

KIRURGIJA KOJA VRAĆA LAKOĆU: SUVREMENI PRISTUPI LIJEČENJU LIMFEDEMA



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Limfedem se dugo smatrao kroničnom i progresivnom bolešću, često neizlječivom. Tradicionalno liječenje, poput Kompleksne fizikalne terapije (KPE), uglavnom je ublažavalo simptome, ali nije rješavalo osnovni problem zastoja limfe. Objavljivanje Barcelona Consensus Papera (2026.) promijenilo je ovo gledište, pokazujući da limfedem može biti kirurški rješiv ako se intervencija provede pravovremeno i uz primjenu suvremenih metoda. Ova paradigma pacijentima pruža nadu ne samo u smanjenje edema, već i u povratak funkcionalne slobode. Limfedem nije samo nakupljanje tekućine. Kronični zastoj limfe potiče upalne procese koji postupno pretvaraju meko tkivo u fibrozno i masno tkivo. Ove promjene otežavaju kasniju terapiju i naglašavaju važnost rane dijagnostike. Njemačke S2k smjernice dijagnostike i liječenja limfedema preporučuju intervenciju prije nego što se ove promjene učine ireverzibilnima. Preoperativna dijagnostika ključna je za planiranje kirurškog zahvata. Klinička procjena i funkcionalna analiza limfnog sustava kombiniraju se s naprednim slikovnim metodama. ICG limfografija omogućuje vizualizaciju limfnih kolektora u realnom vremenu, identificiranje mjesta zastoja i precizno planiranje mikrokirurških anastomoza. Ova procjena posebno je važna u ranim i srednjim stadijima bolesti, jer omogućuje optimiziran odabir metode i smanjuje rizik od komplikacija. S2k smjernice ističu važnost upućivanja pacijenata u specijalizirane centre s odgovarajućom opremom i iskustvom. Suvremena kirurška terapija kombinira fiziološke rekonstruktivne metode i reduktivne tehnike. Limfovenozne anastomoze (LVA) spajaju funkcionalne limfne žile s malim venulama, omogućujući izravnu drenažu limfe i zaobilazanje oštećenih područja, što je osobito učinkovito u ranim fazama. Kod težih stadija, kada su limfni putovi znatno oštećeni, primjenjuje se vaskularizirani transfer limfnih čvorova (VLNT), pri čemu transplantirani čvorovi poboljšavaju odvod limfe i potiču stvaranje novih limfnih putova. Odabir metode temelji se na stadiju bolesti, dostupnosti limfnih struktura i individualnim ciljevima pacijenta. Napredak u tehnologiji, uključujući robotski asistiran supermikrokirurški pristup, dodatno povećava preciznost izvođenja i omogućuje zahvate na izuzetno malim žilama. U uznapredovalim slučajevima, kada prevladava fibrozno i masno tkivo, fiziološke metode često nisu dovoljne. *Suction-assisted protein lipectomy* (SAPL) i druge reduktivne tehnike uklanjaju hipertrofično masno tkivo, a u kombinaciji s fiziološkim metodama čine hibridni pristup. Ovaj pristup smanjuje volumen udova, poboljšava funkciju limfnog sustava i smanjuje ovisnost o kompresivnoj terapiji, što omogućuje bolju svakodnevnu funkcionalnost pacijenata. Barcelonski algoritam posebno naglašava primjenu hibridnog pristupa u složenim slučajevima.

Preventivna kirurgija također ima važnu ulogu. LYMPHA (engl. *Lymphatic Microsurgical Preventive Healing Approach*) uključuje izvođenje preventivnih LVA tijekom disekcije limfnih čvorova, primjerice kod karcinoma dojke. Proaktivna primjena ovog protokola značajno smanjuje rizik od sekundarnog limfedema i potrebu za naknadnim opsežnim zahvatima, što doprinosi očuvanju kvalitetne svakodnevne aktivnosti i kvalitete života. Kirurške intervencije uvijek se provode u kombinaciji s konzervativnom terapijom. KPE, kompresivna terapija, manuelna limfna drenaža i edukacija pacijenata ostaju temelj prije i nakon zahvata. Barcelona Consensus i S2k smjernice naglašavaju da je integracija kirurških i konzervativnih metoda ključna za dugoročne rezultate, smanjenje komplikacija i očuvanje funkcionalnosti. Sveukupno, suvremeni pristup limfedemu temelji se na preciznoj dijagnostici, individualiziranom odabiru kirurških metoda, multidisciplinarnom pristupu i kontinuiranoj edukaciji pacijenata. Barcelona Consensus pruža međunarodno usklađene preporuke za izvođenje zahvata i evaluaciju ishoda, dok S2k smjernice nude praktičan okvir za kliničku primjenu, prevenciju i praćenje pacijenata. Zajedno, ovi dokumenti definiraju strategiju koja poboljšava funkcionalne i kliničke ishode, smanjuje komplikacije i omogućuje pacijentima očuvanje svakodnevne aktivnosti. Suvremeni pristup limfedemu pokazuje kako interdisciplinarna medicina, napredna tehnologija i znanstveno utemeljeni protokoli mogu značajno poboljšati život pacijenata. Precizna dijagnostika, rana intervencija i kombinacija fizioloških i reduktivnih metoda stvaraju temelje za personaliziranu terapiju, dok preventivni kirurški protokoli i kontinuirana edukacija osiguravaju dugoročne rezultate. Kirurško liječenje limfedema danas predstavlja siguran i učinkovit dio sveobuhvatne strategije, pretvarajući limfedem iz kroničnog invaliditeta u kirurški rješiv izazov i otvarajući novo poglavlje u rekonstruktivnoj medicini.

