

CADTH Health Technology Review

# Liposuction for Lipedema: 2022 Update

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## Abbreviations

- AGREE II** Appraisal of Guidelines for Research and Evaluation II
- GRADE** Grading of Recommendations Assessment, Development and Evaluation

## Key Messages

- A 2022 UK guideline recommends that the liposuction procedure for treatment of lipedema should only be used in the context of research because of inadequate efficacy and safety data.
- A 2021 US guideline recognizes that liposuction is currently the only available technique for removing abnormal lipedema tissue. The guideline has a series of consensus statements on patient selection, indications for liposuction, prevention of procedure-related adverse events, and pre- and post-surgical management.
- There were no recent studies on the clinical effectiveness of liposuction compared with no treatment or to alternative treatments for the treatment of lipedema.

## Context and Policy Issues

Lipedema is considered a chronic and progressive disease that is often unrecognized and misdiagnosed.<sup>1,2</sup> It mainly affects women, with a prevalence of approximately 10%.<sup>2</sup> The disease is characterized by abnormal fat deposition around the buttocks, the thigh, or the entire lower limb.<sup>2</sup> Because the pathophysiology of the disease remains unclear, lipedema is diagnosed mainly based on clinical examinations of the skin and subcutaneous tissue.<sup>2</sup> There are 3 clinical stages of lipedema based on morphological appearance.<sup>2,3</sup> In stage 1, the skin surface is normal but with enlarged subcutis, maybe multiple small nodules on palpation.<sup>3</sup> In stage 2, the skin surface is uneven with bigger nodules of the subcutaneous fatty tissue.<sup>3</sup> In stage 3, the skin surface has lobular deformation due to increased adipose tissue with large nodules, deformities, bulging protrusion of fat mainly on the hips, thighs, and around the knees.<sup>3</sup> The disease manifests at times of hormonal changes such as puberty, pregnancy, or menopause.<sup>2</sup> Common symptoms of lipedema include pressure-induced pain, a feeling of discomfort, and easy bruising, which are associated with depression and impaired quality of life if untreated.<sup>4,5</sup>

Current treatment strategies focus on reducing pain and edema, maintaining mobility, and improving quality of life through conservative and surgical treatment.<sup>6</sup> Standard conservative therapy includes lifestyle counselling, nutritional guidance, manual therapy, compression garments, pneumatic compression devices, and a home exercise program.<sup>6</sup> Although conservative treatment can alleviate the symptoms, it does not achieve long-lasting benefits and cannot prevent progression of the disease.<sup>7</sup> Surgical treatment, also known as lipedema reduction surgery or liposuction, is the only technique for removing abnormal lipedema tissues and slowing progression of the disease.<sup>7</sup> Tumescence liposuction, which uses a solution injected into the tissue to decrease pain and bleeding, has become a standard procedure in surgical treatment of lipedema.<sup>8</sup> Other surgical methods that may be used include water jet–assisted liposuction<sup>9</sup> and power-assisted liposuction.<sup>10</sup>

A recent CADTH report<sup>11</sup> that included 5 before-and-after studies found limited evidence that liposuction may be beneficial in patients with lipedema. A Dutch guideline included in the CADTH report<sup>11</sup> recommended tumescence liposuction be considered the treatment of choice for patients with a suitable health profile or inadequate response to conservative and supportive measures. However, the guideline did not provide the quality of the supporting evidence and the strength of recommendations.

This report aims to update the previous CADTH report<sup>11</sup> by summarizing any new evidence on the clinical effectiveness of liposuction compared with no treatment or to alternative treatments for the treatment of lipedema. Additionally, this report aims to summarize the new recommendations from evidence-based guidelines regarding the use of liposuction for the treatment of lipedema.

## Research Questions

1. What is the clinical effectiveness of liposuction compared to no treatment for the treatment of lipedema?
2. What is the clinical effectiveness of liposuction compared to alternative treatments for the treatment of lipedema?
3. What are the evidence-based guidelines regarding the use of liposuction for the treatment of lipedema?

## Methods

### Literature Search Methods

A limited literature search was conducted by an information specialist on key resources, including MEDLINE, Embase, the Cochrane Database of Systematic Reviews, the International HTA Database, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy comprised controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were lipedema and liposuction. No filters were applied to limit the retrieval by study type. If possible, retrieval was limited to the human population. The search was completed on June 27, 2022, and limited to English-language documents published since January 1, 2018.

### Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in [Table 1](#).

**Table 1: Selection Criteria**

Criteria	Description
Population	Individuals with lipedema (also called lipoedema) or lipolymphedema (individuals with lipedema and secondary lymphedema)
Intervention	Liposuction (any type)

Criteria	Description
Comparator	Q1: No treatment Q2: Alternative treatments (e.g., wrapping or compression, drainage, combined decongestive therapy [e.g., manual lymphatic drainage and wearing compression garments]) Q3: Not applicable
Outcomes	Q1 and Q2: Clinical effectiveness (e.g., reduced swelling, pain, bruising or discomfort; easier ambulation; improved quality of life) and safety Q3: Recommendations regarding best practices (e.g., appropriate populations or clinical settings, strategies to minimize adverse events)
Study designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, evidence-based guidelines

## Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in [Table 1](#), were included in the previous CADTH report,<sup>11</sup> or were published before 2018. Before-and-after studies were excluded but are listed in [Appendix 5](#).

## Critical Appraisal of Individual Studies

The included guidelines were critically appraised by 1 reviewer using the Appraisal of Guidelines for Research and Evaluation (AGREE) II instrument.<sup>12</sup> Summary scores were not calculated for the included studies; rather, the strengths and limitations of each included publication were described narratively.

## Summary of Evidence

### Quantity of Research Available

A total of 106 citations were identified in the literature search. Following screening of titles and abstracts, 91 citations were excluded and 15 potentially relevant reports from the electronic search were retrieved for full-text review. Two potentially relevant publications were retrieved from the grey literature search for full-text review. Of these potentially relevant articles, 15 publications were excluded for various reasons, and 2 publications met the inclusion criteria and were included in this report. These comprised 2 evidence-based guidelines. [Appendix 1](#) presents the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA)<sup>13</sup> flow chart of the study selection. Additional references of potential interest are provided in [Appendix 5](#).

### Summary of Study Characteristics

Additional details regarding the characteristics of included guidelines<sup>14,15</sup> are provided in [Appendix 2](#).



## Study Design

Both included guidelines were evidence-based, providing consensus statements on liposuction for chronic lipedema in the UK,<sup>14</sup> and standard of care including surgery (i.e., liposuction) for lipedema in the US.<sup>15</sup> The literature was reviewed by expert panels, and the recommendations were made by consensus. The recommendations in the UK guideline were developed according to *NICE Health Technology Evaluations: The Manual*.<sup>16</sup> In the US guideline,<sup>15</sup> the strength of recommendations was assessed and graded using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) instrument based on the balance between benefits, risks, burden, and cost; the degree of confidence in the estimates of benefits, risks, and burden; and the quality of the evidence.

## Country of Origin

The guidelines were conducted by authors from the UK<sup>14</sup> and the US.<sup>15</sup>

## Patient Population

In both guidelines, the target population was patients with lipedema, while the intended users were health care professionals responsible for treatment of lipedema.

## Interventions and Comparators

The UK guideline<sup>14</sup> provided recommendations on the use of liposuction for treatment of chronic lipedema. The US guideline<sup>15</sup> provided consensus statements on standard of care for lipedema, including medical, surgical (i.e., liposuction), vascular, and other therapeutic procedures.

## Outcomes

The UK guideline<sup>14</sup> considered all efficacy and safety outcomes of the liposuction procedure. Patient-reported outcomes, including quality of life and reduction in the volume of lipedema, were also considered. The US guideline<sup>15</sup> considered all outcomes related to benefits, risks, burden, and costs of the standard of care for lipedema.

## Summary of Critical Appraisal

Additional details regarding the strengths and limitations of included guidelines<sup>14,15</sup> are provided in [Appendix 3](#).

