继发性肢体淋巴水肿整合治疗专家共识(2025版)

中国医师协会显微外科医师分会淋巴水肿工作组，中国康复医学会修复重建外科专业委员会淋巴水肿工作组，中华医学会整形外科分会淋巴系统疾病专业学术工作组，中华医学会显微外科分会淋巴水肿工作组，中国研究型医院学会创面防治与损伤组织修复专业委员会，
邓呈亮[1]，章一新[2]，赵德伟[3]

(1. 遵义医科大学附属医院烧伤整形外科，贵州遵义 563000；2. 上海交通大学医学院附属第九人民医院整复外科，上海 200011；3. 大连大学附属中山医院骨科，辽宁大连 116001)

摘　要：继发性肢体淋巴水肿是淋巴循环障碍导致的慢性进行性疾病，以肢体肿胀和皮肤增厚为特征，严重影响肢体功能及生活质量。该疾病的治疗较为棘手，治疗手段主要包括淋巴管静脉吻合术(lymphaticovenous anastomosis，LVA)、血管化淋巴结移植(vascularized lymph node transfer，VLNT)等生理重建手术和脂肪抽吸减容手术，以及以压力治疗为核心的非手术治疗。治疗理念正从单一模式向“整合治疗”模式转变，强调基于个体化评估，整合多学科治疗策略实现长期疾病管理。为规范整合治疗路径，中国医师协会显微外科医师分会等五个专业委员会组织国内相关领域多学科专家联合制定本专家共识(2025版)。共识基于循证医学证据及我国临床实践特点，旨在为继发性肢体淋巴水肿的整合治疗提供规范化指导意见。

关键词：肢体淋巴水肿；整合治疗；专家共识；淋巴管静脉吻合术；血管化淋巴结移植；脂肪抽吸
中图分类号：R622　　**文献标志码：**A
文章编号：2095-2783(2025)12-0977-25　　**开放科学(资源服务)标识码(OSID)：**

Expert consensus on integrated management of secondary limb lymphedema (2025 Edition)

Lymphoedema Working Group of Microsurgery Branch of Chinese Medical Doctor Association, Lymphoedema Working Group of the Committee on Reconstructive Surgery of the Chinese Association of Rehabilitation Medicine, Working Group on Lymphatic System Diseases of the Plastic Surgery Branch of the Chinese Medical Association, Lymphedema Working Group of the Society of Microsurgery of the Chinese Medical Association, Chinese Research Hospital Association Committee on Wound Prevention and Treatment and Tissue Repair,
DENG Chengliang[1], ZHANG Yixin[2], ZHAO Dewei[3]

(1. *Department of Burn and Plastic Surgery, Affiliated Hospital of Zunyi Medical University, Zunyi, Guizhou*

收稿日期：2025-12-09
基金项目：国家自然科学基金(82372541、82260391、82560448、82360448)；贵州省淋巴水肿基础与临床研究科技创新人才团队建设(黔科合人才CXTD[2025]051)
通信作者：邓呈亮，主任医师，主要研究方向为淋巴水肿与慢性创面，cheliadeng@sina.com；章一新，主任医师，主要研究方向为整形修复与显微再造，zhangyixin6688@163.com；赵德伟，主任医师，主要研究方向为显微外科与髋关节疾病，zhaodewei2016@163.com

563000, *China*; 2. *Department of Plastic and Reconstructive Surgery, Shanghai Ninth People's Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai* 200011, *China*; 3. *Department of Orthopaedics, Affliated Zhongshan Hospital of Dalian University, Dalian, Liaoning* 116001, *China*)

Abstract: Secondary limb lymphedema is a chronic progressive disease caused by lymphatic circulation disorders, characterized by limb swelling and thickening of the skin tissue, which seriously affects limb function and quality of life. The management of this condition is particularly challenging. Treatment approaches mainly include physiological reconstructive surgeries such as lymphaticovenous anastomosis (LVA) and vascularized lymph node transfer (VLNT), as well as debulking surgery (such as liposuction) and non-surgical treatments centered on compression therapy. The treatment philosophy is changing from a single model approach toward an "integrated therapy" model, which emphasizes individualized assessment and the integration of multidisciplinary strategies for long-term disease management. To standardize the integrated treatment pathway, five professional committees, including the Microsurgery Branch of Chinese Medical Doctor Association, organized multidisciplinary experts from relevant fields in China to jointly develop this expert consensus (2025 Edition). Based on evidence-based medicine and the characteristics of clinical practice in China, the consensus aims to provide standardized guidance for the integrated treatment of secondary limb lymphedema.

Keywords: limb lymphedema; integrated treatment; expert consensus; lymphaticovenous anastomosis (LVA); vascularized lymph node transfer (VLNT); liposuction

肢体淋巴水肿是一种慢性进展性疾病,主要表现为肢体肿胀与皮肤增厚。若不及时干预,可能引发皮肤反复感染、溃疡等并发症,不仅影响肢体外观和功能,也会对患者的整体生活质量造成显著影响[1-3]。全球约2.5亿人受淋巴水肿的影响[4],我国以恶性肿瘤淋巴结清扫术后的继发性肢体淋巴水肿最为常见。随着肿瘤诊疗水平的不断提升,继发性肢体淋巴水肿作为一种严重影响患者生活质量的术后并发症,其患病基数日益庞大,所带来的肢体功能障碍、心理社会负担及长期医疗需求,已成为外科学、康复医学、肿瘤学及相关专科领域亟待解决的公共卫生问题。

目前,继发性肢体淋巴水肿尚难以治愈。其治疗方法包括综合消肿疗法(comprehensive decongestive therapy,CDT)、间歇充气加压、烘绑疗法、体位与生活方式干预、中医药治疗等非手术治疗方法,以及淋巴管静脉吻合术(lymphaticovenous anastomosis,LVA)、血管化淋巴结移植(vascularized lymph node transfer,VLNT)、脂肪抽吸术以及切除减容等手术治疗[5-6]。每种治疗方法均有其适应症及局限性。近年来,随着对淋巴水肿病理生理机制认识的深入以及诊疗技术的快速发展,其治疗理念正经历从"单一"到"整合"治疗模式的转变[7-9]。整合治疗强调以患者为中心,融合了CDT、生活方式干预、VLNT、LVA和脂肪抽吸术等多种治疗手段,旨在实现继发性肢体淋巴水肿的长期有效控制、功能的全面恢复以及生活质量的提升。

为顺应这一发展趋势,规范并推广继发性肢体淋巴水肿的整合治疗路径,中国医师协会显微外科医师分会、中国康复医学会修复重建外科专业委员会、中华医学会整形外科分会、中华医学会显微外科分会、中国研究型医院学会创面防治与损伤组织修复专业委员会五个淋巴水肿工作组组织国内相关领域多学科专家,在系统回顾国内外最新循证医学证据、充分结合我国临床实践的基础上,制定本专家共识(2025版),旨在为继发性肢体淋巴水肿的整合治疗提供临床研究证据支撑和科学指导。

1 共识制订方法

本共识已在国际实践指南注册与透明化平台(http://www.guidelines-registry.cn)进行了注册(注册号:PREPARE-2025CN1770)。本共识制定步骤如下:1)共识编写组组建。编写组由整形外科、烧伤与创面修复科、手显微外科、康复科、乳腺外科等专业领域的专家组成,下设顾问、组长、专家组、证据评价组、文献整理组和执笔组。2)共识范围和临床问题的确定。执笔组在文献检索、临床经验、专

家咨询与交流讨论的基础上初步拟定共识范围和临床问题,并制定成在线调查问卷,由专家组成员评价临床问题的重要性后进行筛选整理(保留评分大于4分的临床问题,评分标准:1分极其不重要至5分极其重要)。3)文献检索与证据评价。以lymphedema、lymphoedema、vascularized lymph node transplantation、lymphaticovenous anastomosis、liposuction、comprehensive decongestive therapy为检索词检索PubMed、Web of Science、Cochrane Library数据库,以淋巴水肿、血管化淋巴结移植、淋巴管静脉吻合、抽脂、综合消肿疗法为检索词检索中国知网和万方数据库,检索时间为各库从建库始至2025年8月1日止。由证据评价组成员根据证据质量和推荐强度分级系统(grading of recommendations assessment, development and evaluation, GRADE)(表1)[10]对每条证据进行2次独立评价,最终形成一致的证据等级。4)共识推荐意见的形成。执笔组依据3)的证据形成共识初稿,组织专家进行讨论,对全文提出修改意见,超过80%专家同意的主要观点视为通过。根据专家意见修改,再次组织专家组进行讨论和修改,将最终的意见形成问卷。通过在线问卷对每条意见的推荐强度进行调查。综合每条意见的证据质量和专家组意见形成最终的共识(表2)。

表1　GRADE证据等级定义

Table 1　Definition of GRADE evidence levels

证据等级	内容
高	对效应估计值具有高度把握,估计值与真实值极为接近
中	对效应估计值有中等把握,真实值可能接近估计值,但存在明显差异的可能
低	对效应估计值把握有限,真实值与估计值之间可能存在较大出入
极低	对效应估计值几乎无把握,真实值很可能与估计值存在显著差异

表2　推荐强度条件

Table 2　Recommended strength conditions

最终推荐强度	条件
强推荐	1)高级或中级证据意见,且强推荐比例≥70%; 2)低级或极低级证据意见,强推荐比例≥80%
中推荐	1)高级或中级证据意见,强推荐比例<70%且强推荐+中推荐比例≥70%; 2)低级或极低级证据意见,强推荐比例<80%且强推荐+中推荐比例≥80%
弱推荐	1)高级或中级证据意见,强推荐+中推荐比例<70%且强推荐+中推荐+弱推荐比例≥70%; 2)低级或极低级证据意见,强推荐+中推荐比例<80%且强推荐+中推荐+弱推荐比例≥80%
不推荐	1)高级或中级证据意见,不推荐比例>30%; 2)低级或极低级证据意见,不推荐比例>20%

2　临床问题及推荐建议

2.1　临床问题1:LVA的适应症和疗效

推荐意见1.1:LVA适用于经保守治疗效果不佳或有手术意愿且存在功能性淋巴管的继发性肢体淋巴水肿患者(证据等级:中级;推荐强度:强推荐)。

推荐意见1.2:LVA能减轻患肢肿胀(证据等级:中级;推荐强度:强推荐)。

推荐意见1.3:LVA能减少蜂窝织炎发作次数,提高患者生活质量(证据等级:低级;推荐强度:强推荐)。

证据与说明:

LVA是一种通过显微外科技术将淋巴管与相邻的静脉吻合,将淋巴液引流至静脉,从而缓解淋巴水肿的术式[11],该术式成功的关键在于吻合“功能性淋巴管”。功能性淋巴管是指具有运输淋巴液能力的集合淋巴管,术中直接观察到淋巴液流出是

判断其功能的“金标准”，吲哚菁绿（indocyanine green，ICG）显像可作为重要的辅助定位和判断工具[12-13]。

系统综述显示，接受LVA治疗的肢体淋巴水肿患者中约50%为国际淋巴学会（International Society of Lymphology，ISL）分期的Ⅱ期，25%为Ⅲ期，其余25%为Ⅰ期[14]，故LVA可用于保守治疗效果不佳或有手术意愿的各期继发性肢体淋巴水肿患者[14-23]。通常，保守治疗6个月且肢体体积减少不足50%可视为保守治疗效果不佳[14]。当肢体淋巴水肿患者有严重静脉功能不全或合并蜂窝织炎等活动性感染时，不宜行LVA手术[24-28]。此外，相对禁忌症包括肿瘤复发或肿瘤治疗未结束、严重蜂窝组织炎、慢性静脉功能不全以及经淋巴闪烁显像诊断的严重纤维硬化性淋巴水肿[14]，此类情况需谨慎评估手术时机与获益风险。

对于LVA治疗淋巴水肿的治疗效果，一项系统评价表明LVA可显著改善不同分期患者患肢体积，减少蜂窝织炎发作频率[24]。多项队列研究比较了压迫治疗与LVA在减少淋巴水肿患者肢体肿胀方面的效果，相比于单纯压迫治疗，LVA能使患肢周径平均减少4 cm以上[25-27]。一些病例系列报道了LVA能显著减少蜂窝织炎的发生次数或发生率[27-30]，基于这些病例系列的系统评价表明LVA可使蜂窝织炎发生次数平均减少2.57次（95%CI：1.75～3.38）[24]。此外，LVA也被证实能提高继发性肢体淋巴水肿患者的生活质量[16,31-32]。

2.2 临床问题2：LVA的治疗效果与淋巴管质量和吻合数量的相关性

推荐意见2：LVA的治疗效果与淋巴管的质量和吻合数量存在相关性。推荐尽可能多吻合质量较高的淋巴管，以优化治疗效果（证据等级：中级；推荐强度：强推荐）。

证据与说明：

淋巴管的质量可依据淋巴液引流能力、管壁硬化程度等进行评估，通常具有运输淋巴液能力的集合淋巴管被认为是质量较高的功能性淋巴管[12-13]。引流淋巴液的能力是评价淋巴管功能的首要指标，研究表明LVA成功的关键在于吻合的淋巴管是否具有引流淋巴液的功能[21-22,33-34]。淋巴管管壁硬化程度可作为判断淋巴管功能的辅助指标。Mihara等[35]基于手术显微镜和病理学发现创建了淋巴管硬化程度的分型方法，分为正常型、扩张型、收缩型及硬化型。研究表明选择扩张型淋巴管进行LVA的术后效果最佳[36]，收缩型淋巴管仍能为继发性肢体淋巴水肿患者带来临床获益，可作为LVA的“次优”选择[37]。除了在形态上选择合适淋巴管以外，有研究指出应在术中实时对淋巴管的功能进行验证，确保所选淋巴管具备引流功能也极为重要[21]。