Ključne riječi

limfovenozne anastomoze, transfer limfnih čvorova, liposukcija

SURGERY THAT RESTORES LIGHTNESS: MODERN APPROACHES TO THE TREATMENT OF LYMPHEDEMA

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Lymphedema has long been considered a chronic, progressive disease, often regarded as incurable. Traditional treatment, such as Complex Physical Therapy (CPT), primarily alleviated symptoms but did not address the underlying lymphatic obstruction. The publication of the Barcelona Consensus Paper (2026) has shifted this perspective, demonstrating that lymphedema can be surgically treatable if the intervention is timely and modern techniques are applied. This paradigm offers patients hope not only for edema reduction but also for the restoration of functional freedom. Lymphedema is more than fluid accumulation. Chronic lymphatic stasis triggers inflammatory processes that gradually transform soft tissue into fibrotic and fatty tissue. These changes complicate later therapy and highlight the importance of an early diagnosis. The German S2k guidelines for the diagnosis and treatment of lymphedema

recommend intervention before these changes become irreversible. Preoperative diagnostics are essential for surgical planning. Clinical assessment and functional evaluation of the lymphatic system are combined with advanced imaging techniques. Indocyanine Green (ICG) lymphography allows real-time visualization of lymphatic collectors, identification of obstruction sites, and precise planning of microsurgical anastomoses. This assessment is especially important in early and intermediate stages, as it enables optimal method selection and reduces the risk of complications. The S2k guidelines emphasize referring patients to specialized centers with appropriate equipment and experience. Modern surgical therapy combines physiologic reconstructive techniques with reductive methods. Lymphaticovenous anastomoses (LVA) connect functional lymphatic vessels to small venules, enabling direct lymph drainage and bypassing damaged areas, which is particularly effective in early stages. In more advanced stages, when lymphatic pathways are significantly compromised, vascularized lymph node transfer (VLNT) is used, with transplanted nodes improving lymphatic drainage and promoting new lymphatic pathway formation. The choice of method depends on the disease stage, availability of lymphatic structures, and individual patient goals. Technological advances, including robotic-assisted supermicrosurgery, further enhance precision and allow interventions on extremely small vessels. In advanced cases, where fibrotic and fatty tissue predominates, physiologic methods alone are often insufficient. Suction-assisted protein lipectomy (SAPL) and other reductive techniques remove hypertrophied fatty tissue, and in combination with physiologic methods, constitute a hybrid approach. This strategy reduces limb volume, improves lymphatic function, and decreases dependence on compression therapy, allowing better daily functionality. The Barcelona algorithm emphasizes the application of hybrid techniques in complex cases. Preventive surgery also plays a significant role. LYMPHA (Lymphatic Microsurgical Preventive Healing Approach) involves performing preventive LVA during lymph node dissection, for example, in breast cancer surgery. Proactive implementation of this protocol significantly reduces the risk of secondary lymphedema and the need for subsequent extensive procedures, preserving daily activity and quality of life. Surgical interventions are always integrated with conservative therapy. CPT, compression therapy, manual lymphatic drainage, and patient education remain fundamental before and after surgery. Both the Barcelona Consensus and S2k guidelines stress that combining surgical and conservative approaches is crucial for long-term outcomes, complication reduction, and preservation of functionality. Overall, modern lymphedema management is based on precise diagnostics, individualized selection of surgical techniques, a multidisciplinary approach, and continuous patient education. The Barcelona Consensus provides internationally harmonized recommendations for surgical procedures and outcome evaluation, while the S2k guidelines offer a practical framework for clinical application, prevention, and follow-up. Together, they define a strategy that improves functional and clinical outcomes, reduces complications, and helps patients maintain daily activities. This contemporary approach demonstrates how interdisciplinary medicine, advanced technology,

and evidence-based protocols can significantly enhance patients' lives. Precise diagnostics, early intervention, and a combination of physiologic and reductive methods provide the foundation for personalized therapy, while preventive surgical protocols and continuous education ensure sustainable results. Today, surgical treatment of lymphedema represents a safe and effective component of a comprehensive strategy, transforming lymphedema from a chronic disability into a surgically manageable condition and opening a new chapter in reconstructive medicine.

Keywords

lymphaticovenous anastomoses, lymph node transfer, liposuction

References

1. Masià J, Al Sakkaf AM, Hong JP, et al. Barcelona Consensus Paper on Reconstructive Lymphedema Surgery: A Delphi Study. *Plast Reconstr Surg.* 2026;157(1):193-203.
2. AWMF S2k Leitlinie „Diagnostik und Therapie der Lymphödeme“. AWMF Registernummer 058/001. https://www.lymphologic.de/wp-content/uploads/2019/01/058-001L_S2k_Diagnostik_und_Therapie_der_Lymphoedeme_2017-05.pdf
3. Yamamoto T, et al. Characteristic indocyanine green lymphography findings in lower extremity lymphedema. *Plast Reconstr Surg.* 2011;127(5):1979-1986.
4. van Mulken TJM, Schols RM, Scharmga AMJ, et al. First-in-human robotic supermicrosurgery using a dedicated microsurgical robot for treating breast cancer-related lymphedema: a randomized pilot trial. *Nat Commun.* 2020;11(1):757.
5. Lee M, Perry L, Granzow J. Suction-assisted protein lipectomy (SAPL) for the treatment of chronic fibrotic and scarified lower extremity lymphedema. *Lymphology.* 2016;49(1):36-41.
6. Boccardo F, Casabona F, De Cian F, et al. Lymphatic microsurgical preventive healing approach (LYMPHA) for primary surgical prevention of breast cancer-related lymphedema: over 4 years follow-up. *Microsurgery.* 2014;34(6):421-424.