debulking)
	No search filter, no sorting by date
ClinicalTrial.org	Advanced search
	Condition or disease: lymphedema
	Other terms: breast cancer
	No further filters were used

Keywords, search strings, and Boolean operators were used. LVA, lymphovenous anastomosis; VLNT, vascularized lymph node transfer; MeSH, medical subject headings.

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Table S2 Overview of arm volume outcomes from included articles on LVA

Author	Presentation of volume	Pre-operative volume	Post-operative volume	Volume difference	Significant reduction, yes/no
Roh S *et al.* (43)	Interlimb volume ration = affected arm volume/unaffeced arm volume	1.29±0.12	1.21±0.15	0.08±0.04	Yes
Ciudad P *et al.* (44)	CRR (%) = [1 – (post-operative affected limb – nonaffected limb)]/(pre-operative affected limb – nonaffected limb) 100	NA	NA	56.5%±8.4%	NA
van Mulken TJM *et al.* (20)	UEL index = $(C_1^2 + C_2^2 + C_3^2 + C_4^2 + C_5^2)$/BMI	116.45 [101.1–131.8]; 122.7 [110.1–135.6]	122.7 [106.1–139.3]; 128.0 [114.7–141.4]	–6.2 [–38.2 to 25.7]; –5.3 [–31.1 to 20.9]	No
Fuse Y *et al.* (45)	Arm circumference difference = (circumference affected arm – circumference unaffected arm)/circumference unaffected arm	NA	NA	–0.25% [–3.35 to 2.25], 0.37% [–3.67 to 2.84], –2.45% [–6.22; to 0.27]; –2.78% [–8.14 to –1.87], –0.74% [–4.07 to 2.31], –2.54% [–6.40 to –0.75]	No
Visconti G *et al.* (27)	Difference in sum of arm circumferences (cm) = sum of arm circumferences pre-operative – sum of arm circumference post-operative	143.84±11.15	133.25±14.24	10.59±2.64	Yes
Rodriguez JR *et al.* (28)	Calculated limb volume using formula of a truncated cone, then presented as volume reduction rate (%)	NA	NA	67% [7–93%]	NA
Park JK *et al.* (46)	Calculated limb volume using formula of a truncated cone, then presented as volume reduction rate (%)	NA	NA	10.2%±7.7%	Yes
Boccardo F *et al.* (29)	Relative excess volume = pre-operative arm volume – (post-operative arm volume/pre-operative arm volume) 100	2,806±460	2,164±806	642±117.01	NA
Brahma B *et al.* (42)	UEL index = $(C_1^2 + C_2^2 + C_3^2 + C_4^2 + C_5^2)$/BMI	117.7±26.5	106.9±18.5	10.8	Yes
Wolfs JAGN *et al.* (30)	UEL index = $(C_1^2 + C_2^2 + C_3^2 + C_4^2 + C_5^2)$/BMI	16.2	15.8	0.4	No
Qiu SS *et al.* (31)	UEL index = $(C_1^2 + C_2^2 + C_3^2 + C_4^2 + C_5^2)$/BMI	119.8±13.8	116.8±15.9	–3.18±8.7	No
Seki Y *et al.* (47)	UEL index = $(C_1^2 + C_2^2 + C_3^2 + C_4^2 + C_5^2)$/BMI	NA	NA	10.23±6.16 [3.83–26.17]	No
				2.03±9.36 [–15.51 to 16.53]	Yes
Winters H *et al.* (48)	Volume reduction defined as the relative decrease in volume difference between the healthy and affected extremity	NA	NA	–32.3%	Yes
Phillips GSA *et al.* (32)	Relative volume reduction of excess limb volume (excess limb volume = volume affected arm – volume unaffected arm)	13.3% [–0.8% to 59.5%]	6.6% [3.5–36.4%]	23%	Yes
Khan AA *et al.* (33)	EVR = (volume of affected limb post-operative – volume of affected limb pre-operative)/(volume of affected limb pre-operative – volume of unaffected limb pre-operative) 100	NA	NA	9.2%±71.8%	No
Engel H *et al.* (49)	Circumferencial reduction = (pre-operative circumference arm differende – post-operative circumference arm difference)/pre-operative circumference arm difference	NA	NA	–17.3%±6.0%	NA
Mihara M *et al.* (34)	Change rate = (sum of pre-operative circumferences – sum of post-operative circumferences)/sum of pre-operativecircumference	NA	NA	–1.43%	No
Winters H *et al.* (50)	Arm volume differende (mL) = pre-operative arm volume – post-operative arm volume	701±435 mL	467±303 mL	234 mL or 23.5%	Yes
Poumellec MA *et al.* (35)	Arm circumference difference (cm) = pre-operative (circumference affected arm – circumference unaffected arm) – post-operative (circumference affected arm – circumference unaffected arm)	NA	NA	1.29; 1.00; 1.79 (22.5%; 21.32%; 20.24%)	NA
Cornelissen AJM *et al.* (36)	UEL index = $(C_1^2 + C_2^2 + C_3^2 + C_4^2 + C_5^2)$/BMI	14.92±8.01	12.99±7.47	–1.93	No
Gennaro P *et al.* (51)	Sum of diameters pre-operative and post-operative (cm), and the percentage of reduction	134.5±13.45 cm	125.3±12.37 cm	9.2±5.23 cm or 49.65%±19.98%	NA
Chang DW *et al.* (37)	Reduction in excess volume = (pre-operative volume differential – post-operative volume differential)/pre-operative volume differential Volume difference = (volume of affected limb – volume of unaffected limb)/volume of unaffected limb	32% excess volume	NA	42% reduction	Yes
Ayestaray B *et al.* (38)	CSA =pi $r^2 = C^2/4$ pi	NA	NA	22.8% [7.2–48.8%]	Yes
	The volume of lymphoedema [V = pi h $(C_1^2 + C_3^2 + C_1 \ C_3)/12$]				
	The reduction rate at percentage (%) and difference pre-operative and post-operative cross-sectional area (cm^3)				
Mihara M *et al.* (39)	Percentage reduction = (post-operative sum of four sites' circumference/pre-operative sum of four sites' circumference) 100	NA	NA	93.5% [90–97%]	NA
Chang DW *et al.* (40)	Reduction in excess volume = (pre-operative volume difference – post-operative volume difference)/pre-operative volume difference The volume difference = (volume of affected arm – volume of unaffected arm)/ volume of unaffected arm	NA	NA	35%	NA
Damstra RJ *et al.* (41)	Volume difference = volume of affected arm – volume of unaffected arm	988 [532–1,400] mL	1,075 [500–1,856] mL	87 mL	NA
	Presented as mean volume difference between both arms pre- and post-operative (%)	35.2% [20–50%]	33.5% [18–49%]	1.7%	NA