Both guidelines<sup>14,15</sup> are explicit in terms of scope and purpose (i.e., objectives, health questions, and populations), and have clear presentation (i.e., specific and unambiguous recommendations, and easy-to-find key recommendations). In terms of stakeholder involvement, both guidelines<sup>14,15</sup> clearly define the target users and the development groups. However, it is unclear if the views and preferences of the patients were sought in the US guideline.<sup>15</sup> Regarding rigour of development, both guidelines<sup>14,15</sup> do not report the systematic methods used to search for evidence or the criteria for selecting evidence. Both guidelines<sup>14,15</sup> provide explicit links between the recommendations and the supporting evidence, and the methods of formulating the recommendations. In formulating the recommendations, both guidelines<sup>14,15</sup> considered the health benefits, side effects, and risks, and were externally peer-reviewed before publication. One guideline<sup>15</sup> used GRADE methodology to assess and grade its recommendations, while the other<sup>14</sup> developed and graded its recommendation according to *NICE Health Technology Evaluations: The Manual*.<sup>16</sup> Regarding clarity, the recommendations in both guidelines are specific and unambiguous, and are easily identifiable. One guideline<sup>15</sup>

provides different options for management of lipedema, while the other guideline<sup>16</sup> focuses on liposuction. Regarding applicability, both guidelines<sup>14,15</sup> are not explicit in terms of facilitators and barriers to application, advice and/or tools on how the recommendations can be put into practice, and the monitoring or auditing criteria are not clear. However, resource implications (e.g., considering costs in recommendations) are considered in both guidelines.<sup>14,15</sup> For editorial independence, both guidelines<sup>14,15</sup> report competing interests of the guideline development group members, but do not report whether the views of the funding body had any influence on the content of the guidelines. Overall, both the included guidelines<sup>14,15</sup> are of moderate methodological quality.

## Summary of Findings

[Appendix 4](#) presents the summary of guideline recommendations.

### Guidelines

The UK guideline<sup>14</sup> recommends that liposuction should only be used to treat lipedema in the context of research due to inadequate efficacy and safety data. The recommendation was made based on 8 before-and-after studies with methodological limitations. The guideline recommends that the procedure, including patient selection, requires a research ethics committee's approval and should be conducted in specialized centres by a multidisciplinary team, including clinicians with expertise in managing lipedema.

The US guideline<sup>15</sup> provided 85 consensus statements on standard of care for lipedema, of which 23 consensus statements were on lipedema reduction surgery (liposuction). The guideline recognizes that liposuction is currently the only available technique for removing abnormal lipedema tissue. The consensus statements were made on the patient selection and indications for liposuction (e.g., candidates should be in good health, there is no limit on age, and patients should be first treated with conservative therapy), the procedure, the technique, the precautions for procedure-related adverse events, and the pre- and post-surgical management. Details of the recommendations are presented in [Table 4](#). The strength of recommendations was rated as strong or weak based on the balance between benefits, risks, burden, and cost, and the degree of confidence in the estimates of benefits, risks, and burden; and quality of evidence was ranked as high, moderate, or low.

### Limitations

The recommendations from both included guidelines<sup>14,15</sup> on the use of liposuction for the treatment of lipedema were mostly based on low-quality evidence, mainly from retrospective studies with methodological limitations.

## Conclusions and Implications for Decision- or Policy-Making

This report identified 2 guidelines.<sup>14,15</sup> There was no evidence regarding the clinical effectiveness of liposuction compared to no treatment or to alternative treatments for the treatment of lipedema.

The UK guideline<sup>14</sup> recommends that the liposuction procedure for treatment of lipedema should only be used in the context of research because of inadequate efficacy and safety data. The US guideline<sup>15</sup> recognizes that liposuction is currently the only technique for treatment of lipedema in people who have inadequate response to conservative therapy and provides a series of guidance pertaining to patient selection, indication for liposuction, the procedure, the technique, the safety concerns related to the procedure, and the pre- and post-surgical management. Both guidelines recommend the procedure should be performed at a specialized centre by a multidisciplinary team including surgeons experienced in the care of people with lipedema.

