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What is This?
Liposuction for Submental Lymphedema Improves Appearance and Self-Perception in the Head and Neck Cancer Patient

Maria K. Brake, MD, FRCSC¹, Lauren Jain, MD¹, Robert D. Hart, MD, FRCSC¹, Jonathan R. B. Trites, MD, FRCSC¹, Matthew Rigby, MD, FRCSC¹, and S. Mark Taylor, MD, FRCSC¹

Lymphedema of the neck is an unfortunate complication for a reported 6% to 30% of patients undergoing surgical and/or radiation treatments in management of head and neck cancers.¹,² Lymphedema has been repeatedly shown to cause both physical and emotional effects, imposing further burden on these patients who have already had a significant reduction in their quality of life.³⁻⁵ As an option for management of lymphedema, liposuction was introduced in 1980s and since then has been used to manage upper limb lymphedema resulting from breast cancer treatment.⁶ At our center, we have investigated the success of using liposuction for submental lymphedema in head and neck cancer patients as a treatment option and have studied its effect on patients’ self-perception and self-confidence. At time of this writing, there has been no prior publication describing the use of liposuction for head and neck cancer–related lymphedema and its associated outcomes.

The technical details of the procedure have been described by Taylor and Brake.⁷ The procedure is performed under local anesthesia in a minor procedure room setting with the patient positioned supine. The suspected position of the marginal mandibular nerve is landmarked bilaterally, and the submental area is infiltrated with local anesthetic. A small skin incision is created within a submental skin crease. The liposuction cannula is introduced into this incision, and a fanning technique of lipectomy is performed in the preplatysmal plane. A facelift dressing is applied at the end of the procedure to be worn for 7 days postoperatively, and patients are given a week’s course of antibiotics.

Abstract

Objective. Patients who have undergone treatment for head and neck cancer are at risk for neck lymphedema, which can severely affect quality of life. Liposuction has been used successfully for cancer patients who suffer from posttreatment limb lymphedema. The purpose of our study was to review the outcomes of head and neck cancer patients at our center who have undergone submental liposuction for post-treatment lymphedema.

Study Design. Prospective cohort study.

Setting. Oncology center in tertiary hospital setting.

Subjects and Methods. Head and neck cancer patients who underwent submental liposuction for posttreatment lymphedema were included. Nine patients met the study criteria. Patients completed 2 surveys (Modified Blepharoplasty Outcome Evaluation and the validated Derriford Appearance Scale) pre- and postoperatively to assess satisfaction. Patients’ pre- and postoperative photos were graded by independent observers to assess outcomes objectively.

Results. Our study demonstrated a statistically significant improvement in patients’ self-perception of appearance and statistically significant objective scoring of appearance following submental liposuction.

Conclusion. Submental liposuction improves the appearance and quality of life for head and neck cancer patients suffering from posttreatment lymphedema by way of improving their self-perception and self-confidence.

Keywords

liposuction, submental, lymphedema, head and neck, self-perception, Derriford appearance, blepharoplasty outcome evaluation

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Materials and Methods

All head and neck cancer patients at our center who suffered from lymphedema secondary to head and neck cancer treatment and who had been disease-free for a minimum of 1 year were eligible to undergo submental liposuction therapy. Patients who met these criteria and who underwent submental liposuction after September 1, 2007, were eligible for inclusion in the study. Patients were not eligible to participate if they had undergone any concurrent facial cosmetic procedures. Preoperative and postoperative photographs of 3 of the study participants are shown in Figure 1.

Participants were asked to complete 2 surveys, the Derriford Appearance Scale (DAS59)⁸ and the Modified Blepharoplasty Outcome Evaluation (MBOE)⁹ prior to the liposuction procedure and then again 6 months or more following the procedure. The DAS59 is a validated scale designed to objectively measure “the spectrum of psychological distress and dysfunction that is characteristic of disfigurements, deformities and aesthetic problems of appearance.”⁸ It was introduced by Harris and Can⁸ in 2001 and consists of 59 questions subdivided into 5 categories: general self-consciousness of appearance; social self-consciousness of appearance; sexual and bodily self-consciousness of appearance; negative self-concept; and facial self-consciousness of appearance (see appendix at www.otojournal.org). It is intended and validated for persons over 16 years of age. The scale for each question ranged from 1 to 5; a change of 2 points between surveys was considered significant.