Unless otherwise stated, values are reported as mean ± standard deviation, median [interquartile range], or mean. LVA, lymphovenous anastomosis; CRR, circumference reduction rate; NA, not available; UEL, upper extremity lymphedema; BMI, body mass index; EVR, excess volume reduction; CSA, cross-sectional area.

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Table S3 Overview of outcomes for PROMs from included articles on LVA

Author	PROM	Scale	Pre-operative score	Post-operative score	Change in score
van Mulken TJM *et al.* (20)	Lymph-ICF	Total score	38 [25–50]	22 [8–35]	–16
			49 [38–59]	26 [16–37]	–23
Park JK *et al.* (46)	Lymph-ICF	Average	NA	NA	–34.4±38
Wolfs JAGN *et al.* (30)	Lymph-ICF	Total score	47.5	31.5	16.0*
		Hand functioning score	NA	NA	NA*
		Mental function score	NA	NA	NA*
		Household activities score	NA	NA	NA
		Mobility activities score	NA	NA	NA*
		Life and social activities score	NA	NA	NA
Qiu SS *et al.* (31)	Lymph-ICF	Total score	43.9±19.9	30.6±20.2	–13.3*
		Physical function score	49	33	–16*
		Mental function score	39	22	–17*
		Household activities score	45	34	–11
		Mobility activities score	44	32	–12
		Life and social activities	41	30	–11
Cornelissen AJM *et al.* (36)	Lymph-ICF	Total score	44	14	–30*
		Physical function score	48	13	–35*
		Mental function score	42	11	–31*
		Household activities score	52	28	–24*
		Mobility activities score	41	11	–30*
		Life and social activities	41	11	–30*
Winters H *et al.* (48)	LYMQOL	Overall QOL	5.8	7.3	1.4 [0–3]*
		Function	2.2	1.7	–0.5*
		Appearance	2.6	1.9	–0.7*
		Symptoms	2.8	1.9	–0.9*
		Mood	2.2	1.5	–0.7*
Phillips GSA *et al.* (32)	LYMQOL	Overall QOL	NA	NA	9*
		Function			25*
		Appearance			18*
		Symptoms			28*
		Mood			14*
Brahma B *et al.* (42)	LeQOLiS	Overall dissatisfaction cause by lymphedema	5.6±2.4	3.7±2.6	–38%*
		Distention	6.1±2.5	3.2±2.2	–47%*
		Heaviness	5.7±2.8	3.0±2.3	–47%*
		Pain	4.7±3.3	2.9±2.8	–37%*
		Dysesthesia	4.8±3.3	2.7±2.6	–44%*
		Appearance distortion	5.6±2.5	3.3±2.5	–41%*
		Motor dysfunction	4.6±3.1	2.8±2.5	–39%*
		Limitation in daily activity	4.8±2.8	3.3±2.4	–32%*
		Influence in social activity	4.3±3.0	2.9±2.6	–32%*
		Distress cause by compression therapy	4.6±3.0	3.7±2.8	–18%
Mihara M *et al.* (34)	VAS	–	3.5 [0–8]	0.59 [0–3]	*
Winters H *et al.* (50)	LymphQoL	Overall QOL	5.8±1.1	4.7±0.7	*
		Function	2.2	1.8	*
		Appearance	2.6	1.9	*
		Symptoms	2.8	1.8	*
		Mood	2.7	1.5	*
Damstra RJ *et al.* (41)	SF-36	NA	NA	NA	Subjective relief of complaints in 5 patients
Gennaro P *et al.* (51)	Self-developed	A 4-point scale measuring patients' satisfaction level, with 1 representing the lowest satisfaction, and 4 being the highest	NA	3.7	NA

