Long-term Outcome After Surgical Treatment of Lipedema

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Long-term Outcome After Surgical Treatment of Lipedema

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Abstract: Lipedema is a condition characterized by abnormal deposition of adipose tissue in the lower extremities leading to circumferential bilateral lower extremity enlargement typically seen extending from the hips to the ankles. Diagnosis of the condition is often challenging, and patients frequently undergo a variety of unsuccessful therapies before receiving the proper diagnosis and appropriate management. Patients may experience pain and aching in the lower extremity in addition to distress from the cosmetic appearance of their legs and the resistance of the fatty changes to diet and exercise. We report a case of a patient with lipedema who was treated with suction-assisted lipectomy and use of compression garments, with successful treatment of the lipodystrophy and maintenance of improved aesthetic results at 4-year postoperative follow-up.

Key Words: lipedema, suction-assisted lipectomy

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Lower extremity swelling is a common problem that can be caused by a variety of conditions, the majority of which are related to systemic causes, such as congestive heart failure or cirrhosis. However, localized edema can also occur secondary to lymphatic disruption or dysfunction, as in the case of lymphedema, or from fatty deposition, as is seen in lipedema. Lipedema is a condition characterized by abnormal deposition of adipose tissue in the lower extremities leading to circumferential bilateral lower extremity enlargement typically seen extending from the hips to the ankles. Diagnosis of the condition is often challenging and patients frequently undergo a variety of unsuccessful therapies before receiving the proper diagnosis and appropriate management. Patients may experience pain and aching in the lower extremity in addition to distress resulting from the cosmetic appearance of their legs and the resistance of the fatty changes to diet and exercise.

We report a case of a patient with lipedema who was treated with suction-assisted lipectomy and use of compression garments, with successful treatment of the lipodystrophy and maintenance of improved aesthetic results at 4-year postoperative follow-up.

CASE PRESENTATION

A 21-year-old woman presented with chronic bilateral lower extremity swelling and associated discomfort. Her symptoms developed spontaneously more than 10 years prior to presentation and gradually progressed over time. The swelling was initially attributed to lymphedema and treatment with bandaging, and the use of compression garments was recommended. However, given the persistent swelling and physical and psychological distress experienced by the patient, she sought further evaluation. A lymphoscintigram was performed (Fig. 1), which demonstrated normal lymphatic function, thus excluding the diagnosis of lymphedema.

On physical examination, the patient was a thin, well-appearing young woman (weight, 68 kg; height, 173 cm; body mass index, 22.7). She had significant bilateral enlargement of her lower extremities, extending from her inguinal region to her ankles (Fig. 2). The soft-tissue swelling ceased abruptly at her ankle, leading to a ring-like deformity of the area. There was no evidence of fibrosis or peau d'orange changes of the skin and the swelling was soft and nonpitting.

Given her symptoms and the evident fatty deposition characteristic of lipedema, plans were made for the patient to undergo modified suction-assisted lipectomy of her lower extremities.

In the operating room, the patient's legs were prepared and draped in sterile manner and tourniquets were applied bilaterally to minimize intraoperative blood loss.[1] Each limb was initially elevated and exsanguinated with an Esmarch bandage, after which tourniquet pressure was applied at 220 mm Hg. Low molecular weight heparin was given perioperatively for deep venous thrombosis prophylaxis. Multiple (approximately 15) 3-mm incisions were made throughout the lower extremities. Suction-assisted lipectomy was performed using both MicroAire (1641 Edlich Drive, Charlottesville, VA) 3- to 4-mm cannulas and individualized 3- to 4-mm cannulas (Fig. 3) that have been used extensively and successfully in lymphedema patients treated by one of the authors (H.B.). The tissue retrieved was soft and supple, and there was no evidence of fluid accumulation or the fibrosis that is frequently seen in patients with lymphedema. Liposuction was focused on the lower leg from the ankle to knee, where the most severe enlargement was seen. Aspirate (1400 mL) was removed from each limb, which was entirely comprised of fatty oil and large clusters of fat lobules (Fig. 4). Significant contour improvement of the limbs was seen immediately. After the tourniquets were released and skin circulation was deemed satisfactory, the wounds were closed individually with Vicryl sutures. Compression garments extending from the ankles to below the knee were applied bilaterally.

The patient's postoperative course was uneventful. Her compression garments were worn continuously and changed every 24 hours. She required the use of crutches for the first 5 days after the procedure due to discomfort. Compression garments were worn continuously for 6 months postoperatively and then discontinued aside from occasional use for patient comfort during physical exercise.