The Blepharoplasty Outcome Evaluation is a validated scale introduced by Alsarraf⁹ in 2000. It was introduced as 1 of 4 facial plastic outcome measurement scales for the following procedures: rhinoplasty, blepharoplasty, facelift, and skin rejuvenation. Each survey consisted of 6 similar questions, each modified slightly as applicable for the various facial unit; validation results were published by Alsarraf et al¹⁰ in 2001. Their results showed that a 6-question survey can be used to monitor patients’ self-perception of appearance. Alsarraf was contacted and agreed to modification of the survey for the submental region. The modified survey used in our study can be found in Table 1. Again, each question had a graded 5-point response, and a change of 2 points or more was considered significant.

As an objective measurement, 2 head and neck oncologists at our institution were asked to grade each of the 9 patients’ appearance based on their preliposuction and postliposuction photos (for a total of 18 photo sets). The scorers were asked to use a grading scale from 1 to 5, ranging from (1) normal contours and no lymphedema to (5) complete loss of neck contours and severely disfiguring lymphedema. The photos were unlabeled to avoid identification of whether they were taken pre- or postprocedure and were randomized using randomizer.org, accessed on May 16, 2013.

The preliposuction and postliposuction survey responses were compared using the Wilcoxon signed rank test for each question individually as well as the survey results overall. This test was also used to assess changes in the pre- and postprocedural scores for the independent objective scoring. Interrater reliability between the independent objective scorers was measured using Cronbach’s alpha for absolute agreement using a 2-way mixed model. Ethics approval was obtained from the institutional research ethics board.

Results

Ten patients were eligible for the study and all 10 consented to participate. One of the participants developed a new head and neck cancer prior to undergoing liposuction treatment and was therefore excluded from the study. Of the remaining 9 participants, 6 were male and 3 were female. Their mean age was 60 ± 9 years. The time between completion of cancer treatment and liposuction therapy was 30 ± 12 months. Primary sites included the larynx (n = 3), oropharynx (n = 3), nasopharynx (n = 1), oral cavity (n = 1), and unknown primary (n = 1). The majority of patients were staged with T2 lesions (n = 6), with 1 each of T1, T3, and T4. Five patients had nodal disease. None of the patients...
had distant metastatic disease. All patients in our group had undergone radiation therapy as a part of their cancer management; only 5 of the patients underwent neck dissections.

Comparing the survey responses overall showed a statistically significant difference \( (P = .0078) \) of self-perceived improvement in appearance and reduction of distress following liposuction. Each individual question was also analyzed for paired differences. Four of the 5 MBOE questions had a statistically significant improvement to \( P < .01 \). The General Self-Consciousness of Appearance subsection of the DAS95 showed a statistically significant improvement to \( P < .05 \). Three questions from the Social Self-Consciousness of Appearance and the Negative Self-Concept subsections of the DAS95 were also statistically significantly improved to \( P < .05 \); however, there was no statistically significant difference of either subgroup overall. There were no statistically significant responses within the Sexual and Bodily Self-Consciousness of Appearance or the Facial Self-Consciousness of Appearance subsections. Detailed results, including mean differences and 95% confidence intervals for the MBOE responses, are outlined in Table 1. Example of before and after photos can be seen in Figure 1. No patients had any other procedures performed between the capture of these photographs other than 1 session of submental liposuction.

The objective scoring from the 2 independent reviewers also supported findings of significant improvement to appearance post liposuction. For each rater, the postprocedural photos were scored significantly lower than the preprocedural photos \( (P = .016) \). The interrater reliability was good \((0.89)\). As well, each rater independently rated 7 cases as improved and 2 as no change. There were no scores from either reviewer that ranked the postoperative pictures worse than the preoperative ones.