Values are reported as mean ± standard deviation, median [interquartile range], or mean. *, statistical significant. PROM, patient-reported outcome measure; LVA, lymphovenous anastomosis; NA, not available; LYMQOL, Lymphedema Quality of Life; QOL, quality of life.

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Table S4 Presenting post-operative management and complications in included studies of VLNT

Author	Post-operative management	Complications
Di Taranto G *et al.* (80)	NA	Dehiscence of wound on abdomen, seroma, hernia
Ciudad P *et al.* (44)	CCT 14 days after surgery	Venous congestion n=1, partial flap loss n=1, seroma n=3, delayed wound healing n=2, complete flap loss n=1
Winters H *et al.* (70)	NA	Infected heamatoma n=1, revision of anastomosis n=2, infected seroma n=2, wound dehiscence on the abdomen n=3, seroma n=2
Francis EC *et al.* (60)	Admission to microsurgical intensive care unite for 5 days, then transferred to regular ward. No CCT at any stage post-operatively. Retrograd manual lymphatic drainage was recommender three times daily starting from post-operative day 14. Gradual return to normal activity level as tolerated	No major
Brown S *et al.* (64)	No nasogastric tubes. Discharge at day 3, with compression wrapping and manual lymphatic drainage until volume plateau. Hereafter CCT	NA
Akita S *et al.* (81)	NA	No major
Abdelfattah U *et al.* (19)	NA	Partial flap loss n=1, seroma n=1
Rannikko EH *et al.* (71)	CCT for 6 months. Manual lymphatic drainage 4 weeks after surgery	Haematoma n=16, reanastomosis n=5, partial flap necrosis n=11, total flap loss n=1, poor wound healing n=10, infection n=5, loss of sensation in the upper thigh n=2, seroma n=10
Dionyssiou D *et al.* (72)	Manual lymphatic drainage for 30 days, followed by CCT of 20 mmHg for 5 months	No major. One flap failure excluded from the study
Ngo QD *et al.* (77)	Prophylactic antibiotics for 3 days. Doppler monitoring of the flap. Surgical drains at both donor- and recipient site. CCT avoided for 2 weeks. After 2 weeks, patients were advised to wear CCT for at least 12 months. Limb elevation and rest were advised. After discharge at day 4–7, manual lymph drainage was permitted. No pressure on the lymph node flap for the first 4 weeks	No major
Mousavi SR *et al.* (73)	NA	None
Ciudad P *et al.* (61)	NA	NA
Chang EI *et al.* (67)	Flap monitored every 2 hours for first 48 hours post-operative, then every 4-hour until discharge. LMWH daily from first porsoperative day. Percutaneus drains left in place until production less than 33 mL/day for 2 consecutive days. Intravenous antibiotics during hospitalization. No CCT or conservative treatments for 1 month after surgery	Delayed wound healing n=3, skin flap necrosis n=1, pulmonary embolus n=1
Maruccia M *et al.* (68)	Monitored for 5 days	NA
Aljaaly H *et al.* (56)	Microsurgical care unit for 5 days, discharged at day 7. Restricted finger movement was encouraged from day 3. No CCT. Manual lymphatic massage was encouraged. Return to normal activity gradually as tolerated	–
Ho OA *et al.* (57)	50.9±31.4; 28.6±6.7	46.2% had complications in group A, 38.5% in group B
Engel H *et al.* (49)	NA	NA
Montag E *et al.* (78)	Plaster cast for 21 days with wrist in neutral position. Monitoring flap every 3 hours for 48 hours, then every 6-hour until discharge. CCT after 30 days post-operative	NA
Lin CY *et al.* (59)	NA	NA
Liu HL *et al.* (79)	Bed rest for 2 days with arm abducted. Immediate after surgery, arm bandage and manual lymphatic massage	NA
Akita S *et al.* (76)	NA	Seroma n=2
Yang Z *et al.* (69)	Flap monitoring every 2 hours for first 72 hours. Leg placed in knee and hip flexion for 2 weeks. CCT continuously for 1 year, avoiding the transplanted axilla	Fat necrosis n=1
Gratzon A *et al.* (65)	Immediately short stretch CCT, adjusted after 1 day. Continue wear at day and nights for 1 month. Hereafter, only when symptoms of swelling, pain, or heaviness occurred	Seroma n=6, wound dehiscence n=6, infection n=6, hematoma n=1, non-healing wound n=1, bleeding n=1
Arriv L *et al.* (74)	NA	NA
Dionyssiou D *et al.* (5)	NA	Mild discomfort at donor site n=2, lymphorrhea at donor site n=2
De Brucker B *et al.* (75)	Removal of drains 1–2 days post-operative. CCT initiated 10 days post-operative	Seroma n=3, wound problems n=4, infection n=1, total flap loss n=1
Patel KM *et al.* (62)	Flap monitoring for 2 weeks, hereafter discharged with encouragement to ambulate, slowly increasing the daily activity and eliminate any previous CCT	None
Nguyen AT *et al.* (66)	NA	Delayed wound healing n=9, partial flap necrosis n=1, venous thrombosis n=1, abdominal bulge n=1, seroma n=1, swelling of lower extremity n=1
Cheng MH *et al.* (58)	NA	NA
Lin CH *et al.* (63)	Microsurgical intensive care unit for 5 days, discharged after 7–10 days. Upper limb elevation with wrist in neutral position with splinting for 2 weeks. Finger flexion and extension encouraged upon day 3 post-operative	Venous congestion n=1, infection n=1
Becker C *et al.* (8)	Manual lymphatic massage daily for the first 3 months. Hereafter twice a week for another 3 months. No CCT. Acetylsalicylates were administered during the post-operative period	Lymphorrhea n=8, infection n=18