一些研究表明，LVA的吻合数量与患肢体积减少率呈正相关[21,38-39]。Bianchi等[39]对232例患者共完成1 000次LVA，平均每例患者建立3～5个吻合口，结果显示，吻合口数量越多，术后肢体体积改善越明显。此外，Tsai等[21]指出，多吻合口可分散淋巴引流负荷，提高整体引流效率，尤其在淋巴管质量不均一的情况下更为重要[40]。然而，一项系统评价对18项研究进行汇总分析后认为单纯增加淋巴管与静脉之间的吻合数量并不能提高LVA的效果[41]。因此，淋巴管的吻合数量虽具有重要临床意义，但若其本身质量欠佳，仅依靠增加吻合数量所获得的改善效果仍将相当有限[42]。

2.3 临床问题3：功能性淋巴管的定位与判断方法

推荐意见3.1：功能性淋巴管是指具备有效输送淋巴液能力的集合淋巴管，术前可使用高频超声或超声造影剂寻找功能性淋巴管（证据等级：中级；推荐强度：强推荐）。

证据与说明：

常规B型超声对显示微小淋巴管结构存在一定局限。一些研究表明，采用15～24 MHz高频超声或48～70 MHz超高频超声可实现对淋巴管细微结构的实时显像[43-45]。为进一步规范高频及超高频彩超在识别功能性淋巴管中的应用，Hara等[44]提出了淋巴管的超声影像分型，包括正常型、扩张型、收缩型及硬化型。一些研究指出，选择扩张型淋巴管进行LVA可取得更佳的疗效[46-47]。高频超声具有成本低、无辐射等优点[48-50]，可作为ICG淋巴造影的辅助技术或潜在替代方案[51-53]，但高频超声高度依赖

操作者,学习曲线较长[54]。

增强对比超声(contrast enhanced ultrasound,CEUS)是一种常用于定位乳腺癌前哨淋巴结的超声技术,通过在皮下注射超声造影剂并对其进行实时跟踪流量监测,可特异性识别淋巴管,并评估淋巴管的通畅性。CEUS具有良好的穿透性、较高的分辨率及较强的特异性,可准确定位并测量位置较深的淋巴管,从而为LVA提供更多可选淋巴管[55-56]。此外,通过观察造影剂在淋巴管蠕动过程中的流动模式,还能借此评估淋巴管的泵送功能[57]。若造影剂在淋巴管中有节律地向前流动,提示该淋巴管功能良好,适合作为LVA的吻合对象[35,58]。尽管CEUS具备一定优势,但造影剂可能导致过敏反应,如皮疹、瘙痒、呼吸困难甚至过敏性休克等,虽然严重过敏反应的发生率较低,但仍存在风险。

高频超声与CEUS各有明确的临床应用价值与适用范围,在LVA术前规划中应结合患者具体情况、设备可及性与团队技术熟练度审慎选择与应用。

推荐意见3.2:ICG造影剂可用于寻找功能性淋巴管和评估吻合质量(证据等级:中级;推荐强度:强推荐)。

证据与说明:

ICG是一种近红外荧光染料,经皮内或皮下注射后可被淋巴系统迅速吸收,并与淋巴液中的蛋白结合,在特定波长近红外光激发下发出荧光。此特性使得术者能够通过近红外荧光摄像系统实时、清晰地观察淋巴管的分布走行、形态结构及功能状态。

在肢体淋巴水肿的手术评估中,ICG淋巴造影的核心价值在于显著提高功能性淋巴管的识别率[59-60]。配备ICG荧光造影的手术显微镜,可于放大视野下直接显示淋巴管内的荧光信号,从而辅助外科医生精准地进行皮下淋巴管的定位,为后续的LVA提供关键导航[61-64]。

同时,ICG淋巴造影提供的动态功能信息,如荧光的流动速度、管径粗细以及是否存在迂曲扩张,是评估淋巴管功能的重要依据[65]。通畅且功能良好的淋巴管常表现为快速、连续的荧光流动,此种表现可作为术中选择功能性淋巴管的重要参考[66]。

2.4　临床问题4:LVA术后压力治疗介入时机及持续时间

推荐意见4:LVA术后压力治疗有助于提高LVA的治疗效果,推荐LVA术后即刻在专业的淋巴水肿医护人员指导下开展压力治疗,持续3～6个月后根据患者病情减少或停用压力治疗,多数患者需长期或终身压力治疗(证据等级:中级;推荐强度:强推荐)。

证据与说明:

研究已表明LVA能显著改善淋巴水肿患者的肢体体积、症状严重程度及生活质量,但LVA术后吻合口的通畅率会随着时间的推移而下降,故LVA术后患者需通过压力治疗以维持吻合口部位的正向压力梯度,促进淋巴液向静脉回流[17,25,67-69]。一项系统评价表明,与术前相比,LVA术后联合压力治疗显著降低了患肢周径,平均减少3.8 cm(95%CI:2.93～4.67,P<0.000 01)[24]。

压力治疗主要包括多层压力绷带和压力套两大类。多层压力绷带具备较强的压力可调节特性,可依据患者术后自身耐受性灵活调整,常用于CDT快速消肿期[70-71]。相较之下,压力套施加的压力相对恒定,常用于CDT稳定期[72]。可根据ISL分期选择压力范围:ISL 0期(潜伏期)预防淋巴水肿,建议压力套选择1级压力(15～20 mmHg)以预防和缓解肢体轻度不适为主。ISL Ⅰ期(可逆性淋巴水肿期)消肿和维持性压力治疗,建议压力套选择2级压力(20～30 mmHg)快速消除可逆性水肿,恢复淋巴通路通畅性,防止水肿反复。ISL Ⅱ期(不可逆性淋巴水肿期)消肿和抗纤维化压力治疗,建议压力套选择3级压力(25～35 mmHg)控制水肿进展,延缓皮肤纤维化,维持肢体围径稳定。ISL Ⅲ期(橡皮肿期,晚期严重阶段)对症和抗纤维化压力治疗,建议压力套选择4级压力(35～45 mmHg)缓解局部不适,预防感染、溃疡等并发症[73]。

多项研究已表明LVA术后压力治疗时长与方案需结合肢体部位、分期及患者耐受性调整[74-75]。多数中心的研究建议在术后即刻采用压力治疗[38,76-77],也有学者认为压力治疗的介入时机应在

术后1周左右，此时吻合口的血管内膜已初步愈合，血栓形成倾向较低，可避免压力对吻合口血供的影响[78]。压力治疗有多种方式选择，多数研究中心在术后1月内优先采用多层压力绷带包扎，随后穿戴压力套维持疗效[25,69,79-81]。一些学者主张让患者在术后6月内持续穿戴压力套，以维持患肢体积稳定，减少水肿复发[27,82-83]。继发性肢体淋巴水肿的分期可为患者LVA术后压力治疗的持续时间提供重要参考价值，ISL Ⅰ～Ⅱ期患者压力治疗持续3～6月后可根据病情选择减少或停止压力治疗，ISL Ⅲ期患者通常需长期甚至终身使用压力治疗[76,84-89]。长期或终身采用压力治疗的患者每6个月需评估患肢周径、皮肤状况及压力设备适配性[73]，根据患者的压力耐受情况、压力设备的适配性进行个性化调整。

2.5 临床问题5：VLNT的适应证及疗效

推荐意见5.1：VLNT适合于经保守治疗效果不佳或有手术意愿的ISL Ⅱ期或Ⅲ期患者（证据等级：中级；推荐强度：中推荐）。

推荐意见5.2：VLNT能有效缓解肢体肿胀、沉重感和疼痛，减少蜂窝织炎发作频率，同时可降低患者对压力治疗的长期依赖，显著改善患者的生活质量（证据等级：中级；推荐强度：强推荐）。

证据与说明：

VLNT是指将淋巴结及其滋养血管以组织瓣的形式转移到淋巴水肿的区域，以重建淋巴回流通路[90]。这是治疗ISL Ⅱ～Ⅲ期肢体淋巴水肿的有效外科手段，尤其适用于保守治疗或LVA治疗效果不佳、失败或不适宜的患者[91-92]。其核心适应人群包括经淋巴造影证实存在淋巴引流严重障碍（如完全阻塞、严重真皮反流或功能性淋巴管缺失）者，以及反复发生蜂窝织炎或生活质量严重下降的患者[91-93]。在疗效方面，VLNT可显著降低患肢体积与周径，减容率介于20%～70%[93-107]。研究表明，该术式对复发性蜂窝织炎的控制效果突出，可大幅降低感染发作频率，部分患者可实现零感染[92,94,98-99,102-103,105-111]，且在肥胖人群中表现尤为显著[111]。术后患者生活质量在多维度量表如淋巴水肿生活质量问卷（lymphedema quality of life questionnaire，LYMQOL）、淋巴水肿腿部指数评分（lymphedema leg index score，LLIS）等评估中均有显著提升[98,100-103,106,112-115]，同时可有效减轻患者对压力治疗的依赖，约75%的患者可完全停用或减少压力治疗[92,98,101,103,106,116-118]。

2.6 临床问题6：VLNT治疗继发性肢体淋巴水肿的效果与淋巴结数量的相关性

推荐意见6：VLNT的疗效与淋巴结数量相关，通常移植淋巴结数量大于等于3个具有更好的治疗效果（证据等级：低级；推荐强度：中推荐）。

证据与说明：

一项前瞻性队列研究依据移植的淋巴结数量将患者分为A（1～2个，n=10）、B（3～4个，n=14）、C（5～8个，n=11）三组，B组和C组患肢的周径改善幅度均显著高于A组（分别为P=0.04和P=0.02）[119]。因此，该低级别证据表明，移植3个或更多的淋巴结更能减轻患肢肿胀。但该项单中心研究样本量有限、未设置盲法且随访时间较短，未来仍需大样本、多中心、设计严谨的前瞻性研究加以验证，以进一步明确移植淋巴结的适宜数量及远期疗效。

2.7 临床问题7：VLNT治疗继发性肢体淋巴水肿的供区选择

推荐意见7：腹腔来源血管化淋巴结的治疗效果不劣于皮肤血管化淋巴结移植，供区选择应个体化，综合考虑患者意愿、解剖条件、手术团队经验及供区并发症风险（证据等级：中级；推荐强度：中推荐）。

证据与说明：

腹腔来源血管化淋巴结包括胃网膜淋巴结和肠系膜淋巴结。血管化胃网膜淋巴结移植后可重建淋巴生理引流功能，缓解肢体淋巴水肿进展，且术后生物阻抗分析显示其改善效果优于皮肤血管化淋巴结供区[120]。常用的皮肤血管化淋巴结供区主要有腹股沟区、颏下、锁骨上、胸外侧区等。腹股沟区淋巴结瓣切取简便，常用于上肢淋巴水肿的治疗；颏下淋巴结解剖恒定，血管口径大，易于吻合，但存在损伤面神经分支的风险；锁骨上区毗邻重要血管神经，手术难度高；胸外侧区淋巴结瓣血管蒂

较长,可获取多个淋巴结。腹股沟区和胸外侧区淋巴结瓣存在医源性淋巴水肿发生风险[100,121-124]。研究表明腹腔来源血管化淋巴结移植治疗继发性肢体淋巴水肿的效果与皮肤血管化淋巴结移植的治疗效果相当,可有效减轻肢体水肿,改善肢体的功能和外观,减少蜂窝织炎的发生次数,显著提高患者生活质量和患者主观满意度[120,125-127]。研究表明胃网膜内淋巴结分布位置相对固定,沿胃网膜右动脉分布,且网膜右动脉的口径为(2.49±0.66) mm,这些优点适合于显微吻合[128]。解剖学研究发现,与传统皮肤淋巴结相比,胃网膜淋巴结的淋巴结数量更多(平均5.2枚/瓣),且网膜瓣体积足以支持功能重建[129]。此外,相对于其他供区,胃网膜血管化淋巴结供区因具备广泛淋巴侧支循环,发生淋巴漏和医源性供区淋巴水肿的几率较低[98,121,126,128,130-131]。随着机器人辅助/腹腔镜等微创技术的应用,开腹手术相关的疝气(<13.8%)、肠梗阻(<10.3%)及切口感染(<3.4%)等风险显著降低[125,132-134],使胃网膜血管化淋巴结瓣更具优势。因此,腹腔来源血管化淋巴结移植具有解剖结构可靠、淋巴结含量相对丰富、供区并发症少等优势。

2.8　临床问题8:VLNT治疗继发性肢体淋巴水肿的受区选择

推荐意见8:淋巴结移植到患肢的近端或远端均有效,推荐根据水肿范围、瘢痕情况、血管条件及是否合并软组织缺损等因素综合评估,选择最适宜的移植部位(证据等级:低级;推荐强度:中推荐)。

证据与说明:

对于上肢淋巴水肿,一项纳入1 440例患者的系统分析显示,肢体近端(腋窝或腹股沟区)、远端(腕部或踝部)及双部位移植在体积减少、患者满意度和压力治疗停用率方面无显著差异,提示三种受区均有效,受区选择应基于技术可行性和患者个体情况综合考虑[135]。另一项系统评价表明,无论将VLNT的受区选在腕部还是腋窝均能有效减轻水肿,二者的患者周径减少率(腕部42.1% vs 腋窝51.5%)与体积减少率(腕部35.6% vs 腋窝48.8%)虽在数值上存在差异,但统计学上二者之间无显著差异[136]。因此,对于继发性上肢淋巴水肿的患者,若腋窝区域存在瘢痕粘连或静脉回流障碍,先行瘢痕松解和静脉减压,然后将淋巴结移植至腋窝。腋窝瘢痕松解术作为辅助措施可显著提高患者满意度,并可改善体积控制效果[135]。若腋窝无明显瘢痕粘连且水肿主要集中在肢体远端,可考虑将淋巴结移植至肘部或腕部,利用局部肌肉泵效应增强淋巴引流[136-137]。

对于下肢淋巴水肿的患者,小腿内侧和踝部是最常用的受区,该受区血管易于解剖,术后淋巴引流改善明显[136]。一项回顾性研究表明在40例下肢继发性淋巴水肿的患者中将VLNT移植到远端,平均周径减少率为(38.9±2.5)%,显著高于CDT组[137]。若水肿范围广泛,亦可选择移植下肢中段或大腿近端[138]。一项回顾性队列研究比较了将网膜淋巴结瓣移植到下肢的远端和中段的效果,在随访6个月后,发现移植到中段的患者平均体积减少为23.3%,而移植到远端的患者平均体积减少为13.3%[139]。

2.9　临床问题9:VLNT术后压力治疗介入时机及持续时间

推荐意见9:VLNT术后压力治疗有助于提高VLNT的治疗效果,推荐压力治疗的介入时机为术后1周左右,压力治疗持续6个月后可根据患者情况减少或停用压力治疗,但部分患者需终身压力治疗(证据等级:中级;推荐强度:中推荐)。

证据与说明:

一项系统评价表明,VLNT联合加压治疗能显著减少患者周径和体积[24]。Dionyssiou等[105]的随机对照临床试验研究比较了VLNT联合压力治疗与单纯压力治疗治疗继发性肢体淋巴水肿的效果,发现联合组肢体体积平均减少57%,且蜂窝织炎发作次数显著减少,所有VLNT组患者报告肢体无疼痛感和沉重感,功能改善明显。此外,多项研究在VLNT术后均建议采用压力治疗[116,140]。

对于压力治疗的介入时机,多个中心均建议在术后1周左右开始或恢复压力治疗[106,141-148],这些学者认为VLNT术后过早压力治疗可能压迫移植淋巴结和血管吻合口,影响淋巴结血供。但也有临床研究在术后1~2天即开始进行压力治疗[143]。对于

压力治疗的压力选择，通常建议30～40 mmHg[149]，一项随机对照临床研究采用2级压力（30 mmHg）治疗显示了较好的临床效果[105]。对于加压方式，多项研究建议采用多层压力绷带加压[106,141-143,149]。此外，也有报道显示部分病例术后一直未采用压力治疗，仍显示了较好的治疗效果[150-152]。因此，整体证据倾向于延迟介入以降低淋巴结坏死风险，故推荐术后1周左右开始压力治疗，且压力强度和加压方案需根据患者耐受情况以及各中心的加压设备型号进行调节。

部分研究显示VLNT治疗后可根据治疗效果适时停用压力治疗[14,153]。Ozturk等[106]的系统评价也指出，53%的患者在VLNT术后2～6月实现减少或停用压力治疗。Becker等[154]建议在VLNT术后6月根据水肿严重程度停用压力治疗。在Agko等[155]的方案中，患者在VLNT术后前3月全天使用压力套治疗，3月后评估肿胀无复发，则过渡到仅白天使用压力套，最终在术后6月停用压力治疗。因此，压力治疗6个月是评估治疗反应和调整压力治疗的关键点。综合研究数量和证据等级，建议VLNT术后持续压力治疗6个月后可根据患者情况减少或停用压力治疗。然而，一些研究在术后长期随访过程中发现，部分患者可能需要长期压力治疗[98,153]。

2.10 临床问题10：继发性肢体淋巴水肿生理性重建术式选择

推荐意见10：LVA与VLNT均可改善肢体淋巴水肿症状，但起效时间和效果维持时间存在差异，术式选择应基于临床分期、病理特点、患者耐受性与意愿、疗效预期等综合决定（证据等级：中级；推荐强度：强推荐）。

证据与说明：

LVA通过将淋巴管与邻近静脉吻合，建立旁路引流淋巴液，早期效果显著；随着淋巴管内压力低于静脉压，可能导致静脉血逆流、吻合口栓塞，因此远期效果存在争议[89,115,156]。VLNT通过移植血管化淋巴结至水肿区域，促进淋巴管再生和重建淋巴回流。淋巴管再生通常需要6个月左右，因此VLNT在患肢体积的改善方面具有一定的延迟性，但其效果更持久[115,157]。三项研究（共161例患者）对比显示，尽管术后12～18个月时，VLNT和LVA两组淋巴回流功能改善率无显著差异（VLNT组65% vs LVA组42%），但在48个月的长期随访中，VLNT组有46%的患者淋巴回流功能持续改善，而LVA组仅为16%（OR=4.57，P=0.07），提示VLNT在疗效维持方面更具优势[24]。系统评价表明VLNT组术后患者肢体周长减少率较LVA组高16.7%（95%CI：13.32～20.08），每年蜂窝织炎发作次数较接受LVA的患者平均少1.2次（P=0.02）[24]，进一步支持VLNT在患肢体积改善和炎症控制方面的显著效果。在压力治疗依赖性方面，Granzow等[118]发现在24个月随访时，VLNT组中75%的患者已不再依赖压力衣，而LVA组仅为38%，提示VLNT有助于患者摆脱长期压力治疗。然而，LVA手术创伤小，并发症发生率低（约5%）、住院时间短（平均8.9 d）；而VLNT手术时间较长、并发症发生率较高（29%）、住院时间较长（平均15.2 d）[24,158-159]。综上，LVA与VLNT均为淋巴水肿有效的外科治疗手段，临床决策应结合患者具体病情、期望值与手术风险，制定个体化治疗方案。

2.11 临床问题11：脂肪抽吸术治疗继发性肢体淋巴水肿的适应证及疗效

推荐意见11.1：脂肪抽吸术是以脂肪沉积为主的肢体淋巴水肿的有效减容手段，不作为以液体成分为主的凹陷性水肿的首选治疗方案（证据等级：中级；推荐强度：强推荐）。

推荐意见11.2：脂肪抽吸术能显著减轻肢体肿胀，减少蜂窝织炎发生率，并提高继发性肢体淋巴水肿患者的生活质量（证据等级：中级；推荐强度：中推荐）。

证据与说明：

淋巴水肿晚期，肢体肿胀由单纯的液体聚集转变为纤维脂肪组织增生，形成以“固体”成分为主的非凹陷性水肿[5]。此时，旨在改善淋巴引流的“生理性手术”（如LVA、VLNT）效果有限。脂肪抽吸术通过物理性去除过度沉积的脂肪组织，能直接实现肢体减容，是针对此阶段核心病理改变的对症治疗

方法[160-161]。脂肪抽吸术治疗继发性肢体淋巴水肿的适应证[162-173]包括:1)ISL Ⅱ～Ⅲ期淋巴水肿患者,经保守治疗或生理手术治疗效果不佳或出现复发;2)患侧肢体体积比对侧增大超过10%,并伴有疼痛、麻木、沉重等主观不适症状;3)压陷试验显示无或仅轻微凹陷(<6～7 mm),或影像学提示病变以脂质沉积为主(即非凹陷性水肿);4)患者依从性良好,能够长期坚持规范的加压治疗。

多项研究证实,脂肪抽吸术能显著缩小肢体体积[166,173-174]。荟萃分析显示,该方案可使水肿体积平均减少63.95%(95%CI: 49.57～78.33),或绝对体积减少895 mL(95%CI: 650.98 ～1 140.63),效果远优于单用加压治疗[24],该效果在上下肢淋巴水肿中均得到验证[173,175]。脂肪抽吸术后,肢体蜂窝织炎的发作次数也显著减少[118]。一项系统评价报告严重蜂窝织炎发生率从术前的70%降至术后的10%(OR=21.00),极大改善了患者的生活质量[24]。

2.12　临床问题12:规范的脂肪抽吸术可最大限度减小对淋巴管损伤

推荐意见12:规范操作的脂肪抽吸术总体上是安全的。为最大限度降低淋巴管损伤风险,建议沿肢体长轴方向实施操作,并可于术前借助影像学技术进行淋巴管示踪,以此规划安全路径,实现精细化吸脂。(证据等级:低级;推荐强度:中推荐)。

证据与说明:

淋巴管在解剖结构上沿肢体长轴分布,并具备一定的抗拉伸强度。多项解剖学研究证实,当脂肪抽吸操作方向与淋巴管走向平行(夹角为0°～10°)时,对淋巴管的牵拉和损伤较小[176-177]。与之相反,当脂肪抽吸方向垂直于淋巴管轴线时,会对淋巴管造成显著的剪切力,极易导致淋巴管的撕裂、断裂等结构性损伤,从而可能诱发或加重淋巴水肿[176-178]。多项长期随访研究显示,在遵循轴向操作等严格规范的前提下,脂肪抽吸术本身并未导致淋巴引流功能的恶化,反而能有效减少脂肪沉积,表明规范脂肪抽吸技术的安全性和有效性[178-179]。Greene等[180]在2例患者中通过淋巴核素成像证实脂肪抽吸术并不会对淋巴系统造成明显的损伤,反而能促进淋巴新生。此外,术前示踪功能性淋巴管引流区域可以最大限度减少脂肪抽吸术中对淋巴系统的损伤[181]。

2.13　临床问题13:脂肪抽吸术后压力治疗介入时机和持续时间

推荐意见13:压力治疗是维持脂肪抽吸术效果的关键措施,仅应用脂肪抽吸术治疗肢体淋巴水肿患者,建议术后终身使用压力治疗;若联合生理性重建手术,则在压力治疗持续6个月后根据患者病情可减少对压力治疗的依赖(证据等级:中级;推荐强度:强推荐)。

证据与说明:

压力治疗应在脂肪抽吸手术结束时、放松止血带前开始实施。其初始目的在于压迫止血、闭合脂肪抽吸后产生的组织腔隙(死腔)、减轻术后水肿与渗出,并为早期淋巴液回流提供外部支持[182]。多数医学中心的研究在脂肪抽吸术后进行压力治疗,压力通常维持在30～40 mmHg[162-164,167,169],但也有一些学者建议在术后早期就采用更高强度的压力(40～50 mmHg)[183]。对于接受联合手术的患者,持续压力治疗6个月左右后,可依据恢复情况逐步降低压力依赖[96,155,183-189]。因此,脂肪抽吸术后应根据患者情况、手术方案和不同医学中心加压设备使用情况进行个性化压力治疗,并在后续随访中根据体积改善情况进行调整。尽管有研究表明部分患者术后可能出现淋巴管新生[180],但此种代偿机制并不可靠且无法预测。脂肪抽吸术去除了占位的脂肪组织,但并未修复潜在的淋巴运输功能缺陷。因此,外部压力是替代缺失的组织张力、防止淋巴液重新积聚和脂肪沉积的关键。若患者压力治疗依从性差,肢体复胀几乎不可避免。

所有证明脂肪抽吸术有效的临床研究,其方案均联合了规范的压力治疗,即脂肪抽吸术的疗效是在压力治疗的协同下实现的。多项研究比较了“脂肪抽吸术联合压力治疗”与“单纯压力治疗”的效果[169,175,190],系统评价表明前者在肢体体积减少方面展现出了明显的优势(平均多减少64%的体积或895 mL)[24],表明脂肪抽吸术联合压力具有更显著的临床疗效。压力治疗需要长期坚持,并应根据肢体体积变化定期评估和更换压力衣,以确保维持有

效的压力水平。

2.14 临床问题14:CDT治疗继发性肢体淋巴水肿的适应证及疗效

推荐意见14:CDT可有效减轻肢体体积、改善临床症状、提升功能与生活质量,对于各期的肢体淋巴水肿均有疗效,是国际公认的淋巴水肿保守治疗的金标准和核心方案(证据等级:高级;推荐强度:强推荐)。

证据与说明:

CDT适用于由任何病因导致的、各类分期的继发性肢体淋巴水肿,合并局部活动性肿瘤的患者并非CDT的绝对禁忌症。在肿瘤科医生评估病情稳定的前提下,CDT可作为姑息治疗的一部分,以缓解症状、提高患者生活质量[191]。对于合并有急性深静脉血栓的患者需要先行抗凝治疗,在病情稳定后,CDT是安全的[192-193]。大量临床研究和系统评价证实了CDT的综合疗效。多项系统综述证实,CDT能显著减少患肢体积,平均体积减少率可达40%~70%[194-197]。尽管早期干预效果更佳,但晚期患者同样能从CDT中获益。一项对多项试验的效应值分析显示,中重度淋巴水肿患者的体积减少效应值可能更大[197]。此外,患者报告的沉重感、紧绷感、疼痛感等不适症状可获得显著缓解。多项研究证实,CDT能显著改善与淋巴水肿相关的生活质量,包括减轻疼痛、身体功能、情绪状态、社会功能和自我形象[197-198]。总之,CDT是安全、有效的淋巴水肿一线保守治疗方案,广泛应用于临床实践,但患者依从性是维持CDT治疗效果的决定性因素[199]。