### Discussion

Lymphedema of the neck is an unfortunate complication for a reported 6% to 30% of patients undergoing surgical and/or radiation treatments in management of their head and neck cancers.\(^1\)\(^2\) It results from the body’s insufficiencies to drain lymph fluid from the tissues secondary to lymph vessel damage and scar contracture, which causes an imbalance in capillary filtration and lymph drainage.\(^11\)

Subsequently, the altered flow leads to the collection of fluid and protein in the extravascular and interstitial spaces.\(^2\) Surgical management of head and neck cancer often violates the normal flow of lymphatics, while radiation management can lead to inflammation and scarring of lymphatics, both leading to an increased risk of local lymphedema of these patients.

Lymphedema has been shown repeatedly to cause both physical and emotional effects. Lymphedema of the neck can become severe enough to limit range of motion and function of the jaw, neck, and shoulders as well as effect voice quality and swallowing or cause otalgia and nasal congestion.\(^1\)\(^2\) In addition, it can lead to a negative self-perception and emotional distress.\(^3\)\(^5\) Unlike peripheral sites, lymphedema of the neck, and more specifically of the submental region, cannot be prevented or managed with compression therapy. Patients suffering from neck lymphedema rely on manual lymph drainage as the mainstay of treatment, which has limited improvement in many cases.\(^2\)

Liposuction was introduced as a management option for lymphedema in 1980s by Nava and Lawrence.\(^6\) They reported a case of a 79-year-old woman with longstanding, stable, and incapacitating lymphedema of her arm secondary to a mastectomy 20 years earlier. The authors described their experimenta- tion with using liposuction for lymphedema debulking, followed by excess skin removal and a postoperative compression bandage for 6 weeks; the function of the patient’s arm was greatly improved both subjectively and objectively.

There are many theories regarding the biomechanics of liposuction and lymphedema. Some investigators believe that lipids that leak from the original lymph channels are dissolved into the local tissue, leading to increased amounts of local adipose tissue as well as subcutaneous tissue hypertrophy and fibrosis.\(^12\) Liposuction is believed to remove these thickened pathological tissues, possibly slowing the recurrence of lymphedema as well as increasing cutaneous circulation.\(^12\)-\(^16\) In fact, Bronson and Svensson\(^17\) showed that patients undergoing liposuction for lymphedema had fewer incidents of cellulitis postoperatively than their control counterparts. Lymphoscintigraphy studies have also

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### Table 1. Liposuction Survey Response Means.

<table>
<thead>
<tr>
<th>Modified Blepharoplasty Outcome Evaluation</th>
<th>Mean Before Liposuction</th>
<th>Mean After Liposuction</th>
<th>Mean Difference</th>
<th>( P ) Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How well do you like the appearance of your chin?</td>
<td>1.4</td>
<td>4.6</td>
<td>3.1</td>
<td>.0039</td>
</tr>
<tr>
<td>2. How much do you feel your friends and loved ones like the appearance of your chin?</td>
<td>1.9</td>
<td>4.3</td>
<td>2.4</td>
<td>.0078</td>
</tr>
<tr>
<td>3. Do you feel the current appearance of your chin limits your social and professional activities?</td>
<td>2.8</td>
<td>4.6</td>
<td>1.8</td>
<td>—</td>
</tr>
<tr>
<td>4. How confident are you that the appearance of your chin is the best that it can be?</td>
<td>1.2</td>
<td>4.6</td>
<td>3.3</td>
<td>.0039</td>
</tr>
<tr>
<td>5. Would you like to surgically alter the appearance of your chin?</td>
<td>3.8</td>
<td>1.0</td>
<td>–2.8</td>
<td>.0078</td>
</tr>
</tbody>
</table>

*Individual response differences were analyzed using the Wilcoxon signed rank test: Significant \( P \) values \((.05 \) significance) are shown. Dash indicates nonsignificance.
shown that liposuction does not significantly affect the already altered lymphatics flow.\textsuperscript{16,17} Since it was introduced as an option, liposuction has been successfully in the management of upper limb lymphedema resulting from breast cancer treatment. Several studies have been completed to illustrate its benefits. Brorson and Svensson\textsuperscript{17} showed that 28 women who underwent liposuction for breast cancer treatment–related lymphedema had an average volume reduction of 106% after 1 year, with results reportedly persisting more than 7 years,\textsuperscript{18} and other studies have shown similar persistence of 4 to 10 years.\textsuperscript{9,12,15,19-22} As well, these patients have been shown to have a significant improvement in quality of life.\textsuperscript{21}