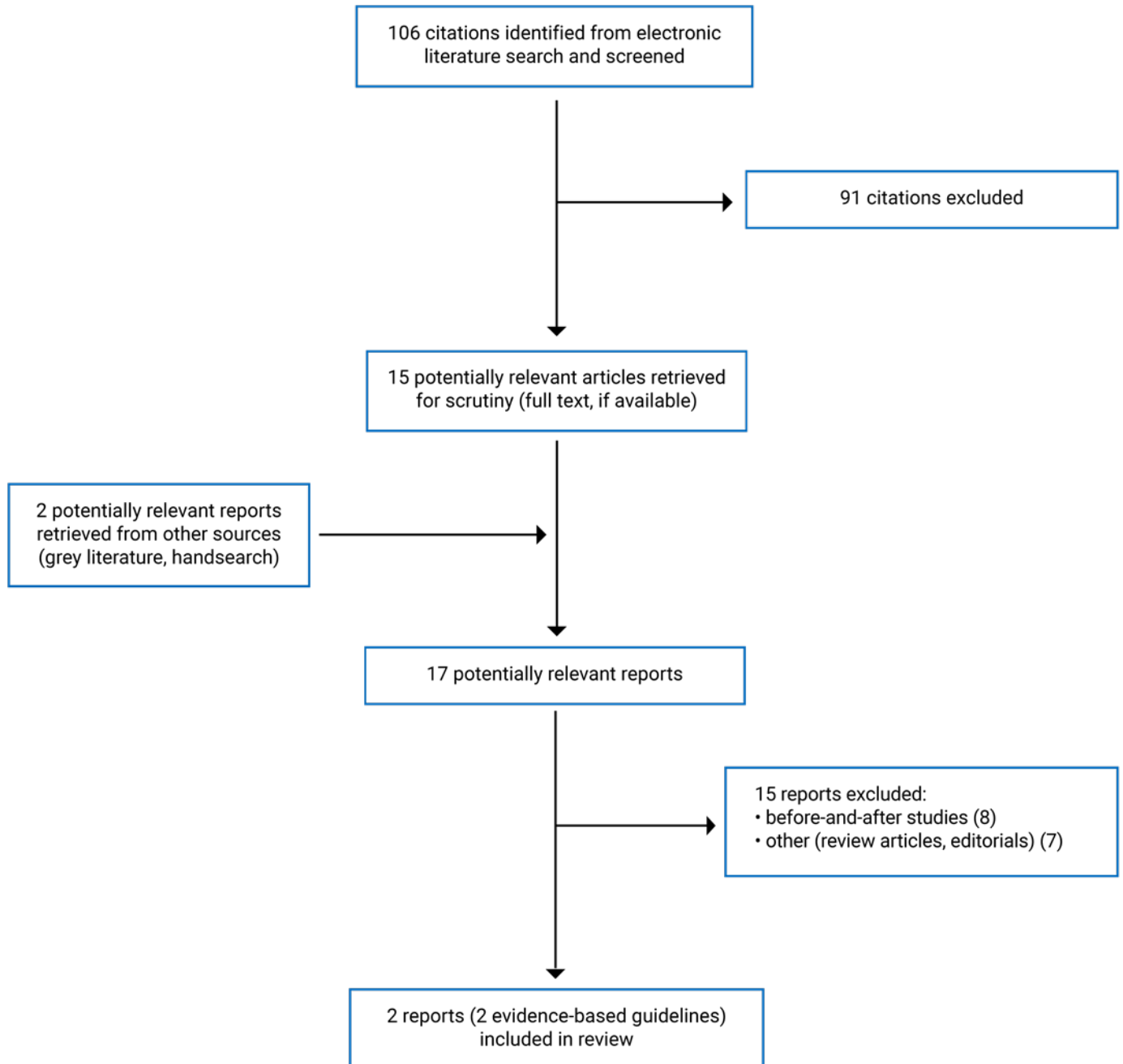
A recent CADTH report<sup>11</sup> on liposuction for the treatment of lipedema identified 5 uncontrolled before-and-after studies and 1 guideline. This current report also found 7 before-and-after studies, which were excluded and are presented in [Appendix 5](#). Given the inadequate clinical and safety data on liposuction, and the limitations of the identified guidelines, it is still unclear if this technique should be implemented as an option among the standard procedures for treating people with lipedema in Canada. Areas of further research should focus on patient selection, long-term outcomes, patient-reported outcomes including quality of life, pre- and post-surgical protocols, and how to optimize treatment to improve care for people with lipedema. Well-designed trials on the efficacy of liposuction compared with no treatment or to alternative treatments are also needed.

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## Appendix 1: Selection of Included Studies

Figure 1: Selection of Included Studies



## Appendix 2: Characteristics of Included Publications

Note that this appendix has not been copy-edited.