2.15 临床问题15:继发性肢体淋巴水肿手术治疗后的康复锻炼及体重管理

推荐意见15.1:康复锻炼对肢体淋巴水肿患者术后恢复安全、有效,推荐术后在淋巴水肿专业康复师指导下进行运动康复,包括有氧运动和规范的力量训练(证据等级:低级;推荐强度:强推荐)。

推荐意见15.2:将体重管理纳入肢体淋巴水肿患者术后的治疗体系,推荐将身体质量指数(body mass index,BMI)长期维持在25 kg/m^{2}以下(证据等级:中级;推荐强度:强推荐)。

证据与说明:

运动康复作为淋巴水肿术后综合管理的重要组成部分,其有效性源于其对淋巴回流独特的生理促进作用。主要包括以下机制[82,200-202]:1)提高组织间隙压力,促进淋巴液引流;2)肌肉收缩促进淋巴液回流;3)降低淋巴系统总体负荷;4)增强淋巴管自主收缩功能。多项临床研究鼓励患者在术后早期(即刻或术后第1天)开始下床活动与行走,这表明在专业监护下早期运动是安全的,并能尽早获益于"肌肉泵"效应[82,200,203]。案例研究报道,在VLNT术后实施包括运动在内的物理治疗干预,可显著改善患者结局[200]。

淋巴水肿患者的体重管理应被重视。肥胖本身可导致获得性淋巴功能障碍,表现为淋巴功能下降、淋巴液流动减弱,故淋巴系统损伤后更易发生淋巴水肿[204]。此外,肥胖状态下的慢性炎症环境在淋巴系统损伤后会引发更为剧烈的CD4$^+$细胞浸润与组织纤维化,从而进一步阻碍淋巴管再生并加重病情[204-205]。临床研究表明,与BMI≤25 kg/m^{2}的患者相比,肥胖(BMI≥30 kg/m^2)的淋巴水肿患者其感染风险增加7.9倍,住院风险激增30倍,肢体发生中重度过度肿胀的风险也高达6.7倍[206]。反之,减重被证实能够有效恢复淋巴功能并减轻肢体体积[205-206]。因此,建议将所有患者将BMI长期控制在25 kg/m^{2}以下,以期从病因层面改善淋巴功能、减轻症状严重程度并最大程度降低并发症风险。

2.16 临床问题16:继发性肢体淋巴水肿的整合外科治疗

推荐意见16:对于ISL Ⅱ~Ⅲ期、合并多种病变成分(液体、脂质沉积、纤维化)的继发性肢体淋巴水肿患者,建议依据病变成分同期或分期实施各种生理性手术联合减容手术的整合外科治疗(证据等级:中级;推荐强度:强推荐)。

证据与说明:

针对不同程度的淋巴水肿患者,国际上多个医学中心提出了针对性治疗算法[7-10,14-16,24-27]。治疗方案(尤其是手术方案)原则上应根据主要病变成分

来选择[67,207-208]。对于ISL Ⅰ期或症状较轻的淋巴水肿患者推荐保守治疗或根据主要病变成分行单一手术治疗。若一期手术无效或复发的患者,可根据病变情况考虑进行二期联合手术治疗[67,207-208]。对于以淋巴液蓄积为主的“液态”继发性肢体淋巴水肿,推荐实施生理性手术治疗(LVA或VLNT)。这两种手术发挥作用中存在一定的时间差异,研究表明,LVA与VLNT联合使用在中远期疗效上优于LVA单独治疗[209]。因此,对于早期肢体淋巴水肿患者,建议选择LVA联合VLNT的治疗方案。对于以脂肪沉积和纤维化为主的“固态”继发性肢体淋巴水肿,首选减容手术。根据纤维化程度和肿胀体积,可以选择脂肪抽吸术、Charles手术或保留穿支的减容手术等减容手术[210-211]。然而,由于减容手术未进行生理性重建,可能存在较高的复发风险。因此,对于中晚期肢体淋巴水肿患者,建议进行生理性手术与减容手术联合治疗[7-10,14-16,24-27]。文献报道,相比LVA联合脂肪抽吸术,3L手术(LVA联合VLNT联合脂肪抽吸术)在中晚期肢体淋巴水肿的疗效持久性方面更具优势[212-213]。目前,淋巴水肿的联合治疗方式多种多样,尚无统一的规范标准。邓呈亮教授团队在国内率先提出了继发性肢体淋巴水肿的整合治疗算法并创新了多种整合治疗技术,既契合肢体淋巴水肿复杂的病理生理改变,同时有机整合各种外科治疗[9],结合个性化治疗算法进行精准干预[8]。

3　总结与展望

继发性肢体淋巴水肿的临床管理较为复杂,其有效防控与治疗不仅需要依据水肿分期、受累部位及病因采取个体化策略,更需整合外科与康复医学手段,同时需关注肢体功能、生活质量及心理社会适应。本共识基于现有循证证据,融合多学科专家意见,形成具有较强临床适用性的整合治疗推荐方案,以促进继发性肢体淋巴水肿的规范化和全程化管理。需要指出的是,当前该领域的高质量随机对照研究仍相对有限,部分推荐意见的证据等级不高,且在疗效差异方面对不同人群的考量尚显不足。未来亟待开展更多针对不同病因不同人群以及整合不同外科术式及康复手段的大样本临床研究,为继发性肢体淋巴水肿治疗策略的优化提供证据支撑。

随着对淋巴系统解剖和淋巴水肿发病机制的深入研究,超级显微外科技术的推广与淋巴显影技术的发展、组织工程材料的研发,以及基于人工智能的病程监测与疗效评估体系的建立,继发性肢体淋巴水肿的整合治疗必将迈向更精准、更微创、更个性化的新阶段,推动全程管理范式的持续革新与完善。

《继发性肢体淋巴水肿整合治疗专家共识(2025版)》编写组

顾问:吴军(深圳大学第一附属医院烧伤整形外科)、顾立强(中山大学附属第一医院显微创伤骨科)、罗高兴(陆军军医大学西南医院全军烧伤研究所)、徐永清(中国人民解放军联勤保障部队第九二〇医院创伤骨科)、沈文彬(首都医科大学附属北京世纪坛医院淋巴外科)、龙笑(北京协和医院整形美容外科)、王欣(宁波市第六人民医院手显微整复外科)、魏在荣(遵义医科大学附属医院烧伤整形外科)

牵头专家:邓呈亮(遵义医科大学附属医院烧伤整形外科)、章一新(上海交通大学医学院附属第九人民医院整复外科)、赵德伟(大连大学附属中山医院骨科)

组长:邓呈亮、肖顺娥(遵义医科大学附属医院烧伤整形外科),黄广涛(深圳大学第一附属医院烧伤整形外科),章一新、李科(上海交通大学医学院附属第九人民医院整复外科),刘宾(西安交通大学附属西安市中心医院烧伤整形美容外科),王季(深圳市第二人民医院大鹏新区南澳医院康复医学科)

国内专家组成员(单位名称以拼音排序,姓名以姓氏笔画排序):

安徽医科大学第一附属医院烧伤外科孙业祥,北京大学人民医院整形美容科毕晔,北京大学深圳医院手足显微外科周喆刚,北京大学首钢医院修复重建外科阳跃,北京协和医院康复医学科刘颖,北京协和医院整形美容外科龙笑、郭路齐,兵器工业卫生研究所手显微外科梁高峰,重庆市璧山区人民

医院淋巴外科胡明兴，大连大学附属中山医院骨科刘保一、赵德伟，福建医科大学附属第一医院整形外科雷忱，福建医科大学附属协和医院烧伤与创面修复科陈昭宏，赣州市人民医院烧伤整形与创面修复科涂家金，广东省人民医院烧伤与创面修复科赖文、罗红敏，广西医科大学第一附属医院烧伤整形与创面修复科李德绘，广西中医药大学附属瑞康医院修复重建外科兰荣玉，广西壮族自治区南溪山医院烧伤整形与创面修复科李建毅，贵州省人民医院烧伤整形外科郑德义，哈尔滨市第五医院手足显微外科聂广辰，海南医科大学第二附属医院乳腺外科穆籣，海南医科大学第一附属医院创面修复科程少文，海南医科大学第一附属医院急诊创伤外科崔红旺，河北医科大学第二医院整形外科刘柳，河北医科大学第三医院烧伤与创面修复科冯建科，河南省直第三人民医院整形外科王军杰，湖南省娄底市中心医院泌尿外科龙晓丹，湖南省肿瘤医院乳腺肿瘤整形科（头颈外三科）吕春柳、宋达疆，吉林大学第二医院手足显微外科刘军，暨南大学附属广州红十字会医院烧伤与创面修复科张志、李罡，解放军总医院第一医学中心组织再生与创面修复科杨润功，浏阳市人民医院烧伤整形外科蒋章佳，陆军军医大学西南医院全军烧伤研究所罗高兴，南昌大学第二附属医院整形美容科易阳艳，南昌大学第一附属医院烧伤与创面修复治疗中心闵定宏，南方医科大学南方医院整形外科张明君，南京大学医学院附属鼓楼医院康复医学科徐蓉，南通大学附属医院烧伤与创面修复科张逸、蔡玉辉，宁波市第六医院手显微整复外科中心王欣、潘佳栋，山东大学齐鲁第二医院整形烧伤科姜笃银，山东省立医院手足显微外科刘林峰，陕西省肿瘤医院乳腺科丁艳妮，汕头大学医学院第一附属医院整形外科谢思田，上海交通大学医学院附属第九人民医院整复外科李科、章一新，上海交通大学医学院附属瑞金医院烧伤整形与创面修复科刘琰、窦懿，上海交通大学医学院附属新华医院崇明分院手足显微外科林涧，深圳大学第一附属医院烧伤整形外科吴军、黄广涛，深圳大学总医院手足显微外科魏鹏，深圳市第二人民医院大鹏新区南澳医院康复医学科王季、徐姗姗，首都医科大学附属北京积水潭医院烧伤整形与创面修复科沈余明、陈辉，首都医科大学附属北京积水潭医院手足显微外科武竞衡，首都医科大学附属北京世纪坛医院淋巴外科沈文彬、郝昆，四川省人民医院烧伤与创面修复科陈博，四川现代医院手外科/显微外科张航，台州恩泽医疗中心（集团）恩泽医院手足显微外科王成、易利奇，天津市第一中心医院整形外科李小兵，皖南医学院第一附属医院烧伤科吕大伦，温州医科大学附属第一医院烧伤与创面修复科林才，无锡市第二中医医院整形外科张若冰，武汉协和医院手足显微外科陈振兵，西安交通大学第一附属医院整形美容颌面外科舒茂国，西安交通大学附属西安市中心医院烧伤整形美容外科马戈甲、刘宾，云南大学附属医院手足显微外科杨华刚，浙江大学医学院附属第二医院整形外科胡学庆，浙江省人民医院淋巴重建外科郑有卯，浙江省人民医院乳腺外科李永峰，郑州大学附属郑州中心康复医学科王景信，中国人民解放军联勤保障部队第九二〇医院创伤骨科徐永清，中国人民解放军中部战区空军医院烧伤与创面修复科王玉振，中山大学附属第一医院显微创伤骨科杨弈、顾立强，中山大学孙逸仙纪念医院乳腺外科吴建南，遵义医科大学附属医院烧伤整形外科邓呈亮、肖顺娥、金文虎、聂开瑜、魏在荣

文献整理组成员：陈君哲、唐泽耀、陈宗灿、王芸、罗紫依、叶科辰、袁绍翔、陈月忠、秦昊焜、罗大洋（遵义医科大学附属医院烧伤整形外科）

证据评价组成员：蒋玲丽、刘志远、吴祥奎、李海、吴必华、张芳、张天华、邵星、王媛媛、石胜霞（遵义医科大学附属医院烧伤整形外科）

执笔组成员：简扬、肖顺娥、潘垚（遵义医科大学附属医院烧伤整形外科）

（由于印刷关系，查阅本文电子版请登录：http://www.paper.edu.cn/journal/zgkjlw.shtml）

[参考文献]（References）

[1] GRADA A A, PHILLIPS T J. Lymphedema: pathophysiology and clinical manifestations [J]. Journal of the American Academy of Dermatology, 2017, 77(6): 1009-1020.

[2] CHANG D W, MASIA J, GARZA R 3RD, et al.

Lymphedema: surgical and medical therapy [J]. Plastic and Reconstructive Surgery, 2016, 138(3 Suppl): 209s-218s.

[3] DAYAN J H, LY C L, KATARU R P, et al. Lymphedema: pathogenesis and novel therapies [J]. Annual Review of Medicine, 2018, 69: 263-276.

[4] SCHAVERIEN M V, CORONEOS C J. Surgical treatment of lymphedema [J]. Plastic and Reconstructive Surgery, 2019, 144(3): 738-758.

[5] ROCKSON S G. Advances in lymphedema [J]. Circulation Research, 2021, 128(12): 2003-2016.

[6] SHAITELMAN S F, CROMWELL K D, RASMUSSEN J C, et al. Recent progress in the treatment and prevention of cancer-related lymphedema [J]. CA: a Cancer Journal for Clinicians, 2015, 65(1): 55-81.

[7] FILLON M. Combined physiologic and excisional therapies improve cancer-related lymphedema outcomes [J]. CA: a Cancer Journal for Clinicians, 2018, 68(4): 237-239.