Leg volumes were calculated pre- and postoperatively (Fig. 5) using the formula of the truncated cone.[2] This formula accounts for the volume of the segment, the circumferences at the ends of the segment, and the segment height; the segments are then all added together to give the total volume. Results from the formula are used in an Excel-based volume program made by one of the authors (H.B.) to calculate overall leg volumes. Good correlation between circumference measurements and water plethysmography has been previously been shown.[3]

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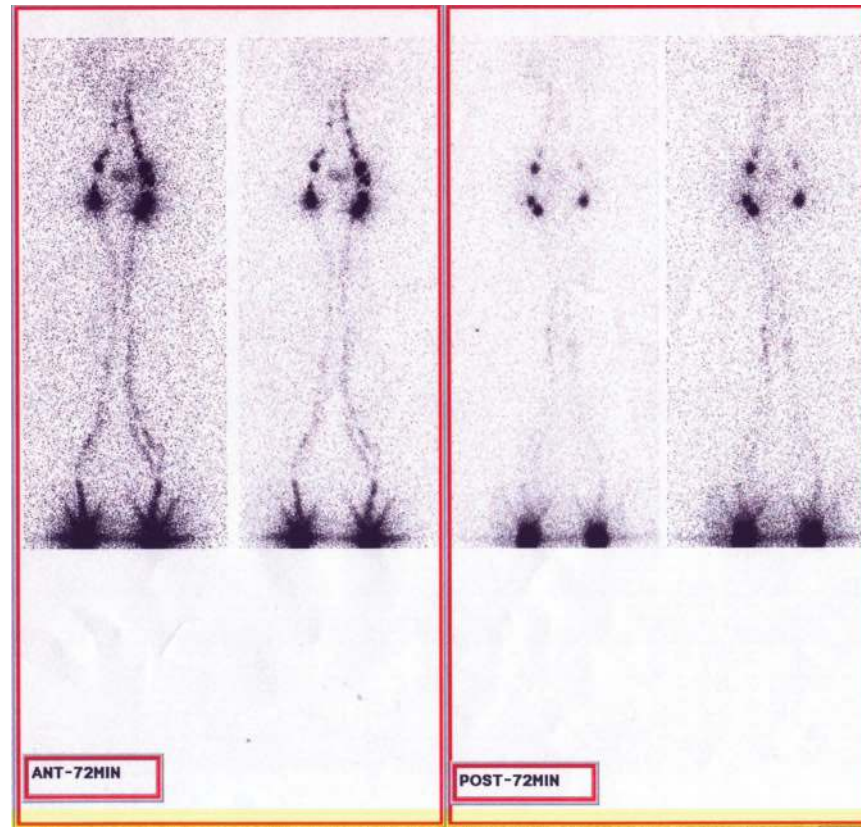

FIGURE 1. Preoperative lower extremity lymphoscintigram demonstrating normal lymphatic flow.

FIGURE 2. Preoperative images of the patient's lower extremities.

Results at 1 year demonstrated improvement in the contour of the patient's lower extremities (Fig. 6). A repeat lymphoscintigram performed 2 years postoperatively showed no change in the function of the lymphatic system (Fig. 7). Computed tomography (CT) scan performed at 2 years postoperatively showed marked reduction of the subcutaneous adipose tissue in the distal

FIGURE 3. Customized liposuction cannulas used for suction-assisted lipectomy in patients with lymphedema or lipedema.

part of the lower extremities as compared with preoperative images (Fig. 8). At 4-year follow-up, weight gain of 9 kg had occurred, explaining the increased leg volumes depicted in Figure 5. However, she is still pleased with the improved contour of the legs, which has been maintained despite the weight gain (Fig. 9).

DISCUSSION

Lipedema was first described by Allen and Hines in 1940.[4] They reported a syndrome seen in a series of 119 patients[5] involving "fat legs," pain, and easy bruising of the lower extrem-

FIGURE 4. Lipoaspirate suctioned from the patient's lower extremities.