**Table 2: Characteristics of Included Guidelines**

Intended users, target population	Intervention and practice considered	Major outcomes considered	Evidence collection, selection, and synthesis	Evidence quality assessment	Recommendations development and evaluation	Guideline validation
<b>NICE (2022)<sup>14</sup></b>						
<b>Intended users:</b> <b>Health care professionals responsible for treatment of lipedema</b>  Target population: People with lipedema in the UK	Liposuction procedure	All efficacy and safety outcomes of liposuction procedure. Patient-reported outcomes including quality of life, and reduction in the volume of lipedema were also considered.	Evidence was reviewed from a comprehensive literature search. The key evidence was summarized in the interventional procedure overview. The committee discussed the evidence and other relevant literature.	Evidence quality was assessed by discussion and consensus of the professional experts and the committee.	The recommendations were developed according to <i>NICE Health Technology Evaluations: The Manual</i> . <sup>16</sup>	The guideline was reviewed by the committee and professional experts. The guideline was published at the NICE website.
<b>Herbst et al. (2021)<sup>15</sup></b>						
<b>Intended Users:</b> <b>Health care providers, patients, and families</b>  Target Population: People with lipedema in the US	Medical, surgical (liposuction), vascular, and other therapeutic procedures	All outcomes related to benefits, risks, burden, and costs of the standard of care for lipedema.	The expert panel met in 2019 to review the literature.	The strength of the consensus statements <sup>a</sup> were rated using the GRADE system based on the quality of evidence. <sup>b</sup>	The consensus statements were written by a US committee following the Delphi method.	The guideline was published in a peer-reviewed journal.

GRADE = Grading of Recommendations, Assessment, Development and Evaluations; NICE = National Institute for Health and Care Excellence.

<sup>a</sup>**Strength of recommendations** based on the balance between benefits, risks, burden and cost, and the degree of confidence in the estimates of benefits, risks, and burden, and quality of evidence: Grade 1: Strong; Grade 2: Weak.

<sup>b</sup>**Quality of evidence:** Grade A: High; Grade B: Moderate; Grade C: Low.

## Appendix 3: Critical Appraisal of Included Publications

Note that this appendix has not been copy-edited.

**Table 3: Strengths and Limitations of Guidelines Using AGREE II<sup>12</sup>**

Item	NICE (2022) <sup>14</sup>	Herbst et al. (2021) <sup>15</sup>
<b>Domain 1: Scope and purpose</b>		
1. The overall objective(s) of the guideline is (are) specifically described.	Yes	Yes
2. The health question(s) covered by the guideline is (are) specifically described.	Yes	Yes
3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.	Yes	Yes
<b>Domain 2: Stakeholder involvement</b>		
4. The guideline development group includes individuals from all relevant professional groups.	Yes	Yes
5. The views and preferences of the target population (patients, public, etc.) have been sought.	Yes	NR
6. The target users of the guideline are clearly defined.	Yes	Yes
<b>Domain 3: Rigour of development</b>		
7. Systematic methods were used to search for evidence.	NR	NR
8. The criteria for selecting the evidence are clearly described.	NR	NR
9. The strengths and limitations of the body of evidence are clearly described.	Yes	Yes
10. The methods for formulating the recommendations are clearly described.	Yes	Yes
11. The health benefits, side effects, and risks have been considered in formulating the recommendations.	Yes	Yes
12. There is an explicit link between the recommendations and the supporting evidence.	Yes	Yes
13. The guideline has been externally reviewed by experts prior to its publication.	Yes	Yes
14. A procedure for updating the guideline is provided.	NR	NR
<b>Domain 4: Clarity of presentation</b>		
15. The recommendations are specific and unambiguous.	Yes	Yes
16. The different options for management of the condition or health issue are clearly presented.	NA	Yes
17. Key recommendations are easily identifiable.	Yes	Yes
<b>Domain 5: Applicability</b>		
18. The guideline describes facilitators and barriers to its application.	NR	NR

Item	NICE (2022) <sup>14</sup>	Herbst et al. (2021) <sup>15</sup>
19. The guideline provides advice and/or tools on how the recommendations can be put into practice.	Unclear	Unclear
20. The potential resource implications of applying the recommendations have been considered.	Yes	Yes
21. The guideline presents monitoring and/or auditing criteria.	Unclear	Unclear
<b>Domain 6: Editorial independence</b>		
22. The views of the funding body have not influenced the content of the guideline.	NR	NR
23. Competing interests of guideline development group members have been recorded and addressed.	Yes	Yes

AGREE II = Appraisal of Guidelines for Research and Evaluation II; NICE = National Institute for Health and Care Excellence; NR = not reported; NA = not applicable.