[8] 邓呈亮, 陈君哲, 肖顺娥, 等. 基于算法浅谈继发性下肢淋巴水肿的外科整合治疗[J]. 中华烧伤与创面修复杂志, 2025, 41(6): 516-524.
DENG C L, CHEN J Z, XIAO S E, et al. An overview of integrated surgical management for secondary lower limb lymphedema guided by algorithms [J]. Chinese Journal of Burns and Wounds, 2025, 41(6): 516-524. (in Chinese)

[9] 邓呈亮, 陈君哲, 章一新. 继发性肢体淋巴水肿的外科整合治疗[J]. 中华损伤与修复杂志(电子版)2024, 19(3): 185-191.
DENG C L, CHEN J Z, ZHANG Y X. Integrated surgical treatment of secondary limb lymphedema [J]. Chinese Journal of Injury Repair and Wound Healing (Electronic Edition), 2024, 19(3): 185-191. (in Chinese)

[10] ATKINS D, ECCLES M, FLOTTORP S, et al. Systems for grading the quality of evidence and the strength of recommendations I: critical appraisal of existing approaches The GRADE Working Group [J]. BMC Health Services Research, 2004, 4(1): 38.

[11] OGUNLEYE A A, NGUYEN D H, LEE G K. Surgical treatment of lymphedema [J]. JAMA Surgery, 2020, 155(6): 522-523.

[12] YANG J C, WU S C, HAYASHI A, et al. Selection of optimal functional lymphatic vessel cutoff size in supermicrosurgical lymphaticovenous anastomosis in lower extremity lymphedema [J]. Plastic and Reconstructive Surgery, 2022, 149(1): 237-246.

[13] YANG J C, WU S C, CHIANG M H, et al. Intraoperative identification and definition of "functional" lymphatic collecting vessels for supermicrosurgical lymphatico-venous anastomosis in treating lymphedema patients [J]. Journal of Surgical Oncology, 2018, 117(5): 994-1000.

[14] BASTA M N, GAO L L, WU L C. Operative treatment of peripheral lymphedema: a systematic meta-analysis of the efficacy and safety of lymphovenous microsurgery and tissue transplantation [J]. Plastic and Reconstructive Surgery, 2014, 133(4): 905-913.

[15] QIU S S, PRUIMBOOM T, CORNELISSEN A J M, et al. Outcomes following lymphaticovenous anastomosis (LVA) for 100 cases of lymphedema: results over 24-months follow-up [J]. Breast Cancer Research and Treatment, 2020, 184(1): 173-183.

[16] YI L, JIANG Y, XU L, et al. Optimizing strategies for lymphaticovenular anastomosis in lower secondary extremity lymphedema [J]. Journal of Vascular Surgery: Venous and Lymphatic Disorders, 2025, 13(1): 101984.

[17] SHIMBO K, KAWAMOTO H, KOSHIMA I. Conservative treatment versus lymphaticovenular anastomosis for early-stage lower extremity lymphedema [J]. Journal of Vascular Surgery: Venous and Lymphatic Disorders, 2023, 11(6): 1231-1240.

[18] CARETTO A A, STEFANIZZI G, GARGANESE G, et al. Treatment of early-stage gynecological cancer-related lower limb lymphedema by lymphaticovenular anastomosis-the triple incision approach [J]. Medicina (Kaunas, Lithuania), 2022, 58(5): 631.

[19] RAMACHANDRAN S, CHEW K Y, TAN B K, et al. Current operative management and therapeutic algorithm of lymphedema in the lower extremities [J]. Asian Journal of Surgery, 2021, 44(1): 46-53.

[20] YANG J C, WU S C, LIN W C, et al. Supermicrosurgical lymphaticovenous anastomosis as alternative

treatment option for moderate-to-severe lower limb lymphedema [J]. Journal of the American College of Surgeons, 2020, 230(2): 216-227.

[21] TALIAT G, OU Y C, WANG Y M, et al. Impact of lymphedema duration on lymphatic vessel quality and outcomes after super-microsurgical lymphaticovenous anastomosis [J]. Plastic and Reconstructive Surgery, 2025, 156(4): 593e-603e.

[22] HARA H, MIHARA M. Lymphaticovenous anastomosis for advanced-stage lower limb lymphedema [J]. Microsurgery, 2021, 41(2): 140-145.

[23] CHA H G, OH T M, CHO M J, et al. Changing the paradigm: lymphovenous anastomosis in advanced stage lower extremity lymphedema [J]. Plastic and Reconstructive Surgery, 2021, 147(1): 199-207.

[24] CHANG D W, DAYAN J, GREENE A K, et al. Surgical treatment of lymphedema: a systematic review and meta-analysis of controlled trials. results of a consensus conference [J]. Plastic and Reconstructive Surgery, 2021, 147(4): 975-993.

[25] KOSHIMA I, INAGAWA K, URUSHIBARA K, et al. Supermicrosurgical lymphaticovenular anastomosis for the treatment of lymphedema in the upper extremities [J]. Journal of Reconstructive Microsurgery, 2000, 16(6): 437-442.

[26] KOSHIMA I, NANBA Y, TSUTSUI T, et al. Long-term follow-up after lymphaticovenular anastomosis for lymphedema in the leg [J]. Journal of Reconstructive Microsurgery, 2003, 19(4): 209-215.

[27] ENGEL H, LIN C Y, HUANG J J, et al. Outcomes of lymphedema microsurgery for breast cancer-related lymphedema with or without microvascular breast reconstruction [J]. Annals of Surgery, 2018, 268(6): 1076-1083.

[28] GONG-KANG H, RU-QI H, ZONG-ZHAO L, et al. Microlymphaticovenous anastomosis for treating lymphedema of the extremities and external genitalia [J]. Journal of Microsurgery, 1981, 3(1): 32-39

[29] HUANG G K, HU R Q, LIU Z Z, et al. Microlymphaticovenous anastomosis in the treatment of lower limb obstructive lymphedema: analysis of 91 cases [J]. Plastic and Reconstructive Surgery, 1985, 76(5): 671-685.

[30] MATSUBARA S, SAKUDA H, NAKAEMA M, et al. Long-term results of microscopic lymphatic vessel-isolated vein anastomosis for secondary lymphedema of the lower extremities [J]. Surgery Today, 2006, 36(10): 859-864.

[31] PENG S H, HUANG C Y, SHIH C M, et al. Effects of lymphaticovenous anastomosis on quality of life, body image, and spiritual health in lymphedema patients: a prospective cohort study [J]. Healthcare, 2024, 12(14):1419.

[32] KWON J G, KIM Y, JANG M Y, et al. The quality of life after lymphaticovenous anastomosis in 118 lower limb lymphedema patients [J]. Archives of Plastic Surgery. 2023, 50(5): 514-522.

[33] VISCONTI G, HAYASHI A, BIANCHI A, et al. Lymphaticovenular anastomosis for advanced-stage peripheral lymphedema: expanding indication and introducing the hand/foot sign [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2022, 75(7): 2153-2163.

[34] ALSHOMER F, CHO J, NOH H, et al. Lymphaticovenous and lymph node-to-vein anastomosis to improve milroy disease-related chylothorax and lymphedema [J]. Plastic and Reconstructive Surgery, 2025, 155(3): 610e-617e.

[35] MIHARA M, HARA H, KAWAKAMI Y. Ultrasonography for classifying lymphatic sclerosis types and deciding optimal sites for lymphatic-venous anastomosis in patients with lymphoedema [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2018, 71(9): 1274-1281.

[36] GIUSEPPE V, AKITATSU H, ALESSANDRO B, et al. Lymphaticovenular anastomosis for advanced-stage peripheral lymphedema: expanding indication and introducing the hand/foot sign [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2022, 75(7): 2153-2163.

[37] MARTIN K, YU-MING W, SHENG-DEAN L, et al. Comparison of contraction-type and noncontraction-type lymphatic vessels in lymphaticovenous anastomosis for cancer-related unilateral lower limb lymph-

edema: a retrospective cohort propensity-score-matched outcome analysis [J]. International Journal of Surgery, 2024, 110(4): 1913-1918.

[38] HARA H, MIHARA M. Lymphatic refill in ultrasound and lymphatic washout after lymphaticovenous anastomosis [J]. Microsurgery, 2023, 43(4): 339-346.

[39] BIANCHI A, SALGARELLO M, HAYASHI A, et al. Recipient venule selection and anastomosis configuration for lymphaticovenular anastomosis in extremity lymphedema: algorithm based on 1,000 lymphaticovenular anastomosis [J]. Journal of Reconstructive Microsurgery, 2022, 38(6): 472-480.

[40] TSAI P L, WU S C, LIN W C, et al. Determining factors in relation to lymphovascular characteristics and anastomotic configuration in supermicrosurgical lymphaticovenous anastomosis—a retrospective cohort study [J]. International Journal of Surgery, 2020, 81: 39-46.

[41] ONODA S, SATAKE T, KINOSHITA M. Relationship between lymphaticovenular anastomosis outcomes and the number and types of anastomoses [J]. The Journal of Surgical Research, 2022, 269: 103-109.

[42] VISCONTI G, SALGARELLO M, HAYASHI A. The recipient venule in supermicrosurgical lymphaticovenular anastomosis: flow dynamic classification and correlation with surgical outcomes [J]. Journal of Reconstructive Microsurgery, 2018, 34(8): 581-589.

[43] HIDEHIKO Y, MIN-JEONG C, KEITA I, et al. Combining indocyanine green lymphography and ultrasonography findings to identify lymphatic vessels in advanced-stage lymphedema: the milestone and swirl sign approach [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2025, 102: 134-141.

[44] HARA H, MIHARA M. Screening lymphatic ultrasound to detect lymphatic dysfunction [J]. Lymphatic Research and Biology, 2025, 23(2): 64-70.

[45] AKITATSU H, NOBUKO H, HIDEHIKO Y, et al. Effective and efficient lymphaticovenular anastomosis using preoperative ultrasound detection technique of lymphatic vessels in lower extremity lymphedema [J]. Journal of Surgical Oncology, 2017, 117(2): 290-298.

[46] HARA H, MIHARA M. Ultrasound-guided lymphaticovenous anastomosis without indocyanine green lymphography mapping: a preliminary report [J]. Microsurgery, 2023, 43(3): 238-244.

[47] HARA H, MIHARA M. The accuracy of lymphatic ultrasound in measuring the lymphatic vessel size in lower limb lymphedema patients [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2022, 75(5): 1573-1578.

[48] MOHOS B, CZEDIK-EYSENBERG M, STEINBACHER J, et al. Long-term use of ultrasound for locating optimal lva sites: a descriptive data analysis [J]. Journal of Reconstructive Microsurgery, 2022, 38(3): 238-244.

[49] BIANCHI A, VISCONTI G, HAYASHI A, et al. Ultra-high frequency ultrasound imaging of lymphatic channels correlates with their histological features: a step forward in lymphatic surgery [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2020, 73(9): 1622-1629.

[50] CZEDIK-EYSENBERG M, STEINBACHER J, OBERMAYER B, et al. Exclusive use of ultrasound for locating optimal LVA sites-a descriptive data analysis [J]. Journal of Surgical Oncology, 2020, 121(1): 51-56.

[51] HARA H, MIHARA M. Establishing a standard method for screening lymphatic ultrasound in lymphedema patients [J]. Plastic and Reconstructive Surgery-Global Open, 2025, 13(6): e6922.

[52] HARA H, MIHARA M. Sensitivity of each index of doppler, cross, uncollapsible, parallel, and superficial fascia in lymphatic ultrasound [J]. Lymphatic Research and Biology, 2024, 22(2): 147-152.

[53] KIM H B, JUNG S S, CHO M J, et al. Comparative analysis of preoperative high frequency color doppler ultrasound versus mr lymphangiography versus ICG lymphography of lymphatic vessels in lymphovenous anastomosis [J]. Journal of Reconstructive Microsurgery, 2023, 39(2): 92-101.

[54] JANG S, LEE C U, HESLEY G K, et al. Lymphatic mapping using US microbubbles before lymphaticovenous anastomosis surgery for lymphedema [J]. Radiology, 2022, 304(1): 218-224.

[55] BUSTOS S S, RIOS M, JANG S, et al. Comparative evaluation of contrast-enhanced ultrasound and indocyanine green lymphography for lymphatic mapping: a retrospective study [J]. Plastic and Reconstructive Surgery-Global Open, 2025, 13(8): e7022.

[56] XIAHOU Y, YUAN X, ZHU J, et al. The significance of contrast-enhanced ultrasound in the application of lymphaticovenous anastomosis [J]. Current Medical Imaging, 2024, 20: 8.

[57] ZENG Z, LIU Z, XIA H, et al. Contrast-enhanced ultrasound for assessing pre-operative lymphatic vessel function and post-operative anastomotic patency in lymphatic-venous anastomosis: a retrospective observational study [J]. Academic Radiology, 2025, 32(6): 3281-3290.

[58] WANG J, HU M X, LU M, et al. Application of percutaneous lymphatic contrast-enhanced ultrasound in lymphovenous anastomosis microsurgery [J]. PLOS ONE, 2025, 20(8): e0330773.

[59] PEREIRA N, LÓPEZ M A, OÑATE V, et al. Augmented reality for lymphovenous anastomosis planning based on ICG lymphography anatomy of the healthy limb [J]. Microsurgery, 2025, 45(6): e70115.