Submental liposuction in itself is not a new procedure. It has been used in cosmetic surgery for improvement of neck contour for many years. Patient selection in these cases is much more precise and limited by patient age, skin tone, hyoid position, and the volume of the fat deposit. As well, submental liposuction is often performed in conjunction with other procedures to achieve desired results.\textsuperscript{22,23} In the case of our patients, selection was not limited by the typical cosmetic criteria, and all were included who were medically fit, free of cancerous disease, and interested in the procedure. As well, no other cosmetic procedures were performed on any of our patients to achieve the results. Preoperatively, most of our patients had excessive tissue bulk, indurations, and poorly defined normal landmarks. Our goal was to improve the submental region such that patients could feel both functionally and cosmetically improved, rather than to achieve the ideal anatomic contours as is often the benchmark in cosmetic surgery.

As is true with all surgical procedures, submental liposuction is not without risk; however, liposuction has been shown to have fewer complications and is less invasive than traditional excisional techniques for lymphedema.\textsuperscript{12,19} The theoretical complications include marginal mandibular nerve injury, hematoma, infection (including necrotizing fasciitis), scarring, skin redundancy, and platysmal banding.\textsuperscript{23} Marginal mandibular nerve injury is usually transient and the rate of injury quoted is 1% to 2%, a rate comparable to that of a facelift procedure.\textsuperscript{24} We did not have any complications in our study as a result of the liposuction procedure and feel that if the procedure is done correctly, the risk to the patient is very low.

As reported in other studies that have been mentioned for other lymphedema subsites, our submental liposuction procedures have successfully improved the quality of life of patients who previously suffered from lymphedema secondary to head and neck cancer treatment. Although we have not formally, objectively studied visible improvements, the photographs in this article suggest the cosmetic benefits and perceived improved neck mobility of the patients who pursue submental liposuction for their lymphedema. It has been suggested that it is truly difficult to prove whether our patients would improve with time and without intervention. When we started doing this procedure and studying the outcomes, we felt that it would be unfair to restrict any of our patients, who are suffering physically and mentally from submental lymphedema, from having access to this new procedure. Nonetheless, going forward, we have started studying patient scores at the time of enrollment, again at the time of surgery (for which waiting time can range from 6 months to 2 years), and again 6 months following the procedure. We expect those results to clarify the benefit of the procedure on patients’ quality of life to show that improvements over time with expectant management are not equivocal to liposuction intervention.

Although we cannot comment on long-term results, this study shows much promise for improving the quality of life of head and neck cancer patients who have lymphedema. All 9 patients showed statistically significant improvement in self-perception and self-confidence using the MBOE and the validated DAS59. Independent objective ratings also supported statistically significant improvement. These patients reported their own subjective opinions on improvement and were very motivated to participate in the study in hopes that their own outcomes would allow for the improvement of the lives of other head and neck cancer survivors. We hope to follow our currently enrolled patients to determine their long-term outcomes and benefits.

Conclusion

We conclude that submental liposuction can significantly improve the appearance and quality of life of patients with cervical lymphedema resulting from head and neck cancer therapy by way of improving their self-perception and self-confidence. We feel this procedure should be considered for head and neck cancer patients who are suffering, either emotionally or physically, as a result of neck lymphedema.

Acknowledgments

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Author Contributions

Maria K. Brake, design, acquisition, analysis and interpretation of data, drafting and final approval; Lauren Jain, acquisition of data, editing article and final approval; Robert D. Hart, design, editing paper and final approval; Jonathan R. B. Trites, design, editing paper and final approval; Matthew Rigby, design, analysis of data, editing paper and final approval; S. Mark Taylor, concept and design, editing paper and final approval.

Disclosures

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Supplemental Material

Additional supporting information may be found at www.otojournal.org/supplemental

References