## Appendix 4: Main Study Findings

Note that this appendix has not been copy-edited.

**Table 4: Summary of Recommendations in Included Guidelines**

Recommendations and supporting evidence	Quality of evidence and strength of recommendations
<b>NICE (2022)<sup>14</sup></b>	
<p>“Evidence on the safety of liposuction for chronic lipoedema is inadequate but raises concerns of major adverse events such as fluid imbalance, fat embolism, deep vein thrombosis, and toxicity from local anaesthetic agents. Evidence on the efficacy is also inadequate, based mainly on retrospective studies with methodological limitations. Therefore, this procedure should only be used in the context of research.”<sup>14</sup> (p. 1 to 2)</p> <p><b>The evidence supporting this recommendation included 8 before-and-after studies.</b></p>	<p>Quality of evidence: Retrospective studies with methodological limitations.</p> <p>Strength of recommendation: To be used in the context of research<sup>a</sup></p>
<p>“Patient selection should be done by a multidisciplinary team, including clinicians with expertise in managing lipoedema”<sup>14</sup> (p. 2)</p>	NR
<p>“The procedure should only be done in specialist centres by surgeons experienced in this procedure.”<sup>14</sup> (p. 2)</p>	NR
<b>Herbst et al. (2021)<sup>15</sup></b>	
<p>“Lipedema reduction surgery is currently the only available technique for removing abnormal lipedema tissue such as adipocytes, nodules, fibrotic extracellular matrix, and other non-adipocyte components. It is also the only treatment that slows progression of lipedema and ideally would be performed before complications and disabilities from lipedema develop.”<sup>15</sup> (p. 787)</p> <p><b>Supporting evidence for this recommendation was from 2 long-term follow-up studies.</b></p>	<p>Quality of evidence: Low</p> <p>Strength of recommendation: Strong</p>
<p>“Lipedema reduction surgery utilizes suction lipectomy (liposuction), excision and manual extraction that spares blood and lymphatic vessels.”<sup>15</sup> (p. 787)</p> <p><b>Supporting evidence for this recommendation was from the results of an International Consensus Conference.</b></p>	<p>Quality of evidence: Low</p> <p>Strength of recommendation: Weak</p>
<p>“Candidates for lipedema reduction surgery should generally be in good health.”<sup>15</sup> (p. 787)</p> <p><b>Supporting evidence for this recommendation was from the results of an International Consensus Conference.</b></p>	<p>Quality of evidence: Low</p> <p>Strength of recommendation: Strong</p>
<p>“There is no age limit for which people will benefit from lipedema reduction surgery.”<sup>15</sup> (p. 787)</p> <p><b>Supporting evidence for this recommendation was from the results of an International Consensus Conference.</b></p>	<p>Quality of evidence: Low</p> <p>Strength of recommendation: Strong</p>