[60] ABDELFATTAH U, ELBANOBY T, OMARAH M, et al. LVA for advanced unilateral lower extremity lymphedema: impact of ICG lymphography of normal side in improving the lymphatic detection rate and operative time [J]. Archives of Plastic Surgery, 2025, 52(3): 178-184.

[61] HARA H, MIHARA M. Multi-area lymphaticovenous anastomosis with multi-lymphosome injection in indocyanine green lymphography: a prospective study [J]. Microsurgery, 2019, 39(2): 167-173.

[62] SEKI Y, KAJIKAWA A, YAMAMOTO T, et al. Real-time indocyanine green videolymphography navigation for lymphaticovenular anastomosis [J]. Plastic and Reconstructive Surgery-Global Open, 2019, 7(5): e2253.

[63] YAMAMOTO T, YAMAMOTO N, AZUMA S, et al. Near-infrared illumination system-integrated microscope for supermicrosurgical lymphaticovenular anastomosis [J]. Microsurgery, 2014, 34(1): 23-27.

[64] LIU H L, PANG S Y, CHAN Y W. The use of a microscope with near-infrared imaging function in indocyanine green lymphography and lymphaticovenous anastomosis [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2014, 67(2): 231-236.

[65] KIM H O, WOO K J, KIM B S, et al. Lymphoscintigraphic findings as indicators of lymphaticovenous anastomosis outcome in patients with extremity lymphedema: a retrospective cohort study [J]. Clinical Nuclear Medicine, 2021, 46(7): 549-555.

[66] HARA H, MIHARA M. Lymphatic mapping with multi-lymphosome indocyanine green lymphography in legs with lymphedema [J]. Archives of Plastic Surgery, 2024, 51(6): 592-596.

[67] CHANG D W, SUAMI H, SKORACKI R. A prospective analysis of 100 consecutive lymphovenous bypass cases for treatment of extremity lymphedema [J]. Plastic and Reconstructive Surgery, 2013, 132(5): 1305-1314.

[68] CHANG D W. Lymphaticovenular bypass for lymphedema management in breast cancer patients: a prospective study [J]. Plastic and Reconstructive Surgery, 2010, 126(3): 752-758.

[69] MASIA J, PONS G, NARDULLI M L. Combined surgical treatment in breast cancer-related lymphedema [J]. Journal of Reconstructive Microsurgery, 2016, 32(1): 16-27.

[70] DAMSTRA R J, VOESTEN H G, VAN SCHELVEN W D, et al. Lymphatic venous anastomosis (LVA) for treatment of secondary arm lymphedema. a prospective study of 11 LVA procedures in 10 patients with breast cancer related lymphedema and a critical review of the literature [J]. Breast Cancer Research and Treatment, 2009, 113(2): 199-206.

[71] DUYGU-YILDIZ E, BAKAR Y, HIZAL M. The effect of complex decongestive physiotherapy applied with different compression pressures on skin and subcutaneous tissue thickness in individuals with breast cancer-related lymphedema: a double-blinded randomized comparison trial [J]. Supportive Care in Cancer, 2023, 31(7): 383.

[72] REISSHAUER A, TSATRAFILIS E, KORNAP-

PEL S, et al. A randomized, controlled noninferiority study of adjustable compression wraps compared with inelastic multilayer bandaging used in the intensive complex decongestive therapy of lower leg lymphedema [J]. Journal of Vascular Surgery: Venous and Lymphatic Disorders, 2025, 13(4): 102214.

[73] SCHAVERIEN M V, MOELLER J A, CLEVELAND S D. Nonoperative treatment of lymphedema [J]. Seminars in Plastic Surgery, 2018, 32(1): 17-21.

[74] DAMSTRA R J, HALK A B. The Dutch lymphedema guidelines based on the international classification of functioning, disability, and health and the chronic care model [J]. Journal of Vascular Surgery: Venous and Lymphatic Disorders, 2017, 5 (5): 756-765.

[75] CHANG C, KUO P J, WANG Y M, et al. Groin-only lymphaticovenous anastomosis: a paradigm shift for lower extremity lymphedema—a prospective cohort propensity-score matched analysis [J]. International Journal of Surgery, 2025, 111(10): 6833-6842.

[76] ITO R, WU C T, LIN M C, et al. Successful treatment of early-stage lower extremity lymphedema with side-to-end lymphovenous anastomosis with indocyanine green lymphography assisted [J]. Microsurgery, 2016, 36(4): 310-315.

[77] MIHARA M, HARA H, IIDA T, et al. Antegrade and retrograde lymphatico-venous anastomosis for cancer-related lymphedema with lymphatic valve dysfuction and lymphatic varix [J]. Microsurgery, 2012, 32(7): 580-584.

[78] CHAN J C Y, TARANTO G D, ELIA R, et al. Postoperative care after lymphaticovenous anastomosis [J]. Archives of Plastic Surgery, 2021, 48(3): 333-335.

[79] AKITA S, MITSUKAWA N, KURIYAMA M, et al. External valvuloplasty for subcutaneous small veins to prevent venous reflux in lymphaticovenular anastomosis for lower extremity lymphedema [J]. Plastic and Reconstructive Surgery, 2013, 132(4): 1008-1014.

[80] O'BRIEN B M, MELLOW C G, KHAZANCHI R K, et al. Long-term results after microlymphaticovenous anastomoses for the treatment of obstructive lymphedema [J]. Plastic and Reconstructive Surgery, 1990, 85(4): 562-572.

[81] FILIPPETTI M, SANTORO E, GRAZIANO F, et al. Modern therapeutic approaches to postmastectomy brachial lymphedema [J]. Microsurgery, 1994, 15(8): 604-610.

[82] DEMIRTAS Y, OZTURK N, YAPICI O, et al. Supermicrosurgical lymphaticovenular anastomosis and lymphaticovenous implantation for treatment of unilateral lower extremity lymphedema [J]. Microsurgery, 2009, 29(8): 609-618.

[83] DEMIRTAS Y, OZTURK N, YAPICI O, et al. Comparison of primary and secondary lower-extremity lymphedema treated with supermicrosurgical lymphaticovenous anastomosis and lymphaticovenous implantation [J]. Journal of Reconstructive Microsurgery, 2010, 26(2): 137-143.

[84] NARUSHIMA M, MIHARA M, YAMAMOTO Y, et al. The intravascular stenting method for treatment of extremity lymphedema with multiconfiguration lymphaticovenous anastomoses [J]. Plastic and Reconstructive Surgery, 2010, 125(3): 935-943.

[85] SUN C R, LIU M Y, NI Q H, et al. Clinical guidelines on compression therapy in venous diseases [J]. Annals of Vascular Surgery, 2025, 110 (Pt B): 183-203.

[86] AYESTARAY B, BEKARA F. π-shaped lymphaticovenular anastomosis: the venous flow sparing technique for the treatment of peripheral lymphedema [J]. Journal of Reconstructive Microsurgery, 2014, 30(8): 551-560.

[87] AYESTARAY B, BEKARA F, ANDREOLETTI J B. Patent blue-enhanced lymphaticovenular anastomosis [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2013, 66(3): 382-389.

[88] BOCCARDO F, DESSALVI S, CAMPISI C, et al. Microsurgery for groin lymphocele and lymphedema after oncologic surgery [J]. Microsurgery, 2014, 34(1): 10-13.

[89] MARKKULA S P, LEUNG N, ALLEN V B, et al. Surgical interventions for the prevention or treatment of

lymphoedema after breast cancer treatment [J]. The Cochrane Database of Systematic Reviews, 2019, 2(2): Cd011433.

[90] 简扬, 邓呈亮, 魏在荣. 基于血管化淋巴结移植的淋巴水肿外科联合治疗研究进展[J]. 中国修复重建外科杂志, 2023, 37(2): 240-246.
JIAN Y, DENG C L, WEI Z R. Research progress of combined surgical treatment of lymphedema based on vascularized lymph node transfer [J]. Chinese Journal of Reparative and Reconstructive Surgery, 2023, 37(2): 240-246. (in Chinese)

[91] HAHN B A, KLEEVEN A, RICHIR M C, et al. Objectifying clinical outcomes after lymphaticovenous anastomosis and vascularized lymph node transfer in the treatment of extremity lymphedema: a systematic review and meta-analysis [J]. Microsurgery, 2025, 45(3): e70050.

[92] BONAPACE-POTVIN M, LORANGE E, TREMBLAY-CHAMPAGNE M P. Lymphaticovenous anastomosis and vascularized lymph node transfer for the treatment of lymphedema-a Canadian case series [J]. Plastic Surgery, 2024, 32(2): 305-313.

[93] MOON K C, KIM H K, LEE T Y, et al. Vascularized lymph node transfer for surgical treatments of upper versus lower extremity lymphedema [J]. Journal of Vascular Surgery: Venous and Lymphatic Disorders, 2022, 10(1): 170-178.

[94] CIUDAD P, AGKO M, PEREZ COCA J J, et al. Comparison of long-term clinical outcomes among different vascularized lymph node transfers: 6-year experience of a single center's approach to the treatment of lymphedema [J]. Journal of Surgical Oncology, 2017, 116(6): 671-682.

[95] DIONYSSIOU D, SARAFIS A, TSIMPONIS A, et al. Long-term outcomes of lymph node transfer in secondary lymphedema and its correlation with flap characteristics [J]. Cancers, 2021, 13(24): 6198.

[96] CIUDAD P, BOLLETTA A, KACIULYTE J, et al. The breast cancer-related lymphedema multidisciplinary approach: algorithm for conservative and multimodal surgical treatment [J]. Microsurgery, 2023, 43(5): 427-436.

[97] MEULI J N, GUIOTTO M, ELMERS J, et al. Outcomes after microsurgical treatment of lymphedema: a systematic review and meta-analysis [J]. International Journal of Surgery, 2023, 109(5): 1360-1372.

[98] BROWN S, MEHRARA B J, CORIDDI M, et al. A prospective study on the safety and efficacy of vascularized lymph node transplant [J]. Annals of Surgery, 2022, 276(4): 635-653.

[99] BRAIZAT O, JARRAR S, EL-DEBS M, et al. Comparing different donor sites after vascularized lymph node transfer to the lymphedematous upper limb: a systematic review and meta-analysis of clinical outcomes [J]. Annals of Plastic Surgery, 2024, 93(1): 130-138.

[100] SCHAVERIEN M V, ASAAD M, SELBER J C, et al. Outcomes of vascularized lymph node transplantation for treatment of lymphedema [J]. Journal of the American College of Surgeons, 2021, 232(6): 982-994.

[101] WINTERS H, TIELEMANS H J P, PAULUS V, et al. A systematic review and meta-analysis of vascularized lymph node transfer for breast cancer-related lymphedema [J]. Journal of Vascular Surgery: Venous and Lymphatic Disorders, 2022, 10(3): 786-795.e1.

[102] FRANCIS E C, KIM B S, LIN M C, et al. Vascularized lymph node transfer improved outcomes of elderly patients with secondary upper extremity lymphedema [J]. Annals of Surgical Oncology, 2022, 29(12): 7868-7878.

[103] GRATZON A, SCHULTZ J, SECREST K, et al. Clinical and psychosocial outcomes of vascularized lymph node transfer for the treatment of upper extremity lymphedema after breast cancer therapy [J]. Annals of Surgical Oncology, 2017, 24(6): 1475-1481.

[104] MOUSAVI S R, AKBARI M E, ZARRINTAN S. Vascularized gastroepiploic lymph node transfer significantly improves breast cancer-related lymphedema [J]. Journal of Surgical Oncology, 2020, 121(1): 163-167.

[105] DIONYSSIOU D, DEMIRI E, TSIMPONIS A, et al.

A randomized control study of treating secondary stage II breast cancer-related lymphoedema with free lymph node transfer [J]. Breast Cancer Research and Treatment, 2016, 156(1): 73-79.

[106] OZTURK C N, OZTURK C, GLASGOW M, et al. Free vascularized lymph node transfer for treatment of lymphedema: a systematic evidence based review [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2016, 69(9): 1234-1247.

[107] LO TORTO F, KACIULYTE J, DI MEGLIO F, et al. Orthotopic vascularized lymph node transfer in breast cancer-related lymphedema treatment: functional and life quality outcomes [J]. Microsurgery, 2024, 44(2): e31147.

[108] CIUDAD P, ESCANDÓN J M, MANRIQUE O J, et al. Lessons learnt from an 11-year experience with lymphatic surgery and a systematic review of reported complications: technical considerations to reduce morbidity [J]. Archives of Plastic Surgery, 2022, 49(2): 227-239.

[109] ELIA R, CHEN H C, CAZZATO G, et al. Evaluation of modulation of immunity by lymph node transfer: a preliminary histological evidence in lymphedema patients [J]. Microsurgery, 2024, 44(1): e31123.

[110] MARUCCIA M, GIUDICE G, CIUDAD P, et al. Lymph node transfer and neolymphangiogenesis: from theory to evidence [J]. Plastic and Reconstructive Surgery, 2023, 152(5): 904e-912e.

[111] CIUDAD P, FORTE A J, HUAYLLANI M T, et al. Impact of body mass index on long-term surgical outcomes of vascularized lymph node transfer in lymphedema patients [J]. Gland Surgery, 2020, 9(2): 603-613.