VLNT, vascularized lymph node transfer; NA, not available; CCT, controlled compression therapy; LMWH, low molecular weight heparin.

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Table S5 Overview of volume measures for included studies on VLNT

Author	Volume method	Pre-operative excess volume	Post-operative excess volume	Volume change (reduction)	Significant reduction, yes/no
Di Taranto G *et al.* (80)	Arm circumference (circumferences at deltoid insertione, above elbow, below elbow, mid-forearm, and wrist)	NA	NA	46.1±52.3, 39±42.3, 47.5±53.5, 39.2±52.4, 33.6±50.1 cm at the deltoid insertion, above the elbow, below the elbow, at the mid-forearm and wrist respectively	No
Ciudad P *et al.* (44)	Arm circumference {CRR = [1 – (post-operative affected – post-operative nonaffected)/(pre-operative affected – pre-operative nonaffected)] 100}	NA	NA	54.4%±10.2% for GE group 56.5%±3.9% for DIEP group	NA
Winters H *et al.* (70)	Water displacement [arm volume difference = (volume_lymphedema_arm – volume_healthy_arm)]	407 mL	406 mL	1 mL	No
Francis EC *et al.* (60)	Arm circumference [circumference measured 10 cm above elbow, 10 below elbow; limb difference = (pre-lymf – pre-healthy)/pre-healthy]	25.6±11.5 cm	8.3±4.2 cm	NA	Yes
Brown S *et al.* (64)	Arm circumference, perometer (arm volumes calculated by circumferences at 4 cm intervals from the wrist to 44 cm proximally then using the truncated cone formula; perometer to calculate limb volume)	30.2±15.4 mL	25.5±11.9 mL	15.6%	Yes
Akita S *et al.* (81)	Arm circumference (arm volume calculated using forumla of a blunt cone; arm circumference at wrist, forearm, elbow, and upper arm)	NA	NA	142.9±89.4 cm in good blood flow group 62.1±55.0 cm cm in poor blood flow group	NA
Abdelfattah U *et al.* (19)	Arm circumference (10 cm below and above elbow, both limbs)	NA	NA	38.8±16.1	Yes
Rannikko EH *et al.* (71)	Arm circumference (arm volume calculted from forumla of blunt cone; the arm circumference was measured at 4 cm intervals from the distal end of the ulna to proximal direction of both upper limbs on 12 different sites in these patients; the edema volume was calculated using Brorson's truncated cone model)	416±432 mL 3.2±2.6 cm	267±285 mL 2.5±1.7 cm	NA NA	No No
Dionyssiou D *et al.* (72)	Perometer [VD (%) = (affected limb volume – unaffected limb volume)/unaffected limb volume 100; mVDR not further specified]	NA	NA	55.7%	NA
Ngo QD *et al.* (77)	Arm circumference [excess volume = (affected limb volume – unaffected limb volume)/unaffected limb volume; arm volume calculated using forumla of a blunt cone. Arm circumference at 4 cm interval]	498 mL	573 mL	74.32 (increase)	NA
Mousavi SR *et al.* (73)	Arm circumference (circumference above elbow, below elbow; not further specified)	33.4%±12.6% above elbow 30.6%±12.2% below elbow	12.5%±11.1% above elbow 15.1%±17.9% below elbow	NA	Yes
Ciudad P *et al.* (61)	Arm circumference {circumference measured 10 cm below the elbow, 10 cm above the wrist, and at the midhand; CRR (%) = [1 – (post-operative lymphedema – healthy)]/(pre-operative lymfedema – healthy) 100}	NA	NA	28.6%±5.6%	Yes
Chang EI *et al.* (67)	Perometer [VD (%) = (affected limb volume – unaffected limb volume)/unaffected limb volume 100]	NA	NA	57.8%	Yes
Maruccia M *et al.* (68)	Arm circumference {arm circumference above and below elbow; used to CRR = [(pre_circumference _lymphedem – pre_circumference_healthy) – (post _circumference_lymphedem – post_circumference_healthy)]/(pre_circumference_lymphedem – pre_circumference_ healthy)}	NA	NA	51.2%±6.3% axillary recipient site 34.8%±5.8% wrist as recipient site	Yes Yes
Aljaaly H *et al.* (56)	Arm circumference {arm circumference 10 cm above and 10 cm below elbow; used to CRR = [(pre_circumference_lymphedem – pre_circumference_ healthy) – (post_circumference_lymphedem – post_ circumference_healthy)]/(pre_circumference_lymphedem – pre_circumference_healthy)}	33.5±15.6 31.5±10.6	16.2±9.2 16.8±16.7	54.3%±35.5% 30.1%±23.7%	Yes