Recommendations and supporting evidence	Quality of evidence and strength of recommendations
<p>“Indications for lipedema reduction surgery include a diagnosis of lipedema with demonstrated compliance and adherence to or failure of conservative therapies.”<sup>15</sup> (p. 787)</p> <p><b>Evidence supporting this recommendation included 3 guidelines, 1 CADTH report, and the results of an International Consensus Conference.</b></p>	<p>Quality of evidence: Low Strength of recommendation: Strong</p>
<p>“Lipedema reduction surgery does not fit traditional volume limits for liposuction.”<sup>15</sup> (p. 787)</p> <p><b>Evidence supporting this recommendation included a longitudinal study, 2 guidelines, 1 CADTH report, and the results of an International Consensus Conference.</b></p>	<p>Quality of evidence: Moderate Strength of recommendation: Weak</p>
<p>“Women with lipedema should be treated with conservative therapy prior to lipedema reduction therapy (4.0 Surgical treatment section). People may travel to receive surgery and rely on a therapy team in their hometown for pre- and post-operative care.</p> <p>In the weeks before surgery, a certified lymphedema therapist can perform a pre-surgical screening to guide “prehab” exercise, perform manual therapies and recommend compression garments for the patient.”<sup>15</sup> (p. 788)</p> <p><b>Evidence supporting this recommendation included 2 guidelines, 1 CADTH report, and the results of an International Consensus Conference.</b></p>	<p>Quality of evidence: Moderate Strength of recommendation: Weak</p>
<p>“If the patient has lipolymphedema, complete decongestive therapy performed prior to surgery should include an intensive volume reduction phase, ideally 3–4 treatments per week.”<sup>15</sup> (p. 788)</p> <p><b>Supporting evidence for this recommendation was from a narrative review.</b></p>	<p>Quality of evidence: Low Strength of recommendation: Strong</p>
<p>“Before surgery, two sets of off the shelf, made to measure or inelastic garments or a combination of micro-massage garment and short stretch bandages should be prescribed. Compression garments should be replaced 3 or 4 times during the first year.</p> <p>Garments must be worn regularly as non-compliance risks a rebound of edema.”<sup>15</sup> (p. 788)</p> <p><b>Supporting evidence for this recommendation was from a narrative review.</b></p>	<p>Quality of evidence: Low Strength of recommendation: Strong</p>
<p>“People with lipedema, especially higher stages, are at increased risk for venous thromboembolism and pulmonary embolus after surgery. We recommend venous thromboembolism risk stratification and treatment when indicated.”<sup>15</sup> (p. 788)</p> <p><b>Evidence supporting this recommendation was not reported.</b></p>	<p>Quality of evidence: High Strength of recommendation: Strong</p>
<p>“A Pre-surgical venous duplex ultrasound and/or treatment of chronic venous disease should be considered especially in patients with lipolymphedema prior to lipedema reduction surgery.”<sup>15</sup> (p. 788)</p>	<p>Quality of evidence: High Strength of recommendation: Weak</p>

Recommendations and supporting evidence	Quality of evidence and strength of recommendations
<p><b>Supporting evidence for this recommendation was from a retrospective study.</b></p>	
<p>“Lipedema reduction surgery can be safely accomplished in an outpatient setting.”<sup>15</sup> (p. 788)</p> <p><b>Supporting evidence for this recommendation was from the results of an International Consensus Conference.</b></p>	<p>Quality of evidence: Moderate Strength of recommendation: Weak</p>
<p>“Lipedema reduction surgery can be safely performed under local or general anesthesia.”<sup>15</sup> (p. 788)</p> <p><b>Supporting evidence for this recommendation was from the results of an International Consensus Conference.</b></p>	<p>Quality of evidence: Moderate Strength of recommendation: Strong</p>
<p>“Lipedema reduction surgery is not without risk and may cause long-term complications including lymphatic injury.”<sup>15</sup> (p. 788)</p> <p><b>Supporting evidence for this recommendation was from a retrospective study.</b></p>	<p>Quality of evidence: Low Strength of recommendation: Strong</p>
<p>“Lipedema reduction surgery should be performed by surgeons experienced in the care of people with lipedema, with expert knowledge of the anatomy and function of lymphatic collection systems, using meticulous care to avoid lymphatic injury.”<sup>15</sup> (p. 788)</p> <p><b>Supporting evidence for this recommendation was from a guideline and a narrative review.</b></p>	<p>Quality of evidence: Moderate Strength of recommendation: Strong</p>
<p>“Lipedema reduction surgery may be less effective in advanced stages of lipedema and in women with lipedema and severe obesity although recent data demonstrate a greater reduction of symptoms in more advanced cases. Surgery may involve multiple procedures, however, the optimal time between procedures is unknown.”<sup>15</sup> (p. 788)</p> <p><b>Evidence supporting this recommendation included a guideline, 3 long-term follow-up studies, 1 survey, and a before-and-after study.</b></p>	<p>Quality of evidence: Moderate Strength of recommendation: Weak</p>
<p>“Blunt cannulas no larger than 2–4mm should be used during lipedema reduction surgery.”<sup>15</sup> (p. 788)</p> <p><b>Supporting evidence for this recommendation was from a technical review.</b></p>	<p>Quality of evidence: Low Strength of recommendation: Strong</p>
<p>“Longitudinal technique should be used during lipedema reduction surgery to avoid damaging lymphatic vessels.”<sup>15</sup> (p. 788)</p> <p><b>Supporting evidence for this recommendation was from an observational study.</b></p>	<p>Quality of evidence: Low Strength of recommendation: Strong</p>
<p>“Anemia is a risk with large volume liposuction in people with lipedema.”<sup>15</sup> (p. 788)</p> <p><b>Supporting evidence for this recommendation was from a narrative review.</b></p>	<p>Quality of evidence: Low Strength of recommendation: Strong</p>