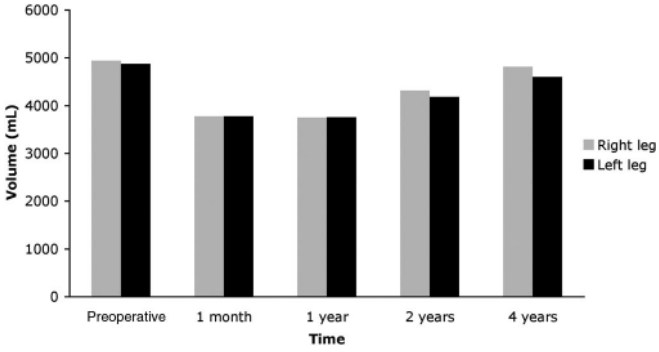

FIGURE 5. Pre- and postoperative leg volume measurements showed a decrease of 1164 mL in the right leg and 1098 mL in the left leg after 1 month. After 1, 2, and 4 years the decrease (right leg/left leg) was 1191 mL/1123 mL, 622 mL/696 mL, and 125 mL/275 mL, respectively.

ities, and the strong predisposition of the condition to affect women almost exclusively. Physical examination of these patients' lower extremities demonstrated bilateral, soft, non-pitting edema ending abruptly at the ankles. Although lipedema is often misdiagnosed as lymphedema, this finding of sparing of the feet in lipedema, leading to a negative Stemmer's sign (Fig. 10), is a key initial clue to differentiate the 2 conditions. A positive Stemmer's sign means that the skin at the base of the second and third toes cannot be pinched into a thin web due to the increased fibrosis induced by lymphedema.[6] Additionally, patients with lipedema will have normal lymphatic function on lymphoscintigraphy, a study that is often performed in patients suspected of having lymphedema. CT scans also demonstrate very different findings in the 2 conditions, with studies in patients with lipedema typically revealing localized adipose hypertrophy of the lower extremities as compared with the dermal thickening and subcutaneous edema and fibrosis seen in patients with lymphedema.[7]

Given the diffuse adipose hypertrophy seen in lipedema, suction-assisted lipectomy is a well-suited surgical option in the management of these patients. Prior reports describing the use of liposuction to treat lipedema[8,9] have demonstrated some success with variable operative follow-up. In this study, we sought to determine whether long-term results could be maintained without

FIGURE 6. Postoperative images of the patient's lower extremities 1 year after suction-assisted lipectomy.

the need for further surgical intervention, a goal that has been achieved in this patient.

Additional considerations to ensure long-term results in patients with lipedema include the role of adjunct compression garment use. Prior studies have shown that fat deposition can lead to microlymphatic disturbances,[10] culminating in the development of lipolymphedema after the long-term presence of lipedema, demonstrating that lymphatic pathology must be addressed as well. Another issue is that lipolymphedema often develops in patients with lipedema who are morbidly obese and have associated difficulties with ambulation, which limits activation of the muscle pump in the lower extremities and subsequently leads to pitting edema. Conversely, disturbance of the lymph flow can cause deposition of adipose tissue in the extremities,[11,12] further illustrating the complex relationship between the 2 systems. One of the authors has had great success with the use of suction-assisted lipectomy and continuous compression garments in patients with upper extremity lymphedema after breast cancer treatment[13,14] and in patients with primary or secondary leg lymphedema.[15,16] His technique[17] involves a modified form of liposuction with many incisions and primarily vertically-based aspiration to minimize any further lymphatic damage suspected to occur with transverse aspiration. The same principles shaping the management of these patients, namely that liposuction will address fat deposition and compression therapy will minimize edematous accumulation, has been successfully applied to the patient presented in this report, with the maintenance of results even after the cessation of compression garment use.

Although there is a theoretical concern that persistent redundant skin could be an issue in patients receiving suction-assisted lipectomy alone for the treatment of lipedema, particularly in older patients, we have found in prior studies that patients up to 80 years of age have been successfully treated with modified suction-assisted lipectomy for lymphedema without the need for skin excision.[18] Optimizing patient selection for this