[112] INBAL A, TEVEN C M, CHANG D W. Latissimus dorsi flap with vascularized lymph node transfer for lymphedema treatment: technique, outcomes, indications and review of literature [J]. Journal of Surgical Oncology, 2017, 115(1): 72-77

[113] FISH M L, GROVER R, SCHWARZ G S. quality-of-life outcomes in surgical vs nonsurgical treatment of breast cancer-related lymphedema: a systematic review [J]. JAMA Surgery, 2020, 155 (6): 513-519.

[114] GRÜNHERZ L, HULLA H, UYULMAZ S, et al. Patient-reported outcomes following lymph reconstructive surgery in lower limb lymphedema: a systematic review of literature [J]. Journal of Vascular Surgery: Venous and Lymphatic Disorders, 2021, 9 (3): 811-819.

[115] KAPPOS E A, FABI A, HALBEISEN F S, et al. Vascularized lymph node transfer (VLNT) versus lymphaticovenous anastomosis (LVA) for chronic breast cancer-related lymphedema (BCRL): a retrospective cohort study of effectiveness over time [J]. Breast Cancer Research and Treatment, 2025, 210 (2): 319-327.

[116] BECKER C, ASSOUAD J, RIQUET M, et al. Postmastectomy lymphedema: long-term results following microsurgical lymph node transplantation [J]. Annals of Surgery, 2006, 243(3): 313-315.

[117] LILJA C, MADSEN C B, DAMSGAARD T E, et al. Surgical treatment algorithm for breast cancer lymphedema-a systematic review [J]. Gland Surgery, 2024, 13(5): 722-748.

[118] GRANZOW J W, SODERBERG J M, KAJI A H, et al. An effective system of surgical treatment of lymphedema [J]. Annals of Surgical Oncology, 2014, 21(4): 1189-1194.

[119] GUSTAFSSON J, CHU S Y, CHAN W H, et al. Correlation between quantity of transferred lymph nodes and outcome in vascularized submental lymph node flap transfer for lower limb lymphedema [J]. Plastic and Reconstructive Surgery, 2018, 142(4): 1056-1063.

[120] COOK J A, SASOR S E, THOLPADY S S, et al. Omental vascularized lymph node flap: a radiographic analysis [J]. Journal of Reconstructive Microsurgery, 2018, 34(7): 472-477.

[121] GRÜNHERZ L, BARBON C, VON REIBNITZ D, et al. Analysis of different outcome parameters and quality of life after different techniques of free vascularized lymph node transfer [J]. Journal of Vascular Surgery: Venous and Lymphatic Disorders, 2024, 12 (6): 101934.

[122] HARM W, HANNEKE J P T, VERA A A P, et al. A systematic review and meta-analysis of vascularised lymph node transfer for breast cancer related lymphedema [J]. Journal of Vascular Surgery Venous and Lymphatic Disorders, 2021, 10(3): 786-795.

[123] MARK V S, IDO B, JESSE C S, et al. Vascularized lymph node transfer for lymphedema [J]. Seminars in Plastic Surgery, 2018, 32(1): 28-35.

[124] MARIO F S, MICHAEL A, YEN-CHOU C, et al. Comprehensive review of vascularized lymph node transfers for lymphedema: outcomes and complications [J]. Microsurgery, 2016, 38(2): 222-229.

[125] CHU C K, SCHAVERIEN M V, CHANG E I, et al. Intra-abdominal lymph nodes: a privileged donor site for vascularized lymph node transfer [J]. Plastic and Reconstructive Surgery-Global Open, 2020, 8(3): e2673.

[126] POZZI M, SECLÌ D D, BOLLETTA A, et al. Gastroepiploic vascularized lymph node transfer for extremity lymphedema: tips and insights from extensive clinical experience [J]. Medicina, 2025, 61(3): 503.

[127] LOSCO L, BOLLETTA A, DE SIRE A, et al. The combination of lymph node transfer and excisional procedures in bilateral lower extremity lymphedema: clinical outcomes and quality of life assessment with long-term follow-up [J]. Journal of Clinical Medicine, 2022, 11(3): 570.

[128] BORDIANU A, PETRE I, BOBIRCĂ A, et al. The vascularized omentum lymph node transfer—a key point in the lymphedema management [J]. Chirurgia, 2024, 119(2): 191-200.

[129] RUTER D, CHEN W, GARZA R, et al. Mesoappendix as potential donor site for vascularized lymph node transfer: anatomic study [J]. The Journal of Surgical Research, 2018, 230: 143-147.

[130] YODRABUM N, POUNGJANTARADEJ N. Five-year follow-up outcome of total omental lymph node flap transfer in primary lymphedema patient [J]. Plastic and Reconstructive Surgery-Global Open, 2023, 11(1): e4769.

[131] KENWORTHY E O, NELSON J A, VERMA R, et al. Double vascularized omentum lymphatic transplant (VOLT) for the treatment of lymphedema [J]. Journal of Surgical Oncology, 2018, 117(7): 1413-1419.

[132] HIRSCH T I, FRIEDMAN R, GRANOFF M, et al. Omental vascularized lymph node transplant for the treatment of breast lymphedema: a case report [J]. Microsurgery, 2023, 43(4): 387-391.

[133] FUJIWARA K, KIGAWA J, HASEGAWA K, et al. Effect of simple omentoplasty and omentopexy in the prevention of complications after pelvic lymphadenectomy [J]. International Journal of Gynecological Cancer, 2003, 13(1): 61-66.

[134] LASSO J M, PINILLA C, CASTELLANO M. New refinements in greater omentum free flap transfer for severe secondary lymphedema surgical treatment [J]. Plastic and Reconstructive Surgery-Global Open, 2015, 3(5): e387.

[135] SENGER J B, RAJAII R, SLATER C, et al. Proximal vs. recipient site for vascular lymph node transfers for breast cancer-related lymphedema: a meta-analysis and systematic review [J]. Journal of Clinical Medicine, 2025, 14(20): 7281.

[136] CHOCRON Y, AZZI A J, BOUHADANA G, et al. Axilla versus wrist as the recipient site in vascularized lymph node transfer for breast cancer-related lymphedema: a systematic review and meta-analysis [J]. Journal of Reconstructive Microsurgery, 2022, 38(7): 539-548.

[137] ROKA-PALKOVITS J, LIN M C, TZOU C J, et al. Retrograde manual lymphatic drainage following vascularized lymph node transfer to distal recipient sites for extremity lymphedema: a retrospective study and literature review [J]. Plastic and Reconstructive Surgery, 2021, 148(3): 425e-436e.

[138] PAPPALARDO M, PATEL K, CHENG M H. Vascularized lymph node transfer for treatment of extremity lymphedema: an overview of current controversies regarding donor sites, recipient sites and outcomes [J]. Journal of Surgical Oncology, 2018, 117(7): 1420-1431.

[139] MANRIQUE O J, BUSTOS S S, KAPOOR T,

et al. Gastroepiploic vascularized lymph node transfer for the treatment of extremity lymphedema: comparison between middle and distal inset [J]. Gland Surgery, 2020, 9(2): 528-538.

[140] KWAK M D, MACHENS H G. The lateral intercostal artery perforator as an alternative donor vessel for free vascularized lymph node transplantation [J]. Archives of Plastic Surgery, 2018, 45(3): 275-279.

[141] SOO-BYN K, KYUNG-CHUL M. Surgical treatment of carpal tunnel syndrome in advanced-stage upper extremity lymphedema: a case report [J]. Medicine, 2021, 100(20): e25872.

[142] GÓMEZ MARTÍN C, MURILLO C, MALDONADO A A, et al. Double autologous lymph node transplantation (ALNT) at the level of the knee and inguinal region for advanced lymphoedema of the lower limb (elephantiasis) [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2014, 67(2): 267-270.

[143] VIITANEN T P, VISURI M T, HARTIALA P, et al. Lymphatic vessel function and lymphatic growth factor secretion after microvascular lymph node transfer in lymphedema patients [J]. Plastic and Reconstructive Surgery-Global Open, 2013, 1(2): 1-9.

[144] CHEN W F, ZHAO H, YAMAMOTO T, et al. Indocyanine green lymphographic evidence of surgical efficacy following microsurgical and supermicrosurgical lymphedema reconstructions [J]. Journal of Reconstructive Microsurgery, 2016, 32(9): 688-698.

[145] YAMAMOTO T, YOSHIMATSU H, YAMAMOTO N. Complete lymph flow reconstruction: a free vascularized lymph node true perforator flap transfer with efferent lymphaticolymphatic anastomosis [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2016, 69(9): 1227-1233.

[146] GHARB B B, RAMPAZZO A, SPANIO DI SPILIMBERGO S, et al. Vascularized lymph node transfer based on the hilar perforators improves the outcome in upper limb lymphedema [J]. Annals of Plastic Surgery, 2011, 67(6): 589-593.

[147] TAN P W, GOH T, NONOMURA H, et al. Hilar vessels of the submandibular and upper jugular neck lymph nodes: anatomical study for vascularized lymph node transfer to extremity lymphedema [J]. Annals of Plastic Surgery, 2016, 76(1): 117-123.

[148] AKITA S, TOKUMOTO H, YAMAJI Y, et al. Contribution of simultaneous breast reconstruction by deep inferior epigastric artery perforator flap to the efficacy of vascularized lymph node transfer in patients with breast cancer-related lymphedema [J]. Journal of Reconstructive Microsurgery, 2017, 33(8): 571-578.

[149] SOO-BYN K, KYUNG-CHUL M. Surgical treatment of carpal tunnel syndrome in advanced-stage upper extremity lymphedema: a case report [J]. Medicine, 2021, 100(20): e25872.

[150] PATEL K M, LIN C Y, CHENG M H. A prospective evaluation of lymphedema-specific quality-of-life outcomes following vascularized lymph node transfer [J]. Annals of Surgical Oncology, 2015, 22(7): 2424-2430.

[151] PATEL K M, LIN C Y, CHENG M H. From theory to evidence: long-term evaluation of the mechanism of action and flap integration of distal vascularized lymph node transfers [J]. Journal of Reconstructive Microsurgery, 2015, 31(1): 26-30.

[152] CHENG M H, HUANG J J, NGUYEN D H, et al. A novel approach to the treatment of lower extremity lymphedema by transferring a vascularized submental lymph node flap to the ankle [J]. Gynecologic Oncology, 2012, 126(1): 93-98.

[153] SAARISTO A M, NIEMI T S, VIITANEN T P, et al. Microvascular breast reconstruction and lymph node transfer for postmastectomy lymphedema patients [J]. Annals of Surgery, 2012, 255(3): 468-473.

[154] BECKER C. Autologous lymph node transfers [J]. Journal of Reconstructive Microsurgery, 2016, 32(1): 28-33.

[155] AGKO M, CIUDAD P, CHEN H C. Staged surgical treatment of extremity lymphedema with dual gastroepiploic vascularized lymph node transfers followed by suction-assisted lipectomy: a prospective study [J]. Journal of Surgical Oncology. 2018, 117(6): 1148-1156.

[156] ZELTZER A, NISTOR A, ADRIAENSSENS N, et al. Outcomes of lymphovenous anastomoses and vascularized lymph node transplant in the combined surgical treatment of lymphedema: a prospective cohort study [J]. Plastic and Reconstructive Surgery, 2026,157(1): 163-175.

[157] SANKA S A, CHRYSSOFOS S, ANOLIK R A, et al. Advances in surgical management of chronic lymphedema: current strategies and future directions [J]. Medical Oncology, 2025, 42(2): 44.

[158] SEIDENSTUECKER K, FERTSCH S, GHAZALEH A A, et al. Improving quality of life after breast cancer: a comparison of two microsurgical treatment options for breast cancer-related lymphedema (BCRL) [J]. Clinical and Experimental Medicine, 2024, 24 (1): 82.

[159] AKITA S, MITSUKAWA N, KURIYAMA M, et al. Comparison of vascularized supraclavicular lymph node transfer and lymphaticovenular anastomosis for advanced stage lower extremity lymphedema [J]. Annals of Plastic Surgery, 2015, 74 (5): 573-579.

[160] SCHAVERIEN M V, MUNNOCH D A, BRORSON H. Liposuction treatment of lymphedema [J]. Seminars in Plastic Surgery, 2018, 32(1): 42-47.

[161] BRORSON H. Liposuction in lymphedema treatment [J]. Journal of Reconstructive Microsurgery, 2016, 32(1): 56-65.

[162] LO S L, SALMAN M, CHEN W F. Debulking lymphatic liposuction: are the therapeutic effects limited to the treated limb? [J]. Journal of Surgical Oncology, 2025, 131(1): 36-41.

[163] KARLSSON T, HOFFNER M, OHLIN K, et al. Complete reduction of leg lymphedema after liposuction: a 5-year prospective study in 67 patients without recurrence [J]. Plastic and Reconstructive Surgery-Global Open, 2023, 11(12): e5429.

[164] KARLSSON T, HOFFNER M, BRORSON H. Liposuction and controlled compression therapy reduce the erysipelas incidence in primary and secondary lymphedema [J]. Plastic and Reconstructive Surgery-Global Open, 2022, 10(5): e4314.

[165] JOSÉ M L, FARTO J C A. Indocyanine green-guided liposuction for patients presenting with residual nonpitting edema after lymphovenous anastomosis [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2022, 75(8): 2482-2492.

[166] XIN J, SUN Y, XIA S, et al. Liposuction in cancer-related lower extremity lymphedema: an investigative study on clinical applications [J]. World Journal of Surgical Oncology, 2022, 20(1): 6.