Recommendations and supporting evidence	Quality of evidence and strength of recommendations
<p>“Large tissue sacks may remain after successful surgery and weight loss, for which subsequent plastic surgery in the form of dermo-lipectomy may be required.”<sup>15</sup> (p. 788)</p> <p><b>Supporting evidence for this recommendation was from 1 guideline and 3 retrospective long-term studies.</b></p>	<p>Quality of evidence: Low Strength of recommendation: Strong</p>
<p>“People with early stage lipedema should wear a postoperative compression garment for at least 2–3 months to manage post-operative edema. People with advanced lipedema and/or lipolymphedema may need to continue compression garments for life.<sup>15,120</sup> If people find it difficult to don and doff compression garments, two garments with a lesser level of compression can be layered to achieve adequate compression.”<sup>15</sup> (p. 789)</p> <p><b>Evidence supporting this recommendation included a CADTH report, a narrative review, and a longitudinal study.</b></p>	<p>Quality of evidence: Low Strength of recommendation: Strong</p>
<p>“Post-surgical care should be performed by a certified lymphedema therapist 2–3 times a week as soon after surgery as possible until swelling subsides. Certified lymphedema therapists or a qualified fitter can monitor compression needs.”<sup>15</sup> (p. 789)</p> <p><b>Supporting evidence for this recommendation was from a longitudinal study and a case series.</b></p>	<p>Quality of evidence: Moderate Strength of recommendation: Weak</p>
<p>“Complete decongestive therapy is either no longer needed or the need reduced in people after recovery from lipedema reduction surgery.”<sup>15</sup> (p. 789)</p> <p><b>Supporting evidence for this recommendation was from a before-and-after study.</b></p>	<p>Quality of evidence: High Strength of recommendation: Weak</p>

NICE = National Institute for Health and Care Excellence; NR = not reported.

<sup>17</sup>Clinicians should only carry out these procedures in the context of formal research studies. A research ethics committee needs to have approved their use.<sup>17</sup>

## Appendix 5: References of Potential Interest

Note that this appendix has not been copy-edited.

### Previous CADTH Report

Liposuction for the Treatment of Lipedema: A Review of Clinical Effectiveness and Guidelines. Ottawa (ON): CADTH. 2019; <https://www.cadth.ca/liposuction-treatment-lipedema-review-clinical-effectiveness-and-guidelines>. Accessed July 11, 2022.

### Before-and-After Studies

Kruppa P, Georgiou I, Schmidt J, Infanger M, Ghods M. A 10-Year Retrospective before-and-after Study of Lipedema Surgery: Patient-Reported Lipedema-Associated Symptom Improvement after Multistage Liposuction. *Plast Reconstr Surg*. 2022;149(3):529e-541e. [PubMed](#)

Baumgartner A, Hueppe M, Meier-Vollrath I, Schmeller W. Improvements in patients with lipedema 4, 8 and 12 years after liposuction. *Phlebology*. 2021;36(2):152-159. [PubMed](#)

Schlosshauer T, Heiss C, von Hollen AK, Spennato S, Rieger UM. Liposuction treatment improves disease-specific quality of life in lipoedema patients. *Int Wound J*. 2021;18(6):923-931. [PubMed](#)

Ghods M, Georgiou I, Schmidt J, Kruppa P. Disease progression and comorbidities in lipedema patients: A 10-year retrospective analysis. *Dermatol Ther*. 2020;33(6):e14534. [PubMed](#)

van de Pas CB, Boonen RSM, Stevens S, Willemsen S, Valkema R, Neumann M. Does tumescent liposuction damage the lymph vessels in lipoedema patients? *Phlebology*. 2020;35(4):231-236. [PubMed](#)

Witte T, Dadras M, Heck FC, et al. Water-jet-assisted liposuction for the treatment of lipedema: Standardized treatment protocol and results of 63 patients. *J Plast Reconstr Aesthet Surg*. 2020;73(9):1637-1644. [PubMed](#)

Bauer AT, von Lukowicz D, Lossagk K, et al. New Insights on Lipedema: The Enigmatic Disease of the Peripheral Fat. *Plast Reconstr Surg*. 2019;144(6):1475-1484. [PubMed](#)