Ho OA *et al.* (57)	Arm circumference (cm, not further specified)	NA	NA	48.4%±23.9% 55.5%±23.9%	Yes Yes
Engel H *et al.* (49)	Arm circumference {circumference difference = (circumference affected – nonaffected)/nonaffected; CRR = [(pre-operative circumference affected – nonaffected)/nonaffected] – [(post-operative circumference affected – nonaffected)/nonaffected]/[(pre-operative circumference affected – nonaffected)/nonaffected]}	NA	NA	34%±6.9% lymph node transplantation; 34.9%±10.0% lymph node transplantation combined with DIEP	NA (significantly greater reduction when combined with DIEP)
Montag E *et al.* (78)	Arm circumference [arm volume calculated from formula of truncated cone; circumferences of the wrist, 5 and 10 cm above wrist, the elbow, 5 and 10 cm above elbow; compared means before and after (difference)]	426 [300–774] cm^3	425 [192–661] cm^3	20.1%±44.89%	Yes
Lin CY *et al.* (59)	Arm circumference (circumference 10 cm above and below the elbow; not further specified)	NA	NA	7.8%±3.9%	Yes
Liu HL *et al.* (79)	Arm circumference {arm circumference to calculate reduction rate = [(pre-lymphedema circumference – pre-healthy circumference) – (post-lymphedema circumferende – post-healthy circumference)]/(pre-lymphedema circumference – pre-healthy circumference)}	NA	NA	47.06%±27.92%	NA
Akita S *et al.* (76)	Arm circumference [UEL index = $(C_1^2 + C_2^2 + C_3^2 + C_4^2 + C_5^2)$/BMI]	NA	13.9±4.1; 13.2±1.5	NA	NA
Yang Z *et al.* (69)	Arm circumference (arm circumference, the palm of the hand between the thumb and the index finger, the wrist, the median of the forearm, the elbow through the olecranon, and the median and the root of the upper arm.)	25.34±1.24; 22.49±0.69; 32.19±1.09; 30.37±1.66; 36.88±1.45; 39.88±3.16	23.34±1.04; 23.40±0.73; 29.15±1.45; 27.75±1.43; 33.15±1.17; 38.10±2.65	NA	Yes
Gratzon A *et al.* (65)	Arm circumference {arm circumference to calculate volume; circumferential reduction rate was calculated using forumla: [(A2 – N2) – (A1 – N2)]/(A1 – N1) 100; A1, affected arm volume pre-operative; A2, affected arm volume at reassessment; N1, nonaffected arm volume pre-operative; N2, affected arm at reassessment}	NA	NA	57.68	No
Arriv L *et al.* (74)	Arm circumference (reduction in cm; circumferential measures four levels, 5 cm above wrist, 10 cm above the wrist, 5 cm above elbow, 10 cm above elbow)	19,45±3.0; 27.91±5.3; 31.09±5.6; 22.91±4.7	17.91±2.9; 25.36±5.0; 29.27±5.0; 21.72±4.3	1.545±1.293; 2.455±1.508; 2.182±1.662; 1.818±1.601	NA
Dionyssiou D *et al.* (5)	Arm circumference [4 cm intervals; excess volume calculated as arm difference/unaffected limb 100 (%)]	36.61%	15.72%	20.88%	Yes
De Brucker B *et al.* (75)	NA	NA	NA	NA	NA
Patel KM *et al.* (62)	Arm circumference [arm circumference measured 10 cm proximal to the elbow and 10 cm below the elbow; the circumferential differentiation = (the circumference of unaffected arm – the circumference of the affected arm)/the circumference of the healthy arm]	18.1±4.2	21.1±5.3	6 cm or 24.4%±14.7%	Yes
Nguyen AT *et al.* (66)	Perometer [excess volume = (affected limb volume – unaffected limb volume)/unaffected limb volume]	21%	10%	11% absolute volume reduction; 48% relative volume reduction	NA
Cheng MH *et al.* (58)	Arm circumference (10 cm above elbow)	NA	NA	7.3%±2.7% ccircumferential differentiation; 40.4%±16.1% mean circumferential reduction rate	Yes (significantly greater reduction when recipient site was wrist compared to elbow)
Lin CH *et al.* (63)	Arm circumference {measured 10 cm above elbow; CRR of the lymphedematous arm = [(a – b) – (c – d)]/(a – b); a, pre-operative lesion of the arm; b, pre-operative healthy arm; c, post-operative lesion of the arm; d, post-operative healthy arm}	33.3±5.3	29.7±5.3	50.55±19.26	Yes
Becker C *et al.* (8)	Measurements (not further explained)	NA	NA	Returned to normal in 10 cases, unchanged in 2 cases, decreased more than 50% in 6 patients and led than 50% in 6 patients	NA