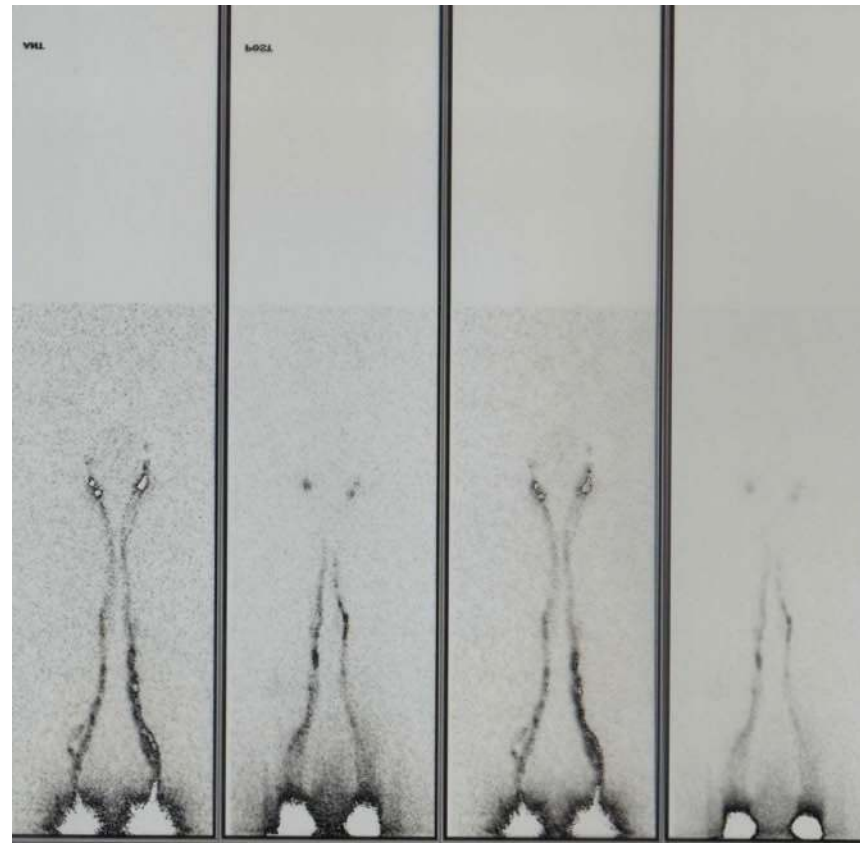

FIGURE 7. Postoperative lower extremity lymphoscintigram showing no change in lymphatic function.

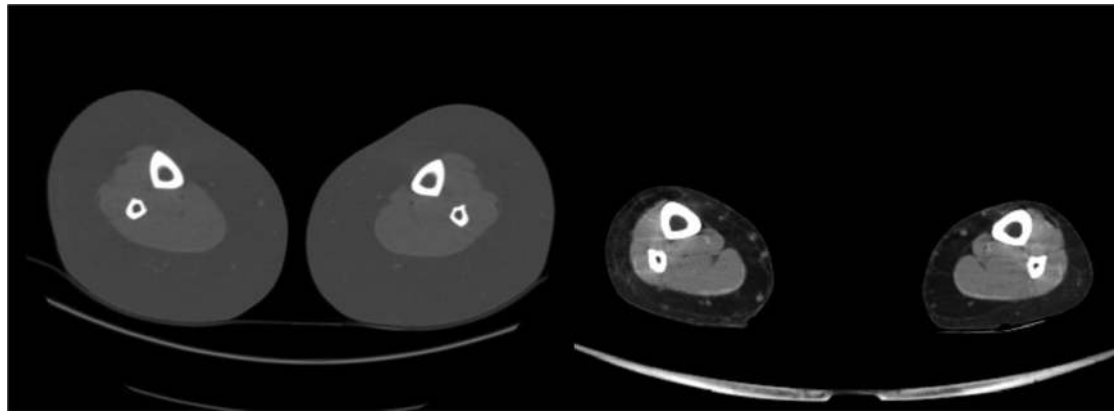

FIGURE 8. CT-scans pre- and postoperatively at 2 years.

procedure also eliminates the potential for persistent redundant skin: ideal candidates present with body mass index within the normal range, thus eliminating the possible limit of liposuction that could be seen in the treatment of obese patients (as well as increased perioperative complications).

We suspect that the improved contour after suction-assisted lipectomy presented here several years postoperatively will persist in the future. Follow-up at 4 years demonstrates that the patient's weight gain has been associated with increased leg volumes, but the improved contour of the legs has been maintained. Additionally, unlike patients with extremity lymphedema who require indefinite continuous compression garment use postoperatively, the pathologic differences between the 2 conditions suggest that removal of the adipose deposition seen in patients with lipedema should decrease the mechanical stress on lymphatic vessels sufficiently to allow for cessation of compression garment use beyond the initial postoperative period.

SUMMARY

Lipedema is a clinical condition characterized by bilateral lower extremity adipose hypertrophy that is typically resistant to conservative management. It can be treated with circumferential suction-assisted lipectomy and limited postoperative compression garment use, with successful maintenance of aesthetic results at long-term postoperative follow-up.

FIGURE 9. Frontal (A) and dorsal (B) pre- and postoperative images at 1, 2, and 4 years (from left to right).

FIGURE 10. A negative Stemmer sign as seen in patients with lipedema.

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