[167] KARLSSON T, KARLSSON M, OHLIN K, et al. Liposuction of breast cancer-related arm lymphedema reduces fat and muscle hypertrophy [J]. Lymphatic Research and Biology, 2022, 20(1): 53-63.

[168] COLIN J R S, DAVID A M. Liposuction as an effective treatment for lower extremity lymphoedema: a single surgeon's experience over nine years [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2017, 71(2): 239-245.

[169] HOFFNER M, OHLIN K, SVENSSON B, et al. Liposuction gives complete reduction of arm lymphedema following breast cancer treatment: a 5-year prospective study in 105 patients without recurrence [J]. Plastic and Reconstructive Surgery-Global Open, 2018, 6(8): e1912.

[170] PAULINE M, MUNNOCH D A. Treatment of gynaecological cancer related lower limb lymphoedema with liposuction [J]. Gynecologic Oncology, 2018, 151(3): 460-465.

[171] MATTIAS H, SHIRIN B, EMMA H, et al. SF-36 shows increased quality of life following complete reduction of postmastectomy lymphedema with liposuction [J]. Lymphatic Research and Biology, 2017, 15(1): 87-98.

[172] LAMPROU D A, VOESTEN H G J, ROBERT J D, et al. Circumferential suction-assisted lipectomy in the treatment of primary and secondary end-stage lymphoedema of the leg [J]. The British Journal of Surgery, 2016, 104(1): 84-89.

[173] BOYAGES J, KASTANIAS K, KOELMEYER L A, et al. Liposuction for advanced lymphedema: a multidisciplinary approach for complete reduction of arm and leg swelling [J]. Annals of Surgical Oncol-

ogy, 2015, 22(Suppl 3): S1263-S1270.

[174] BRORSON H, SVENSSON H. Liposuction combined with controlled compression therapy reduces arm lymphedema more effectively than controlled compression therapy alone [J]. Plastic and Reconstructive Surgery, 1998, 102(4): 1058-1067.

[175] DAMSTRA R J, VOESTEN H G, KLINKERT P, et al. Circumferential suction-assisted lipectomy for lymphoedema after surgery for breast cancer [J]. The British Journal of Surgery, 2009, 96(8): 859-864.

[176] FRICK A, HOFFMANN J N, BAUMEISTER R G, et al. Liposuction technique and lymphatic lesions in lower legs: anatomic study to reduce risks [J]. Plastic and Reconstructive Surgery, 1999, 103(7): 1868-1873.

[177] HOFFMANN J N, FERTMANN J P, BAUMEISTER R G, et al. Tumescent and dry liposuction of lower extremities: differences in lymph vessel injury [J]. Plastic and Reconstructive Surgery, 2004, 113(2): 718-726.

[178] VAN DE PAS C B, BOONEN R S, STEVENS S, et al. Does tumescent liposuction damage the lymph vessels in lipoedema patients? [J]. Phlebology, 2020, 35(4): 231-236.

[179] CHEN W F, PANDEY S K, LENSING J N. Does Liposuction for lymphedema worsen lymphatic injury? [J]. Lymphology, 2023, 56(1): 3-12.

[180] GREENE A K, VOSS S D, MACLELLAN R A. Liposuction for swelling in patients with lymphedema [J]. The New England Journal of Medicine, 2017, 377(18): 1788-1789.

[181] GABRIELE G, NIGRI A, CHISCI G, et al. Combination of supramicrosurgical lymphatico-venular anastomosis (sLVA) and lymph-sparing liposuction in treating cancer-related lymphedema: rationale for a regional one-stage approach [J]. Journal of Clinical Medicine, 2024, 13(10): 2872.

[182] 魏苗苗, 吴祥奎, 吴必华, 等. 手动负压抽吸联合血管化淋巴结移植治疗继发性下肢淋巴水肿的疗效分析[J]. 组织工程与重建外科杂志, 2022, 18(1): 14-8.
WEI M M, WU X K, WU B H, et al. Simultaneous application of vascularized lymph nodes transfer andliposuction for treatment of secondary lymphedema of the lower extremities [J]. Journal of Tissue Engineering and Reconstructive Surgery, 2022, 18(1): 14-18. (in Chinese)

[183] CHEN J, FENG X, ZHOU Y, et al. Outcomes after liposuction-based treatment of lymphedema: a systematic review and meta-analysis [J]. Frontiers in Oncology, 2025, 15: 1651472.

[184] WEI M, WANG L, WU X, et al. Synchronous supraclavicular vascularized lymph node transfer and liposuction for gynecological cancer-related lower extremity lymphedema: a clinical comparative analysis of three different procedures [J]. Journal of Vascular Surgery: Venous and Lymphatic Disorders, 2024, 12(5): 101905.

[185] KUN C, SONG X, LIANG C, et al. A clinical study of liposuction followed by lymphovenous anastomosis for treatment of breast cancer-related lymphedema [J]. Frontiers in Surgery, 2023, 10: 1065733.

[186] PHILIP S B, DUNG N. Combined liposuction and physiologic treatment achieves durable limb volume normalization in class II-III lymphedema: a treatment algorithm to optimize outcomes [J]. Annals of Plastic Surgery, 2021, 86(5S): S384-S389.

[187] CAMPISI C, MELISSA R, FRANCESCO B, et al. Fibro-lipo-lymph-aspiration with a lymph vessel sparing procedure to treat advanced lymphedema after multiple lymphatic-venous anastomoses: the complete treatment protocol [J]. Annals of Plastic Surgery, 2016, 78(2): 184-190.

[188] FABIO N, JOANNIS C, PEDRO C, et al. Free lymph node flap transfer and laser-assisted liposuction: a combined technique for the treatment of moderate upper limb lymphedema [J]. Lasers in Medical Science, 2015, 30(4): 1377-1385.

[189] QI F Z, GU J Y, SHI Y D, et al. Treatment of upper limb lymphedema with combination of liposuction, myocutaneous flap transfer, and lymph-fascia grafting: a preliminary study [J]. Microsurgery, 2008, 29(1): 29-34.

[190] BRORSON H, OHLIN K, OLSSON G, et al. Qual-

ity of life following liposuction and conservative treatment of arm lymphedema [J]. Lymphology, 2006, 39(1): 8-25.

[191] XIMENA A P, STEPHANIE K, KENNEDY H, et al. Manipulative therapy of secondary lymphedema in the presence of locoregional tumors [J]. Cancer, 2008, 112(4): 950-954.

[192] SHRUBB D, MASON W. The management of deep vein thrombosis in lymphoedema: a review [J]. British Journal of Community Nursing, 2006, 11(7): 292-297.

[193] DAMSTRA R J, PARTSCH H. Compression therapy in breast cancer-related lymphedema: a randomized, controlled comparative study of relation between volume and interface pressure changes [J]. Journal of Vascular Surgery, 2009, 49(5): 1256-1263.

[194] BRANDÃO M L, SOARES H, ANDRADE M D A, et al. Efficacy of complex decongestive therapy for lymphedema of the lower limbs: a systematic review [J]. Journal Vascular Brasileiro, 2020, 19: e20190074.

[195] LASINSKI B B, MCKILLIP THRIFT K, SQUIRE D, et al. A systematic review of the evidence for complete decongestive therapy in the treatment of lymphedema from 2004 to 2011 [J]. PM&R, 2012, 4(8): 580-601.

[196] SHAMOUN S, AHMAD M. Complete decongestive therapy effect on breast cancer related to lymphedema: a systemic review and meta-analysis of randomized controlled trials [J]. Asian Pacific Journal of Cancer Prevention, 2023, 24(7): 2225-2238.

[197] GILCHRIST L, LEVENHAGEN K, DAVIES C C, et al. Effectiveness of complete decongestive therapy for upper extremity breast cancer-related lymphedema: a review of systematic reviews [J]. Medical Oncology, 2024, 41(11): 297.

[198] MONDRY T E, RIFFENBURGH R H, JOHNSTONE P A. Prospective trial of complete decongestive therapy for upper extremity lymphedema after breast cancer therapy [J]. The Cancer Journal, 2004, 10(1): 42-48.

[199] VIGNES S, PORCHER R, ARRAULT M, et al. Long-term management of breast cancer-related lymphedema after intensive decongestive physiotherapy [J]. Breast Cancer Research And Treatment, 2007, 101(3): 285-290.

[200] MCKEY K P, ALAPPATTU M J. Physical therapy intervention to augment outcomes of lymph node transfer surgery for a breast cancer survivor with secondary upper extremity lymphedema: a case report [J]. International Journal of Student Scholarship in Physical Therapy, 2015, 1: 30-44.

[201] LANE K, WORSLEY D, MCKENZIE D. Exercise and the lymphatic system: implications for breast-cancer survivors [J]. Sports Medicine, 2005, 35(6): 461-471.

[202] CARLSON D J, DIEBERG G, HESS N C, et al. Isometric exercise training for blood pressure management: a systematic review and meta-analysis [J]. Mayo Clinic Proceedings, 2014, 89(3): 327-334.

[203] BELCARO G, ERRICHI B M, CESARONE M R, et al. Lymphatic tissue transplant in lymphedema-a minimally invasive, outpatient, surgical method: a 10-year follow-up pilot study [J]. Angiology, 2008, 59(1): 77-83.

[204] SAVETSKY I L, TORRISI J S, CUZZONE D A, et al. Obesity increases inflammation and impairs lymphatic function in a mouse model of lymphedema [J]. American Journal of Physiology-Heart and Circulatory Physiology, 2014, 307(2): H165-H172.

[205] ZHU J, WILDING J P H, HU J. Defective lymphatic vasculature in obesity [J]. Obesity Reviews, 2025, 26(8): e13922.

[206] GREENE A K, ZURAKOWSKI D, GOSS J A. Body mass index and lymphedema morbidity: comparison of obese versus normal-weight patients [J]. Plastic and Reconstructive Surgery, 2020, 146(2): 402-407.

[207] MIHARA M, HARA H, KAWAKAMI Y, et al. Multi-site lymphatic venous anastomosis using echography to detect suitable subcutaneous vein in severe lymphedema patients [J]. Journal of Plastic, Reconstructive & Aesthetic Surgery, 2018, 71(2): e1-e7.

[208] YANG J C, WU S C, HAYASHI A, et al. Lower limb lymphedema patients can still benefit from super-microsurgical lymphaticovenous anastomosis (LVA) after vascularized lymph node flap transfer (VLNT) as delayed lymphatic reconstruction-a retrospective cohort study [J]. Journal of Clinical Medicine, 2021, 10(14): 3121.

[209] 陈宗灿, 陈君哲, 吴祥奎, 等. 血管化淋巴结移植联合淋巴静脉吻合术治疗乳腺癌根治术后单侧上肢淋巴水肿的临床效果[J]. 中华烧伤与创面修复杂志, 2025, 41(6): 534-542.
CHEN Z C, CHEN J Z, WU X K, et al. Clinical efficacy of vascularized lymph node transfer combined with lymphatico-venous anastomosis in treating unilateral upper limb lymphedema after radical mastectomy for breast cancer [J]. Chinese Journal of Burns and Wounds, 2025, 41 (6): 534-542. (in Chinese)

[210] CHRISTOPHER J S, PAOLO S, BAHAR BASSIRI G, et al. Radical reduction of upper extremity lymphedema with preservation of perforators [J]. Annals of Plastic Surgery, 2009, 63(3): 302-306.

[211] CHRISTOPHER J S, SAMIR M, STEFANO S, et al. Radical reduction of lymphedema with preservation of perforators [J]. Annals of Plastic Surgery, 2007,59(2): 173-179.

[212] 陈宗灿, 陈君哲, 王媛媛, 等. 基于旋髂浅动脉穿支的血管化淋巴结移植联合淋巴管静脉吻合术及脂肪抽吸术一期治疗乳腺癌术后上肢淋巴水肿[J]. 中国修复重建外科杂志, 2025, 39(9): 1114-1121.
CHEN Z C, CHEN J Z, WANG Y Y, et al. Single-stage treatment of upper limb lymphedema following breast cancer surgery using superficial circumflex iliac artery perforator-based vascularized lymph node transfer combined with lymphaticovenular anastomosis and liposuction [J]. Chinese Journal of Reparative and Reconstructive Surgery, 2025, 39 (9): 1114-1121. (in Chinese)

[213] DI TARANTO G, BOLLETTA A, CHEN S H, et al. A prospective study on combined lymphedema surgery: gastroepiploic vascularized lymph nodes transfer and lymphaticovenous anastomosis followed by suction lipectomy [J]. Microsurgery, 2021, 41 (1): 34-43.

(责任编辑: 韩晚军)

引用格式: 中国医师协会显微外科医师分会淋巴水肿工作组, 中国康复医学会修复重建外科专业委员会淋巴水肿工作组, 中华医学会整形外科分会淋巴系统疾病专业学术工作组, 等. 继发性肢体淋巴水肿整合治疗专家共识(2025版)[J]. 中国科技论文, 2025, 20(12): 977-1001.
Lymphoedema Working Group of Microsurgery Branch of Chinese Medical Doctor Association, Lymphoedema Working Group of the Committee on Reconstructive Surgery of the Chinese Association of Rehabilitation Medicine, Working Group on Lymphatic System Diseases of the Plastic Surgery Branch of the Chinese Medical Association, et al. Expert consensus on integrated management of secondary limb lymphedema (2025 Edition) [J]. China Sciencepaper, 2025, 20(12): 977-1001.