Unless otherwise stated, values are reported as mean ± standard deviation or mean. VLNT, vascularized lymph node transfer; NA, not available; CRR, circumference reduction rate; GE, gastroepiploic lymph nodes; DIEP, deep inferior epigastric perforator; VD, volume differential; mVDR, mean volume differential reduction; UEL, upper extremity lymphedema; BMI, body mass index.

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Table S6 Overview of outcomes for PROMs from included articles on VLNT

Author	PROM	Scale	Pre-operative score	Post-operative score	Change in score
Di Taranto G *et al.* (80)	LYMQOL	Overall QOL	6.7±1.7	8.6±1.4	1.9*
		Function	1.57±0.48	1.21±0.16	0.36*
		Appearance	2.33±0.81	1.15±0.4	1.18*
		Symptoms	2.5±0.68	1.34±0.38	1.16*
		Mood	2±0.85	1.33±0.43	0.67*
Francis EC *et al.* (60)	LYMQOL	Overall QOL	3.9±1.1	7.4±0.5	3.5*
		Function	30.6±2.8	14.5±2.5	16.1*
		Appearance	18.2±1.9	8.5±2.1	9.7*
		Symptoms	30.4±5.9	10.9±1.0	19.5*
		Mood	29.2±4.4	10.7±1.0	18.5*
Maruccia M *et al.* (68)	LYMQOL	Function	37.9 (Group A)	19.7 (Group A)	18.2
			38.0 (Group B)	20.6 (Group B)	17.4
		Appearance	20.1 (Group A)	11.4 (Group A)	8.7
			20.0 (Group B)	12.0 (Group B)	8.0
		Symptoms	23.6 (Group A)	15.0 (Group A)	8.6
			23.8 (Group B	15.5 (Group B)	8.3
		Mood	23.6 (Group A)	14.7 (Group A)	8.9
			23.4 (Group B)	15.2 (Group B)	8.2
Aljaaly H *et al.* (56)	LYMQOL	Overall QOL	NA	NA	NA*
		Function	NA	NA	NA*
		Appearance	NA	NA	NA*
		Symptoms	NA	NA	NA*
		Mood	NA	NA	NA*
Lin CY *et al.* (59)	LYMQOL	Overall QOL	3.9	8.6	4.7*
		Function	37	15	22*
		Appearance	18	8	10*
		Symptoms	22	9	13*
		Mood	18	10	8*
Gratzon A *et al.* (65)	LYMQOL	Overall QOL	5.72	7.79	2.07*
		Function	2.41	1.5	0.91*
		Appearance	2.99	1.5	1.49*
		Symptoms	2.69	1.6	1.09*
		Mood	2.23	1.4	0.83*
		Pain	3.97	0.38	3.59*
		Heaviness	5.52	1.67	3.85*
Patel KM *et al.* (62)	LYMQOL	Overall QOL	2.1±0.5	5.8±0.7	3.7*
		Function	37.9±0.5	19.3±4.4	18.6*
		Appearance	19.9±0.5	12.1±2.9	7.8*
		Symptoms	23.9±0.5	15.3±2.8	8.6*
		Mood	23.9±0.5	14.4±2.9	9.5
Winters H *et al.* (70)	ULL-27	Total ULL-27	NA	NA	12.66*
		Physical	NA	NA	13.65*
		Psychological	NA	NA	11.11*
		Social	NA	NA	9.50*
Brown S *et al.* (64)	ULL-27	Total ULL-27	51.5±19.7	69.1±14.7	17.6*
		Physical	49.4±23.5	68.8±17.4	19.4*
		Psychological	49.7±20.3	65.3±16.9	15.6*
		Social	60.9±20.7	75.7±16.1	14.8*
	LLIS	LLIS total impairment	47.5±18.1	31.5±16.1	16.0*
		Physical	12.3±4.7	8.0±5.2	4.3*
		Psychological	10.9±5.3	7.5±4.5	3.4*
		Functional	9.2±4.5	5.9±2.9	3.3*
De Brucker B *et al.* (75)	ULL-27	Total ULL-27	44±18	26±16	18±17*
		Physical	NA	20±19	NA*
		Psychological	NA	12±16	NA*
		Social	NA	19±21	NA*
Abdelfattah U *et al.* (19)	VAS	Infection	2.46	0.0	2.46*
		Pain	5.2	0.73	4.47*
		Heaviness	6.2	0.93	5.27*
		Function	6.73	1.06	5.67*
Dionyssiou D *et al.* (72)	VAS	Infection	1.94	0.277	1.663*
		Pain	5.38	0.61	4.77*
		Heaviness	6.33	0.94	5.39*
		Function	5.5	1.22	4.28*

Unless otherwise stated, values are reported as mean ± standard deviation or mean. *, significant. PROM, patient-reported outcome measure; VLNT, vascularized lymph node transfer; LYMQOL, Lymphedema Quality of Life; QOL, quality of life; NA, not available; ULL-27, Upper Limb Lymphedema 27; LLIS, Lymphedema Life Impact Scale; VAS, Visual Analog Scale.

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Table S7 Overview of outcomes from included articles on liposuction

Author	Volume method	Volume aspirated (mL)	Pre-operative excess volume	Post-operative excess volume	Volume change (reduction)
Karlsson T *et al.* (86)	Water displacement	1,323 [1,230–1,828]	1,213 [1,014–1,676] mL	–73 [–180 to –59] mL	1,286 mL
Kim RS *et al.* (93)	Arm circumference	500 [300–600]	0.41 [0.22–0.53] (excess volume ratio)	0.13 [0.10–0.28] (excess volume ratio)	–0.13 [–0.28 to –0.12]
		550 [437.5–762.5]	0.41 [0.33–0.51] (excess volume ratio)	0.32 [0.25–0.46] (excess volume ratio)	–0.04 [–0.09 to –0.02]
Hoffner M *et al.* (87)	Plethysmography	1,831±599	1,573±645 mL	–188±300 mL	1,761 mL
Hoffner M *et al.* (88)	Water displacement	1,361±66	1,365±73 mL	–213±35 mL	1,574 mL
Lee D *et al.* (82)	Water displacement	NA	1,607 [570–3,950] mL	–43 [–945 to –1,390]	1,650 mL
Damstra RJ *et al.* (92)	Water displacement	2,124 [945–4,070]	1,540 [765–3,090] mL	–149 [–876 to –473]	1,689 mL
Brorson H *et al.* (83)	Water displacement	NA	1,781 [1528–2,080] mL	–21 [–118 to –112]	1,802 mL
Bagheri S *et al.* (89)	Water displacement	1,724	1,648 [765–3,090] mL	112 [580–410]	1,536 mL
Brorson H *et al.* (84)	Water displacement	NA	1,610 [570–2,950] mL	–230 [–655 to –235]	1,840 mL
Brorson H *et al.* (85)	Water displacement	NA	1,790 [570–3,914] mL	52 [–655 to –1,135]	1,738 mL
Brorson H *et al.* (90)	Water displacement	2,060 [1,000–3,850]	1,745 [810–3,915] mL	60 [–445 to –135]	1,685 mL
Brorson H *et al.* (91)	Water displacement	2,250 [1,000–3,858]	1,845 [570–3,915] mL	30 [–655 to –1,135]	1,815 mL

Unless otherwise stated, values are reported as mean ± standard deviation, median [interquartile range], or mean. NA, not available.

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Table S8 Overview of outcomes for PROMs from included articles on liposuction

Author	PROM	Scale	Pre-operative score	Post-operative score	Change in score
Hoffner M *et al.* (88)	SF-36	Physical functioning	67±2.4	75±2.5	8*
		Role physical	65±5.3	67±4.8	2
		Bodily pain	65±3.4	79±3.2	14*
		Social functioning	83±3.2	90±2.3	7*
		Role emotional	71±5.1	78±4.7	7
		Mental health	74±2.5	82±2.1	8*
		General health	68±2.9	69±2.7	1
		Vitality	66±2.7	72±2.4	6*
		Physical component score	43±1.3	45±1.2	2*
		Mental component score	49±1.3	52±1.2	3*
Brorson H *et al.* (83)	VAS	Pain	25 [9–35]	3 [2–5]	22*
		Swelling of hand	39 [27–48]	12 [8–22]	31*
		ADL	41 [31–51]	4 [2–8]	37*
		Reduces mobility	63	20	43*
		Swollen arm	94	14	80*
		Heavy arm	89	11	78*
		Fatigue/weakness	51	14	37*
		Numbness/prick. sens.	37	23	14
		Total score	9 [5–23]	8 [2–14]	1*
	NHP	Emotions	5 [0–14]	0 [0–8]	5
		Sleep	17 [6–28]	11 [6–21]	6
		Lack of energy	0 [0–30]	0 [0–12]	0
		Pain	11 [5–26]	0 [0–13]	11*
		Physical mobility	7 [4–14]	5 [0–10]	2
		Social isolation	0 [0–13]	0 [0–0]	0
		House work	51	29	22*
		Social life	9	9	0
		Family life	3	6	3
		Hobbies	31	34	3
		Holidays	26	29	3
		Total score	107 [100–113]	109 [100–118]	2
		Anxiety	26 [24–27]	26 [24–28]	0
	PGWB	Depressed mood	16 [16–17]	16 [15–17]	0
		Well-being	17 [16–18]	17 [16–19]	0
		Self-control	17 [16–17]	17 [15–17]	0
		General health	15 [13–16]	16 [14–17]	1
		Vitality	18 [17–20]	20 [17–21]	2
	HAD	Anxiety	5 [4–6]	4 [3–6]	1
		Depression	3 [2–4]	3 [1–4]	0

Unless otherwise stated, values are reported as mean ± standard deviation, median [interquartile range], or mean. *, significant. PROM, patient-reported outcome measure; SF-36, Short Form-36; VAS, Visual Analog Scale; ADL, activity of daily living; NHP, Nottingham Health Profile; PGWB, Psychological General Well-Being Index; HAD, Hospital Anxiety Depression Scale.

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Table S9 Overview of risk of bias assessment for included studies in the systematic review

Author	Risk of bias
Articles on LVA	
Roh S *et al.* (43)	Serious
Ciudad P *et al.* (44)	Serious
van Mulken TJM *et al.* (20)	Moderate
Fuse Y *et al.* (45)	Serious
Visconti G *et al.* (27)	Serious
Rodriguez JR *et al.* (28)	Serious
Park JK *et al.* (46)	Serious
Boccardo F *et al.* (29)	Serious
Brahma B *et al.* (42)	Critical
Wolfs JAGN *et al.* (30)	Serious
Qiu SS *et al.* (31)	Serious
Seki Y *et al.* (47)	Serious
Winters H *et al.* (48)	Serious
Phillips GSA *et al.* (32)	Serious
Khan AA *et al.* (33)	Serious
Engel H *et al.* (49)	Serious
Mihara M *et al.* (34)	Serious
Winters H *et al.* (50)	Serious
Poumellec MA *et al.* (35)	Serious
Cornelissen AJM *et al.* (36)	Serious
Gennaro P *et al.* (51)	Critical
Chang DW *et al.* (37)	Critical
Ayestaray B *et al.* (38)	Critical
Mihara M *et al.* (39)	Critical
Chang DW *et al.* (40)	Critical
Damstra RJ *et al.* (41)	Serious
Articles on lymph node transfer	
Di Taranto G *et al.* (80)	Serious
Ciudad P *et al.* (44)	Critical
Winters H *et al.* (70)	Serious
Francis EC *et al.* (60)	Serious
Brown S *et al.* (64)	Serious
Akita S *et al.* (81)	Serious
Abdelfattah U *et al.* (19)	Some concerns
Rannikko EH *et al.* (71)	Critical
Dionyssiou D *et al.* (72)	Serious
Ngo QD *et al.* (77)	Serious
Mousavi SR *et al.* (73)	Serious
Ciudad P *et al.* (61)	Serious
Chang EI *et al.* (67)	Serious
Maruccia M *et al.* (68)	Moderate
Aljaaly H *et al.* (56)	Moderate
Ho OA *et al.* (57)	Moderate
Engel H *et al.* (49)	Serious
Montag E *et al.* (78)	Serious
Lin CY *et al.* (59)	Moderate
Liu HL *et al.* (79)	Serious
Akita S *et al.* (76)	Moderate
Yang Z *et al.* (69)	Moderate
Gratzon A *et al.* (65)	Critical
Arriv L *et al.* (74)	Serious
Dionyssiou D *et al.* (5)	Some concerns
De Brucker B *et al.* (75)	Serious
Patel KM *et al.* (62)	Serious
Nguyen AT *et al.* (66)	Serious
Cheng MH *et al.* (58)	Moderate
Lin CH *et al.* (63)	Critical
Becker C *et al.* (8)	Critical
Articles on liposuction	
Karlsson T *et al.* (86)	Moderate
Kim RS *et al.* (93)	Moderate
Hoffner M *et al.* (87)	Moderate
Hoffner M *et al.* (88)	Moderate
Lee D *et al.* (82)	Moderate
Damstra RJ *et al.* (92)	Serious
Brorson H *et al.* (83)	Moderate
Bagheri S *et al.* (89)	Serious
Brorson H *et al.* (84)	Critical
Brorson H *et al.* (85)	Serious
Brorson H *et al.* (90)	Moderate
Brorson H *et al.* (91)	Moderate

Overall, articles were primarily evaluated as high risk of bias, some being at moderate risk. No study presented with low risk of bias. LVA, lymphovenous anastomosis.

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